

# Is food security sufficiently integrated in estimates of global biomass potentials for non-food uses?



Michael Nassl<sup>1</sup>, Tina Beuchelt<sup>1</sup>

<sup>1</sup> Center for Development Research (ZEF), University of Bonn

## Purpose and relevance:

- The substitution of petroleum-based products with biomass-derived alternatives is of high economic and scientific relevance
- Global biomass supply is limited by planetary boundaries → conflict-laden trade-offs between biomass uses are predictable
- Global food security is a critical issue → further investigation whether it is adequately accounted for in the estimates is important



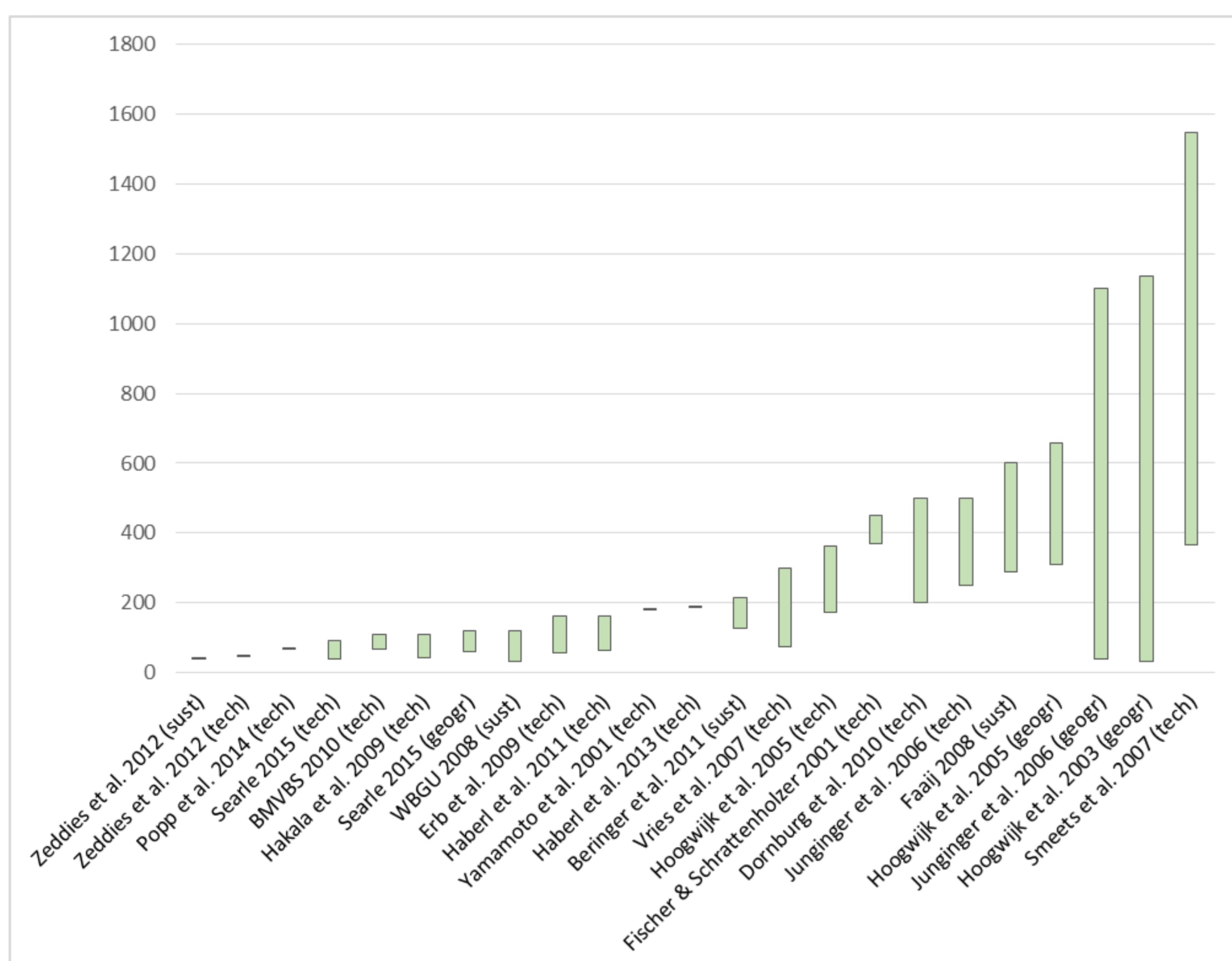
Harvesting poplar for jet fuel © Marcus Kauffman hardwoodbiofuels.org

## This research...

...aims to understand **how food requirements and different dimensions of food security are reflected in biomass potential estimations**

## For this...

...we conducted a systematic literature review of peer-reviewed and “grey” literature focusing on estimates for the year 2050

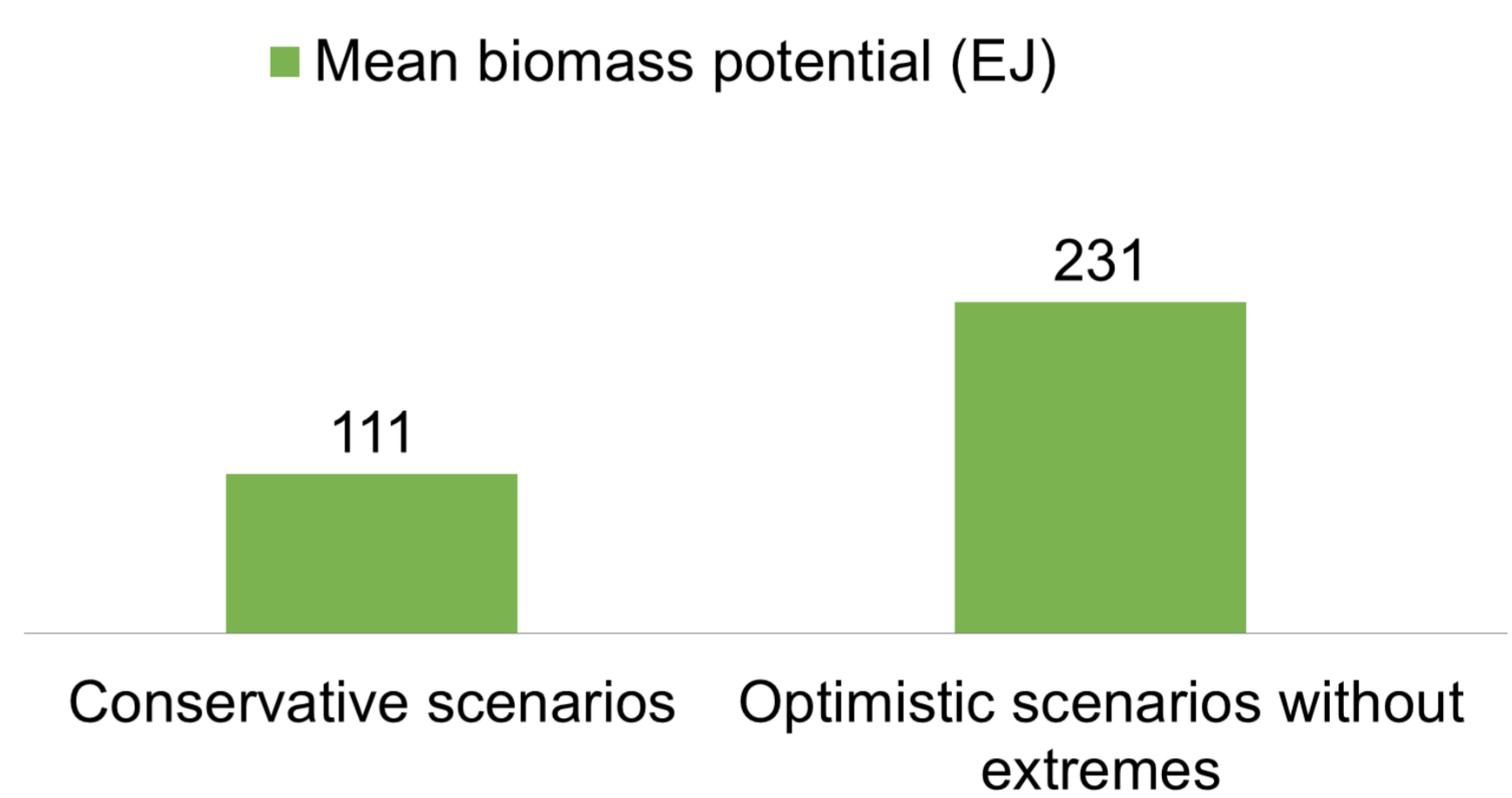


## The studies...

- ... show wide variations in their estimates ranging from 40 to over 1540 EJ/a
- ... all claim to account for a sufficient food supply for 2050's world population
- ... by a majority predict future potential for energy from biomass to be significantly higher than the current levels

## What are 'realistic' estimates?

- Biospheric maximum for the energy capacity from aboveground NPP is ~1100 EJ/a (Haberl et al. 2013)
- Currently humans harvest and destroy ~300 EJ/a → leaves ~800 EJ/a “untapped”
- The current share of bio-energy use of the global biomass harvested is 22% (IEA 2013) → maximum capacity for bio-energy uses would be ~245 EJ/a



## Integration of Food Security in the studies

- All studies calculate the agricultural land requirements based on caloric energy needs.

### However:

- Only 8 out of 22 studies disclose their calculation base regarding food diets in 2050
- Only 6 out of 22 studies provide explicit dietary scenarios
- Only 7 out of 22 include projected future food prices

- Estimated total caloric intake in the studies range from 2410 kcal/cap/d (vegetarian diet) to 3170 kcal/cap/d (high meat based diets)

### However:

- OECD current food consumption is 3500 kcal/cap/d → this would mean a caloric reduction of 10% to 30% for OECD

- Share of protein in diets is considered in several studies

### However:

- Balanced nutrition (including vitamins, minerals, micronutrients, phytochemicals etc.) is not considered

### AND:

- Food security is only considered via caloric requirements (supply) → other dimensions of food security (i.e., availability, access, utilization, and stability) are only mentioned in 2 studies.

## Conclusions:

- A large number of studies overestimate future bioenergy-potentials, as anything beyond 245 EJ/a would most likely mean an expansion of bio-energy production at the cost of other biomass uses
- Most studies lack transparency regarding their underlying assumptions and modelling approaches
- Food security is hardly discussed and integrated from a present-day understanding

Haberl, Helmut; Erb, Karl-Heinz; Krausmann, Fridolin; Running, Steve; Searchinger, Timothy D.; Smith, W. Kolby (2013): Bioenergy: how much can we expect for 2050? In: Environmental Research Letters 8 (3). IEA (2013): World energy outlook 2013 – Renewable energy outlook. Hg. v. International Energy Agency (IEA). Online verfügbar unter <http://www.worldenergyoutlook.org/>