Bioeconomy‘s Contribution to Economic Growth

Daniela Thrän

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1 Bioeconomy – where do we stand?

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Resource use

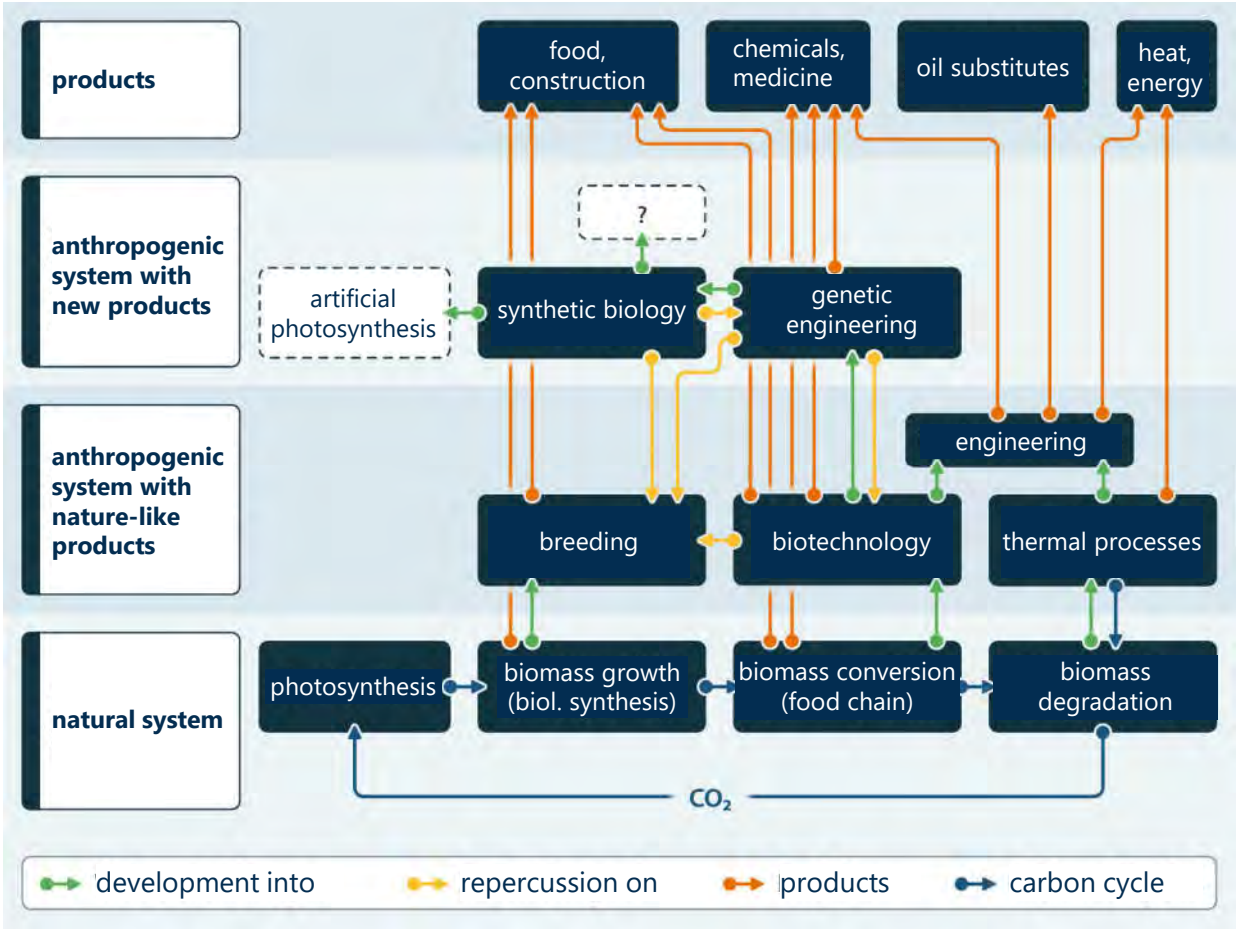
System dynamics

Technology dynamics

Perception

1 Bioeconomy – where do we stand?

Technology dynamics



Source: Adapted from Thrän et al. (2020): Das System Bioökonomie

1 Bioeconomy – where do we stand?

System dynamics

1713 Carlowitz

1972 Club of Rome

1987 Brundt-land report

1992 Rio Earth Summit

2000 Millennium Goals

2015 SDGs

- Zeman: Biology as fundament of nearly all biological activities
- Bioeconomy as sustainable nature-based economy
- Bioeconomy as design area of genetic engineering
- Bioeconomy as production and use of biological resources (incl. knowledge) within a sustainable economy

Classic Genetics → Modern Genetics → Modern Biotechnology → Genetic engineering → Precision methods in genetic engineering

1 Bioeconomy – where do we stand?

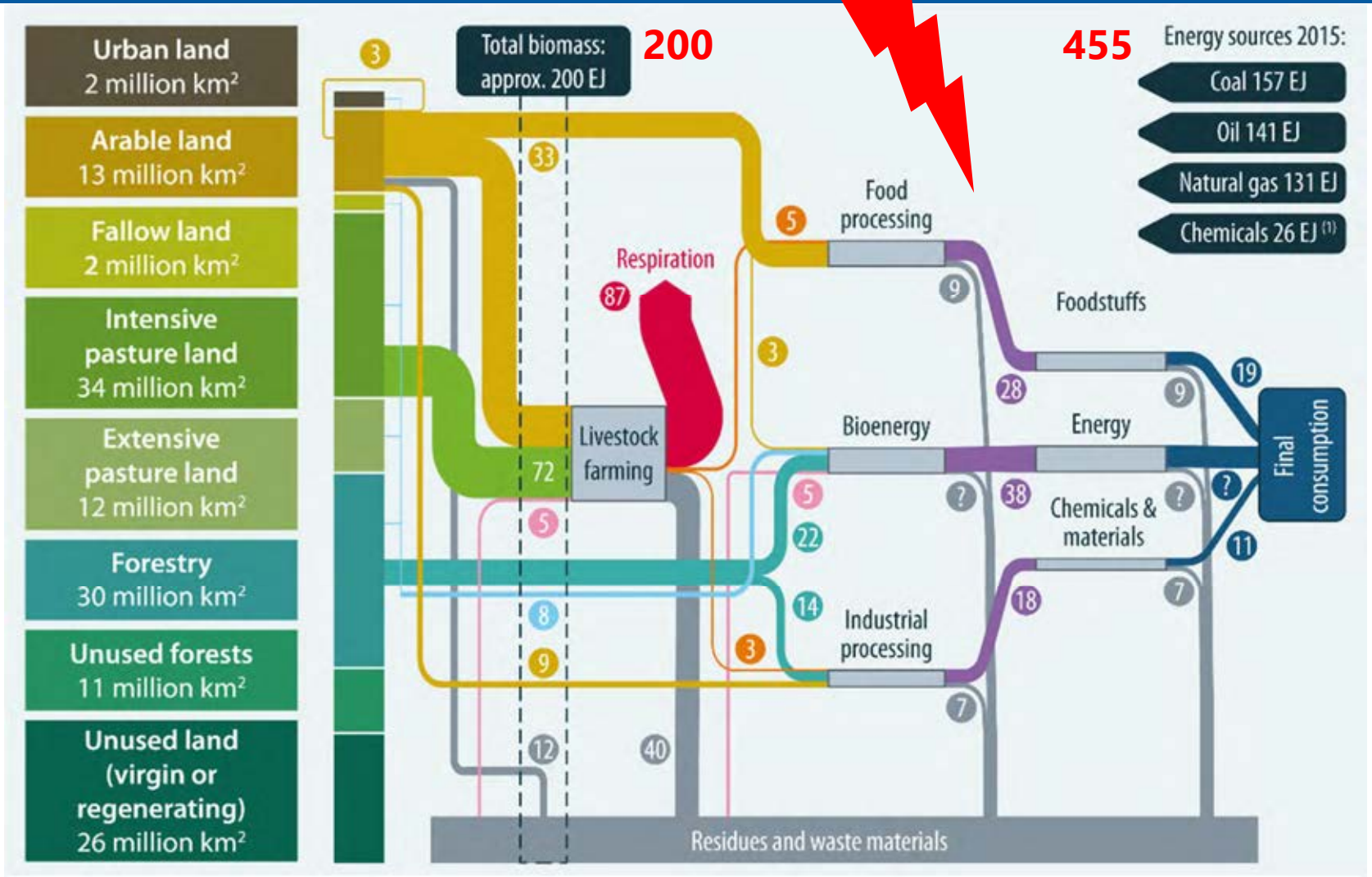
perception

- Global food security
- Substitution of fossil resources
- Innovations and global competitiveness
- Jobs in rural areas
- Contribution to green growth

- Conflicts biomass and land use
- Risks of genetic engineering
- Economization of nature
- Threat to individual basic rights

Source: Adapted from Thrän et al. (2020): Das System Bioökonomie

Ressource use



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2 Competing visions of the bioeconomy

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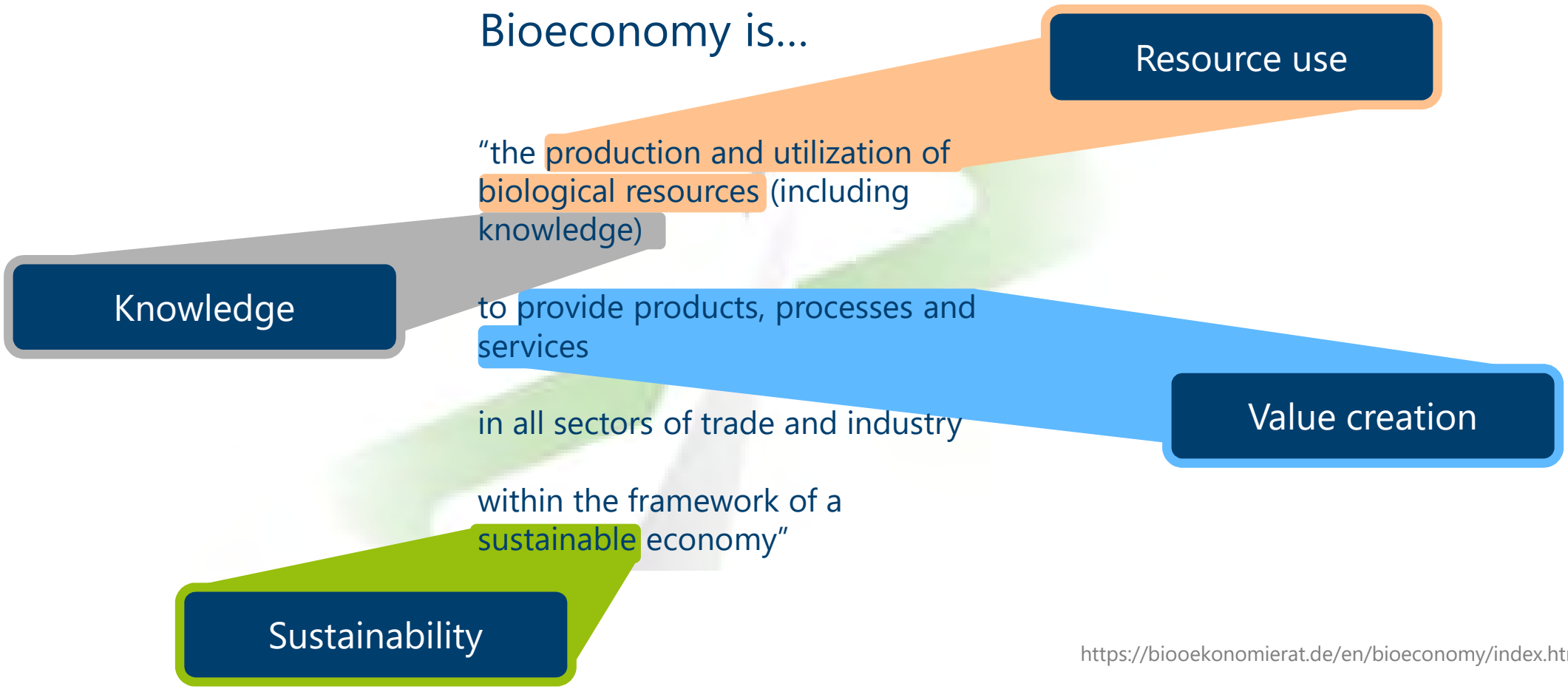
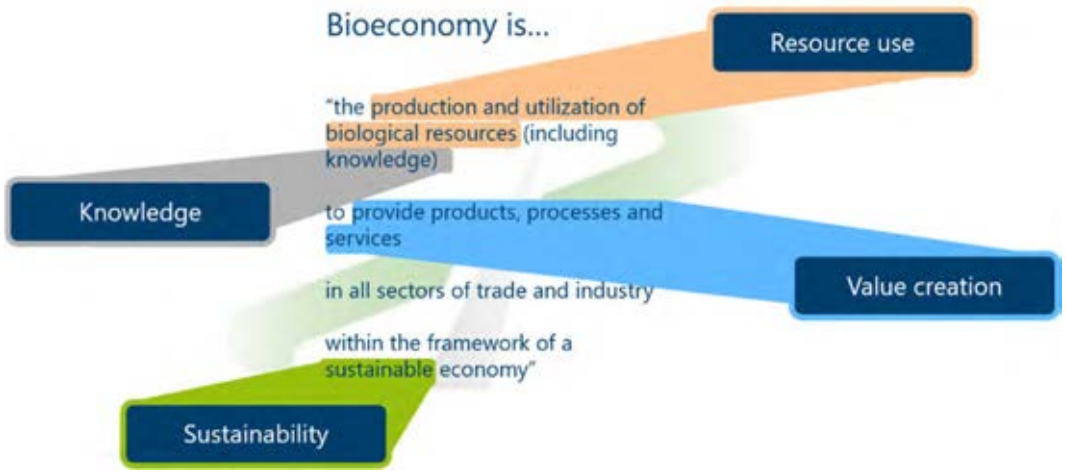


https://biooekonomierat.de/en/bioeconomy/index.html

2 Competing visions of the bioeconomy



Growth vs. sufficiency

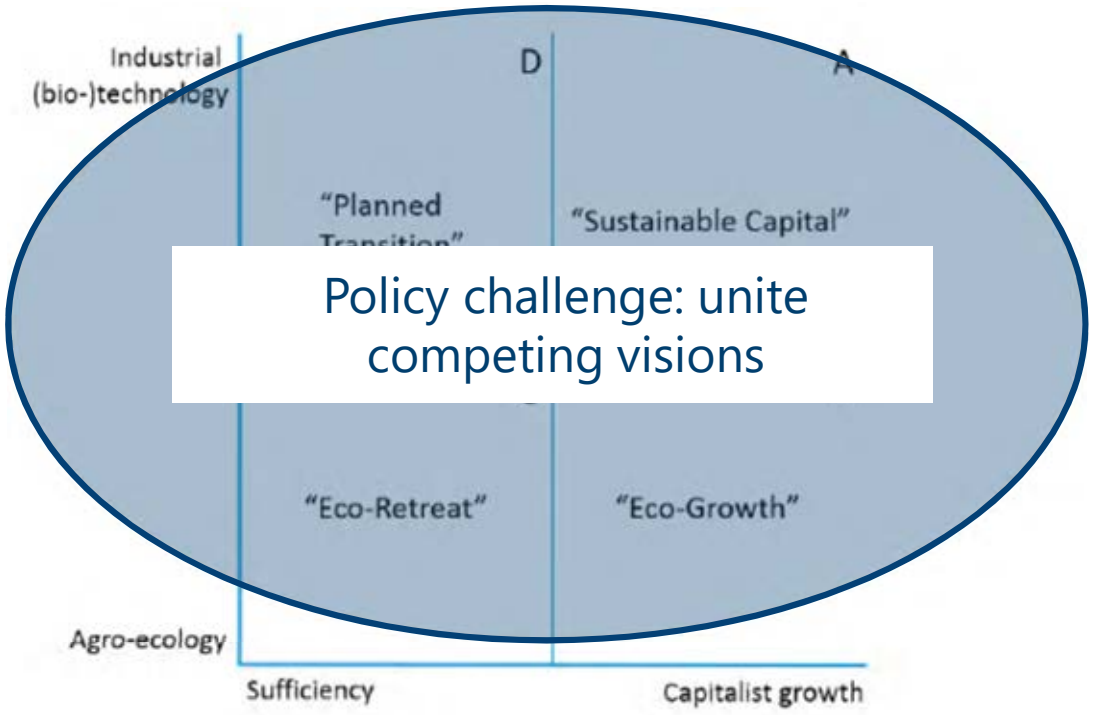
- neither goal nor antipode
- But: knowledge creation (innovation) = key element of growth

Sustainability

- neither goal nor antipode
- Rather: defines (confines) the bioeconomy
- But: sustainable economy possible beyond bioeconomy?

Competing visions

Large-scale high-tech based sufficiency



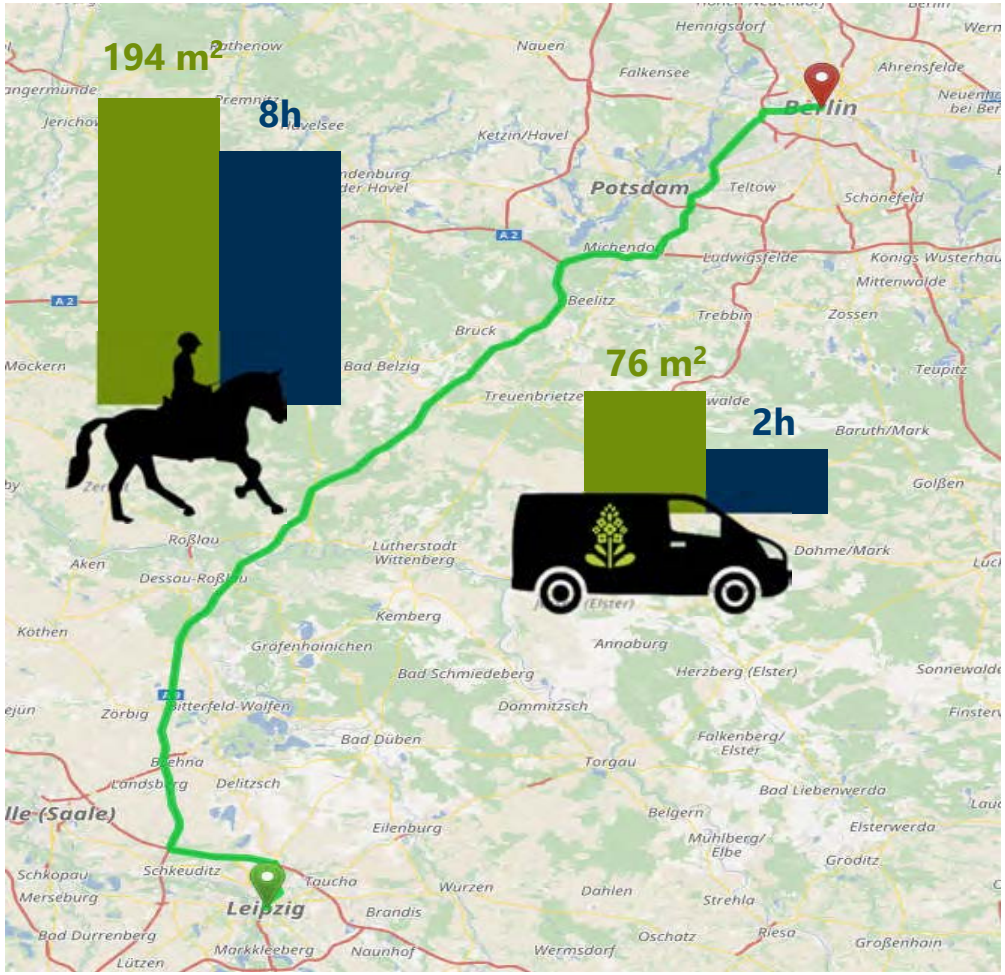
Business as usual (with biotechnology)

Overall reduction of production and consumption

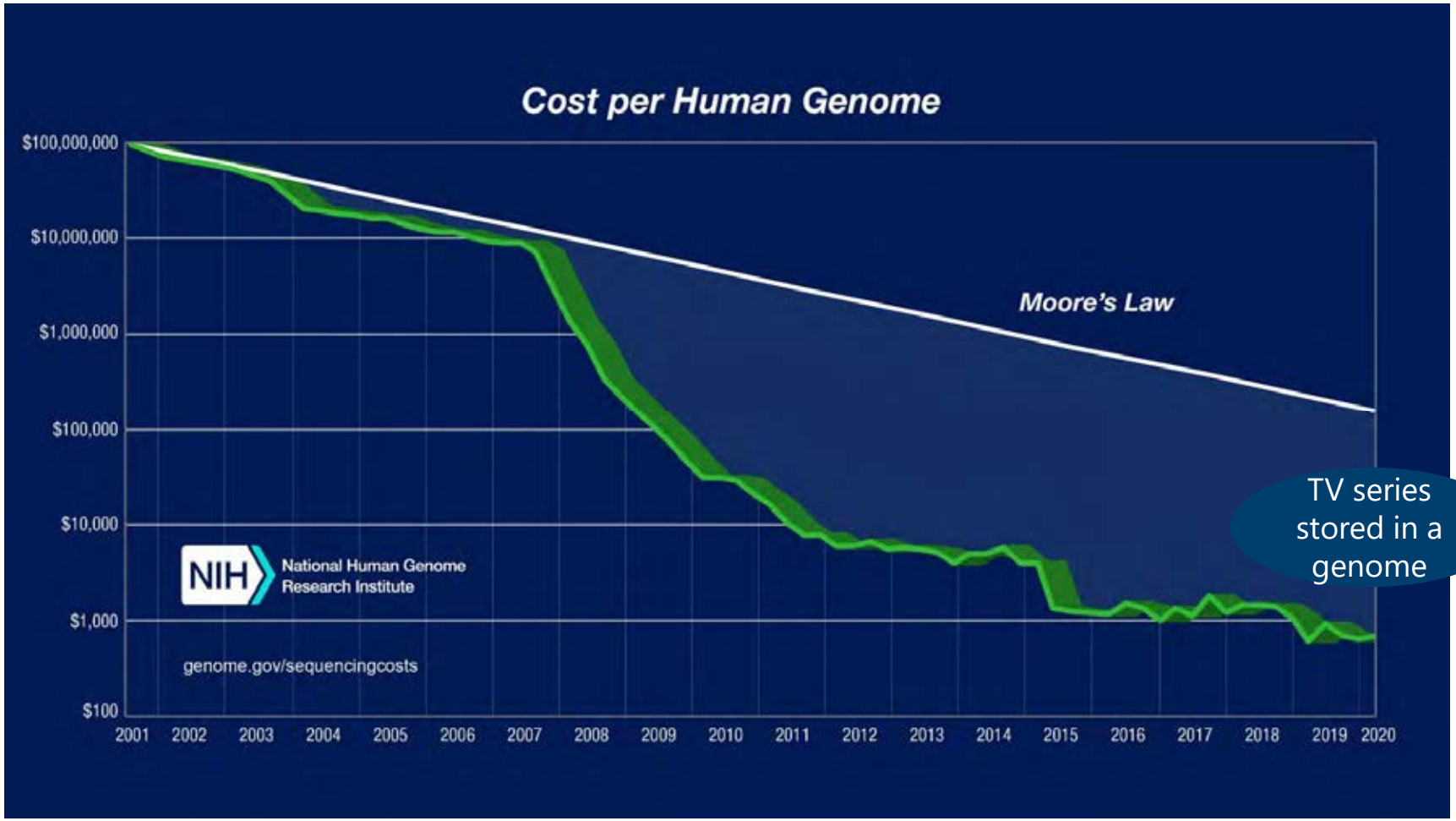
Regional organic farming with reduced inputs

Source: Hausknost et al. (2017): A Transition to Which Bioeconomy? An Exploration of Diverging Techno-Political Choices

2 Innovation: Traditional vs. current use of biomass for energy



2 Innovation: Cost reduction of genome editing



TV series stored in a genome

2 Innovation: How to come to desirable pictures…

Living in the future…

(C) SDuggan/Fotolia.com

3 How to create a sustainable bioeconomy

The new Bioeconomy strategies are holistic

Source: https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf#view=fit&pagemode=none

Source: https://www.bmbf.de/files/bio%C3%B6konomiestrategie%20kabinett.pdf

, ...but still programmatic

Potenial for contribution to sustainable growth

Source: Michael Waddell/Unsplash/2020

Source: ThisisEngineering RAEng/Unsplash/2020

Source: Andrea Davis/Unsplash/2020

Source: Rajesh Ram/Unsplash/2020

Source: https://audit-committee-institute.de/media/aci_quarterly_2019_4.pdf

Source: Eirik Solheim/Unsplash/2020

Source: Andrea Davis/Unsplash/2020

Options for securing a sustainable bioeconomy

Focus on waste and residues (bioenergy)

E.g.: Limitation for crop-based biofuels in transport (EU-RED II)

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Eco-standards for biomass production, conversion and use

E.g.: Minimum GHG-reduction levels for bioenergy uses (EU-RED II)

Sustainability certification

E.g.: PEFC, FCS for forest products

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Price-regulation, trade agreements…

E.g.: sustainable biomass exempted from German Emissions Trading System

Source: DBFZ (2020)

Challenges for securing a sustainable bioeconomy

Costs	• structural cost advantage for fossil based products • Bioeconomy products often substitutes with similar / reduced quality)
complexity	• Complex bio-based value chains with ecological risks (e.g., indirect Land Use Change) • Extensive monitoring and regulation necessary
Trade-offs	• E.g. economic development vs. biodiversity

5 Sustainable bioeconomy – the case of energy

5 Bioenergy: from waste streams to enablers

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Source: ThisisEngineering RAEng/Unsplash/2020

Source: Andrea Davis/Unsplash/2020

Source: Rajesh Ram/Unsplash/2020

Source: https://audit-committee-institute.de/media/aci_quarterly_2019_4.pdf

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Source: Andrea Davis/Unsplash/2020

5 reduse waste: Implementing modern bioenergy globally

Source: Rajesh Ram/Unsplash/2020

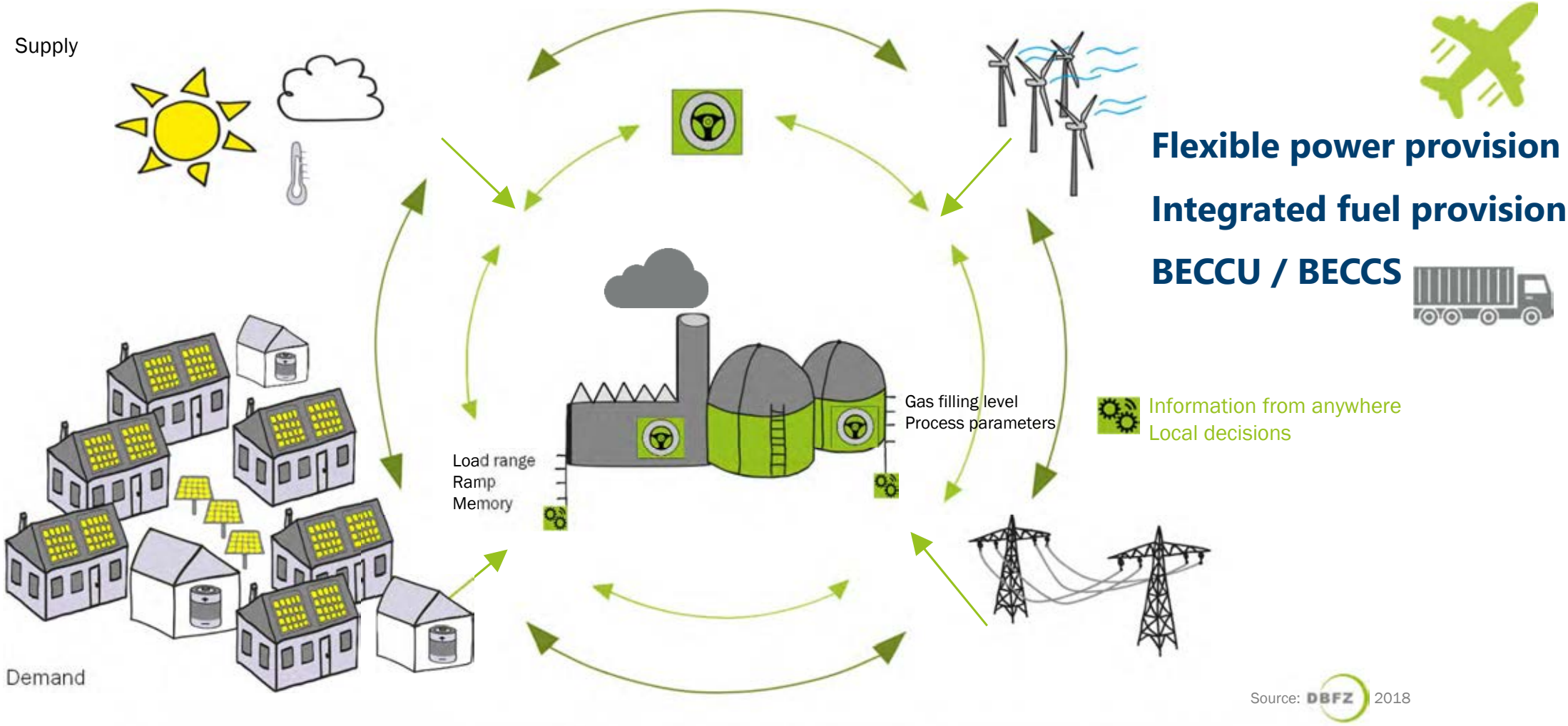
Combustion of wood

Efficiency (global):

Actual: < 20 %

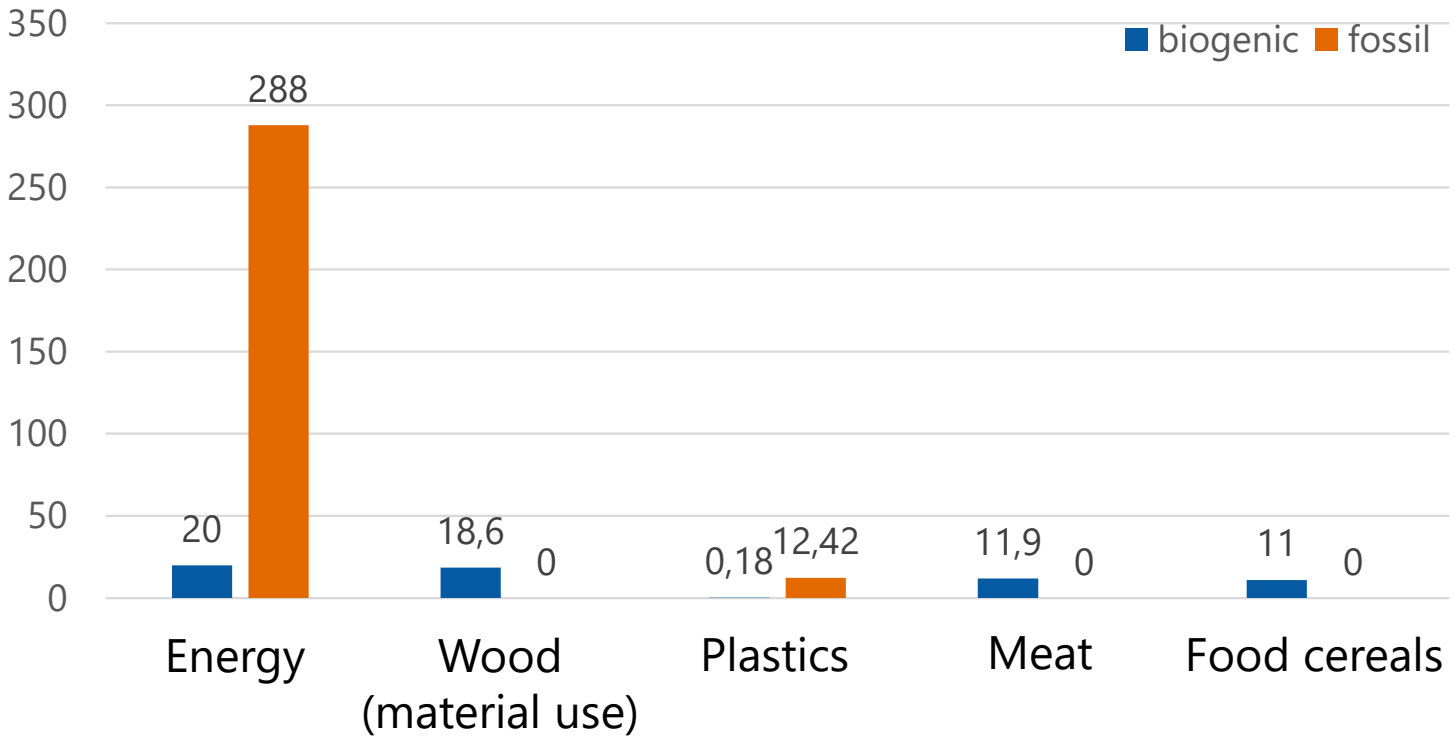
Loss: 20 EJ/a

5 Smart Bioenergy: towards a 100% renewable energy sytem



5 Sustainable bioeconomy – the case of energy

- Replacement of fossil fuels: still a long way…







Source: Thrän et al: SYMOBIO conference 2019

6 Summary

6 Key messages

- Bioeconomy is a story of innovation, growth and sustainability
- The future contribution to economy growths is about a smarter use of the limited bio-based resources
- Bioeconomy can only be sustainable with a fast and efficient implementation of energy efficiency and renewable energies

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