

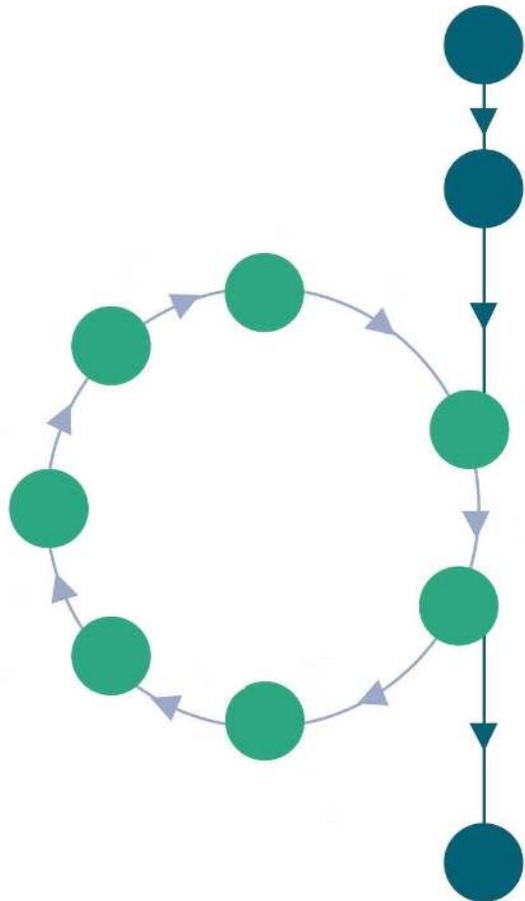
Challenging Changes

Connecting Waste Hierarchy and Circular Economy

Dr Ad Lansink, Nijmegen, the Netherlands

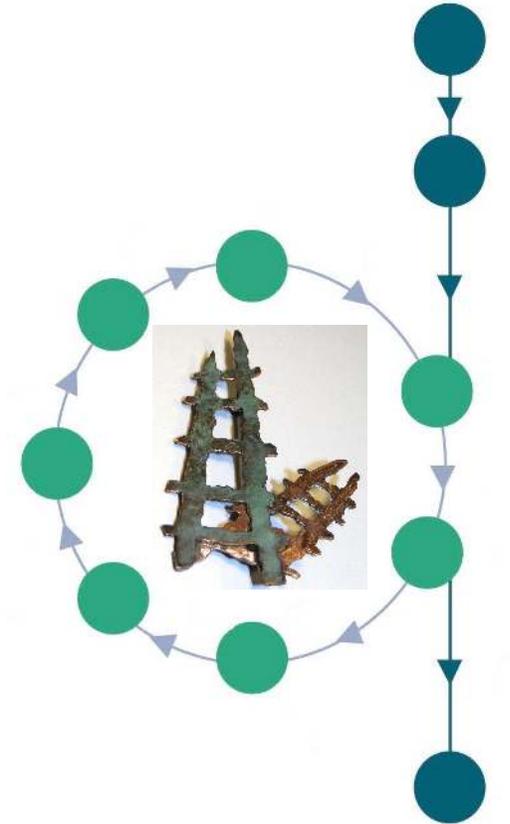
Presentation for Staff and External Guests of Ragn-Sells (Sweden)

Stockholm, 20 June 2018

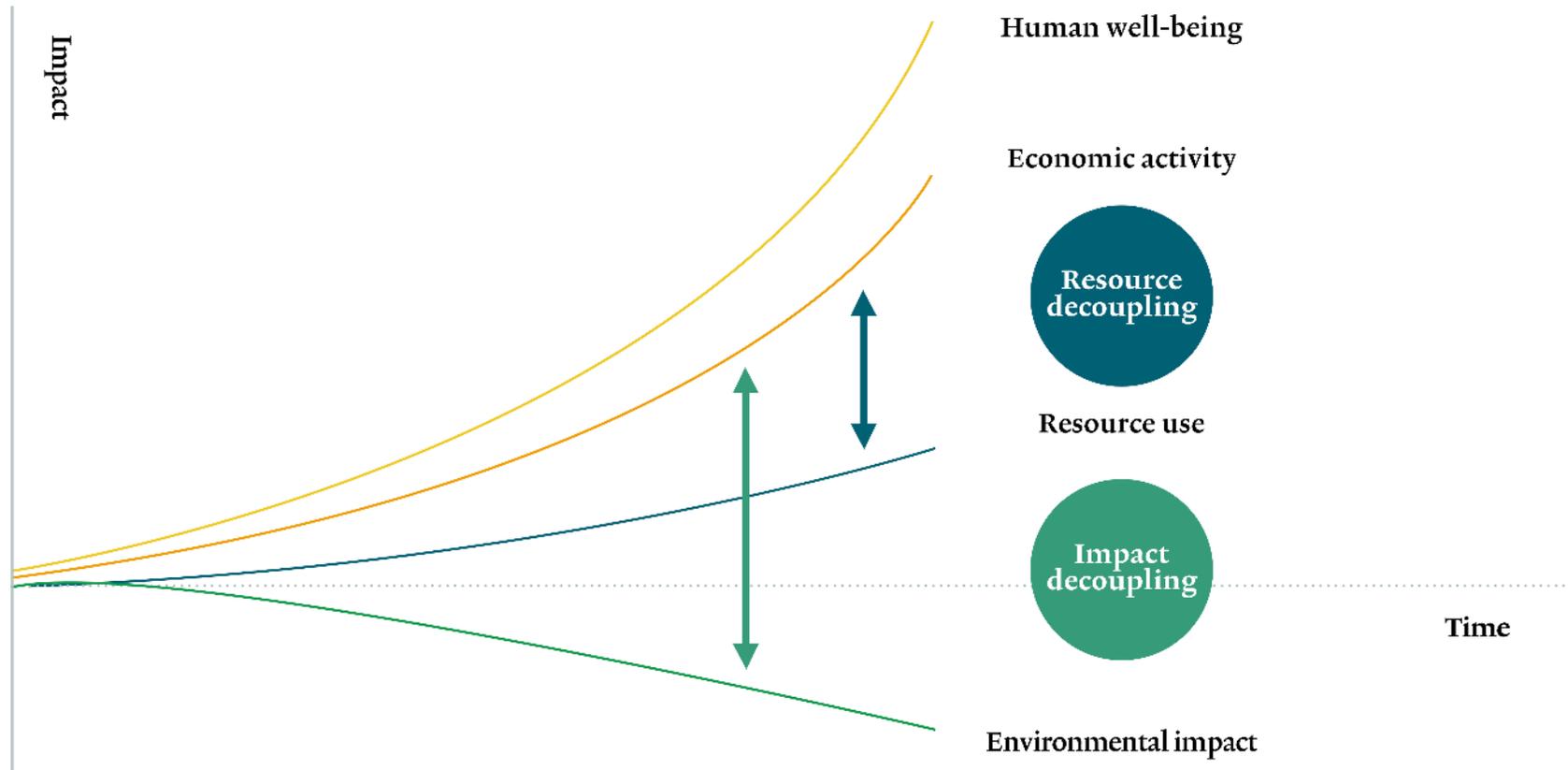


Key challenges circular economy

- Closing loops in several sectors and on various levels
- Creating financial, social and other values
- Developing new (design) technologies
- Shared responsibility producers, consumers, governments
- Creating broad – also global – support
- Decoupling economy from environmental impacts
- Transition towards renewable energy
- Development of workable business models



Decoupling: essential for circular economy



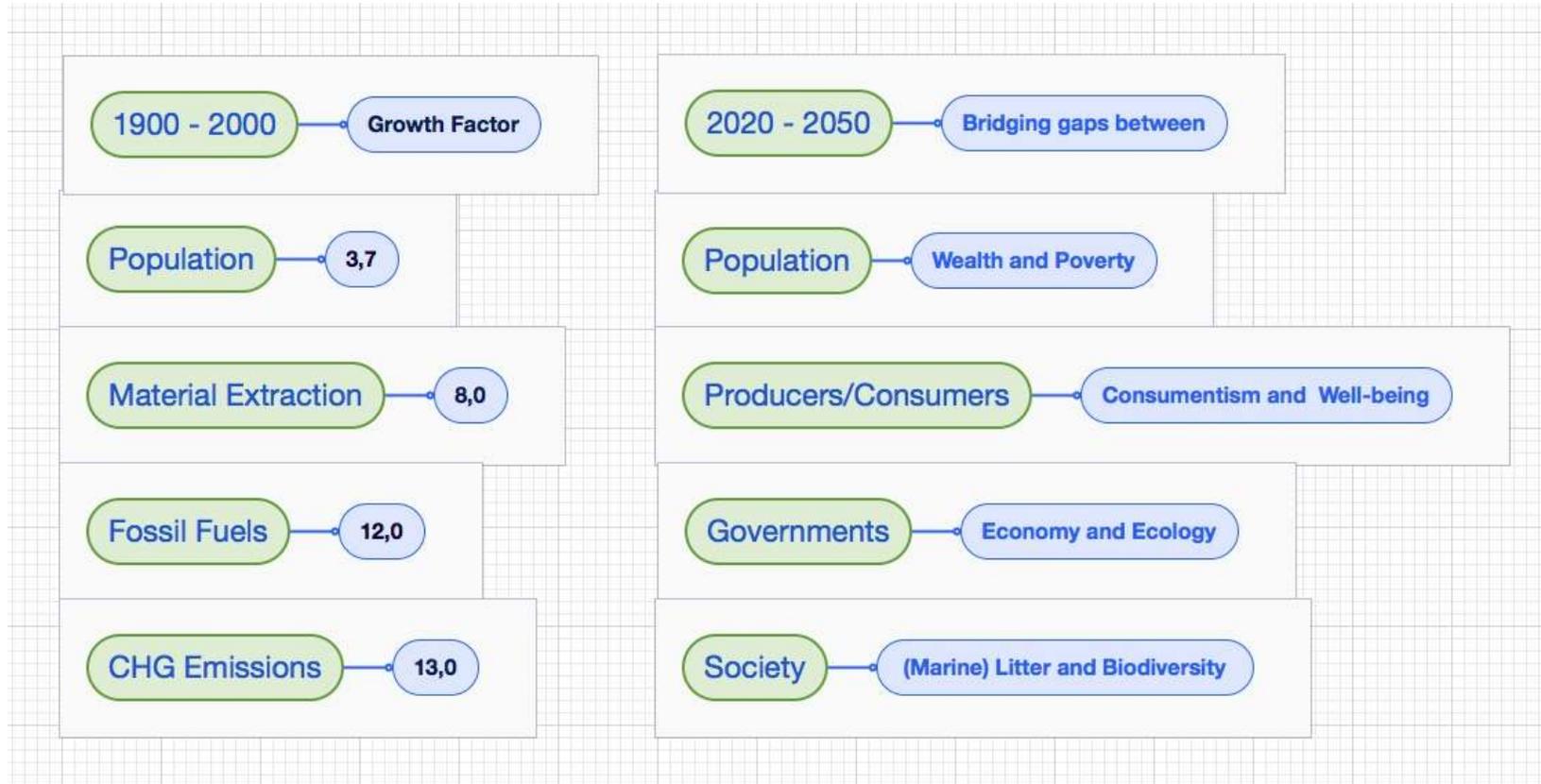
Source:
*Resource Management
Vision, Opportunities and
Challenges,*
by Janez Potocnik
Co-chair UNEP
International Resource
Panel (IRP)
Lecture for 'Plan Bureau
Leefomgeving', the Hague,
17th april 2018

Challenge: Bridging Gaps by Closing Loops

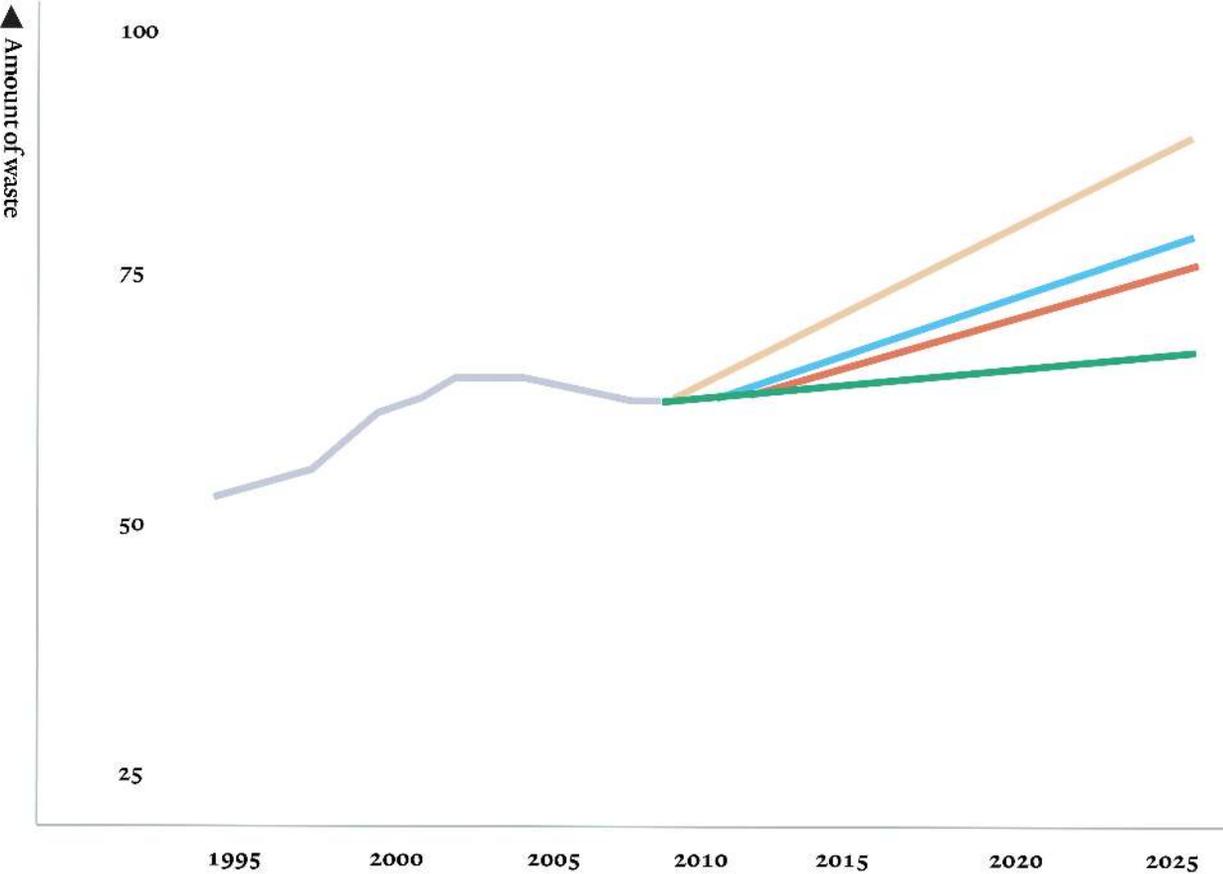
World Economic Forum –
Annual Meeting 2018

- The challenge seems to not be one of not inadequate scientific evidence anymore; rather it is one of **cooperation and implementation**.

- There is a deepening perception of a **lack of synchronicity between economic and environmental policy** responses to global risks.



Waste Scenarios 2010 - 2025



- Real waste production
- Global economy
- Transatlantic markets
- Powerful European growth
- Regionally orientated growth

PwC Investigations indicate that

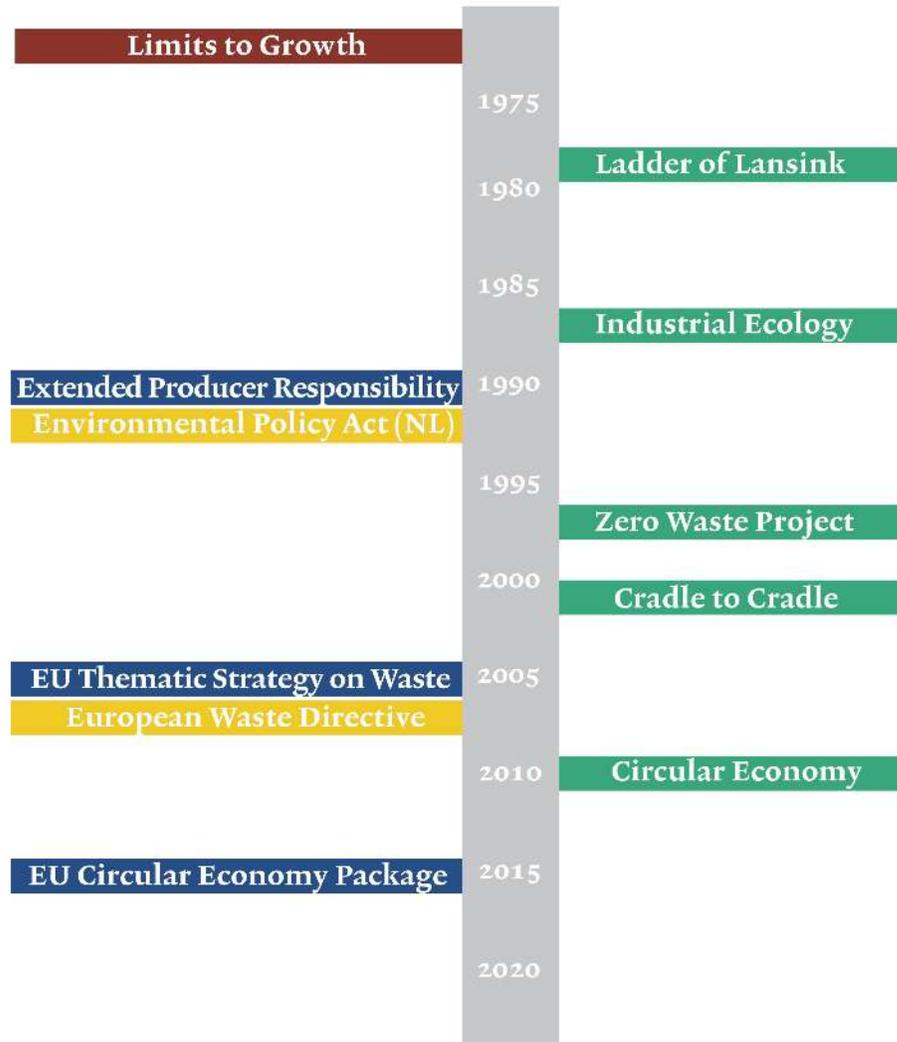
- Prosperity (69%)
- Population growth (51%)
- Raw material shortage (48%)
- Decreasing re-use (47%)
- Political instability (26%)

May result in

- Physical,
- Economical and/or
- Geopolitical Risks

Source :
PwC Sustainability (2011)

Circular Concepts



Drivers for circular concepts or paradigms (green):

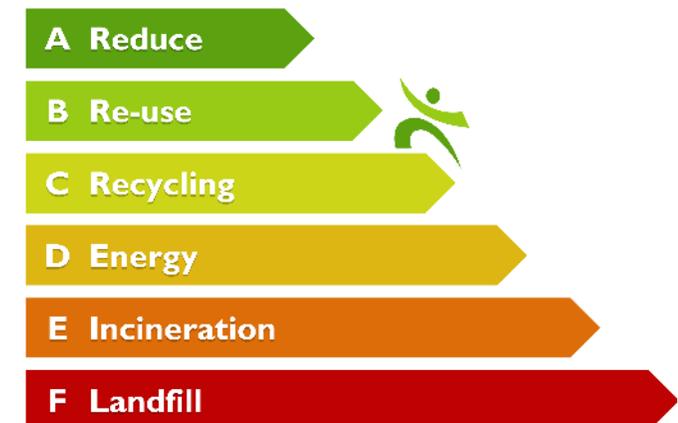
- Trend-setting reports (brown)
 - Limits to Growth (Club of Rome)
- Policy documents (blue)
 - Selective Economic Growth (Lubbers, 1973)
 - Extended Producer Responsibility
 - EU Thematic Strategy on Waste and
- Legislation (yellow)
 - Environmental Policy Act (1993)
 - European Waste Framework Directive (2008)
 - (in process) CE Framework Directive (2018)

Original Text Motion Lansink c.a.(1979)

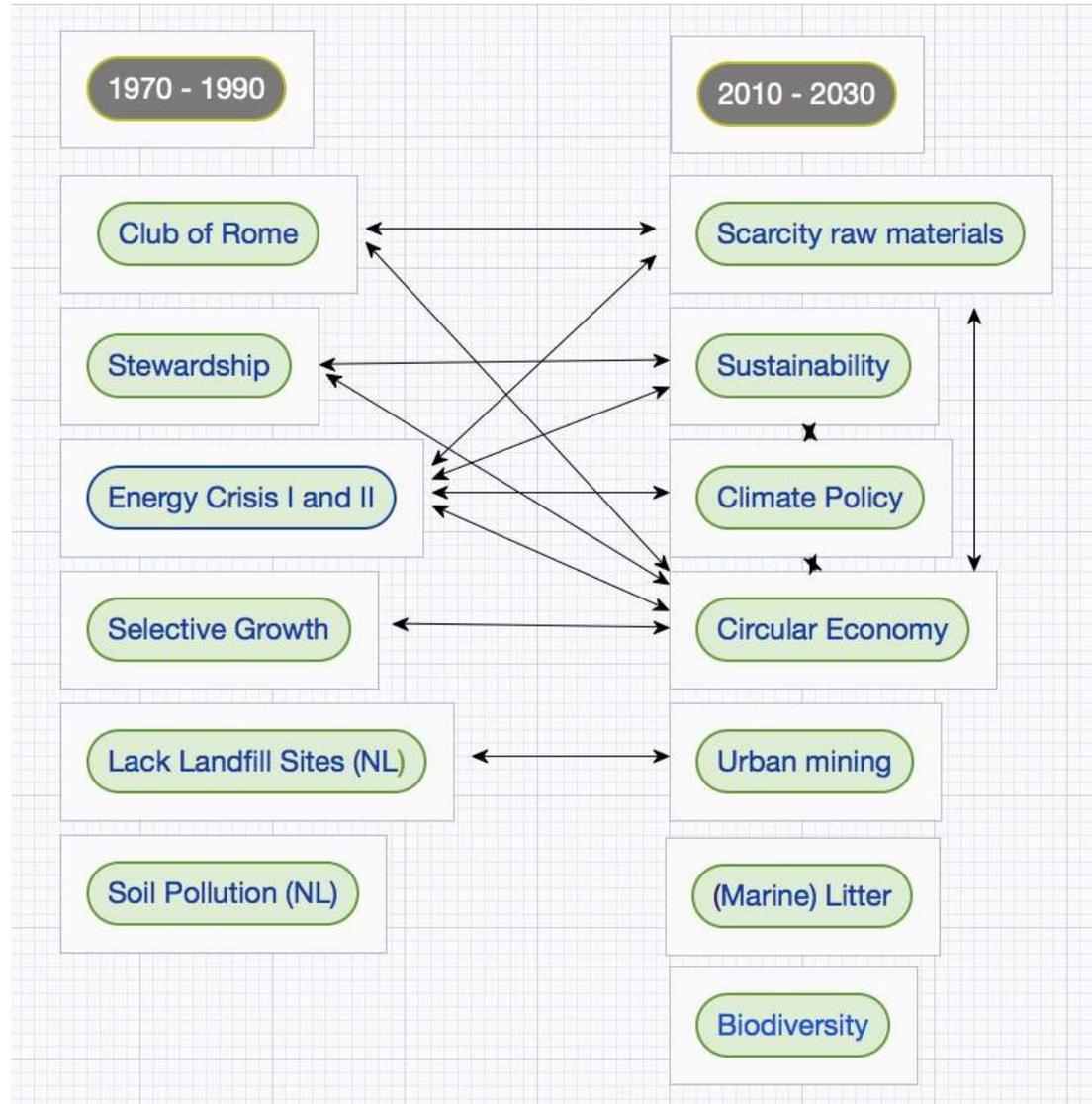
The Parliament,	after hearing the deliberation
noting that	produced quantities and dispose of waste are still increasing
whereas	reducing waste production and recycling of resources contained in the waste must be objectives of environmental policy
finds that	in addition to a maximum recovery of raw materials, also the potential energy gained from waste suitable and significant for this purpose, should be considered
invites the Government	to establish a Waste Reuse Policy Plan, involving inter alia
a.	preventive policy in respect of waste
b.	reuse of raw materials from waste after separation at source
c.	reuse of raw materials from waste after processing in separation plants
d.	conversion of suitable waste into energy
e.	controlled land filling or functional discharge of non-usable waste
f.	other activities, i.e. research and development
and	proceeds to the order of the day
signed by	Lansink, Verkerk-Terpstra, Lambers-Hacquebard, De Boois, Couprie, Jansen

In the original motion Lansink (1979) the second (b) and third (c) step of the preference order (a through f) consisted of source separation and post-separation of waste

WASTE HIERARCHY - LANSINK'S LADDER



Driving Forces Waste Hierarchy and Circular Economy



Transitions take time (and more), both social, technical and economical. Moreover, international differences of health and environmental policy play an important role besides the interpretation of the precautionary principle. So international cooperation is essential.

Presentation of *Challenging Changes* at Brussels, with a.o. Jan Storm (standing) and Julius Langendorff (with book)

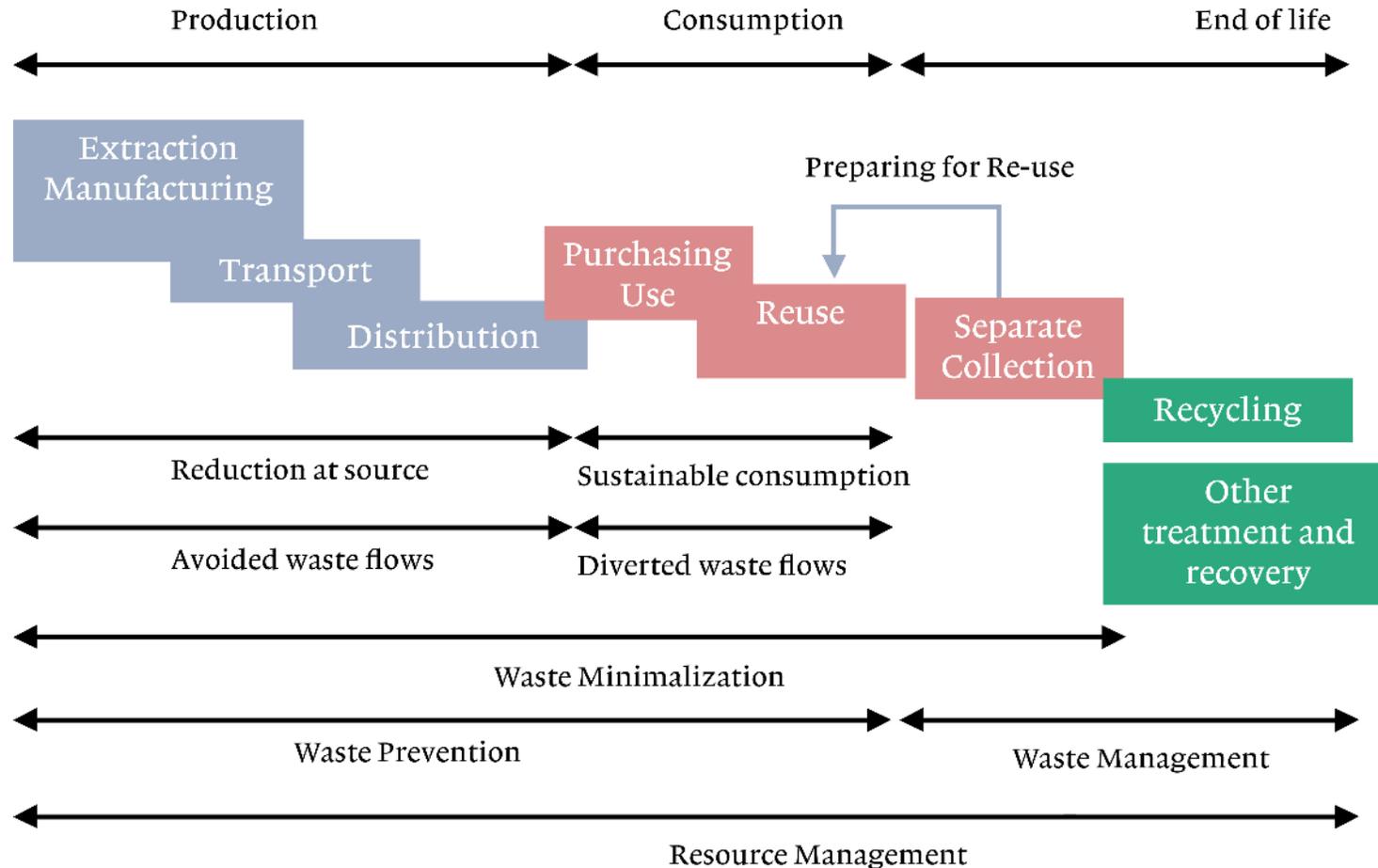


Highlighting Special 'Circular' Topics

- Sustainable (chain) resource management
- Approach of (international) circular dilemmas
- Importance of circular (reverse) logistics
- Creating multiple value from waste
- Urban mining instead of landfilling
- Repairing leaks in circular economy
- Development of achievable business models



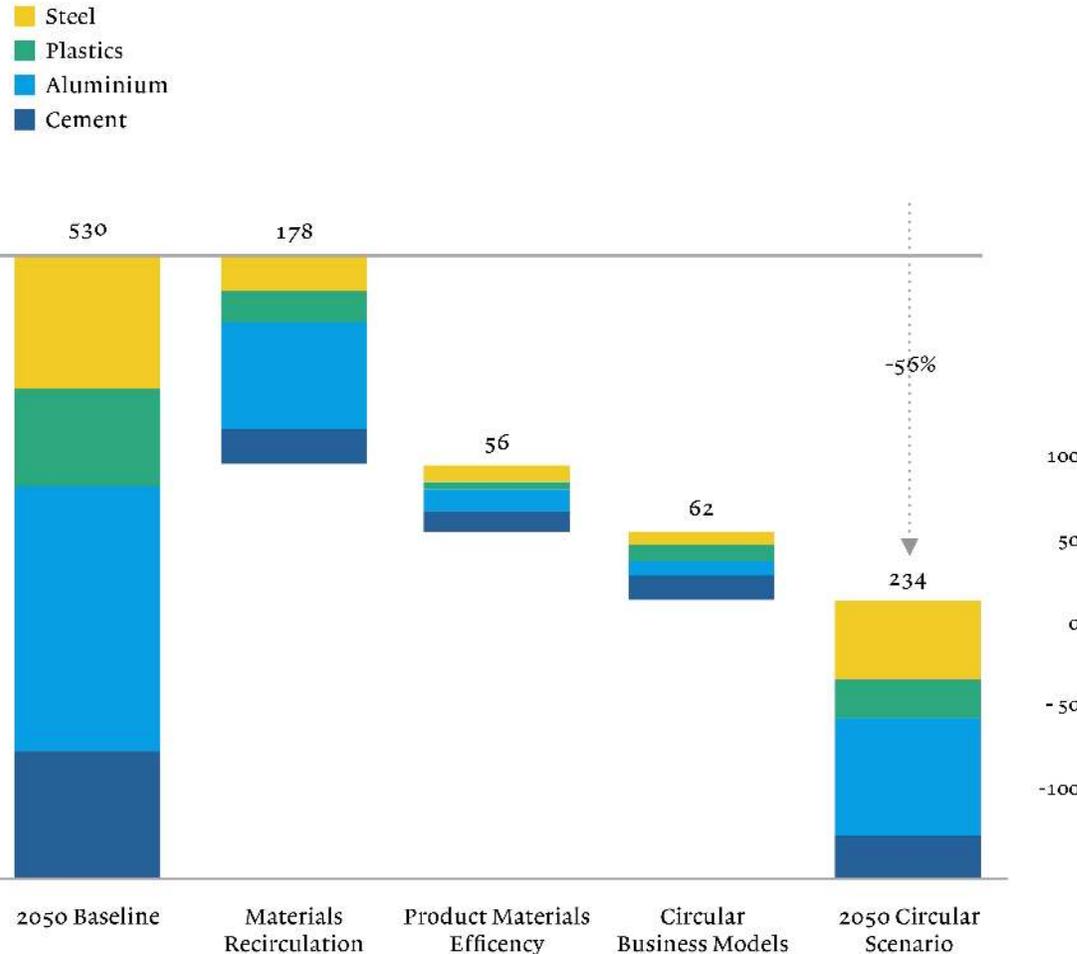
Sustainable Resource Management (1)



Transition from linear waste to circular resource management according to Antonis Mavropoulos, Theo Lemmen and Maarten Goorhuis, ISWA (Mexico, 2011)

Sustainable Resource Management (2)

EU Emissions reductions potential from a more circular economy 2050
Million tonnes of carbon dioxide per year



A more circular economy can cut emissions from heavy industry by 56% in 2050 along three ways:

- Materials Recirculation
- Product Materials Efficiency
- Circular Business Models

Source:

Material Economics

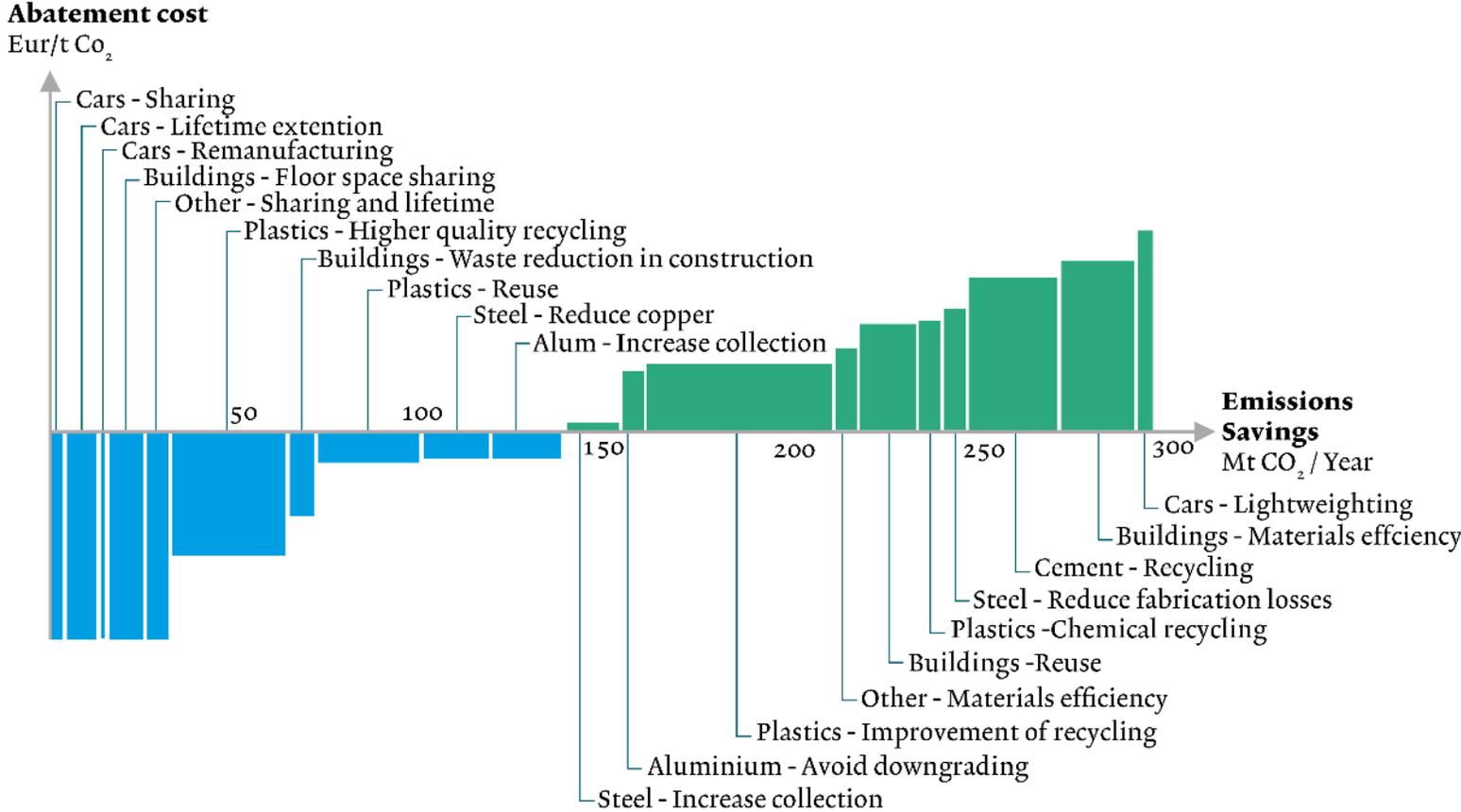
The Circular Economy

A powerful force for climate mitigation

Transformative innovation for prosperous and low-carbon industry (May, 2018)

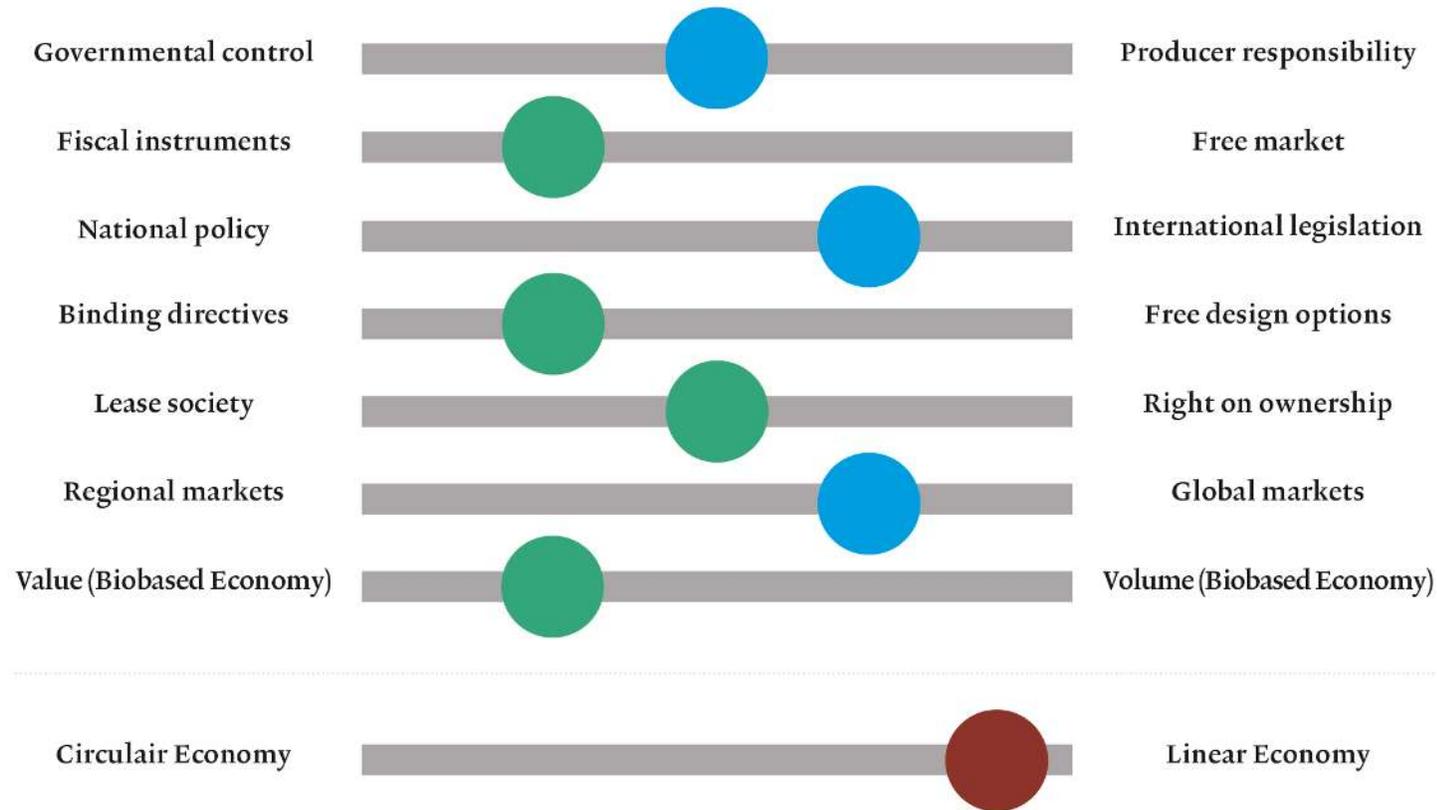
Published by SITRA, European Climate Foundation a.o.

CE levers: abatement potential and emission reductions



Source:
 Material Economics
The Circular Economy
A powerful force for
climate mitigation
 Transformative
 innovation for
 prosperous and low-
 carbon industry (May,
 2018)
 Published by SITRA,
 European Climate
 Foundation a.o.

Circular dilemmas

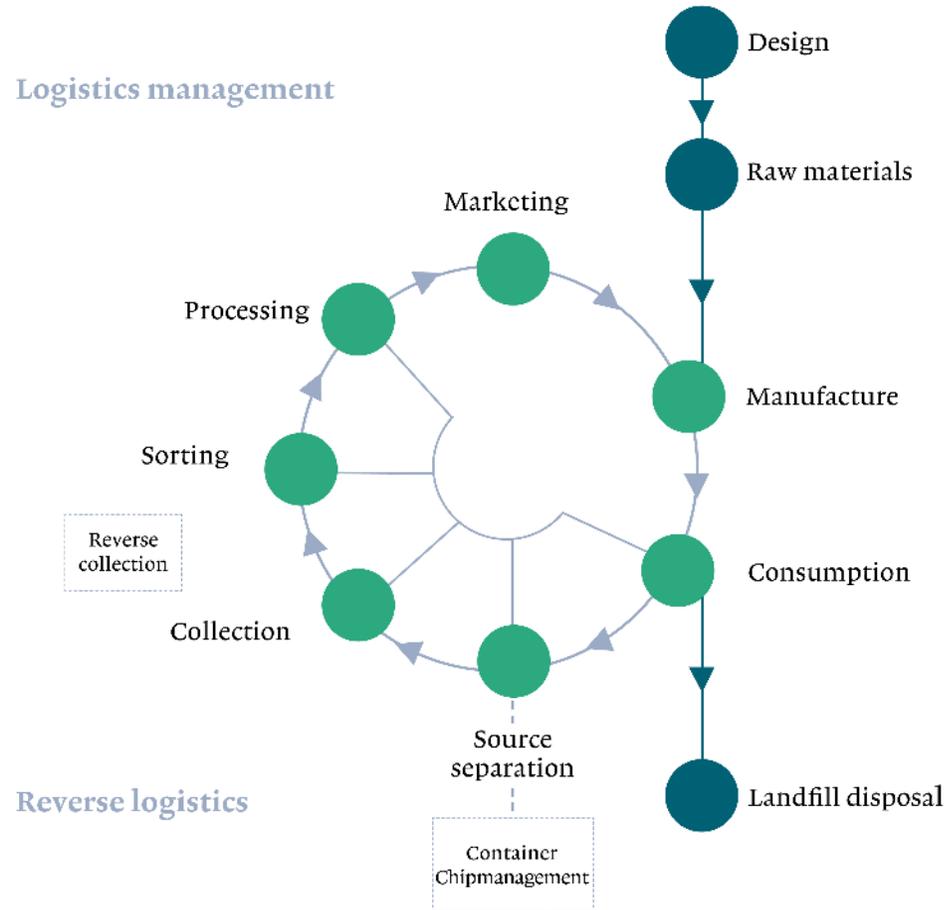


In most cases, the transition of linear economy to circular economy is confronted with dilemmas in different political, social and economical areas. The green dots represent promising choices. The blue dots concern difficult choices. The brown dot shows, that closing the loop needs a lot of work. Source: Circle Economy, January 2018: Our world economy is only 9.1% circular, leaving a massive „Circularity Gap“

Most likely – Balancing between the left and right side of the list

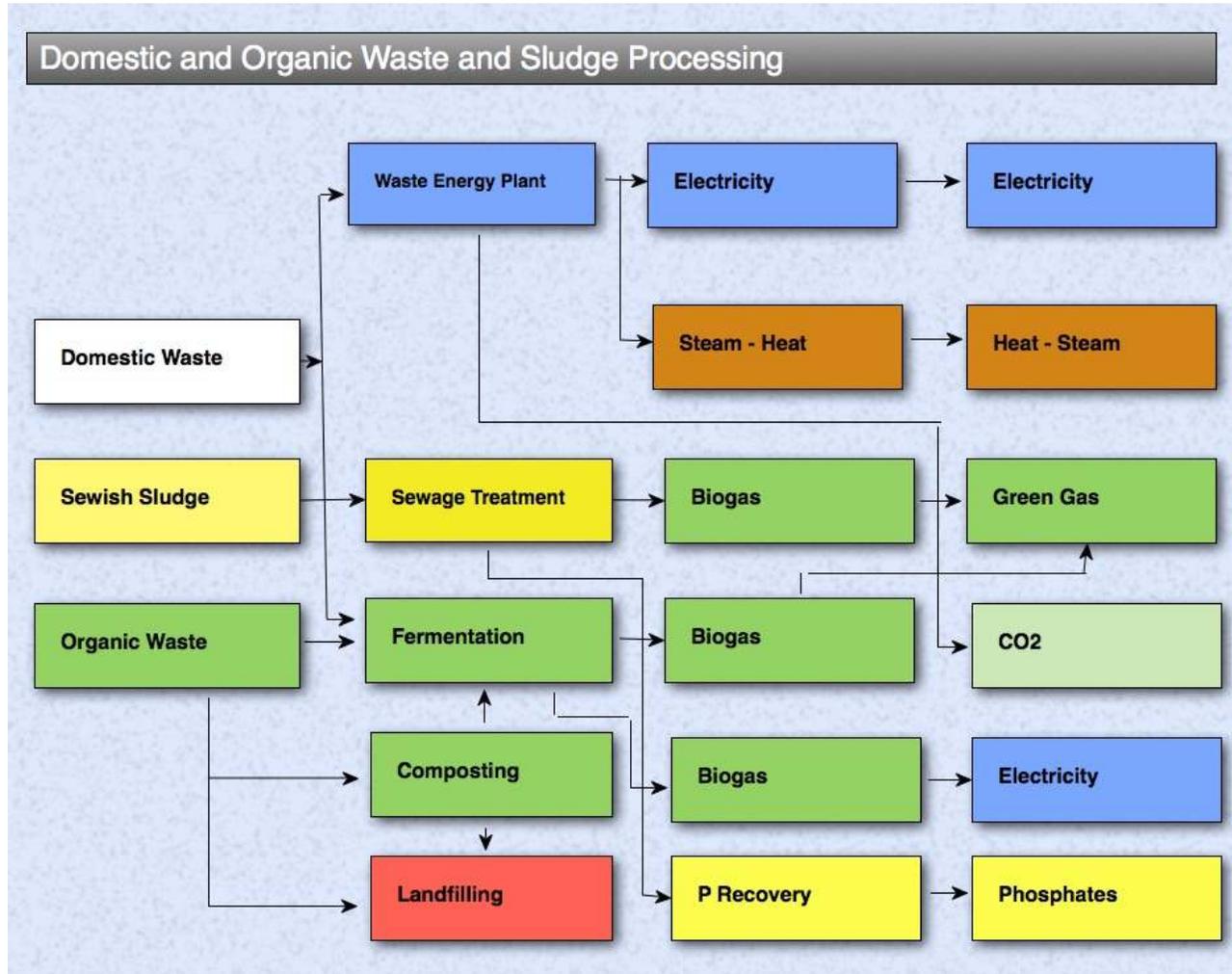
Importance of circular (reverse) logistics

Examples for optimization of supply chain:



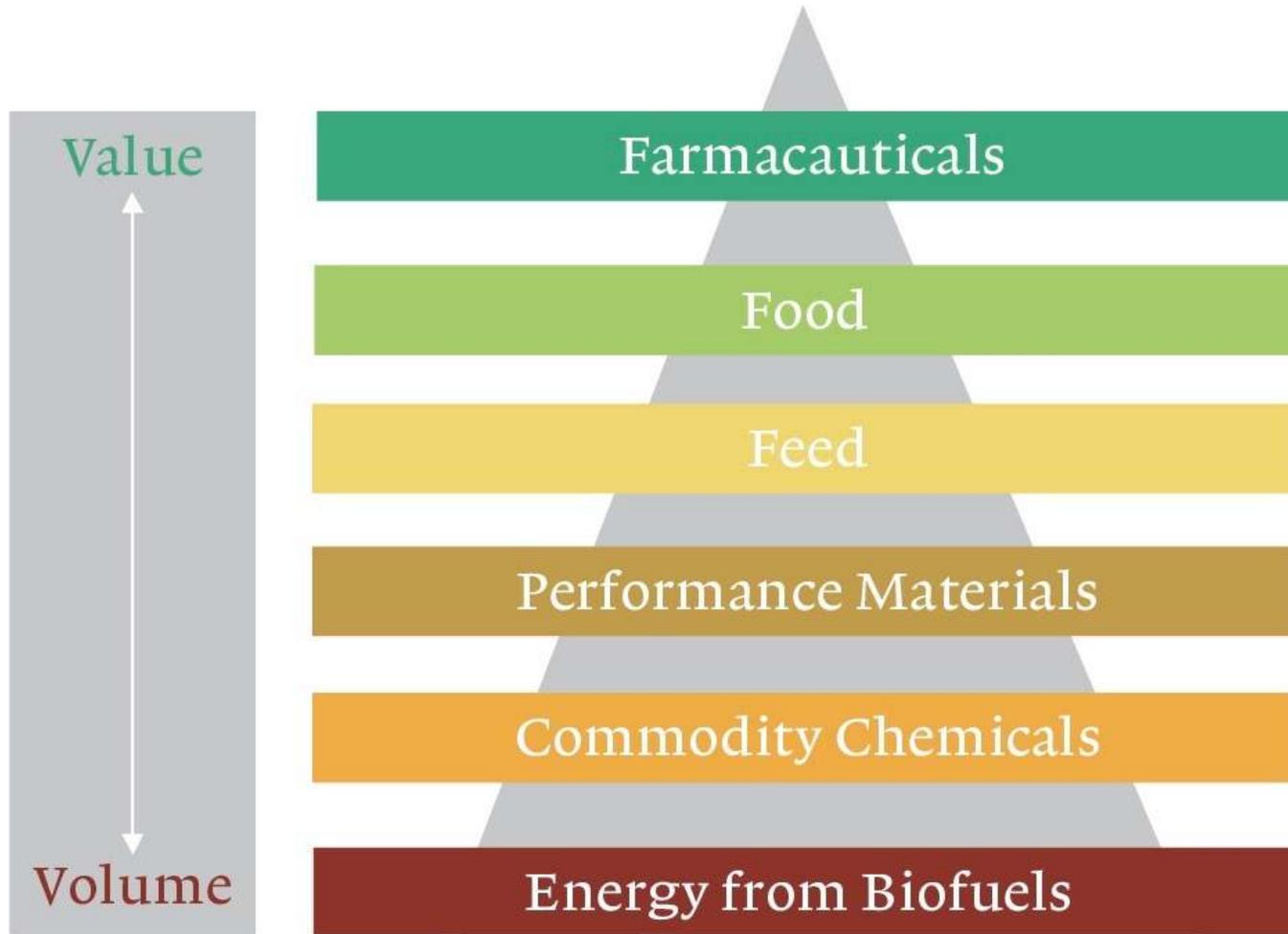
- Improving waste collection by underground containers with chip registration
- Optimization of source separation: e.g. plastic packaging by type, yielding high-quality streams
- Stimulation of deposit return systems, based on sensor technology
- Fermentation of regional organic waste, saving transportation, producing electricity and heat
- Smart demolition of buildings with maximum yield of reusable, high quality materials
- Targeted use of mobile crushers, resulting in granules which are nearby applied
- Application of advanced infrared techniques for the separation of mixed plastic waste streams

Creating Value from (Organic) Waste



Scheme, partly based on information of Attero – Energiek met Milieu
See also: Chapters 30, 33, 34 and 35 of Challenging Changes – Connecting Waste Hierarchy and Circular Economy, by Ad Lansink (2017)

Cascading Biomass: Value or Volume?

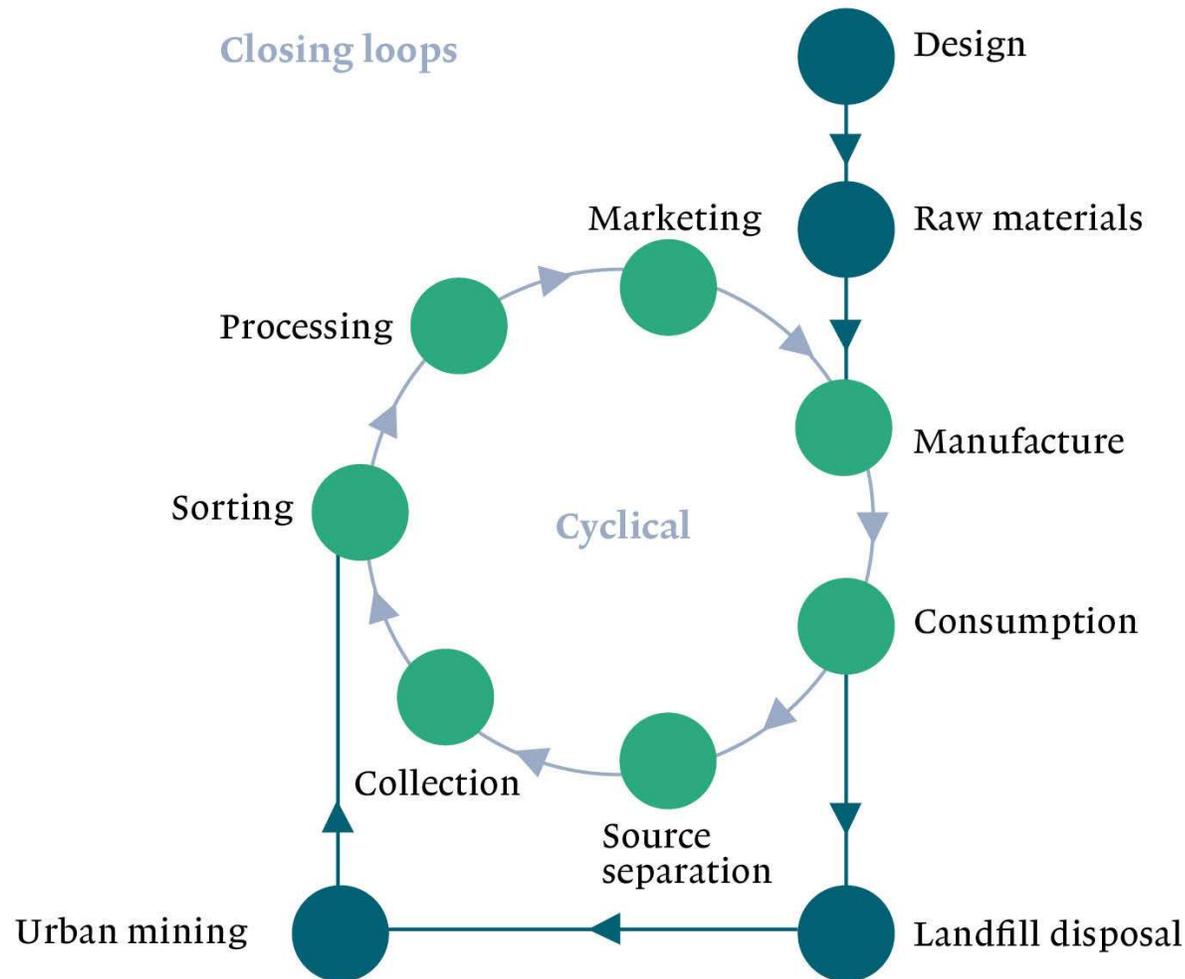


Biomass from corn waste for power generation

Foto: Arnaud Martinez

Shutterstock-id: 700452514

Urban mining instead of landfilling



Ash2®Salt (Ragn-Sells)

Fly ash washing and metal cleaning, followed by separation of dissolved salts in the wash solution. Production of residual sand, metalsulphides and commercial salts (CaCl₂, NaCl, KCl)

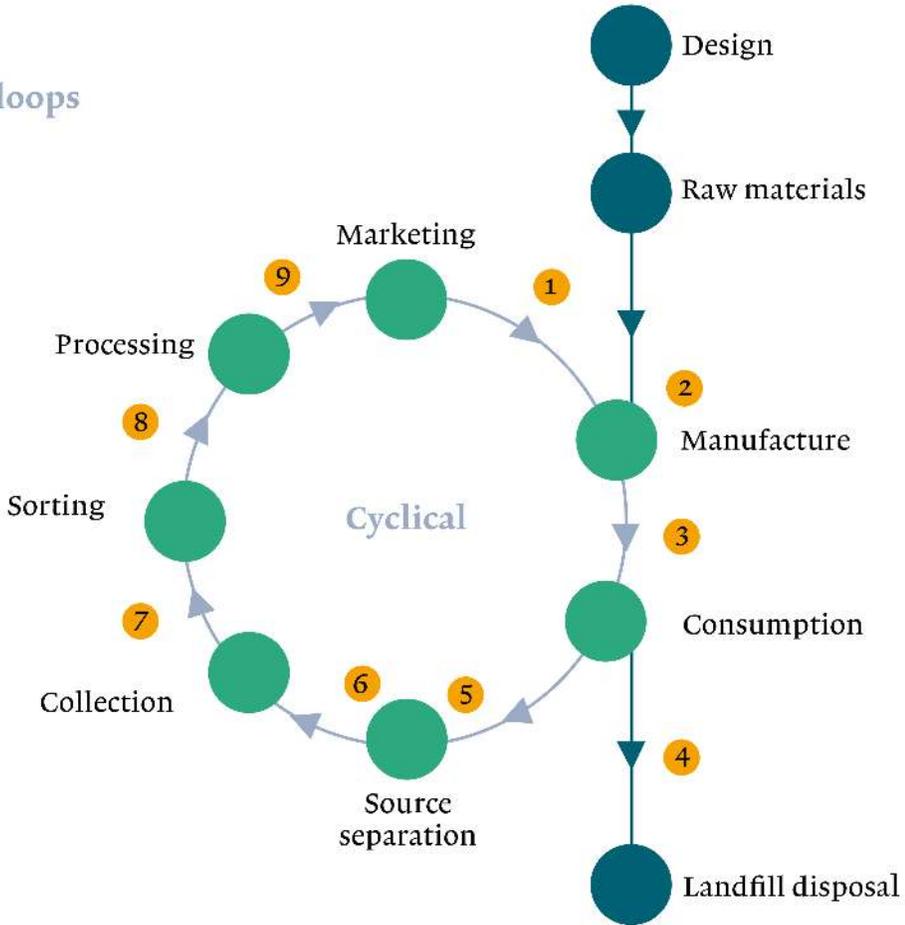
Ash2®Phos (Ragn-Sells)

wet chemical process, recovering clean commercial phosphorus products, precipitation chemicals, removing heavy metals. So reducing the need for virgin resources.

Source: Ragn-Sells: Effective Recycling of Secondary Resources to Reach our Climate Goals, Bonn (2018)

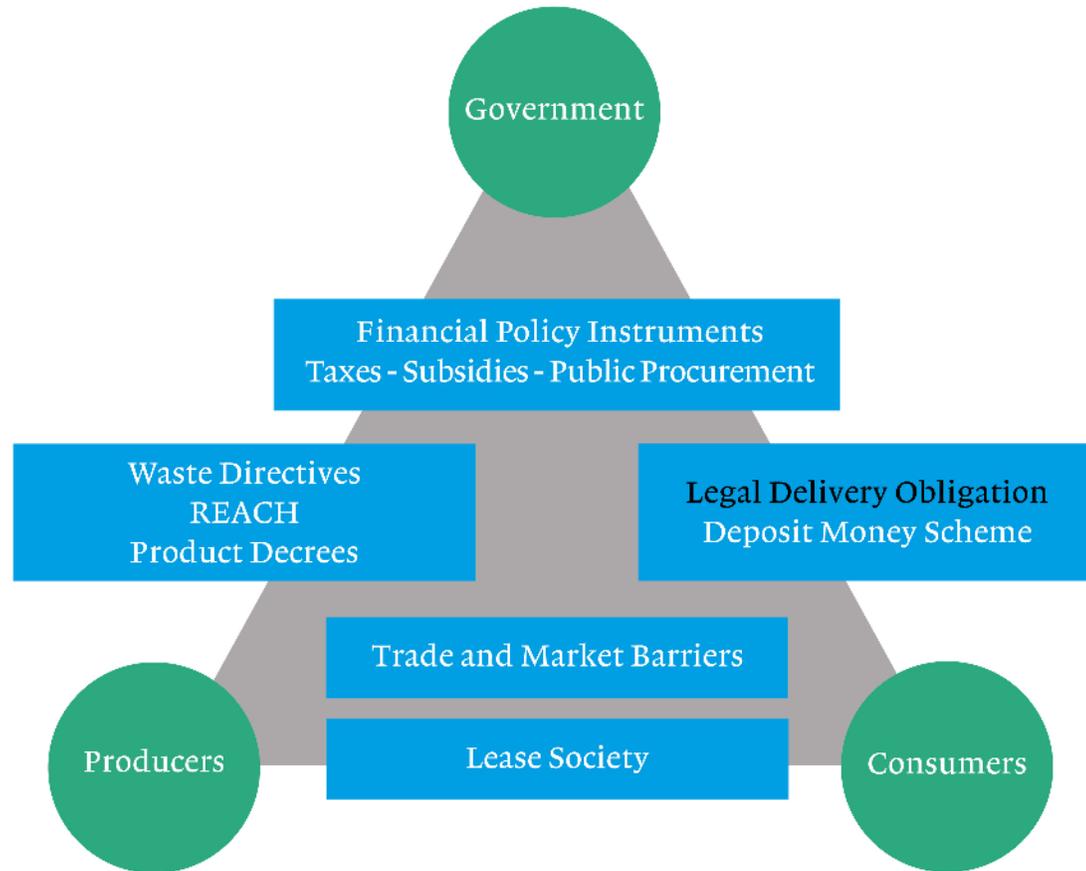
Circular Leaks

Closing loops



- 1 Stigmatization
- 2 Environmental aspects
- 3 Macro-economical effects
- 4 Market failures
- 5 Consumer behaviour
- 6 Insufficient quality
- 7 Global barriers
- 8 Lagging technology
- 9 Downcycling and energy losses

Policies and (financial)policy instruments



In the triangle of government, producers and consumers, different policy instruments are used on each side of the relationship. Financial policy instruments regard both producers and consumers. The same is true for trade and market barriers

Elements of policy agenda

	Set the direction	Create enablers	Level the playing field	Take government action
Materials recirculation	Targets for high value recycling	Support for innovation and technology development	Carbon pricing	Public procurement
		Standards for secondary materials	Extended Producer Responsibility	Waste regulation
	Improved transparency and statistics for waste and recycling	Waste regulations and landfill bans	Quotas or other support for demand	
		Regulation of long-term destructive processes	Improved end-of-life handling	Product design
Product Material Efficiency	Targets for efficient materials use and re-use i	Information systems and platforms	Waste charges	Stimulate re-use and recycling markets
	Materials passports and documentation	Labeling Schemes for materials efficiency	Design for recycling	Require high material efficiency in public procurement
		Fund innovation and technology development		
Circular Business Models	Improve benefits of shared mobility an construction	Supportive city regulations (e.g. parking shared cars)	Pricing/regulation of air pollution, congestion etc	City plans for longevity and adaptability of buildings
	Endorse shared mobility systems as target vision	Revise barriers in existing regulations (insurance)	Efficient materials use or labelling in standards	Integrate car sharing with public transport systems
			Adapt data regulations for new business models	

Examples of potential measures to investigate

Source:
Material Economics
The Circular Economy
A powerful force for climate mitigation
 Transformative innovation for prosperous and low-carbon industry (May, 2018)
 Published by SITRA, European Climate Foundation a.o.

Main Lines for Circular Economy

Topics	Statements	SDG
Chain management	Strengthening chain resource management	
Prevention	Enlarging qualitative and quantitative prevention	
Re-use	Emphasis on reuse of products and materials	
Innovation	Constructive innovation by sustainable technologies	 
Ecodesign	Circular product design (for recycling) and processing	 
Recycling	Functional up-, re- and downcycling	 
Criteria	Establishing achievable recycling and energy criteria	 
Responsibility	Shared responsibility of chain partners and government	 
Instruments	Rapid implementation of financial policy instruments	
Climate policy	Firm relation to energy and climate policy	 
Procurement	Stimulation of green public procurement	
Public support	Activating and ensuring public support	 

Commentary

Topics	Statements
Expectations	Avoiding high or not achievable expectations
Natural laws	Recognizing the meaning and value of natural laws
Cycles	Considering differences between technical and organic cycles
Terminology	Preventing confusion of tongues by univocal terminology
Business models	Necessity of real business models on different levels
Software	Obsolescence of software may hinder life extension
Internationalization	Necessity of international cooperation
Implementation	Allowing various implementation velocities
Level playing field	Importance of international (fiscal) harmonisation
Marketing	Lower emphasis on marketing

Forecast: relation with SDG's

Topics	Outlook	SDG
Preventing scarcity	Saving of primary raw materials	
Energy	Reducing use of (fossil) energy resources	
Climate policy	Reducing CO ₂ -emissions	
Biodiversity	Maintaining and restoring biodiversity	 
Labor market	Promoting employment	 
Technology	Spin off new technologies	
Social cohesion	Chances for social innovation	 
Networking	Increasing influence of networking, platforms and ecosystems	
Industry 4.0	Transition from Third to Fourth Industrial Revolution	

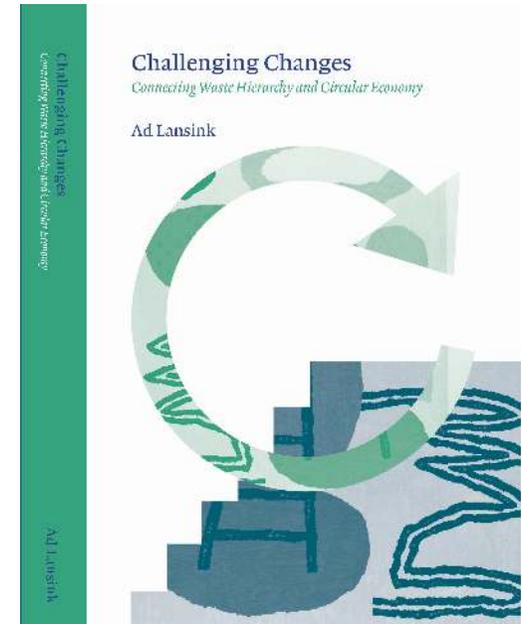
Recommendations

Topics	Statements	SDG
Terms	Use of universal, widely accepted terminology	
Prevention	Stimulating qualitative and quantitative prevention	
Recycling	Implementation of efficient and effective recycling processes	
Energy recovery	Limiting waste incineration to WfE-plants with large energy-production	
Consumers	Bring resource management and recycling closer to the needs of consumers	
Design for recycling	Emphasis on design for recycling, using recycling index as instrument	
Business models	Implementation of flexible, widely useful business models	
No green washing	Avoiding green washing	
Green procurement	Stimulation of green procurement	
Instruments	Transparent application of financial-economic instruments	
Tax harmonization	Development and implementation of international tax system	
Climate policy	Attention for the interaction between circular economy and climate policy	
Food packaging	Solving food wastage and litter by combined food and packaging policy	

Contents of Challenging Changes

- Linear waste and circular resource management
- Waste hierarchy: a challenging framework
- Transition aspects
- Closing different and difficult loops
- Exemplary resource flows
- Waste management and climate policy
- Need for (international) legislation
- Changes for circular economy
- Main lines – Commentary – Outlook – Recommendations

+ Interviews with Karmenu Vella (EU Commissioner) - Antonis Mavropoulos (President ISWA) - Laurentien van Oranje (Founder The Missing Chapter) - Harriet Tiemens + Pieter-Balth Linders (Nijmegen) - Julius Langendorff, EC, Brussel) - Dominique Hogg (CEO Eunomia, UK) - Ernst Worrell (Utrecht University)



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Challenging Changes > Closing Loops

