Bio-economy Symposium
Sowing Innovation – Reaping Sustainability
Forests‘ Crucial Role in a Green Economy
Vienna, Austria, 13 – 14 April 2015

Resource Productivity / Circular Economy / Sustainable Management of Natural Resources

Dr. Xaver Edelmann
President World Resources Forum
Classification of natural resources

Natural resources
- water
- land
- air

Abiotic materials (non-renewable)
- Fossil fuels
- Metal ores
- Industrial materials
- Construction materials

Biotic materials (renewable)
- Agriculture
- Forestry
- Fishery

Source: UN System of Integrated Environmental and Economic Accounts (SEEA)
World demands more resources

Source: OECD 2008, modified Empa 2011
The world behind the wedding ring (7g) is 2.700 kg (factor 385.000)

F. Schmidt-Bleek, Factor 10 Institute, France

Ecological backpack

Metal ring: factor 7070
Car: factor 15
LCD: factor 300
Cell phone: factor 500
PC: factor 1000

Source: Seppo Lajonnen
World population 1400-2050

Resources are getting scarce

• Physical limits
• Political risks
• Prices
• Environmental and health challenges
• Social limits

See Resource Snapshots at http://www.worldresourcesforum.org/resource-snapshots
Humanity’s unsustainable environmental footprint
Chairman’s statement World Resources Forum, WRF 2011 Davos

Improve data and indicators.

You can’t manage what you can’t measure.

Input of Jacqueline McGlade, EEA
Measuring the use of natural resources and its impacts, 2012
Brochure of a+, Lead SATW, Authors: F. Blaser, P. Wäger, H. Böni, EMPA

Proposal of Friends of Earth in the 90s:
Materials
Land Use
Water
Energy (Fossil, Greenhouse Gas Emissions)

Proposal World Forum
Indicators for use of natural resources:
Materials, Water, Land Use, GHG (Fossil Energy)
Biodiversity, Toxicity (Environment, Human Being)

http://www.satw.ch/publikationen/schriften/Indikatoren-Broschuere_EN.pdf
The global resource footprint of nations
Arnold Tucker et. al, 2014

Carbon Footprint

Water Footprint

Land Footprint

Material Footprint

Carbon footprint per capita

The global carbon footprint per capita in 2007 was close to 10 CO2-eq. Citizens of Australia, the USA and Luxembourg were responsible for emissions over five times this volume, reflecting their high GDP per capita. These countries were followed by other, rich OECD countries. Emissions in Africa, China and India were well below average. France had relatively low GHG emissions per capita due to its high reliance on nuclear power.

Water footprint per capita

As in the case of the carbon footprint, the water footprint for 2007 too was the highest for Australia, the USA and Luxembourg respectively, on account of their high per capita GDP. Further, rich countries with limited precipitation, such as Greece, Spain, and Turkey, had high levels of water consumption per capita, since their agricultural systems largely rely on irrigation. For water, the difference between the countries with the highest and lowest footprint was around a factor of 10, which is less pronounced than in the case of the land and material footprint.

Land footprint per capita

In the case of the land footprint, sparsely populated countries with extensive land use, such as Australia, Canada, Finland and Russia, were at the top. For these countries, the amount of land directly available for its population was the determining factor. At first sight, the high rank of the Netherlands, one of the most densely populated countries in the world, is surprising. However, this is due to the intensive Dutch livestock industry, which relies heavily on imported feed, hence creating a high land footprint abroad.

Material footprint per capita

Continuing the trend, countries with high per capita GDP tend to have a high material footprint per capita. Rich countries like Australia and Finland, hosting large primary industries such as mining and forestry, or those like Ireland that experienced a building and construction boom, had particularly high ranks. In this context, it is notable that construction materials are usually responsible for half of the material footprint of a country.
Decoupling Approach

Objective: Decouple Impact from Growth

Decoupling resource use from economic growth:
“more value per kilogram”

Better eco-efficiency: more value per impact

Economic activity (GDP)

Resource use (kg, km², kW…)

Decoupling environmental impact from resource use
“less impacts per kilogram”

Environmental impact (“indicators”)

Source: Klaus Kögler, European Commission, Directorate General for the Environment

2005

2030
UNEP Decoupling Reports

Decoupling Natural Resource Use and Environmental Impacts from Economic Growth

2011

City-Level Decoupling
Urban resource flows and the governance of infrastructure transitions

2013
Decoupling natural resource use and environmental impacts from economic growth

The global interrelation between resource use and income (2000)

UNEP (2011), International Resource Panel. Lead authors: Marina Fischer-Kowalski and Mark Swilling

Figure 2.6. The global interrelation between resource use and income (175 countries in the year 2000)
Cities and natural resource use

- **80% of global GDP** produced on just 2% of the land surface.
- **60-80% of global energy** consumption
- **75% of carbon emissions**
- **More than 75% of the world's natural resources**
- Cities mainly depend on the import of **finite material resources** from outside their boundaries.

A Sustainable economic development will depend on **DECOUPLING** growth from escalating resource use and ensuring equitable distribution of the resulting benefits.
Alas, only one country currently populates the sustainability rectangle
(E.U. von Weizsäcker, WRF 2011, Davos)

Source: Global Footprints Network
Now I am proposing one answer to that challenge: A factor of five in the increase of resource productivity could pull or push most countries into sustainability!

(E.U. von Weizsäcker, WRF 2011, Davos)
WRF 2014 In Arequipa, Peru
More than 1000 participants from 50 countries
We need a ‘Wedge’
Swiss Resource Use

Resource use in terms of the ecological footprint expressed as number Earths; Source: www.footprintnetwork.org
World Resources Forum in Arequipa, Peru
October, 2014

1’000 participants from 40 nations

- Improvements for regulation and tax systems.
- Better resource efficiency and its influence on climate change.
- Development of robust standards and indicators.
Circular Economy Brochure, 2014

• Success Factors for a CE

• Case countries China, Germany, Switzerland

• Short analysis and comparison

• Recommendations
Visualization of a Circular Process


Rolf Hügli, SATW, WRF 2014, October 2014
The Natural Change in Urban Architecture

Life Cycle Tower ONE, realized

The Vision
• What is determining economic success in the 21st century? Increasing influence of factor resources
  Mathis Wackernagel, President Global Footprint Network

• Resource Use in Austria – Can it be done with less?
  First Results of Resource Use Report 2015
  Anke Schaffartzik, Institute for Social Ecology

  2015 new focal area: renewable resources („biomass“) as second largest fraction of Austrian material consumption

• Building the Natural Change
  Harald Professner, Cree GmbH

• European and Austrian Resource Policy
  Christian Helmenstein, Federation of Austrian Industries
The three spheres of sustainability

Social-Environmental
- Environmental Justice
- Natural Resources Stewardship
  - Locally & Globally

Environmental
- Natural Resource Use
- Environmental Management
- Pollution Prevention
  - (air, water, land, waste)

Environmental-Economic
- Energy Efficiency
- Subsidies / Incentives for use of Natural Resources

Social
- Standard of Living
- Education
- Community
- Equal Opportunity

Economic
- Profit
- Cost Savings
- Economic Growth
- Research & Development

Economic-Social
- Business Ethics
- Fair Trade
- Worker’s Rights

Adopted from the 2002 University of Michigan Sustainability Assessment
Sustainability quick check for biofuels, sqcb
A new tool to enhance market access for producers by assessing and improving sustainability, 2009

Rainer Zah, Mireille Faist, Jürgen Reinhard, Empa et. al.
Framework for Research Topics Resources and GHG Emissions

Scope:
- geographical (global, regional, local)
- sectorial (construction, transport, health, ...)
- products (cars, ict, ...)

Energy

Source
- e.g. minerals/metals, renewables

Sink

Feedback / Indicators

Control input

Technology, Economics, Politics, Legislation, Nature, Society

Materials Flows, Life Cycle Inventories
Life Cycle Assessment/Impact:
- Material Use, GHG Emissions, Water Use, Land Use, Biodiversity, Toxicity
- Modelling, Simulation

Copyright: Edelmann, WRF, Widmer, Empa, August 2010, Rev March 2014
Doing more with less

Consuming and producing more efficiently and differently ...

... and providing opportunities for the poor.

Bas de Leeuw, WRF 2009, Davos
Koli Forum, Finnland
Wealth from BioEconomy

• Top-level initiative.
• Establishing a new discussion forum on natural resources.
• Topics related to natural resources and the bioeconomy.
• Availability of raw materials, their economic use and environmental aspects.
• Trendsetting advisory forum in bioeconomy and sustainable use of natural resources.

Koli Forum 2015

• Fourth Koli Forum event will be held on September 9-11, 2015.

• Koli Forum 2015 is focusing on the possibilities of the northern bioeconomy: WEALTH FROM THE NORTHERN BIOECONOMY – JOINT OPPORTUNITIES AND CHALLENGES FOR BUSINESS AND WELL-BEING.

• The venue is the Koli National Park, Finland.
World Resources Forum 2015 Davos

• Davos, October 12-15, 2015

• Boosting Resource Productivity by Adapting the Circular Economy

• Topics:
  – Circular economy and decoupling
  – Technological innovation, business and finance
  – Targets, indicators and benchmarks for resource use
  – Lifestyles and education

• Agenda items to include EU Ministers, UNEP Resources Panel, UNIDO RECP Network, Ellen MacArthur Foundation
Summary

- Resource use a global problem
- Resources are getting scarce
- Resource use of industrialized countries too large
- Right for resource use of less developed nations in order to achieve an adequate standard of living
- Decoupling of welfare / well-being from resource use
- Approaches:
  - Circular economy
  - Renewable resources
  - Bioeconomy
  - Life style
- Sustainable resource use
- Doing more with less
Thank you for your attention!

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