

Circular Economy for public sector auditors and Supreme Audit Institutions



INTOSAI
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on Environmental
Auditing



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Foreword

This Seminar Summary is based on the 20th INTOSAI WGEA Assembly meeting, where we dedicated the first day, 19 January 2021, to circular economy.

The reason to choose the topic was first the fact that Finland as the host of the virtual meeting has long experience in developing the circular economy approaches. Circular economy has been one corner stone in the Finnish Innovation Fund Sitra's work, and the first Finnish road map to a circular economy was launched in 2016. As a more recent step, the government's proposal for the strategic program to promote circular economy was published just a week before the Assembly meeting. Its vision is a carbon-neutral and circular society, and the target is that in 2035 the primary consumption of natural resources in Finland does not exceed the level of 2015.

We also believe that the concept of circular economy can offer a lot to environmental auditors. It challenges fundamentally the way we organise our societies and economies. Circular economy is closely connected to how we produce and consume, and it helps us address both climate problems as well as biodiversity loss.

Furthermore, dedicating part of the Assembly meeting to a topical issue fulfils the INTOSAI WGEA vision on innovative environmental auditing. Once we gather together, whether in online format as we did now for the first time, or in a face-to-face meeting, we should make the best use of our time to learn something new, offer our community fresh ideas that help us think in an innovative way.

Finally, circular economy is connected to the INTOSAI WGEA Work Plan 2020–2022 thematic focus areas of plastic waste, sustainable transport, and climate finance. It is also linked in many ways to the United Nations Sustainable Development Goals, and it has been identified one key principle for reaching the SDGs¹. Circular economy also benefits from policy coherence and multi-stakeholder approaches, which are also currently our areas of INTOSAI WGEA interest.

This paper summarizes the main points and takeaways from the keynote presentations, panel discussions and audit examples. It also provides some useful sources for further studies. We hope this summary will be a source of inspiration to auditors around the world.

Our warmest thanks to all keynote presenters, colleagues presenting audit examples and the dedicated audience for participating in the discussion with virtual tools.

Helsinki, 1 March 2021

1 The concept of circular economy

The purpose of the first part of the circular economy day was to provide an overview of the concept of circular economy from the main developers of the approach. We heard presentations from the representatives of the Ellen MacArthur Foundation, United Nations Development Programme and the Finnish Innovation Fund Sitra.

Ellen MacArthur Foundation

One of the key developers of the circular economy concept is the Ellen MacArthur Foundation. Mr Joss Blériot, Head of Institutions & Governments told that the Ellen MacArthur Foundation is a non-profit organisation, which launched its first report on the potential of circular economy in 2012 at the World Economic Forum and has since been working on developing and promoting the idea. In recent years, the Foundation's work has focused particularly on private sector innovation, together with the public sector which creates an enabling environment for circularity. Currently, the Foundation has three systemic initiatives: the new plastics economy, textiles and circular economy for food systems².

Mr Blériot mentioned that the concept of circular economy is grounded on many schools of thought. The most prominent one is perhaps the ***cradle-to-cradle design*** philosophy, which takes lessons from nature, where there is no waste. Everything that goes into the system should be processed by the system. The second school of thought, ***biomimicry***, which looks at nature at a systemic scale, is responsible for many of the insights in the cradle-to-cradle design philosophy. Performance economy asks whether we have to own and consume the products, or do we want to access and function of the product. This is fundamental for business models. ***Natural capitalism*** is an interesting school of thought, which looks at the value of ecosystems and the services ecosystems provide. Lastly, the idea behind the industrial ecology concept is that the waste of one process is a resource for another one. As an iconic model example of ***industrial ecology***, Joss presented the Kalumborg industrial symbiosis in Denmark. However, it is not ideal either³.

The diagram illustrates the Ellen MacArthur Foundation's Circular Economy Systems Diagram. It shows the flow of materials and products through various stages, categorized into three main flows: Renewables Flow Management, Finite Materials, and Stock Management.

RENEWABLES FLOW MANAGEMENT: This flow starts with **RENEWABLES** (represented by a lightning bolt icon) and **FINITE MATERIALS** (represented by a factory and a truck icon). These feed into **FARMING/COLLECTION** (represented by a wheat stalk icon). This stage leads to **BIOCHEMICAL FEEDSTOCK** (represented by a globe icon) and **BIOMASS** (represented by a flame icon). **BIOMASS** leads to **ANAEROBIC DIGESTION** (represented by a factory icon), which produces **BIOGAS** (represented by a flame icon). **BIOGAS** leads to **REGENERATION** (represented by a globe icon). **REGENERATION** leads to **EXTRACTION OF BIOCHEMICAL FEEDSTOCK** (represented by a flask icon). **EXTRACTION OF BIOCHEMICAL FEEDSTOCK** leads to **CASCADERS** (represented by a factory icon). **CASCADERS** leads to **CONSUMER** (represented by a person icon). **CONSUMER** leads to **COLLECTION** (represented by a person icon). **COLLECTION** leads to **EXTRACTION OF BIOCHEMICAL FEEDSTOCK**.

FINITE MATERIALS: This flow starts with **FINITE MATERIALS** (represented by a factory and a truck icon). These feed into **PARTS MANUFACTURER** (represented by a factory icon). **PARTS MANUFACTURER** leads to **PRODUCT MANUFACTURER** (represented by a factory icon). **PRODUCT MANUFACTURER** leads to **SERVICE PROVIDER** (represented by a person icon). **SERVICE PROVIDER** leads to **USER** (represented by a person icon). **USER** leads to **COLLECTION** (represented by a person icon). **COLLECTION** leads to **EXTRACTION OF BIOCHEMICAL FEEDSTOCK**.

STOCK MANAGEMENT: This flow starts with **STOCK MANAGEMENT** (represented by a factory icon). These feed into **RECYCLE** (represented by a recycling symbol icon). **RECYCLE** leads to **REFURBISH/REMANUFACTURE** (represented by a factory icon). **REFURBISH/REMANUFACTURE** leads to **REUSE/REDISTRIBUTE** (represented by a person icon). **REUSE/REDISTRIBUTE** leads to **MAINTAIN/PROLONG** (represented by a person icon). **MAINTAIN/PROLONG** leads to **SHARE** (represented by a person icon). **SHARE** leads to **USER** (represented by a person icon). **USER** leads to **COLLECTION** (represented by a person icon). **COLLECTION** leads to **EXTRACTION OF BIOCHEMICAL FEEDSTOCK**.

Legend:

- 1 Hunting and fishing
- 2 Cattle take both post-harvest and post-consumer waste as an input

SOURCE
 Ellen MacArthur Foundation
 Circular economy systems diagram (February 2019)
www.ellenmacarthurfoundation.org
 Drawing based on Brunsmeier & McDonough,
 Credits to Credits (C2C)

ELLEN MACARTHUR FOUNDATION

On the left side of the diagram are the biosphere loops, on the right side, the loops closest to the centre have the most value, so it is about keeping the products as close as possible to how they were put in the market. There is a lot to be made in terms of refurbishment and remanufacturing. Recycling is least profitable. Conflating circular economy with recycling is a common mistake, but it is important to move away from this idea.

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Furthermore, circular economy is not only a domestic agenda but has an important ***trade dimension***. We have to think about the countries which live off of natural resources and raw materials export. Also, standards are important, and what we count, what do we value, what do we measure. Joss mentioned that in this context, audit has a strong role to play.



For the questions from the audience, Mr Blériot considered as the most crucial policy for governments could be upstream measures, such as but not limited to eco-design, extending from energy efficiency of products to looking at whether products can be repurposed and whether the right things are put on the market.

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As priorities for developing countries, he considered that the global community should come together and make sure that the circular economy debate is inclusive. Developing countries are at the receiving end of the waste flows. Also, many developing countries rely on exports of raw materials to generate GDP, so the aim should be to change this so that a) they would not be dependent on selling the raw materials and b) would not receive all the waste that gets generated in mature markets. Two negative impacts need to be dealt with. International collaboration and agreements will be very important in that.

United Nations Environment Programme

What is the *situation* with circular economy *globally*? The second keynote speaker, Ms Elisa Tonda, the Head of Consumption and Production Unit in the UNEP Economy Division, introduced us to this perspective. First, Ms Tonda mentioned that a lot of the discussion centred around the concept of circular economy in the 4th UN Environment Assembly in 2019, the world's highest level of environmental decision-making body⁴. Circularity was recognised as one of the approaches that enables us to move forward towards sustainable consumption and production. One of the resolutions of the Assembly⁵ also provided a definition for the concept. The definition describes circular economy as one of the current sustainable economic models, in which products and materials are designed in a way they can be reused, remanufactured recycled and recovered, and therefore maintained in the economy as long as possible, along with the resources they are made of.

Ms Tonda emphasised the instrumental role of circularity in advancing sustainable consumption and production, and the link to Sustainable Development Goal (SDG) 12. *The SDG12* is also closely interlinked with many other Agenda 2030 goals and targets. UNEP and the UN system⁶ believe that advancing toward sustainable consumption and production through circularity will enable to advance over 50 of the 169 SDG targets that are all dependent on more sustainable consumption and production patterns.

Ms Tonda highlighted a study which tracked one SDG target, 12.2 on sustainable resource management⁷. This tells us that over time, we are regrettably going in the wrong direction. Over time, our *pressure on natural resources*, represented by material footprint, has been growing at a higher pace compared with GDP or population growth. If we are extrapolating the tendency of the pressure on natural resources ahead in time, continuing with the same business-as-usual as today, our natural resource use will

double by 2060, going well beyond the planetary boundaries in terms of availability of natural resources on the planet. Therefore, circularity and sustainable consumption and production do play a role in addressing the environmental challenges we have ahead of us.

Another aspect UNEP has noticed when tracking the progress on SDG12 is policies operating in *silos*. Silos relate to sectors, specific institutions in charge of policies that have not taken advantage of opportunities that exist across sectors and institutions to accelerate the shift toward more sustainable consumption and production and reduced use of natural resources. Potential sectors that would enable the shift are e.g. agriculture, food and beverage, construction and building, and the consumer goods sector. Ms Tonda noted that there are already some elements and some signals of having found the right direction that would enable us to accelerate our pace, but we are still struggling to create a more coherent and integrated approach and to implement solutions and tools available. Circular economy approaches are also contributing to the implementation of the Paris Agreement and climate related targets, as well as the biodiversity targets.

Ms Tonda also described how circularity can be achieved. It requires working with all the *actors along the value chain* to be part of the transformation to circularity. This encompasses businesses at all stages from raw material extraction to waste management, governments, research institutions, finance sector, the civil society and individuals. Furthermore, the transition to circularity needs to be thought through so that no one is left behind. She also noted on the importance of role of the informal sector in closing the material loops in our society; therefore, the informal sector should be part of the transformation.

UNEP model for circular economy provides an additional and complementary representation to the butterfly model of the Ellen MacArthur Foundation. UNEP approach shows how resources are kept in the economy as long as possible, and it helps us focus on the actors that play a role in creating *circular systems*⁸. Different kinds of interventions are needed to achieve the loops in the diagram, interventions which empower the different actors in the economy. Different users need to be targeted by different instruments. This is one of the key design elements in UNEP interventions when bringing CE to countries and cities, at different geographic levels.

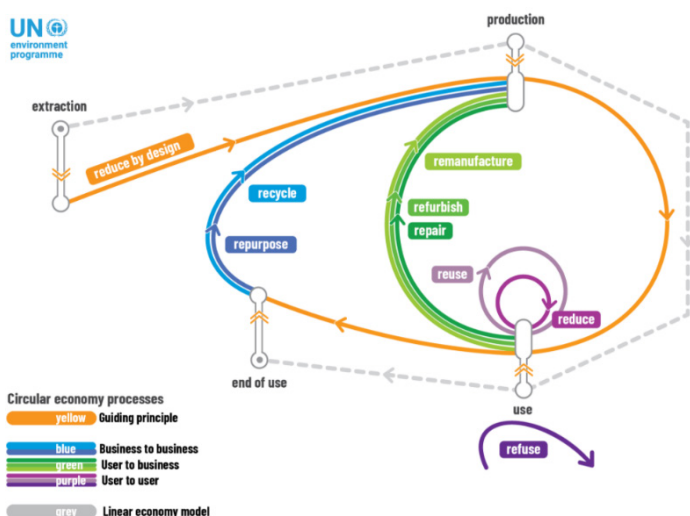


Figure 3: UNEP model for circular economy

The concept of the value chain is a system that enables to translate the scientific information into opportunities related to resource efficiency, circular economy and sustainable consumption and production with concrete action by different stakeholders in the system. The concept of value chain, according to UNEP, goes beyond the concept of the supply chain, which represents the economic actors in the system linked through contractual relationship. Value chain brings in the consumer and the waste management. It also brings in all the activities and parties that can provide or receive value in the form of a product or a service. This includes the environment and the society at large.

Lastly, Ms Tonda presented *four key design elements* that UNEP is using in creating circularity into their work. The first principle is the use of circular economy and sustainable production and consumption to achieve *multiple benefits*, to enable countries and stakeholders to advance toward multiple SDGs, progress toward the commitment made in the Paris Agreement and advance biodiversity targets. The second design principle is the need of thinking that policy frameworks that bring in circularity and sustainable production and consumption rely on a *mix of instruments* that target the strategic intervention point in the value chain, given specific consideration to specific position the country covers in the value chain. It is unlikely that one single policy would solve the challenges associated with circularity. The third principle is related to making sure that the *key actors* in the value chain are part of the design and implementation of the plans to achieve

circular economy. This requires stronger collaboration between the public and the private sector to put in practice circularity in the system of consumption and production. The fourth principle is that **consumers** need to be involved, through campaigns, information; standards, labels, and claims that are associated with products or can be engaged through regulation that enables them to keep the product in the economy and in use as long as possible, e.g through legislation on access to spare parts.



Figure 4: Visualization on Ms Tonda's presentation by Raquel Benmergui

To the question from the audience on which sectors have most potential for circularity in the coming years, Ms Tonda replied that the plastics value chain has raised significant attention, as countries see the opportunity of addressing the plastic problem through circularity. Textiles have also gained growing attention, and the value chain has been deeply affected by the Covid-19 pandemic. Focus has been on solutions to strengthening the resilience of the system. Ms Tonda also mentioned opportunities and interest emerging in the electronics sector, and e-waste. There is a significant need to take action in terms of reducing the carbon footprint of the food and construction sectors.

As for the role of public sector auditors, Ms Tonda saw a lot of opportunity to examine public authorities' actions toward circularity. There is a strong call to ensure that the right mix of policy measures and initiatives are in place to accelerate the transition toward circularity. One issue that characterises the intention toward circularity is that it is frequently taken forward by a non-coherent set of instruments that enable us to achieve the end goal of promoting circularity. One insight would be to look into

the set of measures already in place within a policy framework and get an insight into the coherence of these instruments and other efforts toward circularity.

The Finnish Innovation Fund Sitra

In an interview with Jyrki Katainen, the President of Sitra, Finnish Auditor General and Chair of INTOSAI WGEA Tytti Yli-Viikari started by asking what his vision on circular economy is.

Mr Katainen: In the European commission I coordinated all the tasks related to circular economy within the European Union. This helped me to create a vision that within 10 years circularity becomes a mainstream way to organise the economy. It is a way to address climate change because it enables to reduce and recycle raw materials. Also, it is the way to address the problem of biodiversity loss. The more we can use the already existing resources, the less we cause harm to the nature. Finally, it is important to say the circular economy is not just a greenwashing program for the market economy, but it is market economy. Markets do not have any values, they have features; we as human beings or policy makers give values to the market economy. By changing legislation and by providing incentives to investors and the private sector to give circular economy values to the market economy, a systemic change mainstreaming circularity as a way to organise businesses and our economy is doable within the next 10 years.

Ms Yli-Viikari: What was the kick-starter for this kind of thinking at the European Union Level? What are the success factors for this kind of transformation toward circular economy?

Mr Katainen: When the Juncker Commission started in 2014, circular economy mostly meant recycling waste. Quite soon we reached the idea that it is much more than that. EU as a continent-wide regulator, has a good change to regulate the market and encourage new circularity models to rise. It is all about creating new markets. Circular economy is a more sustainable, more sophisticated form of the market economy. The European Commission came to the view that we have to use our market regulation tool for creating incentives and creating a level playing field for the companies and countries.

Ms Yli-Viikari: So it is about enforcing the values of CE to the market through regulation? Any examples of obstacles to regulate the market in an optimal way?

Mr Katainen: Several obstacles. The biggest is a lack of understanding. Whenever you are creating something new, you have to see far enough. This is a current challenge globally. The second challenge is that even though the aim to create new markets for circular economy is widely shared, there are vested interests. For example, when we established stakeholder platforms for recycled plastics, we invited all stakeholders from different parts of the plastic value chain. A commonly shared objective was to create a new market for recycled plastics. However, companies are competitors with each other, they have different business models. The third obstacle is the change of legislators and how to avoid sub-optimisation in legislation. In some ways we can do a lot of harm if we sub-optimize something; the first idea may look good at first sight but not when you have a closer look. So, boosting circular economy via regulation is doable, a way to encourage circularity to rise, but it is not that easy. It is similar to challenges in all market areas.

Ms Yli-Viikari: This reminds me of the discussion public sector auditors have. You highlight the importance of understanding. Technology is developing very fast, so we have new kinds of possibilities opening up every year. The legislator has a lag so there is some catch up with what is happening in the market. This is also true for auditors. When we go and audit policy and regulation, we need to understand that it is past policy and regulation, and there is a future that is unfolding. The Circular Economy is one of the key themes that SITRA, the Finnish Innovation Fund has put forward. You have noted that only 9% of primary resources are recycled and reused. So there is a huge opportunity for actors to play out a roadmap which would guide us to perform better in circular economy. How did SITRA come up with the idea of circular economy, and what are the driving forces that you are working with?

Mr Katainen: True that only 9% of primary raw material is recycled and reused. If you turn this around, you see there is a huge market potential with the 91% of raw materials which are not recycled or reused. I see this challenge as a new opportunity. Finland was the first country in the world which produced a national circular economy roadmap. It has had a big impact on the government functions. The main reason Sitra got interested in circularity was the idea of decoupling economic growth from pollution or greenhouse gas emissions; Sitra staff thought

decoupling is possible only if we introduce systemic changes to the economic model. Circular economy is definitely one of the ways to achieve this. If we do not accept decoupling, we only have very bad choices, or no choices at all. We either have to admit we will pollute more and more, which has its limits, or we have to accept that our standard of living will sink deep. So, we have to decouple or accept this dark future.

Ms Yli-Viikari: From your experience with the Finnish government, at the European Commission and now at SITRA, what should actors in the public sphere - government officials, policy makers, legislators, politicians - do to create a better future for all of us?

Mr Katainen: I believe that we can address climate change and biodiversity loss only if we let market forces do their job. This means legislators have to understand how to guide market forces and create more sustainable markets, and to use the regulatory power that policy makers have. We have to ensure decoupling will come through. Otherwise losses will be too high. Qualities and competencies are closely linked to environmental taxes, and to how we create more sustainable market mechanisms.

Ms Yli-Viikari: Public auditors can provide information on the impact of policies and shed light on the gaps - if something should be happening but it is not. What could the government structures do?

Mr Katainen: That is true. As I said, there is always the risk of sub-optimisation. Therefore, I find that the auditors have an important role in impact assessment. Your role can be significant in raising technology neutrality and analysing the impact of different policies. When politicians get interested in something, they start thinking how to regulate to produce more common good, or how to taxate. It is all done in good faith, but there are always risks if the outcome or impacts of policies is not considered.

Ms Yli-Viikari: Could you share an insightful example of when technology goes further than the policy-makers initial idea?

Mr Katainen: The European Commission was preparing new legislation on single-use plastics, an important source of plastic waste which ends up in oceans, granulates into micro plastics. If nothing is done, in 50 years' time, there more plastics than fish is projected to be in the oceans. So, it is a serious problem and we made some proposals to address this issue. Two weeks before the

legislation was going to be approved by the European Parliament, a new technology for producing plastics from biomass appeared. So, in good faith the new legislation was made but became outdated already before adoption due to new technology. The technology mentioned is not in mass production yet, but it shows that there are huge challenges in creating legislation when technology develops so quickly.

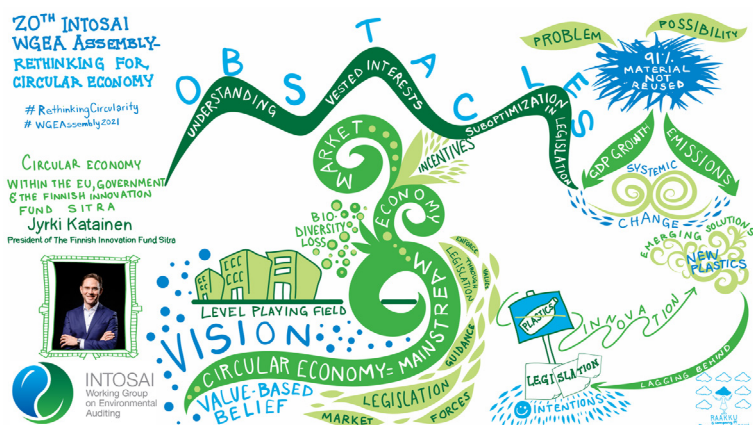


Figure 5: Visualization on Mr Katainen's presentation by Raquel Benmergui

Panel discussion

Key themes of the panel discussion following the keynote contributions were the global perspective, the role of markets and value chain, as well as regulation. Finally, the panellists gave their opinion on what the auditors could do.

Global nature of the concept

Elisa Tonda stressed that circular economy is topical not only in Europe; there are number of regions that have adopted the concept and are thinking what circularity means for them. The [African Alliance of Circular Economy](#) combines circular economy into African priorities, and considers circular economy an important instrument to advance growth with. It is triggered by the increasing amount of waste that African countries receive from other parts of the world. In Latin America, the movement is more recent and discusses how to combine circular economy with the development objectives. Many countries wish to focus on the primary sector. Thus, circular economy is interpreted differently around the world and connected to local priorities.

Jyrki Katainen also praised the energy of African Circular Economy Alliance. It is important that Africa would not make the same mistakes as others. China is also very interested in the circular economy and the topic is part of the economic dialogue with the EU. Circular economy is becoming part of the trade agreements and WTO has acknowledged circular economy as a movement.

If circular economy becomes a product standard e.g. in China and the EU, it would be highly risky for any producer to put a product on the market without these requirements, noted Jocelyn Blériot. When China banned the import of plastic waste couple of years ago, the amount shipped to China dropped dramatically, and the export moved to countries which were less well equipped to handle the waste.

Elisa Tonda highlighted the [One Planet Network](#) on SDG12 and other associated SDGs as a good example of putting environmental knowledge into action. It is about co-creating solutions, bringing key actors around the same table, and designing jointly with them. When we understand what the value chain is, we can trigger the change.

The role of markets and regulation

Panellists discussed the current linear economic systems and considered them extremely efficient. But as Jocelyn Blériot noted, they are efficient only to a certain extent. For example, in the case of Covid-19 pandemic, a lack of medical equipment was seen in the first phase.

All agreed that circular economy is becoming a mainstreamed part of the economy. Jyrki Katainen stressed that to replace a linear system value chains need to be rethought. Circular economy is market economy, new values should be introduced and therefore regulation needed besides markets. For example, oil is a very easy item to trade, while plastic waste is not. Therefore, circular economy needs to be made as efficient as the market economy, because the outcome is better. With the private sector taking the lead, regulation is however lagging behind. An additional thing that governments could do is to think what kind of jobs and skills are needed in circular economy.

Jocelyn Blériot noted that circular economy does not mean only “let’s be circular” in specific sectors, but should be thought through the whole system. It is very much linked to the climate, but in practice e.g. the National Determined Contributions under

the Paris Agreement do not (yet) include circularity. Recovery funding should support the Paris Agreement.

Jyrki Katainen noted that so far climate has been a bigger driver in circular economy than the biodiversity. There is however a strong causality: overconsumption and lack of recycling threaten biodiversity.

What could be the role of auditors?

Jyrki Katainen saw an important role for auditors to assess whether countries are stimulating in an old-fashioned manner or in a sustainable way. It would be worrisome to arrive at a stimulated but unsustainable economy, and this is where auditors view is needed.

Elisa Tonda pointed out no one instrument would make the trick. Instruments must be built so that they are transformative. But if she had to choose one instrument, it would be the public procurement. Governments can give a twist to the economy and a signal to the market, and they should not forget the SMEs. Jocelyn Blériot added that waste separation continues to be one key area which, if managed effectively, helps us to keep the environment clean and ensure safe organic flows, which too often are contaminated and therefore lose their potential value.



Figure 6: Visualization on the panel discussion by Raquel Benmergui

2 Circular economy in practice

Circular economy can be approached from the perspective of any policy sector. It can address the specific questions related to nutrient recycling, forests, bioenergy, waste management, or built environment and “urban mining” just to mention few⁹.

For the 20th Assembly meeting’s practical session, we let our membership decide on the areas of deeper scrutiny by opening a call for audit examples before the event. We received several cases related to waste sector, and one from the agricultural field. To supplement the agricultural perspective, we invited an inspirational speaker to share her ideas on regenerative agriculture.

2.1 Agriculture

Regenerative agriculture

The first question for Ms Saara Kankaanrinta, Finnish environmental influencer, was related to her journey of becoming a successful enthusiast. Her advice was to focus on a topic of passion and choose as many tools as possible to promote it. She certainly has used a great number of tools, as she is the founder of the Baltic Sea Action Group Foundation, Soilfood Ltd & Q Power Ltd among other initiatives.

Ms Kankaanrinta highlighted that the Baltic Sea by which also Finland is located is one of the most *eutrophicated seas*. However, the problem persists also in different areas around the globe (e.g. Lake Erie, Bay of Mexico, Yellow Sea). Eutrophicated water areas can be found where there is intensive agriculture and land use – the *nutrients* not being where they should be, speeding up algae in water bodies whereas they should be in the field speeding up the growth of plants. The conventional way of *farming* has caused huge environmental problems. Soil is key in mitigating climate change by storing carbon – it contains more carbon than plants and the atmosphere together. Therefore, it is important to encourage increasing soil rather than decreasing it in agriculture. In addition, it has a direct link to nutrient emissions to the Baltic Sea.



Figure 7: Many seas around the world are eutrophicated

Currently, soil is not treated well in land use and food production. The conventional paradigm is based on monocultures, pesticides, disturbing soil and in a reductionist way competing with nature. However, if the paradigm should be shifted towards regenerative agriculture and a regenerative way of doing things, partnering with nature, nurturing diversity, and looking at the ecosystem holistically.

The five Core ***Principles of Regenerative Agriculture*** are to minimize soil disturbance, maximize crop diversity (soil holds 25% of the global biodiversity and therefore essential), keep the soil covered, maintain living root year-round and integrate livestock to increase amount of carbon storage in the soil. Even though there is local variance on how the principles are used, the principles are the same all around.

Ms Kankaanrinta brought a practical example of an initiative called Finnish Carbon Action Platform, which aims at scaling up the amount of carbon action farmers.

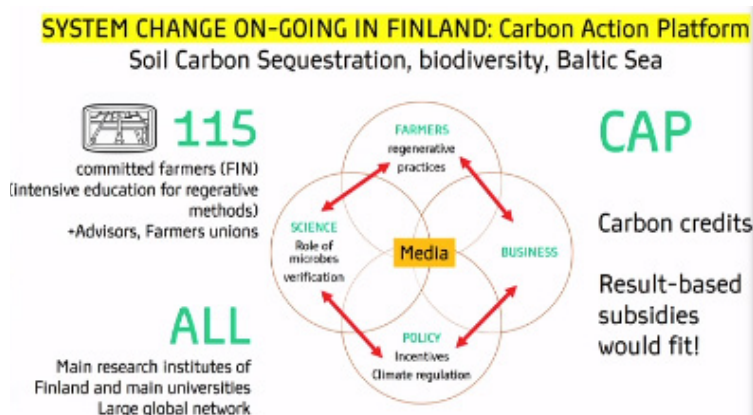


Figure 8: Carbon action platform



Figure 9: Carbon action farms

Ms Kankaanrinta's company Soilfood Ltd recycles nutrients and develops products needed in farming, thus shifting the existing paradigm. The operation volume of the company has grown by 2% each year and it has currently over 40 industrial clients in Finland. The company offer farmers agronomic know-how and a wider range of recycled fertilizers and soil improvers. Furthermore, Soilfood constantly develops new solutions. The name Soilfood comes from the term "soil food web" which is a complex living system in the soil with all its food chains. The microbiota of a healthy soil enhances the structure of the soil, recycling of nutrients and health of plants.



Figure 10: Products of Soilfood Ltd

Circular economy requires strong quality and control over how and when to use regenerative fertilizers. Clients of Soilfood are given a Regenerative Report annually, which provides an overview of their environmental impact. This will also encourage a paradigm change in business thinking.

China: Audit on Agricultural Circular Economy Project

The Agricultural Circular Economy Project was designed based on the concept of circular economy, with the purpose to control the usage of **chemical fertilizers** and **pesticides**, promote the **harmless disposal mode** of rural production and waste and facilitate the construction of **rural economy**. The key elements are:

- using free-range poultry to eliminate crop pests
- using the manure of poultry and crop stalks for biomass power generation
- providing electricity for rural production and life
- using the power generation waste as harmless fertilizer, so that the whole process will be renewable and recyclable.

The National Audit Office of China reviewed the input, management and use of financial subsidy funds, evaluated the benefits of the project output and capital input and exposed prominent problems existing in agricultural non-point source pollution control and rural environmental improvement. The four audit focus points included: the compliance with relevant laws and regulations, the management and use of financial subsidy funds, the implementation of agricultural non-point source pollution control and the treatment of rural domestic sewage garbage disposal and drinking water.

The audit included systematic thinking and verified the implementation of relevant policies and measures. The audit

methods included vertical analysis, horizontal comparison, risk assessment and benefit evaluation on various projects of the system. The audit also verified the effectiveness of subsidy funds, and finally focused on the main indicators of agricultural non-point source pollution control and verified the effectiveness of the project.

2.2 Waste and wastewater management

European Court of Auditors: EU action on plastic waste in the context of circular economy package

The objective of the **EU Circular Economy Action Plan (CEAP)** is to make sustainable products and services the norm and transform consumption patterns to avoid waste being produced in the first place. Main policy aims are to widen the **Ecodesign Directive** beyond energy-related products to improve durability/reusability, increase recycled content and promote high quality recycling while restricting single use products. These actions will be accompanied with a step-up in enforcement of sustainability requirements especially in terms of **inspections** and **market surveillance**. Some other ideas being discussed are the “right to repair” for products (availability of spare parts and access to repair), companies to substantiate their environmental claims and minimum levels of green public procurement.

Plastics areas at the heart of this challenge and a key part in all value chains the Action Plan targets. CEAP focuses on ICT, textiles, construction, food, packaging and plastics. Plastics and especially plastic packaging account for 40% of all plastics produced; 61% of all plastic waste and 80% of all plastic in the ocean. 42% of plastic packaging is currently reported as recycled, compared to 83% of paper, 76% of metal and 73% of plastic packaging. Therefore, plastics packaging is recycled much less than other packaging materials.

ECA chose to do a review rather than an audit because it was too soon to audit the topic. In the review, mainly publicly available information is used, and it does not contain conclusions or recommendations. The review focused on an overview of main sectors, data reporting, extended producer responsibility (EPR) schemes, essential requirements, EU funding, shipment and waste crime, as well as opportunities, challenges, gaps and risks facing the EU’s plastic strategy.

Packaging is the only sector with a plastic *recycling target*, and the reported plastic packaging recycling rate is expected to drop from 42 % to approximately 30% with the new more reliable reporting methodology. Extended Producer Reporting Schemes historically have promoted light weighting ahead of recyclability to reduce costs for producers. Essential requirements are unchanged since 1994 and a recent study by the European Commission found they are “unenforceable in practice” due to broadness and vagueness, consequently making it impossible to check whether a producer complies. Furthermore, looking at EU funding for waste management, it was found that only €1 billion out of €4,4 billion allocated for 2014–2020 had been spent by end of 2019. It was noted that 1/3 of EU’s plastic packaging recycling rate is achieved through shipment to third countries. However, the Basel Convention will make *exporting of plastic waste* more difficult to carry out in the future. It was also noted that waste crime, a growing area often associated with plastic waste, can frequently be linked to organized crime, has low detection rates and can be hard to trace when associated with international shipment.

The review identified the following opportunities, gaps and challenges:

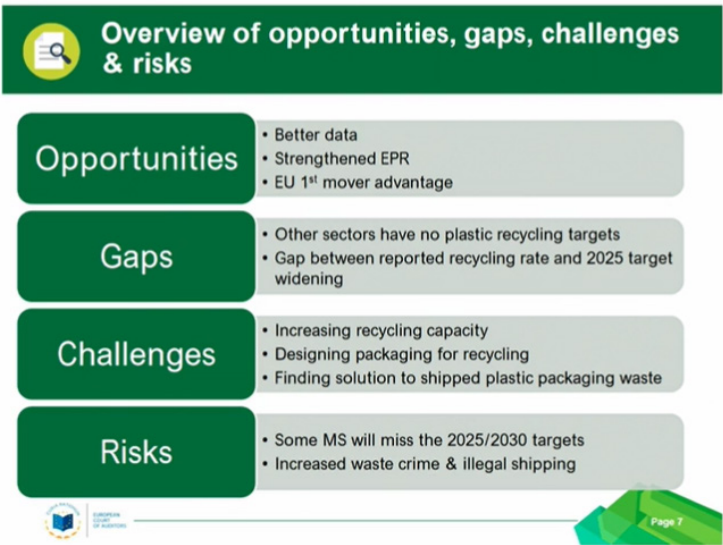


Figure 11: The opportunities, gaps, challenges and risks identified in the review

India: Role of Rag Pickers in Circular Economy

Circular economy is an important driver in achieving Sustainable Development Goals (SDGs). As a country, India strives for development with a minimal cost to the environment and is committed to the SDGs. One advantage is that the circular resource flow is already ingrained into Indian society, exemplified by a large **informal recycling sector** which recycles over 20% of the 150 million tons of waste per day. Furthermore, 60% of plastic waste formulated is recycled by the informal sector and India's plastic recycling rate is among the highest in the world.

Waste pickers are a person or groups of people that are engaged in collection and recovery of reusable and recyclable solid waste from various sources of waste generated. Therefore, they are passing the waste onwards in the waste management hierarchy. Waste pickers form a critical role in the **recycling value chain** providing benefits to society, environment and the economy. India is estimated to have 1.5–4 million waste pickers. Recovering reusable waste helps the formal waste management sector. The role of waste pickers is especially valuable in terms of **SDG 1**.

Plastic waste in India forms close to 8% of the solid waste in the country. India's rate of recycling plastic waste is the highest in the world with a recycling rate of 60% and with the plastic waste collection efficiency being 80.28%. 94% of plastic waste is recyclable. Challenges faced regarding waste pickers are skill gap, supply demand inconsistencies, occupational hazards, low wages and gender discriminations as well as quality control. Since recycling happens at the end of the value chain, waste pickers are not able to add much value to the waste and quality issues. In India only 1.5% of **electronic waste** is recycled and 95% of this is done by waste pickers. Challenges regarding e-waste are that there is lacking awareness about e-waste recycling, skill gaps, waste-pickers are prone to occupational hazards, fragmented nature of unorganized sectors are well gaps in regulatory sector (the role of waste pickers has been better acknowledged in other form of waste management).

Audit products on waste pickers by SAI India include a performance audit on management of waste in India (2007) as well as a performance audit of the Rajasthan Province (2018). Furthermore, NGOs (Saarthak, Chintan) have also conducted case studies regarding waste pickers such as a case study on how the plastic management system improves livelihoods of Bhopal women and helps the environment and a case study titled Waste Pickers: Delhi's Forgotten Environmentalists. NGO Saarthak has conducted capacity-building training for waste pickers on how to

extract reusable waste. Moreover, there are various steps taken for the ***inclusion of waste*** pickers by government committees/organizations from the perspectives of recognition, critical of municipalities, capacity building, integration, call for law, occupational health and organization. SAI India has recommended a law for waste pickers highlighting the health hazards they are facing. Actions taken by various stakeholders have included recognition of waste pickers, formalization of the informal sectors (registration of waste pickers), an all-inclusive approach in waste management, non-governmental organizations self-help groups and SAI India's periodical review on waste management. This year SAI India is also carrying out a review on waste management focusing on plastic waste.

Addressing the Circular Economy through Waste Management

SAI Indonesia presented on the performance audit on the management and ***pollution control*** of Citarum Watershed in Bandung Indonesia in 2016-2018. The audit objectives included looking at policies and program/activities planning, institutional capacity, implementation of program/activities as well as evaluation and monitoring. Six main environmental problems in the Citarum Watershed were highlighted in the audit: land use change, livestock waste domestic wastewater, fishery waste, industrial wastewater and solid waste. Earlier, solid waste, mainly consisting of waste coming from households, was dumped into the river and local governments had been working collectively to solve the problem. The waste collection rate in Bandung Regency is one of the lowest in areas along the river. Therefore, the Bandung residency-initiated ***waste management*** on different levels of inclusion from the household level (reduce, reuse, recycle), community level (recycle and recovery) to regional level (recovery and disposal). This meant prioritizing especially the household and community level. Initiatives at ***household level*** included separation between organic and inorganic waste, biopore infiltration holes/smart organic holes, carbon sink and conserving underground water, converting organic waste into compost and increasing water infiltration.

Community level initiatives have included larger scale composting equipment and utilizing organic waste in black soldier fly larvae (maggot) breeding. Furthermore, the community level initiative includes a waste bank that sorts household waste (which waste can be recycled), deposits the waste into a waste bank,

weighs the waste deposited and records the type and weight of waste to be converted into money. Lastly, the amount is written into a savings book for the customer, and the waste is then transported to the next processing site so that waste does not accumulate in the waste bank. In this mechanism waste becomes a source of revenue. In addition, initiatives at community level include using household materials for making handicrafts at recycling centers and creating them higher economic value. Equipment for communities to manage waste have included biodigesters, pyrolyses and waste briquettes.

At *regional/national level* there is a presidential regulation on *waste-to-energy facilities*. The presidential regulations aim to enhance waste energy facilities and solve municipal waste problems. A successful example of a large-scale initiative at regional/national level is the Benowo Waste-to-Energy Facility in Surabaya, East Java. The facility treats approximately 1,200 tons of waste per day and comprises of two units for landfill gas and thermal gasification. The facility has three main benefits: treating waste, producing energy and generating revenue. SAI Indonesia's audit also highlighted the need to sufficiently manage large amounts of waste. In addition, the audit report emphasized awareness of the individual and community in resource management which is valuable in creating prosperity.

3 Measuring circular economy

Ms Johanna Pakarinen from Statistics Finland and Ms Enni Ruokamo from the Finnish Environment Institute reflected on the practical cases heard and discussed more generally about the measuring of circular economy.

Ms Pakarinen pointed out that it is interesting to examine different societies and their waste management systems from a statistical point of view. This also illuminated how difficult it is to develop a **globally standardized way** to measure circularity to develop standardized statistical indicators. Having many completely different systems that vary across the globe makes things both interesting and challenging. Ms Ruokamo mentioned that the presentations highlighted how circular economy relates to different economic sectors and covers also different actors from households to governments. All presentations had addressed sustainability dimensions, showcasing the need to understand not just the economic aspects, but also social and environmental dimensions.

How to measure circular economy? What are the challenges?

Upon measuring something, a well-established definition for the object of measuring is needed. Circular economy is a relatively **new concept** (approx. 10 years old) and there are actions with different names (eg. cradle-to-cradle, resource efficiency, or industrial symbiosis), all are really related to circular economy. Nonetheless, a single well-established definition for circular economy is lacking, which makes it tricky to measure. Different circular economy sectors for example researchers, firms etc. approach circular economy with different scopes, priorities and starting points. These different definitions affect monitoring. Circular economy goes across the economy and has many different sides making it difficult to measure. A stakeholder survey by Statistics Finland on circular economy got 50 differing answers from 50 respondents. From a statistical point of view, the **classifications** do not really serve circular economy well. Non material-based flows in businesses, for example, are difficult to measure.

How do you see the global status in measuring Circular Economy?

This is a “hot topic” in global discussion. It has been discovered that currently in statistics there is ***no single comparable way to measure circular economy***. It has been identified that main issues are the measurement scope, many definitions and also the issue of data availability, because internationally not all countries produce the same data. In Europe, production of data is quite harmonized, but outside Europe there are many different systems. In addition, the user-need for data can be quite different, for example there can be a need for fast data or regional data. The statistics field is working on a task force for measuring circular economy and currently focusing on presenting to the Conference of European Statisticians. Hopefully by 2023, there will guidelines for measuring circular economy internationally and it will be a harmonized definition which is one of the key elements in cooperation between countries.

Even though there are a lot of challenges, there is also a lot that has already been done in relation to how to measure circular economy, there are many indicators and a lot of knowledge available. There is also a lot of research activity going on regarding ***indicator development***, for example there is development of social impact indicators related to circular economy employment and the desire to understand how different circular economy actions impact the environment. This means trying to develop information related to what kind of impacts circular economy has and how circular mitigates environmental impacts.

What is the most popular or best indicator currently available?

It is not possible to say much with just one indicator as it only evaluates one single aspect. However, as an example, there are already well-established indicators related to ***material flows***, these are nice indicators and can be used also in comparing different countries. In recent years there has emerged the need to give up the idea of using one single indicator to explain phenomena, for example GDP used to be the number that “tells us everything” and nowadays the world is so complex that just evaluating GDP doesn’t work any longer. Now we need to have multiple figures and see all the different sides of the topic – social, environmental, economical etc. It is therefore difficult to just pick one indicator. However, it is notable to mention that the ***consumption of raw material*** is an indicator, which is quite important – it has a long history of recording and is therefore easy to follow and measure.

Although going into the material footprint and seeing how one's material usage affects another country is where this indicator also gets complicated. It is easier to measure what goes on in your own country.

One of the main aims of circular economy is to try to reduce the use of virgin raw materials and with different actions resource efficiency can be increased and the raw material use mitigated. Therefore, a raw material consumption indicator is quite an important and good tool to get information related to countries' material use. Nonetheless, there are some pros and cons related to all indicators - for example raw material consumption indicates how much natural raw materials are required for the domestic final use and consumption including imported goods, but does not include the raw materials used for manufacturing in the home country which are exported goods. The indicator therefore has its benefits, but also misses certain information.

Finland is among the key developers for circular economy concept and policy. But what do the indicators tell in terms of actual performance when it comes to circular economy in Finland?

Finland is further ahead in making the programs and moving the work along¹⁰, but measurement is still lagging. As far as the material flows go, Finland is not the "best student". There is quite a lot of mining in Finland compared to many other countries. Resource efficiency has been moving steadily forward from the 70s onwards. In general, when measuring circular economy, it is important to also not always compare between countries but see how the country's own performance is developing, is it on the right track? Societies are very different, and different natural resources are available in countries so comparing between countries is a bit of risk. It is important to measure progress within the country to see if the country is going in the right direction. There are several things that Finland is quite good in that are not measured. For instance, **R&D** as well as **innovations** related to sustainability and circular economy cannot currently be disseminated from data. Consequently, the effects will most likely be seen later on when the innovations are up and running.

Is there something that you see as useful for auditors to produce? Assessment or information that would help bring the topic of circular economy forward?

Standardized and **comparable data** is preferable, in order to make this macro-level data we need to start from the micro-level in order to have good-quality statistics. It is also valuable

to ensure that **legislation** promotes data collection and that data are standardized. In addition, it is interesting to have audits of plans promoting circular economy, which is helpful to get the motion started. Furthermore, we need ambitious targets to stay in planetary boundaries in different economies. It would be nice to see different countries moving towards more **ambitious goals** related to transitioning to circular economy. Furthermore, if targets have been set, **monitoring** is needed to assess whether one is moving to the right direction. If we can provide good data on the progress and different kinds of indicators this would help circular economy related audit work as well. Platforms such as the INTOSAI WGEA Assembly serve as an important tool in exchanging information and making comparisons between countries.

What is the way forward and what is the next “big thing” we should keep an eye on when it comes to measuring circular economy?

From the research point of view, **environmental impact indicators** are important. It is also rewarding to develop **footprint indicators** as there are different environmental pressures that can be measured such as the carbon footprint, water footprint, toxic measure footprint and biodiversity footprint. **Biodiversity indicators** provide an interesting avenue of work and it is not yet well-understood what kinds of impacts certain circular economy actions or policies have on biodiversity, because the impact chains are complex and depend on location and the biodiversity of land. The value chain from when one buys a product is not easy to assess, but it is possible to do so. In addition to developing new indicators, it is encouraged to look at **existing data**, sometimes there is a high demand for data that are already there. Therefore, it is valuable to also increase the usage of current data. Eurostat has a circular economy indicator set available on their website, which consists of data currently available in Europe. Possibly the Global South already has some of the same indicators also available.

4 Conclusions

The first day of the INTOSAI WGEA 20th Assembly meeting was dedicated to the theme of circular economy. Circular economy represents a framework that can help us think in a new way in our societies and economies. It challenges the way we approach resources and consumption and how we measure economic development. At the same time, circular economy speaks the language that auditors are familiar with, as it is about using the resources in a more efficient and effective ways.

We learned about the concept of circular economy, the change from linear to circular economy and value chain from the main developers of the concept: Ellen MacArthur Foundation, UN Environment Programme and Sitra. Even though the concept of circular economy is no older than ten years, it has reached a global coverage. Furthermore, the concept itself is global in nature: on the one hand, the production chains are global, and waste is exported globally both legally and illegally. On the other hand, trade systems have a great potential for boosting circularity.

We also heard inspirational speeches and inspiring audit examples on agricultural and waste sectors. We also gained suggestions from our keynote speakers on the role of auditors. Auditors could assess the impact of various policies and pay attention to the big picture and policy mixes. If audit offices wish to concentrate in one sector or action, a good starting point could be waste separation or plastic waste, or public procurement, where governments have a crucial role.

The audit examples showed that despite the novelty of the concept, many audit offices have already integrated the concept into their assessments. For auditors, circular economy could be useful at least in two ways. Firstly, if a country has a circular economy strategy, program or projects, auditors could audit the coordination or implementation mechanisms, efficiency and effectiveness of measures, or funding schemes – just to name some approaches. For example, in the case of the European Court of Auditors, plastic packaging in the context of a larger Circular Economy Action Plan, was the focus of the review.

Second, circular economy could be an analytical framework or “lens” through which auditors scrutinize government actions in a variety of sectors. The case of SAI India, where the audit topic of informal waste pickers was put into the larger context of circular economy, including valuing garbage as a resource and discussing what happens to the waste pickers and recycling and reuse of materials once the living standards rise, is an example of this approach.

Finally, we heard considerations on measuring circular economy. Creating universal indicators is not easy because circular economy covers many sectors and actors, from households to governments and private sector. Moreover, countries and societies around the world are not similar. Material consumption and material flows, developing footprint indicators, using as much as possible the existing data, were key takeaways.

We hope this seminar summary has inspired readers and will help auditors around the world to conduct relevant audits, by not only adding the “label” of circularity into them, but understanding more profoundly how the concept could help us to reframe how we approach and assesses policies.

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