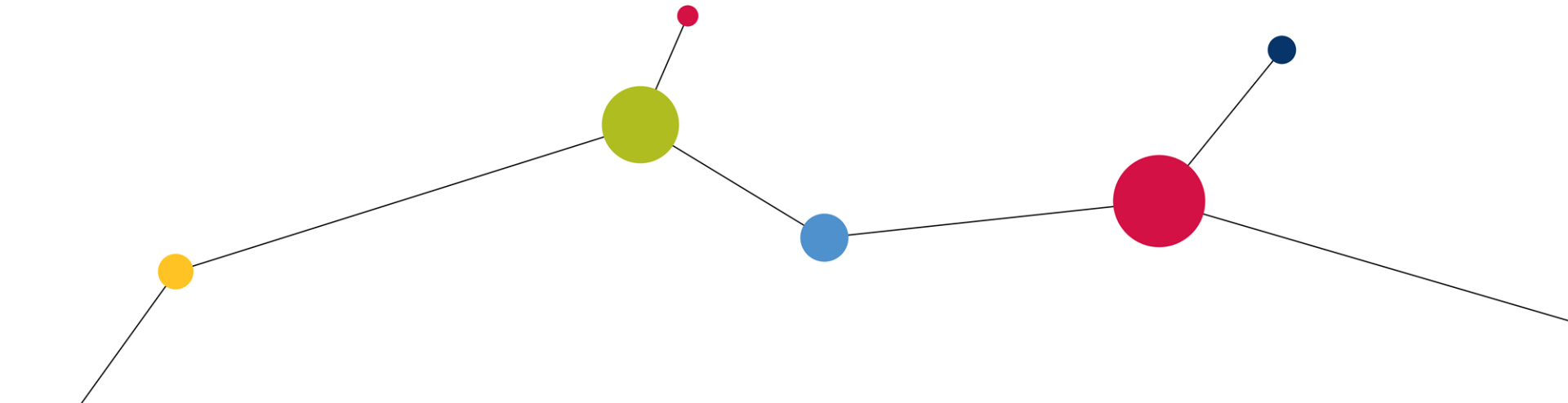
TOWARDS A GREEN ECONOMY:
Pathways through Politics, Culture and Economics

Achim Steiner
Director, Oxford Martin School

29 November 2016




OXFORD MARTIN SCHOOL
UNIVERSITY OF OXFORD
Now for the Long Term
The Report of the
Oxford Martin Commission
for Future Generations

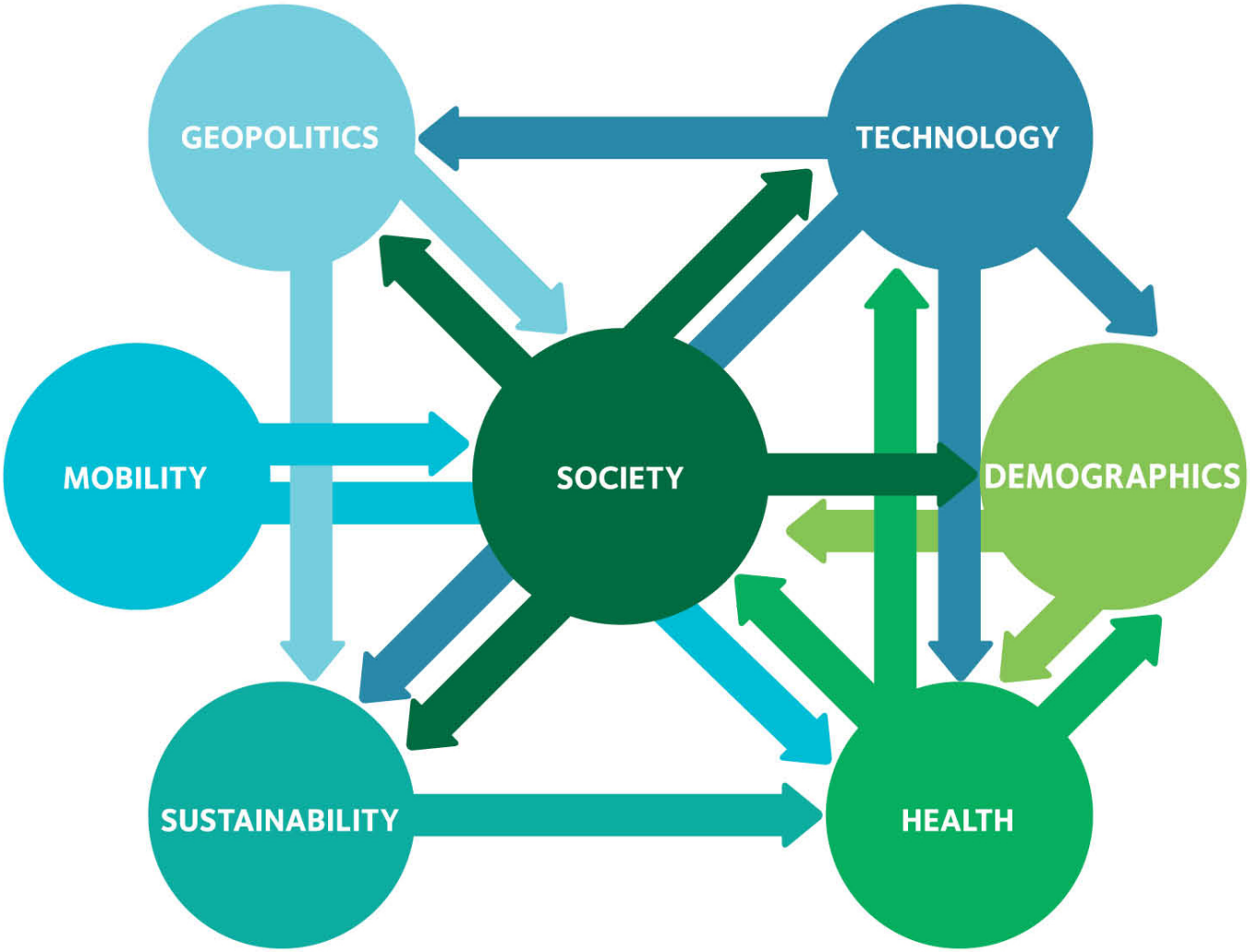
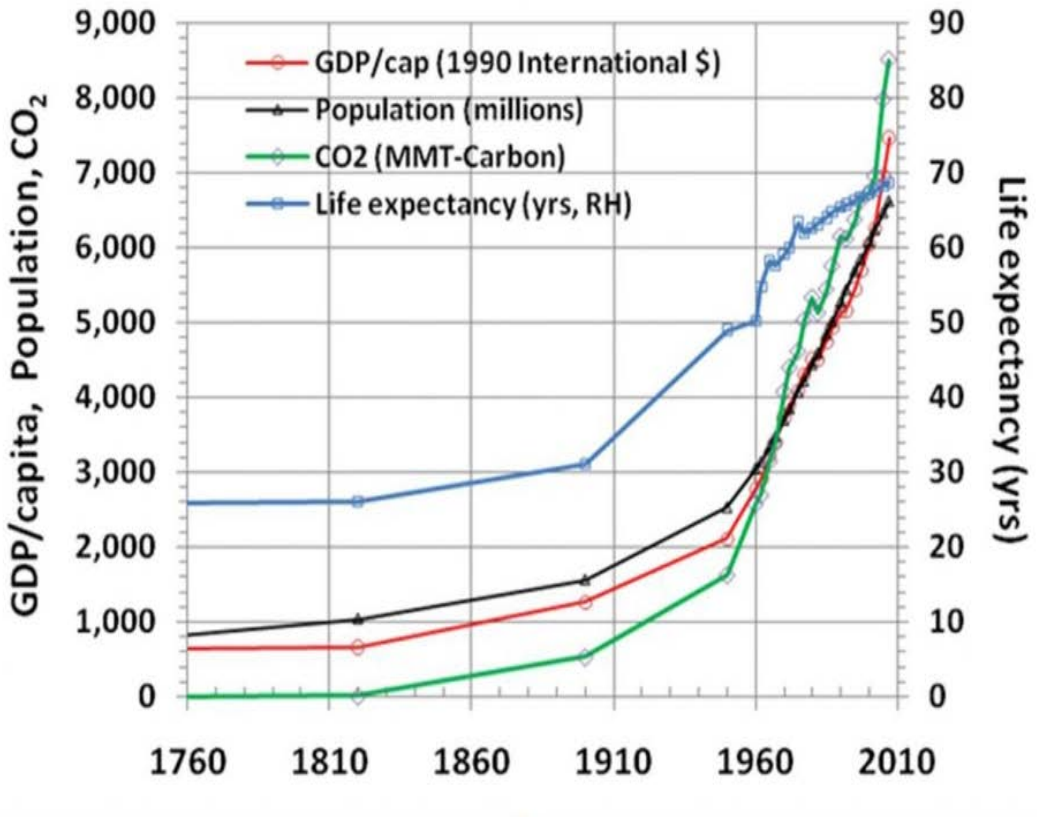


Figure 1: Global megatrends in the 21st century

Source: Oxford Martin Commission for Future Generations.

Diverse Perspectives on a Green Economy

The last half of the 20th Century: five decades of exponential growth and achievement



Innovation & scientific progress

Disease & poverty alleviation

Massive population growth

Large-scale natural resource exploitation

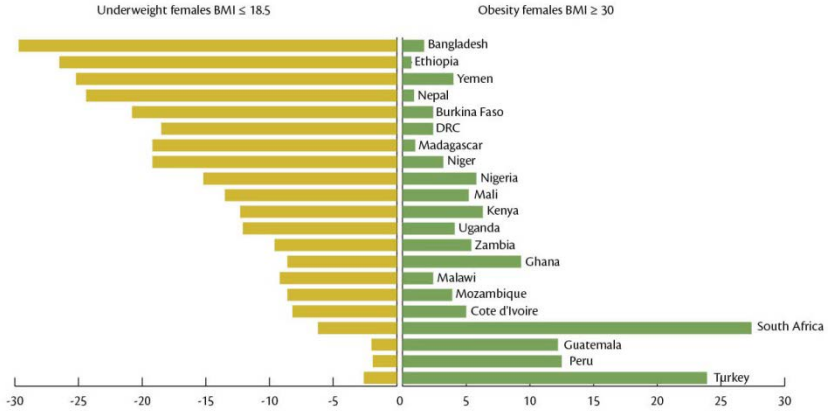
Substantial ecosystem service degradation

Acceleration of greenhouse gas emissions

Where has the 20th Century left us?

There is less poverty, but more food inequality

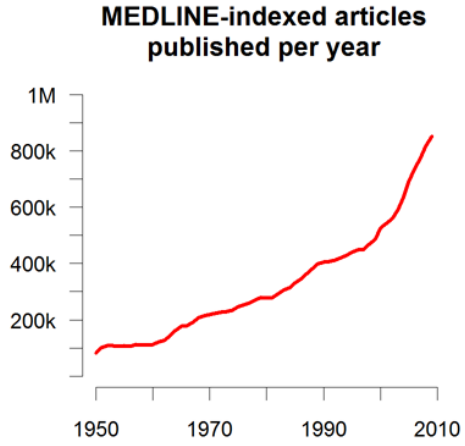
- ~1.3bn still live below the poverty line ($1.25/day)
- 1 in 4 children worldwide are stunted
- In 2008, 35% of the world population was overweight, and 29% was micronutrient deficient



Source: GloPlan, 2014

Industrialisation, globalisation and urbanisation have led to significant greenhouse gas emissions

We are more informed than ever before



There are major natural and physical resource pressures

In key ways, the early 21st Century is already determined… but at the same time the future cannot be like the past

The global community will have to contend with a number of significant challenges

Consumption will increase with prosperity

Demographic momentum:

An extra billion people by 2025

Urbanisation:

global urban:rural ratio ~55% by 2025

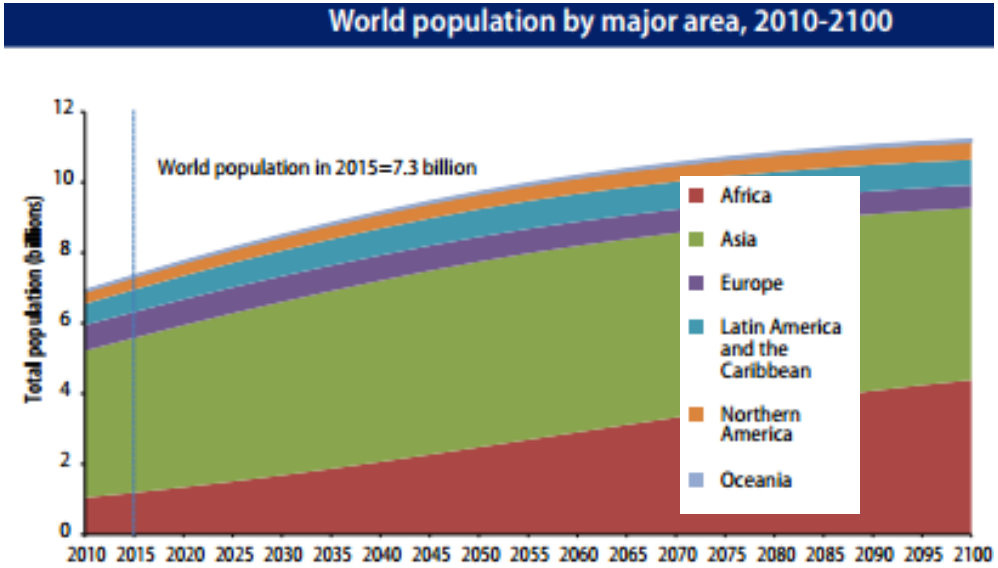
Alemao Shanty Town, Brazil

Brazil is forecast to have 90% urbanisation by 2020
33% of the world's urban population live in slums
The world's cities emit almost 80% of global CO2

Climate change:

GHG in the atmosphere now will drive changes up to 2030

Global Population Predictions



Source: World Population Prospects 2015, UN

More than half of global population growth between now and 2050 is expected to occur in Africa: of the additional 2.4bn people projected to be added to the global population between 2015 and 2030, 1.3bn will be added in Africa

Historical progression of Global Population

Total Population	Year	Interval
3 billion	1959	
4 Billion	1974	15 years
5 Billion	1987	13 years
6 Billion	1998	11 years
7 Billion	2011	13 years
8 Billion	2022	11 years
9 Billion	2040	18 years
10 Billion	2055	15 years

What does the Anthropocene look like?

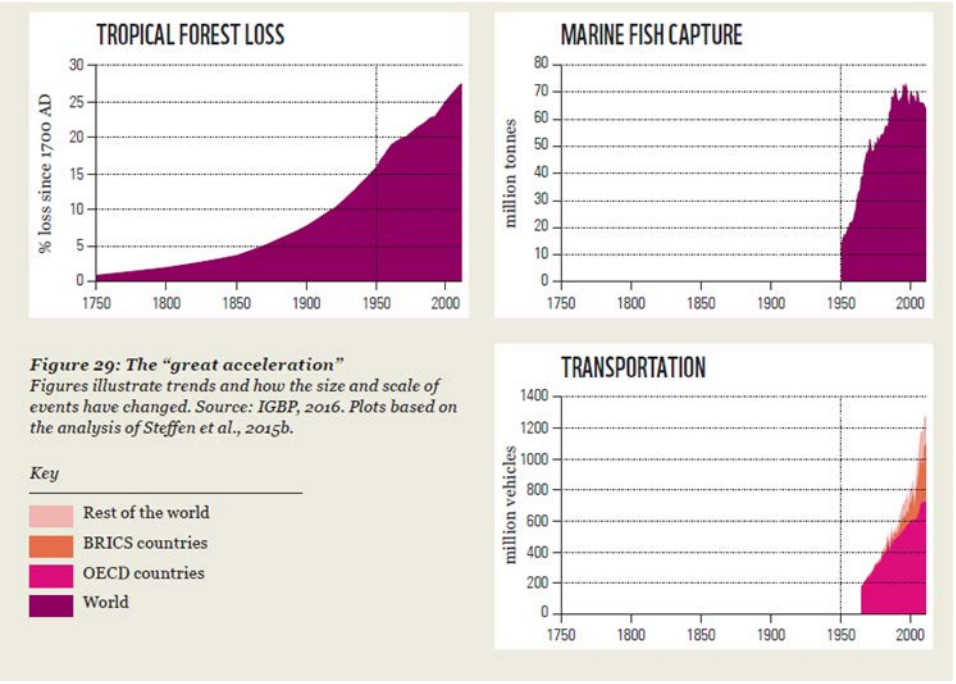
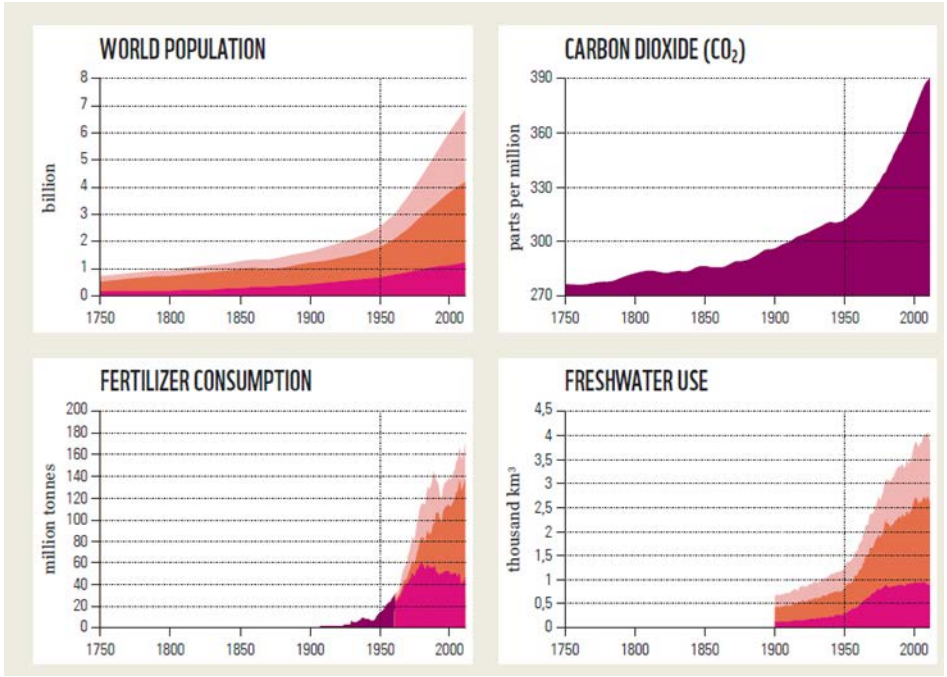


Figure 29: The "great acceleration"
Figures illustrate trends and how the size and scale of events have changed. Source: IGBP, 2016. Plots based on the analysis of Steffen et al., 2015b.

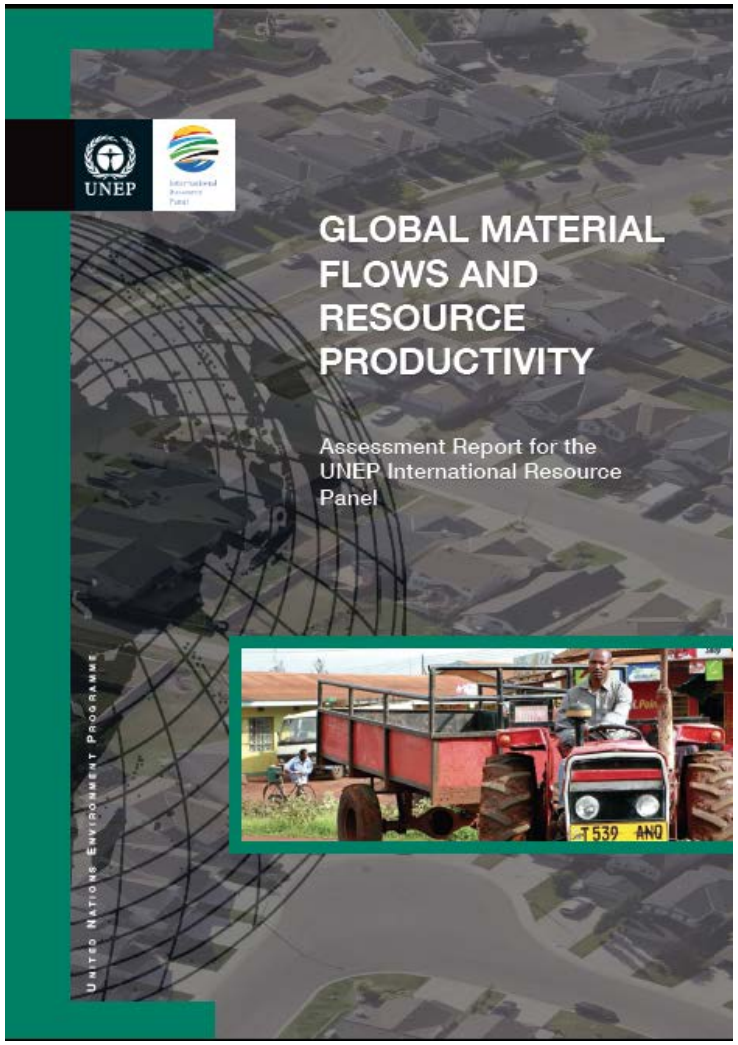
Key

- Rest of the world
- BRICS countries
- OECD countries
- World

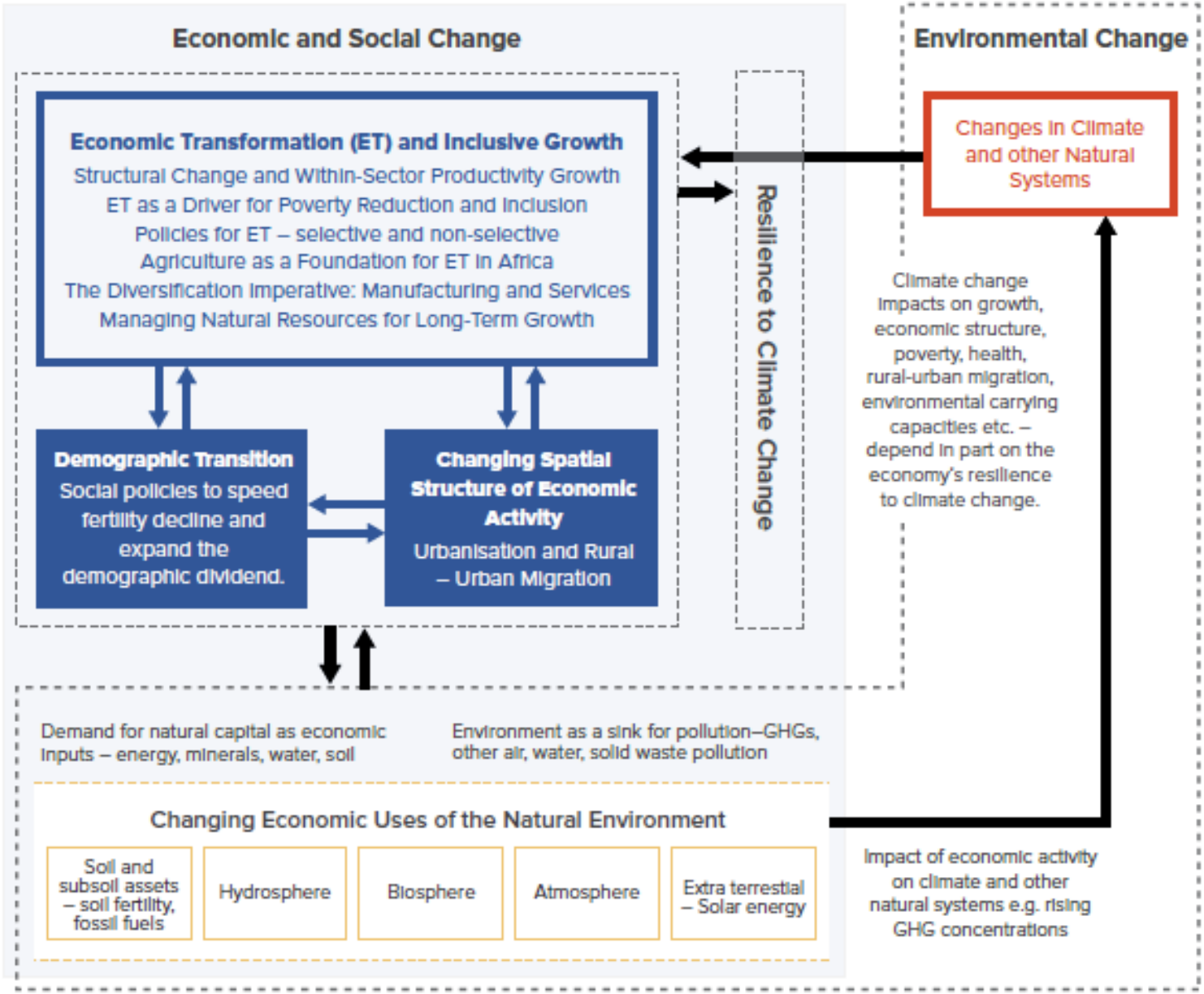


Source: Living Planet Report 2016

Global Material Flows



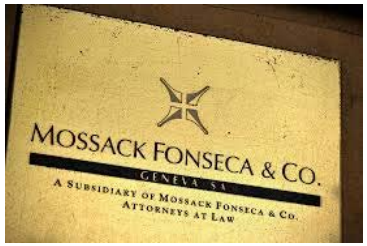
- Annual Global extraction of materials grew from 22 billion tonnes in 1970 to around 70 billion tonnes in 2010
- Growth in per capita income and consumption have been the strongest driver of growth in material use, even more important than population growth in recent decades
- If current systems of production and provision for major services will not be changed, nine billion people would require about 180 billion tonnes of materials annually by 2050, almost three times today's amounts


Economic and Social Change
Environmental Change
Economic Transformation (ET) and Inclusive Growth
Structural Change and Within-Sector Productivity Growth
ET as a Driver for Poverty Reduction and Inclusion
Policies for ET – selective and non-selective
Agriculture as a Foundation for ET in Africa
The Diversification Imperative: Manufacturing and Services
Managing Natural Resources for Long-Term Growth
Resilience to Climate Change
Changes in Climate and other Natural Systems
Climate change impacts on growth, economic structure, poverty, health, rural-urban migration, environmental carrying capacities etc. – depend in part on the economy's resilience to climate change.
Demographic Transition
Social policies to speed fertility decline and expand the demographic dividend.
Changing Spatial Structure of Economic Activity
Urbanisation and Rural – Urban Migration
Demand for natural capital as economic inputs – energy, minerals, water, soil
Environment as a sink for pollution–GHGs, other air, water, solid waste pollution
Changing Economic Uses of the Natural Environment
Soil and subsoil assets – soil fertility, fossil fuels
Hydrosphere
Biosphere
Atmosphere
Extra terrestial – Solar energy
Impact of economic activity on climate and other natural systems e.g. rising GHG concentrations

The Global 'In-Tray'

Climate change

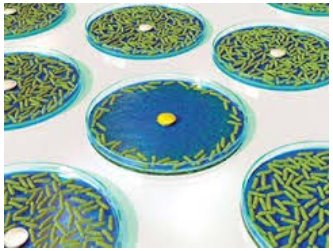
Novel biotechnologies



Inequality

Oil prices

Air pollution



Antibiotic resistance

Migrant crises

Political upheaval

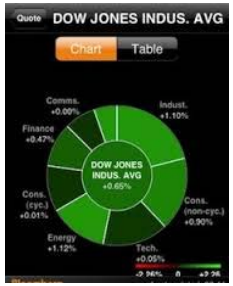
Zika virus

Nuclear proliferation

Terrorism

African famine

Cybersecurity

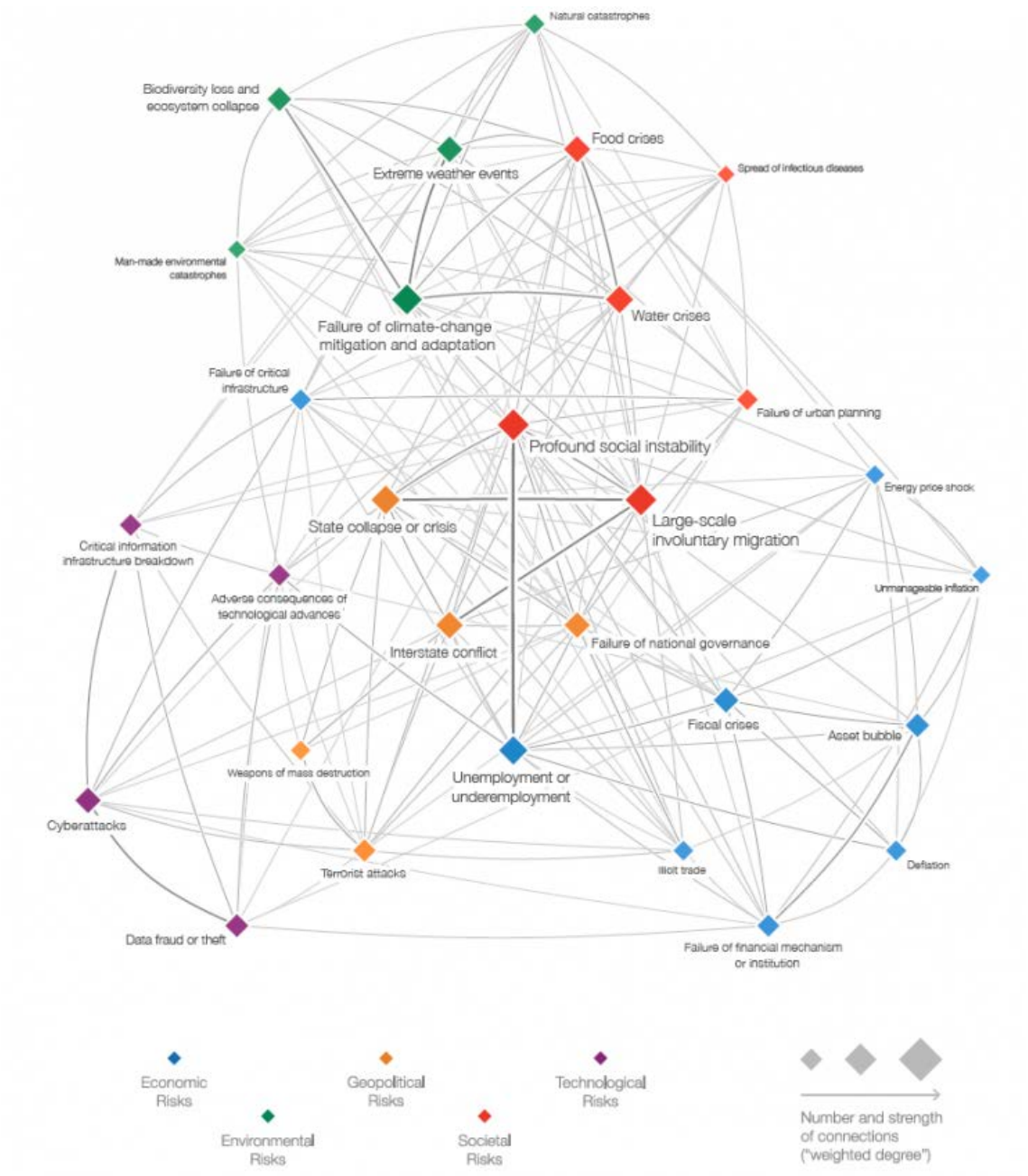


Financial Stability

Environmental disasters

There is clearly huge uncertainty…

Global Risk Interconnections



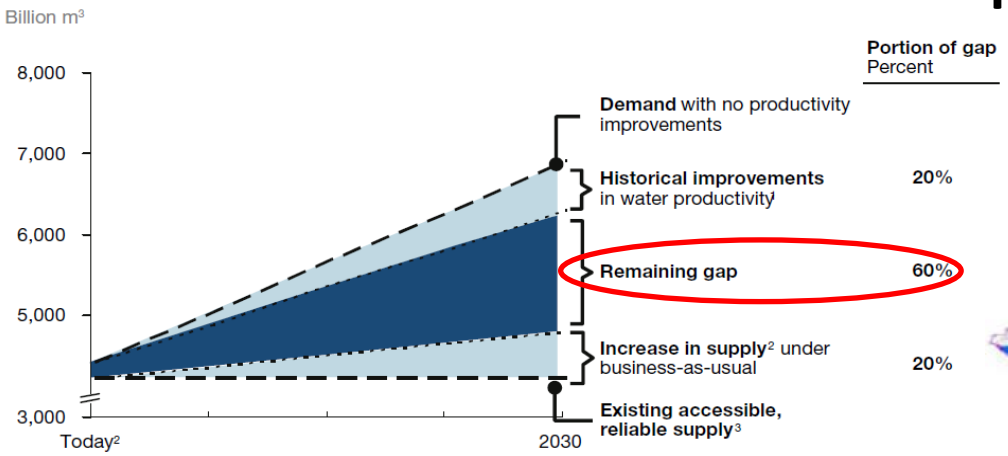
Source: WEF 2016

Green Economy Definitions

- Multiple green economy and green growth definitions have been developed, including the following:
  - UNEP: “A green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcity.” (UNEP, Green Economy Reports: A Preview, 2010, p. 4-5)
  - OECD: ”Green growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.” (Organisation for Economic Cooperation and Development (OECD), Towards Green Growth, 2011, p. 9)
  - Green Economy Coalition: “An economy that provides better quality of life for all within the ecological limits of the planet” (Green Economy Coalition: http://www.greeneconomycoalition.org/)

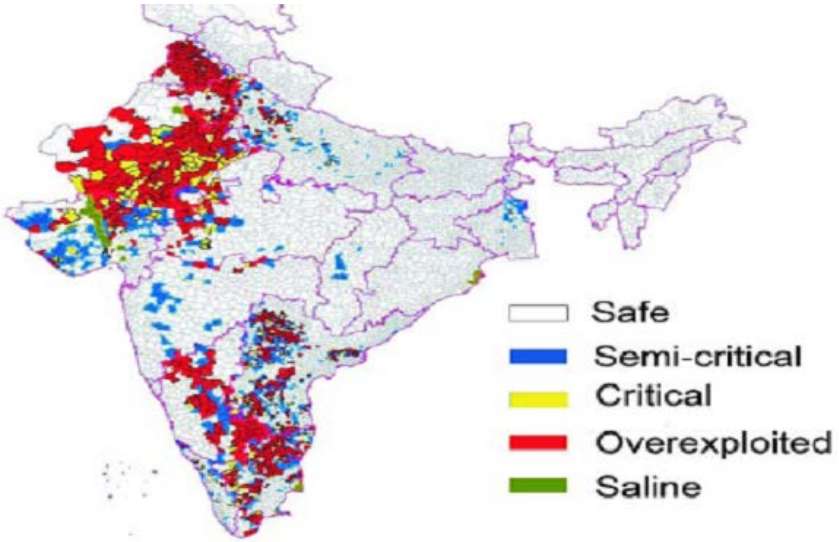

GREENER IS
THE NEW GREEN
BREWED WITH PASSION FOR QUALITY
HEINEKEN LAGER BEER
Heineken
PREMIUM QUALITY
THE ORIGINAL QUALITY
THERE'S MORE
BEHIND THE STAR
Heineken
open your world

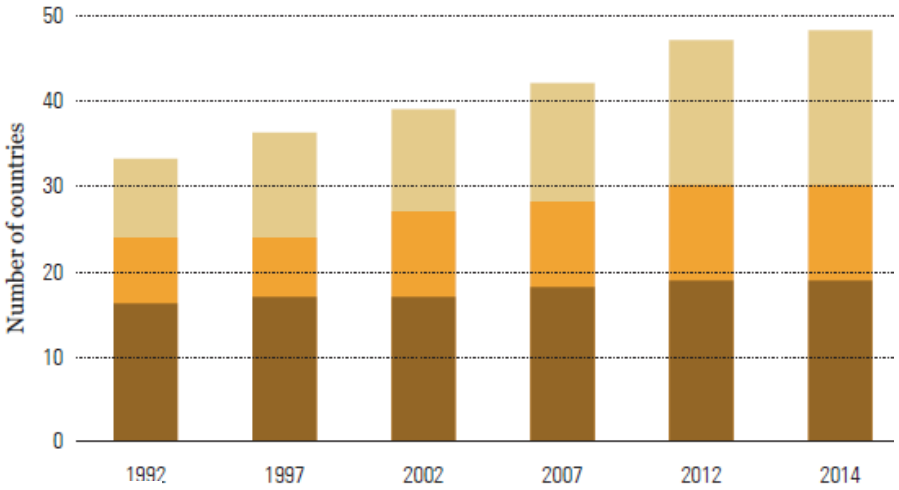
World Water Requirements



Source: 2030 Water Resources Group, 2013

Many aquifers have been over exploited in India

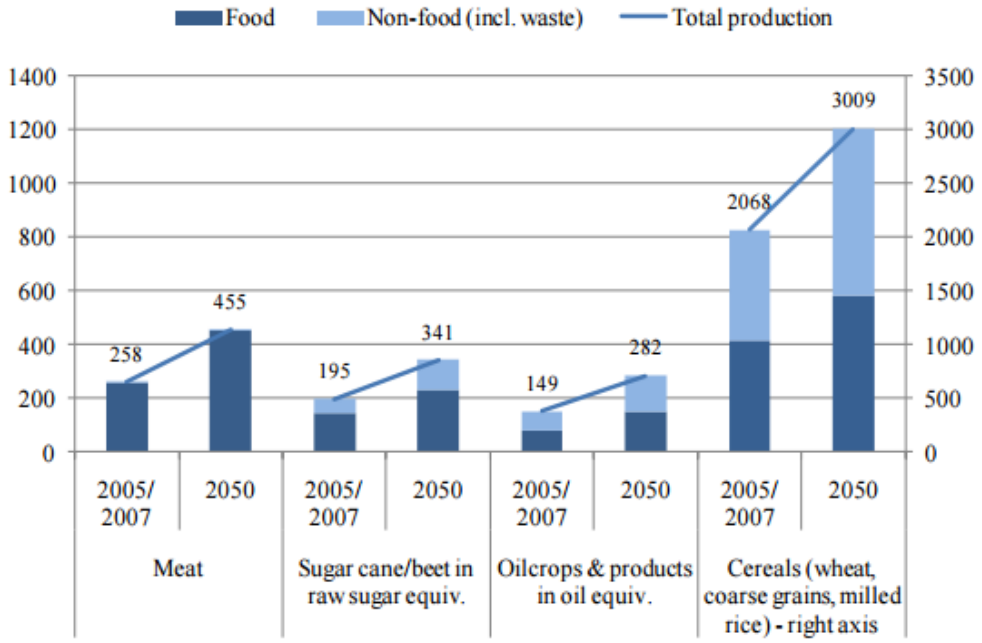




Irrigation circles in Saudi Arabia

There is a major opportunity in improving water management efficiency

World Food Requirements

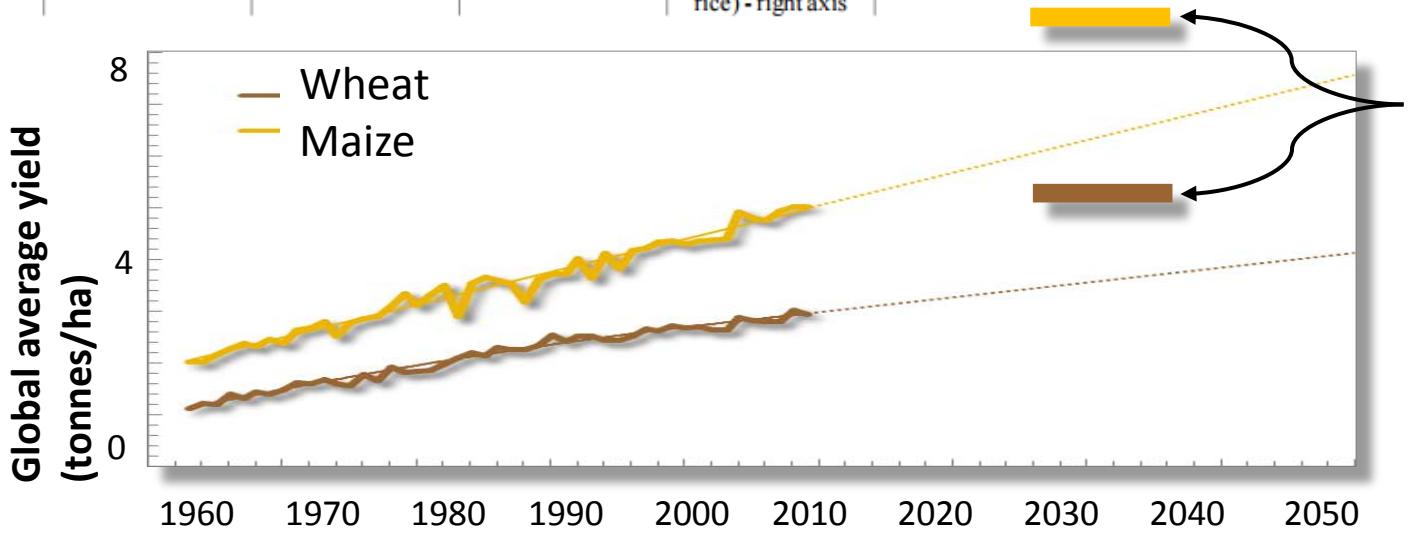


World agricultural production needs to rise by 60% by 2050 to meet demand

The world level increases in food demand are 70% determined by population growth and 30% by per capita income growth

75% of the world's food is generated from only 12 plants and 5 animal species

Source: World Agriculture Towards 2030/2050: 2012 Revision, UN

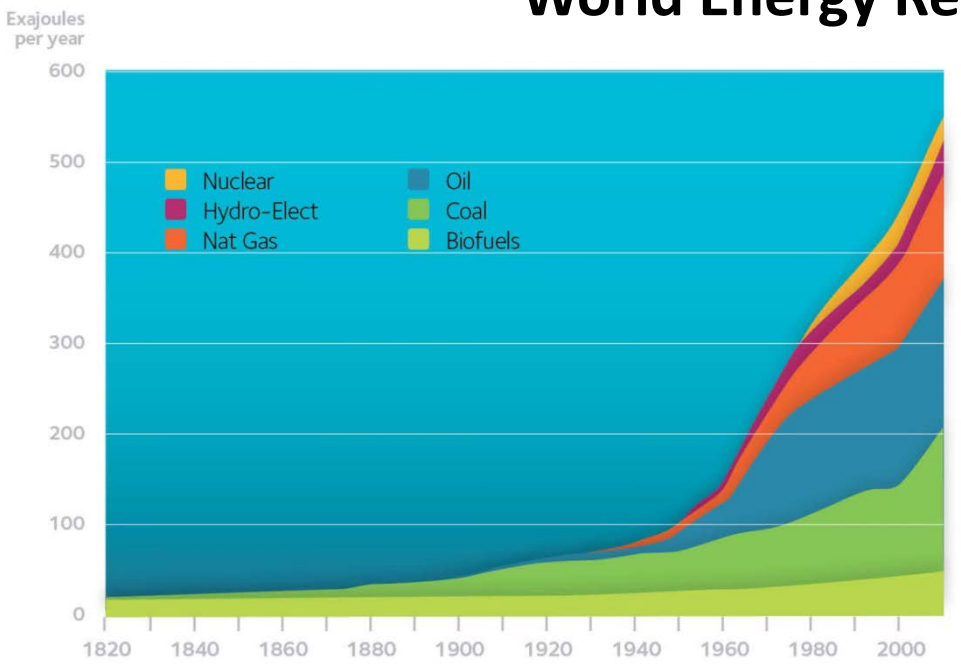


Source: USDA PDS database

Anticipated demand by 2050 (FAO)

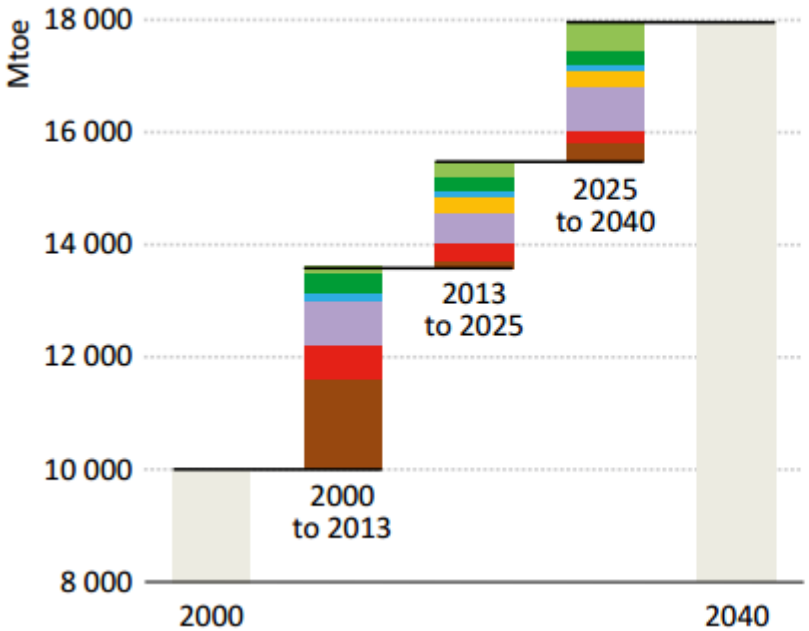
To meet projected crop needs without land use change, average crop yields would need to grow 32% *more* from 2006-2050 than they did from 1962 to 2006

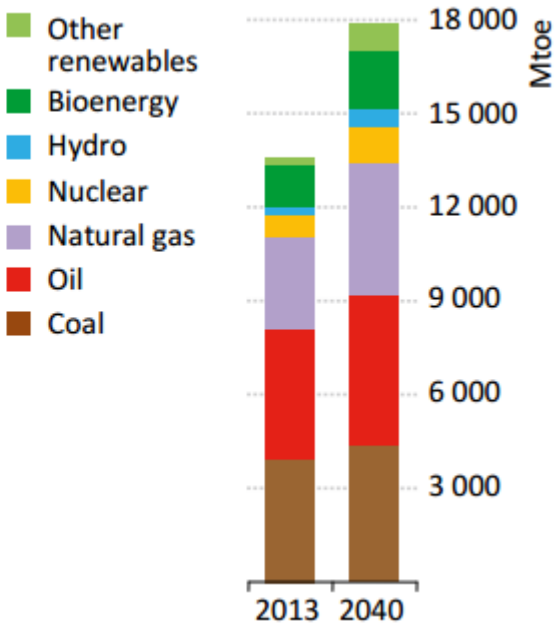
World Energy Requirements



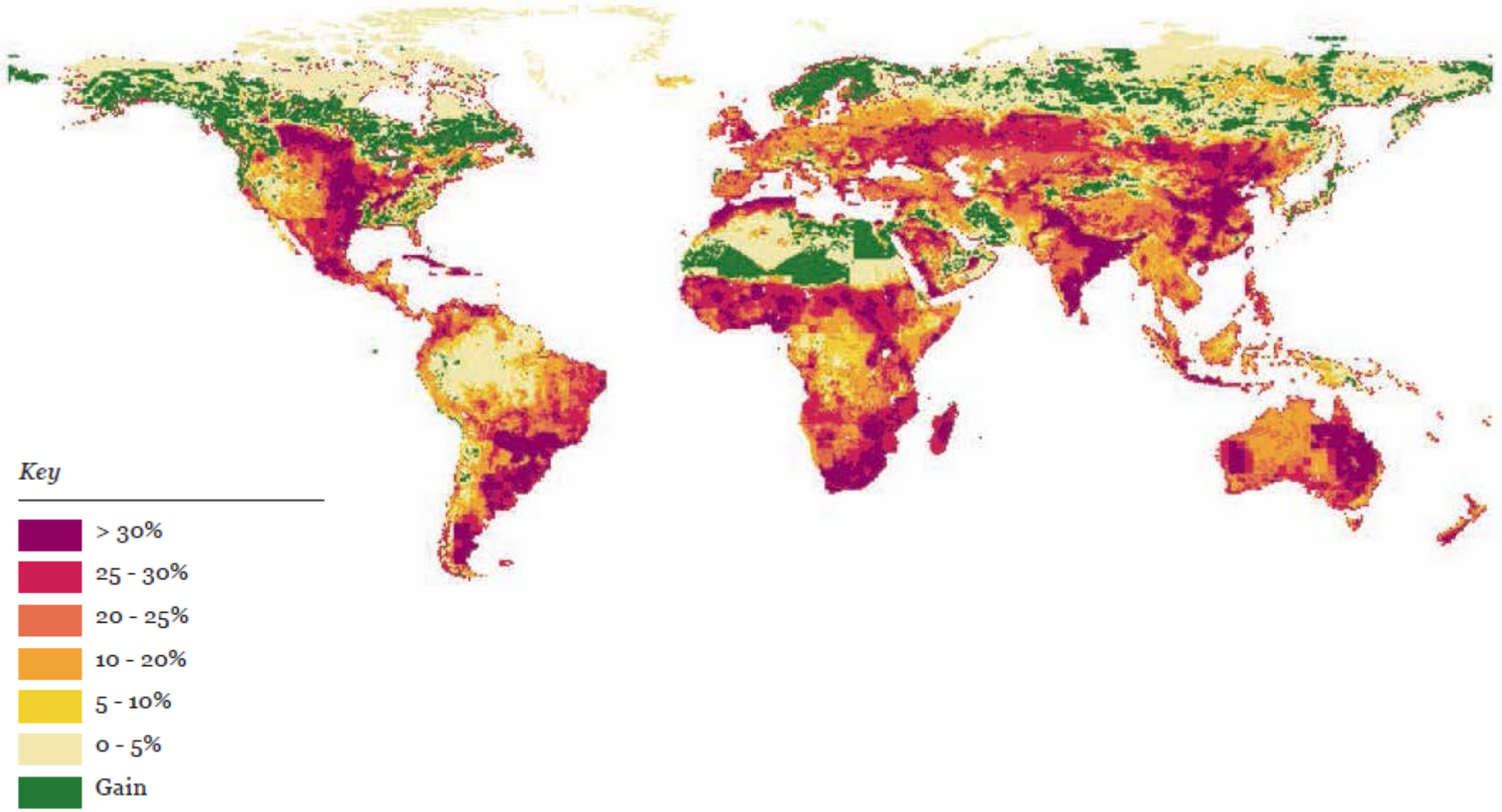
Energy demand is expected to increase by 32% by 2040, with global electricity demand growing by over 70%

Renewables are expected by the IEA to overtake coal as the largest source of electricity by the early 2030s





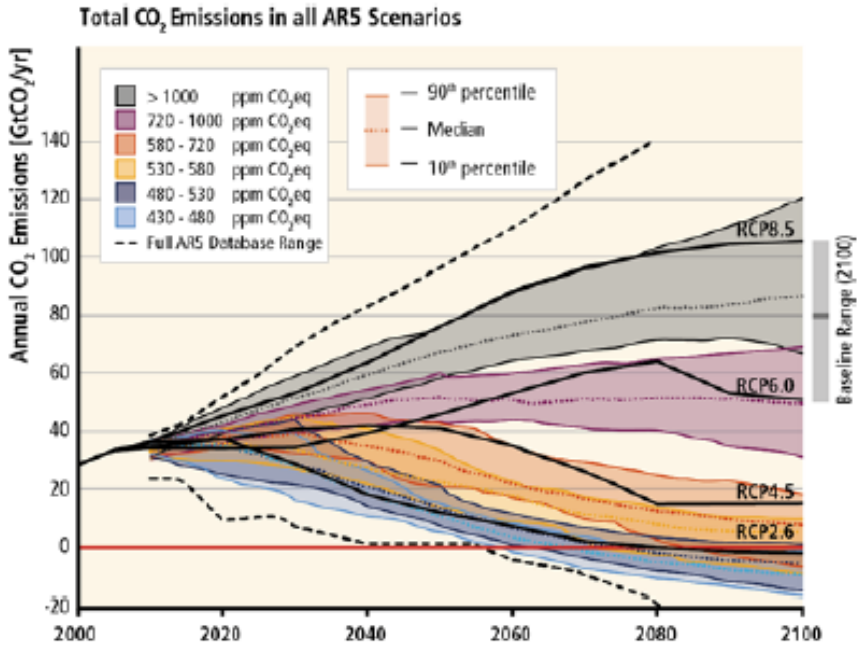
‘Business as usual’:
predicted net loss of local species richness for 2090



Source: Newbold et al, 2016

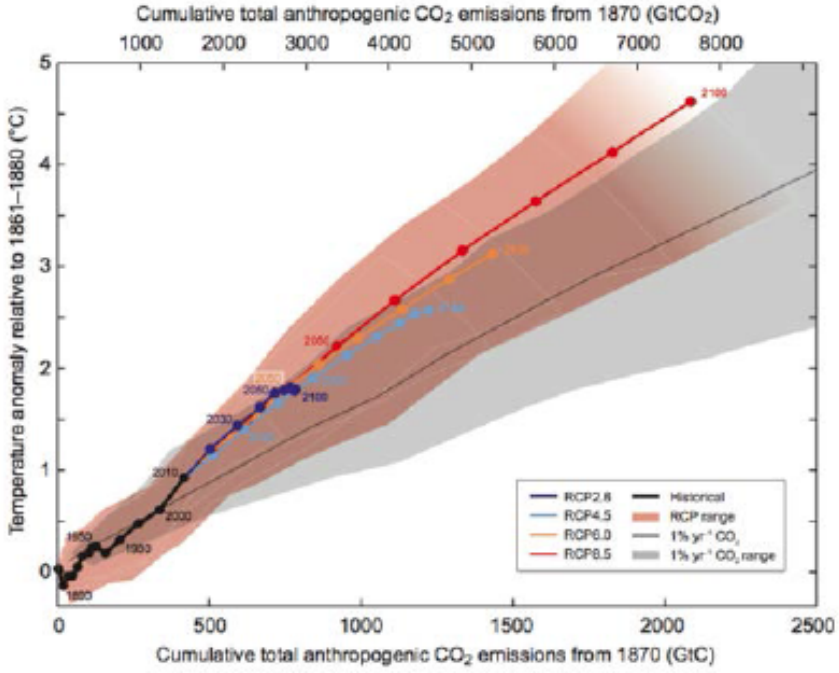
‘Business as usual’:
CO2 emissions to 2100

Figure 11. Annual CO_2 emissions under RCP scenarios



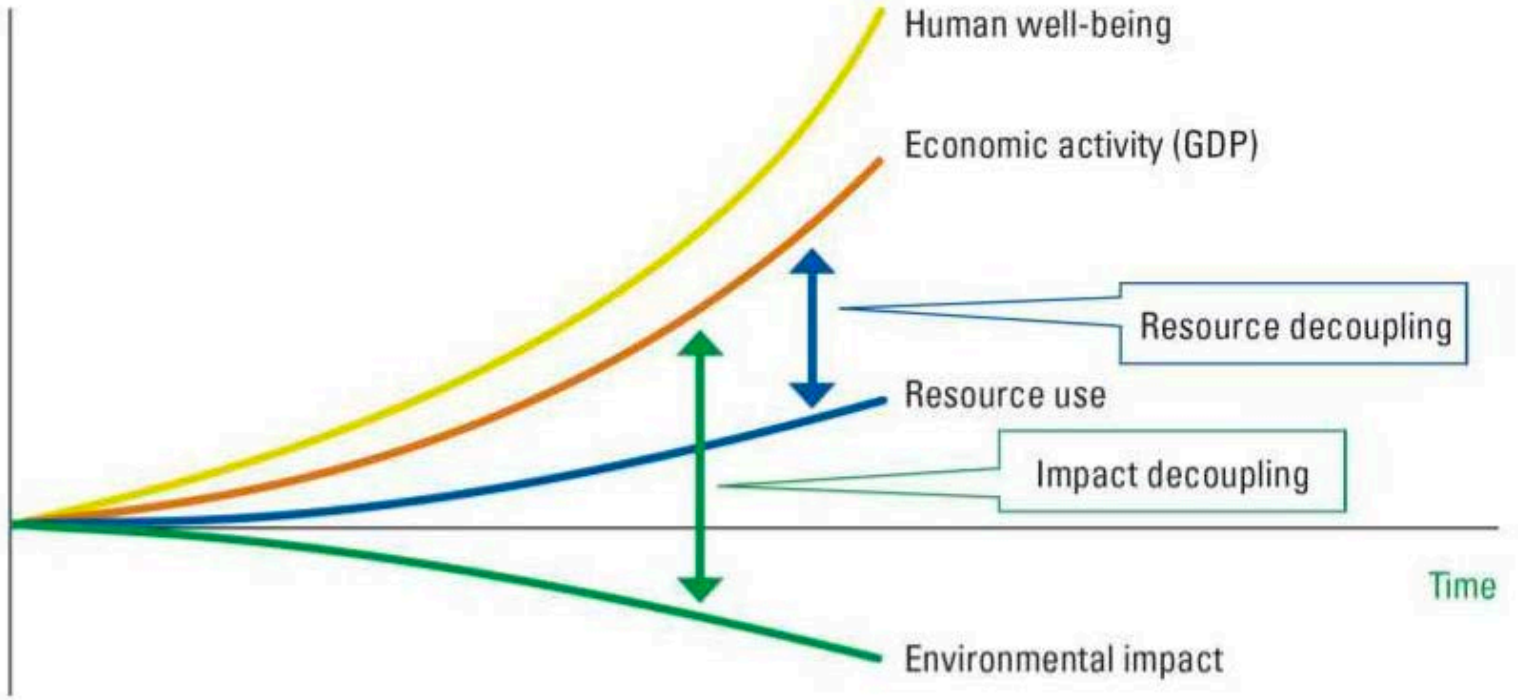
Source: Clarke et al. (2014)

Figure 12. Cumulative CO_2 emissions under RCP scenarios



Source: IPCC, 2013

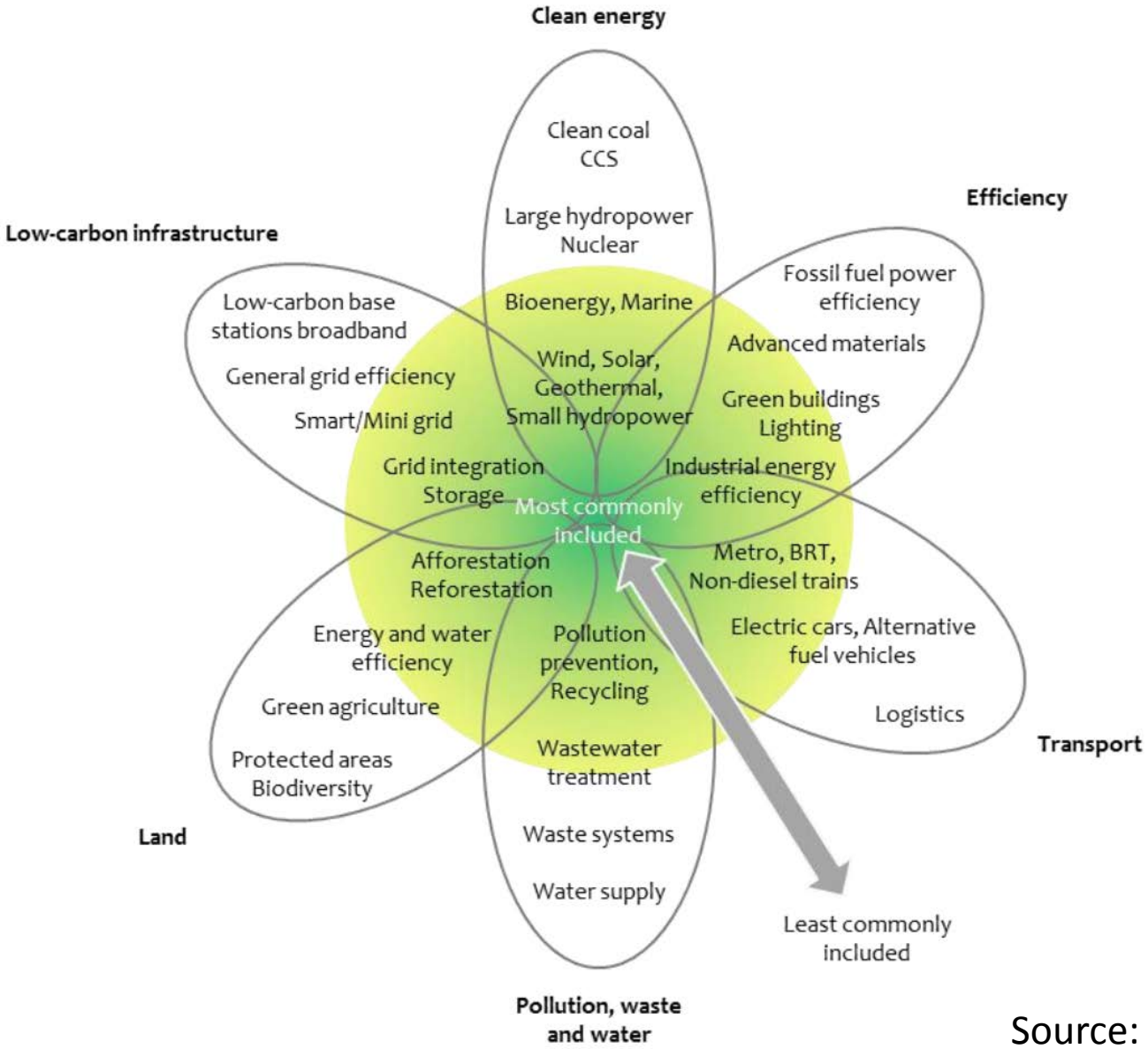
Decoupling is the imperative of modern environmental and economic policy



UNEP

International Resource Panel

The Challenge of Decarbonizing our Economy



Source: UNEP Inquiry 2016

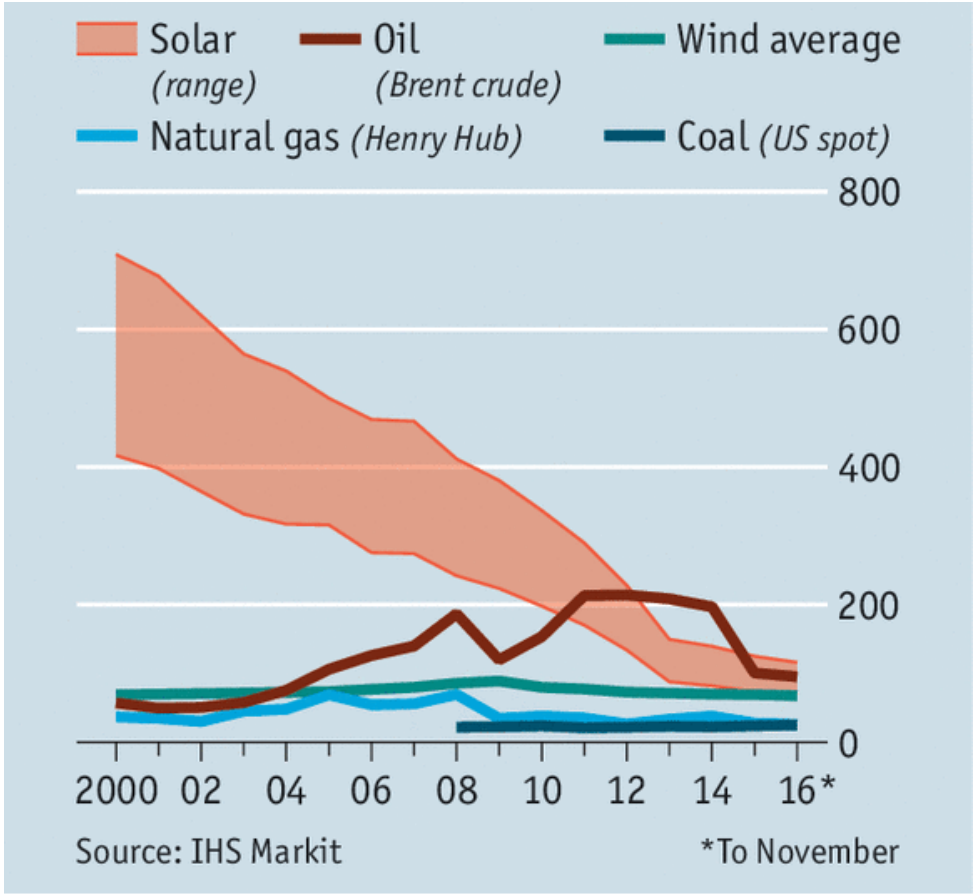
COP Paris 2015: 21 years of negotiations

- An agreement to limit temperature rises to “well below 2°C” and efforts to limit rises to 1.5°C
- A long term emissions goal to peak global emissions “as soon as possible” and to achieve ‘balance’ between emissions and sinks in the second half of the century, i.e. reaching net zero after 2050
- A legal obligation on developed countries to continue to provide climate finance to developing countries
- A five year review cycle on national targets, with ratchet mechanisms to maintain progression

188 countries have made pledges which cover 99% of global emissions and will cost an estimated $3.5trn to implement

- EU: at least a 40% reduction in greenhouse gases by 2030 compared to 1990 levels
- US: 26-28% domestic reduction in greenhouse gases by 2025 compared to 2005 levels, including the land sector & excluding international credits
- China: a peak in CO2 emissions, 20% of energy from low-carbon sources, and emissions per unit GDP cut to 60-65% of 2005 levels, all by 2030

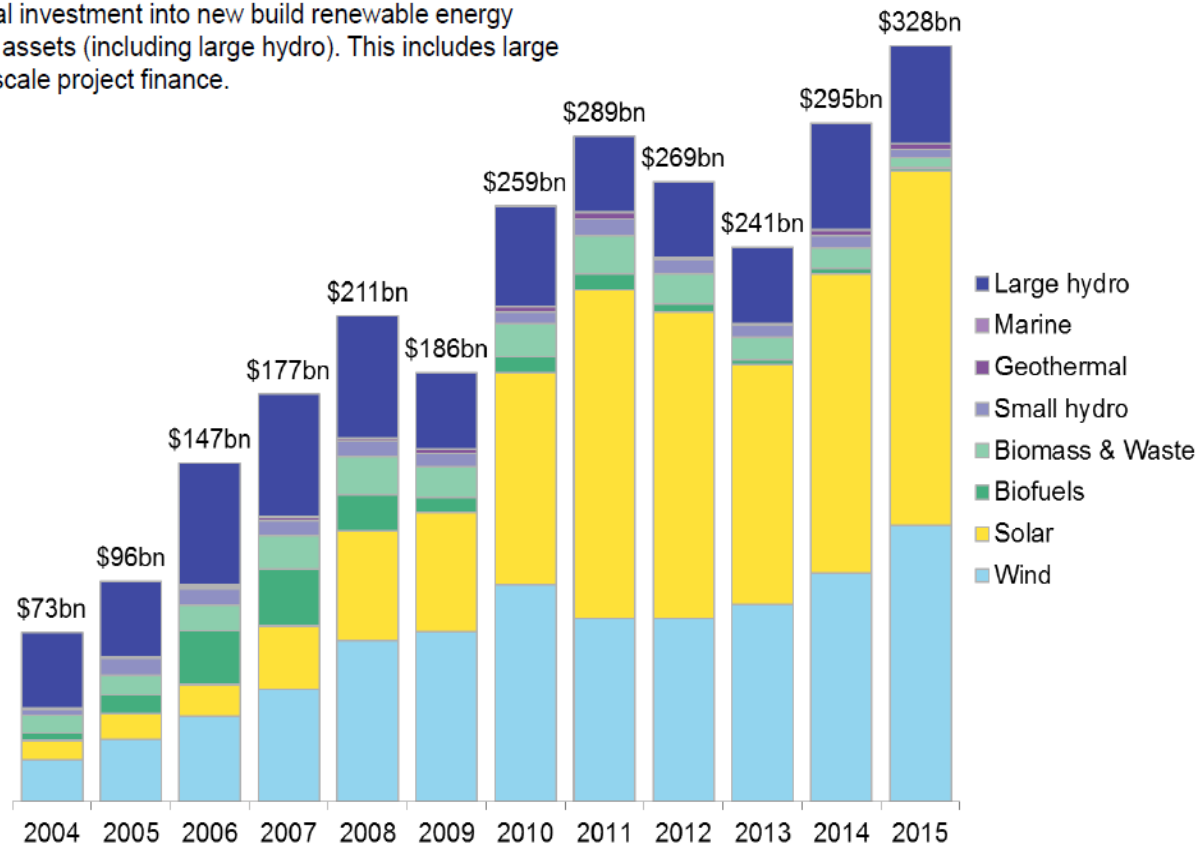
US power generation: relative costs



Economist.com

Renewable Energy Capacity Investment

- Total annual investment into new build renewable energy generating assets (including large hydro). This includes large and small scale project finance.



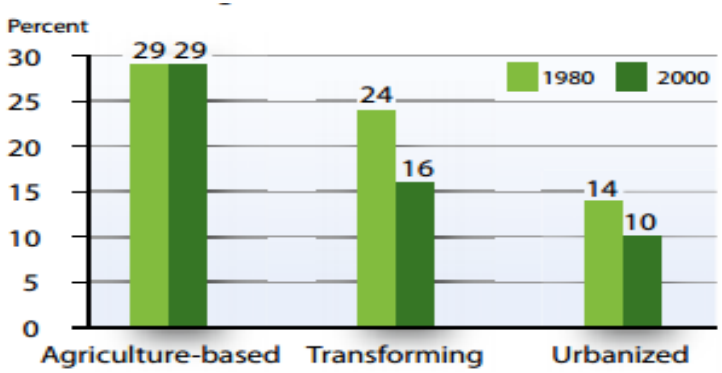
Note: Total values include estimates for undisclosed deals.

Source: Bloomberg New Energy Finance

Importance of the sector

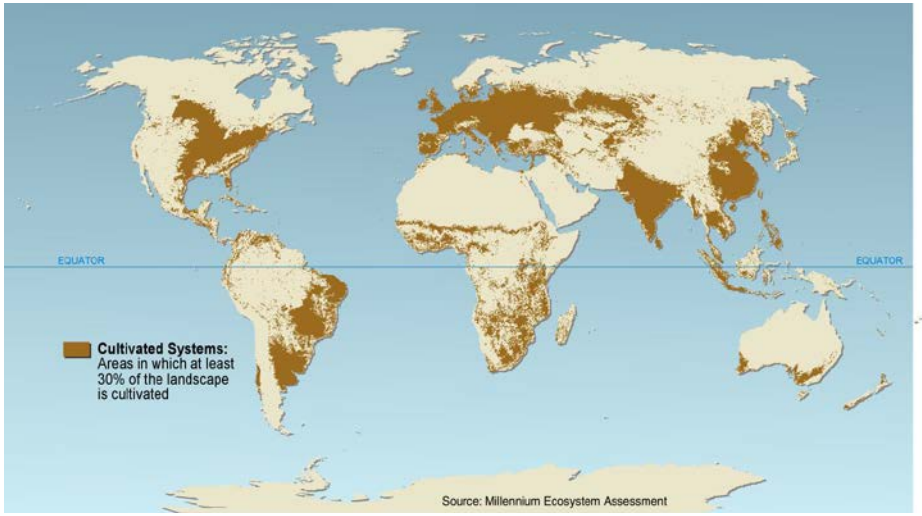
Occupation in agriculture and other sectors (billion people)

Contribution to GDP in different country groups



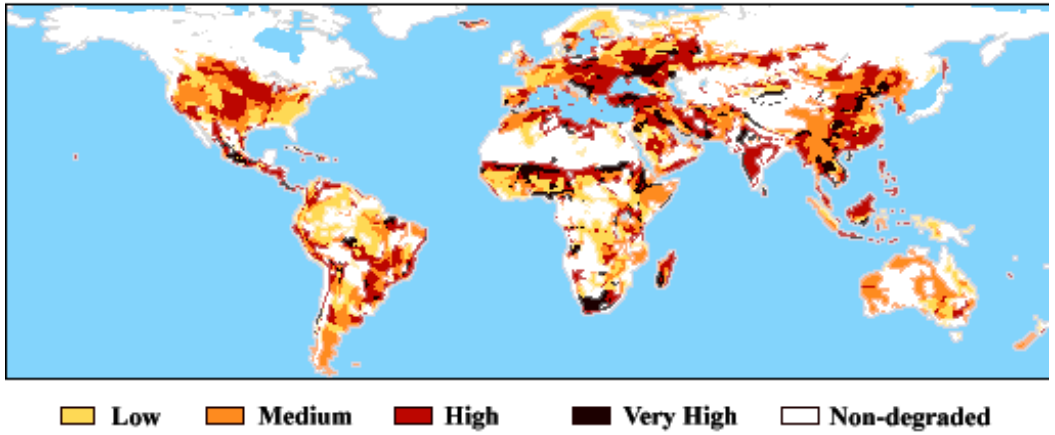
Contribution to poverty alleviation

Consequences: land use change



- More land was converted to cropland in the 30 years after 1950 than in the 150 years between 1700 and 1850
- In 2000 cultivated systems cover 25% of Earth's terrestrial surface

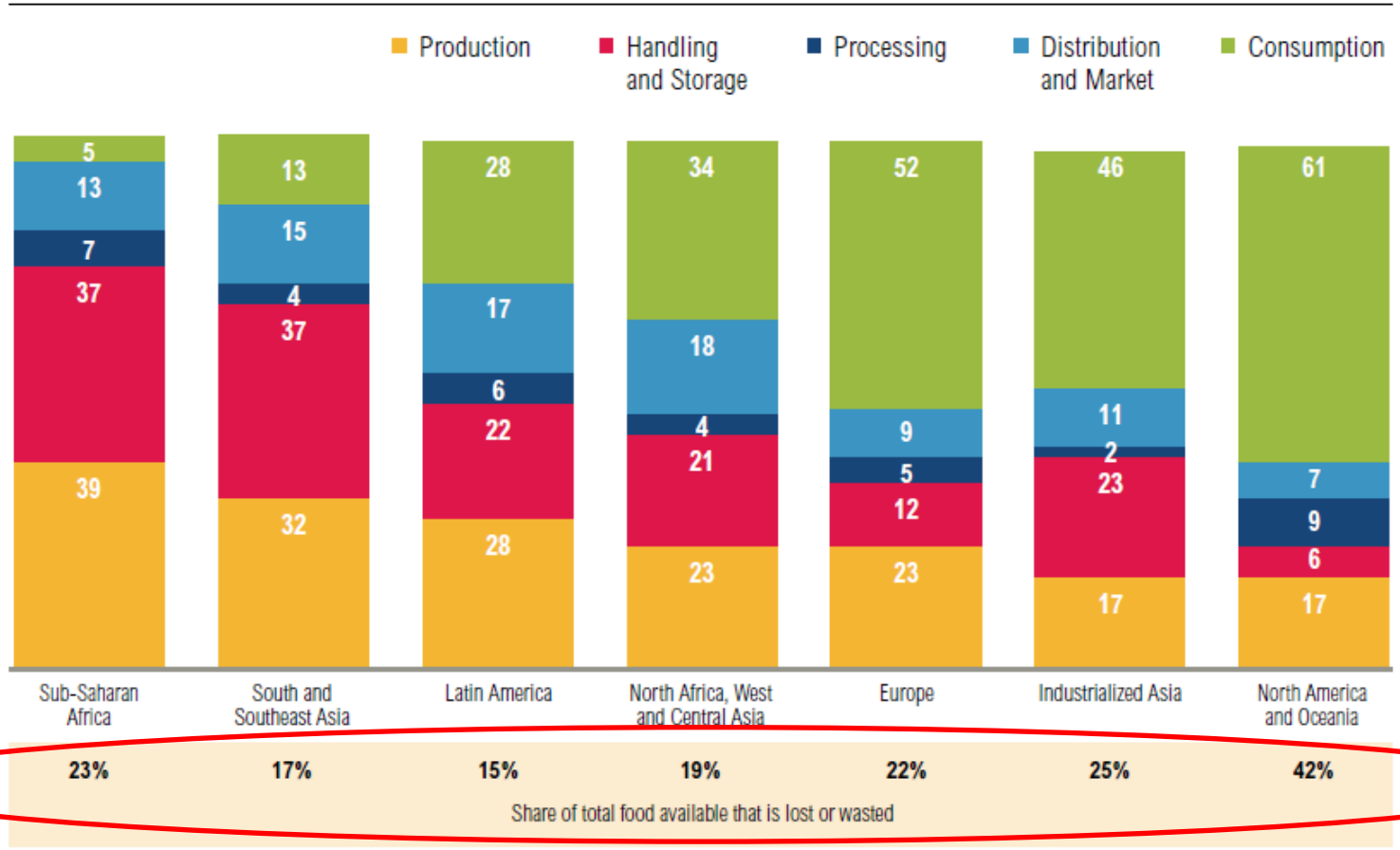
- An estimated 23% of all usable land is degraded
- 20% of the world's pasture and rangelands have been damaged
- 580m ha of forests have been degraded by logging and clearance, nearly 40% of this since 1975



Source: Millennium Ecosystem Assessment, UNEP

Food Waste

As regions get richer, the percentage of production and storage losses declines and that of consumer waste increases



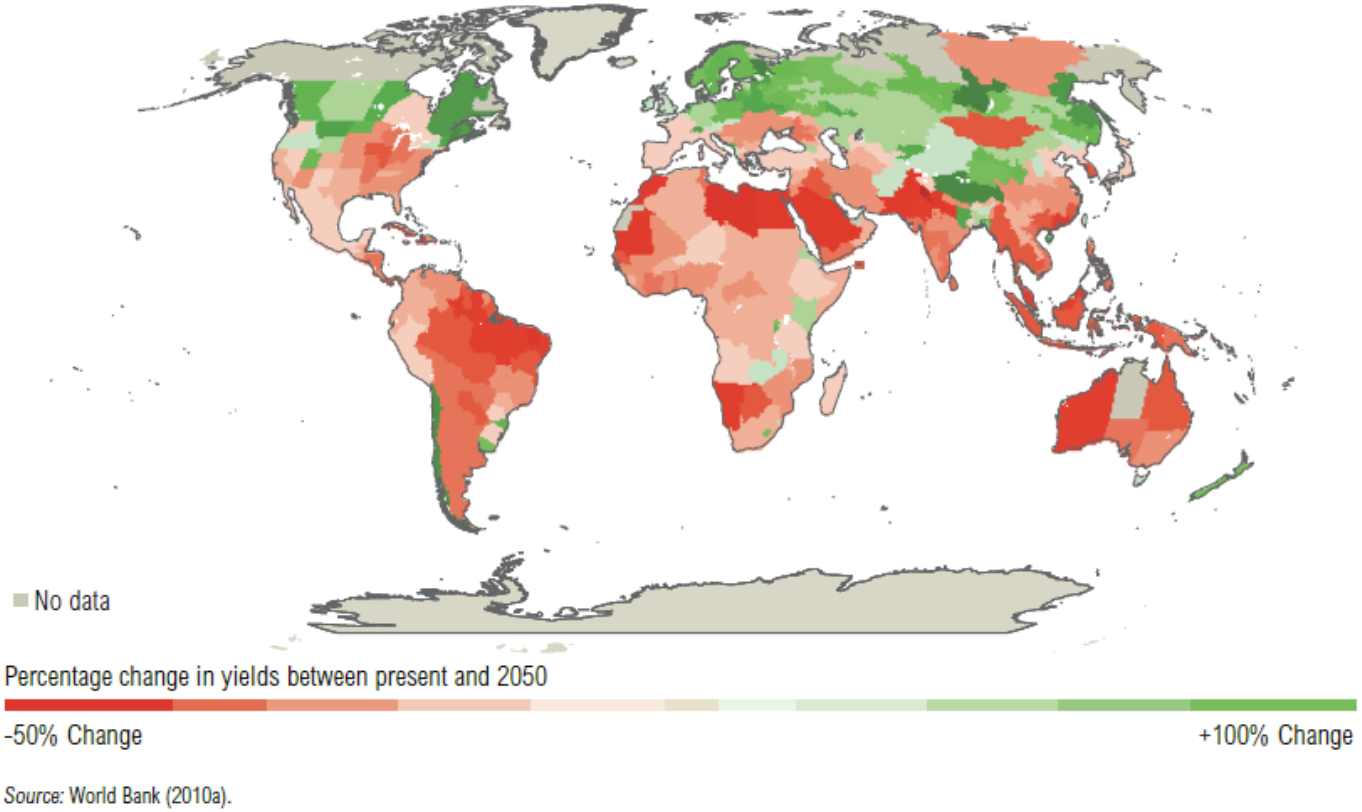
Note: Numbers may not sum to 100 due to rounding.

Source: WRI analysis based on FAO (2011d).

Agriculture and Climate Change

Agriculture accounted for ~24% of GHG emissions in 2010.

Conversely most studies now project adverse impacts on global crop yields due to climate change



Source: World Bank (2010a).

Sustainable Development Goals

The best guide of what value creation in 2030 looks like in 2016

Keeping to 2^{o}: the required financial investment

- IEA: cumulative investment of $53tn required by 2035 in the energy sector alone
- New Climate Economy: investment of $93tn by 2030 required across the whole economy
- Citi: global investment on fuel costs and capex $190.2tn by 2040 (versus a cost of inaction estimate of $192tn)

- This will not be achieved by public spending alone
- OECD government public expenditure is ~30% of GDP
- Global GDP in 2014: $78tn
- Inertia in financial institutions and markets needs to be countered

MOMENTUM IS NOT ENOUGH

TRANSFORMATIVE CHANGE NEEDED IN ECONOMY

THE GLOBAL GOALS
For Sustainable Development

- **One-third** of the world's arable land jeopardised by land degradation.
- **Half** of largest aquifers beyond sustainability tipping point.
- **17%** of the world's population lack access to electricity.

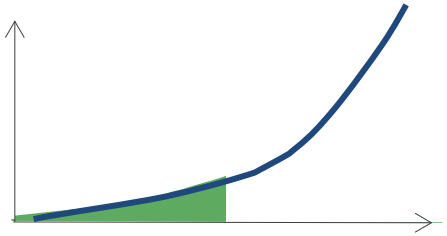
MOBILISING FINANCE IS CRITICAL

US$90

TRILLION
OVER 15 YEARS

- **US$260 billion** annual investment gap in agriculture in developing countries.
- **US$600 billion** needed in green investment in China; only 15% from public sources.

SUSTAINABLE FINANCE NEEDS TO SCALE



- **Only 5-10%** of bank loans are 'green' in countries where measured.
- **Less than 1%** of total bond issuance is made up of labelled green bonds.

"Achieving the SDGs will require mainstream finance. We need to build a new system – that delivers sustainable investment flows, based on both resilient market-based, and robust bank-based, finance."

Mark Carney, Governor, Bank of England

2016: THE QUIET REVOLUTION GETS LOUDER

FINANCIAL STABILITY BOARD: task force on climate-related financial disclosures

CHINA: adopts national policy package for transformation "Guidelines for establishing a green finance system"

GREEN BONDS: A US$694 billion investment universe

G20: "In order to support environmentally sustainable growth globally, it is necessary to scale-up green financing"

EUROPEAN UNION: *EU to develop green finance strategy*

2016

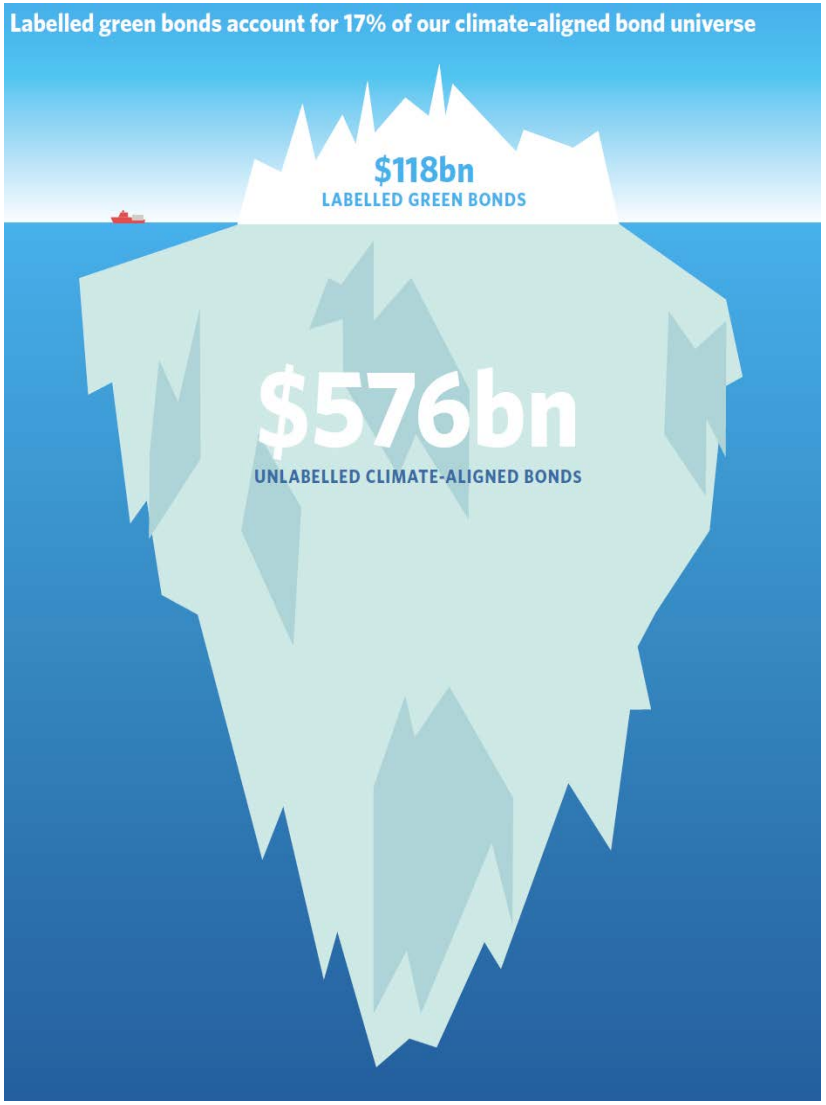
2017?

"Meeting the Paris Agreement's goals will require the full mobilization of all stakeholders, including finance. I fully support efforts to make financial flows consistent with the needed limitation of greenhouse gas emissions and the financing of climate resilient development."

Michel Sapin, Finance Minister, France

Green bonds: the iceberg

- Value of the global bond market: $90tn
- Assessed size of the climate-aligned bonds market, 2016: $694bn
- 67% related to low-carbon transport, mostly rail
- Prudential Regulation Authority: recommendation of green bonds as a climate-related investment opportunity for UK insurance firms



Source: Climate Bonds Initiative 2016

The power of corporates

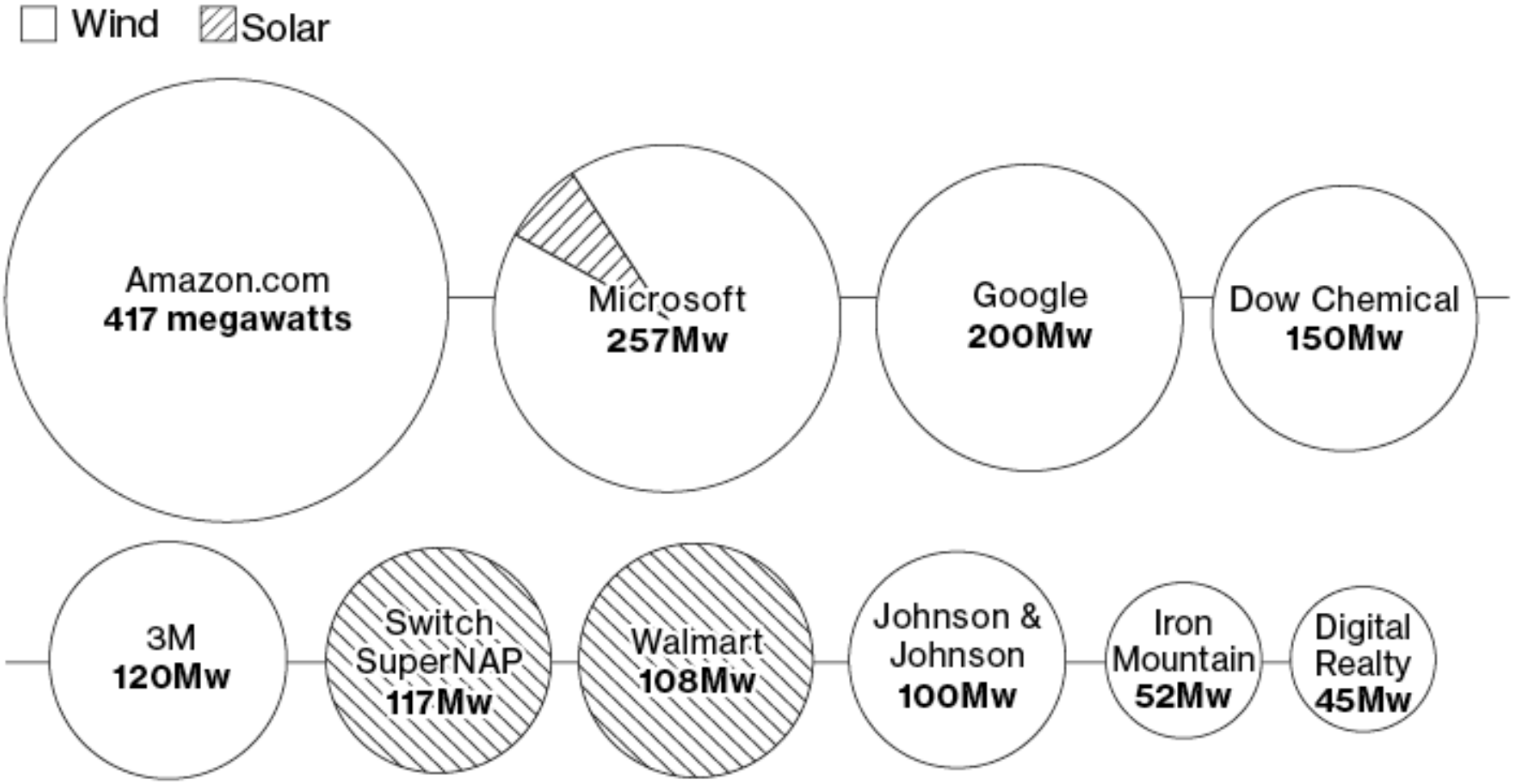
- 1000 businesses are responsible for half the total market value of the world's >60,000 publicly traded companies
- In 2010 those companies revenue was US$32tn, equal to 49% of the total world market cap
- Companies can change the world at a scale historically reserved for nations

Walmart's 2025 Sustainability Goals:

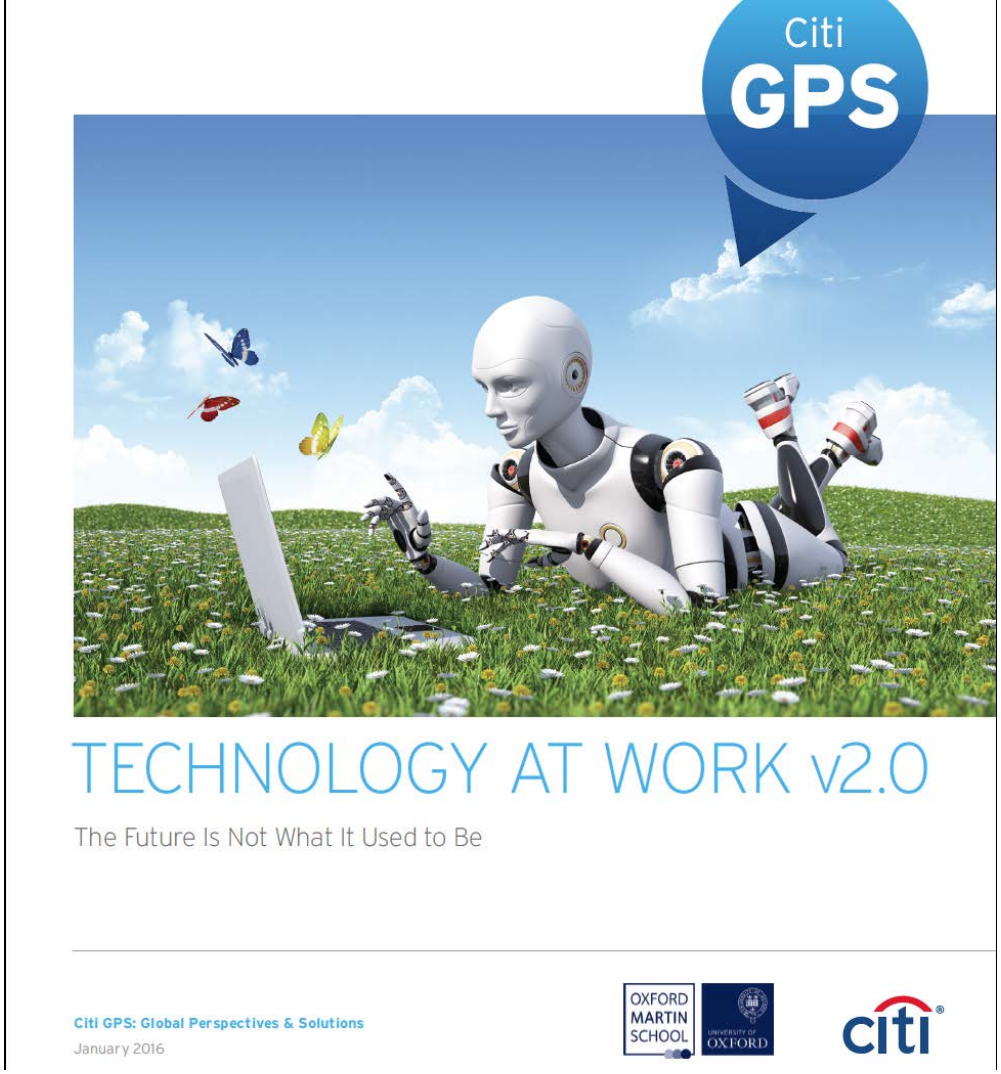
- 50% renewable energy
- 18% absolute GHG emissions reduction
- 1 Gigaton emissions reduction from suppliers
- Zero waste to landfill
- Zero net deforestation in key commodities
- 100% recyclable packaging in private brands

Greener Companies

The 10 biggest signers of renewable-energy deals in 2016



GETTY IMAGES; ENERGY CONTRACT DATA THROUGH NOV. 14;
DATA: BLOOMBERG NEW ENERGY FINANCE; GRAPHIC BY BLOOMBERG BUSINESSWEEK



- A broad range of non-routine tasks are becoming automatable
- 47% of the US workforce are deemed at risk
- E.g. Work Fusion, Google Translate, IBM's Watson
- Many service occupations (where most recent years' job growth has occurred) are now susceptible: Work Fusion (operations), Google Translate, (translation), IBM's Watson (medical diagnosis)

Automation is linked to premature de-industrialisation in emerging economies

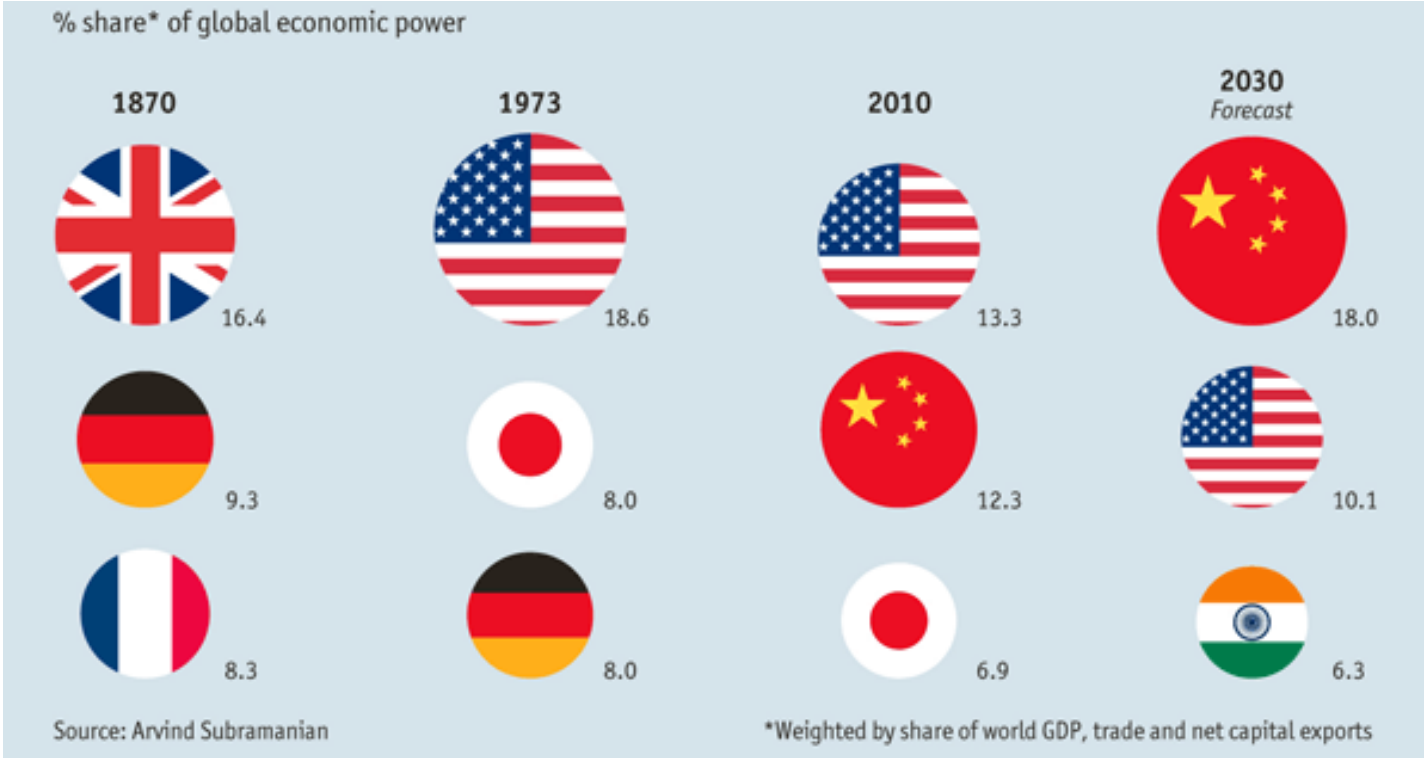
- 77% of the Chinese workforce and 69% of the Indian workforce is at risk of automation
- While emerging economies have become better at adopting new technologies, they are getting worse at putting them into widespread use.
- Manufacturing processes in low- and middle- income countries are more automated today than in the past, and manufacturing is becoming less labour-intensive
- Manufacturing employment in the UK peaked at 45% just before WW1; emerging economies like India and Brazil already seen manufacturing employment peak at 15%.

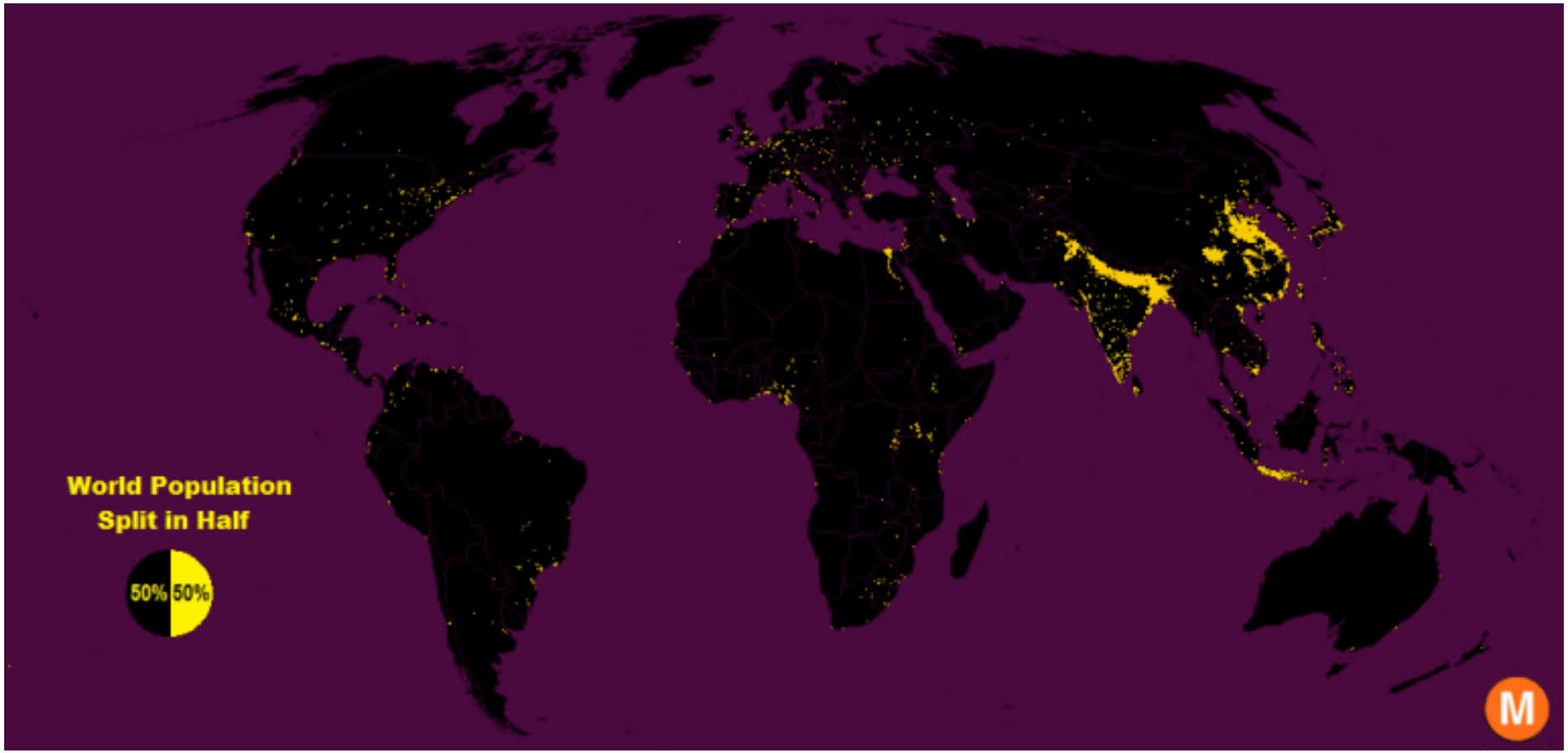
Green Jobs

- 600 million new jobs need to be created by 2030
- 15-60 million additional jobs by 2030 related to low-carbon energy and resource efficiency
- Doubling share of renewables by 2030 adds up to 29 million new jobs to current 8 million
- Sustainable farming can provide significant employment gains

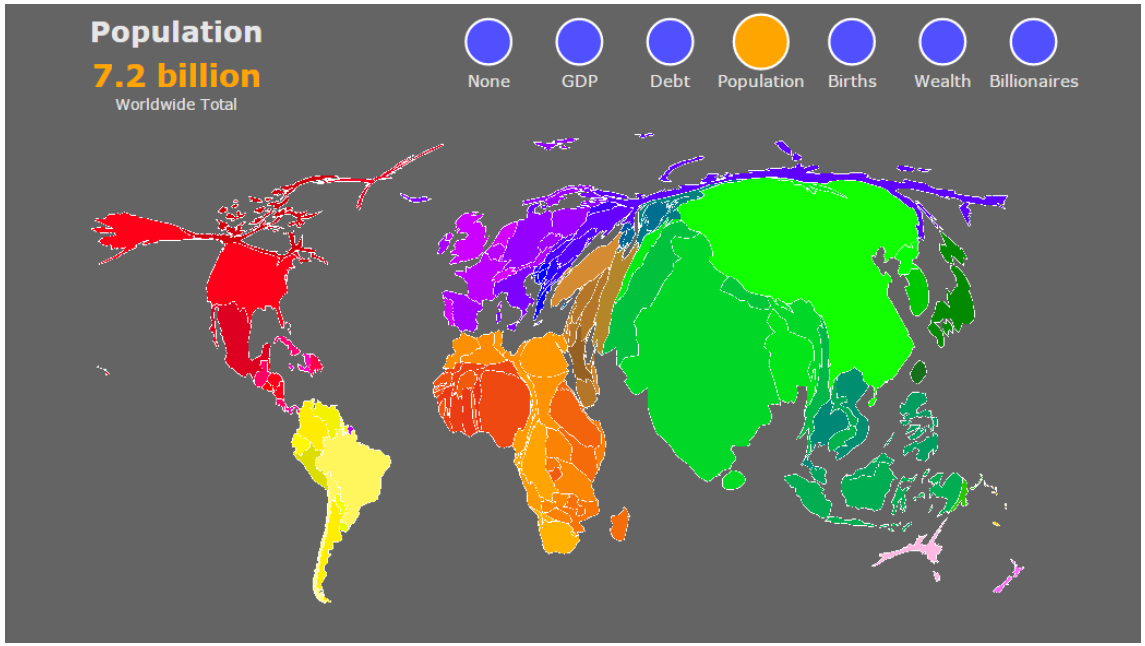
Source: ILO 2016

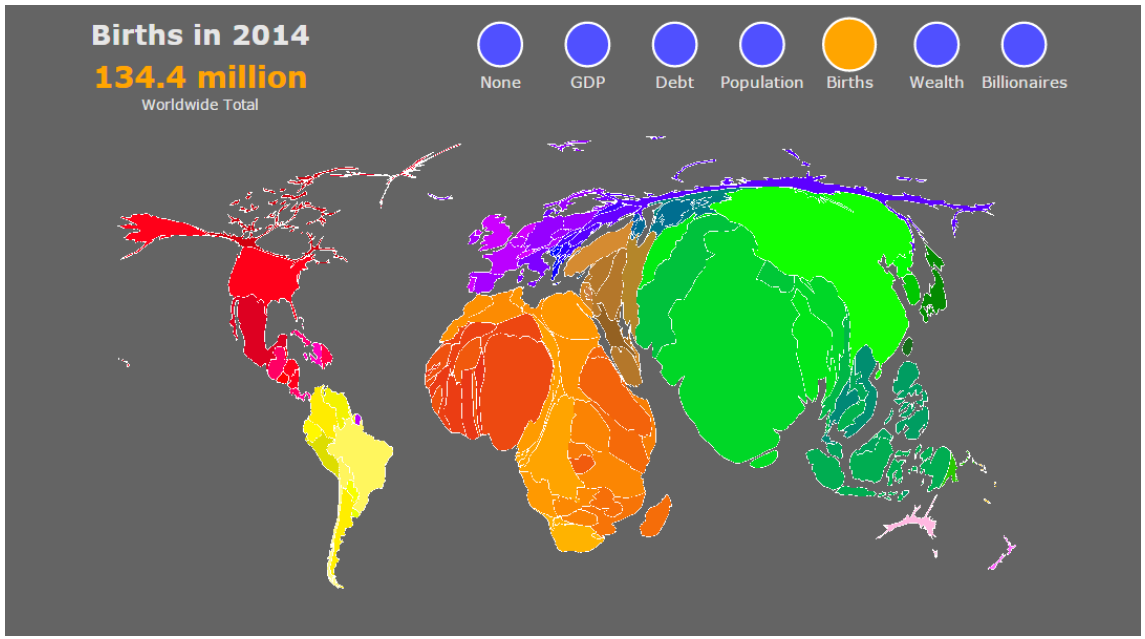
Top three countries by economic dominance





Source: www.metrocosm.com





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