Third International Conference on Waste Management (ICWM)

Pisa (Italy), 18th and 19th June 2015, Sant' Anna School

Section 1: Waste management and circular economy: a critical analysis

From waste – to resource-management

The Ladder of Lansink: Instrument for the (third) transition to circular economy

Dr. Ad Lansink

Circular Concepts

- **Waste hierarchy**
- Ladder of Lansink (Father of waste hierarchy) (1979)

- **Industrial ecology**
- Material and energy flows through industrial systems - Robert Frosch and Nicolas Gallopoulos (1989)

- **Producer responsibility**
- Extended Producer Responsibility - Thomas Lindhqvist (1990)

- **Cradle to Cradle**
- Michael Braungart and William McDonough (Waste is food) (2002)

- **Circular Economy**
- Mac Arthur Foundation (2010)

Ladder of Lansink : Framework for effective regulation

- Waste prevention
- Re-use of products
- Re-use of materials
- Energy recovery (R1)
- Incineration as disposal (D10)
- (Functional) Landfilling

Parliamentary proposal Lansink c.s. was determined by …

- Publications of the Club van Rome (Limits to Growth)
- Energy crisis I en II during the seventies
- (European) trend towards selective economical growth
- Social en political notions on stewardship
- Shortage of landfilling areas in the Netherlands
- High investment costs of incineration plants
- Increasing environmental damage of both soil and water

During the 80's and 90's introduced .....

- **More emphasis on prevention**
  - Qualitatively – to avoid hazardous substances
  - Quantitatively – reduction of volume and/or weight
  - Quantitatively - extension of lifetime
- **Introducing more forms of re-using products and materials**
- **Research on sustainable forms of landfilling**
- **Criteria**
  - Effectiveness
  - Efficiency
  - Feasibility
  - Best technical and/or best practical means

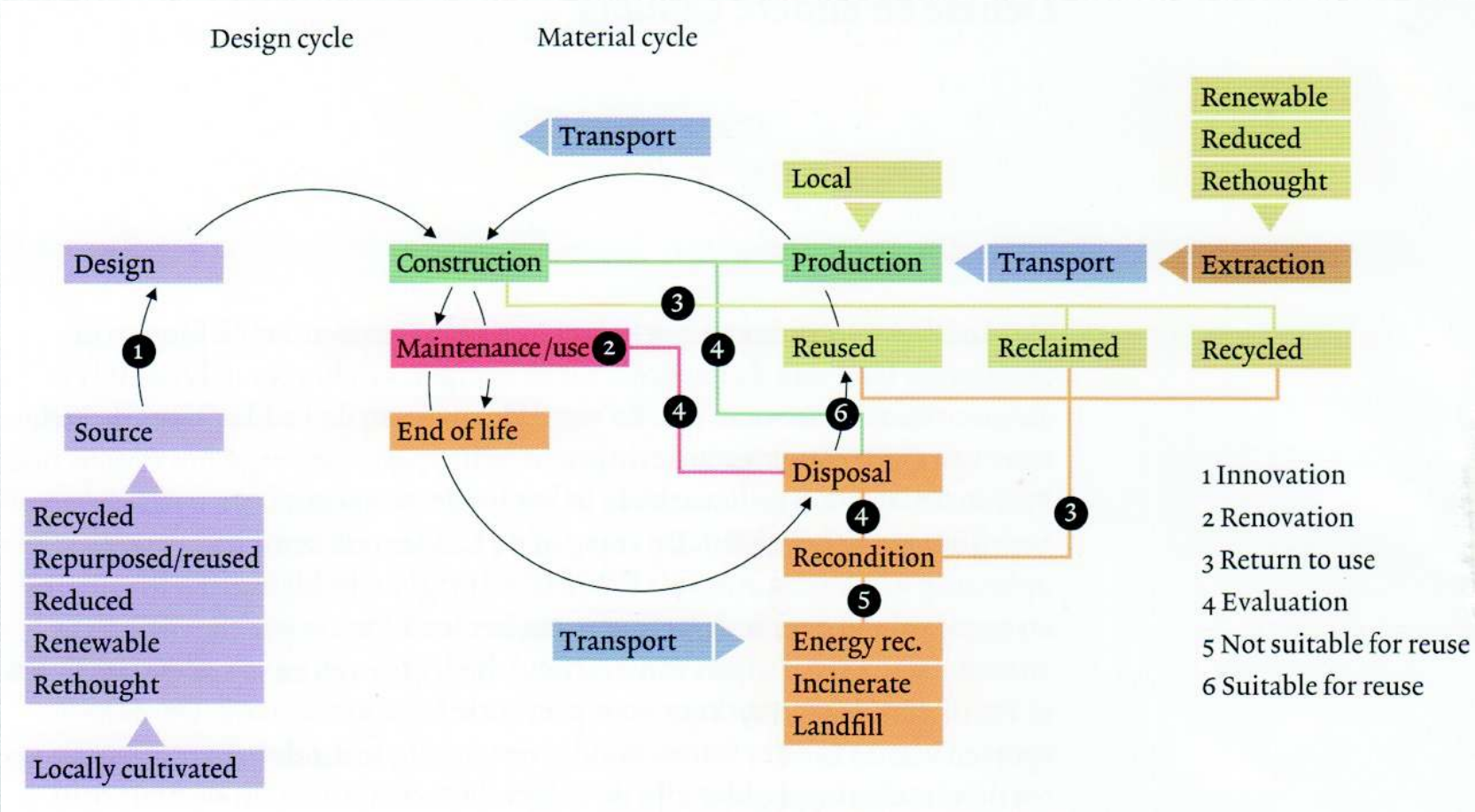
Legislation process

- 1979: Motion Lansink c.s. about waste hierarchy
- 1984: Motion Lansink asking for legal framework
- 1990-1993: Incorporation of Motion Lansink c.s into Environmental Protection Act (in literature "Ladder of Lansink")
- 2007-2008: Incorporation of waste hierarchy into European Waste Directive (EWD)
- 2014-2016: Proposal for new EWD, withdrawn by EC (Timmermans) with announcement of a new proposal

Main criticisms of the Ladder of Lansink

- Prevention ignores the necessity of economical growth
- The waste hierarchy is rigid, not enough flexible
- Government has no effective instruments for promotion and implementation of waste hierarchy

Design and Source (Material) Chain Policy



Model of Kevin Foster O'donnell

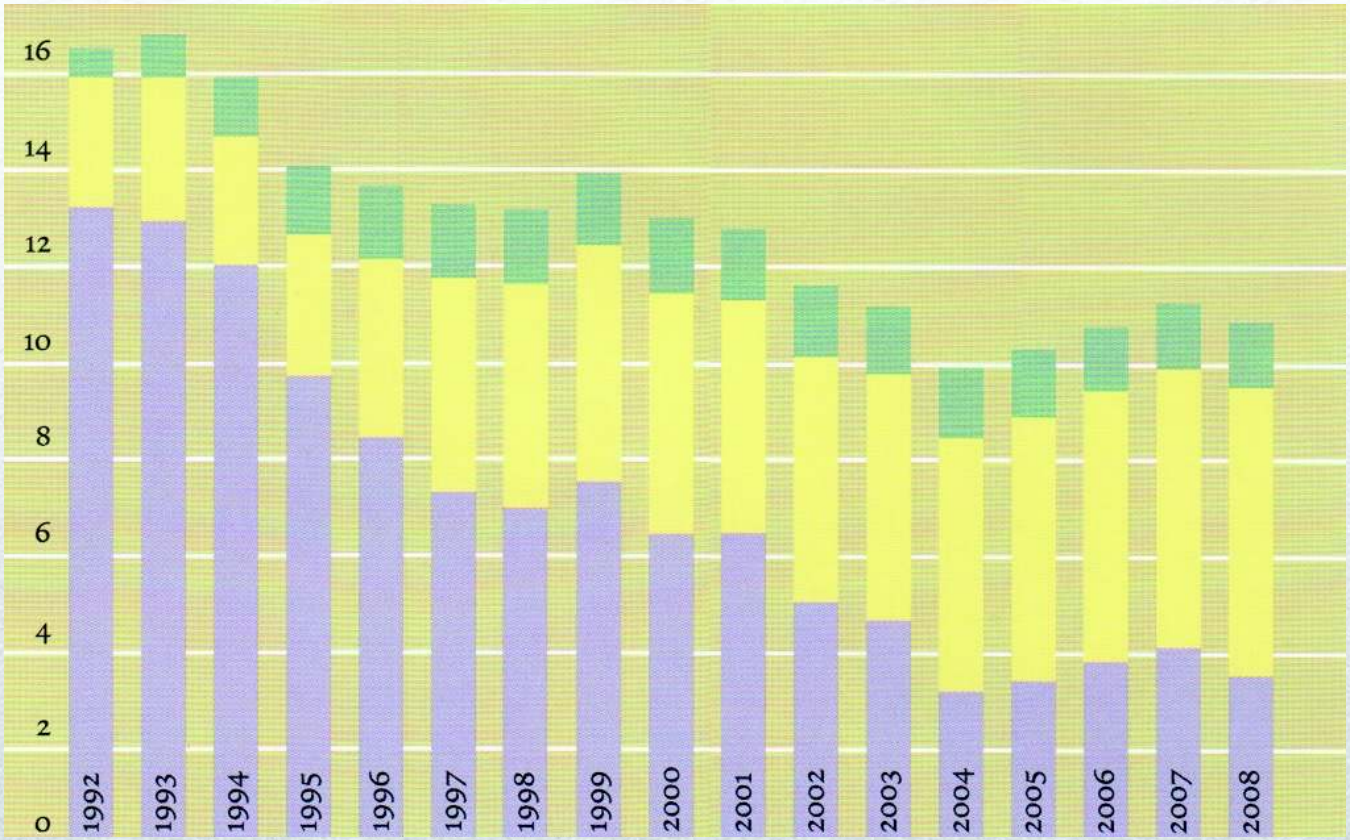
Based upon Ladder of Lansink and the Delft variant of Charles Hendriks

Flexible approach remains possible

- **Scientifical and technological developments**
  - Combustion - Pyrolysis – Fermentation
  - Immobilisation
- **Applied and Policy Research**
  - Results of Life-Cycle-Analysis
  - End of waste criteria
- **Temporary market imperfections**
  - Price formation on the markets of (primary) materials
  - Industrial failure or logistic problems

Waste Removal in the Netherlands from 1991 to 2008

Landfilling, Incineration and Composting 1992 - 2008



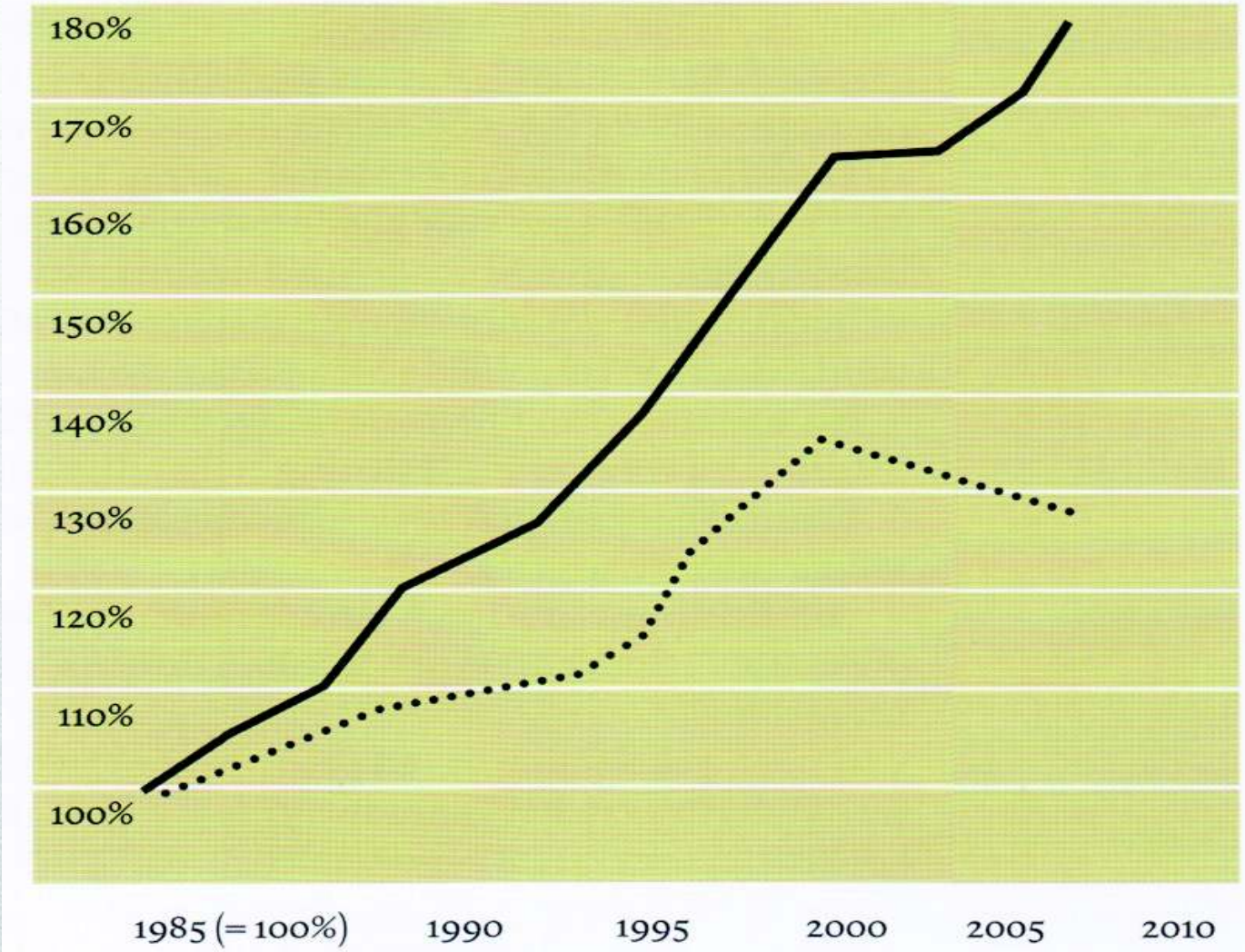
Green
Composting

Yellow
Incineration

Violet
Landfilling

Scale: mton/year - Source: SenterNovem > Agentschap NL

Decoupling economic growth

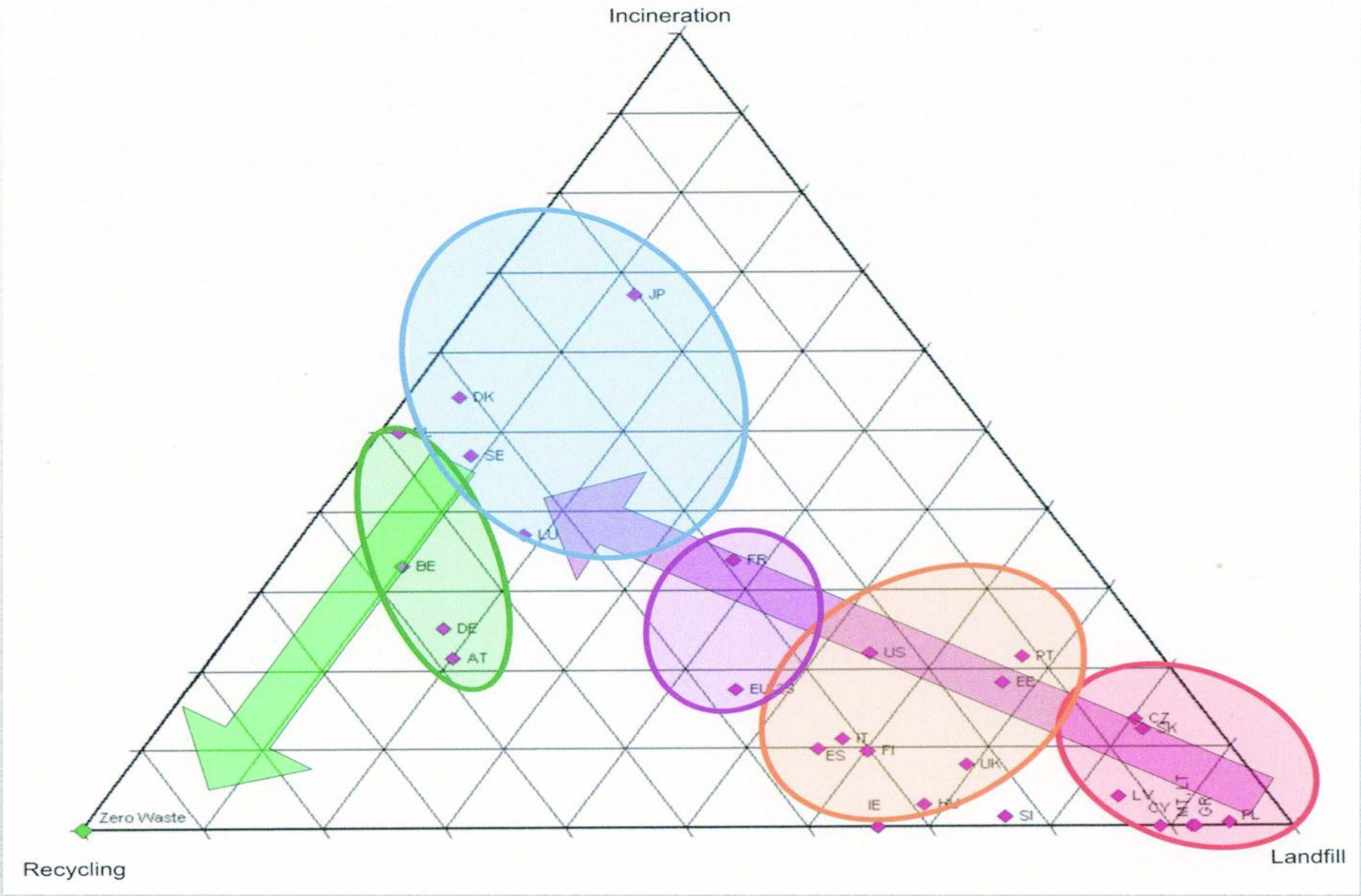


Black line:
Groth Domestic Product (Netherlands)

Black dots:
Waste Production

Source: LAP2

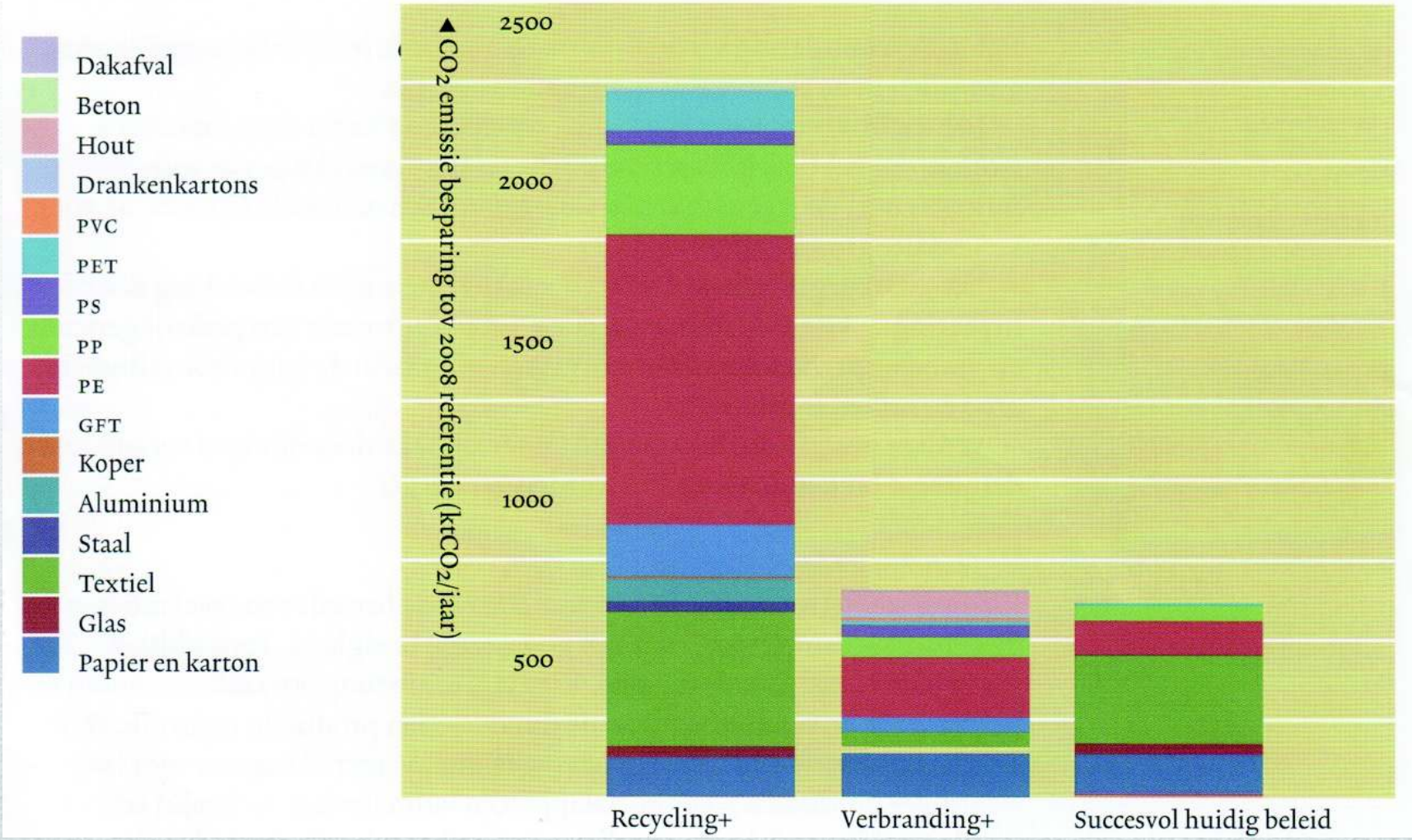
Moving towards recycling



Source: ISWA (Antonis Mavropoulis - Theo Lemmen - Maarten Goorhuis (Mexico, 2011])

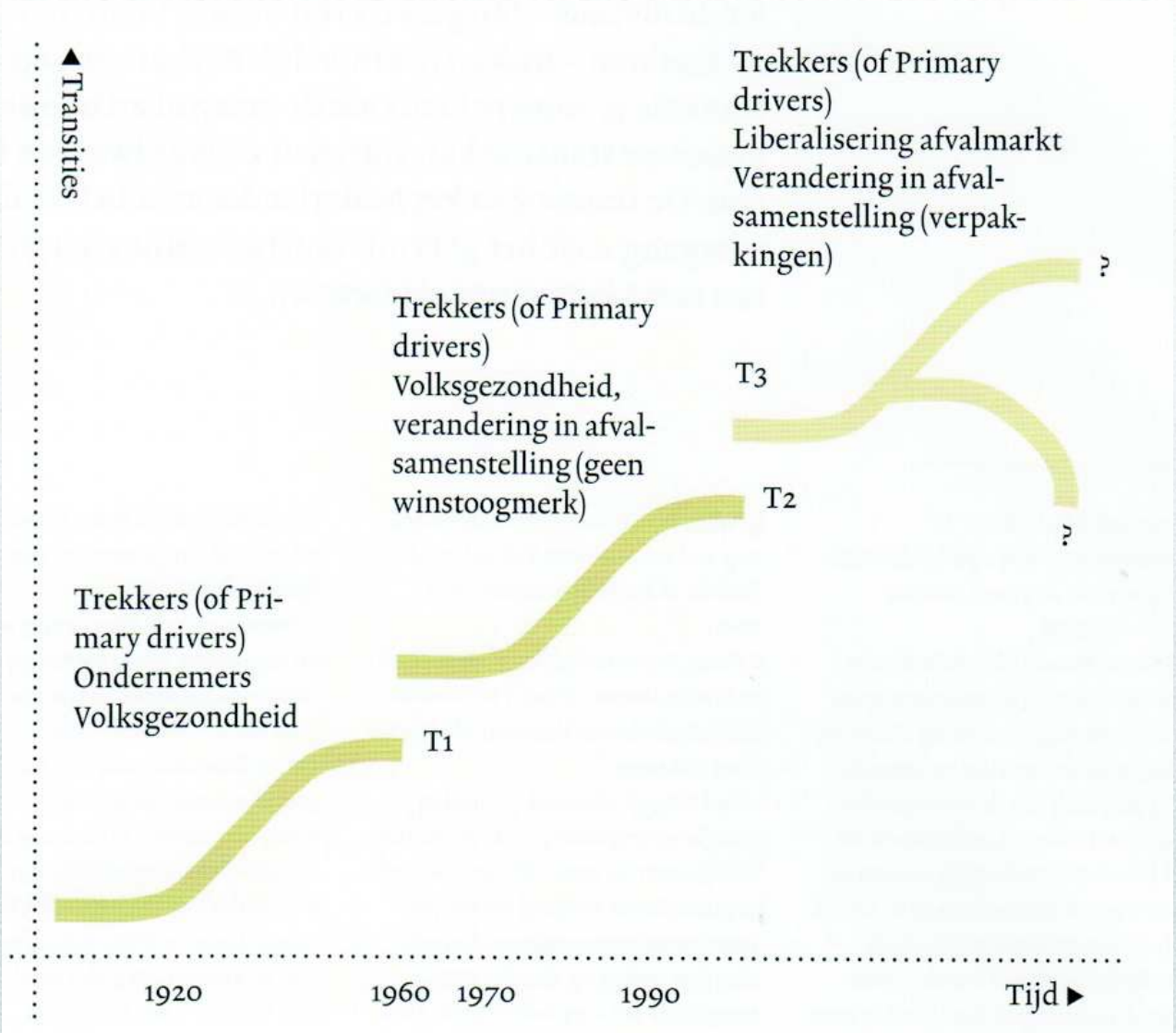
Two aims at the same time: saving materials and energy (and CO2)

Recycling wins the competition with incineration



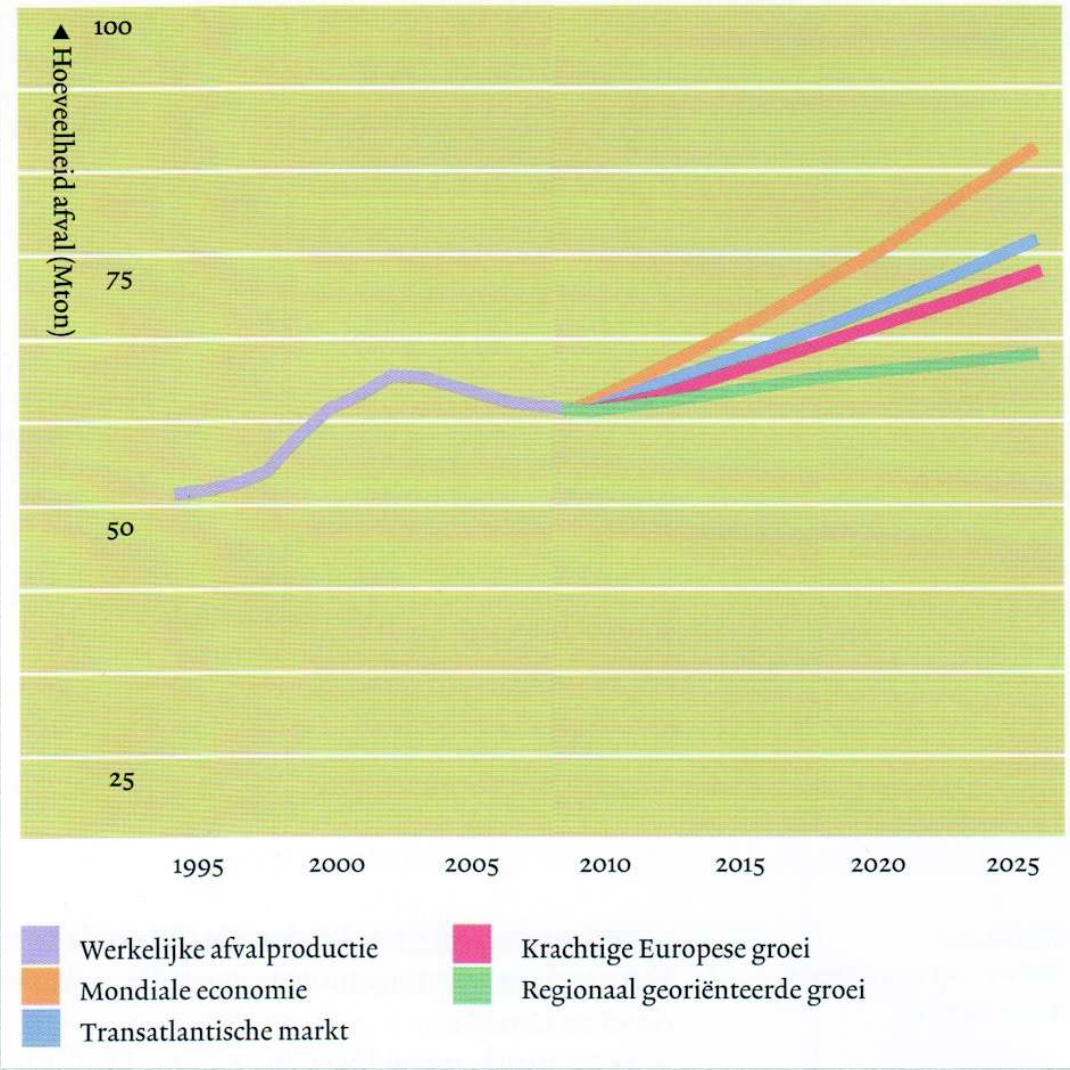
Source: Saving Materials, Ernst Worrell, Copernicus Instituut Utrecht (2010)

Transitions in waste management



Source:
Transitions and Institutional Change: The Case of the Dutch Waste System
Saeed Parto, Derk Loorbach, Ad Lansink and Rene Kemp (2006)

Waste Scenarios 2010 > 2025



PwC Investigation

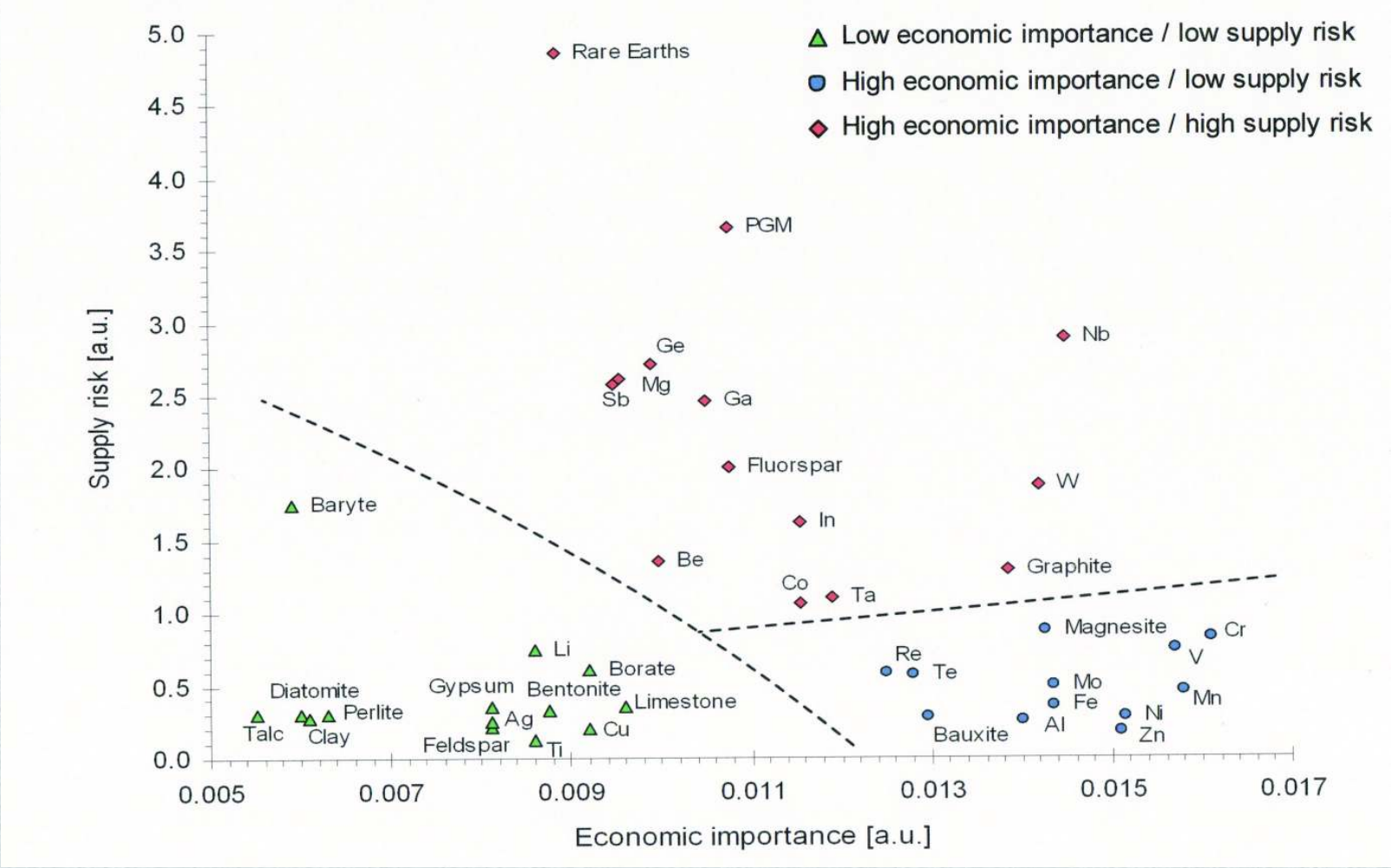
- Prosperity (69%)
- Population growth (51%)
- Raw material shortage (48%)
- Decreasing re-use (47%)
- Political instability (26%)

May result in

- Physical,
- Economical and/or
- Geopolitical Risks

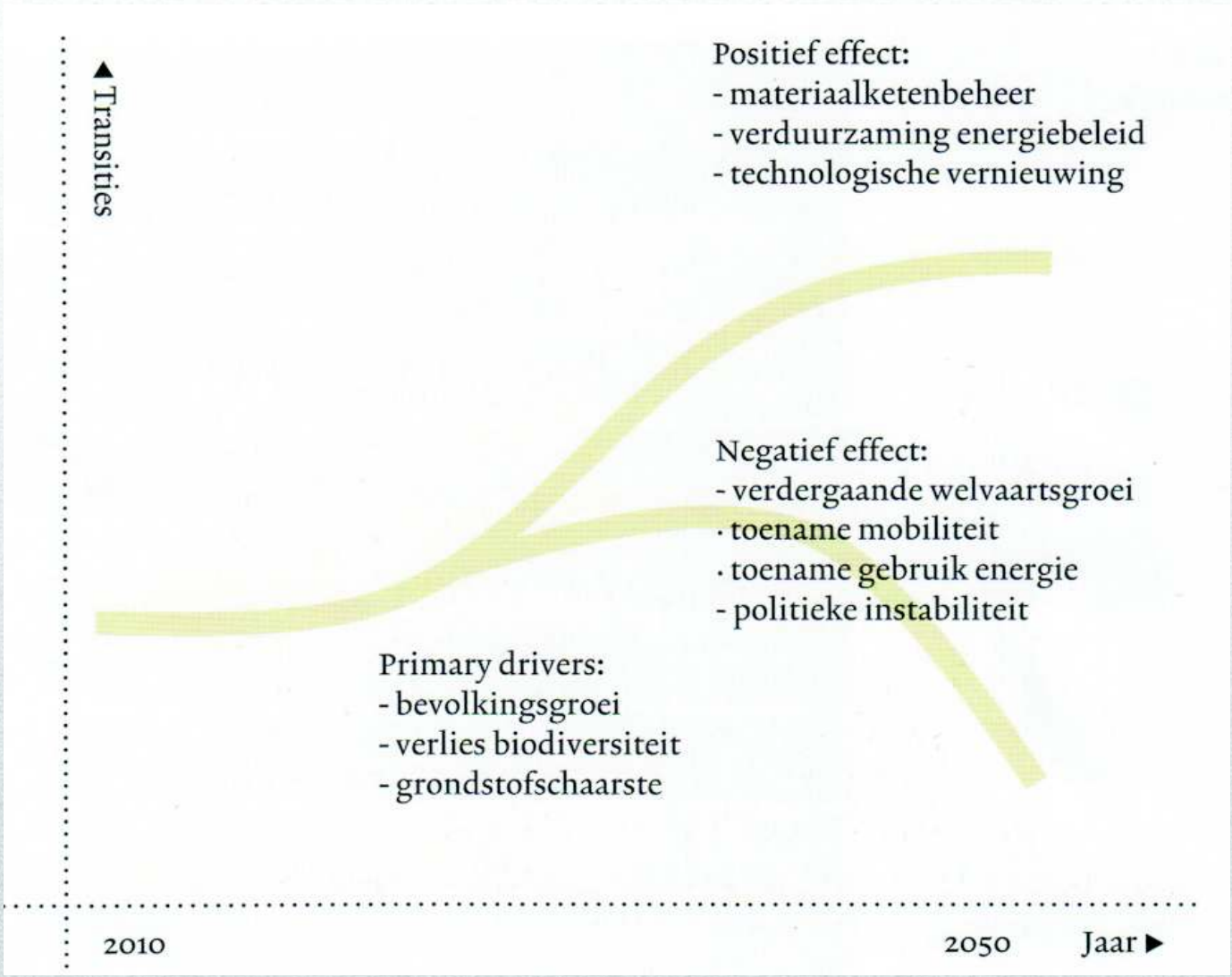
Source :
PwC Sustainabiliy
Barometer 2011

Availability of raw materials



Source: ISWA (Antonis Mavropoulis - Theo Lemmen - Maarten Goorhuis (Mexico, 2011])

Key factors for 3e transition

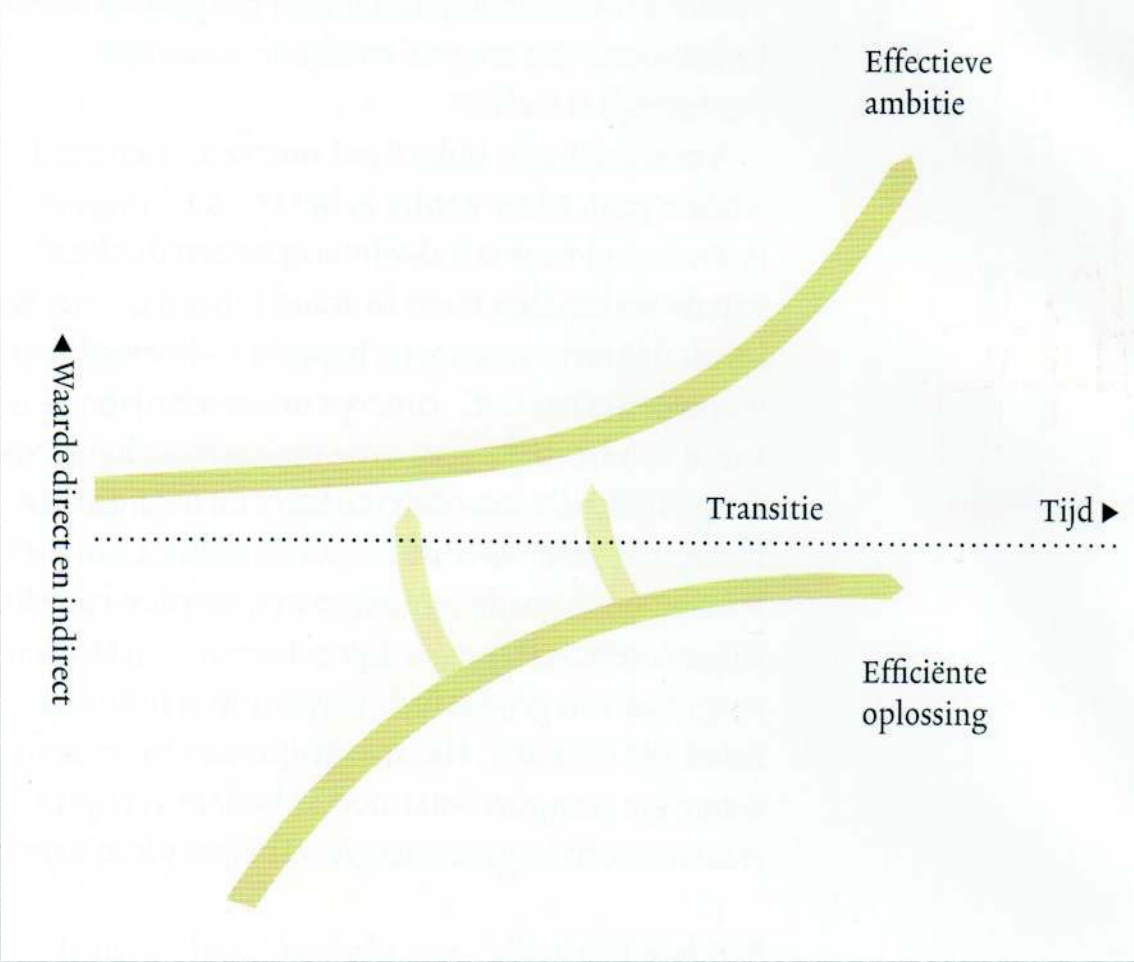


Material management
Sustainable energy
Innovation
Ecodesign

Against

Prosperity
Mobility
Use of energy
Instability

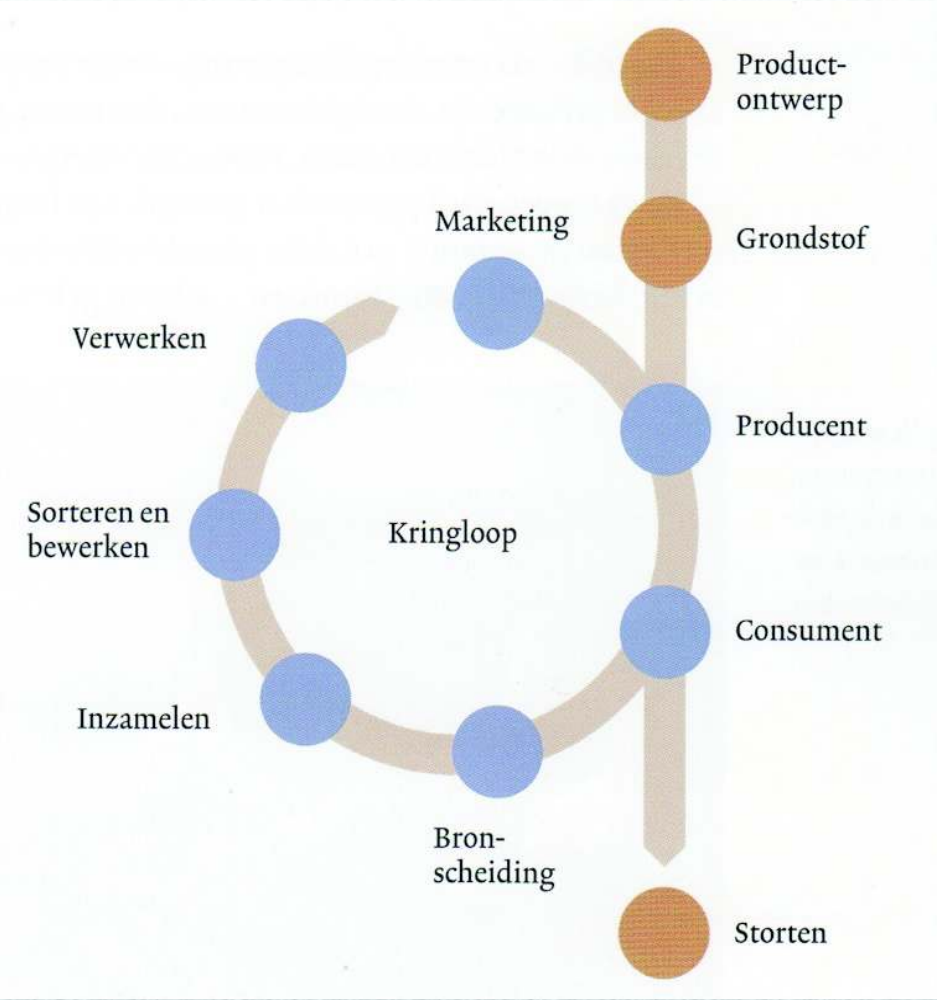
Eco-effectivenes and/or eco-efficiency



Source:
Wat ons bezig houdt ….
Inspired bij Cradle to Cradle

Royal Haskoning – Nijmegen-Rotterdam (2010)

From linear towards circular economics

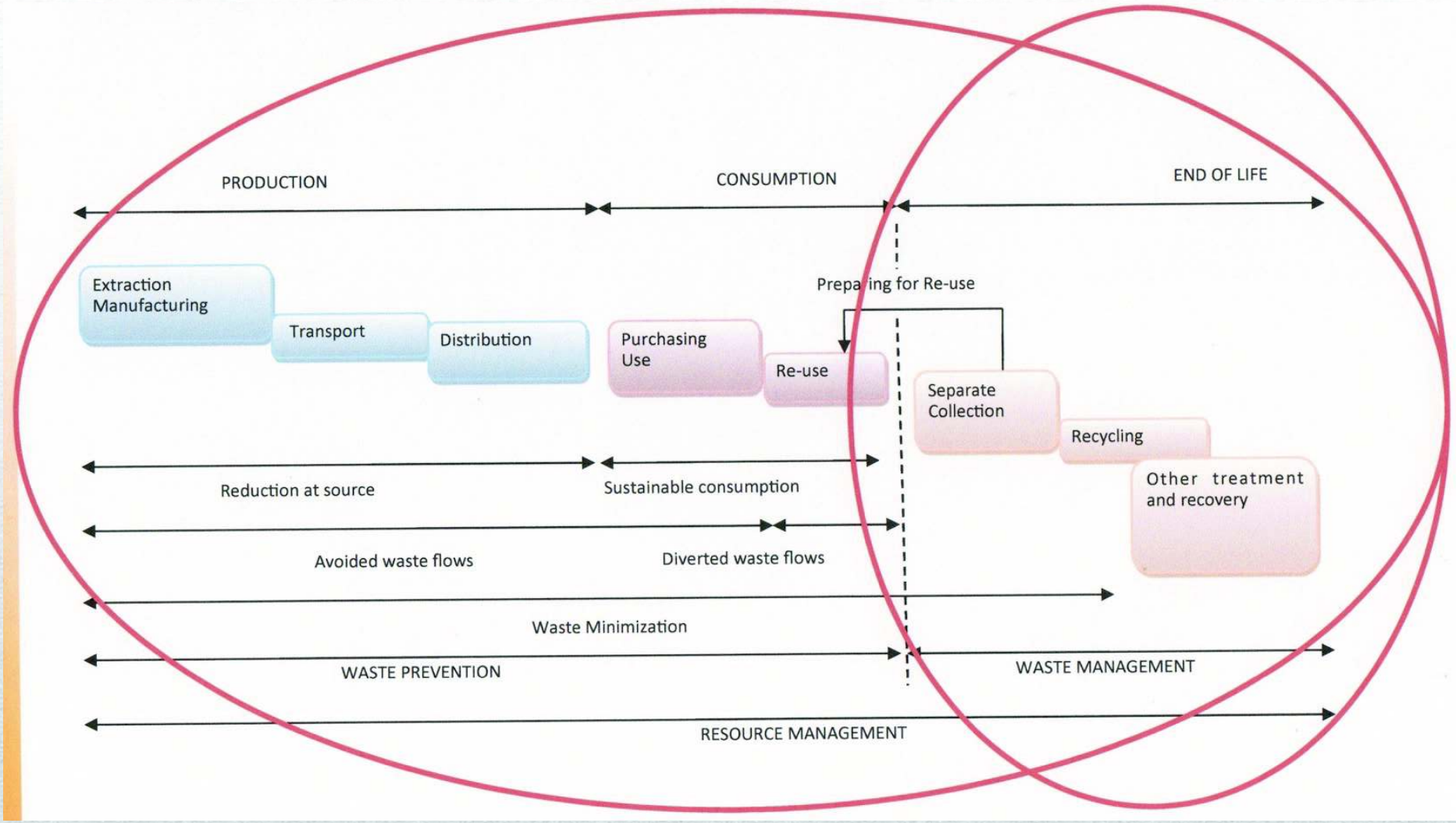


- Effective waste prevention
- Industrial symbiosis
- Integral chain policy
- Technological innovation
- Ecodesign products and processes
- Responsibility of producers
- Ecodesign
- Benchmarking

Instruments for resource management

- Introduction of effective recycling schemes
- Application of economic instruments (e.g. taxes)
- Strengthening of producer responsibility
- Green public procurement
- Research and development policy (innovation)
- Integrate prevention/recycling in permitting procedures
- Integration of environmental criteria in product regulation
- Sustainable (or eco-)design

Moving towards Resource Management



Source: ISWA (Antonis Mavropoulis - Theo Lemmen - Maarten Goorhuis (Mexico, 2011])

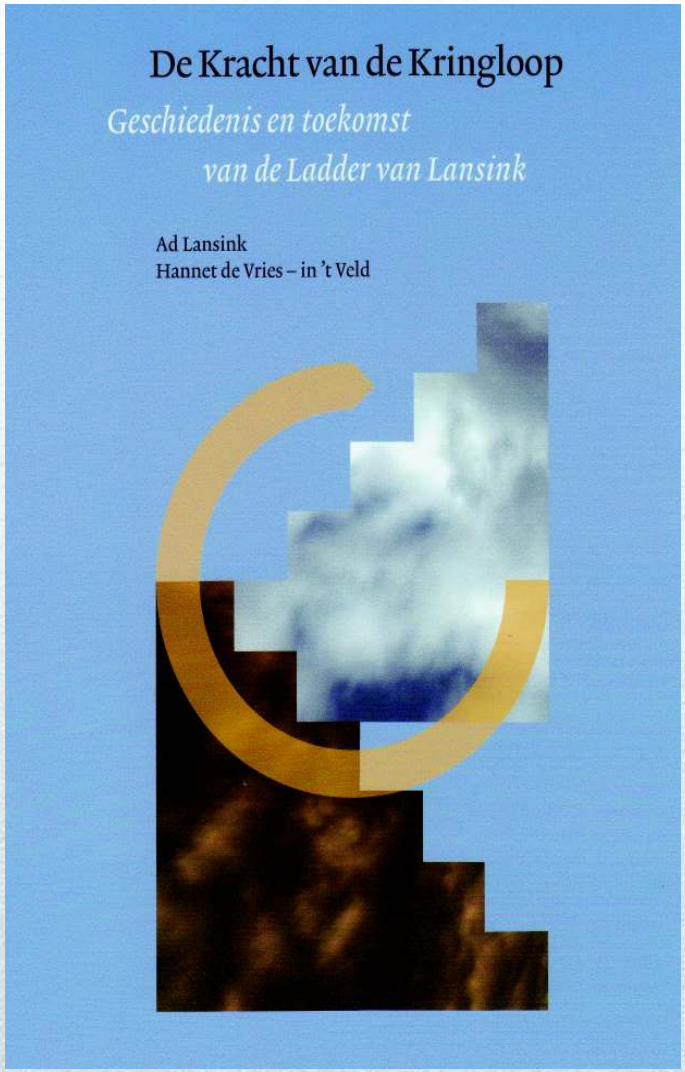
Circular dilemma's

Control by Government	or	**Producer Responsibility**
Fiscal measures	or	**Free market power**
Binding (eco)directives	or	**Freedom for products**
National policy	or	**International Cooperation**
Lease society	or	**Right to property**
Local/Regional market	or	**Continental market**

Important keywords for the near future

- Emphasis on prevention and re-use of materials
- Ecodesign focussing on resource management
- Saving materials and energy
- Strong promotion of sustainable energy
- Importance of ‘CO2 footprints’
- Innovation in technology and logistics (transport)
- Responsibility of producers and consumers (‘prosumers’)
- Legal framework and stimulation programs

Circular Power?



- From proposal towards legislation
  - **Tightening European waste directive**
- From waste towards secondary material
  - **Urban mining**
  - **Reprocessing of bottom ashes**
- From previous times towards near future
  - **Taking away transition obstacles**
  - **Tension between ownership and leasing**
- From open end towards closed circle
  - **Biobased economy**
  - **Responsibility of producers**
- From waste of materials to control of flows
  - **Impulses for prevention**
  - **(Re)using new materials and products**