



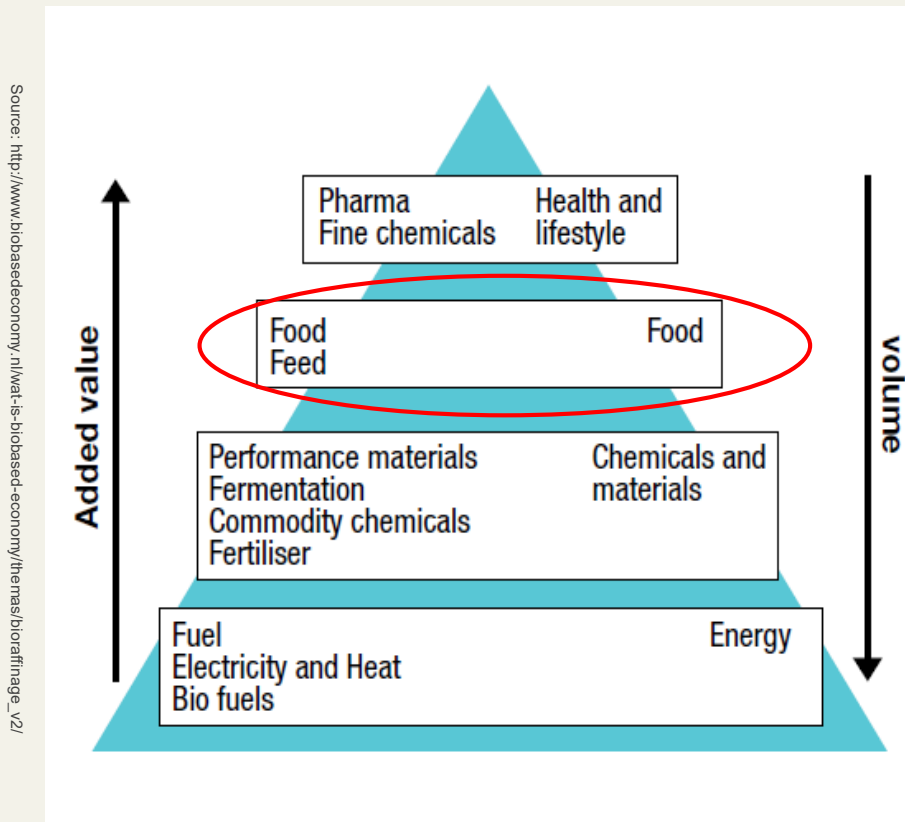
The Bioeconomy in South Africa

WWF inputs for the GreenCape Waste beneficiation workshop

All things to all men?

- EU: *Europe's Bioeconomy Strategy addresses **the production of renewable biological resources and their conversion into vital products**, ranging from food and feed to bio-based products and bio-energy.*
- Germany: *"Bioeconomy is the **sustainable and innovative use of renewable resources to provide food, feed and industrial products** with enhanced properties. Besides economic growth the bioeconomy aims for food security, climate protection and conservation of scarce natural resources."*
- DST: *"The term "Bio-economy" encompasses **biotechnological activities and processes that translate into economic outputs, particularly those with industrial application.**"*
- DEA: *"The biodiversity economy of South Africa encompasses the **businesses and economic activities that either directly depend on biodiversity for their core business or that contribute to conservation of biodiversity through their activities.**"*

Key Concepts

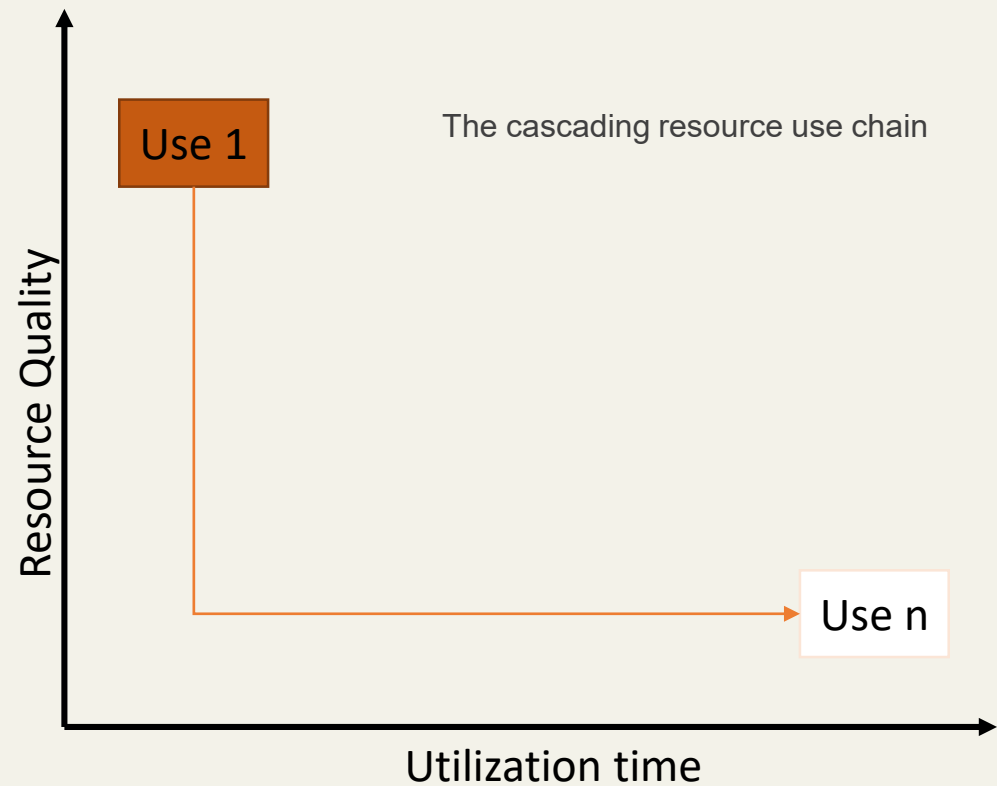


- Prioritisation in terms of economic value
- Protection of right to food is critical
- Larger volumes required for lower value products
- Potential for leveraging economic growth by focussing higher on the hierarchy

The bio-based value hierarchy

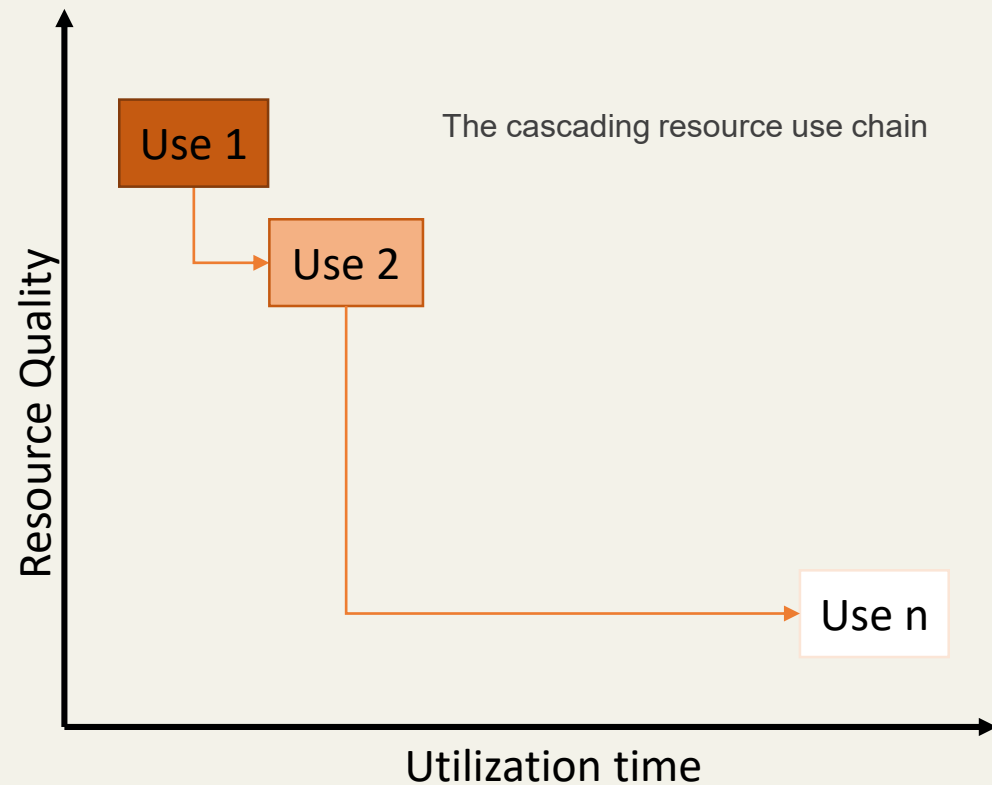
Key concepts

- Cascading resource minimises total consumption, maximises return
- Ultimate use is often bioenergy or landfill



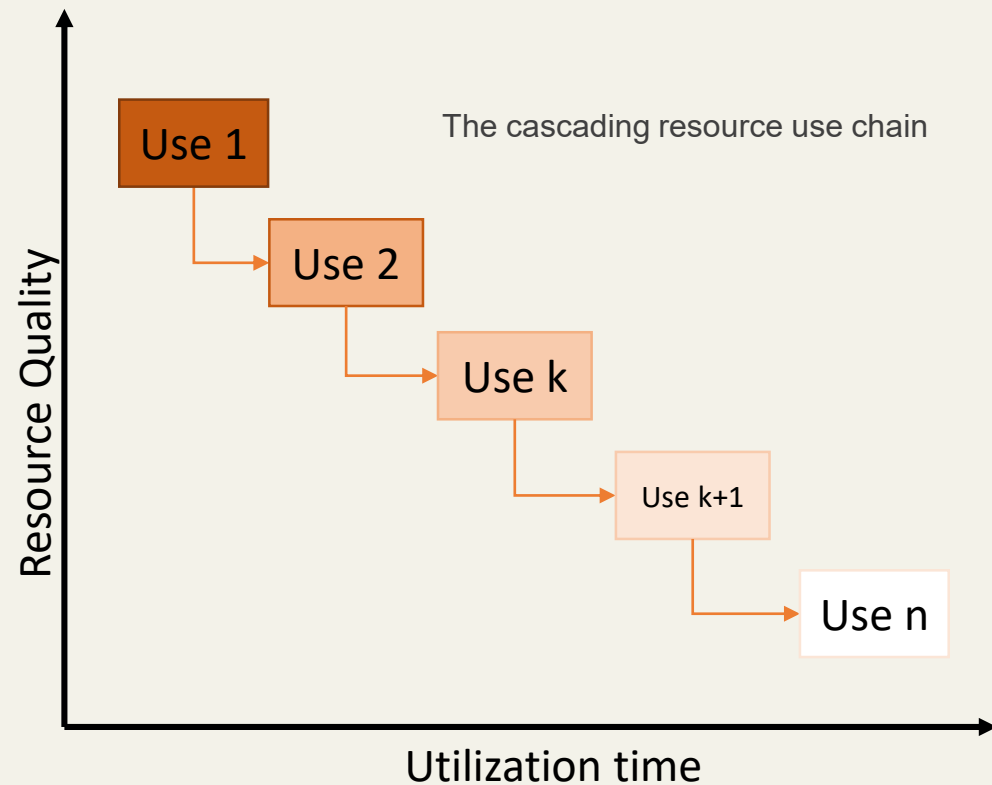
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- Ultimate use is often bioenergy or landfill
- “Waste” is critical – it is only waste when there’s no further use to which it can be put, or when it is consumed
- Value can be extracted at each step, so the more beneficiation that is possible, the better value from a product.



Potential

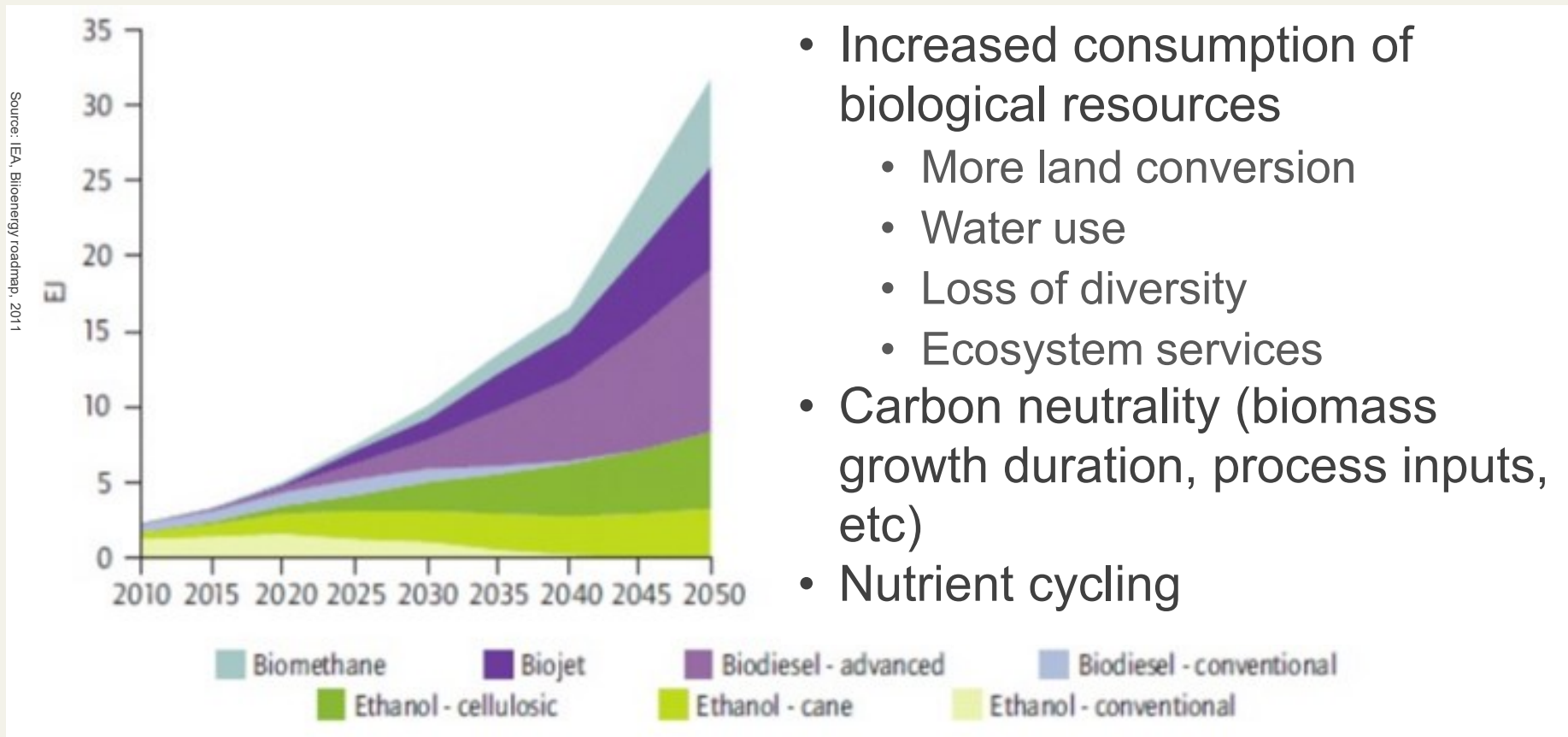
- Reduced dependence on fossil fuels
- Employment in both high tech and low skilled landscapes
- Can help improve food yields and availability
- Better economic returns on natural resources
- Emerging technologies can be game changers:
 - Closed loop farming
 - High-productivity PV to liquids
 - Biorefineries processing



“Greater use of renewable resources is no longer just an option, it is a necessity. We must drive the transition from a fossil-based to a bio-based society, with research and innovation as the motor”

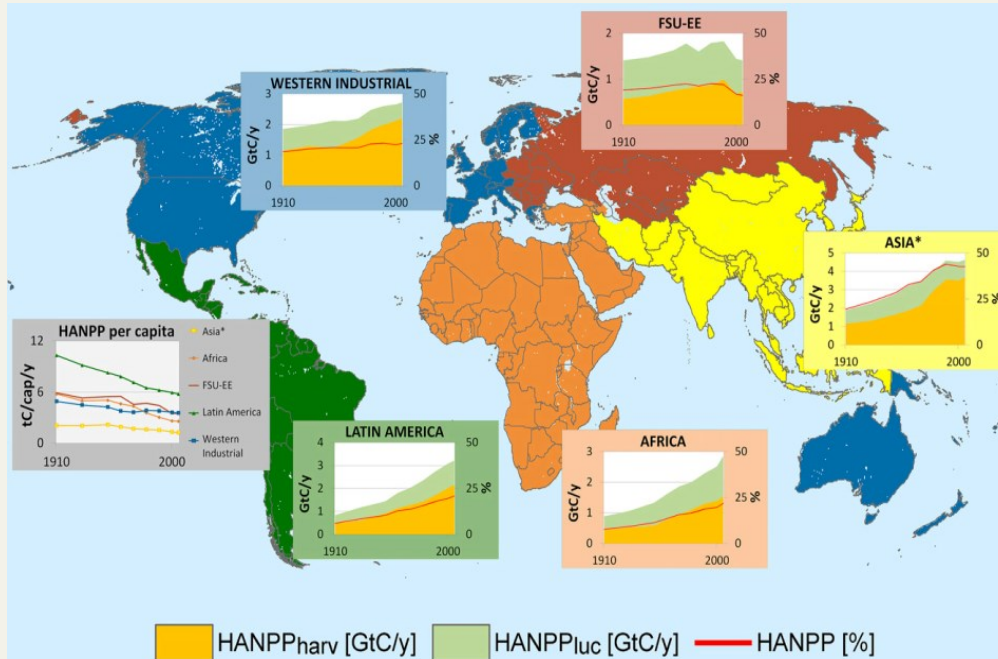
A Bioeconomy Strategy for Europe, EU (2013)

Risks



Biofuels demand projections

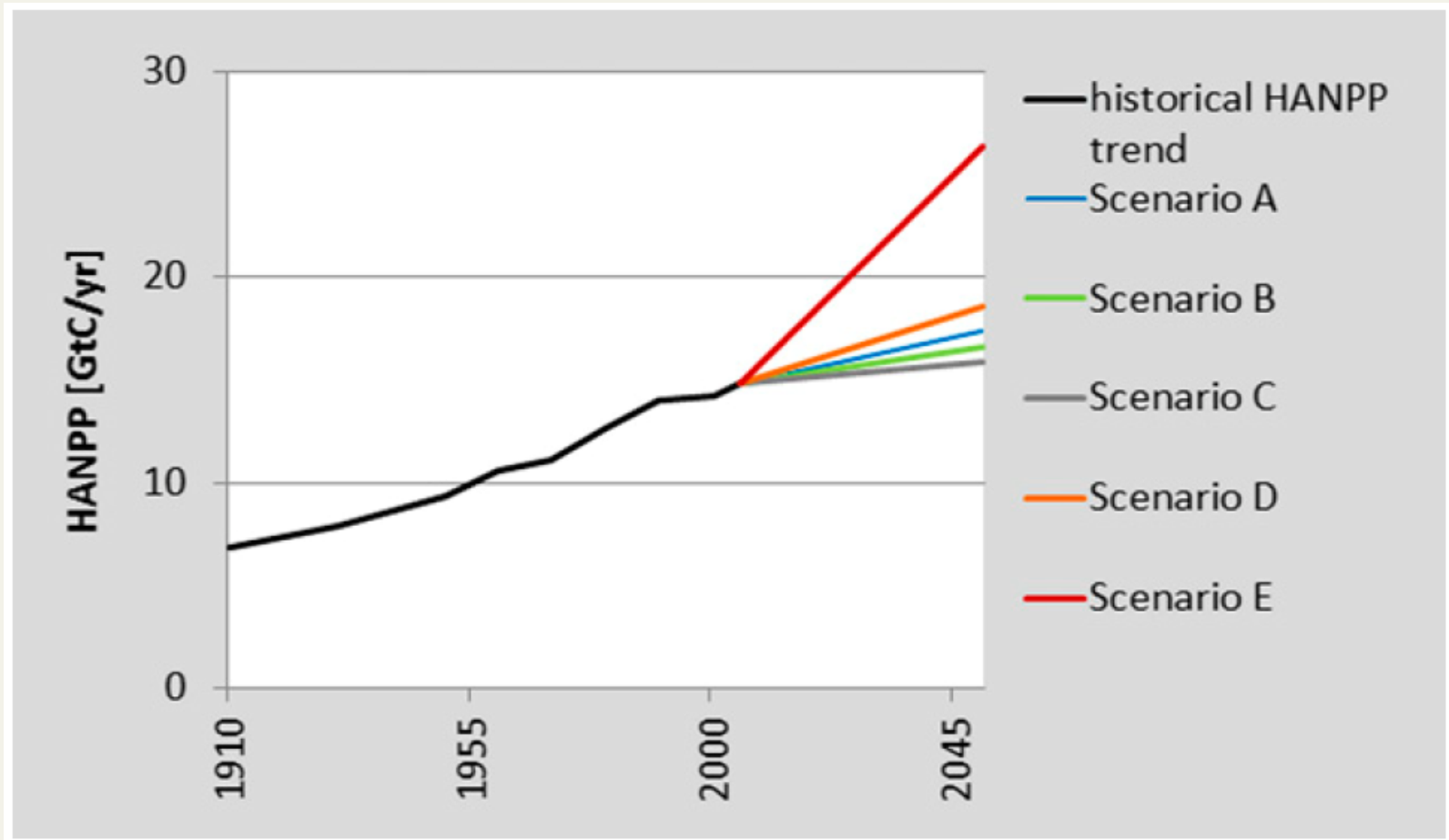
Risks



Krausmann et al., 2013. "Global Human Appropriation of Net Primary Production Doubled in the 20th Century." *PNAS* 110 (25): 10324–29.

- Technology issues:
 - Monopoly capture
 - Loss of genetic diversity
- Regulatory discrepancies driving unsustainable use
- Food scarcity:
 - Increased prices
 - Growing demand (population and aspirational)
- Availability of resources

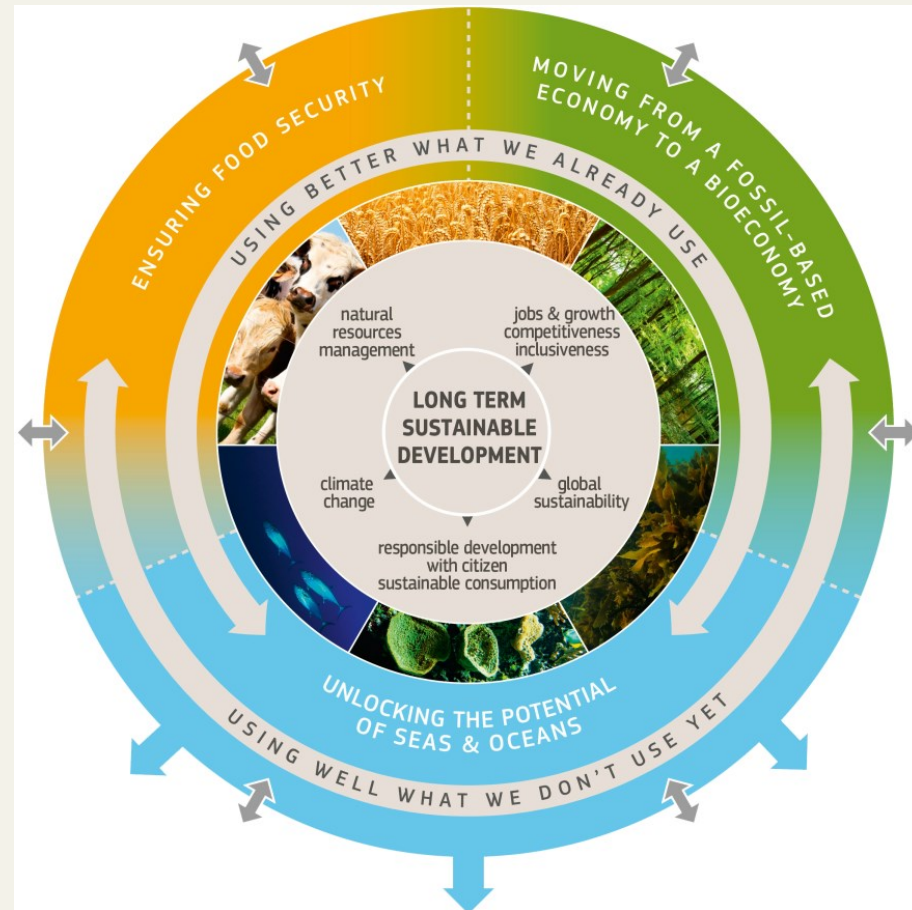
Risks



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South African perspective

- Relevant national documents:
 - The Bio-economy Strategy (DST, 2013)
 - Biodiversity Economy Strategy (DEA, 2015)
 - Biofuels Industrial Strategy (DME, 2007)
 - Biotechnology Strategy (DST, 2001)
 - AgriParks (DRDLR)
 - The Bio-energy Atlas (DEA, 2015)
- No integrated vision, some conflicts in priorities, moderate policy incoherence.
- Land sector transforming (land reform and farm consolidation)
- Strong potential for rural livelihood improvement (agri-hubs)
- Industrial clustering and beneficiation



Source: ECSITE promotion Oct 2015

Waste in the SA Bioeconomy: Waste to energy

- Anaerobic digestion (CCT, Bio2Watt, abbatoirs, dairies)
- Produce biogas/generate electricity
- Biomass (SAPPI, Mondi – good use for some residues)
- Potential scoped in the BioEnergy Atlas: limited potential for crop residues primarily because of competing uses. However, still considerable potential nationally *in toto*
- Pyrolysis, torrefaction and in-field processing to increase value



Cape town Waste to energy plant in Athlone. Photo: Kim Cloete



Waste in the SA Bioeconomy: Biofuels

- Multiple pilots for first generation crops
- Some pilots for second generation crops
- Good potential for integration with SASOL manufacturing process around Secunda, & PetroSA in George
- Algal production with captured CO₂
- Fully regulated field which requires government clarity.
- Potential very dependent on location: logistics to hubs or local processing.

Waste in the SA Bioeconomy: Food & Feed

- High rate of reuse of organic waste from many industries
- Lower quality to processed foods
- Food waste often redirected to animal feed
- AgriProtein
- Composting (municipal and commercial)





The Bioeconomy in SA

A brief overview

Waste in the SA Bioeconomy: fine chemicals and valorisation

- Brenn-o-kem (Grape residues; seeds & skin)
 - Tartaric acid, calcium tartrate, oils,
- UKZN/CSIR: Chicken feather valorisation/ sugar residues
 - Extraction of keratin & protein elements (high value)
 - Manufacture of derivative composites
 - Bioplastics
- CEBER (UCT): confectionary industry waste
 - Polyglutamic acid & polyhydroxyalkanoates
 - Biorefinery development
- Innovus & SBMT (UniStel): Integrated engineering & bioprocessing of cellulose into biofuels
 - Bioplastics, multiple intermediaries
 - Lignocellulosic derived
- Bioplastics
 - Coca-Cola & Woolworths import components for green bottles: potential for local manufacture (currently imported from Brazil)



Where are the gaps?

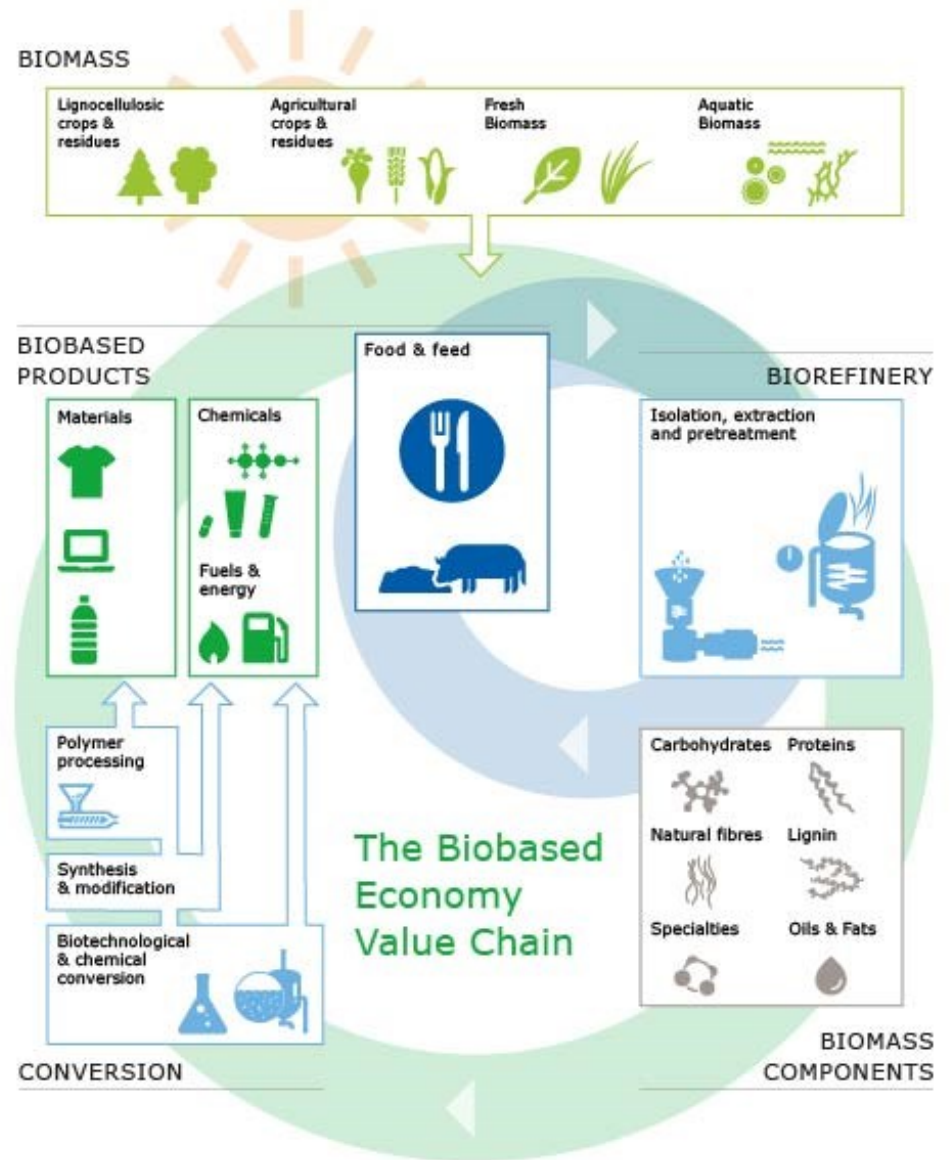


Image source: Wageningen University <http://www.wur.nl/en/Expertise-Services/Research-Institutes/food-biobased-research/Expertise-areas/Biorefinery.htm>



What are the gaps?

- Understanding potential: breaking the “waste” barrier
- Knowledge: low value opportunities available, higher value chains not yet established
- Demand: growing from both sides
- Investment: cautious until proven, so only pilots at present
- Sustainability: insufficiently embedded in policy/processes
- Policy: largely in place, needs strengthening and investment





James Reeler, WWF Land and Climate Project Manager
jreeler@wwf.org.za