Promoting use of Life Cycle Thinking in Regional policies

LCA4Regions
Interreg Europe

European Union
European Regional
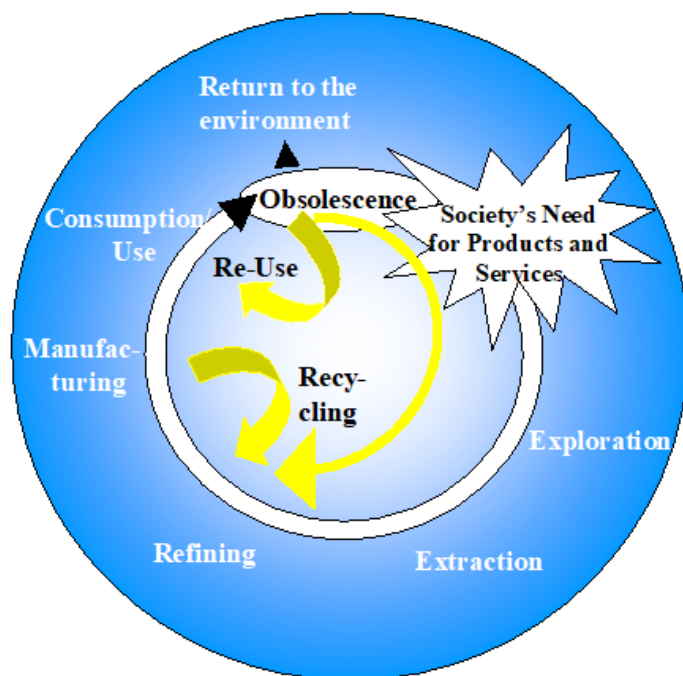Development Fund

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18th European Week of Regions and Cities, 15 October, 2020

Life Cycle Thinking

Return to the environment

Obsolescence

Consumption/Use

Re-Use

Society's Need for Products and Services

Manufac-turing

Recy-cling

Exploration

Refining

Extraction

Source: Secretariat, UNEP/SETAC Life Cycle Initiative

"Consumers are increasingly interested in the world behind the product they buy. Life cycle thinking implies that everyone in the whole chain of a product's life cycle, from cradle to grave has a responsibility and a role to play, taking into account all the relevant external effects."

**Klaus Toepfer,
Former Executive Director,
UNEP**

« The world behind the product »

Life cycle thinking:
Promotes sustainability
Is resource efficient
Reduces waste
Avoids unwanted secondary impacts
Designs and produces sustainable products
Encourages sustainable social conditions

This can apply to materials, products, organisations, territories, biodiversity, land, resources, infrastructures, etc.

Definition

A **Life Cycle of a product** (*"cradle to grave"*) begins with raw materials production and extends to manufacture, use, transport, and waste management
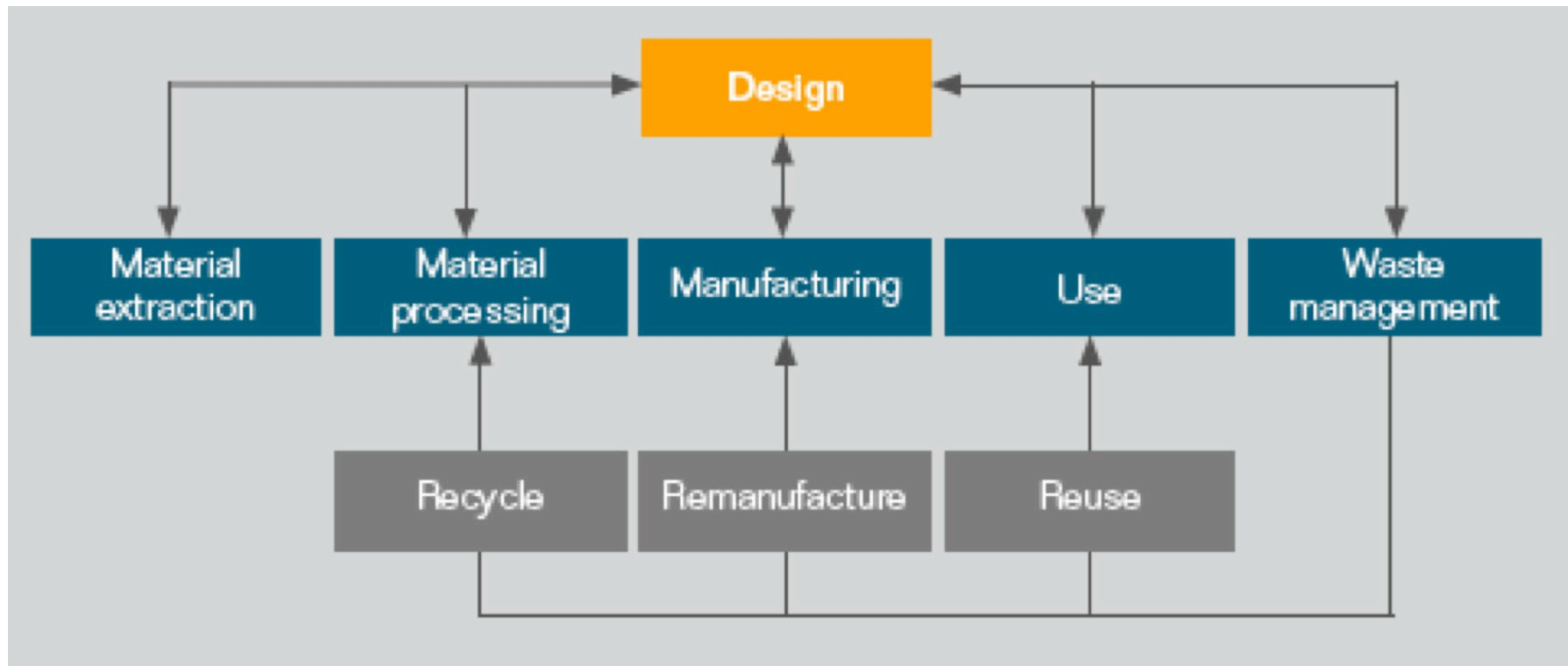
Typical Sustainability initiatives by Regions

Numerous policies presently try to address the Sustainability challenges of Regions. For example:

- **Renewable energy, Climate change and Carbon neutral territory**

- **Resource efficiency, Cleaner production and Industrial innovation**

- **Sustainable agriculture and forestry**

- **Zero waste, Circular economy, Recycling, Bio-economy**

- **Safe production, Social cohesion, health for all**

- **Sustainable consumption, Green procurement, Eco-products**

- **Sustainable buildings, Sustainable transport, Sustainable tourism**

… and many more

to achieve the SDG's…

Life cycle thinking for sustainability

1. Identify all relevant sustainability targets (SDGs) and other local objectives

2. Understand the life cycle impacts (LCA) of products and actions
– build (or borrow) data bases, choose assessment methods, draw correct conclusions, communicate the footprints

3. Manage (reduce) the life cycle impacts (LCM)
- build stakeholder partnerships to: select best infrastructure options, procurement to avoid impacts in the supply chain, support sustainable product innovation, choose sustainable resource development options, manage own organisational footprint, influence societal and organisational consumption patterns
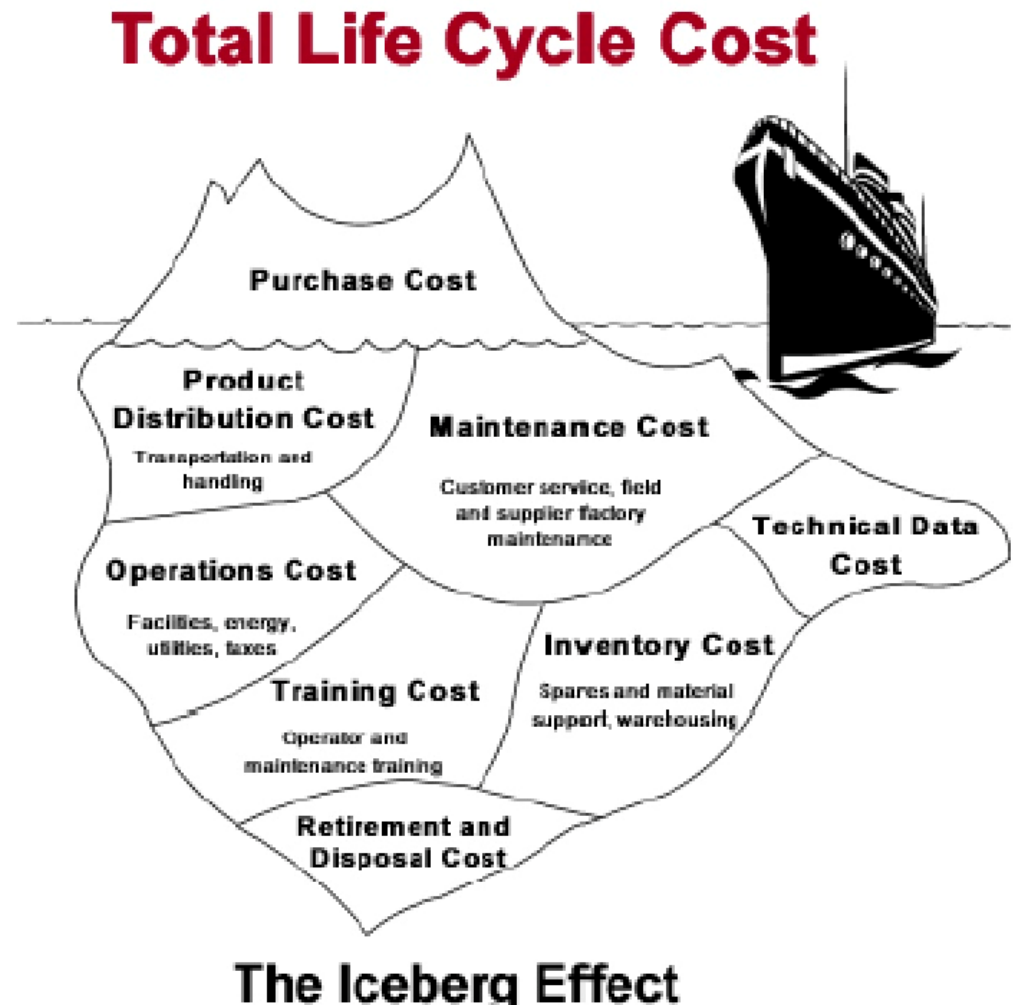
Life chains have many impact points
example of the food sector life chain
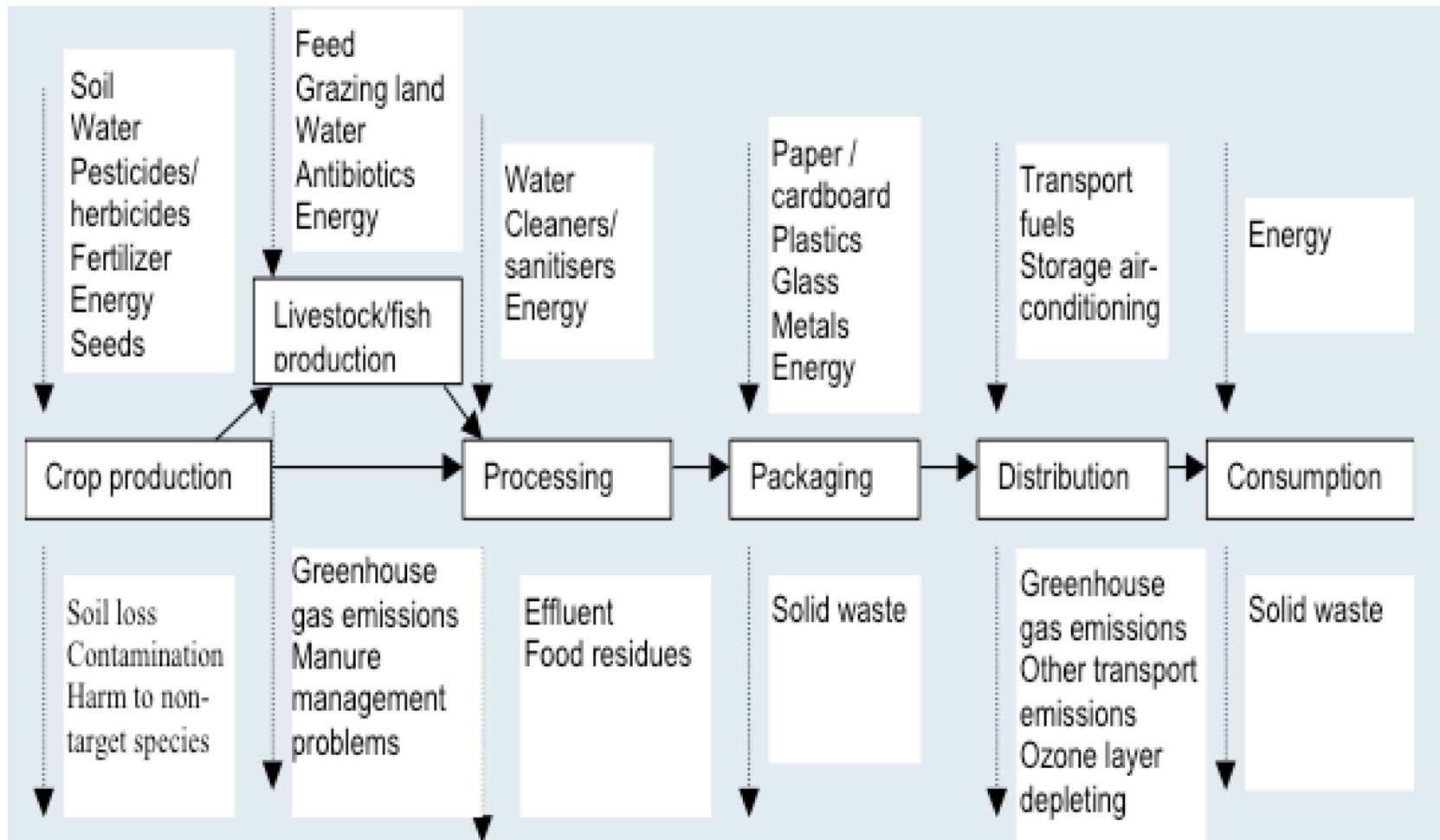
An illustration of Life cycle thinking

Example of Life Cycle Costing (LCC) –

- Traditional costing – consider only initial purchase price
- Internal life cycle costing – account for internal cost flows
- Full life cycle costing – address internal + external costs

Total Life Cycle Cost

Purchase Cost

Product Distribution Cost
Transportation and handling

Maintenance Cost
Customer service, field and supplier factory maintenance

Technical Data Cost

Operations Cost
Facilities, energy, utilities, taxes

Training Cost
Operator and maintenance training

Inventory Cost
Spares and material support, warehousing

Retirement and Disposal Cost

The Iceberg Effect

Some common weaknesses

Regions fall short in a number of important ways in their policies towards **Sustainable development**:

➢ Limited set of **Sustainability goals** e.g. only Fair Trade, or only climate change ('cherry-picking")

➢ Not considering the entire **Life cycle** impacts of their actions ("short-sighted")

➢ Not considering **Spill-over impacts** e.g. biofuels, recycling residues ("parochial")

There is also the rebound effect to take into acount

Unwanted spill-over effects

Improving sustainability in one area may create unexpected impacts elsewhere

❑ Biomass harvesting for bio-energy can impact on land quality and on biodiversity

> *Example: of fuel-wood from South American forests, or palm oil from Asia*

❑ Convenient single-use plastics in food and health services reduces need for detergents for cleaning but greatly increases the problems of waste disposal

> *Example: of growth in medical waste*

❑ Promotion of mass tourism often overwhelms local communities, and adds stress to scarce local services (waste, water supply, transport, etc.)

> *Example: of social impacts in Venice, and other small communities generally*

Some LCA for common products & services

- **Two views on Electric vehicles** - https://theicct.org/publications/EV-battery-manufacturing-emissions https://thedriven.io/2019/12/15/is-a-diesel-cleaner-than-an-electric-car-in-australia/
- **Palm oil as biofuel** - https://www.ifeu.de/landwirtschaft/pdf/rettenmaier_lca-biodiesel.pdf
- **Water footprint of National diet** - https://www.mdpi.com/2072-6643/11/8/1846
- **Organic farming produces higher Greenhouse gas emissions**, but the biggest impact is from livestock raising, it can be deduced that a consumption-type solution would be more effective in reducing GHG. - https://www.abc.net.au/news/science/2019-10-23/organic-vs-non-organic-farming-emissions/11623288
- **The 'circularity paradox' in the European steel industry"** http://theconversation.com/the-circularity-paradox-in-the-european-steel-industry-125613

- **And many more about the Life cycle assessment results of the products, processess, and etc.**

Q: what is the regional policy implication of the above ?

Two main interest areas

❑ Assessment and analysis

Life cycle assessment (LCA)

❑ Management action

Life cycle management (LCM)

Selected Life Cycle Tools, Procedures and Concepts
useful for efficient and effective implementation of SDGs

Life cycle systems and concepts
Circular economy
Industrial ecology
Product-service system
Cradle to grave/cradle to cradle
Environmental/sustainability footprints

Life cycle assessment tools and methods
Life cycle assessment LCA* (materials, energy)
Materials flow assessment (MFA)
Input-Output tables
Social LCA (SLCA)
Sustainability LCA
Organisational LCA (O-LCA)
Life cycle Costing (LCC)
Chemicals assessment*
Risk assessment
Evolving assessment tools for biodiversity, LULUC, landscape etc.

Action tools based on LCA
Eco-labels*
Environmental Product Declarations (EPD)*
Product environmental footprint (PEF)*
Eco-design

Life cycle Management Tools
Sustainable supply-chain management (SSCM)
Circular materials management
Sustainable and/or circular public procurement (SSP, CPP)
Green purchasing (GP)
Extended Producer Responsibility (EPR)
Environmental Management Systems* (EMS, EMAS)
Sustainability reporting* (e.g. GRI)

1. Some of the above have been standardized procedures under international agreements or practices*
2. Other concepts such as sustainable production, resource efficiency, etc. also provide useful frameworks for implementing selected SDGs

Life Cycle Assessment methods - LCA

Measuring the life cycle impacts
of materials, products and issues important to
regions

Comparative impact assessment

LCA results for generalised energy options
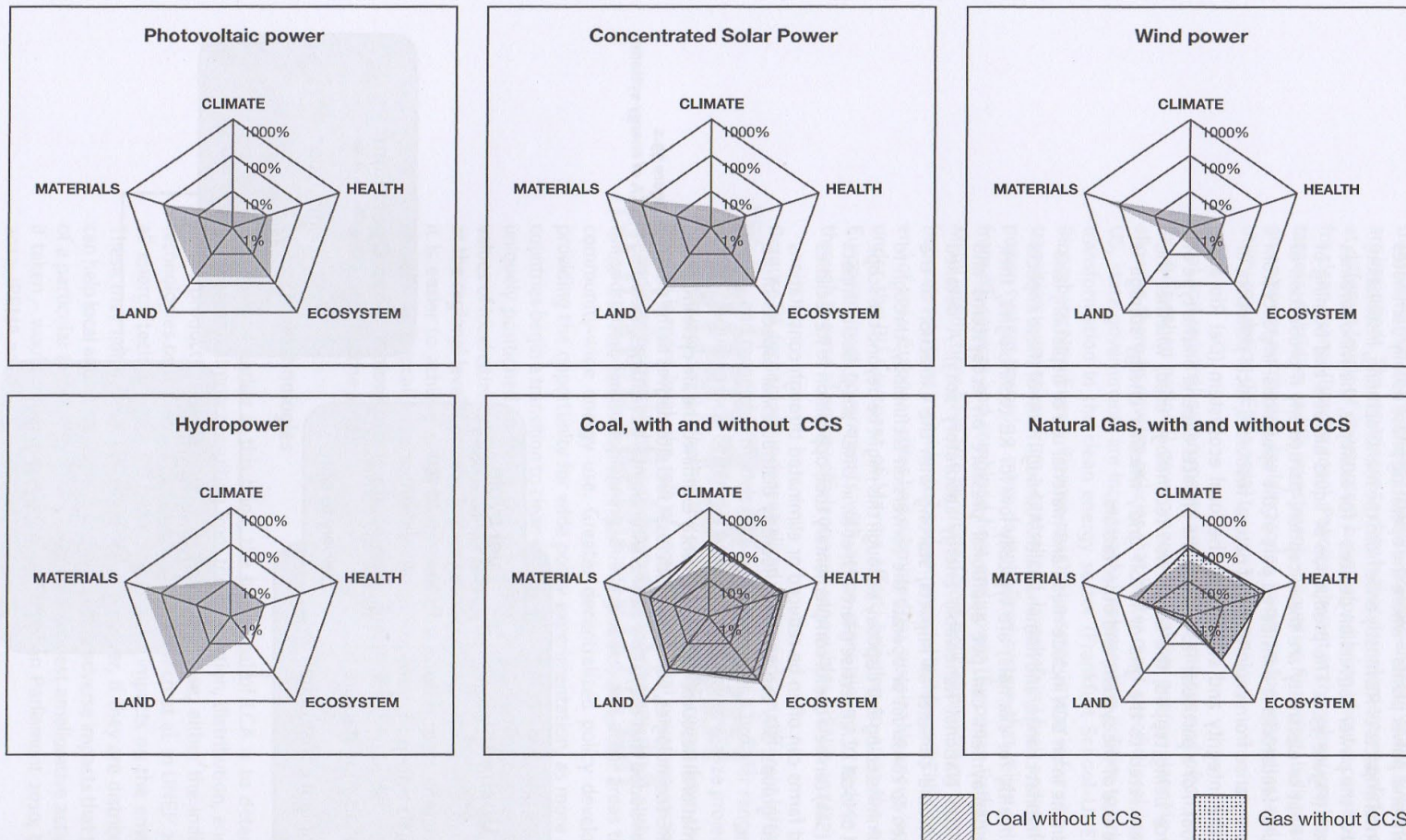*Performance on 5 sustainability criteria is compared*
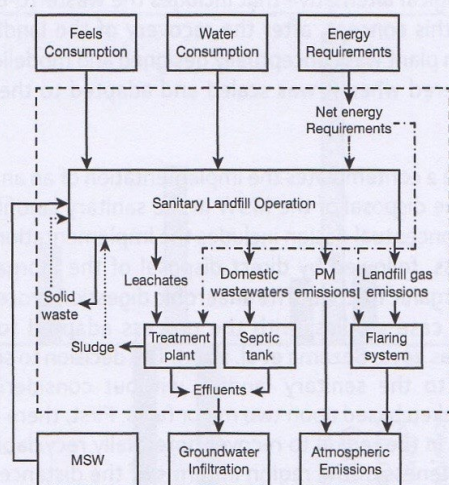

Figure 39.2

LCA for waste management options

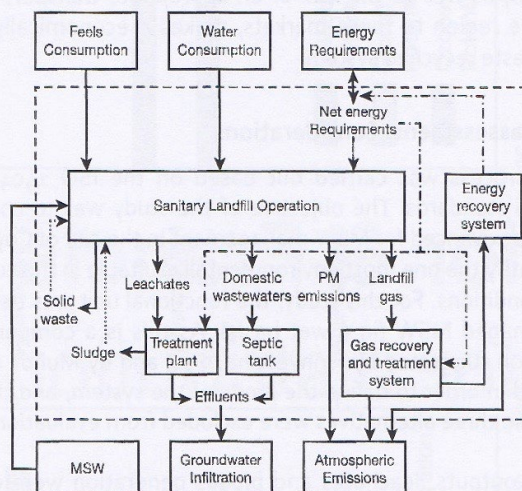What is the best technology option for a region?

- example of Aysén region, Chile

Looking for sustainable options - LCA to evaluate economics and sustainability of waste incineration vs. biogas from landfill. Alternatives considered included Biogas from landfill, Incineration, and a Reactor.

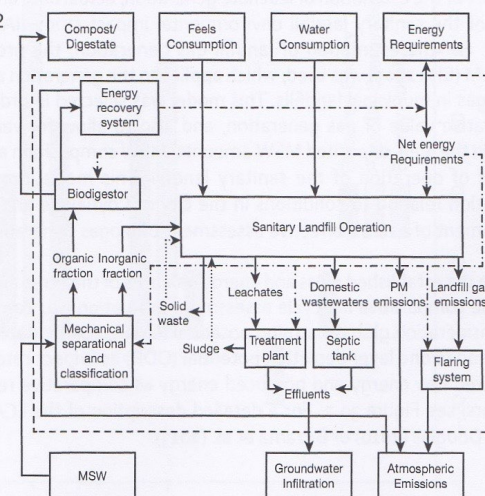What are the Sustainability consequences of each?
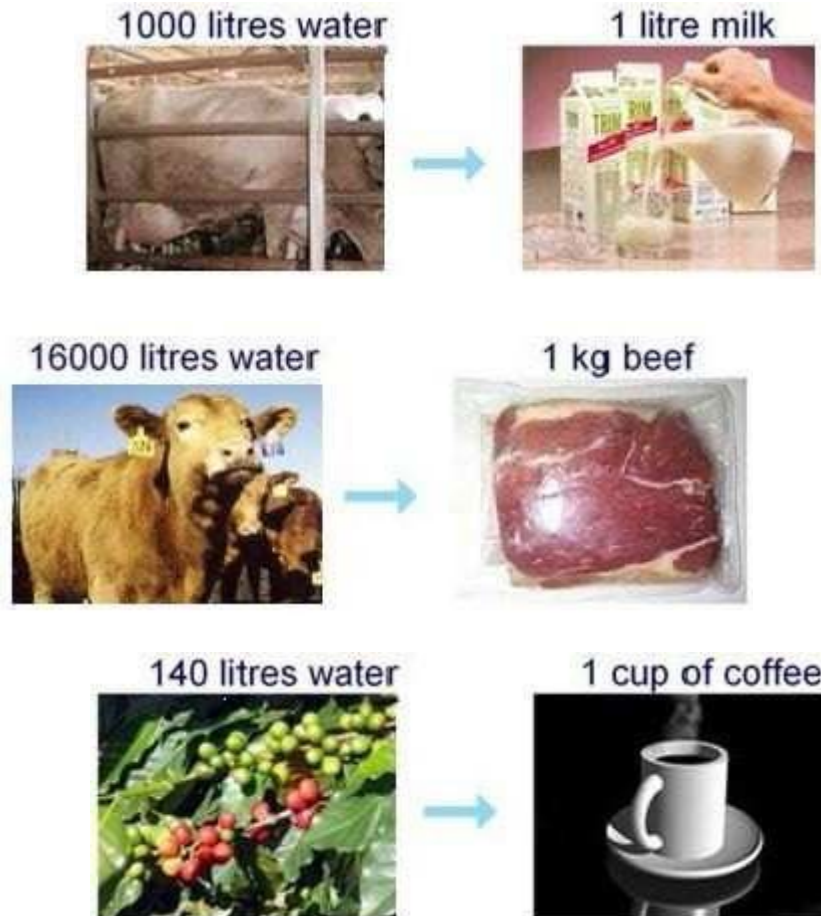
Based on Bezama et al

Water Footprint

1000 litres water → 1 litre milk

16000 litres water → 1 kg beef

140 litres water → 1 cup of coffee

International Organization for Standardization

ISO 14046

The International Standard specifies the requirements and guidelines for the assessment and reporting of the LCA - based Water Footprint: Coherence between the carbon footprint and other impact categories of the LCA, including the scope and system boundaries
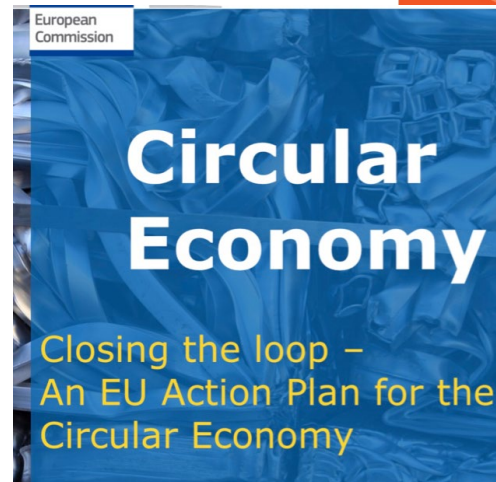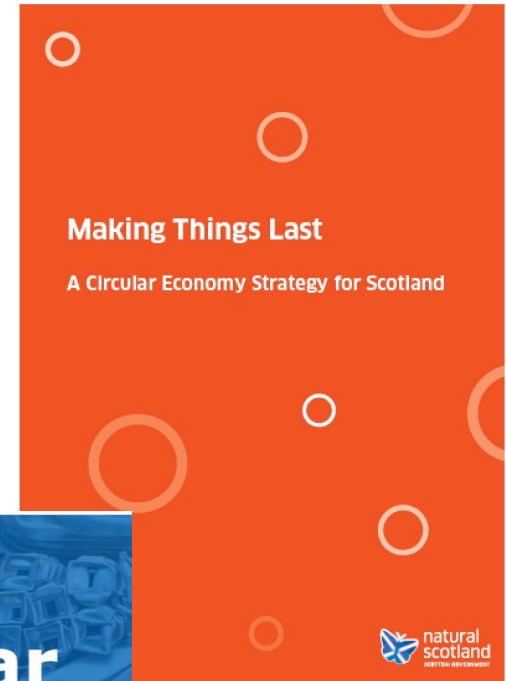
How relevant is this to regional agriculture policy?
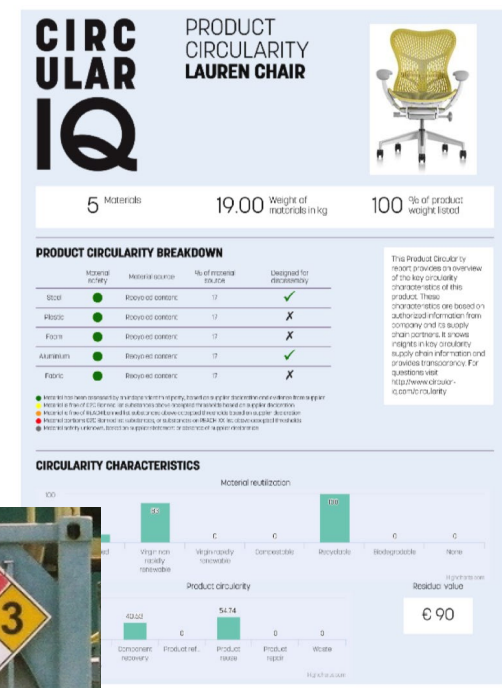
Life Cycle Management - LCM

Translating assessment results into regional life cycle policy implementation

LCM example 1 – Zero waste circular economy

- Documenting problem areas
- Identifying significant waste streams
- LCA on priority wastes
- Reduction at source
- Innovation – think of CE ideas
- LCA for circular economy options
- LCM Stakeholder consultations
- Taking action
- Measuring results

Making Things Last
A Circular Economy Strategy for Scotland

natural scotland
SCOTTISH GOVERNMENT

European Commission

Circular Economy

Closing the loop –
An EU Action Plan for the Circular Economy

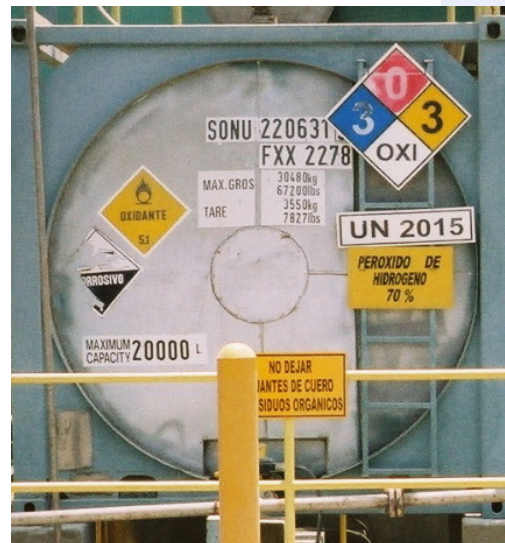https://www.zerowastescotland.org.uk/our-work/circular-economy

LCM example 2- Eco-labels, EPD, etc.

Q: Which regional policies are supported by labelling tools ?
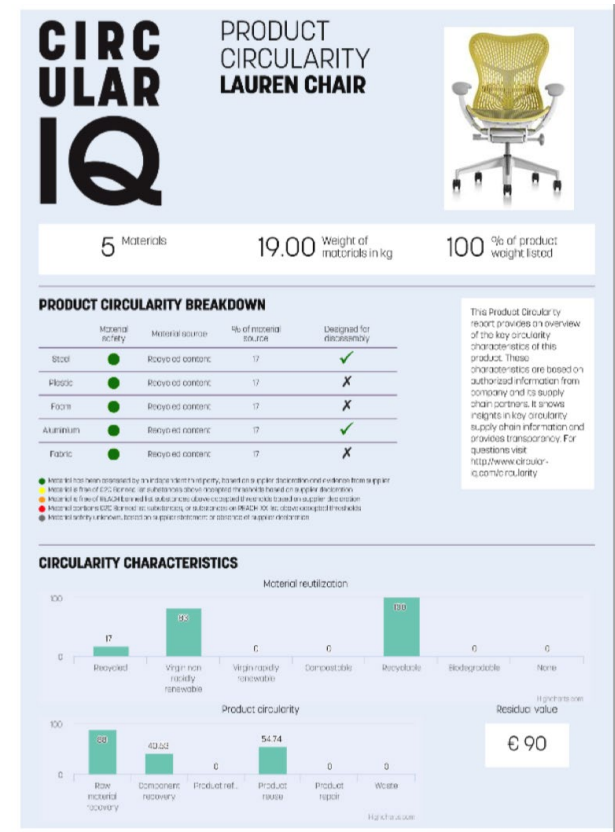
Q: How are such labels selected?

Q: Who are the stakeholders ?

LCM example 3 – Circular Procurement

- Public authorities in the Netherlands are required by legislation to base at least 10% of their current purchasing on Circular economy criteria.

- This has resulted in rethinking of the design and Life chain, and the after-use, of office furniture and furnishings.
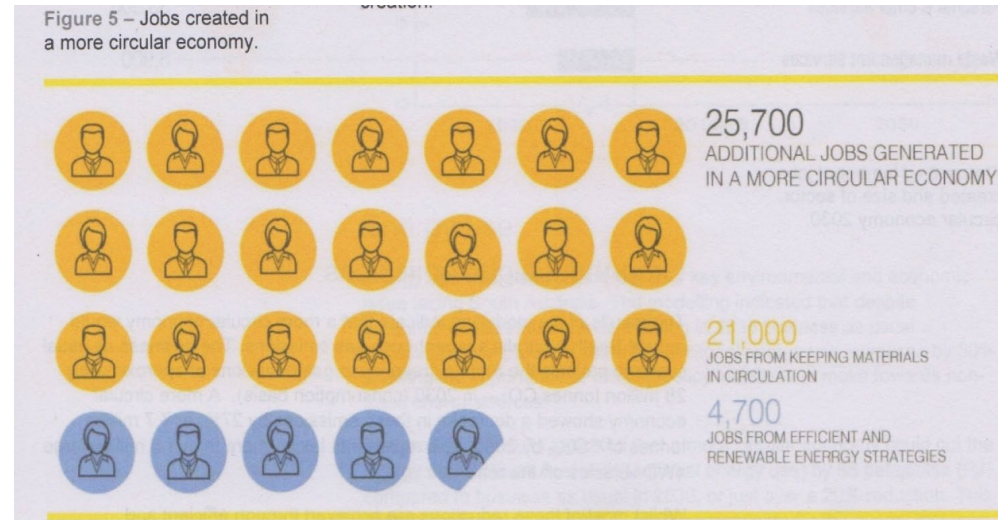
- It has also led to a rethinking of EPD criteria

See also the sustainable procurement policy in Barcelona

https://ajuntament.barcelona.cat/contractaciopublica/sites/default/files/ins_eng_c_furniture.pdf

LCM example 4 – Circular Economic planning in Australia

Circular economy implementation depends on a Life cycle view of materials flows – where they come from, where they go, and how they can remain valuable at all stages of their life cycle.

Social impact such as employment is a part of the CE/LCA calculation

Figure 5 – Jobs created in a more circular economy.

25,700 ADDITIONAL JOBS GENERATED IN A MORE CIRCULAR ECONOMY

21,000 JOBS FROM KEEPING MATERIALS IN CIRCULATION

4,700 JOBS FROM EFFICIENT AND RENEWABLE ENERRGY STRATEGIES

Q: Which Life cycle tools underpin a Circular economy?

From Tim Grant

LCM example 5 – Resource efficient buildings

- Understanding the building Life cycle
- Documenting impacts and consequences
- Identify main building materials
- Life Cycle Assessment of key building components
- Identifying key stakeholder along the Life cycle
- Consultation on objectives and means
- Agreeing on metrics
- Action plan
- Monitoring

How **green homes** can provide the building blocks towards meeting several **Sustainable Development Goals**

Some possible
Life Cycle Management applications

Product improvement and development ←→ **Design for the Environment**

Resource development ←→ **Industrial optimisation**

Pollution prevention ←→ **Sustainable procurement**

Improving environmental programmes ←→ **End-of-life product management**

Sustainable infrastructure ←→ **Strategic public policy planning**

Summary

Many regions have adopted sustainability objectives, but are not always experienced in implementing them. It is common to address only a few issues ('cherry-picking')

Regions engage in many activities, the Sustainability agenda is broad (17 UN SDGs), and the activity or materials Life chains are often long. There is a search for simple solutions. Simplicity comes at a price. By addressing only a limited few SDGs, applied to a small selected set of activities, focussed on isolated points in the Life chain, the total sustainability outcomes are often weak, with a real risk also of merely moving impacts to another SDG or to another part of the life chain. A Life-cycle decision-making framework is a better approach.

Life cycle assessment tools can assist regions in evaluating their sustainability impact (*footprint*), and also that of possible sustainability responses (the 'solutions'), in a more effective manner. Many assessment tools are sufficiently mature for use by regions. Some tools still need to evolve further.

Life cycle management frameworks are sector- or materials-specific, adapted to selected actions (e.g. construction), or embrace a more general approach across all areas (e.g. procurement).

A closer relationship between the Life cycle community and Regions would assist in implementation of a Life cycle approach.

Thank you!

Questions welcome

www.interregeurope.eu/LCA4Regions