## Is the world we live in - the world we want?



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THE EUROPE WE WANT

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## Growing Human Pressure [20/80 dilemma]

### Climate change [560/450/400 dilemma]

## Ecosystem decline [60 % loss dilemma]

Surprise [99/1 dilemma]

# **World Primary Energy**







**Climate Change** < 350 ppm CO<sub>2</sub> < 1W m<sup>2</sup>

**Ozone depletion** < 5 % of Pre-Industrial 290 DU

#### Biogeochemical loading: Global N & P Cycles

Limit industrial fixation of  $N_2$  to 35 Tg N yr<sup>1</sup>(25 % of natural fixation) (25%-35%) P < 10× natural weathering inflow to Oceans (10× - 100×)

> Rate of Biodiversity Loss < 10 E/MSY

Planetary Boundaries Atmospheric Aerosol Loading *To be determined* 

#### **Ocean acidification**

Aragonite saturation ratio > 80 % above preindustrial levels

Global Freshwater Use <4000 km<sup>3</sup>/yr

Land System Change ≤15 % of land under crops

**Chemical Pollution** 

Plastics, Endocrine Desruptors, Nuclear Waste Emitted globally To be determined



### Fate of Anthropogenic CO<sub>2</sub> Emissions (2004-2013 average)





## Global natural disasters 1980 – 2013

Geophysical, meteorological, hydrological events

Loss Events Worldwide 1980 – 2013 Munich RE 🚍





How about adding the idea of social boundaries to the picture?

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Just as there in an environmental ceiling, above which lies unacceptable environmental degradation, so too there is a social foundation, below which lies unacceptable human deprivation



Between the social foundation and the environmental ceiling lies a space – which is the safe and just space for humanity.



#### How far below the social foundation is humanity?

Social foundation	Extent of global deprivation (illustrative indicators)	Percentage
Food security	Population undernourished	13%
Income	Population living below \$1.25 (PPP) per day	21%
Water and sanitation	Population without access to an improved drinking water source	13%
	Population without access to improved sanitation	39%
Health care	Population estimated to be without regular access to essential medicines	30%
Education	Children not enrolled in primary school	10%
	Illiteracy among 15–24-year-olds	11%
Energy	Population lacking access to electricity	19%
	Population lacking access to clean cooking facilities	39%
Gender equality	Employment gap between women and men in waged work (excluding agriculture)	34%
	Representation gap between women and men in national parliaments	77%
Social equity	Population living on less than the median income in countries with a Gini coefficient exceeding 0.35	33%
Voice	E.g. Population living in countries perceived (in surveys) not to permit political participation or freedom of expression	?
Jobs	E.g. Labour force not employed in decent work	?
Resilience	E.g. Population facing multiple dimensions of poverty	?

# FALLING FAR BELOW THE SOCIAL FOUNDATION



# SO... is the world we live in - the world we want?

- Humanity has already crossed at least 3 of the 9 planetary boundaries – for climate change, for nitrogen use, and for biodiversity loss.
- Likewise, humanity is falling far below the social foundation on every dimension for which indicators are available

## The wealthy few stress the planet

# **World Primary Energy**



# Climate Change is a Large Issue

- Majority of the sciences and engineering disciplines are involved.
- Social sciences are interested.
- Business/Industry has a stake.
- Involves citizens, politicians, public policy experts, and advocates.
- Every sector of the economy affected.
- All aspects of our lives touched: environment, jobs, health, politics, national security, arts, religion, etc.



# Future CO<sub>2</sub> concentrations



Countries' individual proposed efforts not sufficient !!!

## Climate change mitigation in a nutshell



Fossil Fuels are Cheapest Energy

Subsidized & do not pay costs (solution: rising price on carbon)

#### Technology Development Needed

Driven by certainty of carbon price (government role limited)

Regulations also Required Efficiency of vehicles, buildings...spatial planning

## Mitigation: What will it cost?

- Stern: 2% of GDP = **\$1.4 trillion**/year
- International Energy Agency: \$38 trillion over 25 years
- World Economic Forum: **\$500 billion**/year
- UNEP: **\$1.05** to **\$2.59 trillion**/year to meet MDGs
- IEA "Blue Map Scenario". T-21 model scenario used = \$1.3 trillion
- Reasonable estimate: **\$1.5 trillion**/year

# We cannot shape the future with tools of the past.

# Key Process: Transformation and innovation

- 1. Technological
- 2. Institutional
- 3. Behavioural

# Four Factors Determine the Amount of CO<sub>2</sub> Emissions







140 kWh/d peak 25 kW rating photovoltaic by Amonix - Photo by David







#### 1,2 ha na osebo

#### 126 kWh/dan

## Efficiency and technology – wining combination?



#### Jevons' paradox

"as technological improvements increase the efficiency with which a resource is used, total consumption of that resource may increase, rather than decrease."

For example, from 1900 to 2000, passenger transportation in the USA became 5 times more energy-efficient; but nowadays, the average person travels 50 times further.

## The Game of Life?







Consumption share of those living in poverty

# Final thoughts

- Environmentally, time is running out.
- Economically and politically, much of what we have been told was true has been shown to be false
- We are at a once-in-acentury crossroads when a different path must be taken.

