Wuppertal Institute
for Climate, Environment
and Energy

Are natural resource reduction targets in the EU achievable?

THE CASE OF LAND

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Conference: Targeting a more efficient Europe

CONTENTS

- What are the targets?
- Where are we today?
- Are global land use targets achievable?

Based on

UNEP (forthcoming). Assessing Global Land Use: Balancing Consumption with Sustainable Supply. A Report of the Working Group on Land and Soils of the International Resource Panel. Bringezu S., Schütz H., Pengue W., O´Brien M., Garcia F., Sims R., Howarth R., Kauppi L., Swilling M., and Herrick J.

UNEP

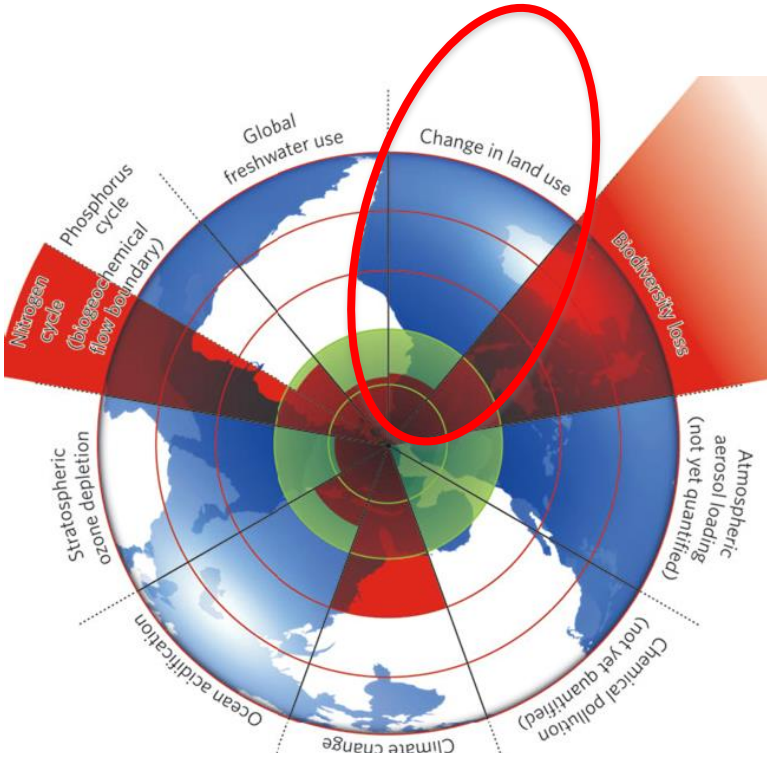
International Resource Panel

Assessing Global Land Use

- Based on an **extensive review** in the areas of agriculture, planetary boundaries and sustainable production and consumption
- Looks at **impacts of global trends** -- growth, urbanization, and changes in diets and consumption behaviors — **on global land use dynamics**, considering the consequences for biodiversity, the supply of food, fibers and fuel, and the long-lasting implications for resource security
- Explores how to improve sustainability **across different scales**: from the sustainable management of soils on the field to the sustainable management of global land use as a whole

WHAT ARE THE TARGETS?

- Based on the safe operating space concept
- How much more land use change can occur before the risk of irreversible damages becomes unacceptable?
- In particular regarding **biodiversity loss**
  - Agricultural expansion is a **key cause** of global biodiversity loss
  - The Convention on Biological Diversity: there is a **high risk** of dramatic biodiversity loss if ecosystems are pushed beyond tipping points
- Modeling results show that to halt biodiversity loss agricultural land needs to, at least, **stabilize from 2020** (van Vuuren and Faber 2009)



Estimate of quantitative evolution of control variables for seven planetary boundaries from pre-industrial level to the present

Source: Rockström et al. 2009

WHAT ARE THE TARGETS

- A cautious global target would be to halt the expansion of global cropland into grasslands, savannahs and forests by 2020
- Implies BAU can “safely” continue until 2020

Reference value: around **1,640 Mha** available for supplying demand in 2020

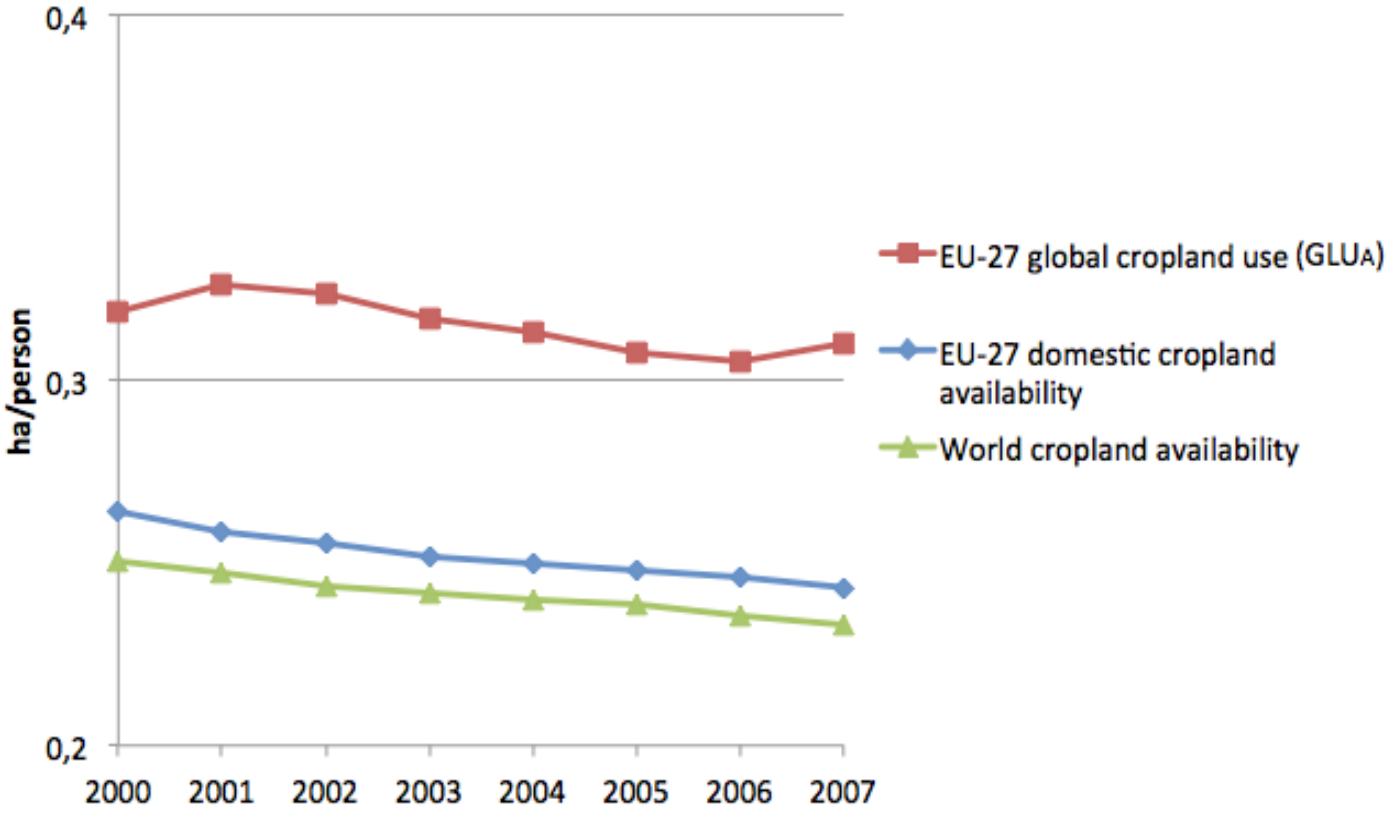
Target of **0.20 ha** of cropland (1,970 m^2) per person in 2030

WHERE ARE WE TODAY?

- How much land worldwide is needed to supply the domestic consumption of countries?
- Method of Global Land use Accounting
  - Follows principles of economy-wide material flow accounting
  - Uses land equivalents for domestic production plus imports minus exports of all agricultural goods
  - For EU countries: 773 commodities in kg from Eurostat ComExt
  - Yields (in kg/ha) for primary crops by country and year from FAO
- EU-27 required **0.31 ha per person** of cropland worldwide in 2007 (Bringezu et al. 2012)

WHERE ARE WE TODAY?

- EU-27 used **one-fourth more** cropland than domestic cropland area in 2007
- EU-27 used **one-third more** cropland than the globally available per person cropland of the world population in 2007



Use of global cropland by the EU-27 for the consumption of agricultural goods

Source: Bringezu et al. 2012

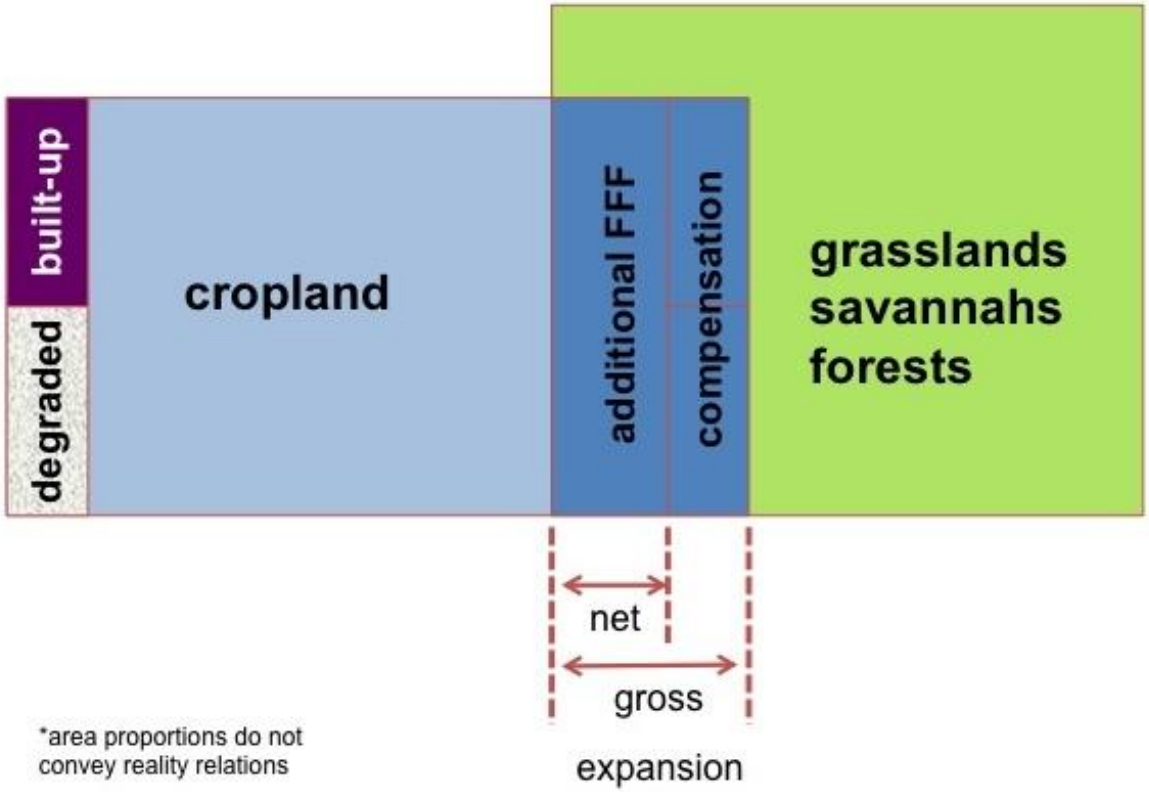
ARE GLOBAL LAND USE TARGETS ACHIEVABLE?

YES!

BUT NOT UNDER BUSINESS-AS-USUAL

GLOBAL LAND USE CHANGE

- **Net expansion** is a result of rising demand for food and non-food biomass which cannot be compensated by higher yields
- **Gross expansion** includes also the shift of cropland to other areas due to losses by severe degradation and built-up land



Net and gross expansion of cropland

EXPECTED MAGNITUDE OF LAND USE CHANGE BY 2050

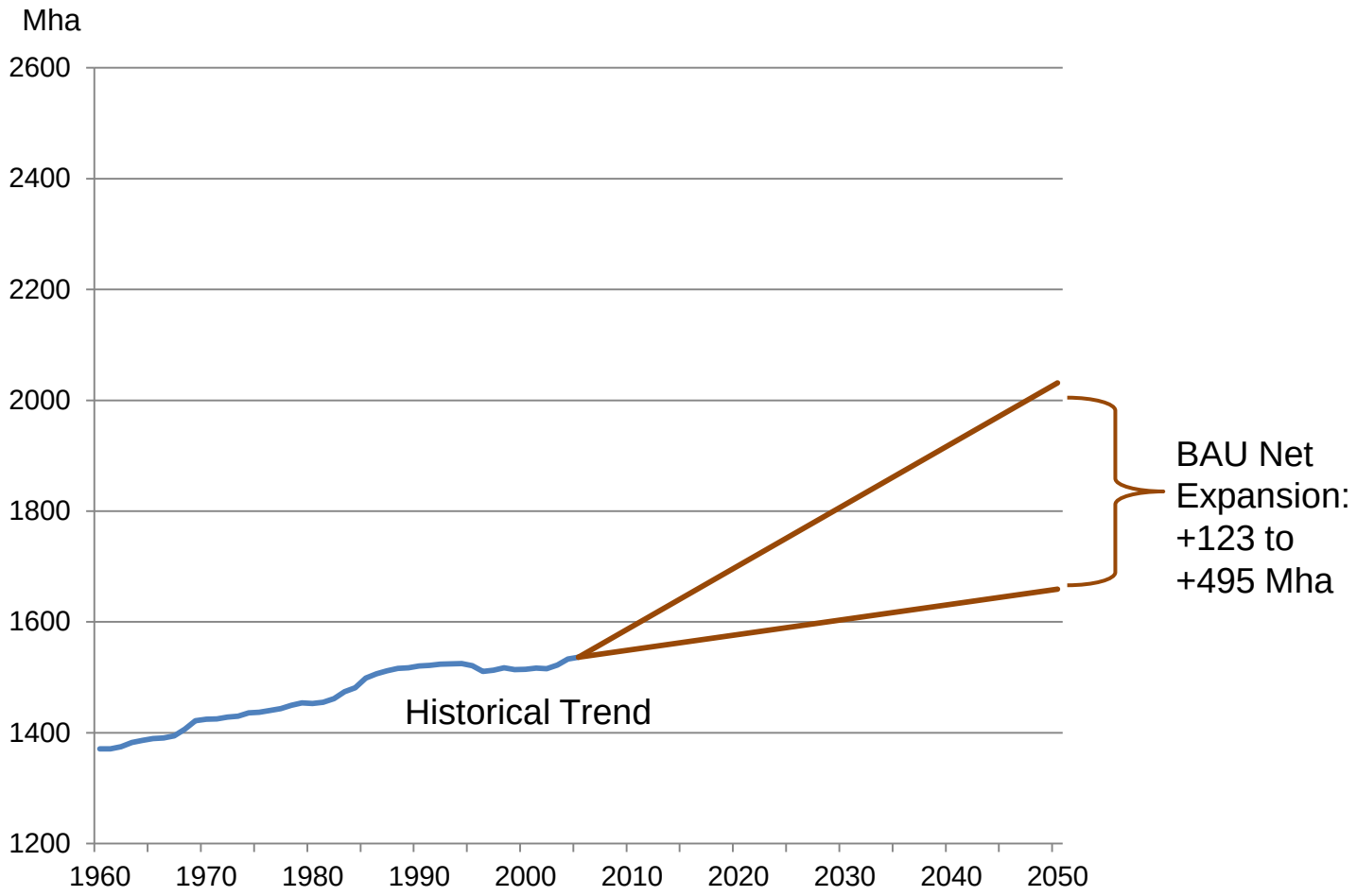
Business-as-usual expansion	Low estimate (Mha)	High estimate (Mha)	Source
Food supply	71	300	Based on Bruinsma 2009, RFA 2008, Bringezu et al. 2009a
Biofuel supply	48	80	Based on Fischer 2009, IEA 2011
Biomaterial supply	4	115	Based on Colwill et al. 2011, Raschka and Carus 2012
Net expansion	**123**	**495**	
Compensation for built environment	107	129	Based on Electris et al. 2009
Compensation for soil degradation	90	225	Based on Scherr 1999
Gross expansion	**320**	**849**	

- Interpret data with caution as data not derived from one modelling approach; competitive effects, natural limits and climate change not considered explicitly

➢ Altogether, data indicate that it is very likely **land competition** will increase in the future

NET EXPANSION

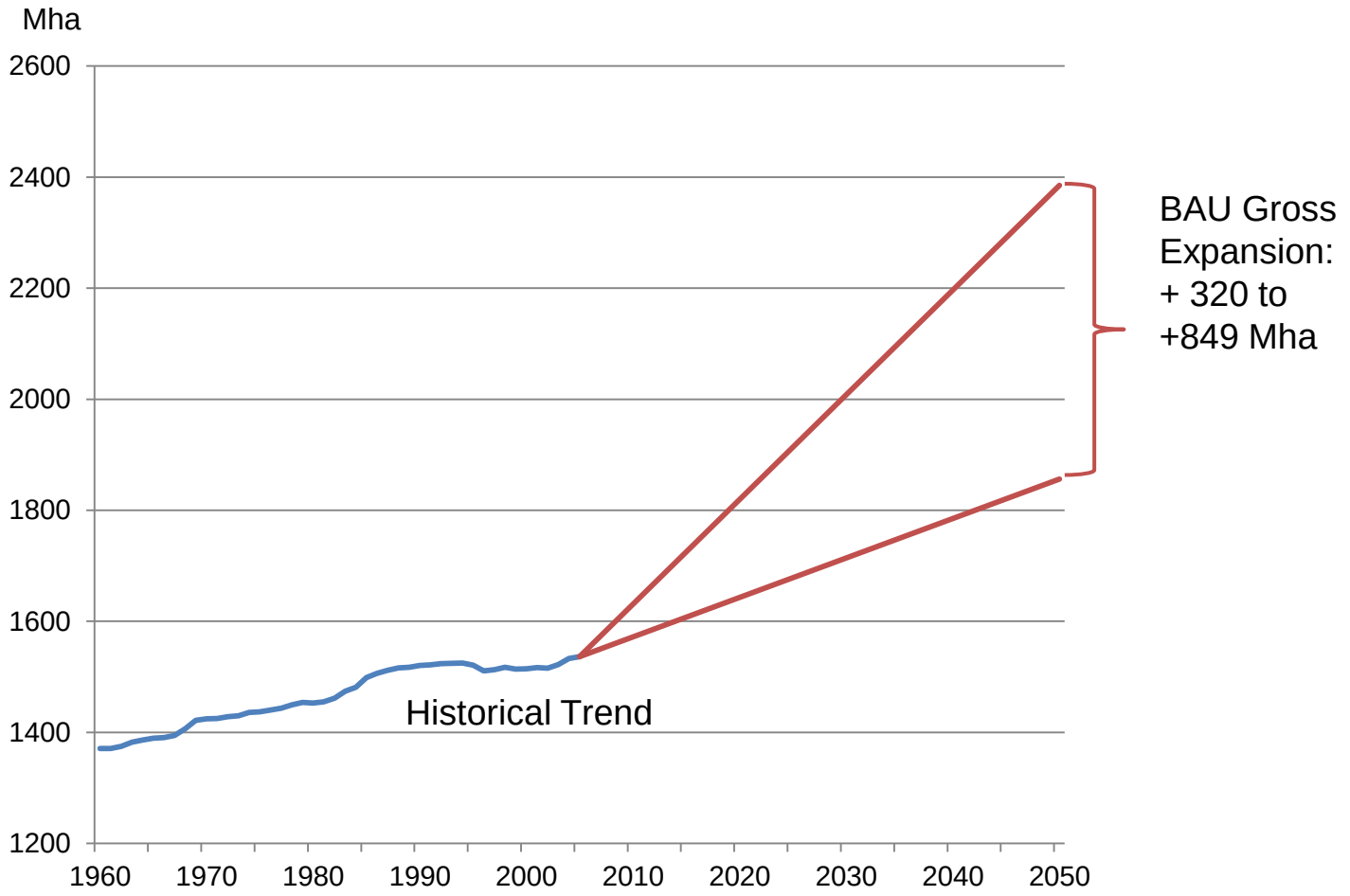
- +8 to 32% net expansion expected by 2050



BAU net expansion of global cropland

GROSS EXPANSION

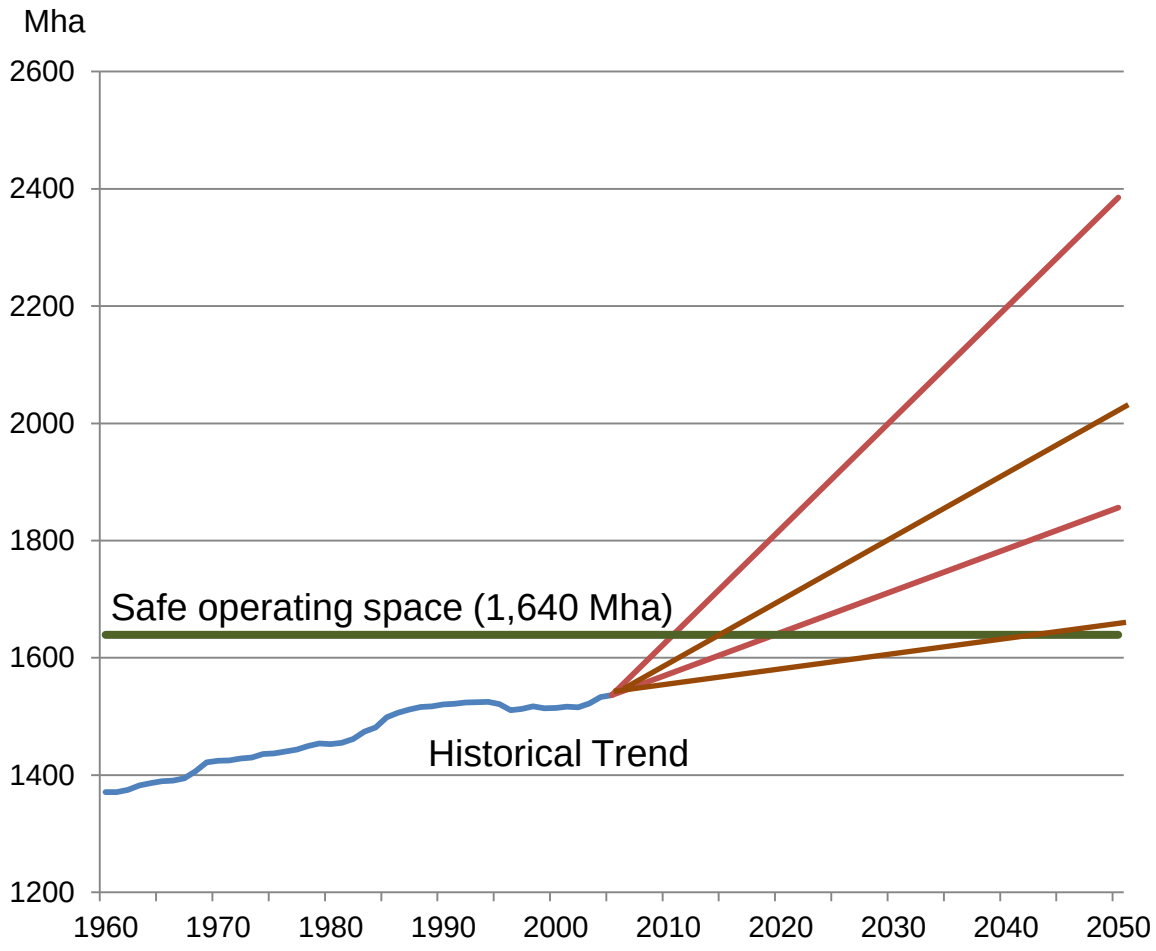
- +21 to 55% gross expansion expected by 2050



BAU Gross expansion of global cropland

SAFE OPERATING SPACE

- Overshoot of safe operating space



BAU expansion of global cropland compared to safe operating space

STRATEGIES TO STEER CONSUMPTION TOWARD TARGETS

	Measure / Action	Effect	Source
Food	**Reduce meat consumption** by around 25% (to a minimum of 70 kg/capita) and decrease the amount of food wasted at retail and household levels by 15-20% in Europe, North America and Oceania by 2030	Save 105 Mha of cropland and 1,062 Mha of permanent grasslands compared to FAO reference scenario	Wirsenius et al. 2010b
	Achieve a healthy diet worldwide based on Harvard recommendations by 2050	Save 135 Mha of cropland and 1,360 Mha of pasture compared to BAU scenario	Stehfest et al. 2009
	Eliminate avoidable food waste in the UK	Save 5.3 million tonnes of food waste, £12 billion, and 20 million tonnes of CO_{2eq} emissions per year	Wrap 2009
	Reduce food waste and loss to the lowest percentage achieved in any region across the food supply chain globally	Save 78 Mha of cropland and 12 Mt of fertilizer per year	Kummu et al. 2012
Fuel	**Abolish biofuel targets** in the EU	Save 4.1 to 6.9 Mha of indirect land use change	Bowyer 2010
	Reduce fuel consumption of cars by about 30% (corresponding to the envisaged limit of 130 g CO_2 per km) and phase out 1rst-generation biofuels in Germany	Save 500 m^2/capita	Bringezu et al. 2009b

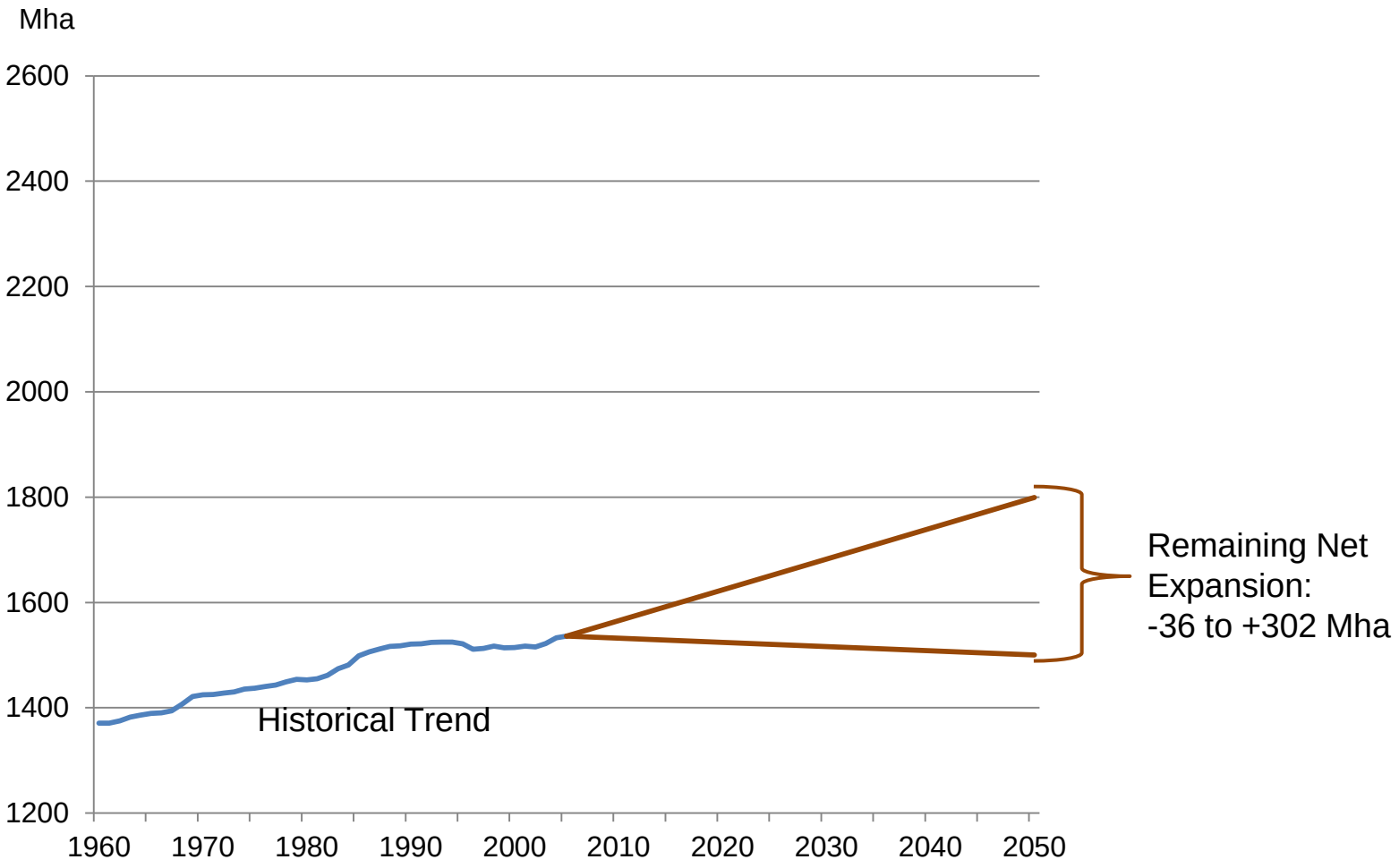
STEERING CONSUMPTION AND LAND MANAGEMENT

Strategies	Save!
❖ Improve diet and reduce waste	96-135 Mha
❖ Halve biofuel targets	24-40 Mha
❖ Control biomaterials demand	up to 57 Mha
❖ Improve land use planning (10% avoidance of building on fertile land)	11 to 13 Mha
❖ Invest in regenerating degraded soils (restore one-third of degraded and abandoned lands	30 to 74 Mha

- A mix of strategies and measures to reduce overconsumption of food and non-food biomass products and to improve land management could **save around 160 to 320 Mha by 2050**
- Cropland would still expand, but not as much

REMAINING NET EXPANSION

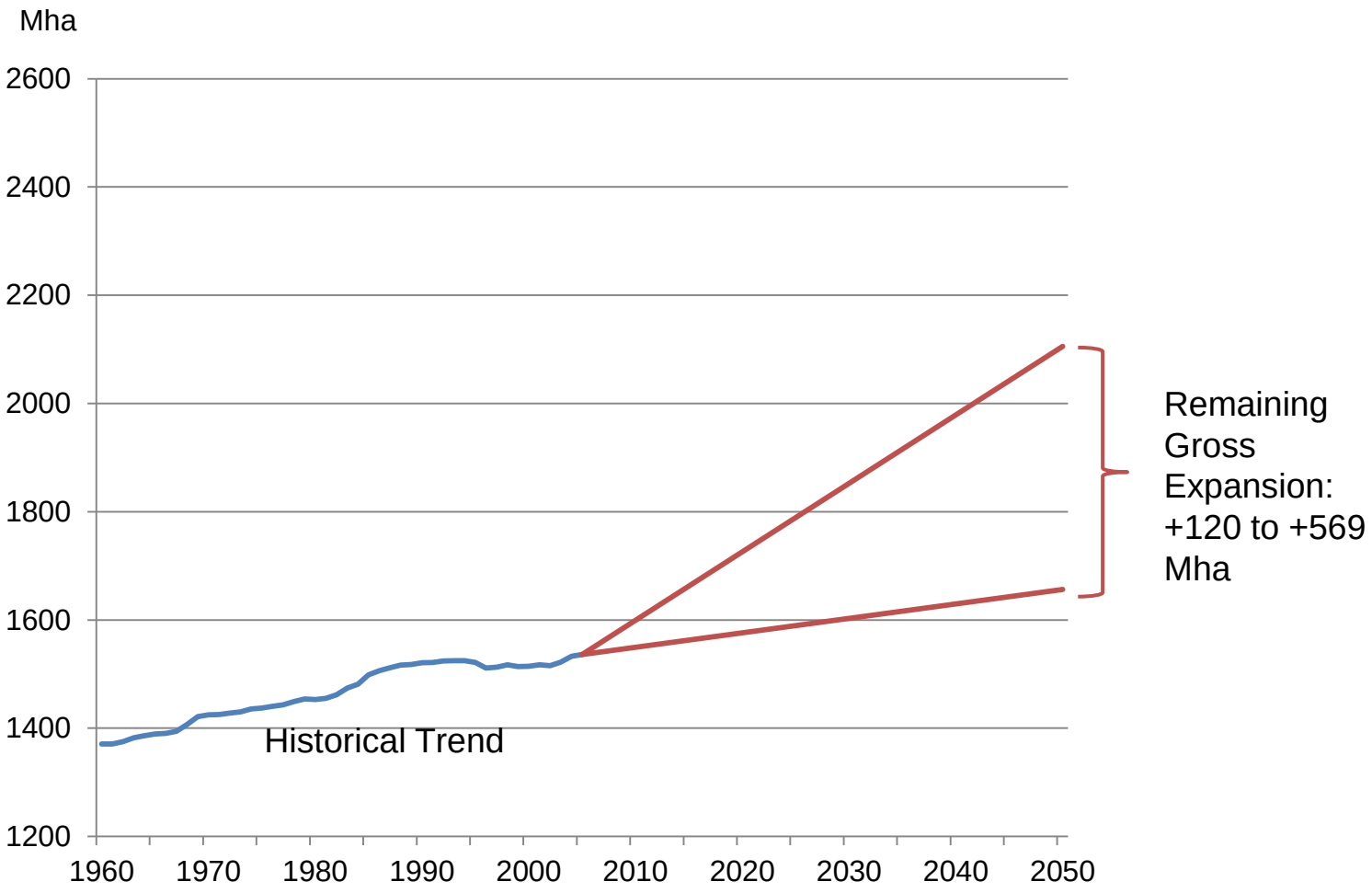
- -2 to +20% remaining net expansion by 2050



Net expansion of global cropland with "land saving" measures

REMAINING GROSS EXPANSION

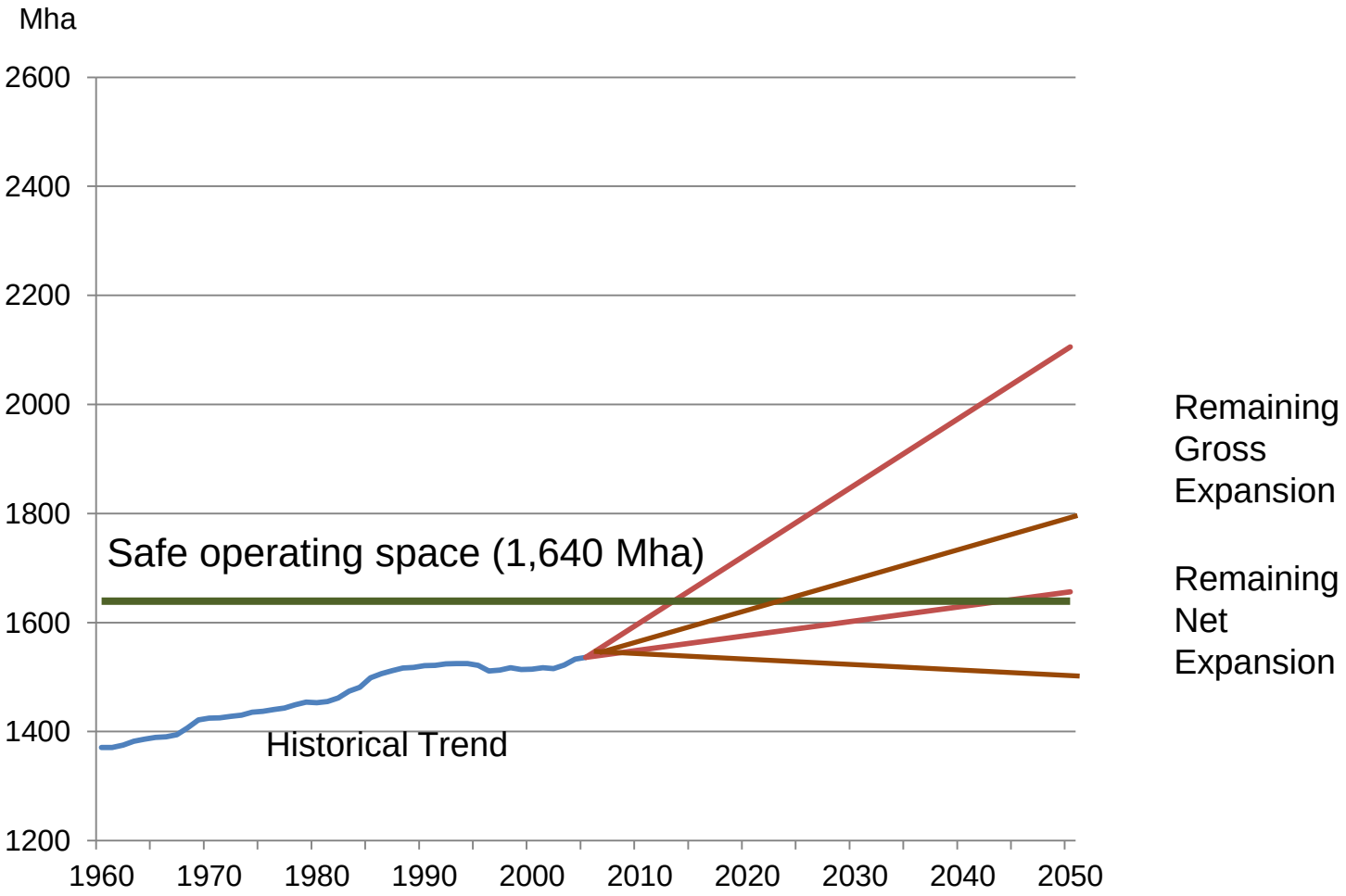
- +8 to 37% remaining gross expansion by 2050



Gross expansion of global cropland with "land saving" measures

REACHING TARGETS

- Remaining expansion is within the Safe Operating Space



Expansion of global cropland with land saving measures compared to safe operating space

KEY MESSAGES

- The safe operating space concept provides a **framework to derive sustainability targets** for global resource use: answers the question, is there overconsumption?
- If the Convention on Biological Diversity goal to halt the loss of biodiversity until 2020 shall be implemented, then also **expansion of global cropland would need to be stopped**
- IRP report provides a global perspective, but results are applicable for the EU
- A more **efficient use of biomass** and its substitutes is necessary and possible

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Many Thanks!

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Further reading:

Bringezu et al. (2012). Beyond Biofuels: Assessing global land use for domestic consumption of biomass. *Land Use Policy* 29(1): 224-232