

Biotechnology goes Bioeconomy

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NABU & Forschungswende

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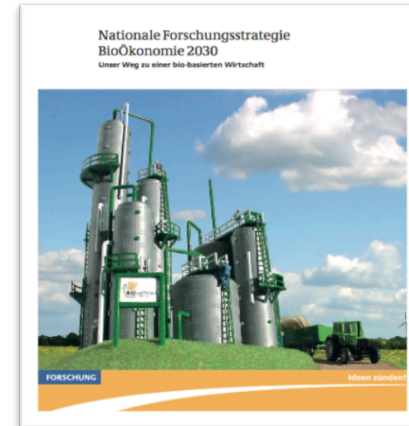
Agenda

1. **The new framework for Biotechnology: Bioeconomy - visions & promises**
2. Proof of concept – what is realistic?
3. Communication of Bioeconomy
4. Conclusions

The new leading science - Bioeconomy

from “Biotechnology -
using and shaping opportunities”
(2001-2010)

to “Bioeconomy 2030”



National Research Strategy Bioeconomy 2030

1. Global food security
2. Sustainable agriculture
3. Healthy and safe food
4. Industrial use of renewable resources
5. Biomass based energy



An Industrial Revolution: to use research and innovation to facilitate a structural transition from an oil-based to a bio-based industry & offer great opportunities for growth and employment



Autoindustrie

- Reifen
- Biokunststoffe
- Metallersatz



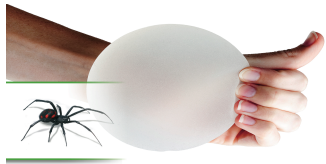
Konsumgüter

- Enzyme in Waschmitteln
- biobasierte Kosmetika
- biologische Zahnpflege



Getränkeindustrie

- biobasierte Verpackungen
- biobasierte Süßungsmittel
- Enzyme als Zusatzstoffe



Medizintechnik

- biologische Beschichtungen
- Implantate
- Diagnostika



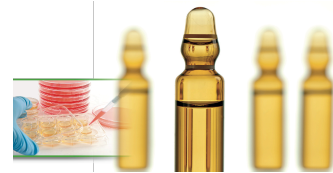
Bauindustrie

- biologische Dämmstoffe
- biobasierte Baumaterialien
- biobasierte Bauchemikalien



Nahrungsmittel

- funktionale Enzyme
- gesunde Zusatzstoffe
- biologische Geschmacksstoffe



Medizin

- Biotech-Medikamente
- Antibiotika
- Gewebeersatz



Energie

- Treibstoffe
- Wärme
- Gas

Innovation = Biotechnology

- Innovative young biotechnology companies
- chemical and pharmaceutical industries, energy economy, plant and machine engineering, seed companies and plant breeders – all of which are vital for the bioeconomy
- Companies in these sectors are particularly dependent on bioeconomy-related innovations
- to maintain and enhance international competitiveness



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Bioeconomy is regarded as the solution for:

- Climate change
- Resource scarcity
- Conservation of biological diversity
- Safeguarding nutrition
- Energy transition
- post-fossil chemistry

while safeguarding:

- Growth and competition
- Sustainability

For our understanding of the changes and risks of bioeconomy, we have to look at the context, at rationalities and systems

Preconditions, which could cause tensions

for the vision of a sustainable bio-based economy by 2030:

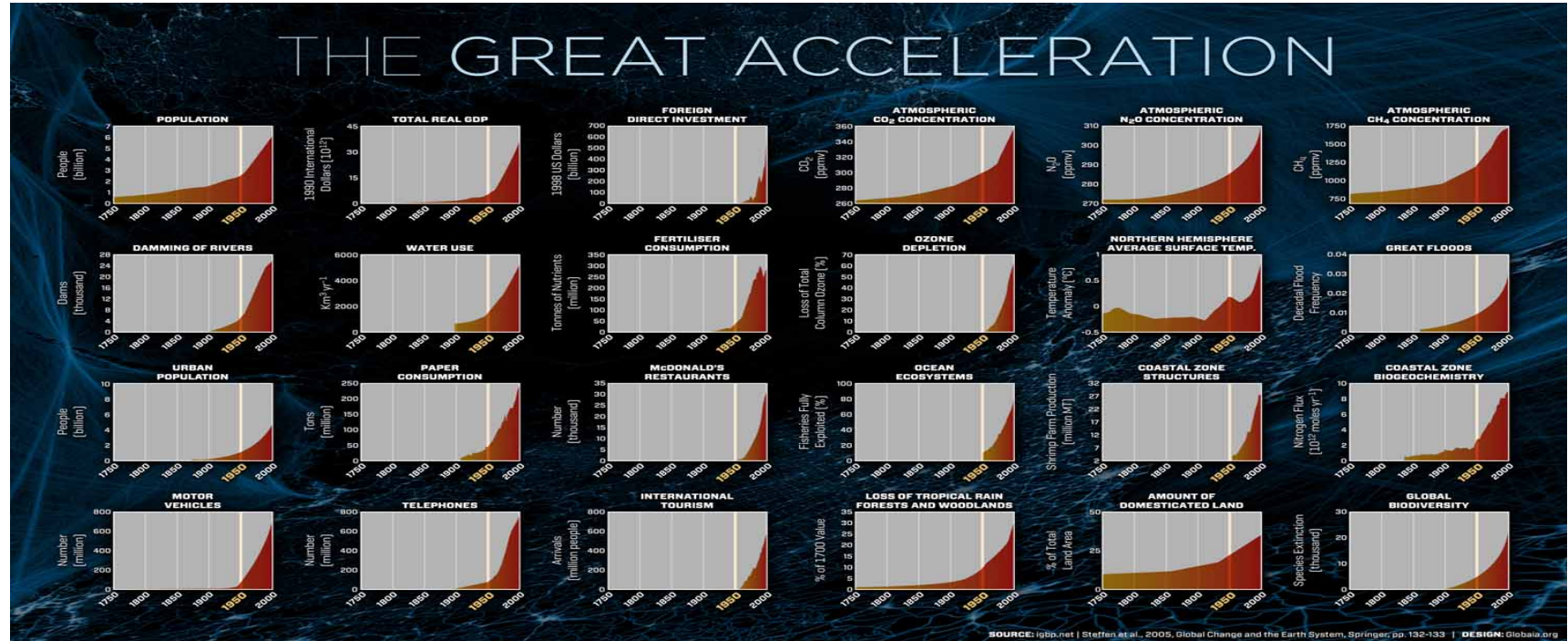
- results from the life- and technological sciences have to be accommodated with **open-mindedness** and **curiosity in society**
- and biotechnological progress and globalisation have to be regarded as decisive **opportunities**
- acceptance for the field of biotechnology

Challenges

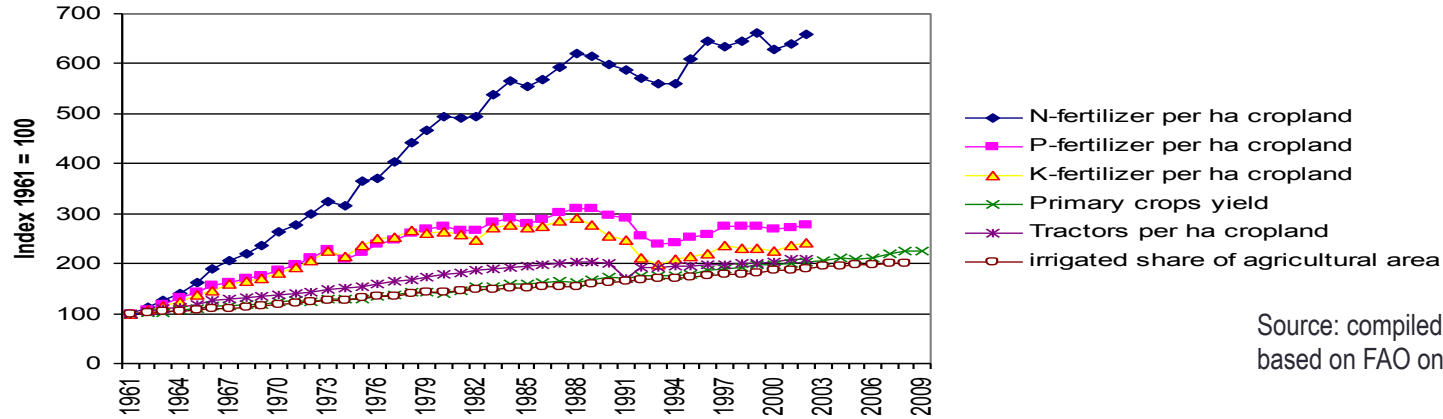
1. Great acceleration
2. Intensification
3. Global land use
4. Planetary boundaries

1. Where we are: The Great Acceleration

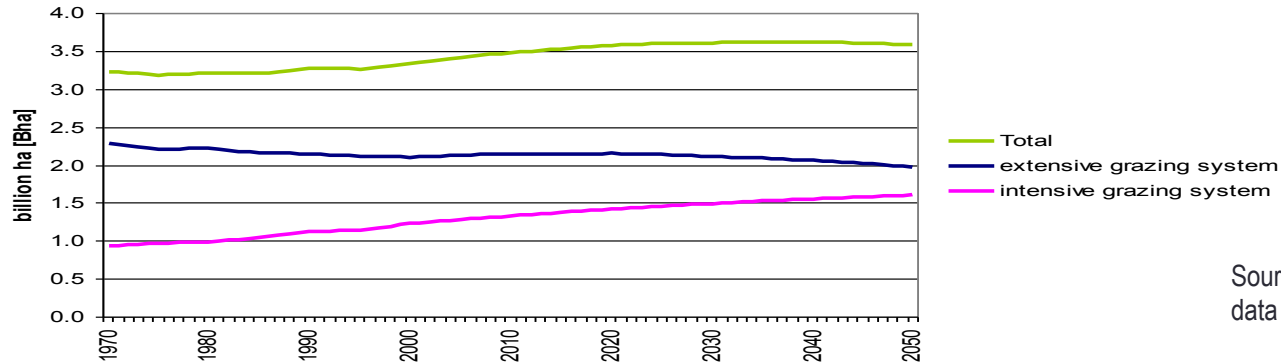
Economies expand and grow to 140 bn tons annually by 2050



2. Intensification of Farming and Land Use



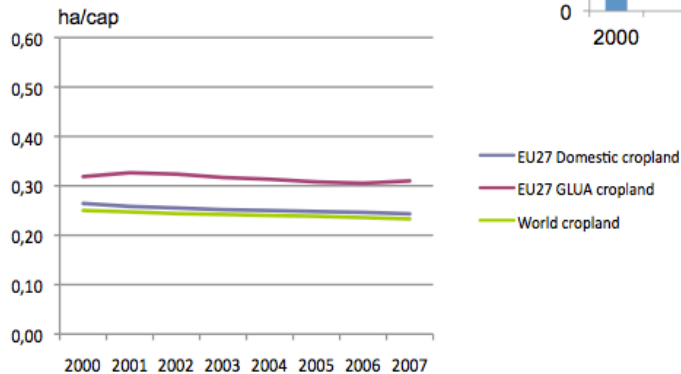
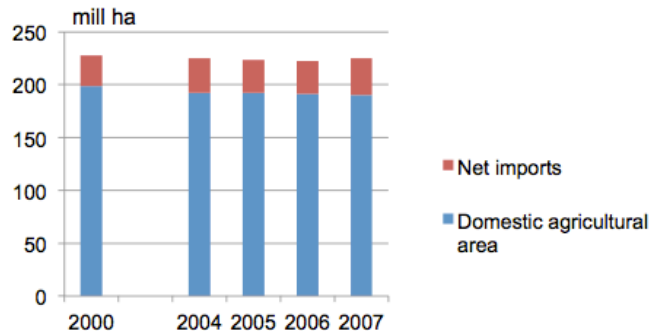
Source: compiled by H. Schütz based on FAO online data base



Source: PBL personal communication E. Stehfest, data from IMAGE, based on Bouwman et al. 2006

3. Global Land Use – Consumption of Agricultural Goods

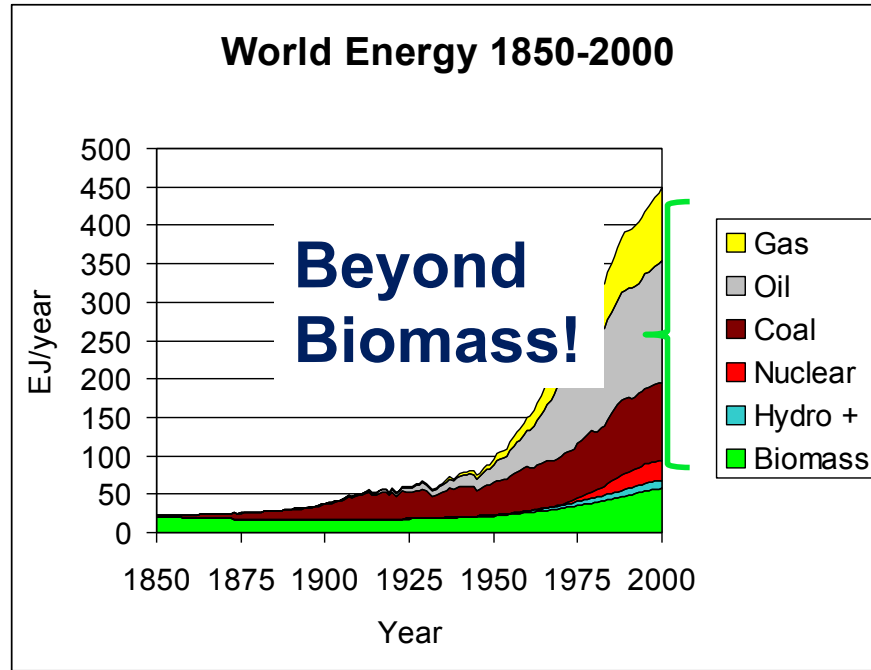
▪ **The EU is a net importer of agricultural land**



▪ **The EU uses global cropland above average**

Source: Wuppertal Institute
H. Schütz

Bioeconomy is a fundamental change! global emissions from agriculture alone are still projected to increase up to 20 % by 2030.

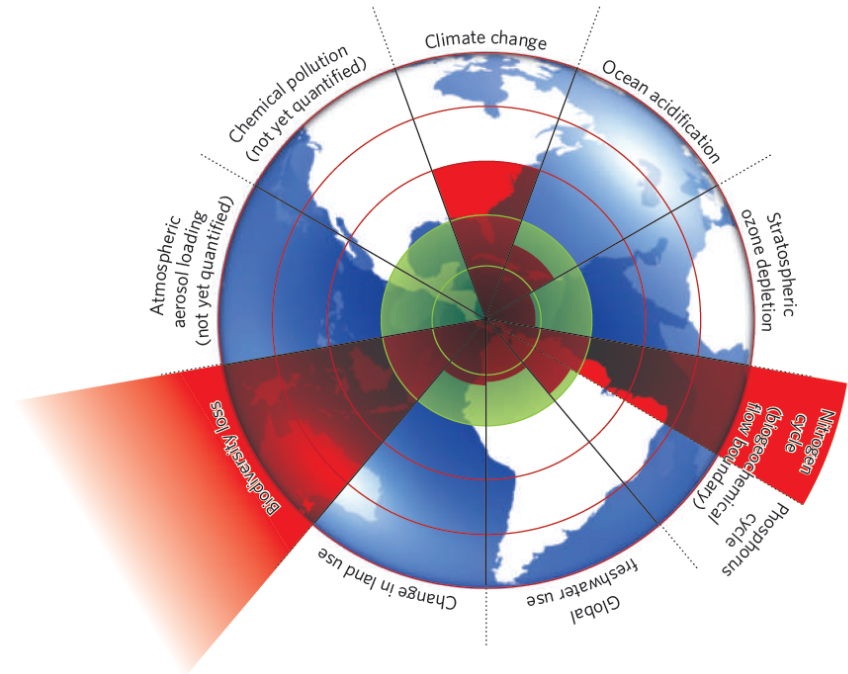


World energy resources 1850-2000

4. Are we on the right track?

The planet's system is a complex interaction of different factors:

- climate change
- rate of biodiversity loss
- nitrogen and phosphorus cycles
- ocean acidification
- global fresh water use
- change in land use



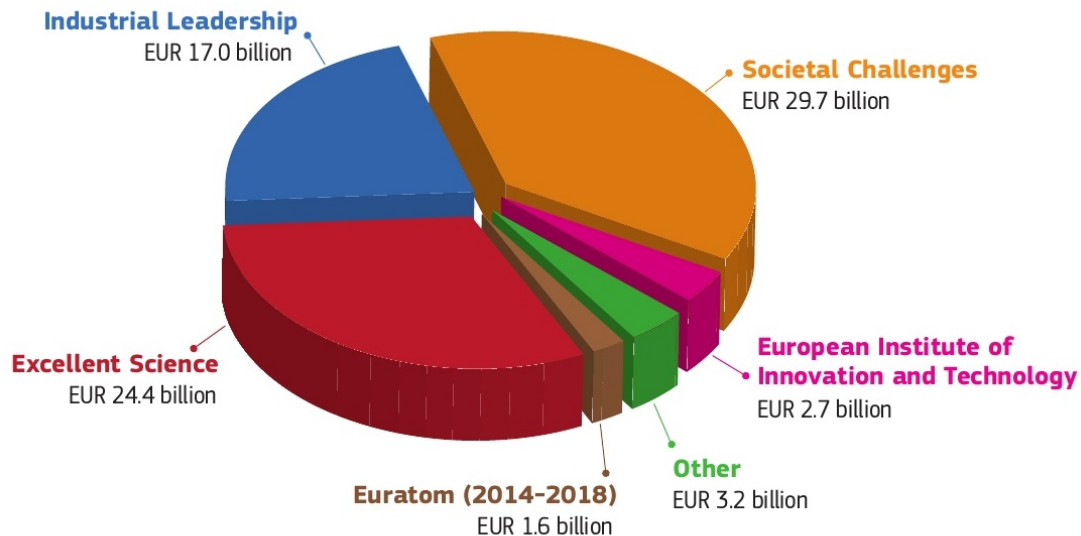
Rockstrom 2009

Agenda

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- 3. Horizon 2020 & Bioeconomy**
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Bioeconomy in Horizon 2020

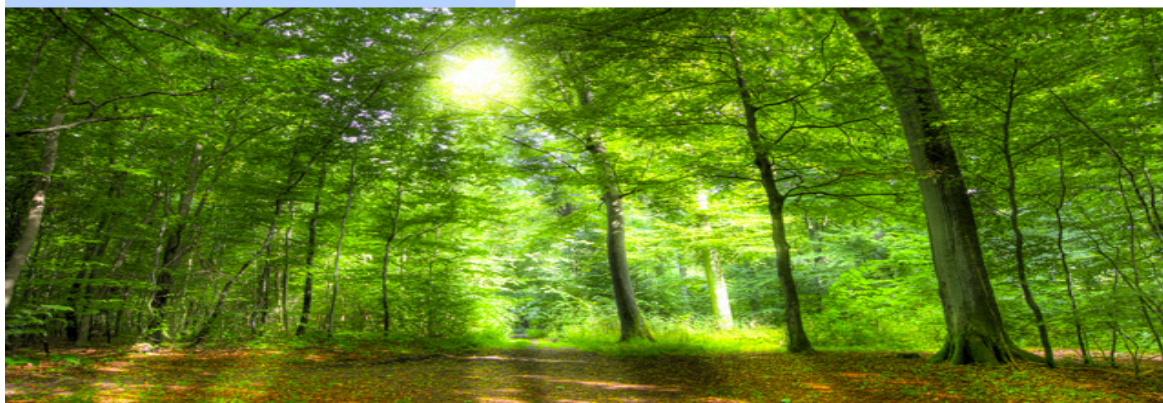
HORIZON 2020 BUDGET (in current prices)



“Bioeconomy is Europe's response to key environmental challenges the world is facing already today”

3.8 billion € in societal challenges for agriculture & bioeconomy

Public-Private Partnerships: EU & bio-based Industries



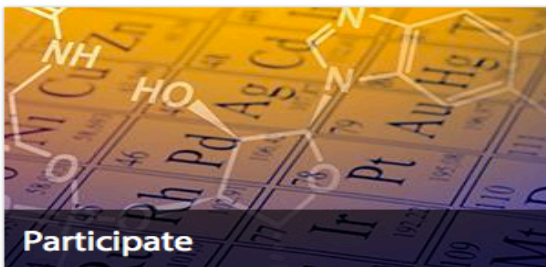
Our Vision

From fossil-based to bio-based products 'Made in Europe'

New markets for a resource efficient low carbon economy



About BBI



Participate



BBI Partnering Platform

3.7 bn EU € = 975 mio EU funds + 2.7 bn private investment, <http://bbi-europe.eu/about>

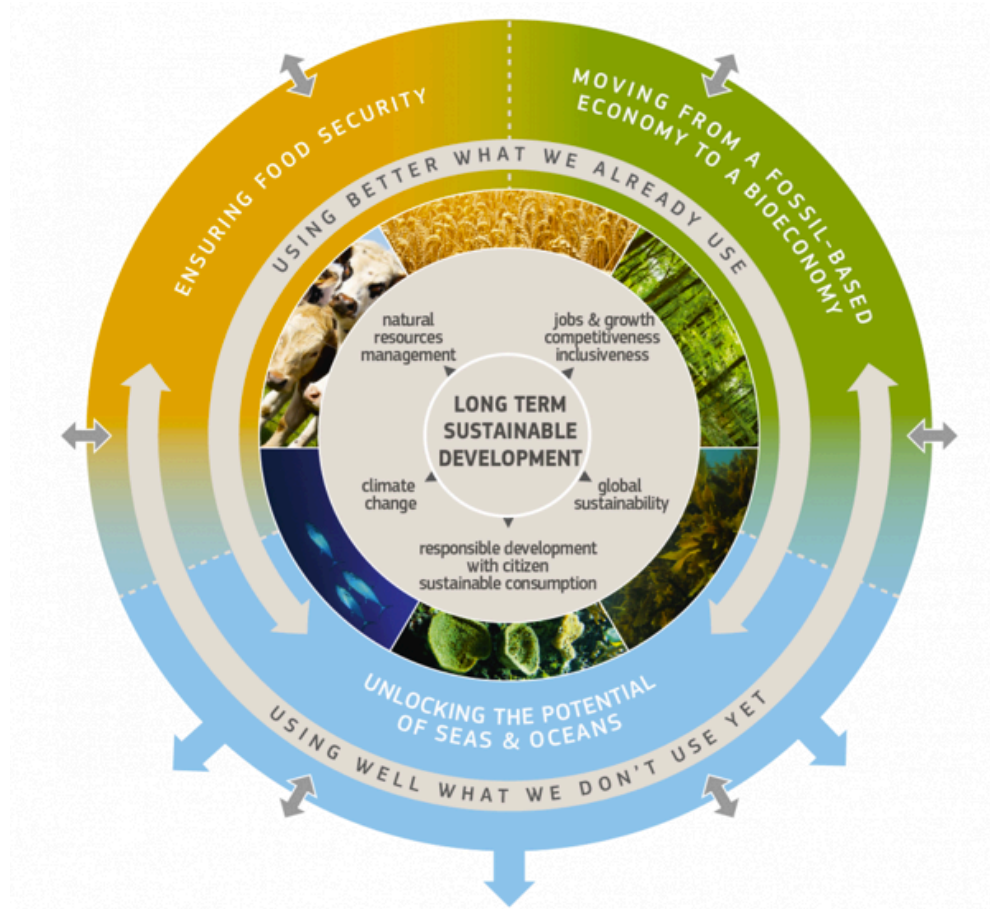
Challenges in Horizon 2020

- Significantly reduce Europe's dependency on fossil-based products
- Meet climate change targets
- Greener and more environmentally friendly growth

while:

- Bioeconomy is a nascent sector to grow rapidly and create new markets
- Is attracting substantial investments in the US, China and Brazil
- **EU wants to compete in the global bioeconomy race**

flawless Vision in Horizon 2020



Does this sound feasible?

- Biomass is limited
- Global cropland is limited
- Intensification is limited: the nitrogen cycle has already transgressed planetary boundaries
- Production can't follow rising consumption patterns worldwide
- rebound effects counteract *sufficient* decoupling of economic growth from natural resource use

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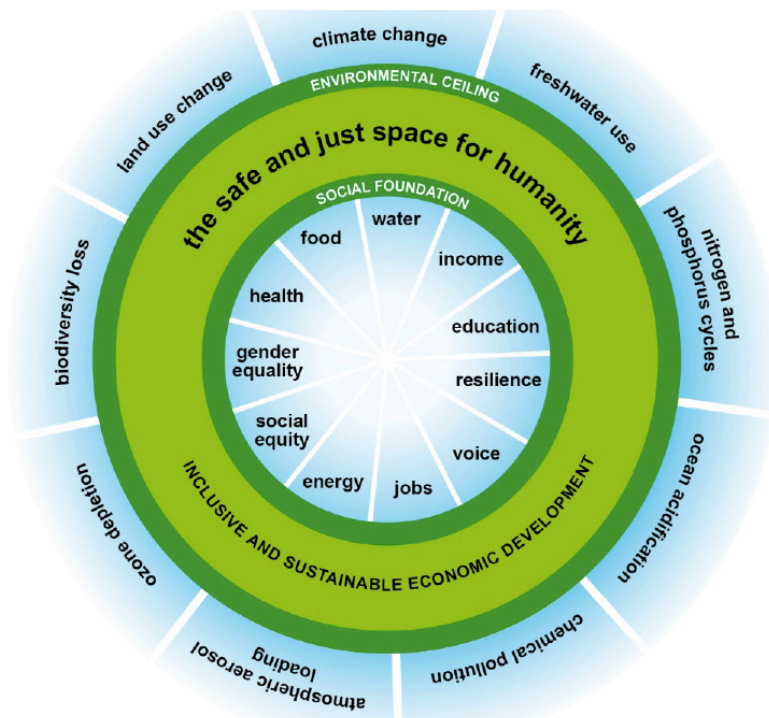
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Communication of limitation

Safe operating space for

- Nature
- Human dignity
- Society / equity

- **Germany's fair share**
- 47 → 8t/head material
- 10 → 2t/head CO2
- 5 → 1.8ha/head ecological footprint



Kate Raworth, Doughnuteconomics

Communication of change

de-carbonization of the economy and human life call for a Change of current consumption patterns and lifestyles

The globalization of:

- unsustainable Western life styles and consumption trends
- higher animal protein content of food
- high mobility obtained through modern, but carbon-intensive transport systems, will be very hard nuts to crack on the consumption front.

changing consumption and lifestyles need to be understood as a social issue

Communication of Bioeconomy & Biotechnology

- is technological leadership the right way to shape the necessary transition to sustainable production?
- Is it realistic to gain economic prosperity along with ecological and social compatibility?
- Is it realistic that an “improved understanding for the biological processes” leads straight to sustainable performance thus biotechnology is key?

However:

- Risks are underestimated
- Potentials are overestimated
- Rebound effects are neglected
- Systemic limits are missing

Misleading Communication: Biotechnology = Innovation, Growth & Competitiveness

- “Green growth” may give false hopes and excuses not to do anything essential in order to bring about a U-turn in global GHG emissions and resource overuse
- “an overemphasis on technology ... tends to displace solutions to problems that are simple, yet effective, and reinforces the belief that changes in lifestyle (or in ways of doing business) are not necessary in order to reduce humanity’s impact on the planet” (Tienhaara, 2009: 18)
- The approach is largely reduced to a technocratic and technology-fetishized one, because changing technologies is much easier than altering societies and their socio-economic drivers
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At its core, the idea of sustainability corresponds with the Aristotelian tradition of oikonomia, the doctrine of good and proper economic governance within the "entire house". In this sense, our goal should be "Bio-Oikonomia".



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