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CLAY Closing the Loop Along with the Youth

IO1 – Task 3

CLAY National Reports

Summary

Content

Introduction

This document summarizes the findings of the national reports developed by the project partners.

It will serve as base material for developing training materials in IO3 (regarding general information on CE and political frameworks for CE internationally and nationally) as well as for developing promotional material for the CLAY project for dissemination activities.

The structure of this document is equal to the separate national reports and compares the national results to an international benchmark.

The best practice examples are also included since they will be used in the training/promotion materials as well to illustrate the concept and implementation of CE in the respective partner countries.

Data, statistics, and reports

National statistics, data and reports have been focused on specific elements of circular economy (e.g. amount of waste and recycling, percentage of renewable energies, etc.) but until recently, hardly any data was compiled on the "circularity" of countries.

"In 2017, **Circle Economy** recognized the urgent need to accurately measure the circular economy. So far, there was no global baseline measurement on the circular state of our world or data available to truly understand how we can effectively move towards circularity or monitor progress. That is why, in January 2018, the first Circularity Gap Report was published during the World Annual Forum in Davos."[1]

International/Global Benchmark

The **Circularity Gap Initiative**[2] reports for 2019, that the world is only 9% circular and the trend since the first report in 2018 is negative. Especially the sectors building and construction (consumes nearly 50% of all global materials and produces around 20% of total emissions) and extraction, processing and production of goods (62% of greenhouse gasses emitted) contribute to the non-circularity of the world today.[3] An online program shows the massive differences between countries regarding circular economy.

Countries are divided into three categories:[4]

- **"Build" countries** have a low material footprint and therefore, the impact of their economic activities often falls within the regenerative capacity of the planet. However, they are typically countries that have problems to meet the basic needs of their population (e.g. Haiti, Liberia, Senegal, Bangladesh, DR Congo, Afghanistan). Their economic activities are largely based on natural rather than human capital, which means that the focus is on extraction and sale of raw materials, while investment in education and skills is insufficient. On the upside, "Build" countries are still building-up their basic infrastructure for public services, hospitals and transport, and therefore have the opportunity to apply circular strategies such as modular, passive and flexible design. In construction they can also prioritize the use of regenerative resources in buildings and avoid, by design, the operational inefficiencies which characterize infrastructure in Shift countries.
  Their decentralized nature of the informal economy also provides a platform on which to develop distributed professional services that allow welfare to grow, while providing decent health and safety conditions.

- Most "**Grow" countries** have already experienced a degree of economic growth and industrialization, broadly expected to continue due to a combination of rising standards of

[1] https://www.circularity-gap.world/about
[2] https://www.circularity-gap.world/
[3] https://www.legacy.circularity-gap.world/2019
[4] https://www.circularity-gap.world/2020

living and population increase (e.g. Brazil, **Turkey**, Belize, Malaysia, Bosnia and Herzegovina, South Africa). As a result, resource use in these countries is characterized by fast economic growth and associated material consumption, rapid stock build-up and an expanding industrial sector (also responding to demand from Shift countries).
In part, therefore, sustainable growth is about more efficient use of natural capital — investing earnings from the likes of minerals into infrastructure and education, thereby developing human capital. Such investment results in growth of total wealth. Designing new infrastructure, buildings and consumer goods in a circular manner, simultaneously considering both enhanced durability for lifetime optimization and end-of-life scenarios, are key strategies for these countries to become more circular.
Alongside this, professionalizing and improving the labor conditions in the informal parts of waste management in these countries also bears potential to reduce the environmental impact of both industrial and consumer waste.

- **"Shift" countries** maintain the highest proportion of services as part of their GDP. Yet, their material consumption is 10 times greater than that of the Build countries. They also produce high volumes of waste, although what they process in-country themselves is usually managed relatively efficiently (e.g. **Czech Republic**, **Austria**, **Italy**, most other European countries, Japan, USA). With consumption levels exceeding several planetary boundaries, however, the true impact of Shift countries extends far beyond their national borders, with much of the environmental and social costs incurred elsewhere.
  Ultimately, Shift countries need to stop passing the buck and take responsibility for these impacts, regardless of where they occur. To that end, they can start incentivizing the dematerialization of consumption by aligning their tax regimes with sustainability ambitions.
  One other characteristic of Shift countries is their distinctive demographic: the population tends to be relatively small and ageing; although, when it comes to sustainability matters, most notably and recently climate, it is the younger generation that have adopted a clear position, taken to the streets and made a stand on the global stage. Their activism is an increasingly influential factor in social change.

Conclusion: Specific indicators and data on circular economy have not been collected on a large scale in the past. Circle Economy with its “Circularity Gap Reporting Initiative” is the first officially recognized metric for evaluating circular economy. It is also referenced by the European Commission and others. Since CE affects several of the SDG goals, their respective metrics are not apt to measure the implementation of and progress towards CE, especially towards involvement and participation of the youth.

For the CLAY project, Circle Economy and the Circularity Reporting Initiative will be referenced to illustrate the concept of circular economy. The differentiation of partner countries (Turkey being a “Grow”, the others being “Shift” countries) will also be reflected in the training materials.

National Reports

Eurostat is among the main sources for CE-relevant national data in the European Union.[5] The following table shows the **municipal waste** generated annually in **kilogram per capita** across the partner countries and compared to the EU average:

	YEAR									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	Development since 2010
European Union - 28 countries	**504**	**498**	**486**	**479**	**478**	**481**	**488**	**488**	**489**	
change to previous year		-1,19%	-2,41%	-1,44%	-0,21%	0,63%	1,46%	0,00%	0,20%	**-2,98%**
Czech Republic	**318**	**320**	**308**	**307**	**310**	**316**	**339**	**344**	**351**	
change to previous year		0,63%	-3,75%	-0,32%	0,98%	1,94%	7,28%	1,47%	2,03%	**10,38%**
Italy	**547**	**529**	**504**	**491**	**488**	**486**	**497**	**488**	**499**	
change to previous year		-3,29%	-4,73%	-2,58%	-0,61%	-0,41%	2,26%	-1,81%	2,25%	**-8,78%**
Austria	**562**	**573**	**579**	**578**	**565**	**560**	**564**	**570**	**579**	
change to previous year		1,96%	1,05%	-0,17%	-2,25%	-0,88%	0,71%	1,06%	1,58%	**3,02%**
Turkey	**407**	**416**	**410**	**406**	**405**	**400**	**426**	**425**	**424**	
change to previous year		2,21%	-1,44%	-0,98%	-0,25%	-1,23%	6,50%	-0,23%	-0,24%	**4,18%**

It shows that from the partner countries, Austria produces the most municipal waste per capita. While Italy managed to reduce the amount of generated waste by more than 8% over time, in all other countries the amount of waste increased – despite warnings on climate change and environmental degradation.

When comparing this to the **percentage of recycled municipal waste**:

	YEAR								
	2010	2011	2012	2013	2014	2015	2016	2017	2018
European Union - 28 countries	38,30	39,30	41,10	41,70	43,40	44,70	46,00	46,50	47,00
Czech Republic	15,80	17,00	23,20	24,20	25,40	29,70	33,60	34,10	34,50
Italy	31,00	35,50	38,40	39,40	41,60	44,30	45,90	47,80	49,80
Austria	59,40	56,70	57,70	57,70	56,30	56,90	57,60	57,70	57,70
Turkey							9,20	9,20	11,50

It shows that Austria has the highest amount of waste recycled, while the rates in all other countries are increasing.

The overall **circularity of the partner countries** is calculated by Eurostat as follows:

	YEAR							
	2010	2011	2012	2013	2014	2015	2016,00	2017
European Union - 28 countries	11,10	10,70	11,50	11,60	11,50	11,70	11,90	11,70
Czech Republic	5,30	5,40	6,30	6,70	6,90	6,90	7,60	8,10
Italy	11,60	12,10	14,50	16,20	16,80	16,60	17,50	17,70
Austria	6,60	6,70	7,70	9,00	10,00	10,90	11,30	11,60
Turkey								

Comparisons like this will be used for the training materials to pose questions like: Is it better to have a high amount of municipal waste and high rates of recycling, or less municipal waste but also a lower percentage of recycling?

Statistics and data will only be used at a minimum, for illustrative purposes.

The Eurostat statistics also are in alignment with the differentiation of the partner countries between “Grow” and “Shift”.

[5] https://ec.europa.eu/eurostat/web/circular-economy

The following table compares the recycling rates for the partner countries in relation to different types of waste (based on Eurostat, in % of waste recycled with year of most recently available data and indication of the trend over the past years):

	Municipal waste	Overall packaging	Plastic packaging	Wooden packaging	E-Waste	Biowaste (kg per capita)
Austria	57,7% 2018 stable	65,6% 2017 decreasing	33,4% 2017 stable	19,9% 2017 rising	50,1% 2017 rising	187 2018 rising
Italy	49,8% 2018 rising	67,1% 2017 stable	41,8% 2017 stable	60,1% 2017 stable	32,1% 2017 rising	105 2018 rising
Czech Republic	34.5% 2018 stable	73,7% 2017 stable	58,9% 2017 stable	51,2% 2017 decreasing	46,5% 2017 rising	26 2018 rising
Turkey	11,5% 2018 rising	-	-	-	14,75%* 2019/2015 -	2 2018 rising

*Data from Global E-Waste Monitor 2020: generated e-waste 2019, e-waste documented to be collected 2015

The data also shows the difference between “Grow” and “Shift” countries.

Regarding **CLAY’s core topics** – e-waste, plastics and packaging, food – the table also illustrates:

- Recycling rates for **e-waste** are rather high in Austria and the Czech Republic, while Italy recycles roughly a third of the generated e-waste and Turkey even less.
- **Plastics**’ **and packaging**’s recycling rates are highest in Czech Republic, followed by Italy and Austria (no data reliable data available for Turkey). However, especially regarding plastics, there is huge potential for additional recycling. Also, if not properly recycled, plastics has major detrimental effects on the environment.
- For the topic **food**, the collected biowaste is positive on the one hand, on the other hand, high per capita kg also indicates massive waste of produced and edible food.

Austria

The European Environmental Bureau in Austria also states, that of 211 Megatons (211.000.000.000 kg) of processed material, only 9% is recycled material.[6]

Circle Economy also conducted a specific study on Austria’s circularity and published a report[7], which found Austria to be 9,7% circular (compared to 24,5% for the Dutch economy), specifically (percentage of circularity)

- 7% in Minerals (resource use 107 MT)
- 12% in Biomass (resource use 50 MT)
- 2% in Fossil Fuels (use 25 MT)
- 24% Ores (used 10 MT)

[6] https://www.eu-umweltbuero.at/assets/Uploads/EUropainfo-2-18-web.pdf

[7] https://publish.circle-economy.com/circularity-gap-report-austria

Based on the "production-based circularity metric" applied by the Circular Reporting Initiative, Austria's circularity is calculated at 9,1%.

Apart from these nation-wide statistics, the association REPANET (association for repair, re-use, refurbishment organizations in Austria) also conducted a market study specifically dealing with repair, reuse, recycling etc. businesses.[8]

Austria's main statistics organization, Statistik Austria, also offers a variety of environment-related data.[9]

Conclusion: Youth's role in circular economy is not reflected in currently available national data and statistics in Austria. However, the Fridays-for-Future movement also was widely popular in Austria, which shows the interest of CLAY's target group in sustainability and climate change. Therefore, the interest for circular economy is also expected to be high within the target group.

Czech Republic

As visible in the table above, Czech Republic has an especially high rate of recycling packaging. Part of the reason for this is **EKO-KOM**, the main Czech packaging recovery organization. EKO-KOM also produces yearly reports on waste management on a national level[10].

Also, the Czech Statistical Office offers details on water supply systems, sewerage and watercourses, material flow accounts, generation, recovery and disposal of waste, environmental protection expenditure and other data.[11]

Conclusion: Also in the Czech Republic, youth's role in circular economy is not reflected in currently available national data and statistics.

Italy

Also reflected in the data shown in the table above, Italy is highly motivated in increasing it's recycling and circular capacities.

For example, a project organized by **Consorzio Rilegno** aims at raising awareness among younger generations of learners from 8 to 10 year-olds about recycling of wood packaging, to develop sustainability and eco-skills, through discovering wood, the natural material par excellence. The project engages companies, institutions and single citizens in the recycling and reutilization of wood packaging, reaching a total of 68% of recycled wood, far ahead as the purposes set by the EU of 30%.[12]

[8] https://drive.google.com/file/d/15aTT6vRmt1e3s5Q5vgeo89PWieH17PhU/view

[9] http://www.statistik.at/web_de/statistiken/energie_umwelt_innovation_mobilitaet/energie_und_umwelt/umwelt/index.html

[10] https://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/vysledky-systemu/vyrocni-shrnuti

[11] https://www.czso.cz/csu/czso/environment_zem; https://www.czso.cz/csu/czso/environment

[12] http://www.vita.it/it/article/2020/01/29/cosi-a-scuola-la-ciclicita-della-natura-spiega-leconomia-circolare/153912/

Already in 2016 (CDCNPA), Italy had developed a top-class system in the regeneration of waste oils and batteries, with great attention of recycling practices of bio-waste, with a total of 58% of bio-waste used to produce compost.[13]

In the **National Report of Circular Economy (Confindustria 2019)**[14], Italy also presents its notable interest for closing the circularity gap, scoring 103 points, followed by UK (90) and Austria (88), resulting at the summit of European average. Italy is particularly engaged in activities to optimize the reutilization of resources, innovation of productivity categories, consumption and management of resources. In another report from 2019 by the European Commission, the implementation of circular economy by SMEs was analyzed. Italy places itself mildly above the European average (101), at the 13th position preceded by Finland and followed by Bulgaria, Austria and France. According to this indicator, the country showing most attention on circular economy in SMEs is Poland.[15]

Other reports also show Italy's progress towards a circular economy, placing the country above the European average in

- productivity of resources (3,5 euros of GDP produced / kg of waste in comparison with the average of 2,2 euros)
- percentage of recycling over the total disposal of waste (79% over 38%)
- employment of raw materials deriving from dumping (17% over 11,7%).[16]

Statistics also show (Greenitaly 2017), that over 1.6 million employees are expected to develop or possess ecological skills, of all educational instances and cultural framework, reflecting a growing interest towards green jobs within the youth. As the Italian Government stated indeed, this instance aims at reducing their carbon footprint, the impact over the planet and empower the companies with sustainable practices. Great attention is given to green jobs, engineers, architects, mechanics, technicians, installers and biological farmers are particularly required.[17]

An even more recent national report (Rapporto Nazionale sull'Economia Circolare in Italia, Circular Economy Network (CEN) 2019-2020) analyzes the circularity index of the country, aiming at a more efficient employment of resources in 5 macro categories: production, consumption, waste management, market for secondary raw materials, investment and

[13] https://www.ecosurvey.it/wp-content/uploads/2017/08/verso-un-nuovo-modello-di-economia-circolare_HR.pdf

[14] http://economiacircolare.confindustria.it/rapporto-2019-sulleconomia-circolare-italia-prima-in-europa-per-economia-circolare/

[15] https://circulareconomynetwork.it/wp-content/uploads/2019/02/Rapporto-sulleconomia-circolare-in-Italia-2019.pdf (page 50)

[16] Una risposta alla crisi, una sfida per il futuro: https://bit.ly/2NDZRkC

[17] https://www.repubblica.it/dossier/ambiente/green/2020/05/18/news/lavori_green_oltre_1_6_milioni_di_posti_di_lavoro_circolari_nell_italia_pre-covid-257003661/; https://magazine.eon-energia.com/in-evidenza/green-jobs-popolari/#:~:text=I%20lavori%20verdi%20si%20possono,a%20favore%20della%20sostenibilit%C3%A0%20ambientale

employment. In 2019 the circularity index was around 17,7%, which in scores between 2019 and 2020 remained stable with 100 points, followed by Germany (89) and France (88).[18]

Conclusion: Italy is the most engaged country in transporting the circular vision to a broad audience. Also for young people, there are projects and initiatives.

Turkey

Eurostat doesn't offer the same amount of data on Turkey as on EU countries, but states that Turkey is the largest destination for waste exported from the EU, with a volume of around 11.4 MT (11.400.000.000 kg) in 2019. This also shows a fact about "Shift" countries mentioned by Circle Economy: That Shift countries often export their (non-recycled) waste to other countries.

The Turkish Statistical Institute **TurkStat** reports for 2018, the waste *disposal* facilities capacity was 56.372.768 tons. The capacity of waste *recovery* facilities was 48.079.834 tones. Since Turkey has these capacities in 2018, it became the EU's largest waste exported country in 2019.[19]

The **OECD Report** "Circular Economy – Waste and Materials" in 2020 found Turkey in the last place within the 29 OECD Countries, regarding the total waste in intensities per capita.[20] The **OECD** found in "Environmental Performance Reviews: Turkey 2019" Turkey as the fastest growing OECD economy with rapidly increasing greenhouse gas emissions. Since 2008, its economic growth has been relatively decoupled from air emissions, energy use, waste generation and water consumption. However, the high resource intensity of Turkey's economy and its heavy reliance on fossil fuels will continue to increase these environmental pressures in absolute terms. More progress is needed in the transition to a low-carbon, circular economy to improve the country's environmental performance.[21]

The need for circular economy is also recognized in Turkey: In 2018, an **UNDP** Workshop in was held in Istanbul on *Environment-Friendly Production*, *Responsible Consumption* and *Effective Recycling*. The report emphasizes that the plastic waste quantity in the seas tops the list of most important problems that call for global solutions, and plastic waste causes 13 billion dollars in damage to marine ecosystems. It also notes that 144 tons of plastic waste go to sea daily in Turkey – that equals 52.560 tons (52.560.000 kg) each year. Tourism being a major part of Turkey's economy, a plastic-free sea is also relevant for economic reasons.[22]

Conclusion: Being a "Grow" country, Turkey is beginning to integrate circular economy into economic growth. Youth's role in circular economy is not reflected in currently available national data and statistics.

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[18] https://www.rinnovabili.it/economia-circolare/economia-circolare-in-italia- https://www.eticanews.it/in-breve/rapporto-cen-italia-ancora-prima-per-indice-di-circolarita/

[19] www.turkstat.gov.tr

[20] https://www.oecd.org/environment/environment-at-a-glance/Circular-Economy-Waste-Materials-Archive-March-2020.pdf

[21] https://www.oecd-ilibrary.org/environment/oecd-environmental-performance-reviews-turkey-2019_9789264309753-en

[22] https://www.tr.undp.org/

Political programs, strategies, and initiatives

Today, circular economy is the focal point for political programs, strategies, and initiatives around the world, also in all participating CLAY countries.

International/Global Benchmark

On a global level, the **United Nations' Sustainable Development Goals** (SDGs) state, that circular economy "holds particular promise for achieving multiple SDGs, including SDGs 7 on energy, 8 on economic growth, 11 on sustainable cities, 12 on sustainable consumption and production, 13 on climate change, 14 on oceans, and 15 on life on land"[23].

Another UN organization, The **Partnership for Action on Green Economy (PAGE)**, was launched in 2013 as a response to the call at Rio+20 to support those countries wishing to embark on greener and more inclusive growth trajectories. PAGE seeks to put sustainability at the heart of economic policies and practices to advance the 2030 Agenda for Sustainable Development and supports nations and regions in reframing economic policies and practices around sustainability to foster economic growth, create income and jobs, reduce poverty and inequality, and strengthen the ecological foundations of their economies. PAGE brings together five UN agencies – UN Environment, International Labour Organization, UN Development Programme, UN Industrial Development Organization, and UN Institute for Training and Research – whose mandates, expertises and networks combined can offer integrated and holistic support to countries on inclusive green economy, ensuring coherence and avoiding duplication.[24]

The **European Union** has released an **Action Plan** for circular economy, "for a cleaner and more competitive Europe". For example, until 2035, the recycling of household and business waste shall reach 65%.[25]

Conclusion: International/Global political programs, strategies and initiatives address CE on an equally international/global level. Therefore, youth is not specifically addressed and the programs rather refer to different economic sectors and production/consumption areas. CLAY will focus on "translating" the topics of global and international (as well as national) programs and strategies for practical use by CLAY's target group.

The websites of the different organizations offer opportunities for reaching out to additional stakeholders and dissemination partners for CLAY.

[23] https://sustainabledevelopment.un.org/sdgs; https://www.un.org/en/ga/second/73/jm_conceptnote.pdf

[24] https://www.un-page.org/

[25] https://ec.europa.eu/commission/priorities/jobs-growth-and-investment/towards-circular-economy_de#documents
https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

National Reports

For all CLAY project partner countries, the **United Nations' SDGs** are equally relevant. The **EU Action Plan** is specifically relevant for the EU countries, but also Turkey can apply similar procedures to close its respective circular gap.

Austria

In Austria, circular economy is included above all in the **governmental program** for the years 2020-2024.

- In "Location and industrial policy": "Stronger alignment of national measures with the EU Commission's "Green Deal" (lighthouse projects ecologisation, circular economy, IPCEI programmes")
- In "Climate Protection and Energy": "Cross-sectoral Climate and Circular Economy Strategy for Industry"
- In "Environment and Nature Conservation": "Promoting circular economy among other things by legal framework conditions for the promotion of reusable containers and a package of measures. For repair business: tax incentives for repair services and the sale of repaired products and an action plan against food waste."
- In "Work": "Circular economy development package: promoting socio-economic enterprises with recycling management (ecological and social)".[26]

Additional legislation includes detailed regulations on different aspects of circular economy, e.g. the **waste management law** 2002 (Abfallwirtschaftsgesetz 2002) on disposal sites, packaging, old electronic devices, batteries, recycling construction materials, old cars and motorized vehicles, wood and burning waste.[27]

Conclusion: Although circular economy is included in the government's program 2020-2024, no specific national actions are planned or being implemented for addressing the youth on circular economy topics. However, thanks to rich legislation on various topics, there are existing networks of waste consultants (e.g. VABÖ) or others (see below for stakeholders), that can be used for CLAY's project results' dissemination.

Czech Republic

The **Eco-innovation action plan**[28] (ECO-INNOVATION at the heart of European policies) measured performance according to the 2017 eco-innovation scoreboard, and ranks Czech Republic on 18th place out of 28 EU Member States with an overall score of 97, which is 3% below the overall EU average. On the other hand, Czech Republic performs well in eco-innovation activities (6th place of EU28) and in socio-economic outcomes (7th place of EU28).

[26] pp. 141-143 of government program are specifically on circular economy: https://www.ara.at/fileadmin/user_upload/Downloads/rechtliche_Grundlagen/Auszug_Regierungsprogramm_2020.pdf

[27] https://www.wko.at/service/umwelt-energie/kreislaufwirtschaft.html

[28] https://ec.europa.eu/environment/ecoap/czech-republic_en

In 2018, as a preparation of the Strategic framework of circular economy of the Czech Republic – **Circular Czechia 2040** started. In cooperation with the OECD, the framework will be aimed at the whole economic cycle, not only waste. The program will be approved in 2020.[29] The **Strategic Framework Czech Republic 2030** was established as part of the project "System of Long-term Priorities for Sustainable Development in the State Administration"[30].

National legislation in the Czech Republic is also detailed for different parts of circular economy. A **waste management plan** including waste management law (expected to be approved by parliament in July 2020) includes detailed regulations on disposal sites, packaging, old electronic devices, batteries, recycling construction materials, old cars and motorized vehicles, wood and burning waste. A **packaging management law** (also expected to be approved by parliament in July 2020) includes detailed regulation on packaging management and packaging waste management, duties of producers, importers, distributors, sellers, and contracting process with EKO-KOM.[31]

Another example for circular economy in Czech Republic is **CIRCULAR PRAGUE**[32], a visual roadmap that identifies the strategies that are best positioned to kick-start the Czech capital's transition towards a circular economy.

Conclusion: Although included in the government's Strategic Framework Czech Republic 2030, no specific national actions are planned or being implemented for addressing the youth on circular economy topics.

Italy

Italy also has **national legislation** governing different aspects of circular economy, e.g. the **"End of Waste" law** (Art. 184 Dlgs 152/2006), which regulates the treatment of waste. It has to be managed, processed and recycled with respect towards the environment, guaranteeing a regulatory coverage for the development of waste management hierarchy and the promotion of circular economy across the country. A revision and integration of the law 14/06/2019, n. 55, converted the law "Sblocca cantieri" regulating the conditions of waste and regulates the disposal of products which can no longer be considered subproducts or give new functionalities to other products.[33]

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[29] https://www.mzp.cz/cz/news_191011_OECD_pomuze_Ceske_republice_pripravou_strategie_obehoveho_hospodarstvi

[30] https://www.vlada.cz/assets/ppov/udrzitelny-rozvoj/projekt-OPZ/Strategic_Framework_CZ2030.pdf

[31] https://www.mzp.cz/cz/poh_cr_prislusne_dokumenty; https://www.nku.cz/assets/o-nas/konference-seminare/2019/kvalita-ovzdusi/cirkularni-ekonomika-v-eu-a-cr_marsak.pdf; https://www.mzp.cz/cz/news_20191207_cesko_ceka_velka_odpadkova_revoluce_vlada_dnes_schvalila_novou_odpadovou_legislativu; https://www.mzp.cz/cz/obaly; https://www.ekokom.cz/cz/klienti/povinnosti-ze-zakona

[32] https://www.circle-economy.com/insights/circular-prague

[33] Arpae Emilia Romagna, 2019; https://www.arpae.it/cms3/documenti/_cerca_doc/ecoscienza/ecoscienza2019_5/Ecoscienza2019_5.pdf; (page 19)

Green Deal per l'Italia is an Italian initiative based on Pacchetto Europeo sull'Economia Circolare, 2020 (European Package for Circular Econoomy). The minister of the environment set a series of objectives to be achieved, e.g. 50% of recycled waste up to 2025, 60% 2030, 65% up to 2035; bio-waste should be recycled to create compost.[34]

The **Legambiente Decalogue** (2019) is a document containing 10 objectives to be achieved by the Italian Government in terms of circular economy. It contains the following weak points to be reinforced:[35]

1. End of waste: simplification of the recycling process to avoid congestion of dumps.
2. More structures and less waste.
3. Increment the activity of the consortia.
4. Tariffs to produce less waste.
5. New eco-tax over disposed waste of resources.
6. Greener contracts.
7. New laws to be approved for the protection of water resources from the diffusion of plastic.
8. Less single-use plastic to be implemented in markets.
9. More auditing to compel with unfair concurrency.
10. Promote process / product innovation.

Another initiative, **Start to be Circular** (2017) is a project aiming at meeting young start uppers to promote entrepreneurship of younger generations and switch to a circular economy and to foster innovation and sustainability.[36]

Conclusion: There already are initiatives in Italy that promote the idea of circular economy to young people. CLAY will complement and extend these initiatives and offers an additional element – the circular behaviour index – that will prove useful to the other initiatives as well.

Turkey

Turkey has also developed a **National Waste Management Action Plan**[37] for the years 2016-2023. Up to date as part of Turkey's compliance with EU environmental legislation, it has been prepared to provide many plans. These plans include:

1. **Environmental High Cost Investments Planning (EHCIP)**
   Turkey's waste management has analyzed the current situation and the Packaging and Packaging Waste Directive and the Landfill Directive to harmonize with EU legislation 'by creating waste management scenarios for the harmonization, necessary cost evaluation and possible financial resource needs have been identified. Investment calendar in the implementation of the Directives and suggestions were made for the transition process.

[34] https://www.italiacircolare.it/it-it/litalia-pronta-a-recepire-il-pacchetto-europeo-per-leconomia-circolare.aspx
[35] https://www.arpae.it/cms3/documenti/_cerca_doc/ecoscienza/ecoscienza2019_5/Ecoscienza2019_5.pdf (page 20)
[36] http://www.vita.it/it/article/2017/09/19/economia-circolare-e-giovani-startupper-alla-prova/144528/
[37] https://webdosya.csb.gov.tr/db/cygm/haberler/ulusal_at-k_yonet-m--eylem_plan--20180328154824.pdf

2. **National Environment Integrated Adaptation Strategy Document**
   This report contains technical and institutional infrastructure needed and necessary to carry out environmental improvements and adjustments to adapt to Turkey's EU environmental acquis.
3. **Solid Waste Master Plan**
4. **Waste Management Action Plan**
5. **National Recycling Strategy Document and Action Plan**

Also, in **Turkey's 11th Development Plan** (2019) on page 170-188 ,there are specific articles related to circular economy, waste management and recycling management and sustainable development goals.[38]

Conclusion: Although included in the government's legislations and regulations between 2016 - 2023, no specific national actions are planned or being implemented for addressing the youth on circular economy topics.

[38] http://www.sbb.gov.tr/wp-content/uploads/2019/07/On-Birinci-Kalkinma-Plani.pdf

Stakeholder Research

The following table shows a compilation of the research on stakeholders conducted by all CLAY partners. The bold/italics in column "Short description" indicate the relevance of the stakeholders for CLAY.

Stakeholder	Country	Short description	Link
Circle Economy	INT	NPO; mission is to accelerate the practical and scalable implementation of the circular economy ***Potential role for CLAY: input/material on CE topics***	https://www.circle-economy.com/
Ellen MacArthur Foundation	INT	The Ellen MacArthur Foundation works in Education & Training, Business & Government, Insight & Analysis, Systemic Initiatives and Communications to accelerate the transition to a circular economy. ***Potential role for CLAY: input/material on CE topics***	https://www.ellenmacarthurfoundation.org/
Circular Economy Club	INT	The Circular Economy Club (CEC) is the largest international network of circular economy professionals with 260 CEC local chapters in 110 countries. CEC's activity is global, non-profit and free to join. CEC's mission is to bring the circular economy to every corner of the world. ***Potential role for CLAY: input/material on CE topics***	https://www.circulareconomyclub.com/
European Data portal	INT	Open Data and the Circular Economy ***Potential role for CLAY: input/material on CE topics***	https://www.europeandataportal.eu/en/highlights/open-data-and-circular-economy
World Bank Group	INT	World Bank on Circular Economy ***Potential role for CLAY: input/material on CE topics***	https://olc.worldbank.org/content/circular-economy
Embassy of Denmark	INT	Youth roles in circular economy ***Potential role for CLAY: input/material on CE topics***	https://ec.europa.eu/environment/international_issues/cem_presentations/Rasmus%20-%20Youth%20Role%20in%20Circular%20Economy.pdf
RENEW2020	INT	Erasmus+ project: RENEW2020 is a European project that gives young people and people from disadvantaged groups entrepreneurial skills which encourage them to seize the opportunities of the circular economy related to re-use, repair and upcycling. ***Potential role for CLAY: input/material on CE topics***	https://www.rreuse.org/leading-young-people-to-make-a-circular-economy-happen/
PAGE (UN)	INT	The Partnership for Action on Green Economy (PAGE) also targets the youth on circular economy.	https://www.un-page.org/youth-green-entrepreneurship-circular-economy

		Potential role for CLAY: input/material on CE topics	
Circular Economy Toolkit	INT	Toolkit, Assessment Tool, Workshops on CE topics/university of Cambridge; ***Potential role for CLAY: input, materials for content***	http://circulareconomytoolkit.org/maintain-repair.html
European Circular Economy Stakeholder Platform	INT	A joint initiative by the European Commission and the European Economic and Social Committee; On this virtual platform you can contribute by submitting content for this website (good practice, publication, event, network...) - engage with other stakeholders on our discussion forum - and stay up-to-date with all ongoing activities of the Platform by subscribing to our newsletter. ***Potential role for CLAY: network, dissemination, input/material for IO3***	https://circulareconomy.europa.eu/platform/
Erasmus+ project "CYCLE"	INT	Ended 2019; Aims at increasing the circularity gap and foster circular economic skills of trainers engages within adult education through the use of open educational resources and innovative technologies. ***Potential role for CLAY: interesting partners for dissemination in other countries and/or training materials etc.***	http://cyclecc.eu/austrian/ https://www.arcolab.org/progetto-cycle-la-formazione-per-adulti-di-economia-circolare/
Circular Futures Platform	AT	Platform for circular economy in Austria; ***Potential role for CLAY: network/dissemination, best practices, events/participate, literature and fact sheets***.	https://www.circularfutures.at/
CEC4EUROPE – circular economy coalition for Europe	AT	Research network based on an initiative by Austrian ARA AG (waste and recycling agency/corporation); ***Potential role for CLAY: network, input/feedback for IOs***	https://www.cec4europe.eu/
Ecodesign	AT	Research body Ecodesign of the Technical University Vienna; ***Potential role for CLAY: network, dissemination, input for IO2 (experts), IO3 (content)***	http://www.ecodesign.at/startseite
VABÖ Verband Abfallberatung Österreich	AT	Voluntary network of Austrian environment and waste consultants in Austria; also issues a "newspaper"; ***Potential role for CLAY: network, dissemination***	https://www.vaboe.at/
EU Umweltbüro Österreich	AT	Austrian branch of European Environmental Bureau; ***Potential role for CLAY: network, dissemination***	https://www.eu-umweltbuero.at/
Verein RepaNet	AT	Austrian network for re-use and recycling organizations; 23 consulting organizations, 27 course and training providers; ***Potential role for CLAY: network, dissemination, target group***	https://www.repanet.at/

ÖGUT Österreichische Gesellschaft für Umwelt und Technik (Austrian society for environment and technics)	AT	Independent NPO, active for more than 30 years working for a transition to a sustainable strategy for economy and society. Offers trainings and workshops; ***Potential role for CLAY: network, target group, dissemination***	https://www.oegut.at/de/
WWF Austria	AT	WWF Austria's section Climate & Energy also works on CE; ***Potential role for CLAY: network, dissemination, input, target group***	https://www.wwf.at/de/kreislaufwirtschaft-entwicklungen-chancen-und-strategien-fuer-oesterreichs-unternehmen/
Quality Austria	AT	Training provider offering courses on "cradle-to-cradle" to promote CE; ***Potential role for CLAY: network, input, dissemination***	https://www.qualityaustria.com/produkt/cradle-to-cradle-und-iso-konzepte-zur-foerderung-der-kreislaufwirtschaft/
Ressourcenforum Austria	AT	Organisation by Austrias business advocacy groups on resource efficiency and CE; ***Potential role for CLAY: network, dissemination***	https://www.ressourcenforum.at/
Aktionstage Nachhaltigkeit (action days for sustainability)	AT	Initiative by Austria's ministry for climate protection; idea sharing platform; European week of Sustainability from 8.10.2020; ***Potential role for CLAY: network, dissemination***	www.nachhaltigesoesterreich.at
IBO Ökologisch Bauen, gesund wohnen (ecological construction, healthy living)	AT	Organisation focusing on ecological buildings and construction; ***Potential role for CLAY: network, dissemination***	https://www.ibo.at/ https://www.ibo.at/wissensverbreitung/ibomagazin-online/ibo-magazin-artikel/data/circular-economy-jetzt/
Clean Tech Cluster Austria	AT	Platform focusing on technological aspects of circular economy and promotes cluster initiatives and CE innovation; ***Potential role for CLAY: network, input, dissemination***	https://www.cleantech-cluster.at/
UFH	AT	Austrian company focusing on trade of secondary raw materials; ***Potential role for CLAY: input, network, additional best practice?***	https://ufh.at/
UBZ Styria	AT	Environment-Education-Centre Styria – conducts events, materials and services on environment-related topics; ***Potential role for CLAY: network, target group***	https://www.ubz-stmk.at/
University of Graz	AT	Institute of Systems Sciences, Innovation and Sustainability Research; ***Potential role for CLAY: experts, dissemination, network***	https://sis.uni-graz.at/en/
University of Vienna	AT	Institute for Managing Sustainability; ***Potential role for CLAY: experts, dissemination, network***	https://www.wu.ac.at/en/sustainability
Institut cirkulární ekonomiky	CZ	INCIEN is a non-profit, non-governmental organization focusing on innovative environmental management in the Czech Republic; ***Potential role for CLAY: network, dissemination, IO3 (content)***	https://incien.org/

Zajímej se	CZ	Unique information portal about the circular economy in the Czech Republic, focus on the latest circular trends in the business world, municipal sector, eco-innovation and lifestyle ***Potential role for CLAY: IO3 (content)***	https://zajimej.se/
Třídění odpadu	CZ	Portal about waste recycling. ***Potential role for CLAY: input for IO2 (experts), IO3 (content)***	https://www.trideniodpadu.cz/recyklace
EKO-KOM	CZ	This NGO established and has been effectively run the country waste management system (called EKO-KOM), that ensures separation, recycling and re-use of the waste on European level. ***Potential role for CLAY: network, dissemination, IO3 (content)***	https://www.ekokom.cz/cz/ostatni/o-spolecnosti/system-eko-kom/o-systemu
Ministry of the Environment of the Czech Republic	CZ	Newsletter about the Circular Economy in the CR. ***Potential role for CLAY: dissemination***	https://www.mzp.cz/cz/news_obehove-hospodarstvi-je-tematem-prvniho-cisla-letosniho-zpravodaje
University of Chemistry and Technology Prague	CZ	Educational program (study) for public, especially production company managers: Circular Economy (starts in September 2020) ***Potential role for CLAY: network, dissemination***	https://cv.vscht.cz/kurzy-cv/obehove-hospodarstvi/obehove-hospodarstvi
Ministry of Industry and Trade	CZ	Přeměna odpadu na zdroje: Competition aimed at enlightment of entrepreneurs and public in the field of circular economy to support the transition. The national competition is realized by Ministry of Industry and Trade in cooperation with the CzechInvest Agency. ***Potential role for CLAY: network, dissemination***	https://www.prumyslovaekologie.cz/info/startuje-4-rocnik-souteze-premena-odpadu-na-zdroje
CIRA Advisory s.r.o. (CIRAA)	CZ	Consultancy on circular economy across all economical segments from agriculture and waste management to innovative ways including digital technologies. ***Potential role for CLAY: input/material for IO3, network/dissemination***	https://www.ciraa.eu/ https://feedit.cz/2020/05/12/incien-a-ciraa-spousti-vzdelavaci-platformu-o-cirkularni-ekonomice/
EnviWeb	CZ	Environmental news service ***Potential role for CLAY: dissemination***	http://www.enviweb.cz/
Moravian-Silesian Innovation Centre Ostrava	CZ	MSIC's main mission is to provide professional services which embrace growth and innovation in companies. ***Potential role for CLAY: network, dissemination***	https://www.ms-ic.cz/en/
AISEC The Italian Association for the development of circular economy	IT	AISEC is a NGO which aims at raising awareness about circular economy through counseling with companies, universities and individuals in general, to coordinate ideas and solutions to create joint purposes and communication with different categories.	https://www.aisec-economiacircolare.org/

		Potential role for CLAY: dissemination/network, input/material for IO3, experts for IO2	
Fondazione per lo sviluppo sostenibile (*Sustainable Development Foundation*)	IT	Organizes meetings and conferences to promote circular economy. Themes of interest are: green city network, waste, circular economy, training courses, sustainable mobility. ***Potential role for CLAY: dissemination/network, experts, input/material***	https://www.fondazionesvilupposostenibile.org/
CDCA	IT	It is a centre founded in 2007 interested in the implementation of European Commission projects with the aim of rethinking waste, exploitation of resources, migrations and climate change. It is engaged with different associations including universities, organizations and research institutions to promote innovation. ***Potential role for CLAY: dissemination/network, input***	www.cdca.it
ECODOM	IT	It is a great NGO that reuses and recycles electric waste, it is engaged in the recycling of batteries and components coming from digital devices. The scope of this consortium is to avoid the dispersal of toxic substances within the environment and the safeguard of the planet from the negative impacts these products might have. Therefore, the company is at the forefront in collecting good practices to preserve the environment. ***Potential role for CLAY: input, network, dissemination***	www.ecodom.it
AISEC The Italian Association for the development of circular economy, 2018	IT	The association organized training courses for managers or professionals willing to implement the principles of circular economy within own department / organization, to foster efficiency of operations. The course was entitled 'From linear to circular economy, closing the loop for eco-sustainability'. ***Potential role for CLAY: network, input, dissemination***	https://www.aisec-economiacircolare.org/dalleconomia-lineare-alleconomia-circolare-pronto-primo-corso-formazione-sulleconomia-circolare/
Association LVIA, Invitation to the youth interested in circular economy related topics to be activated in 2019 / 2020.	IT	The company LVIA in collaboration with Legambiente and Confcommercio has launched a 4 days training school to foster circular economy among 60 participants, the course is addressed to young generations eager to introduce principles of circular economy within organizations, renouncing to the deleterious model of make-use-dispose model of circular economy. The training is based on practice and on field applications of learning material delivered during the course. Therefore, learners will apply knowledge to solve games and simulations. At the end of the course they will be exposing own circular economy idea, a designated Commission will award the best 12 projects.	https://lvia.it/

		Potential role for CLAY: network, input, dissemination	
Business Council for Sustainable Development Turkey (BCSD Turkey)	TR	BCSD Turkey was founded under the leadership of 13 private sector entities. The council accepts only corporate membership. BCSD Turkey is the local network and partner of World Business Council for Sustainable Development (WBCSD) in Turkey, and it is in a strong cooperation with its parent organization. The Council shares knowledge on sustainability with its members and stakeholders through the activities of its working groups. ***Potential role for CLAY: network, dissemination***	http://www.skdturkiye.org/en/about-us
ÇEVKO Foundation	TR	ÇEVKO Foundation is a non-profit foundation established with the initiative of 14 leading industrial companies in Turkey on date November 1991 in order to contribute to the establishment of a sustainable recycling system with the contribution and participation of local management and consumers for the economic and regular recycling of packing wastes in Turkey. ***Potential role for CLAY: network, dissemination***	https://www.cevko.org.tr
DCube	TR	DCube is a scientific R&D and social development cooperative that aims at raising awareness in the circular economy model for sustainable development, capacity increase, solution design and policy development. ***Potential role for CLAY: input/material, experts, network, dissemination***	https://www.d-cube.org/
Yeşilist (Greenist)	TR	Yeşilist, Turkey's first green guide in 2010 and was established as a platform for sustainable living. This platform, which was originally designed as a guide listing companies that make sustainable, clean and environmentally friendly production, has grown, developed and has turned into an online and offline service, taking into account the views of our followers. ***Potential role for CLAY: network, dissemination***	https://www.yesilist.com/hakkimizda/
Turkey Circular Economy Platform	TR	SKD Turkey and the EBRD have joined forces to raise awareness about and circular economy since 2016 and continues to work to accelerate the transition to this new era. ***Potential role for CLAY: input/material, experts, network, dissemination***	https://donguselekonomiplatformu.com
PAGÇEV	TR	PAGÇEV, the Recycling Economic Enterprise of PAGEV (Turkish Plastic Industrialists Research Development and Education Foundation), which is the umbrella organization of the plastic	www.pagcev.org

		industry since 1989; is a non-profit organization established to collect packaging wastes separately from the source and recycle. ***Potential role for CLAY: input, network, dissemination***	
Süreko Inc. Co.	TR	Provide waste management and disposal services appropriate for any types of industrial wastes for all industrial enterprises and companies ***Potential role for CLAY: network, dissemination***	http://www.sureko.com/en/
Bit management/CPC Austria, Training2000, ProEduca, SBTC	INT	All project partners will actively promote the CLAY project within their professional networks of organizations and companies.	www.bitmanagement.at www.training2000.it www.proeduca.cz www.sbtc-tr.com
All best practice examples	INT	Best practice companies (see below) will be informed about the CLAY project as well for "dissemination-marketing": For the companies, CLAY may be used as free marketing "we've been selected as best practice for EU project CLAY" and at the same time promote the CLAY project to a wider audience.	www.pet2pet.at www.refurbed.at https://www.pasta-garofalo.com/it/ http://www.thecircle.global/ www.fairphone.com https://www.signify.com/en-gb/lighting-services https://www.saaczech.com/ https://chytreodpady.cz/ info@nafigate.com www.hagelson.com https://tr.nanomik-tech.com/

Conclusion: Circular economy is a concept promoted by many international stakeholders. However, most initiatives focus on awareness and less on practical skill and competence development. Some initiatives also target the youth, but mainly for awareness-raising. Within CLAY, the project partners bit management, Training2000, ProEduca and SBTC will address the above listed stakeholders to use the project's results for their own work as well as for participation in selected activities.

Best practices

The following good/best practice examples will be analyzed and presented in line with the 7 key elements of circular economy, as described in IO1/T1 Methodological Framework/Handbook. Here, they are already grouped according to CLAY's main topics e-waste, plastics and food.

Best practices: E-Waste

Fairphone (International)[39]

Fairphone was founded in 2010 as an awareness raising campaign for problematic supply chains and production conditions. Today, it is an independent company (since 2013) based in Amsterdam (NL) with more than 70 employees in 20 countries. Fairphone offers "fair-trade" smartphones and already acquired a customer base of more than 100.000 Fairphone-owners. The company still pursues its awareness raising campaign and has more than 250.000 community members on Facebook, Twitter and in the Fairphone-forum combined.

Key element: Design for the future

The modular design of Fairphone's smartphones enables the consumer to replace defect components easily. Common smartphones often have e.g. built-in batteries or other components which are hard to replace. In case one of these components fails/is defect, the whole smartphone needs to be replaced, which most probably leads to e-waste. With it's modular structure, Fairphone aims at long-term customer relations. If a new smartphone is bought every 2 years, the risk is high that customers will switch to a different brand. Therefore, **a circular product design also offers market opportunities**.

Key element: Preserve and extend what's already made

The easy option for consumers to repair their smartphones (i.e. order spare parts) reduces their need to buy a new phone. If one part is defect, it can be replaced while all other (full functional) parts can be kept in use. As a smartphone producer, Fairphone doesn't need to rely on selling new smartphones as a source of revenue, but also spare parts. **Circular design has an impact on the customer experience and on customer relations**.

Fairphone also offers options for recycling (free shipping) and discounts for old phones when buying a Fairphone. Already produced smartphones contain valuable materials that can be extracted and reused in the production of new phones. The materials from recycled smartphones are cheaper and much better for the environment than extracting the materials from natural, non-regenerative sources anew. **Recycling "waste" can and should be combined with motivators for customers**.

Key element: Prioritize regenerative resources

Fairphone offers fair-trade smartphones. Due to modular design, the non-regenerative resources (minerals etc.) are used as little as possible. Supply chains in the electronic industry are complex and long. A lot of non-regenerative materials are involved, and extraction,

[39] Contact details: Jollemanhof 17, 1019 GW Amsterdam, The Netherlands; www.fairphone.com

refinement, transport etc. produce a lot of negative effects on the environment (i.e. regenerative resources). The supply chain is not only bad for the environment, but also quite costly. Recycling and keeping already sold smartphones in use as long as possible, reduces these costs and effects. **If products depend on non-regenerative resources, ways for "regenerative loops" can be found by recycling and reusing materials.**

Key element: Use waste as a resource

Fairphone offers free disposal service for smartphones of all types (free shipping). Materials from disposed smartphones are extracted, which results in less demand for non-regenerative resources. Did you know that a ton of electronic waste contains more gold than one ton of gold ore? Costs for buying materials on the global market (which includes the risk of major price shifts) are reduced. Recycling provides shorter supply chains, less risk and a more stable price. **"Waste" (old smartphones) contains a lot of valuable materials that can be used as an input for the production process**.

Key element: Rethink the business model

Smartphone users also care about the environment and fair working conditions. Fairphone gives them an alternative option to "traditional" smartphones with problematic supply chains or working conditions. Sadly, most electronics producers tend to ignore environmental or human rights effects along their supply chains. Fairphone sells an ethical and sustainable product - in a business area, where these terms seldom apply. **Circular economy can and should also be used in marketing: If you are supporting circular economy, you should talk about it!**

Fairphone not only produces smartphones, but also created and supports a movement for a fairer production of electronic devices and combines economic activities with a social and ecological perspectives. The social movement also indirectly promotes the products of Fairphone. **Circular economy activities are not limited to economic activities, but also affect the ecological and social dimension.**

Key element: Collaborate to create joint value

Fairphone runs a community "#WeAreFairphone" to inform and build awareness on environmental and human rights issues in electronics industry's supply chains and to foster collaboration for more sustainable and fairer electronics production within its community. In economic terms, this collaboration implies "free" marketing. **Circular economy only works, if you collaborate with as many stakeholders as possible.**

Fariphone is connected to other companies and organizations following circular strategies, e.g. Circle Economy, European Partnership for Responsible Minerals, Responsible Minerals Initiative and others. Collaborating in the area of circular economy offers the opportunities to develop the own business model further - gather feedback and ideas from other companies with circular strategies. Innovative processes (circular and others) are fostered by using other circular companies as case studies/role models and collaborating in this area. **A larger collaborative network means more opportunities for finding additional or innovative new circles.**

Key element: Incorporate Digital Technology

Being a smartphone provider, incorporating digital technology seems obvious. Fairphone is present on all major social media (Twitter, Facebook, Instagram, YouTube, Flickr and LinkedIn) and promotes the social movement on all these networks. **The social media activities also promote the product.**

The Fairphone community is also organized via the company's website. The website is not only used as an online-shop, but also to promote the company's circular economy vision. Potential customers (not looking for a new smartphone) may engage in the company's community and thereby notice their product. Digital technology and online media are the ideal way to reach out to others, who are interested in the same topics. The company serves as a "micro-social-network" of like-minded people and customers.

Fariphone also offers opportunities to take action and contribute to the company's vision, events and a forum. Customers are more than buyers. Through digital technologies, Fairphone actively promotes their social ideas and thereby also promotes its products. People actively engaged in the company's campaigns will automatically spread the information on the company's product. Address more than the primary needs ("wants new smartphone") - if you credibly stand for circular economy, people will more likely support your sustainable (economic, ecologic and social) strategy.

Refurbed GmbH (Austria)[40]

Refurbed, founded in Vienna in 2017, is a platform for refurbished smartphones, tablets, notebooks, etc. with high standards regarding quality and safety, which gives customers warranty on refurbished products. Refurbishment saves up to 70% CO2 emissions compared to a new product and for customers, up to 40% savings (and more) compared to new products. In cooperation with other organizations, non-refurbishable products are properly recycled.

Key element: Preserve and extend what's already made

Typically, customers buy new smartphones every two years. Instead of disposing "old" smartphones, they are refurbished, re-sold and re-used, thereby saving the resources neede for producing a new product.

Key element: Prioritize regenerative resources

Regarding the high amount of e-waste generated each year, used electronic devices can almost be considered a "regenerative resource". Instead of producing new smartphones (and all contained materials), the already existing materials and products are – where possible – refurbished or otherwise properly recycled.

[40] Windmühlgasse 30/12, A-1060 Wien; https://www.refurbed.at

Key element: Use waste as a resource

Annually, more than 50 million tons of electro-waste are produced. Refurbishment of existing products doesn't produce electronic waste.

Key element: Rethink the business model

Refurbishing existing products instead of producing new ones as a business model. What was once limited to fashion (second-hand shops) and less technical products, is successfully applied to electronics by Refurbed. The price advantages for consumers and the positive contribution to environmental protection/circular economy also serve as a marketing asset.
For each product sold at Refurbed, a tree is planted in cooperation with a forest organization.

Key element: Collaborate to create joint value

Refurbed also collaborates with other organizations to recycle non-refurbishable products.

Key element: Incorporate digital technology

Digital technology is not only the main business area for Refurbed, but also key for marketing, sales etc.

Best practices: Plastics

PET 2 PET Recycling GmbH (Austria)[41]

PET 2 PET was founded in 2007 and applies a circular “bottle-to-bottle” approach to the recycling of disposed PET-bottles: the company uses the disposed PET-bottles as raw material for new PET bottles. In 2019, more than 26.000 tons (equal to 1,1 billion – 1.000.000.000 bottles) PET-material was recycled.

Key element: Design for the future

PET bottles in Austria already contain 30-40% recycled PET material. Depending on size and form of bottles the percentage is even higher.

Key element: Prioritize regenerative resources

PET-bottles are virtually omnipresent and can be considered a "regenerative" resource in terms of availability.

Key element: Use waste as a resource

PET 2 PET follows a bottle-to-bottle approach: disposed and collected PET-bottles and other PET-made products are recycled to raw material for new PET bottles.

Key element: Rethink the business model

Instead of make-take-dispose bottle-to-bottle stands for a fully circular approach.

[41] SET-Straße 10, A-7052 Müllendorf; https://www.pet2pet.at

Key element: Collaborate to create joint value

PET 2 PET is a collaboration of Austria's main beverage producers, who share a mutual interest.

Nafigate Corporation – HYDAL technology (Czech Republic)[42]

Founded in Prague in 2011, Nafigate is one of the most respected companies in the field of nanofiber applications today.

Key element: Design for the future

There is a growing interest in the United States in products that help protect the environment. PHAs can help combat ocean pollution, and they do not use fossil fuels. They solve the problem with waste oil and do not burden nature. So investors should be very interested in putting their money into the idea. PHA polymers are the plastics of the future.

Key element: Preserve and extend what's already made

Nafigate follows a "waste to material" approach. What's already made (used vegetable oil) is transformed into the raw material for organic polymer (=plastics).

Key element: Prioritize regenerative resources

Used oil is practically a regenerative resource. Fossil oil used for the creation of "ordinary" plastics is not.

Key element: Use waste as a resource

Hydal technology enables the conversion of waste cooking oil into a product with high added value - biopolymer PHA that doesn't burden the environment. PHA can be further used as:

- Abrasive particles for cosmetics
- Bio UV protection
- New material base for 3D printing
- Biosolvents
- Bio-based flavors and aromas
- PHA-based fibers
- Medical applications
- Bioplastics based on "closed loop"

More and more cities in the Czech Republic are trying to solve the problem of used oil. Dozens of them have already placed special garbage cans in their streets. The ecological disposal of oils is necessary because of the problems with wastewater treatment plants when people pour

[42] Prosek Point, Budova A, Prosecká 851/64, 190 00 Praha 9; info@nafigate.com, www.nafigate.com

them into waste normally. People will have to learn a little bit that they can collect vegetable oil in PET bottles and hand it in the collection containers (garbage cans).

Key element: Collaborate to create joint value

Nafigate collaborates with scientists to enhance its technology and products to make them even more circular.

Hagelson (Turkey)[43]

Hagelson Plastic and Recycling San.Tic.Ltd.Şti. is an R&D company founded with the support of TÜBİTAK in March 2016. The company is mainly working on polymer materials and new recycling systems. Thanks to its self-developed new technology, it produces new plastic raw materials from the recycling of waste and waste carpets. In this way, it eliminates the problem of eliminating the woven fire carpets that are formed during the production of the firms, the edge wasting in the carpet floor covering works or the old waste carpets collected during the project phase. It operates in 400 m2 closed area in Yalova Industrial Site with its young and dynamic staff consisting of polymer engineers.

Key Element: Design for the Future

The design of products is done according to circular economy principles. HAGELSON applies a technology that can separate the plastic fibers of waste and waste carpets. Thus, instead of turning waste and waste carpets into products that will be used only once, plastic raw materials are obtained that can be recycled and used repeatedly, and these plastic raw materials are offered as alternative recycling raw materials to the plastic parts manufacturing industry. This approach shows a quality understanding of the "closing the loop". HAGELSON wants to build a long term value creation by applying their motto into their business . Recycle! To Transform Your Future. Applying circular economy principles into the business not only related with the business procedure but also related entire environmental issues.

Key element: Prioritize regenerative resources

Directly: plastic raw materials are obtained that can be recycled and used repeatedly, and these plastic raw materials are offered as alternative raw materials to the plastic parts manufacturing industry.

Key element: Use waste as a resource

Production of recycled plastic raw materials by recycling waste carpets is the main business area of Hagelson. In their first business model, they recycled the carpet waste of business centers and accommodation facilities. In Turkey, per year about 400 thousand tons (400.000.000 kg) carpets and rugs are going to waste. Hotel carpets make up 10 thousand tons of this. Turkish engineers founded the Hagelson waste carpet recycling initiative to bring waste carpets to the economy. Hagelson collected 84 tons of carpets from 29 hotels in a year, transformed the harmful plastic in

[43] Ofis Reşitpaşa Mahallesi Katar Caddesi No.4 D. 1001 Sarıyer-İstanbul (Arı Teknokent-İTÜ Çekirdek), https://www.hagelson.com/

the carpets with the machine they produced and brought them to the economy. Hagelson stated that they received the carpets with their own team and vehicles without any charge from the hotels and stated that they separated these carpets in the machinery in Yalova and sent them to the companies producing plastic parts.

Stating that they collected 84 tons of waste carpets from 29 hotels in 1 year, Alayurt stated that one of the most attractive sides of the project for the hotels is the certificate they issued. Alayurt said, "We are preparing a certificate called Carpet Recycling Program Environment Benefit Counter, which describes the environmental benefits of this transformation in numbers no matter how much waste carpet we have collected from hotels. This certificate contains figures related to the amount of water, carbon, harmful gas and energy. For hotels, this certificate is of great importance in terms of environmental image.

With the conversion of 500 square meters of carpet, 12 cubic meters of garbage remains clean, while 29 cubic meters of water gets rid of contamination, 2.2 tons of carbon dioxide emissions are prevented. 7.2 houses' 1 month energy is gained. About 400 kilograms of plastic raw materials can be produced from a 500 square meter waste carpet.

Key element: Collaborate to create joint value

HAGELSON has built a network with the tourism industry representatives.

Key element: Incorporate digital technology

Via its social media account Hagelson is advertising the importance of recycling and circular economy approach to its target groups.

Best practices: Food

Pasta Garofalo (Italy)[44]

Pasta Garofalo was founded in 1920, in Gragnano, Naples, and is specialized in the production of pasta. At that time the company produced around 400 tons of pasta. The company operates in the Italian market and worldwide, selling to over 60 countries across Europe and Asia (included Japan selling with the name of the Ito-Yokado). It is leader in the premium sector of Sweden, France, Swiss, Ukraine, Belgium nd Portugal. The company has a longstanding tradition in grinding wheat in Italy, and since long the company has valued the importance of developing the production process with respect to the environment.

Key element: Preserve and extend what's already made

The company has launched two important projects to get rid of the waste from the pasta production. The first is called: 'Mpasta', the second is 'Cannucce Garofalo', to reuse the disposal of dough deriving from wheat processing to produce leavened, sweet and savory products, sold in turn to enlarge the pyramid of waste management.

[44] https://www.pasta-garofalo.com/it/

Key element: Prioritise regenerative resources

The project Mpasta (launched in 2019) involves collecting the waste of pasta dough to produce pastry products. This initiative foresees the regeneration of pasta dough disposal to produce new products sold in the Garofalo pastries. The conscious use of waste, employed as a regenerative resource allows to extend the pyramid of waste management hierarchy.

Key element: Use waste as a resource / Collaborate to create joint value

The Cannucce Garofalo project involves the production of straws sold to bars and restaurants from the waste of dough. Once the straws have been used, they are stored in special boxes made of recycled paper and brought back to the 'Pasta Garofalo' factory and employed to produce biogas. Within this system the supplier manages to have more control over the sustainable chain because bars and restaurants collaborate greener approach to economy. Besides, 85% of their packaging is made of recycled paper. Waste is stored and regenerated to produce subproducts, which are sold in turn and contribute to the total turnover (the price of straws on average reaches 15 euros). Finally, straws are used as compost. The environmental benefits from repurposing sources are endless and can be implemented in the heating system and in the production operations, just to cite few examples.

Key element: Rethink the business model / Incorporate digital technologies

The company has been at the forefront to optimise own processes in order to reduce their impact on our planet, choosing to implement several techniques to adopt a closed model of productivity. With the growth of the business, managers decided to implement more sophisticated strategies to work in a more sustainable way: the trigenerator system. This system allows companies to work more efficiently and distribute money for other purposes, as 95% of energy is converted into other forms: electricity and thermal (heating and cooling) energy. As a consequence, it allows to reduce the supply charges of companies, and minimize the costs of maintenance. The characteristic of this system is the possibility to combine electricity production, heating and cooling systems, which in the long run reduces the quantity of costs that companies undergo. Generally, traditional systems employ 40% of energy, and more than 60% of this is dispersed under form of heat, whilst the trigenerator supports companies in exploiting primary energy sources efficiently, resulting in less costs.

The trigeneration system is fueled with natural gas which contributes to reduce the footprint of the company, cutting the greenhouse gases emissions and the global impact of the company on the environment. Only in 2018 the company managed to save a total amount of 958 tons CO2 emissions, 56.876 cubic meters (56.876.000 litres – equals more than 22 full Olympic size-swimming pools) of water, and less than 3.5 million kw/ton of energy, which would have impacted significantly on our environment.

The Circle (Italy)[45]

The Circle is a start-up founded 2017 in Rome, that is specialised in the cultivation of plants and fish farming with the acquaponics technology. The company has received three important

[45] http://www.thecircle.global/

awards: the 'Premio Gaetano Marzotto', 'Road to Green 2020' and 'Storie di Economia Circolare. This company is an example of effective exploitation of hydro sources. In 2019 the company saved around 135.000 liters of water / each kilogram of product, saved 33.000 kilogram of CO2 that would have contributed to enlarge the ozone hole, they doubled the production of vegetables per hectare in comparison to traditional farming, with 0% of pollutant emissions production, with no employment of pesticide, fertilizers and herbicides. The company takes several advantages from the acquaponics system, according to certain esteems, it ensures the production of over 5.000 plants a week, earning around 1.200 € / pro week, with just two hours of work a day. As a consequence, this system allows to earn money with less expenditures and less need of personnel.

Key element: Design for the future

This company combines vegetable production with fish farming. The company produces food in a very sustainable and innovative way closing the loop on the 'production-waste', that is quite common across companies. The main technology involved in this process is the "acquaponics"; an innovative way of farming based on conventional acquaculture (raising acquatic animals such as fishes, snails and crayfishes), together with hydroponics (the cultivation of plants in a symbiotic environment like large tanks).

Key element: Prioritise regenerative resources

Within this system fish living in the large tanks produce ammonia by breathing and eating, in this way they work as compost, or fertilizer, because they produce organic waste to feed the seeds. Consequently, with the exploitation of this technique the water is rich in nutritional organisms and substances that foster the growth of plants and increase the taste of products. The plants grow faster and are superior in quality than treated plants.

Key element: Use waste as a resource

At the core of the company is their '0-waste policy', meaning that they address the production of food in combination with the respect for the biodiversity of the environment and its creatures. The company managed to create a circle par excellence (as suggested in the naming of the start-up itself) which employs waste produced by fish and used to nourish plants.

Best practices: Other

Nanomik Biotechnology Co., Microencapsulated Plant-Based Biopesticides (Turkey)[46]

Nanomik, founded in Istanbul in 2016 with the motto of cleaner foods and healthier tomorrows, develops alternative biopesticides to chemical pesticides used in the journey of foods from the field to the table.

Key element: Preserve and extend what's already made

[46] Reşitpaşa Mah.Katar Cad. Teknokent Arı 3 Sit. No:4/B207 Sarıyer/İstanbul, https://tr.nanomik-tech.com/

Today, chemical pesticides are used to prevent mold and agricultural products and food from becoming moldy. However, studies show that these chemicals harm both human and environment and negatively affect many living species. The biopesticides developed by Nanomik were obtained by microencapsulating active substances with multi-mode of action properties isolated from plants with natural polymers. Microencapsulation enables controlled release of herbal active molecules and a longer effect. Products are naturally protected against microbial threats for much longer.

Key element: Prioritize regenerative resources

Direct contribution: Mikoks is a natural preservative which is developed for preventing loss of fresh fruits and vegetables for post-harvest process.

Key element: Collaborate to create joint value

Nanomik has built a network with agriculture representatives. Also Nanomik has worked with Agriculture Ministry of Turkey for 3 years in order to create a joint value.

Signify/Philips pay per Lux (International)[47]

"Philips circular lighting" is a comprehensive product/service combination that includes the manufacture, installation, maintenance, reuse and recycling of lighting equipment. Complementary to a circular design of lighting products, Philips also sells contracts for "light" (or lux). This proves to be highly effective. Examples from industrial applications are: cutting costs by 73%, reduce carbon footprint by 231 tons of CO2, waste-to-landfill reduction of 161 kg per year; 70% energy savings in parking garage; Amsterdam Airport: 50% less energy, 75% longer lifetime of products.

Key element: Design for the future

Design of lamps/products according to circular economy principles. Upgradable (possible to connect more than one product), modular design (standardized components), easy to disassemble (less than 5 steps), easy to maintain (modular spare parts), recycling (product can be broken down into separate materials' waste streams.

Key element: Preserve and extend what's already made

Refurbishment, parts harvesting, recycling. After a contract with a customer ends, the products are refurbished for reuse. If refurbishment is not possible, components are extracted that can be reused. Any parts that cannot be refurbished or reused are recycled to recover valuable materials.

Key element: Prioritize regenerative resources

Indirectly: By saving energy and waste, the need for non-regenerative resources is reduced.

Key element: Rethink the business model

[47] High Tech Campus 48, 5656 AE Eindhoven, The Netherlands; https://www.signify.com/en-gb/lighting-services

Light as a service: Instead of selling lamps and lighting products, long-term service contracts are made instead of selling products, a product/service combination is sold.

Product ownership becomes less important What matters more to today's consumers is access and performance, which are provided as services.

Key element: Collaborate to create joint value

Long-term contracts with customers enable collaboration on saving energy and resources.

Key element: Incorporate Digital Technology

To optimize lighting solutions in terms of efficiency, digital technology for managing light is essential - "connected lighting" – that would never be possible without digital technology.

JRK Česká republika s.r.o. – ECONIT smart waste evidence system for cities and municipalities (Czech Republic)[48]

EKONIT developed a simple, smart recording of household waste using QR codes, with which waste vessels or sacks are directly marked. It is designed as a motivation system for citizens and statistics show precise data, which helps local authorities configuring support activities and campaigns. ECONIT has three basic modules: recording, motivation and statistical, and is fully variable according to the requirements of each local authority.

Key element: Use waste as a resource

ECONIT aims at reducing the amount of unsorted municipal waste that needs to be disposed in landfills instead of being recycled. Thereby, it supports the possibility of using waste as a resource.

Key element: Incorporate digital technology

Based on statistics and dozens of physical analyses, it has been determined that almost 80% of landfilled waste is composed of components that could be sorted. The mission of ECONIT is to improve waste management thanks to reducing the quantity of mixed municipal waste, avoiding its creation and increasing the level of separation. Through a combination of modern technology and several years of experience in waste management, the degree of waste separation is increasing by means of an innovative and educative solution.

[48] Bolzanova 1615/1, 110 00 Nové Město, Czech Republic, https://chytreodpady.cz/

Conclusion

The national reports conducted by the partners in Austria, Italy, Czech Republic and Turkey have shown that

- **circular economy is a focal topic** in all countries and on an international level
- there are **initiatives, programs, and strategies** both on political, economic and non-governmental levels internationally and in each partner country
- **all CLAY countries are still far from reaching a circular economy**
- there is a **large variety of stakeholders** in all project countries and internationally, which will be addressed with dissemination activities
- there are **examples of successful implementations** of circular economy in all project countries
- **young people are not addressed on a large scale by initiatives**. Italy with its examples of circular economy projects specifically targeting the youth is an exception among the partner countries. All others promote circular economy to the general public or specifically aimed at companies.

CLAY will address and rely on the existing networks promoting circular economy, but bring its own added value to existing projects by developing an index which is specifically designed to measure young people's attitudes towards circular economy.