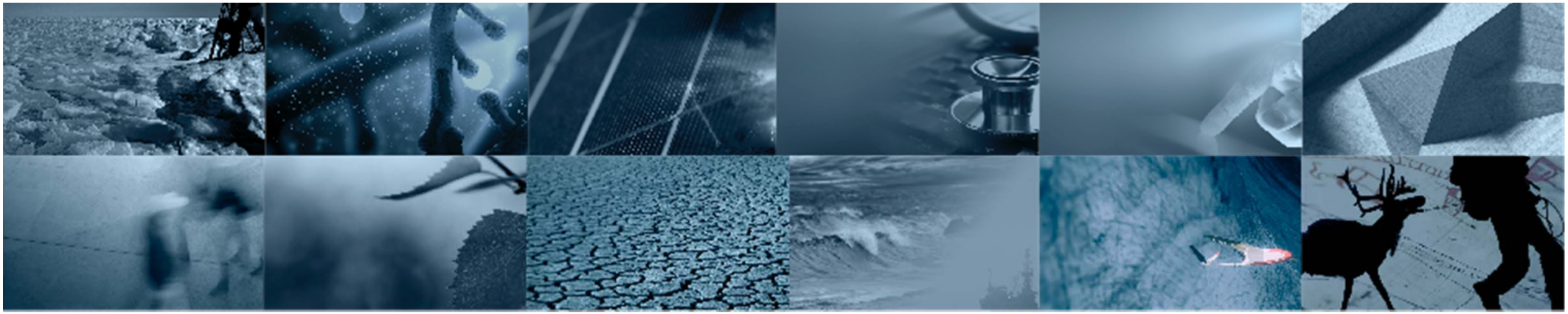


RESOURCEDISTRIBUTION IN THE «SMART BIOECONOMY»

BIOSMART- MANAGING THE TRANSITION TO A SMART BIOECONOMY

May-Britt Ellingsen, Senior researcher, Dr. Philos og Heidi Rapp Nilsen, researcher, Ph.D Norut, Norway

Copenhagen, 25-26 October 2016

BIOSMART

How to manage the transition to a "smart" bioeconomy

What is our focus ?

- To assess bio-sector FUTURE IMAGES of the bioeconomy
- To analyze GREEN transitions in the bio-economy though case studies:
  - Turning biogas into public transportation
  - Developing sustainable feed in aquaculture
  - Transitions towards zero emissions in agriculture
- To develop scenarios for SMART TRANSITIONS across sectors – reveal synergies of collaboration

Bygdeforskning norut NORTHERN RESEARCH INSTITUTE The Research Council of Norway

BIOSMART

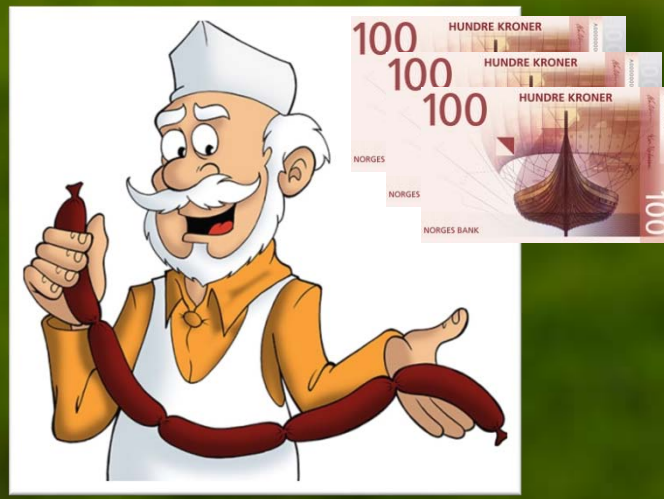
“Address a number of issues that are critical to the overall objective of promoting a ‘smart’ (integrated, human-capital/technology based, and wise) bioeconomic transition across Norway.”

norut
NORTHERN RESEARCH INSTITUTE

BIOSMART

BIO-SMART PROJECT:
WP 6 RESOURCES
WP 9 VALUE CREATION

Eirik Mikkelsen, Jannike Falk-Andersson, Sindre Myhr, Magne Forbord (CRR), Birger Vennesland (NIBIO), May-Britt Ellingsen, Heidi R. Nilsen



hdwyn.com. Illustrasjoner.net. Rockekokk.no. Slowpix.no/aurskogkjøtt.

RESOURCES – TODAY AND IN 2030

- Current status for **biological biomass resources** in Norway from forestry, agriculture and the marine environment
- Available **relevant human capital resources and R&D activities**
- Where are **the bio economic industrial clusters** in Norway currently, and what **resources do the different clusters have access to/require**?
- Types and capacity **for industrial processing for major types of biological resources and products**

BIO ECONOMIC INDUSTRIAL CLUSTERS

- **Cluster - no coherent definition**
  - *groups of related industries*
  - *world-wide policy recipe*
  - *a value chain or as a group of business relationships which can stretch out globally, nationally, regionally*
  - *a clump of enterprises belonging to the same industry and located in a community.*

- **A critical mass** of *'geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition"* (Porter 1998, p. 197)

Roots in theories about the benefits of industrial agglomeration:

- co-location provides a common, specialised labour market, low transport cost and tacit industrial knowledge.
- economic theory: the benefits are externalities, spill-over effects, infrastructure and knowledge resources (Reve and Sasson 2012)

INDUSTRIAL RESOURCES

Distribution: Map/analyse **industrial bio economy** processing capacity:

- Challenges: Defining relevance and scope
  - Defining **industrial bio economic resources**
  - Defining and delimiting **bio economic industrial clusters** in Norway currently, and what **resources do the different clusters have access to/require?**
  - Deciding **types and capacity for industrial processing** for major types of biological resources and products is present today and could be likely in 2030?

3 VISIONS (Bugge, Hansen and Klitkou 2016)
PERCEPTIONS OF THE BIO ECONOMY – INDUSTRIAL DYNAMICS

- Bio-Resources: processing and upgrading of biological raw materials, establishment of new value chains
  - Upgrading and conversion of biological raw materials, new value chains

- Bio-technology: the importance of bio tech research and commercialisation of biotech
  - Application of science, commercialisation

- Bio-ecology: sustainability and ecological processes optimising use of energy and nutrients, promote biodiversity, and avoid monocultures and soil degradation
  - Circular processes

DISTRIBUTION OF RESOURCES IN THE BIO ECONOMY: INDUSTRIAL TRANSFORMATION?

- Value creation:
  - a material component associated with bio resources + an immaterial component of knowledge and development of new knowledge
- Multi-functionality of raw materials, enabling technology, disruptive innovations
- Blurring of boundaries between traditional industries
- New interlinked and interdependent value chains, cross sectoral
- Industrial convergence – cross industry nature
- Industrial symbiosis :
  - exchanging by-products and energy cascades, the joint provision of utilities and services, improve overall environmental and economic performance

NEW CONCEPTUALISATIONS OF RESOURCE DISTRIBUTION?

The bio economy:

- Reshaping of the traditional industrial landscape

- New conceptualisations of industrial processes

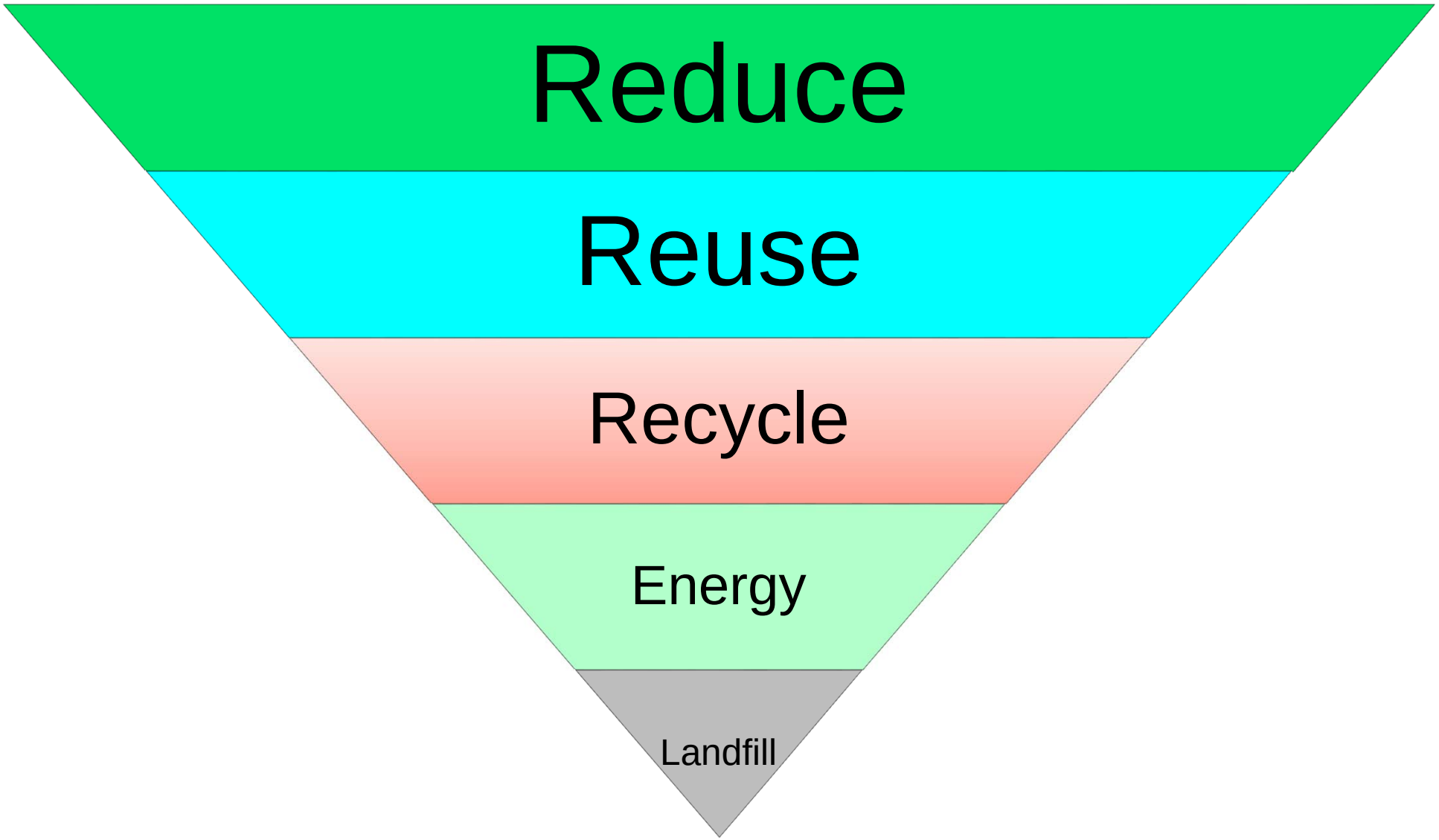
  - industrial converging and industrial symbiosis demand a new understanding of resource distribution

  - linear processes and defined categories has to be expanded with hybrid categories and circular perspective

- Interdisciplinary research and collaboration


RAW MATERIALS
DESIGN
PRODUCTION, REMANUFACTURING
DISTRIBUTION
CONSUMPTION, USE, REUSE, REPAIR
COLLECTION
RECYCLING
CIRCULAR ECONOMY
RESIDUAL WASTE

THE PYRAMID OF RESOURCE USE



- EU Waste Framework Directive of 1975
- Further strengthened in 2010 with a revised EU Waste Framework Directive
- Waste legislation and policy of the EU Member States shall apply as a priority order following the waste management pyramid.
- Departing from the pyramid must be justified!
- Norwegian national strategy from 2013 (Ministry of Environment, 2013)

THE PYRAMID BUILDS ON FOLLOWING PRINCIPLES

There is a bio-physical reality, as well as planetary boundaries with regard to resource extraction, distinction, deforestation, pollution etc.

Minimize throughput of material and energy

Laws of thermodynamics:

Free energy can only be used once

Increase in entropy = decrease in available, free energy

Thank you ☺