Socioeconomic effects of a just transition to the new Circular Biobased Europe (CBE)

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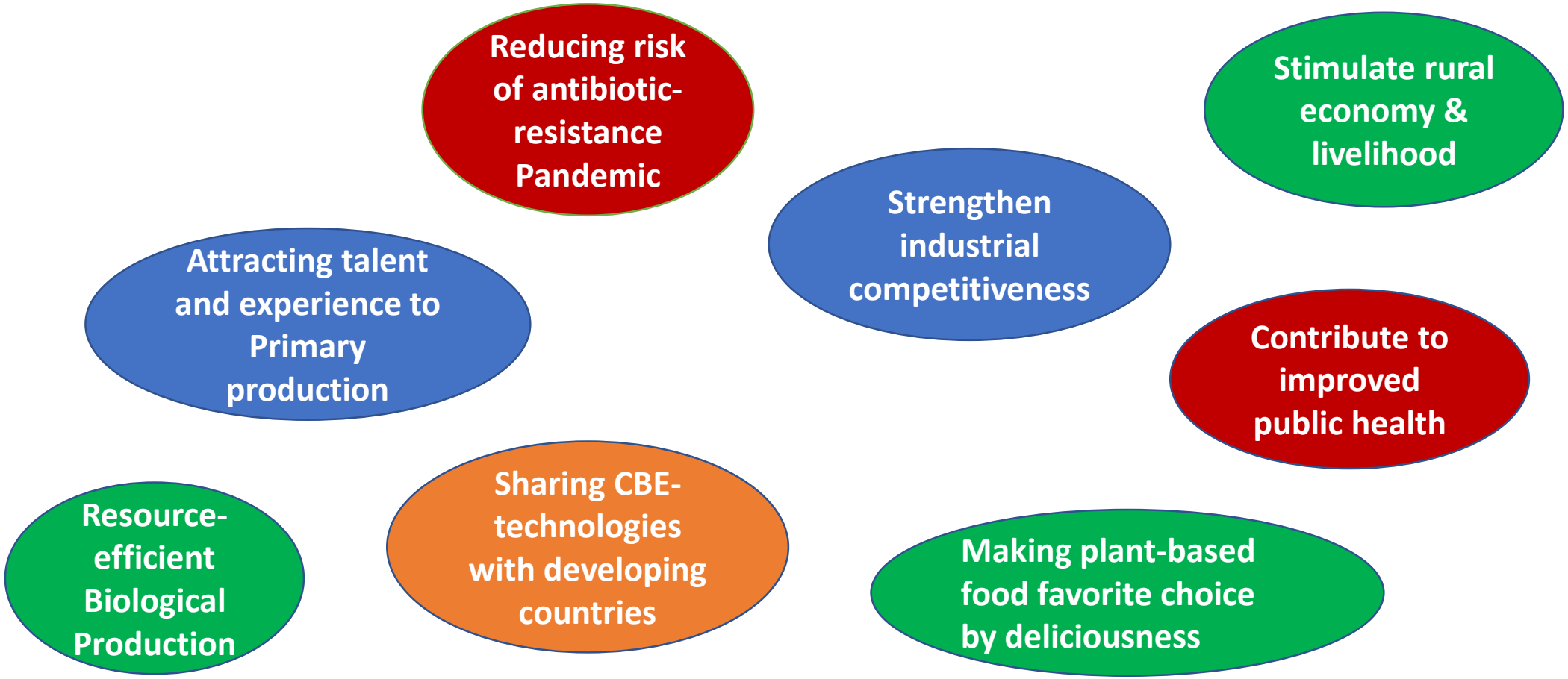
Overview:

Socio-economic Impact-Potential of Circular, Biobased Economy



CBE Basics 1/3:

Circularity of Biological Resources

- **Improved use** of *crop residues* and *animal-derived waste*
- **Valorization** of *food-processing side-streams* (e.g. oil-seed-pulps; dairy)
- **Upgraded use** of *food waste* (WHO: 34% of all food lost globally!)
- **Sustainable use** of *Blue Biomass, seaweeds, microalgae & fish cut-offs*

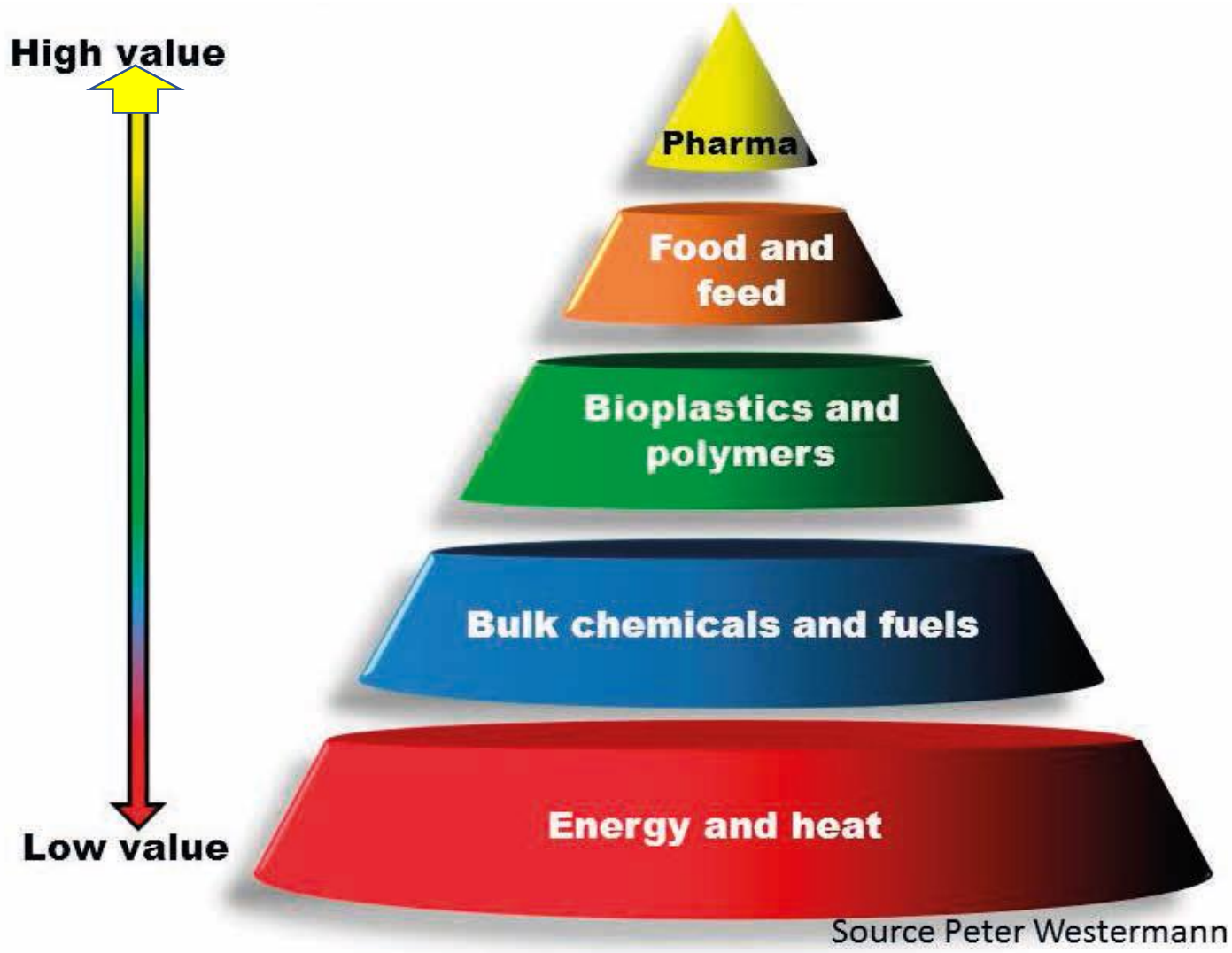
- **Upcycling of *residual microbial biomass*** from biological production
- **Making value from organic content** of *sludge and wastes*
- **Recirculation of *plant nutrients*** back to the soil, m*inimizing pollution*
- **Upgraded use of fibers** from *outsorted textiles, producing new textiles*

CBE Basics 2/3:

Biobased-Products -made from residues & waste

- **Nutritious, healthy and delicious** Food and Food ingredients
  - Alternative, local proteins e.g. from green grass, replace soy). Fungal ”umami delicious”!
  - Gut-health promoting sugar-oligomers e.g. XOS, from grass; microbiome-based treatments
- **Feed and Feed additives**
  - Improved animal welfare, cutting down antibiotics => reduced risk of antibiotic-resistance!
- **Health-promoting products**, for microbiome of plants, animals & man (gut, skin, respiratory)
- **Soil improving products** -a new generation low-emission carbon-sequestering bio-fertilizers
- **Bio-plastics**, produced from plants, waste-water or bacteria
- **Alternative Textile fibers**, e.g. made from orange press-pulp or wood; fiber-circularity!
- **BASICS:** Biobased chemicals & materials (new functionalities!); biofuels & input to Power2X!

CBE Basics 3/3 Cascading use: Unlocking the full potential of the biomass!



Making primary production more sustainable => Attracting young talent & experience to Agriculture, Fishery & Forestry

Sustainability measures: Reduce emissions, improve resource efficiency, food security and nutrition; stop loss of biodiversity; creating social inclusiveness

- Cut emissions by unlocking the full potential of primary production
  - Reduce waste and upgrade side-streams & residues => lower emission per ton food
- Cut down emissions further and contribute to stop of biodiversity loss
  - Take out low-lying, organic-rich soils => more room for biodiversity

Develop CBE business models:

- Primary production to be an integrated part of new Bio-based value chains by delivering optimized feedstocks and value-adding testing of new bio-ag products
  - Improve farmer, fishery and forestry income

Stimulate Rural Economy & Rural Livelihood by bio-based production and circularity of biological resources

Facilitated by local Public Private Partnerships:

- Develop rural and coastal economy through job creation
- Stimulate local livelihood, use kowledge and develop technologies
- Attract investments
- Engage people of many types of skills, across sectors and disciplins

It takes more than technologies to change to a bio-based society!

Strengthen industrial competitiveness & SME-growth

- Improved use of your raw materials (e.g. in food processing industry)
  - More robust business and improved competitiveness

- Upgraded use of side-streams gives higher prophit margins
  - as compared to the primary product (grain; meat; vegetables; oil)
  - Basis for many new, successful SMEs

- New research findings
  - Side-streams (rich in plant cell-wall fibers) is a better feedstock for producing gut-health improving food and feed => competitive edge & higher prices

- Gut-health promoting Food & Feed: Higher prices as compared to basic food

CBE clusters, (industry & SMEs), is a strong business model, stimulating local economy and growth

CBE Clusters create strength and generate synergy among green business-cluster members:

- Local, feedstock producers and ”Circular use” handlers deliver steady supply of feedstocks
- The core biomass-conversion Industry: Separates the feedstocks in its components, producing the core bio-based products
- Smaller companies, placed nearby, valorize each their component, producing specialized, high-value products
- Additional synergy in the cluster is created by sharing and using each others residual resources

BBI-JU Demo- and Flagship- Industries provide a strong & inspiring platform for further growth of the CBE -across EU

Next steps for developing Circular, biobased economy in Europe:

- Stimulate a broader societal socioeconomic value, generated by lifting the entire sector; moving ahead from only individual, pioneering industries
  - Is IP an obstacle for this? –see next slide
- Develop further the many areas of biobased valorization so far not upscaled for commercialization; OBS coordinate to new waste-directives
- To develop technologies for making more Biobased, Health-promoting products for man, animal, plants & soil
- To position CBE as relevant for climate, feeding the world, biodiversity, social inclusiveness and indistrial competitiveness

Knowledge-Sharing & Technology-Protection in Bioeconomy

Knowledge-management for an efficient, green turn-around

- The *bioeconomy builds on a strong platform* of knowledge and technologies *already present in the public domain*
  - Much of the biobased start-up SMEs are not aware of how much knowledge and technologies are actually available, royalty free & open access
- *Individual companies can protect their specialized technologies* by more narrow patents, built on top of public knowledge
- *Open access biology* can be promoted by establishing a designated culture collection of essential bacterial and fungal cultures, essential for biological production, biomass-processing & product development

Positioning the potential of Circular biobased Europe to deliver improved public health

- *Technologies for making new health-applications and treatments*, using the game changing innovation of microbiome sequencing, is being made as we speak
- *Combining probiotics, prebiotics, anti-inflammatory and anti-oxidants* is a potent cocktail for improving microbiome composition & function
- Microbial fermentation is a short-cut for producing such cocktails

- Several new products of *high potential for creating sustainable societal value* (for human, animal, plant and soil health) are in the tube. OBS Waiting for *Regulatory approval can take years!*

CBE´s role in reducing risk of antibiotic-resistance pandemic

Recommendations:

- **Upscaling & Commercializing gut-health-improving pig feed**
  - Example: Co-fermenting rape seed meal and seaweed => probiotic, prebiotic, anti-inflammatory, antioxidants and vitamins in one tsunami of impacting and modifying the gut-microbiome (e.g. European Proteins)
- **Stimulating research** in identifying and inhibiting the microbiome-bacteria most efficient in acquiring and multiplying the antiobiotic resistance genes
  - OBS In both man and animals! New report finds high level resistance genes also in baby feces; mostly reproduced in specific strains of E. coli (Søren J Sørensen, UCPH)
- **Introduce monitoring of fluctuations in antibiotic resistance genes** in the microbiome of waste-water-treatment plants

CBE technologies, to be refined & used in developing countries

- **More food and feed** from upgrading crop residues and side-streams of industrial food processing. Contributing to food security & health
- **Better soils:** New low-emission phosphorous-rich bio-fertilizer from microbiome (of anaerobic digestion) in waste-water-treatment plants
- **Reduced needs for pesticides**, Bioag: e.g. Plant strengtheners, being robust towards diseases and spring draught

- **In short:** CBE can provide a realistic and affordable route to achieve improved food security, nutrition, robustness in health of man and animal
- Hereby also generating local income, job creation! & livelihood!

CBE can speed-up the green, climate friendly turn-around

Deliciousness can be the new driver for introducing more climate-friendly (side-stream based) food habits:

- **Umami-flavor-enhancing food ingredients**, processed by fungi and fungal enzymes *(we have exciting new "Umami-flavor-enhancing products in the tube!)*
  - **Making plant-based the preferred choice for more people**

- **Food entrepreneurs** in knowledge-based SMEs have great potential to contribute to climate change mitigation as well as for feeding the world more sustainably, wasting less

WFS: CBE Take-Aways for UN Food Systems Summit (Sept. 2021)

- Daily intake of **"gut-health-food" part of the official "Public Health & Climate" Dietary Recommendations** (e.g. fermented food, pro-biotics or other gut-health promoting food). Evidence-based by Game Changing gut-microbiome Innovations
- **Contribute to reduce the threat of an antibiotic-resistance pandemic** by making gut-health improving animal feed additives, a part of dietary requirements for industrial animal production. Evidence from microbiome research & innovation
- In close partnership between Private & Public R&D, use **Game Changing bio-conversion technologies to upcycle food processing side-streams**, hereby producing more nutritious and climate friendly food and feed. Climate friendly, due to low emission from circular use; *and* leaving more land for biodiversity
- **Public meals (in schools, public canteens, hospitals etc) to be trendsetting** in serving delicious food, made from food-residues and industrial side-streams. Be inspired through partnering with pioneering restaurants, food entrepreneurs and start-ups. Share experience globally!

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CBE empowering developing countries to take home funding from international Climate- or Philanthropy Funds

- CARE, Denmark has established a project to develop technologies and practicies, for making refugee camps more sustainable (”Camp+”)

- Vision: Creating a short-cut to convert the huge capital investment in refugee camps to investments into new green technologies,
  - not only in the refugee camp but also in the hosting country at large –and regionally –and beyond!

CBE: So socio-economically important, that it is un-ethical NOT to pursue as an integrated part of the green turn around

The basic Principles of Ethics:

- Do good
- Don´t harm
- Respect
- Fair & Just

I

Pro-active action needed!

Collaboration Africa-EU:
CBE-Technology-sharing!
For food security, nutrition, public health & job creation

II

Proposal:

CBE to be included in the green EU Covid19 recovery packages

RISKs for CBE NOT to be implemented timely

- Resource efficiency is **NOT** positioned as relevant for neither climate nor food security and nutrition

- Threat of antibiotic resistance is neglected **NOT** taking serious in time for combating the threat

- Microbiome, composition, function & role, a truely game changing innovation for public health- is **NOT** exploited timely to its full potential

EU globally in lead in producing higher value from biomass

Publication by BBI-JU Scientific Committee & BBI-JU Secretariat

Developing a Sustainable and Circular Bio-Based Economy in EU: By Partnering Across Sectors, Upscaling and Using New Knowledge Faster, and For the Benefit of Climate, Environment & Biodiversity, and People & Business

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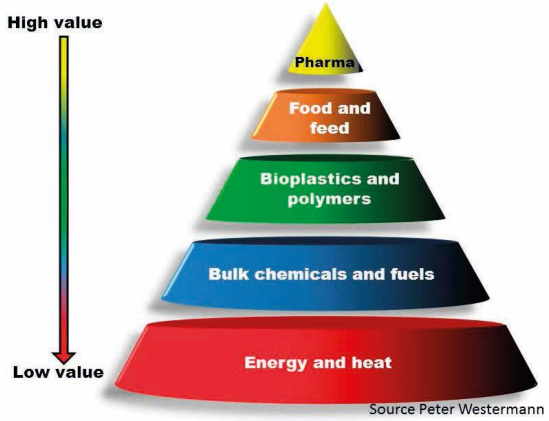
Reference: Front. Bioeng. Biotechnol., 21 January 2021 | https://doi.org/10.3389/fbioe.2020.619066



CBE, the best socio-economic card on hand for:

- Improved social inclusiveness, generating (rural) jobs -for many skills
- Stimulating rural livelihood and economy
- Strengthening industrial competitiveness
- Providing basis for affordable improvement of public health
- Breaking correlation of human (gut-)health to postal zip-codes
- Contributing to reducing risk of antibiotic resistance (annual killing EU >30.000)
- Reducing food waste & valorizing sidestreams => SME growth
- Preventing hunger & malnutrition in climate change challenged areas

Positioning ”Circular & Bio-based” positively impacting meeting the UN SDGs, mitigating major challenges

Contributing to Climate Change mitigation:

- Lower CO_2 emissions by using all for food (etc), instead of wasting >1/3!

Contributing to stopping loss of biodiversity:

- Grow more perennials, Use less hectars for feed, Reduce pesticides

Contributing to improved Public Health & Strengthen Biobased Business:

- Lowering risk of antibiotic resistance
- Affordable health-promoting products
- Higer value products from biomass

Improved livelihood (incl jobs) in rural areas:

- Increased farmer income from more higher value-added products
- New SMV and Start-Up business from biobased products