

Can we feed the world without wrecking the environment?

Crawford Fund Conference, Canberra
Aug 12-13th 2019

Charles Godfray

Oxford Martin School
University of Oxford



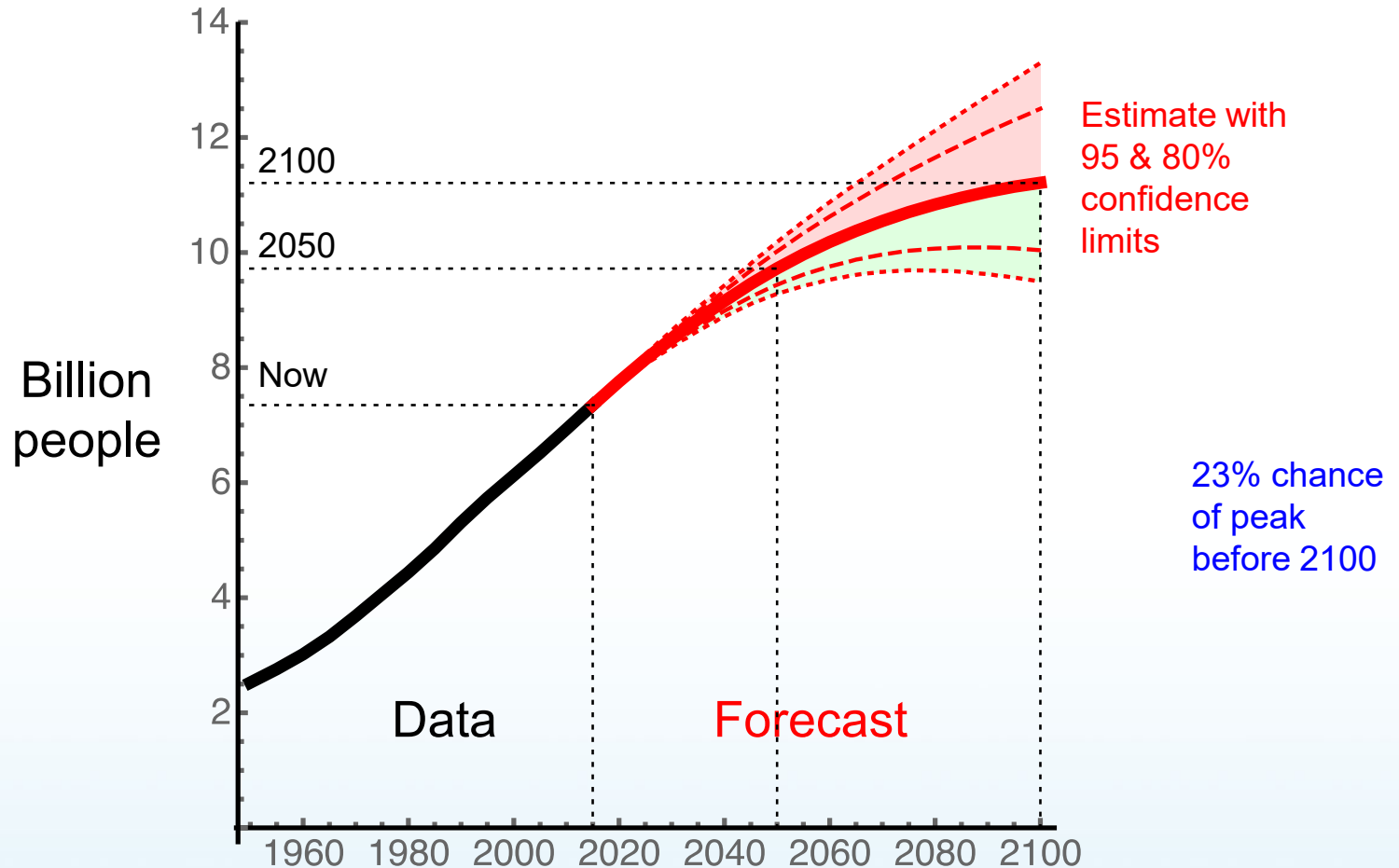
The three waves of Malthusian pessimism

- 1790s; Malthus Essay on the Principle of Population
 - Industrial Revolution
- 1960's & 70's; Limits to Growth, Population Bomb
 - Green Revolution
- From 2008; The Perfect Storm
 - ??



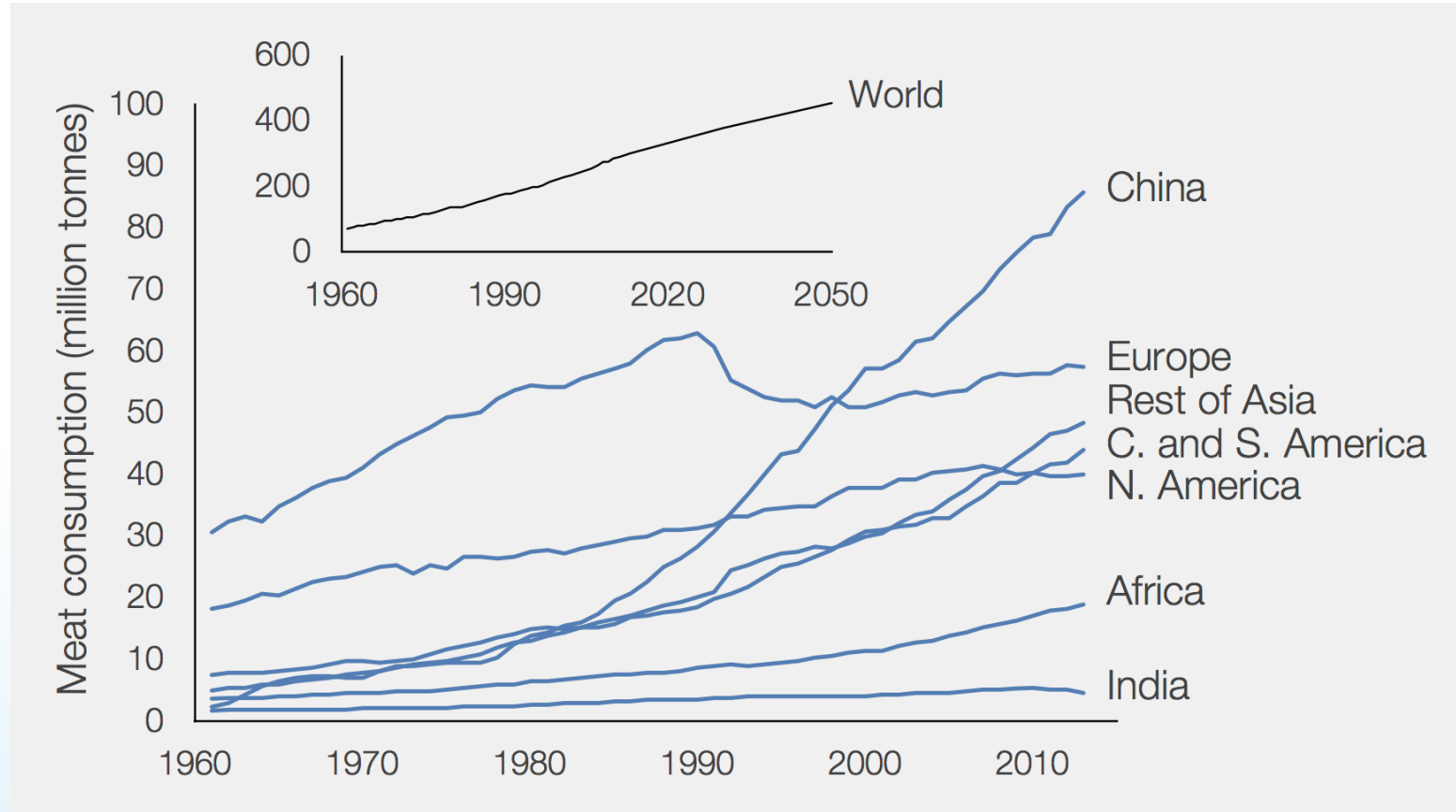
Future population growth

(medium fecundity assumption)



UN Population Division, World Population Prospects, 2015 Revision

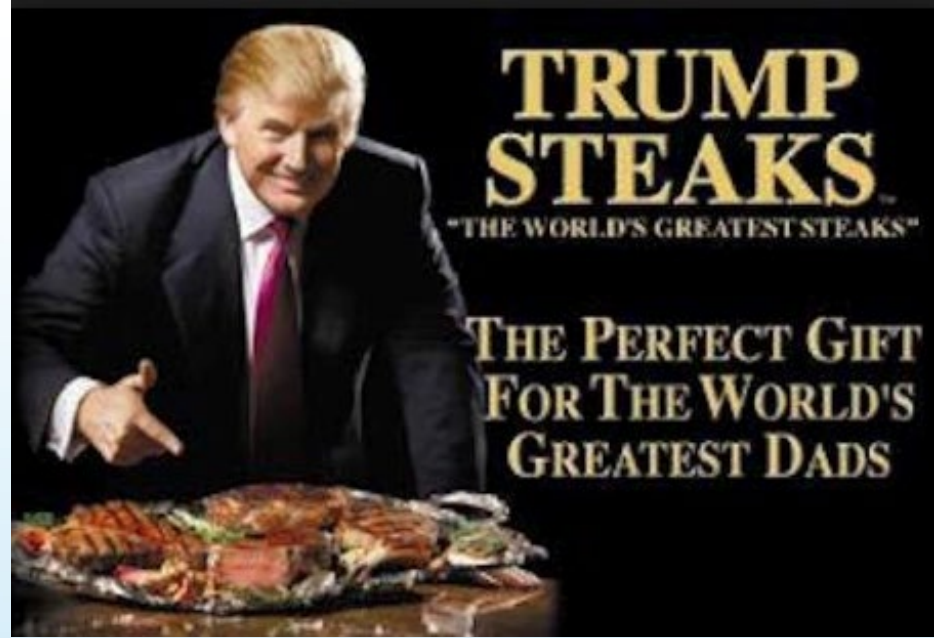
Current regional and projected global meat consumption



Alexandratos, N. & Bruinsma, J. *World Agriculture Towards 2030/2050*. FAO, 2012.

Coming challenge

- Continuing demand growth
 - Urbanisation & mega-cities
- Hunger & under-nutrition + Obesity & over-nutrition
- Pressures on agriculture
 - Water scarcity
 - Competition for land and soil degradation
- More frequent shocks
 - Climate change
 - Geopolitical



This talk

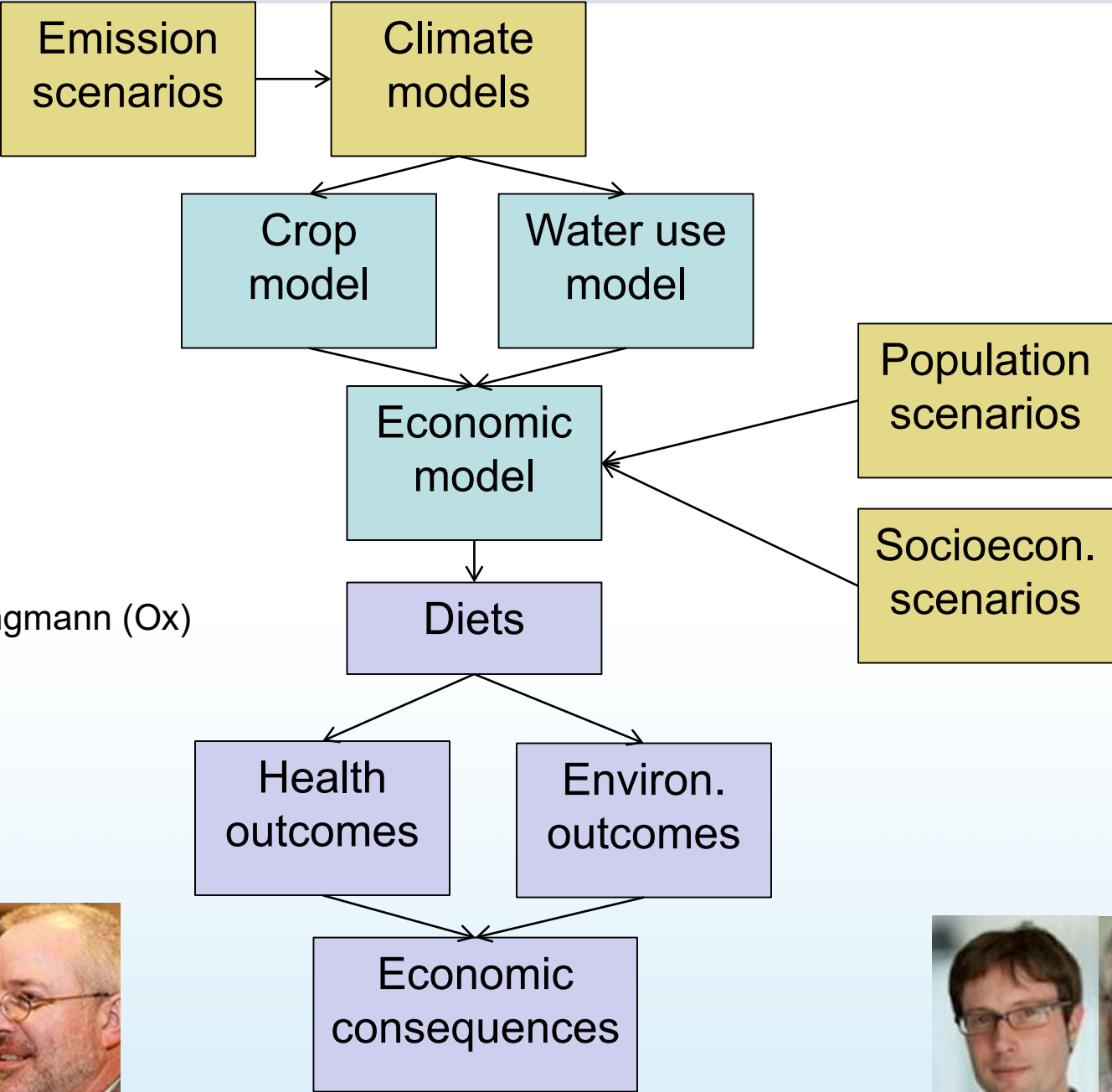
- What if we eat “healthily”?
- Can we feed the world within planetary boundaries
- Near-term governance challenges





Modelling Strategy

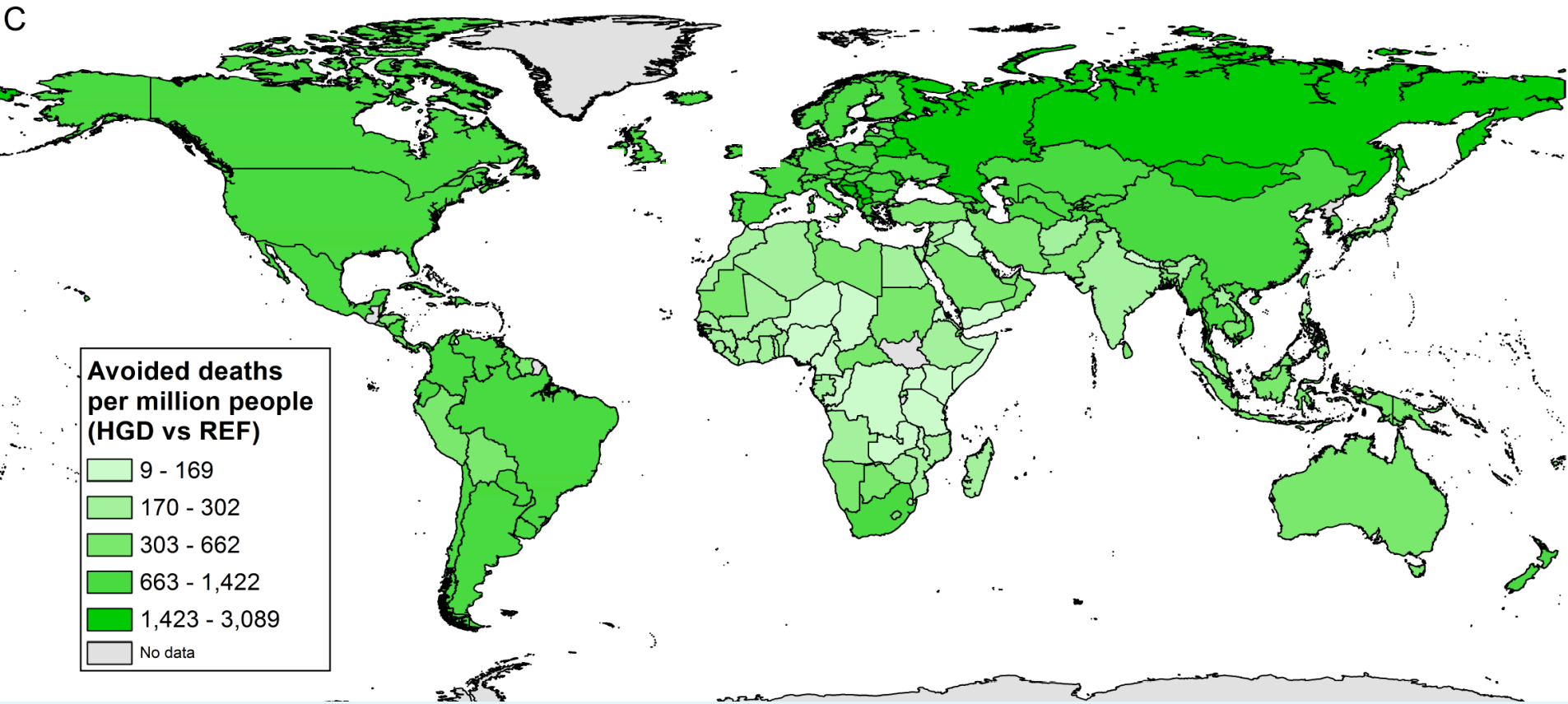
Led by Marco Springmann (Ox)



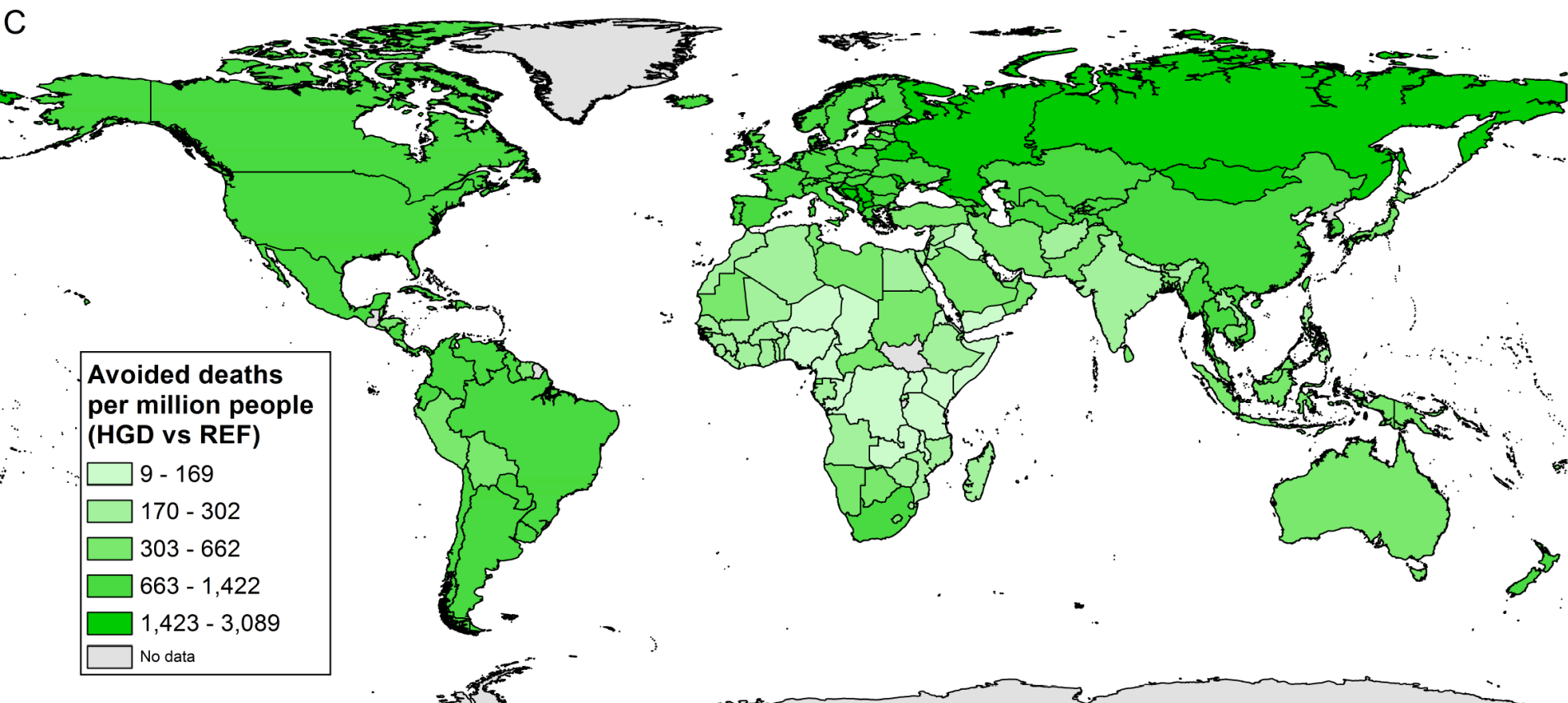
What if we eat healthily?

- Assume by 2050 we adopt diets recommended by the World Health Organisation
- Calculate diet-related disease deaths
- ... and greenhouse gas emissions
- ... and begin to explore economics

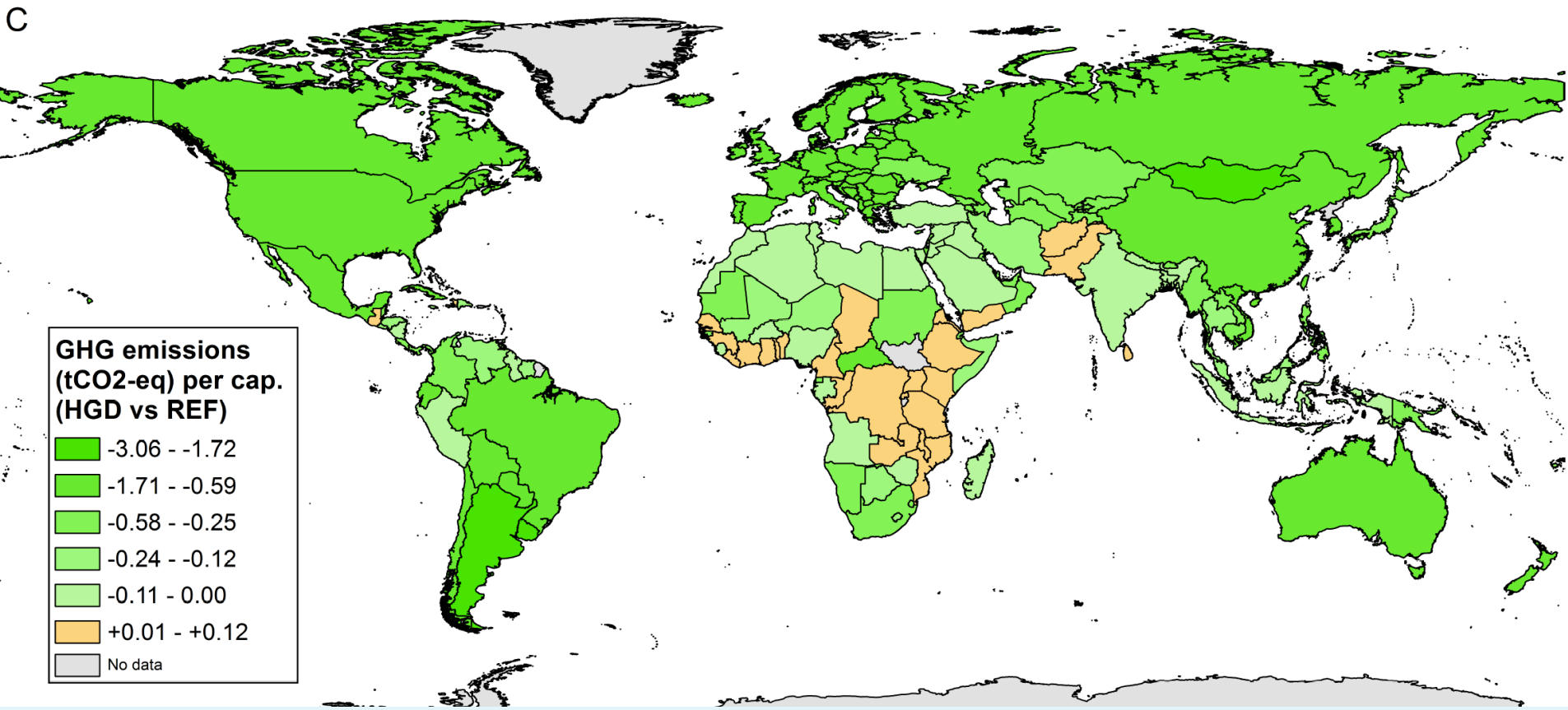
Cartography: © Boris Johnson



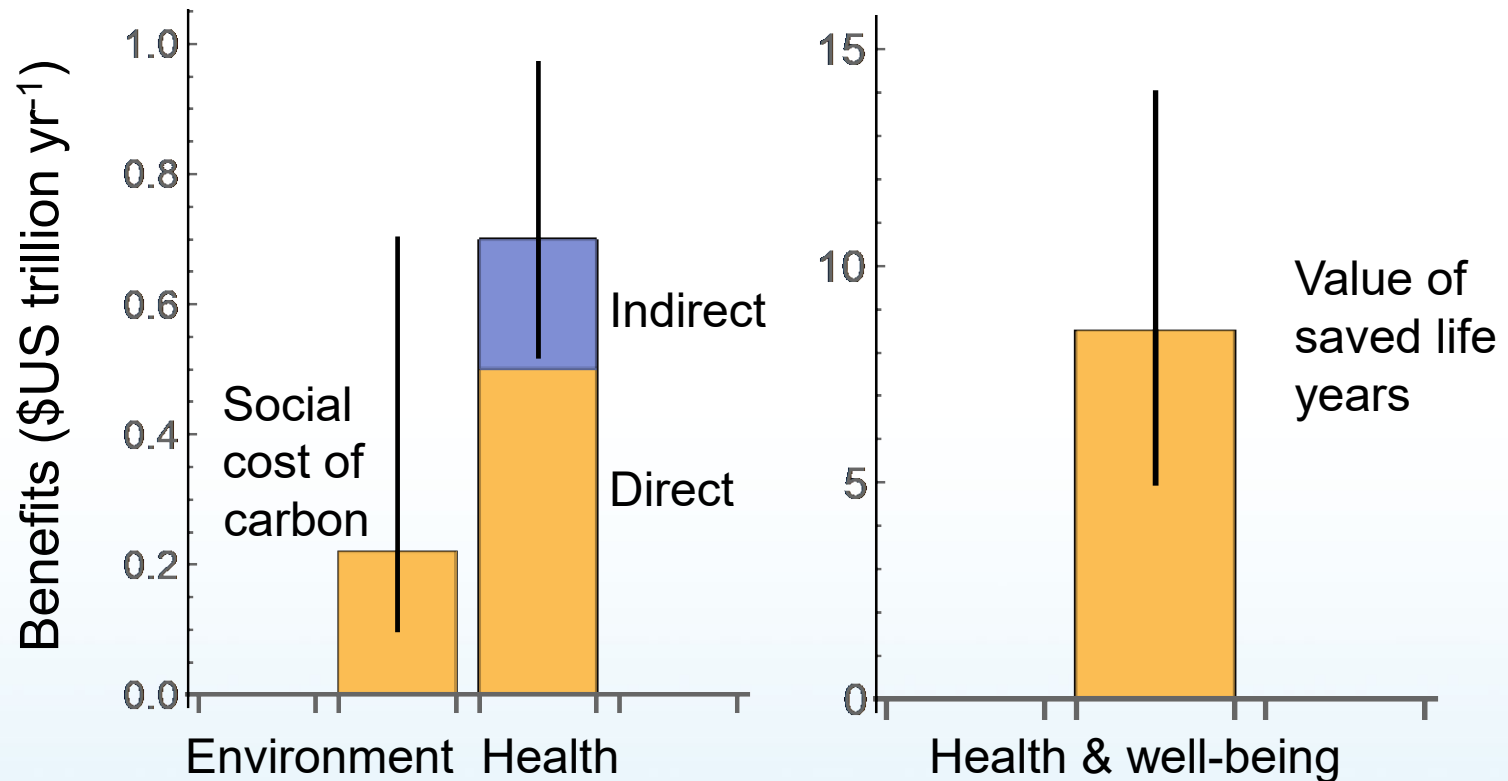
Compared to FAO diet predictions, adoption of a diet meeting nutritional guidelines would in 2050 result in 5.1M avoided deaths per year



Adoption of a diet meeting nutritional guidelines would in 2050
reduce the increase in food-system associated GHG emissions
from 51% to 7%



There are substantial economic benefits of switching to better diets

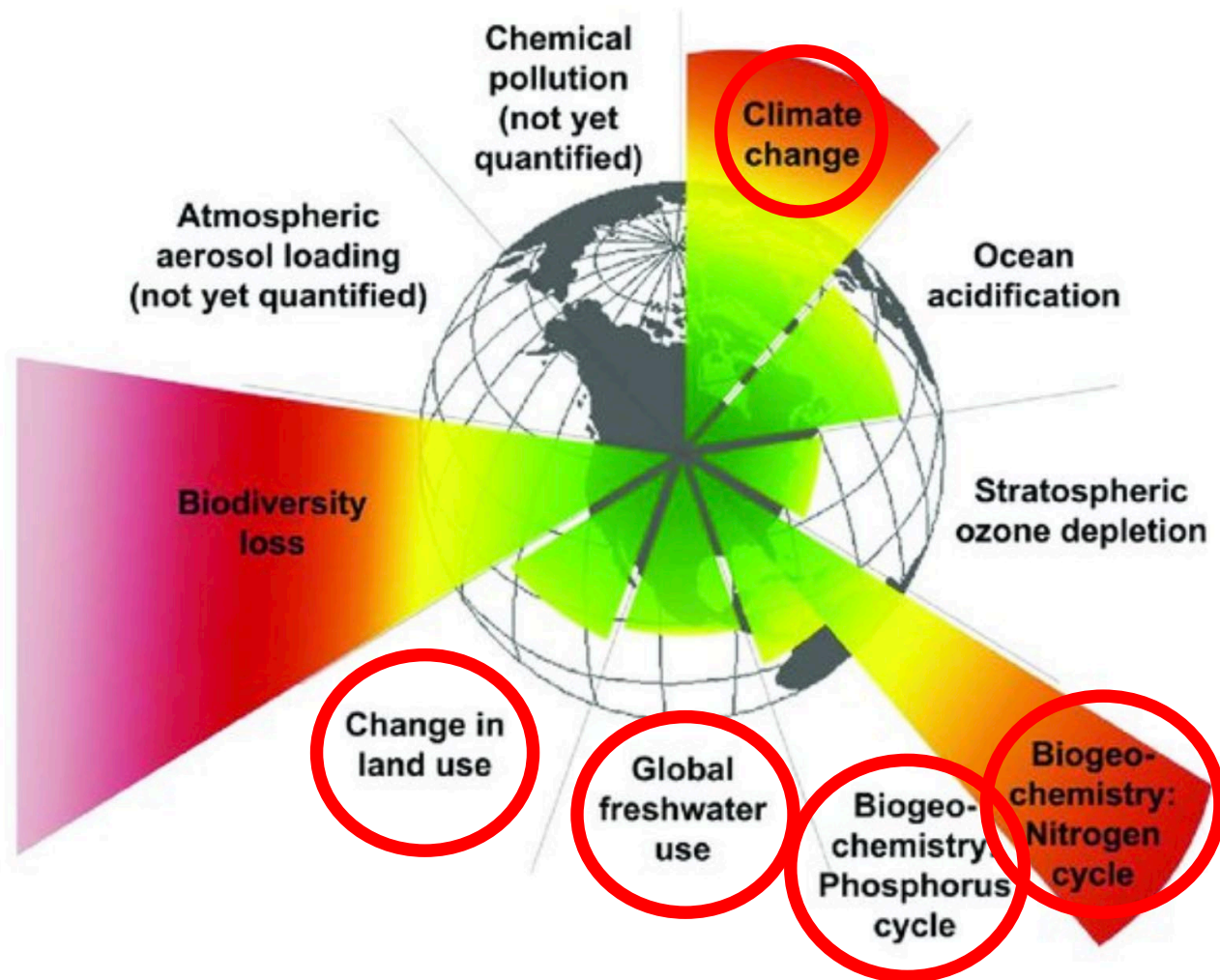


GWP (Σ GDP) \approx \$US 80T yr⁻¹

Can we feed the world within planetary boundaries?

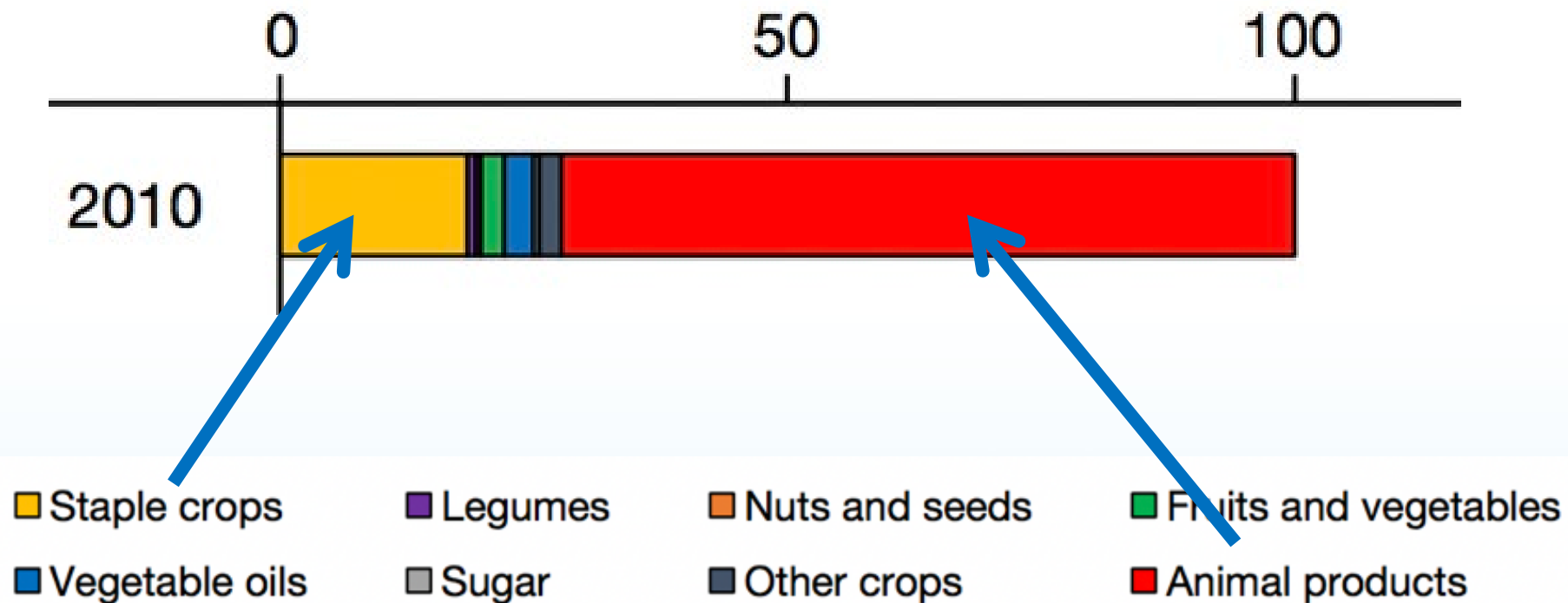
- Planetary boundaries & the Lancet Commission
- What food types challenge boundaries?
- What sets of solution maintain safe operating space?

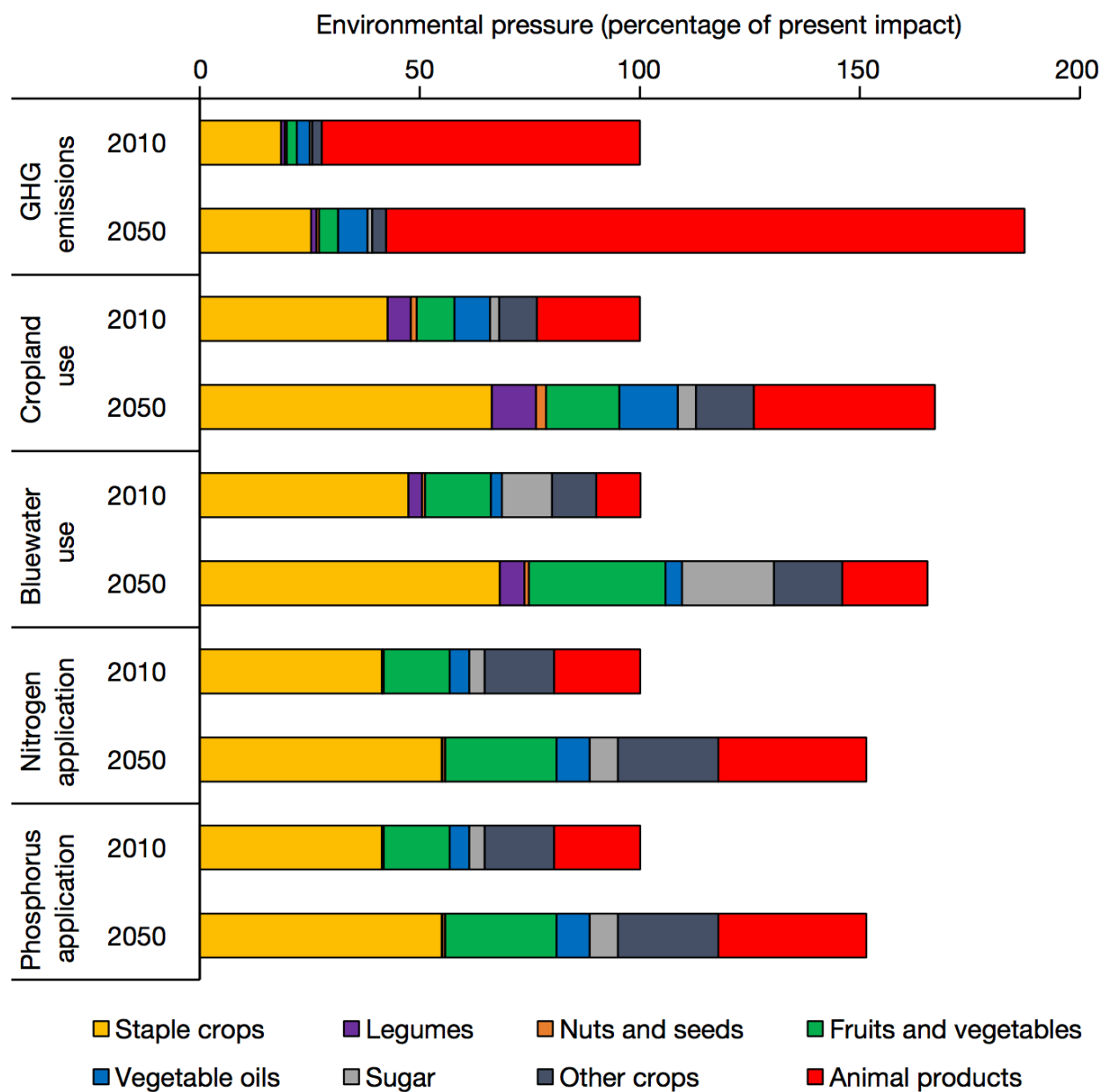
Planetary boundaries

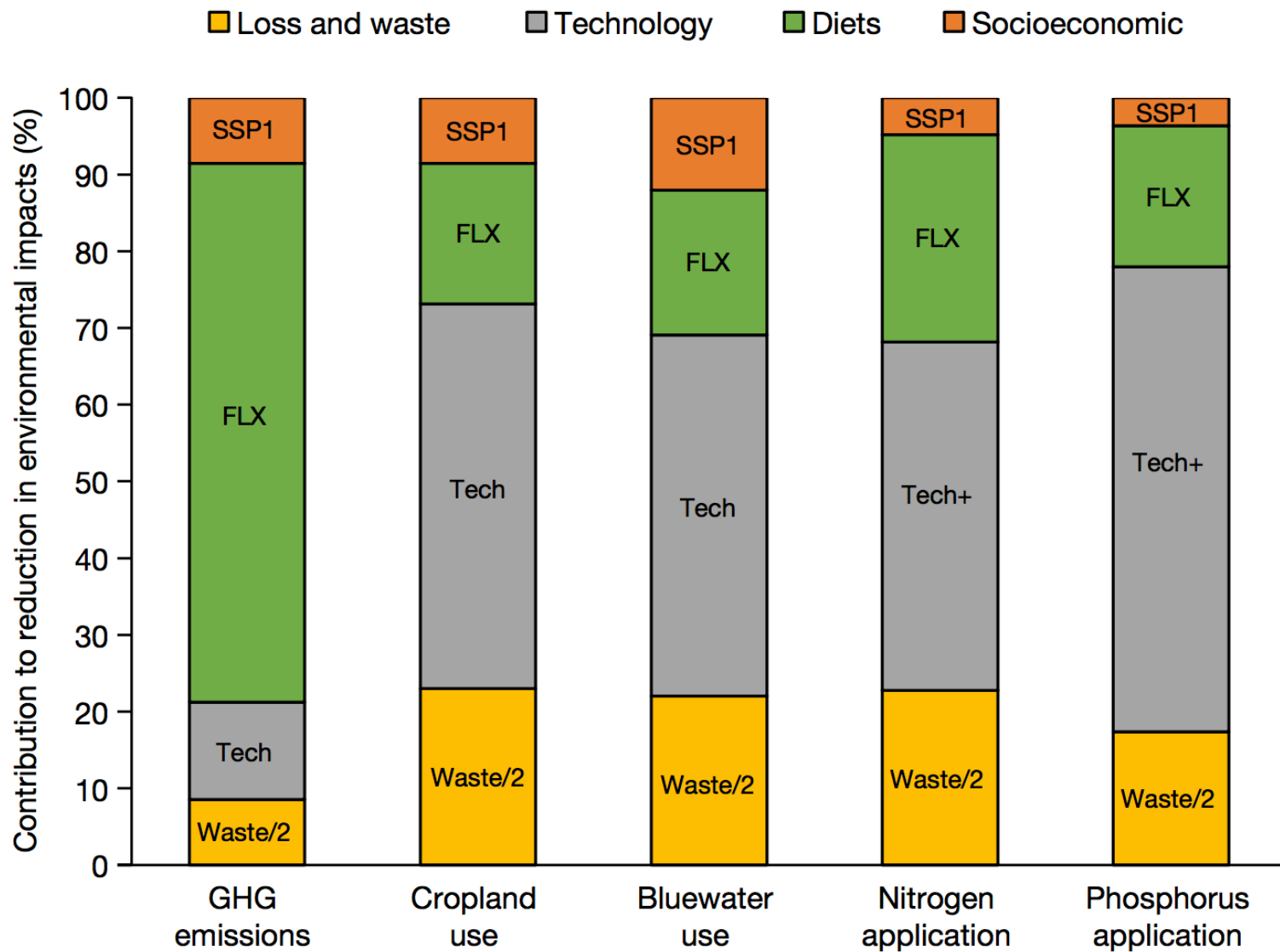


Johan
Rockström

Percentage contributions of different sectors to total agricultural greenhouse emissions



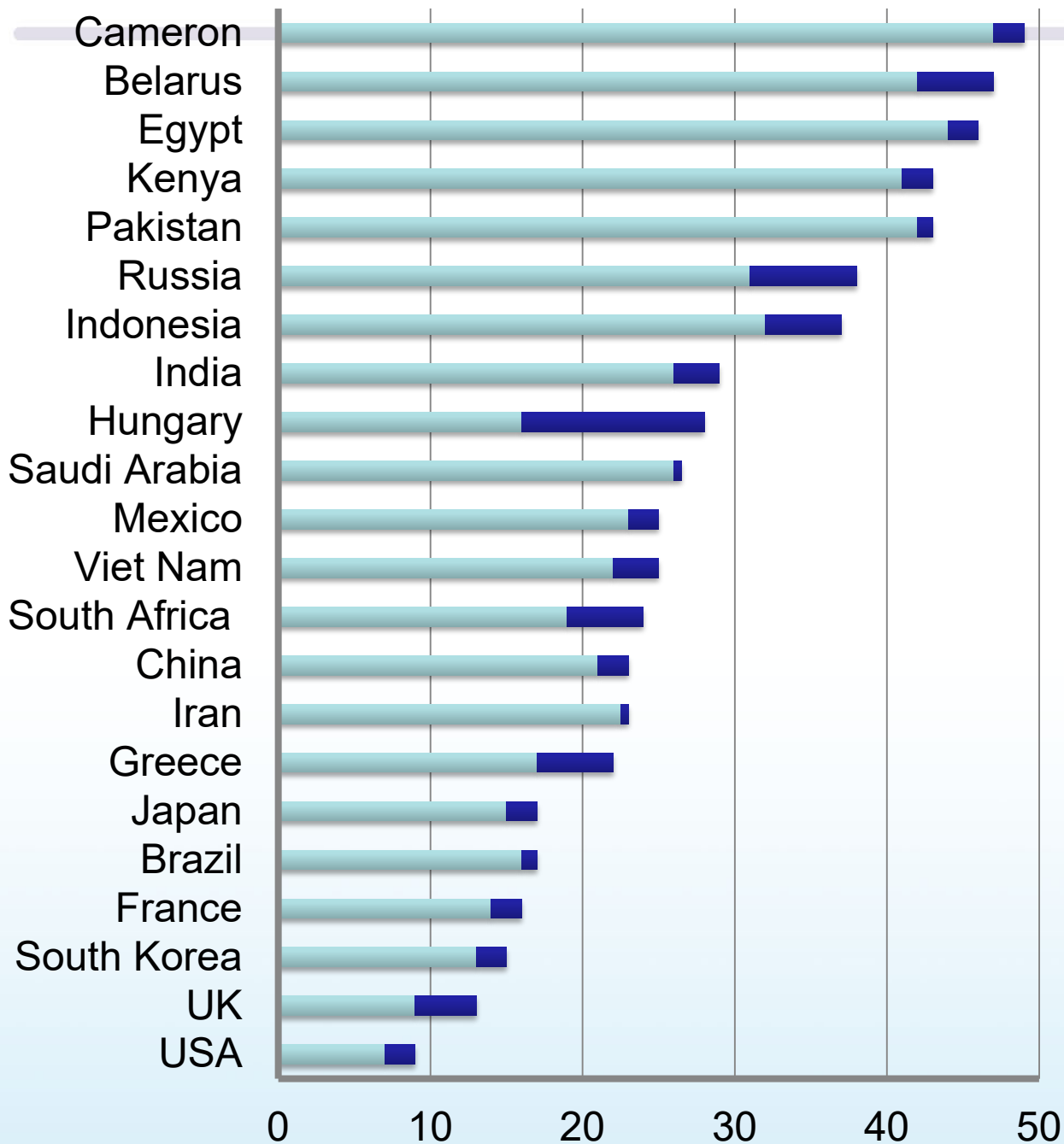




A mid-term food security challenge

- Or what keeps me awake at night

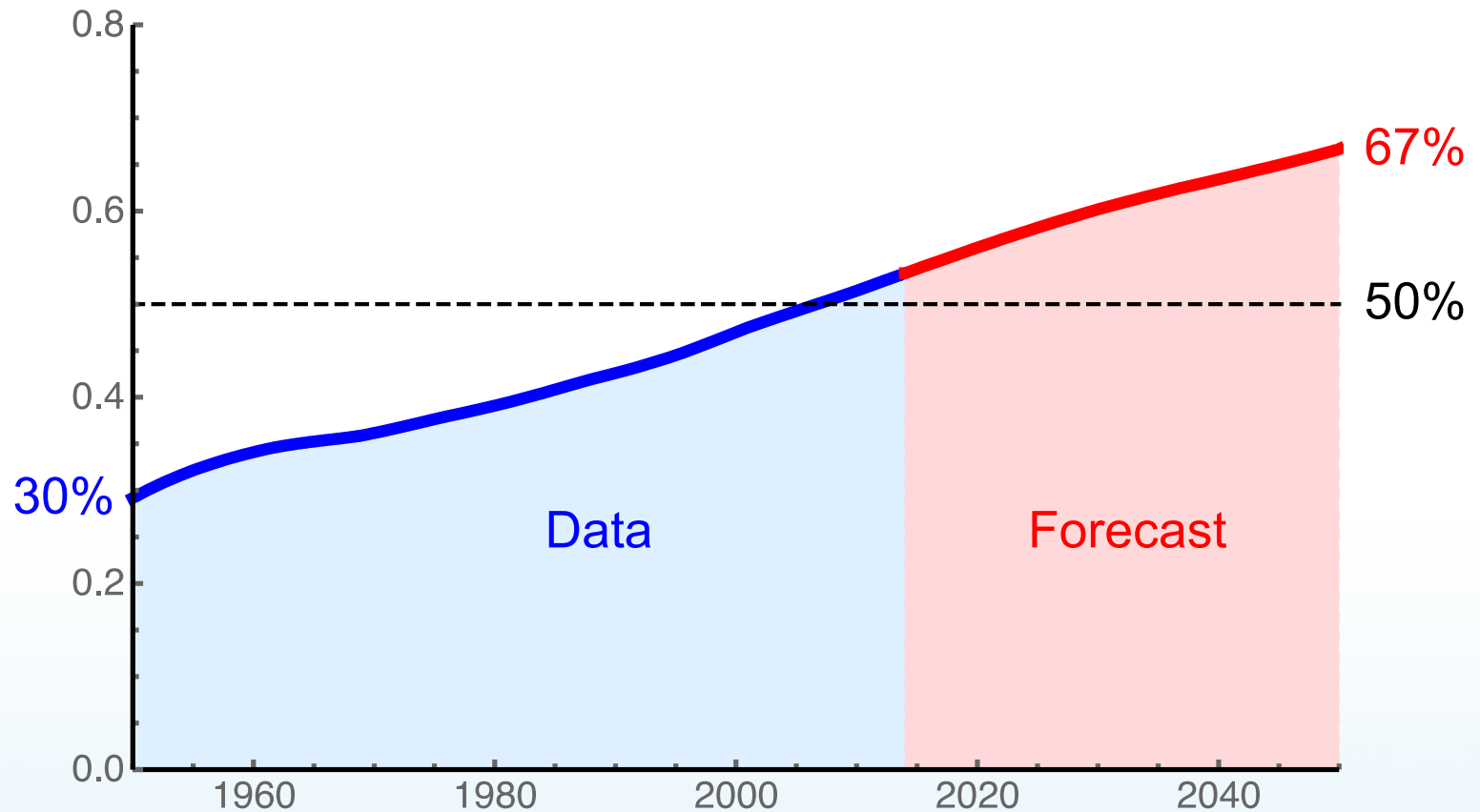




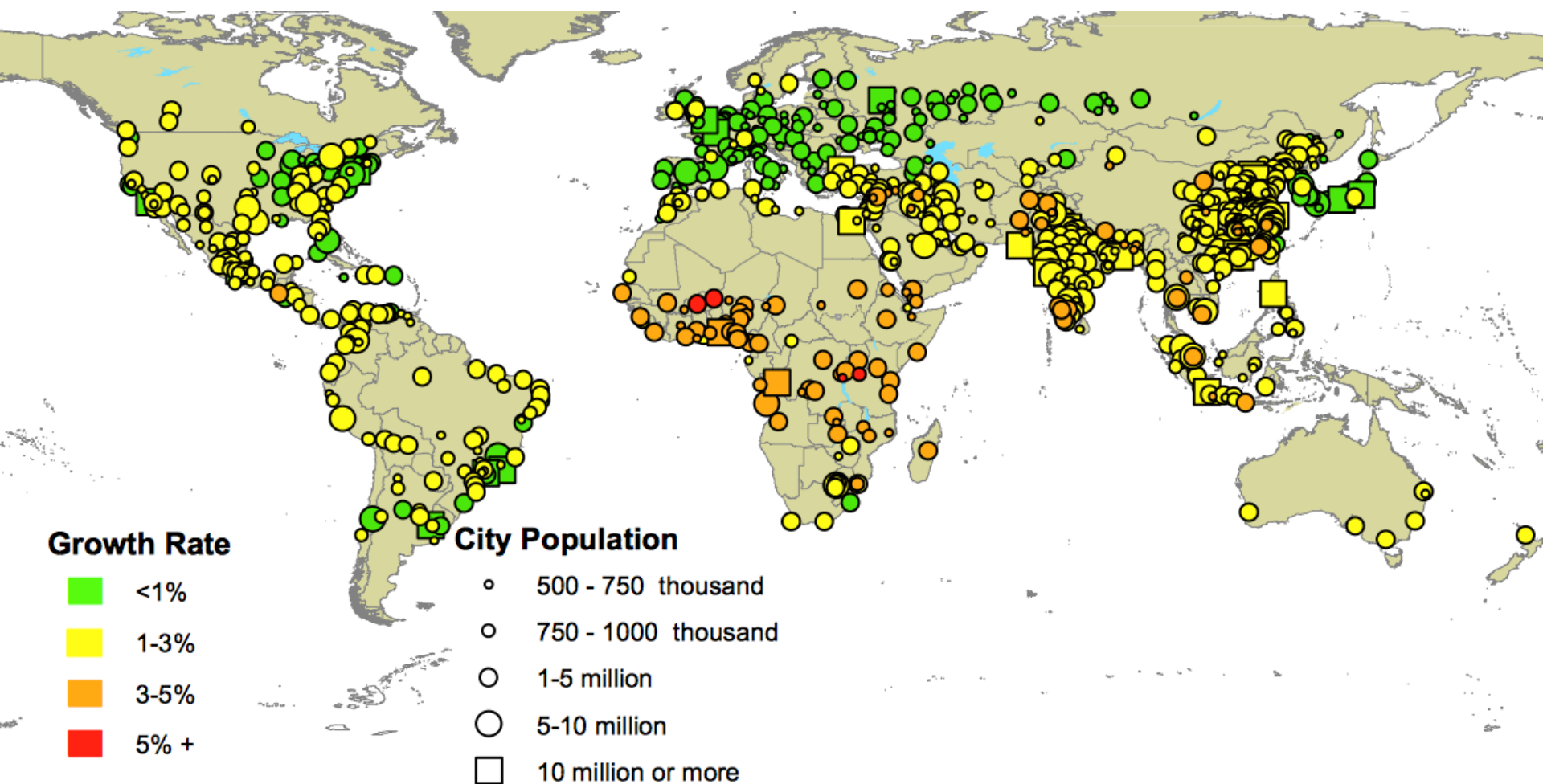
Percentage income
spent on food and
alcohol (2011)

USDA 2012

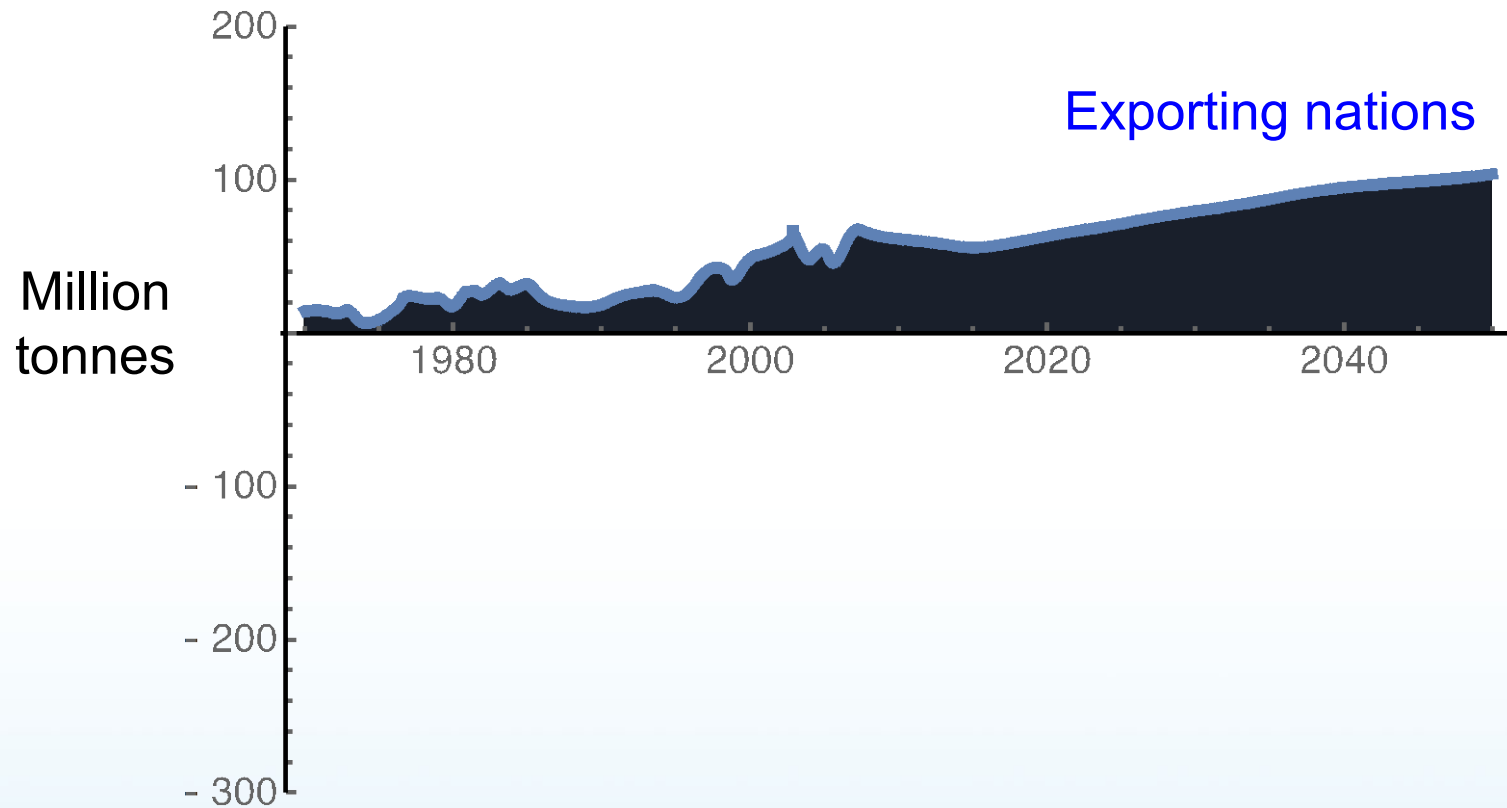
Fraction global population living in cities



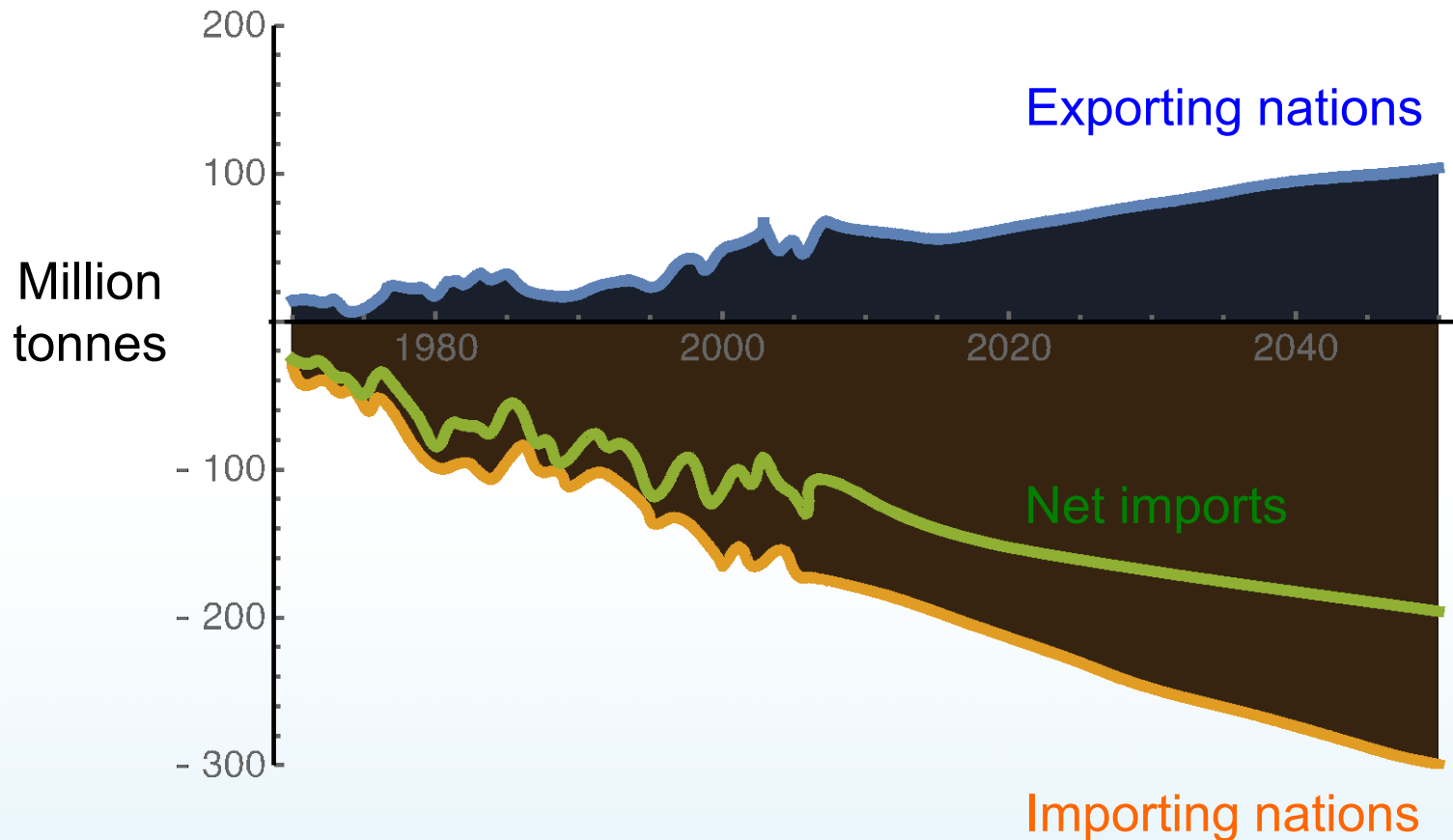
Distribution of large global cities and their growth rates



Developing country cereal trade

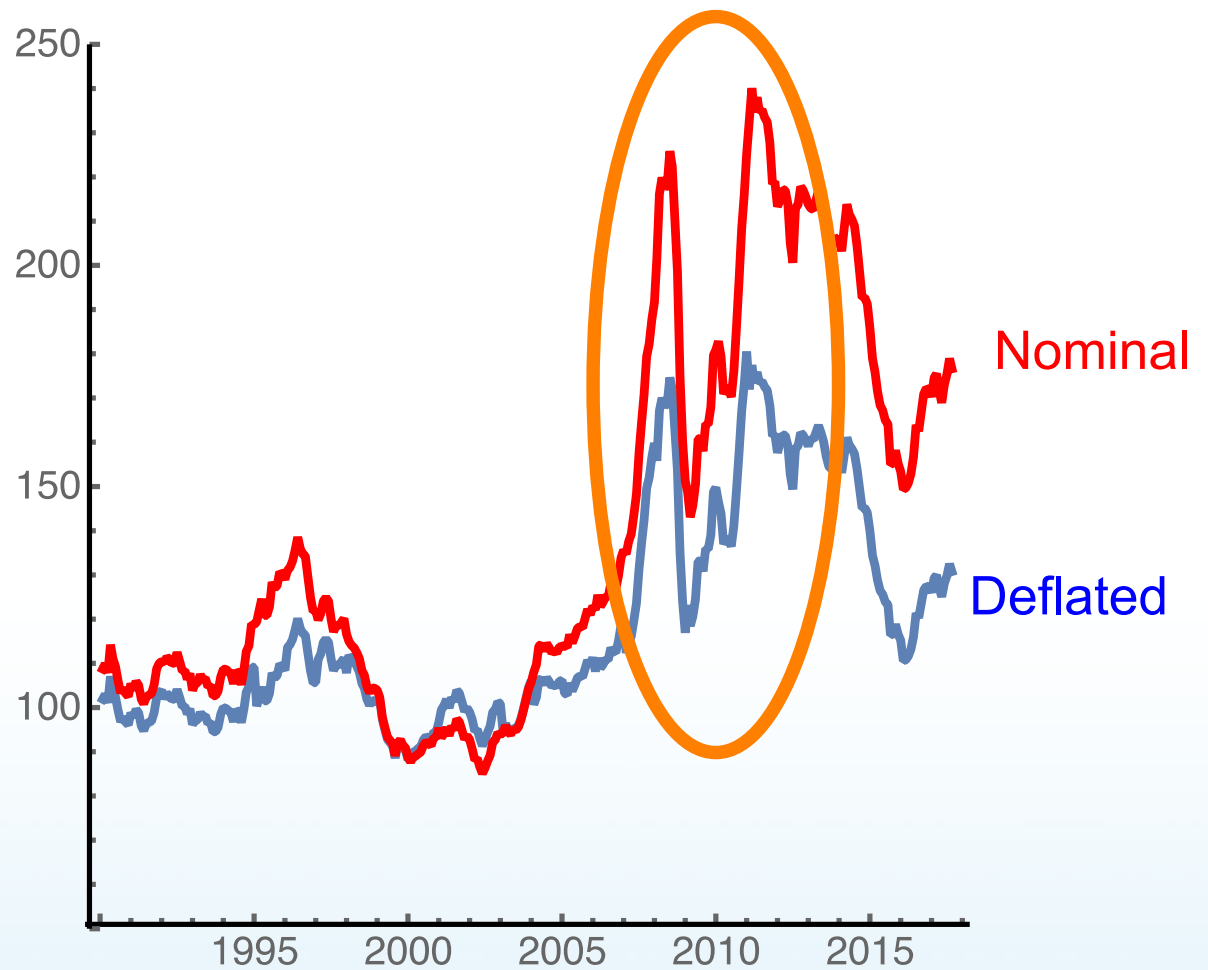


Developing country cereal trade

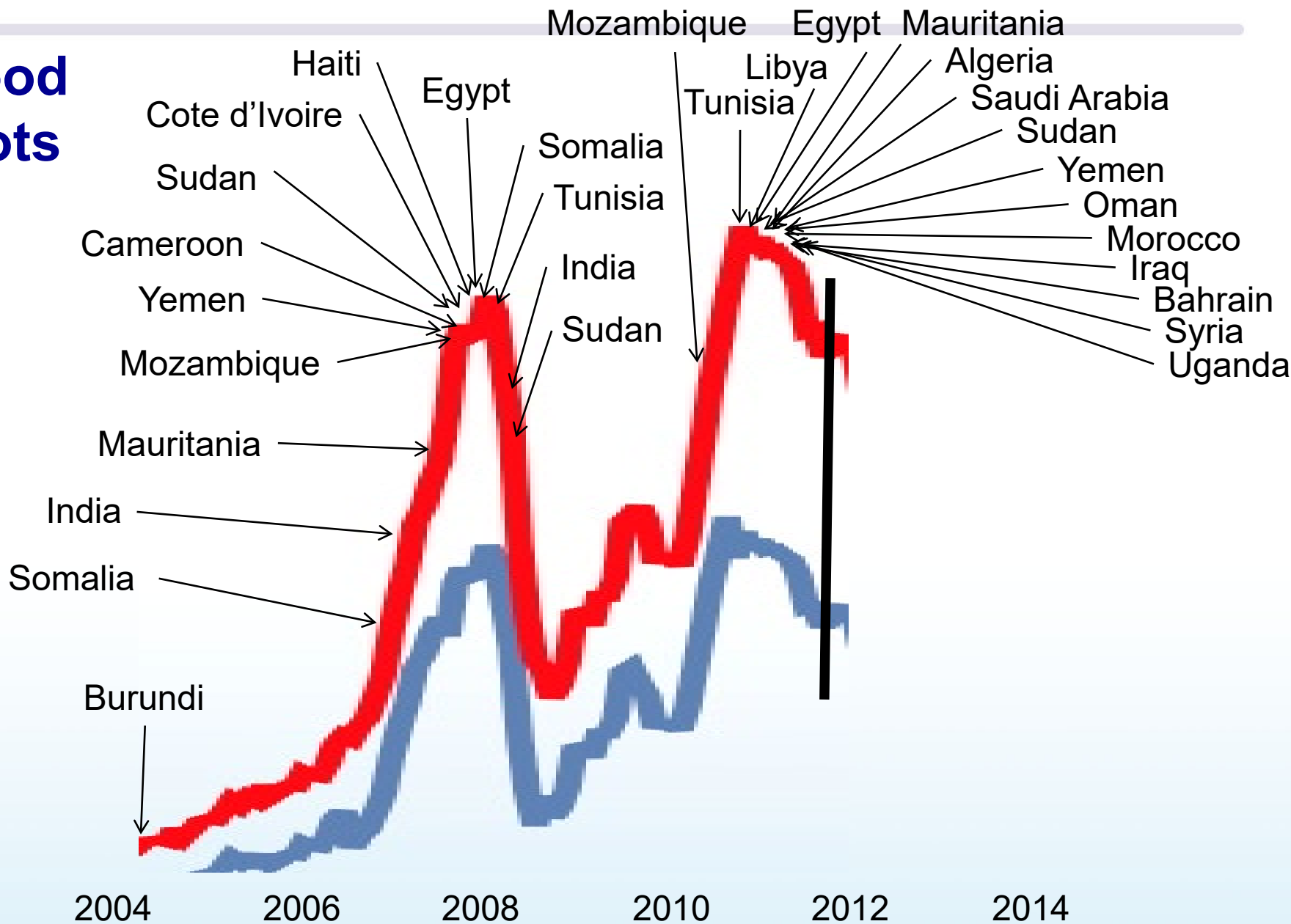


FAO Food Price Index

(1990 = 100;
Jan 1990 to Aug 2017)



Food riots



Lagi, Bertrand & Bar-Yam 2011



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- From 2008; The Perfect Storm
 - Double-green Supply+Demand Side Revolution

