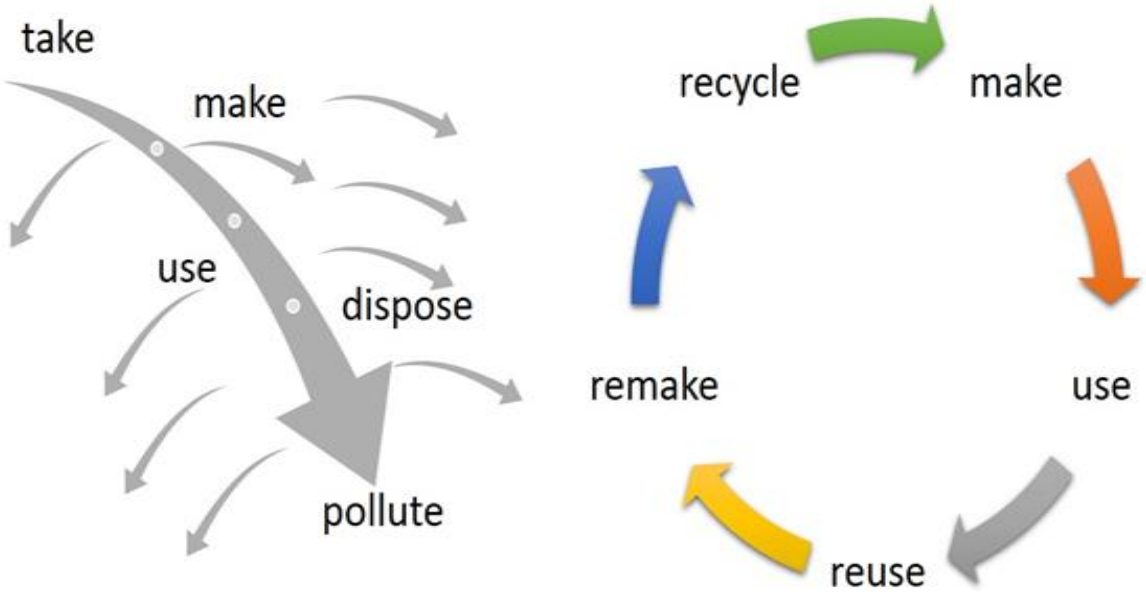
Food Security, Waste and Energy in a Circular Economy

Henry Ibitolu, Edoardo Desiderio, Louise Ormstrup Vestergård, Samira Nazir, Laura Brenes-Peralta, Teemu Loikkanen and Marc-Antoine Larrivee

Framework:
Concepts and methods

Circular Economy

The circular economy is a new way of creating value, and ultimately prosperity. It works by extending product lifespan through improved design and servicing, and relocating waste from the end of the supply chain to the beginning—in effect, using resources more efficiently by using them over and over, not only once.



Five business models for CE

Product-life extension

Products are used according to their original purpose for as long as possible or repaired and refurbished for multiple re-uses, thus reducing the need for purchasing and manufacturing new products.

Product as a service

The customer pays for certain functions or performance and avoids the risks of ownership. The total costs of ownership remain with the service provider, with revenue being earned by means of, for example, a leasing or rental agreement.

Sharing platforms

Digital-based platforms are used to promote the increased use of goods and resources and the extension of their life cycle, such as by renting, selling, sharing and re-use.

Renewability

Renewable, recyclable and biodegradable materials, as well as the principles of eco-design, are preferred for products and their design. Fossil fuels are replaced by renewable energy.

Resource efficiency and recycling

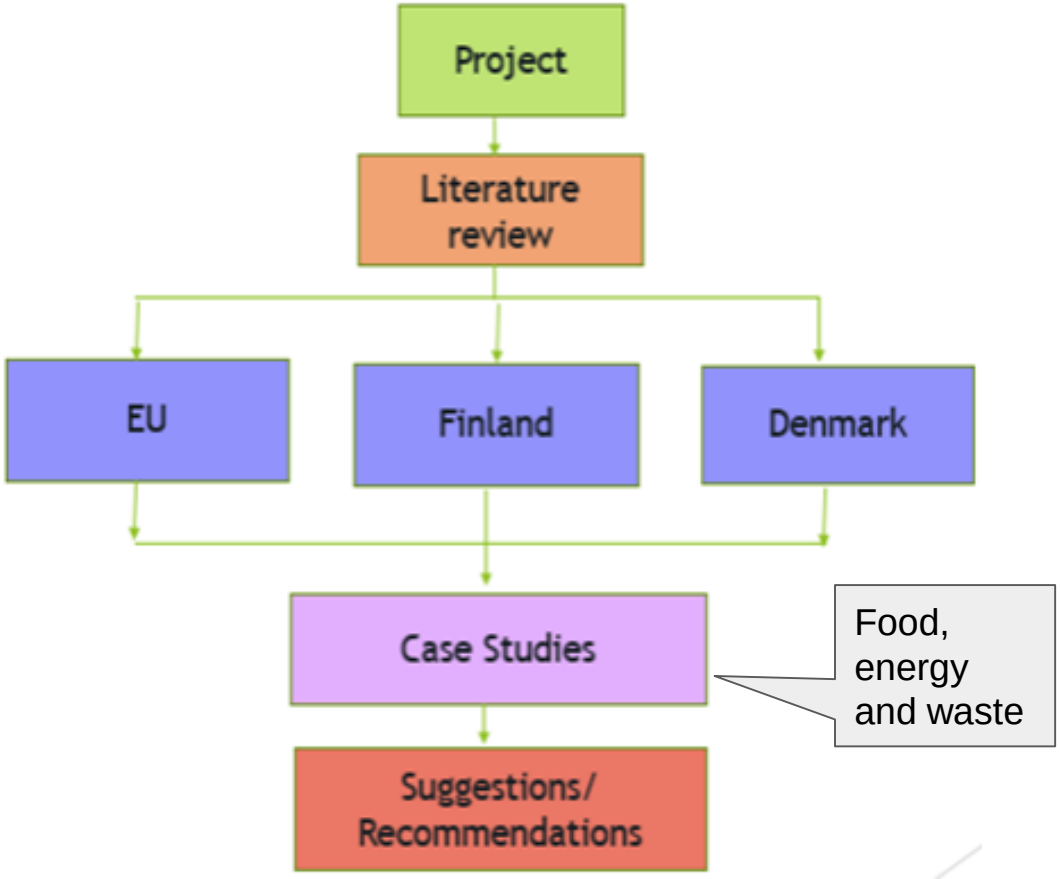
Technological development enhances resource efficiency in value chains, processes and products, and allows for more effective recycling. Side-streams are valuable raw materials for recycled products and materials.

SITRA

Circular economy: a timeline

- At the country and regional level, in **2008 China was among the first to adopt a circular economy law** promoting the recovery of resources from waste.
- Then, in **late 2015, the European Union adopted an ambitious Circular Economy Package**, including goals for food, water and plastics reuse.
- According to the Ellen MacArthur Foundation, by **2025 about $1 trillion per year of materials cost savings could be generated from circular business models**.
- **Finland aims to become a global pioneer in a world.** Despite Finland's small size, it has good opportunities to thrive in the face of global competition: factors such as a high-quality education, solid technological expertise and a strong reputation as a cleantech operator are fundamental to Finland's success.
- It is estimated **by 2030, the added value provided by a circular economy for Finland's national economy could be at least 3 billion euros per year**.

Methodology

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Finland
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Moscow
Москва
Estonia
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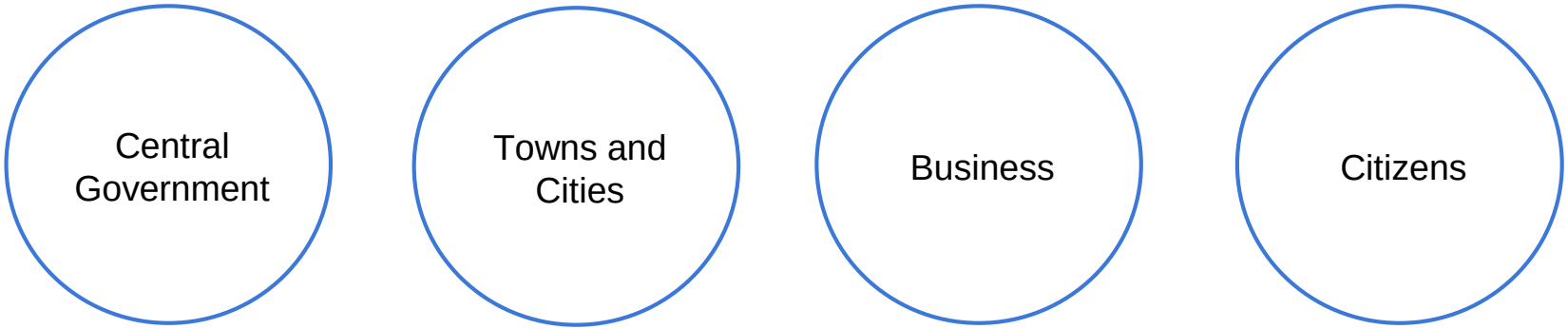
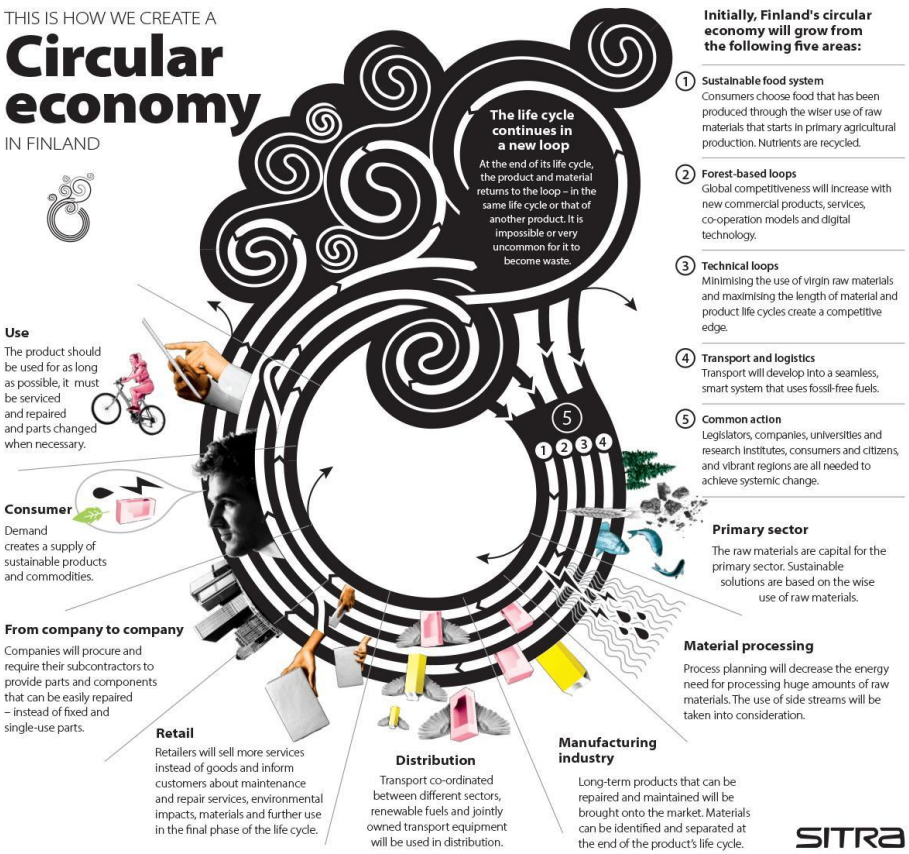
Netherlands
Berlin
London
Germany
Prague
Moldova
Belgium
Czechia
Slovakia
Vienna
Paris
Hungary
Romania
Austria
Google

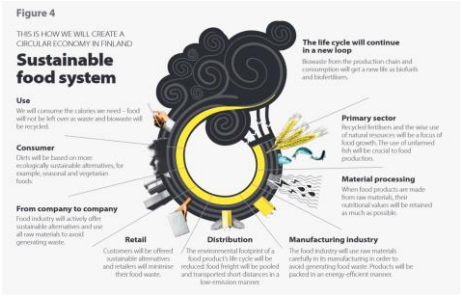
	European Union	**Finland**	**Denmark**
Document	*Report from the commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the implementation of the **Circular Economy Action Plan [2015]*** (**2019**)	*Action Plan for a Circular Economy* (**2017**)	*Strategy for circular economy – More value and better environment through design, consumption and recycling* (**2018**)
Author	European Commission	Ministry of Environment & Arbets- och näringsministeriet	Ministry of Environment & Food and Ministry of Industry, Business & Financial Affairs
Definition of circular economy	"an economy where the **value** of products, materials and resources is maintained in the economy for as long as possible, and the **generation of waste** minimised"	"In a circular economy, products will be designed to enable their **reuse** and **recycling**, **renewable resources** will be favoured, services will replace products, and energy production will be based on **renewable energy sources.** Realisation of a circular economy will require **significant changes** at the social level and also in the choices made by private citizens and consumers." (Sitra 2016, p.39)	Recirculate materials and products, extract their full value and minimise the waste. "Circular economy is about making our **growth sustainable**. To use our natural resources and design our products in a way, so main products that are gathered is used as **rational** and as **many times** as possible. And do not end up at a landfill, but in a new product."
Objectives	● Boost the EU's competitiveness ● Protecting businesses against scarcity of resources and price volatility ● Create new business opportunities ● Innovative and efficient production and consumption	● Generate internationally competitive solutions for the circular economy ● Create substantial added value for products ● Share best practices with other countries	● Secure businesses' competitiveness ● Sustainable management of natural resources ● Continued economic growth
Focus areas/priorities	● 54 actions ● EU Monitoring Framework for the CE 1. Production 2. Consumption 3. Waste Management 4. Secondary Raw Materials a. Plastic b. Food Waste c. Critical Raw Materials d. Construction and Demolition e. Biomass and bio-based products	● Legislative incentives ● New operating models ● Sustainable innovative public procurement (in Finland, the value of public procurement is over EUR 30 billion annually)	1. Strengthen enterprises as driving force for the circular transformation 2. Support circular economy through data and digitalisation 3. Promote circular economy through design 4. Change consumption patterns through circular economy 5. Create a good functioning market for waste and recycled commodities 6. Increase the value of buildings and biomass

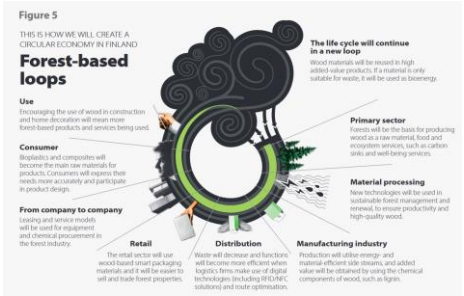
Finland: Sitra Road Map 2.0

1. Renewal of the foundations of competitiveness and vitality
2. Making a shift to low-carbon energy
3. Natural resources are regarded as scarcities
4. Everyday decisions act as catalysts for change

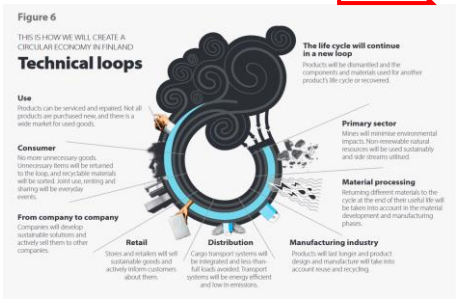


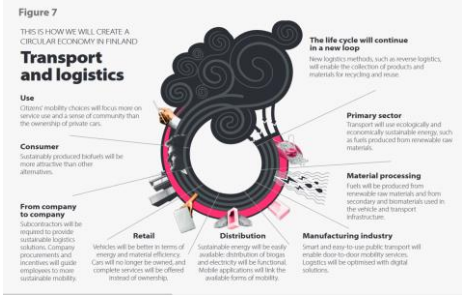






Common actions





Sitra (2016). Finish Road Map to a Circular Economy 2016-2025

Example from the Technical Loop

Description of the pilot

Industrial and construction material flows	**Create regional markets for secondary materials.** For example, a soil exchange for side streams from the mining industry, process industry and construction. The Helsinki Capital Region's UUMA programme will be utilised. The first action will be to organise a training seminar on the topic, where a working model for using secondary materials in infrastructure construction will be presented to key operators. **Owner:** Motiva, Confederation of Finnish Construction Industries RT
	Material efficiency agreements. Implement voluntary agreement activities for material efficiency in accordance with the applicable road map published in June 2016. Clearly linked the circular economy viewpoint to work and future pilots already being prepared by Motiva. It should be noted that a material efficiency agreement differs from energy efficiency in that material efficiency is often achieved in different phases of the value chain rather than at a single production plant. The agreement model should lead to clusters of different operators that jointly commit to certain circular economy goals, such as reuse of parts, life cycle services. **Owner:** Ministry of Economic Affairs and Employment, industry unions, Motiva
	Use of secondary material in earthworks. The pilot will involve developing practical guidelines and an operating model for using secondary materials. **Owner:** City of Lahti (owner), Ladec Oy, local companies

Sitra (2016). Finish Road Map to a Circular Economy 2016-2025

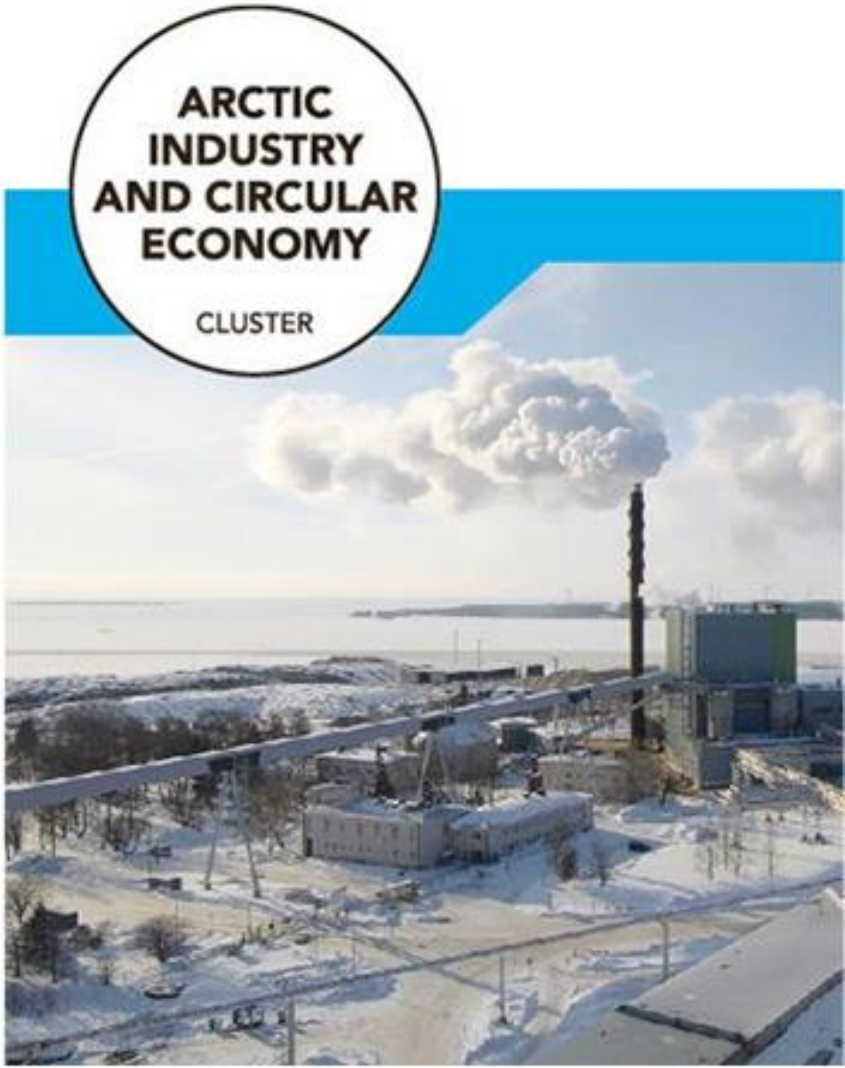
Circular economy in the region of Lapland

- Goal: to be a frontrunner in sustainable utilization of natural resources and sustainable industry and circular economy activities.
- More than 95 % of the waste generated in Finland is produced in industry

The clusters represent a new way of cooperating across organisational boundaries and developing new regional value chains. The core of cluster activities is to create growth and innovation opportunities for SMEs in Lapland.

The cluster:

- connects process- and mining industry companies, SMEs serving industry, universities, research institutions, funding and regional authorities to a same co-operation network.



Case studies:
Food security-Energy-Waste

Food security

Food Security and the Circular Economy *(SDGs & EU level)*

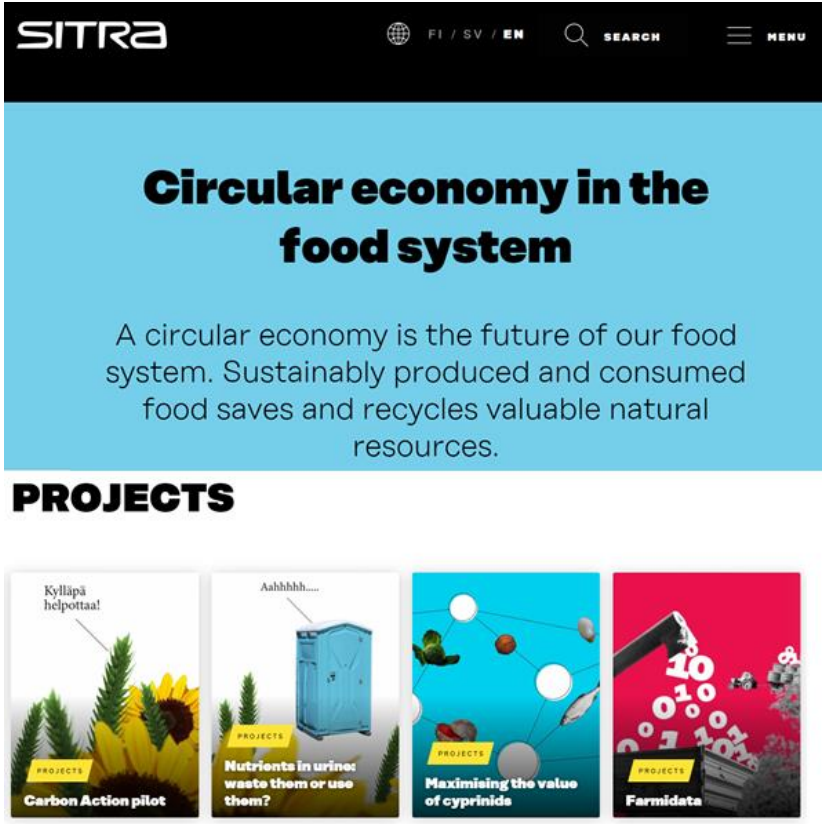
The EU Action Plan for the Circular Economy outlines a set of both general and material-specific actions, as Food Value Chains.

https://ec.europa.eu/growth/industry/sustainability/circular-economy_en

Food Security and the Circular Economy *(Finland level)*

•Minister of Agriculture and Forestry in 2017: "*stressed the **importance of food, water and energy security in the Finnish development policy**, also in the future. He reminded that the global trends are directly reflected in our national challenges as well*".

https://mmm.fi/en/article/-/asset_publisher/finnish-know-how-for-better-food-security



https://www.sitra.fi/en/projects/circular-economy-food-system/#projects

Food Security and the Circular Economy *(Lapland level)*

As an example:

•Visit to Kemijärvi vocational school allow is to see a knowledge building process, which was innovative but also respectful of culture and tradition.

•One of the students already had her own business using forest products and making the most out of them: different processing techniques, conservation strategies and by-products utilization.

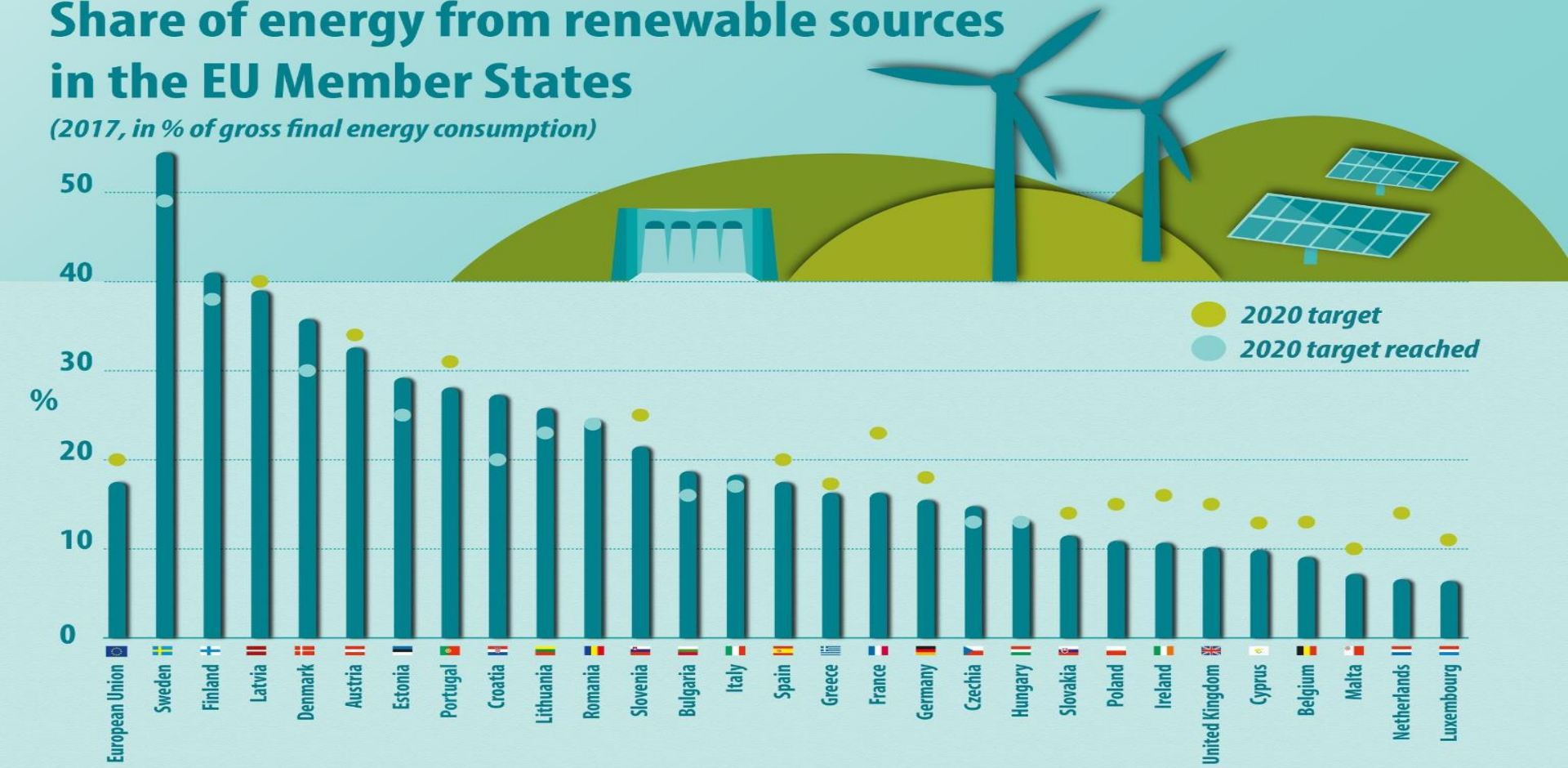
Energy

How is circular economy shaping energy policies in Finland?

- The European energy policy has been guided by conventional sustainability framework that focuses on eco-efficiency and energy-mix systems (Fischer et al. 2018).
- “Energy-mix”, includes whatever sources of energy are balanced in accordance to economic imperatives, social needs and partially ecological requirements (Kopnina,2017).
- Finnish legislation commits Finland to the EU’s common objective of a 20 per cent emissions reduction target by 2020. The Government of Prime Minister Juha Sipilä has set a further objective to raise the share of renewable energy sources to over 50 per cent of total energy consumption in the 2020s.(Aalto et al. 2016)

Share of energy from renewable sources in the EU Member States

(2017, in % of gross final energy consumption)



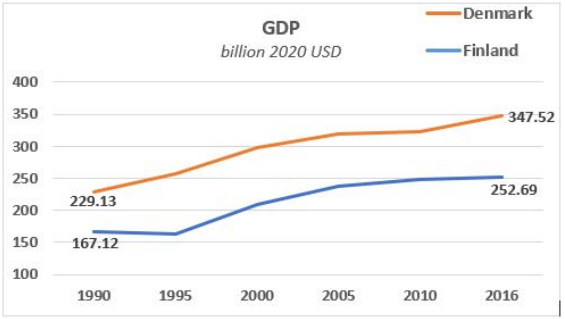
https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Share_of_energy_from_renewable_sources_2017_infograph.png

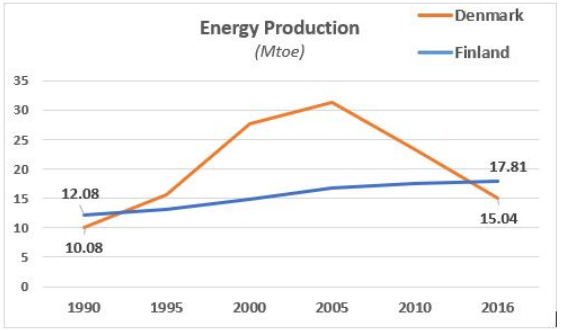
ec.europa.eu/eurostat

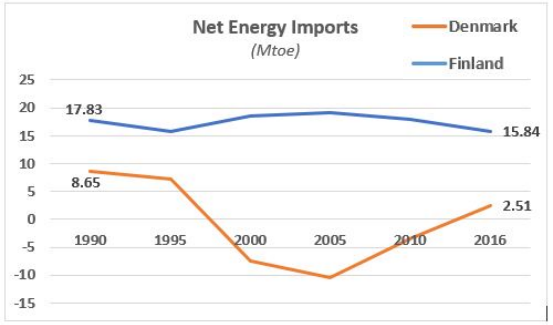
Title	Country	Year	Policy status	Policy type	Policy target
National and energy climate strategy of Finland for 2030	Finland	2016	In force	Policy support> Strategic	Multiple RE sources
Feed-in Tariffs for electricity from wind, biogas and wood chip	Finland	2016	In force	Economic instruments> Fiscal/financial incentives> Feed-in tariffs/premiums	Wind, bioenergy
National Renewable Energy Action Plan (NREAP)	Finland	2010	In force	Policy Support> Strategic planning, policy support	Multiple RE Sources, Multiple RE sources> CHP, Multiple RE Sources> Power

Long-term Climate and Energy Strategy	Finland	2008	In force	Policy Support> Strategic planning	Multiple RE Sources, Multiple RE Sources> Power
Finland - Methane to Markets Partnership	Finland	2008	Superseded	Voluntary approach	Bioenergy>Biomass for power, Bioenergy > Biomass for heat
BioRefine Technology Programme for New Biomass Products	Finland	2007	In force	Information and Education>Information provision, Economic Instruments>Fiscal/financial incentives>Grants and subsidies, Economic Instruments>Fiscal/financial incentives>Loans, Research, Development and Deployment (RD&D)	Bioenergy> Biomass for power, Bioenergy> Biomass for heat

Comparative Analysis of Energy in Finland & Denmark





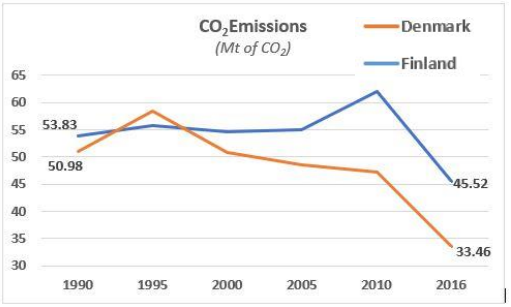


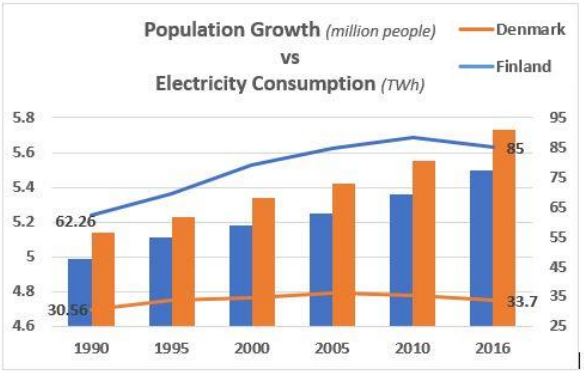
Data Source: IEA.org

		Finland	Denmark
GDP *(billion 2010 USD)*	**1990**	167.12	229.13
	% Δ	51.20	51.67
	2016	252.69	347.52
Energy Production *(Mtoe)*	**1990**	12.08	10.08
	% Δ	47.43	49.21
	2016	17.81	15.04
Net Energy Imports *(Mtoe)*	**1990**	17.83	8.65
	% Δ	-11.16	-0.71
	2016	15.84	2.51
Electricity Consumption *(TWh)*	**1990**	62.26	30.56
	% Δ	36.52	10.27
	2016	85.00	33.70
CO_2 Emissions (Mt of CO_2)	**1990**	53.83	50.98
	% Δ	-15.44	-34.37
	2016	45.52	33.46
Population *(million people)*	**1990**	4.99	5.14
	% Δ	10.22	11.48
	2016	5.50	5.73

Mtoe: Million tonnes of oil equivalent

TWh: Terawatt-hour, Mt: Million tonnes of CO_2

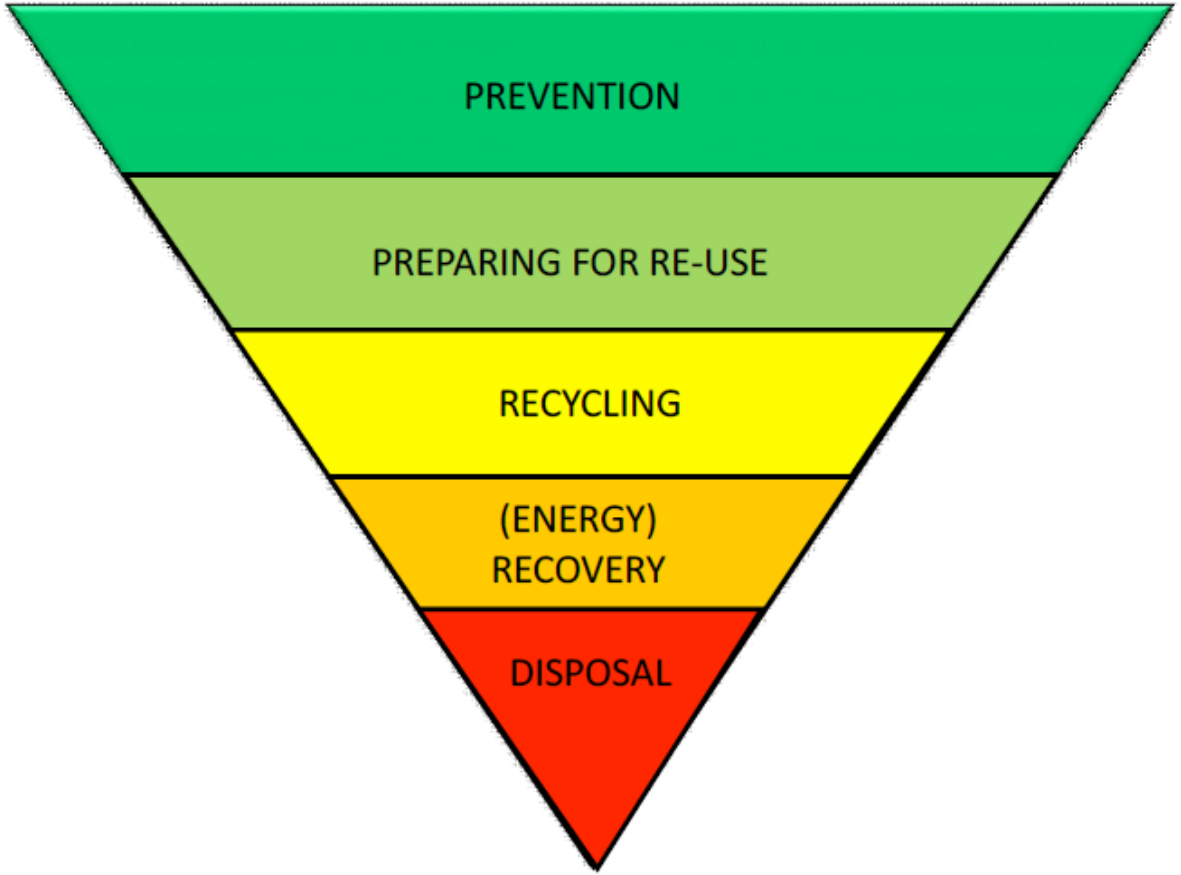




- Significant Progress made to reduce CO_2 emission in both cases,
- Finland consumes more electricity compared to Denmark,
- Denmark produces more energy, and on path to a self-sustaining future.

Recycling and Waste

Figure 3 – Waste hierarchy



Source: European Commission.

Tornio Brewery – bread from malts.

Loue school and farm, producing biogas from the manure of cows.

Kemijärvi vocational school. Shampoo and other products without plastic packaging

Circular Economy and waste policies

- My Master's thesis: Duty and obligation of waste management is placed on the citizens.
- Jacob Hasselbalch (NESS 2019): Different objectives of Circular Economy have been lumped together emphasising "green growth".

- UPSIDE DOWN??

Final comments...

The group had the perception of a lot of focus still in growth and competitiveness, and not that much in well-being and consumer´s approach and their awareness.

“Green-washing” was a concept that surfaced a lot of times in our discussions, and our concern is that sometimes appealing terms are brought up but they do not really cope with actual Rural Development (including different activities) nor maintain a uniform concept among levels (EU, country, local).

Final comments...

Circular economy perspective seems to be in people's mind even from tradition, but policy strategies seem to be focusing a lot in the “economics” and the technology, not evidently linked to nutrition, health, or right for food as in other parts of the world, probably due to the income context.

The Energy Policy Implementation in the two cases has been successful based on the current trend, and we believe both countries are on course to achieve a sustainable energy future - although this will be dependent on how Climate Change affects the different energy resources.

Recommendations and Learned Lessons

Looking at different case studies from the local, national and regional level can help to address gaps and understand the need to contextualize policies, strategies and actions.

The above-mentioned must never lose the focus to ensure a real inclusive development.

Education, clear strategies, funding and research seem to be constant elements to work towards solutions.

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Thank you

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