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*Institute for Economic
Research on Innovation*

TSHWANE UNIVERSITY OF TECHNOLOGY

Capitalist Constraints on Sustainable Development

Rasigan Maharajh
Globelics Academy 2012 Lecture
27th August, Rio de Janeiro

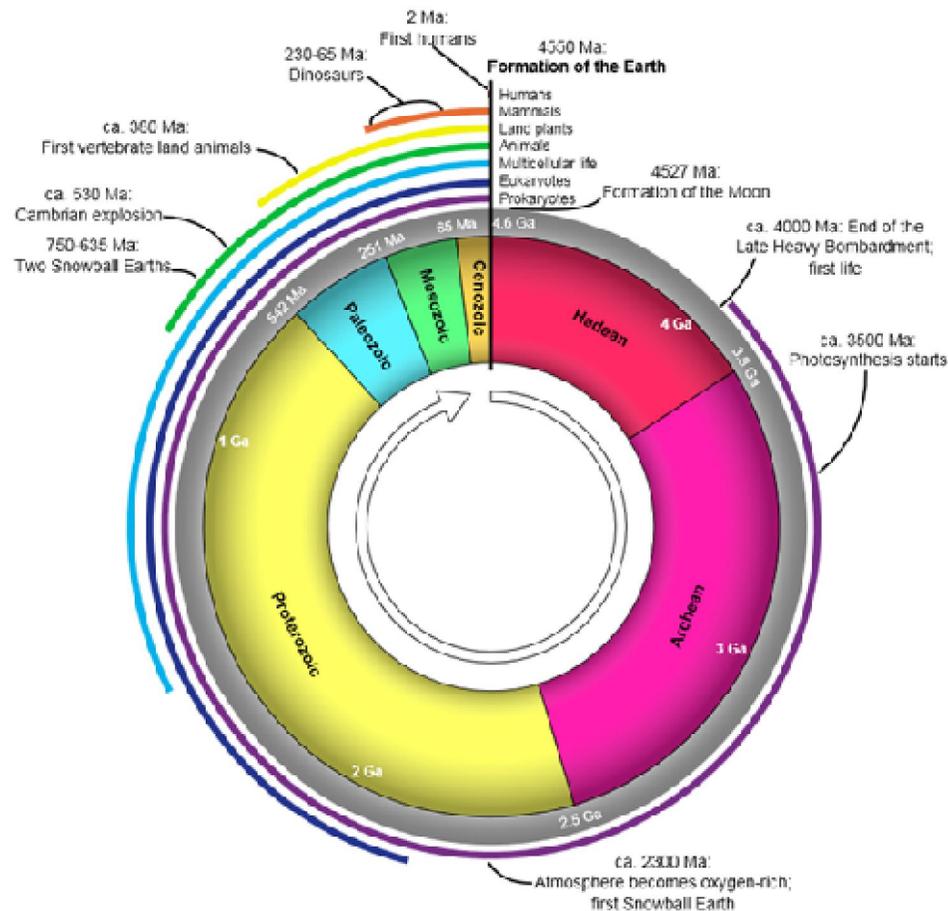
Outline of Presentation

1. Introduction
2. Contemporary Crisis's
3. Developmental Impacts
4. Emergent STI Issues

Introduction

- ❑ Concurrent crisis's all emanate from the current mode of production and consumption, waste, and environmental degradation
- ❑ Accelerated distribution through neo-liberal globalisation
- ❑ Hegemonic World System, Unilateralism & State violence
- ❑ *“the issue is not what will magically solve the immediate dilemmas of our world-system but the basis on which we shall create the successor world-system”*
 - ❑ Wallerstein (2005)

Longer history



- ❑ Long geological timescales
- ❑ Evolutionary change punctuated by revolutionary transformations:
- ❑ Palaeolithic –
Neolithic – Urban-
Industrial – GREEN
- ...

Long history

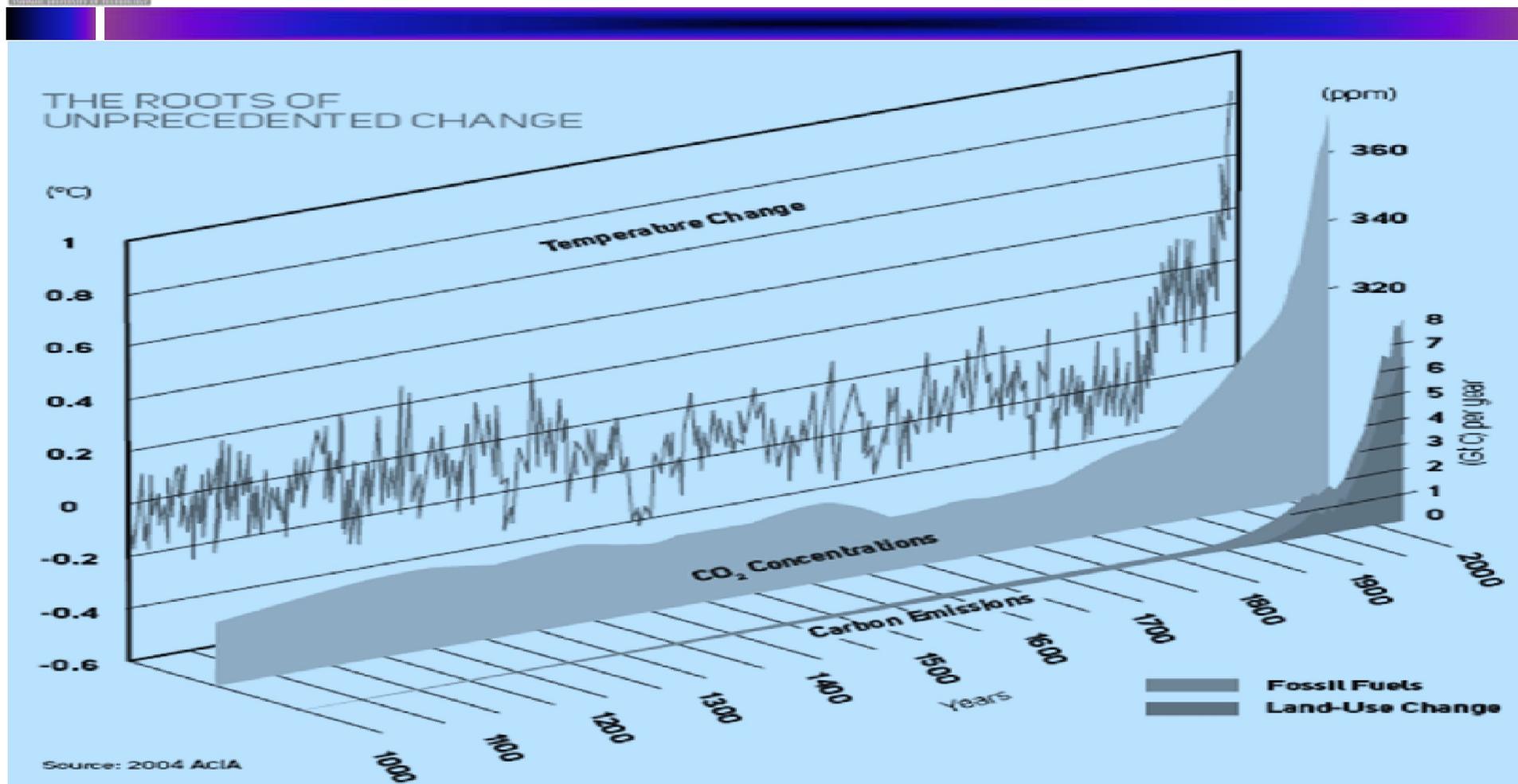
Cultural history

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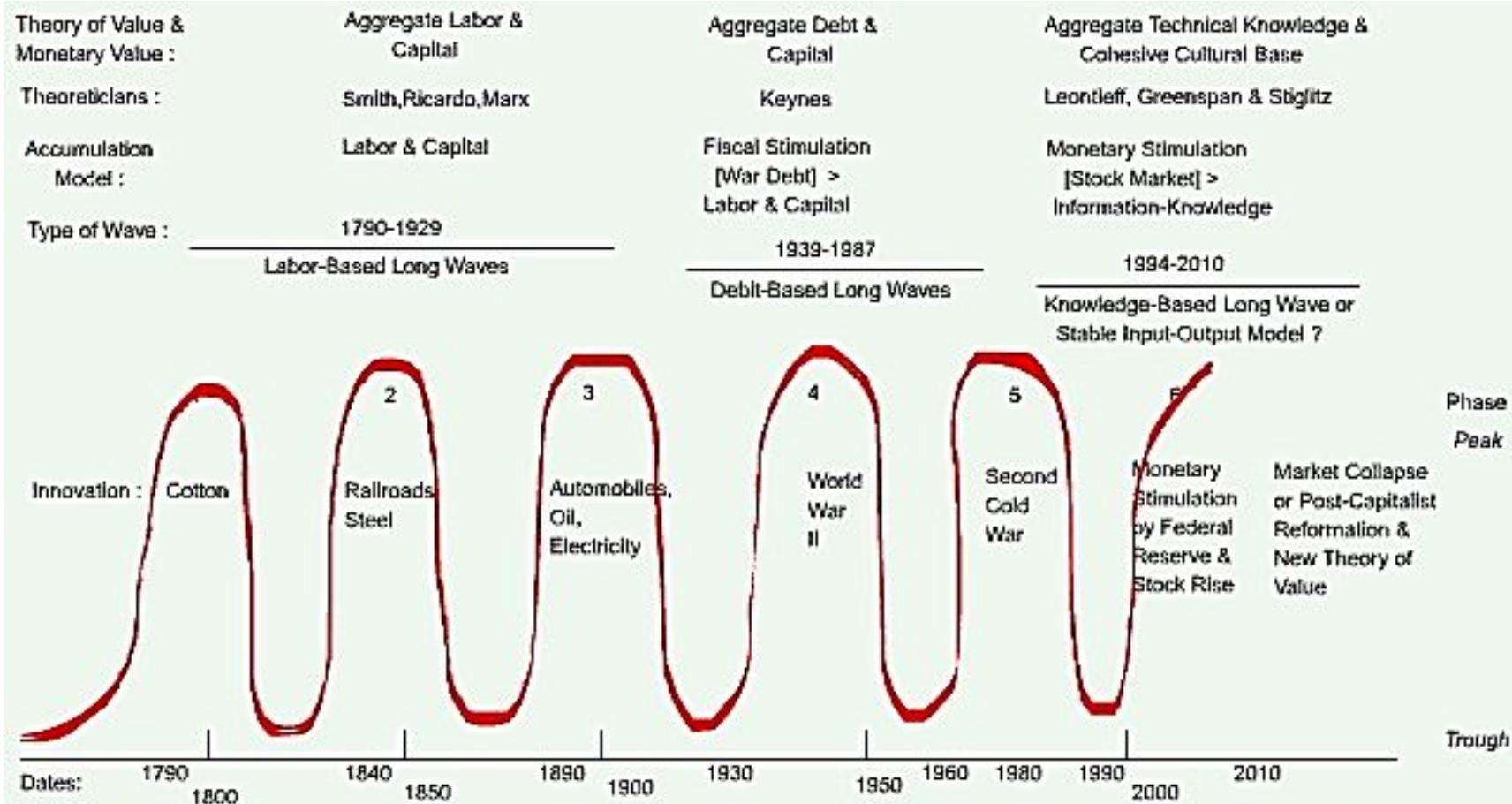
The demands of complex technology may have pushed human culture to accelerate, though it seems to have evolved not steadily but in leaps and bounds



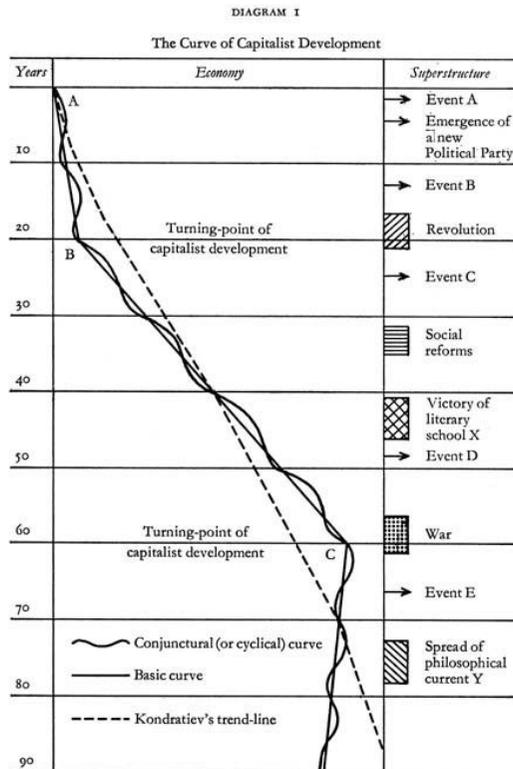
Contemporary Global Dynamics



Kondratieff waves



Waves, TEPs & Hegemony



SOURCE: L. D. Trotsky, 'O krivoi kapitalisticheskovo razvitya', in *Vestnik Sotsialisticheskoi Akademii*, No. 4, April-July 1923.

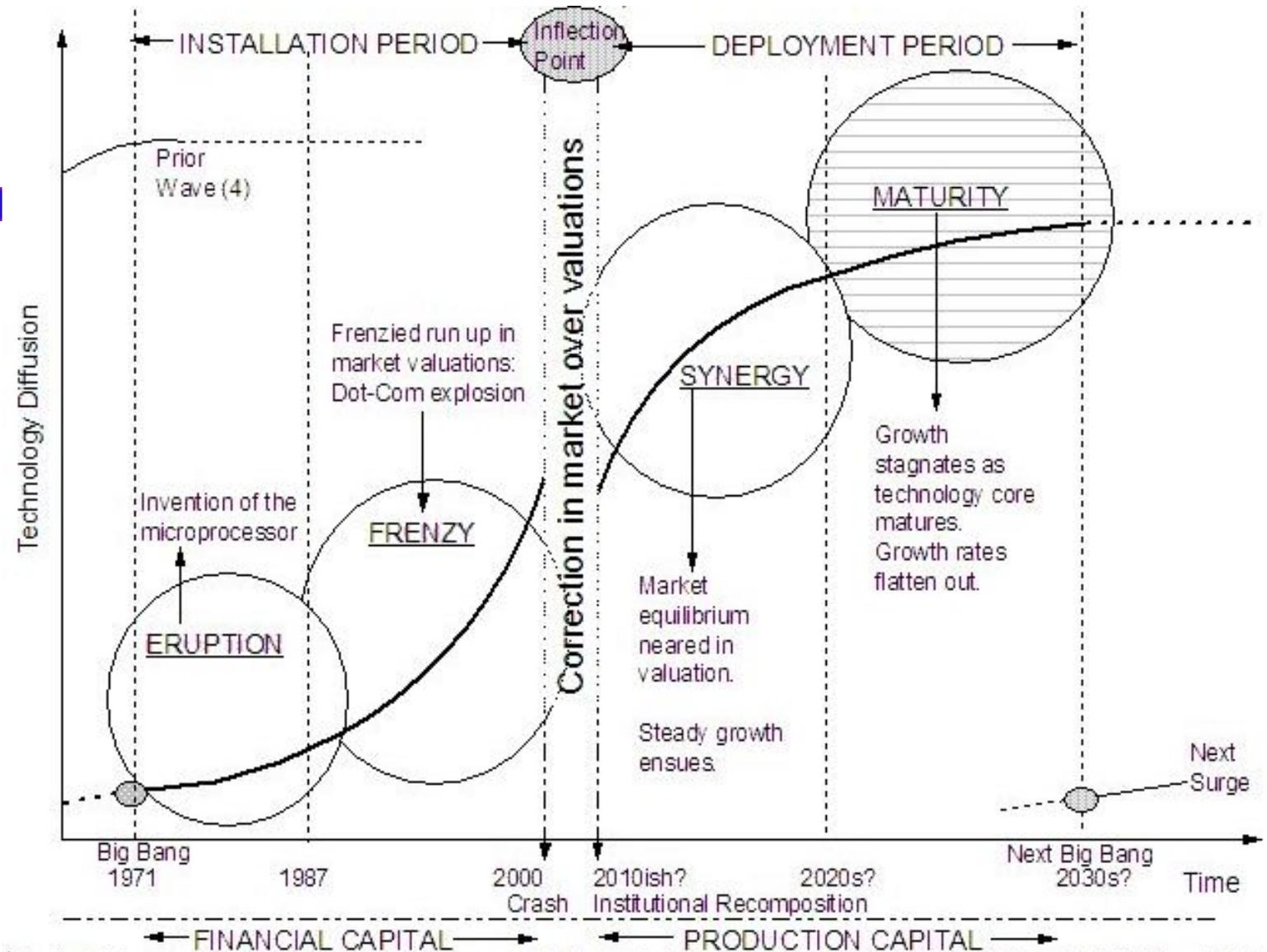
- *The extension of the markets cannot keep pace with the extension of production. The collision becomes inevitable, and as this cannot produce any real solution so long as it does not break in pieces the capitalist mode of production, the collisions become periodic. Capitalist production has begotten another 'vicious circle'*

- Engels (1877)



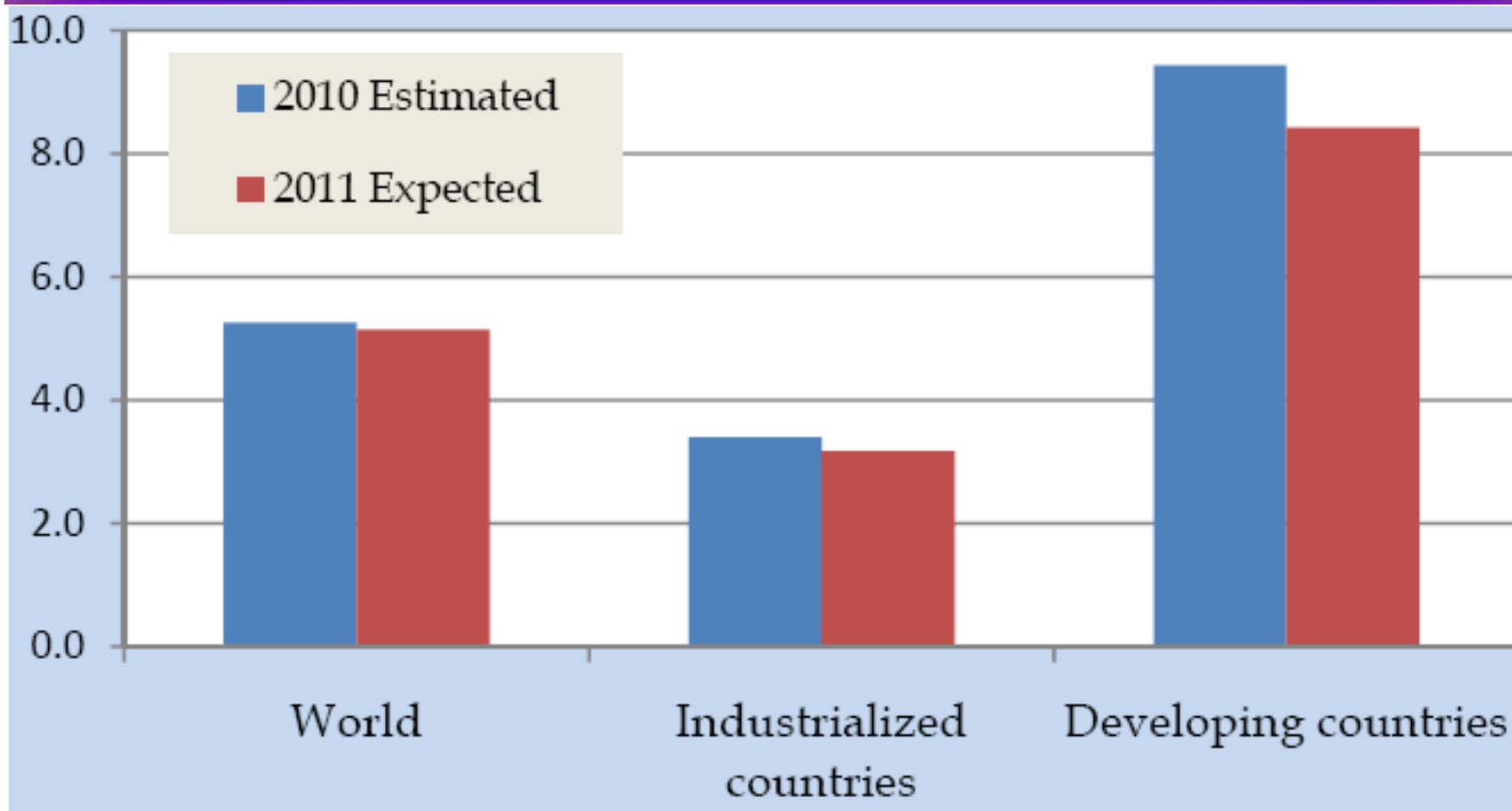
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Techno-Economic Paradigms



*Carlota Perez: Technological Revolutions and Financial Capital Page 74 Edward Elgar Publishing 2002

Expected growth estimates of world MVA at constant 2000 US\$

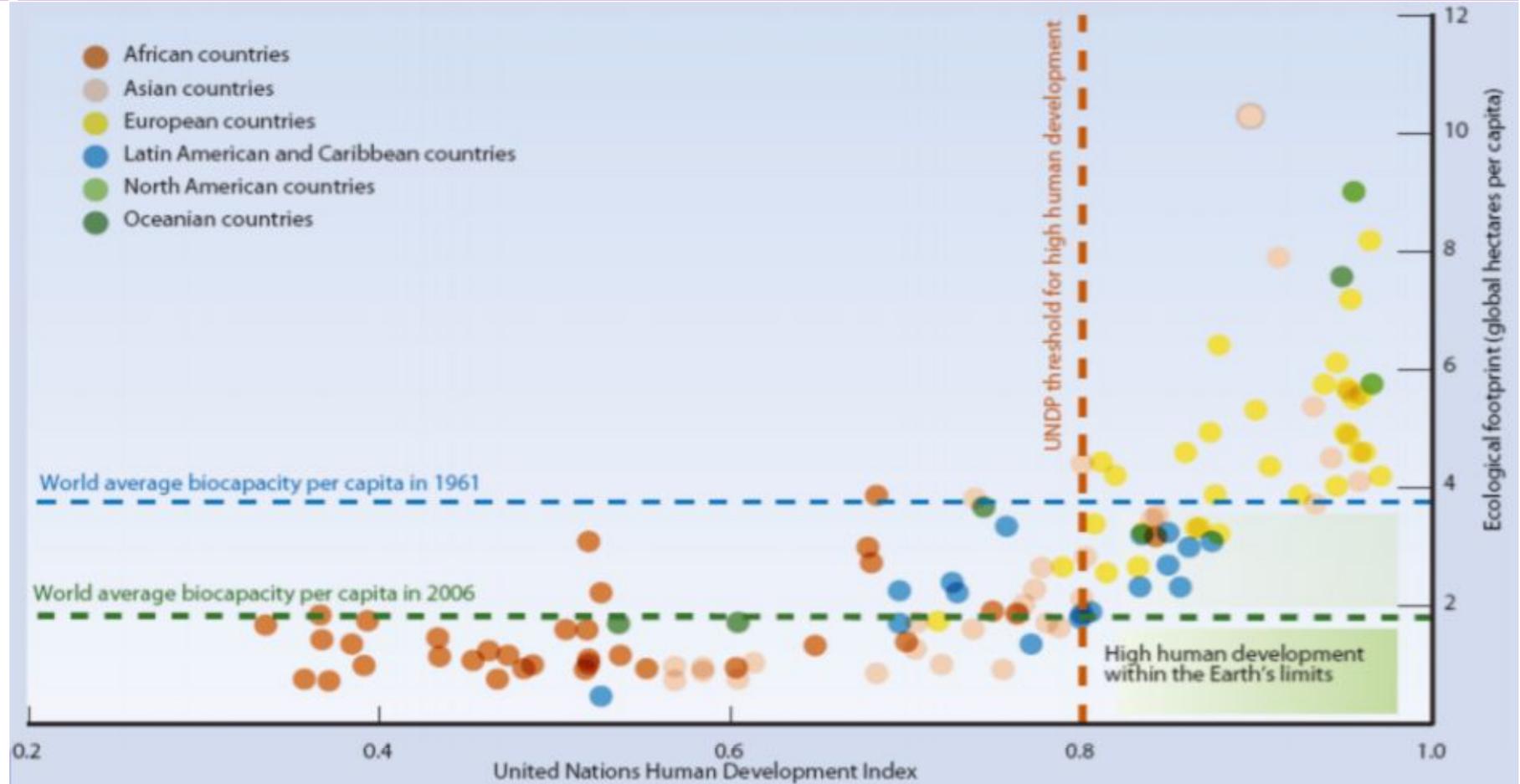


GDP per Capita: Annual Growth Rates (%)

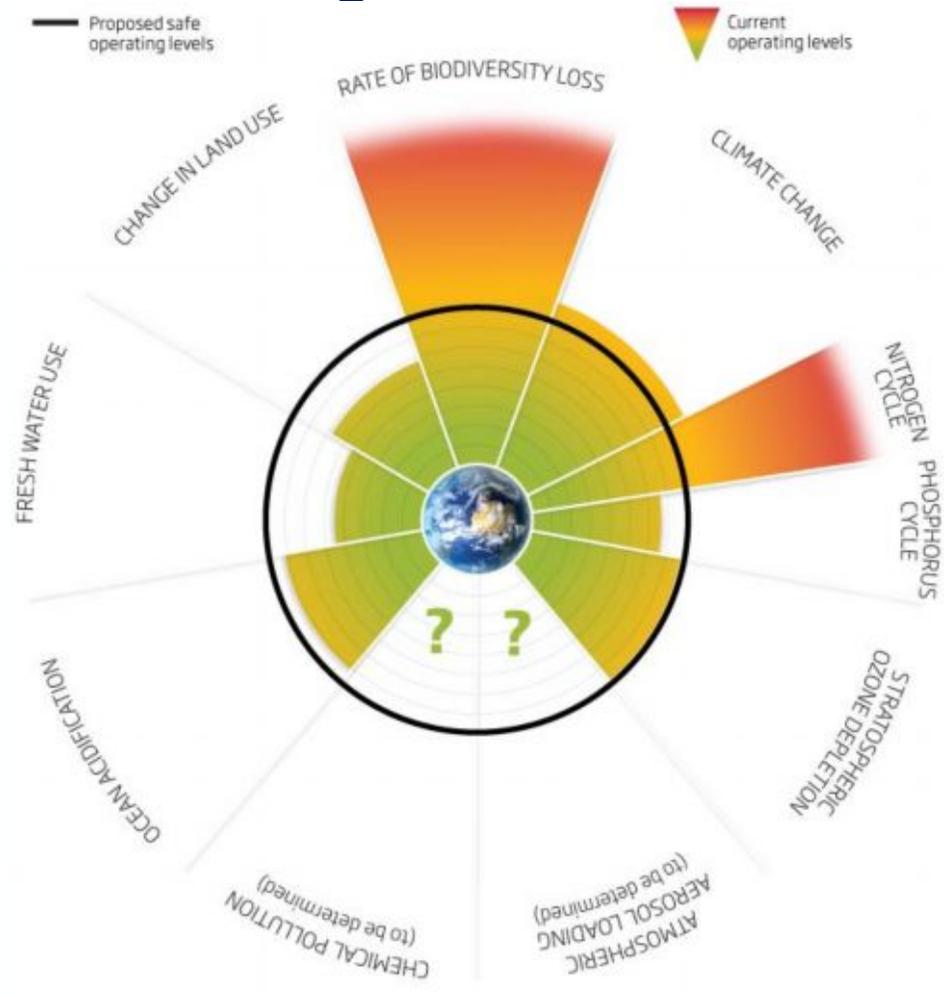


Ecological Footprints and Human Development

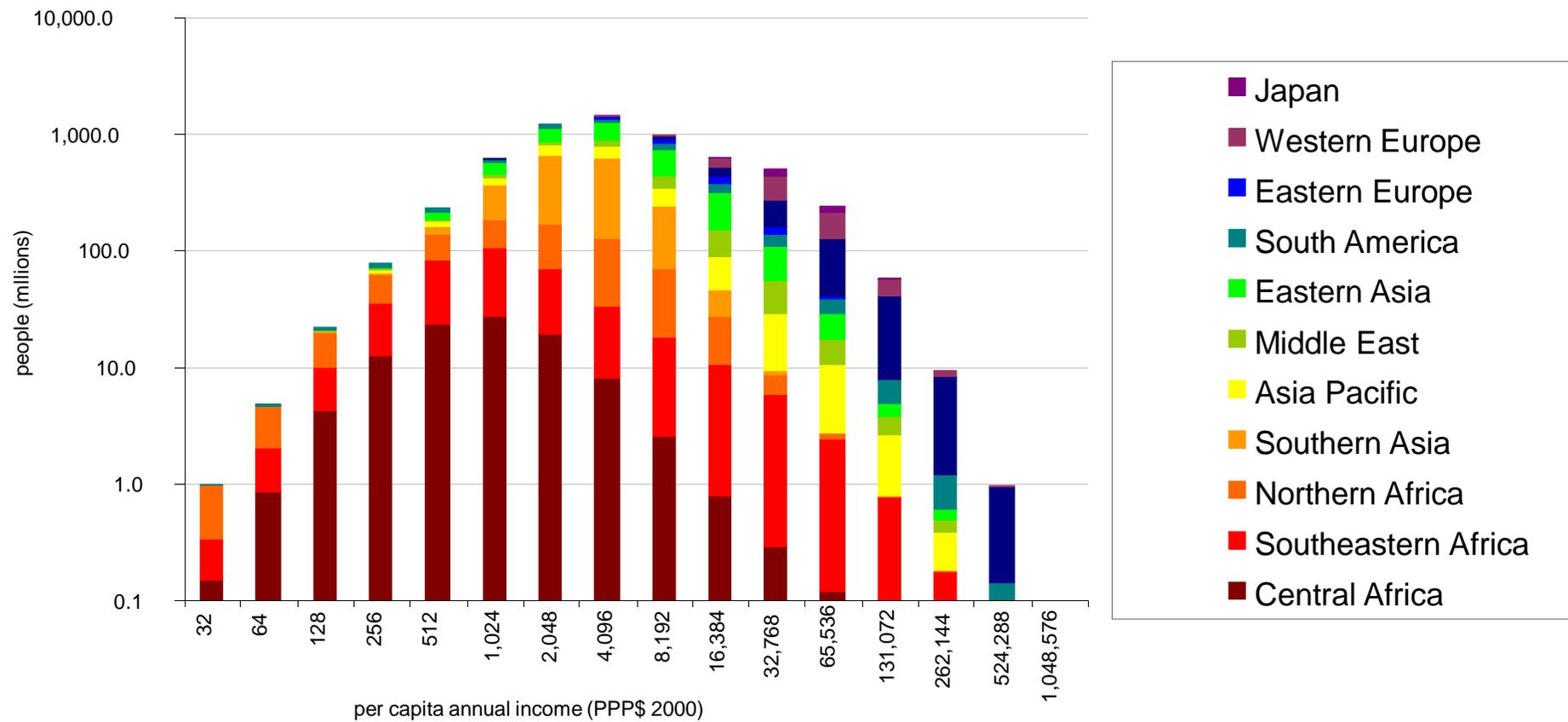
Source: UNEP (2011)



Planetary Thresholds

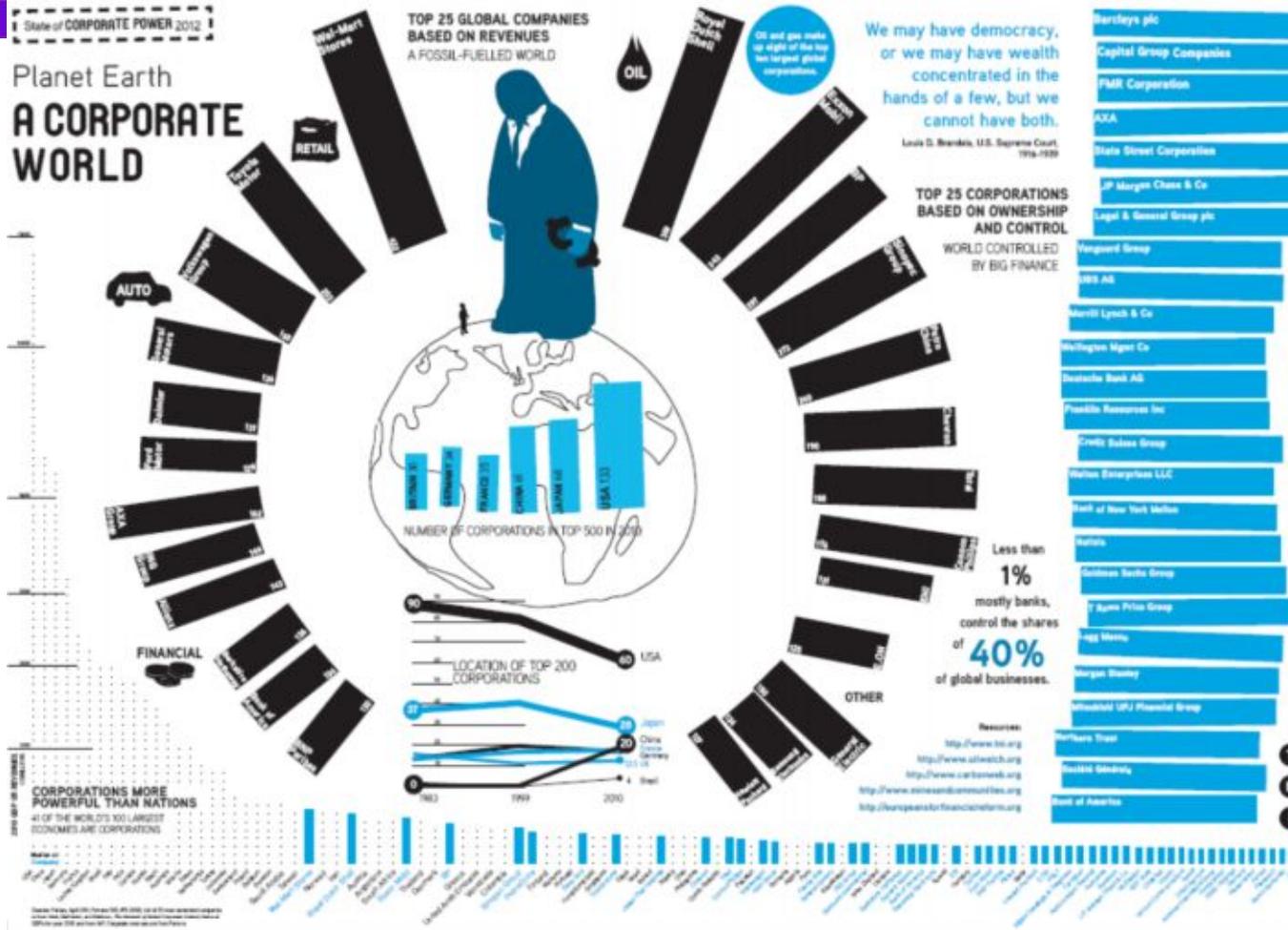


Global Equity [2008]

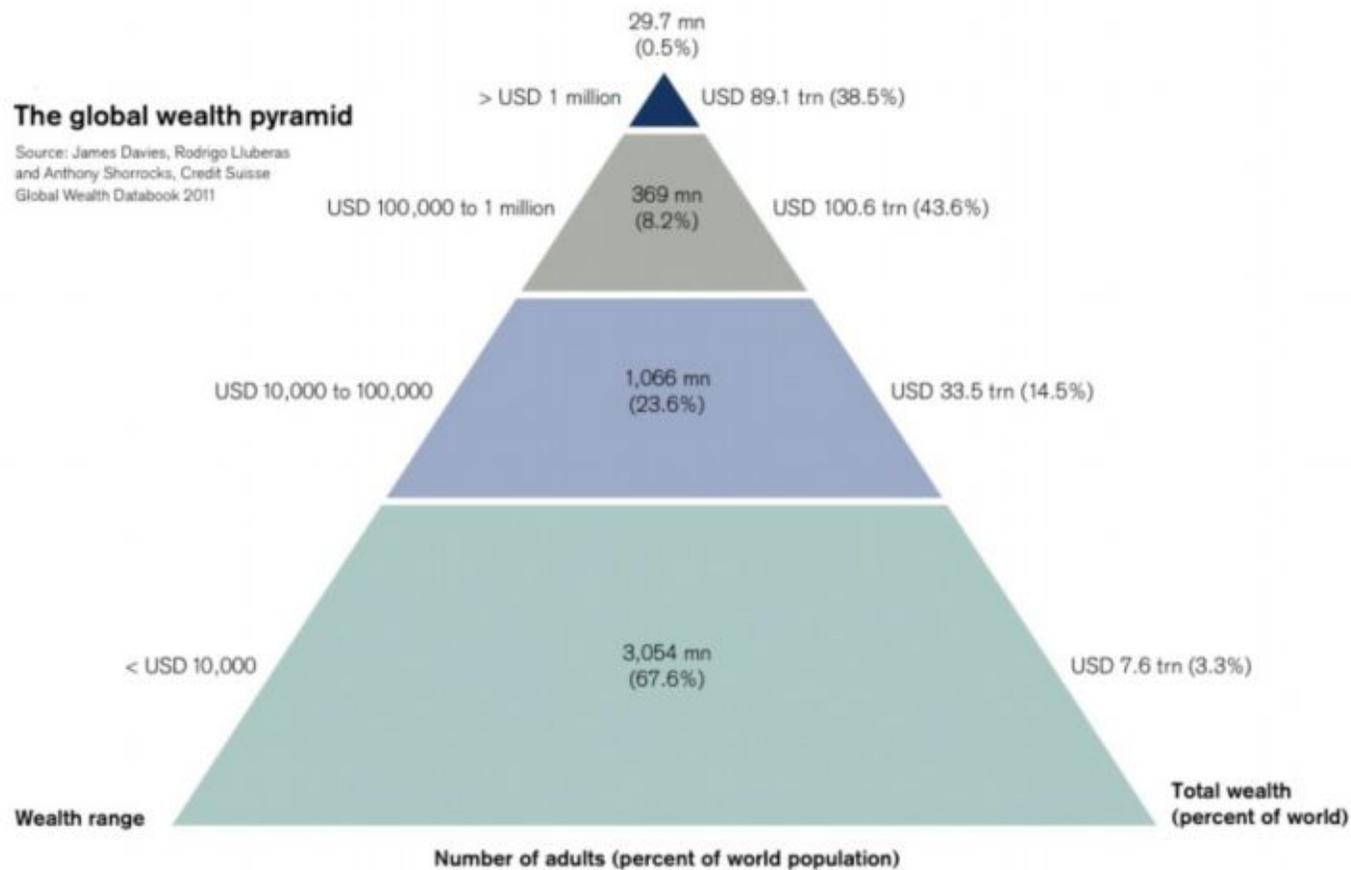


Source: Dorling (2009)

Largest "Economies"



Global Inequality (2011)



Ecological Catastrophe [2008]

- ❑ US\$ 6.6 trillion

- ❑ US\$ 2.15 trillion

- ❑ >50%

- ❑ The estimated annual environmental costs from global human activity equating to 11% of global GDP
- ❑ The cost of environmental damage caused by the world's 3,000 largest publicly-listed companies (7% of Revenue)
- ❑ The proportion of company earnings that could be at risk from environmental costs in an equity portfolio weighted according to the MSCI All Country World Index

Source: Trucost, PRI & UNEP (2011)

Consolidating Technologies

- ❑ Nano-scale Engineering, and new Physics
- ❑ ICT Power, Artificial Intelligence & Media
- ❑ Energy, Production and Transport (sic)
- ❑ Genomics and Biotechnology
- ❑ Green Economy
 - ❑ *Geo-engineering*

Energy in Flux

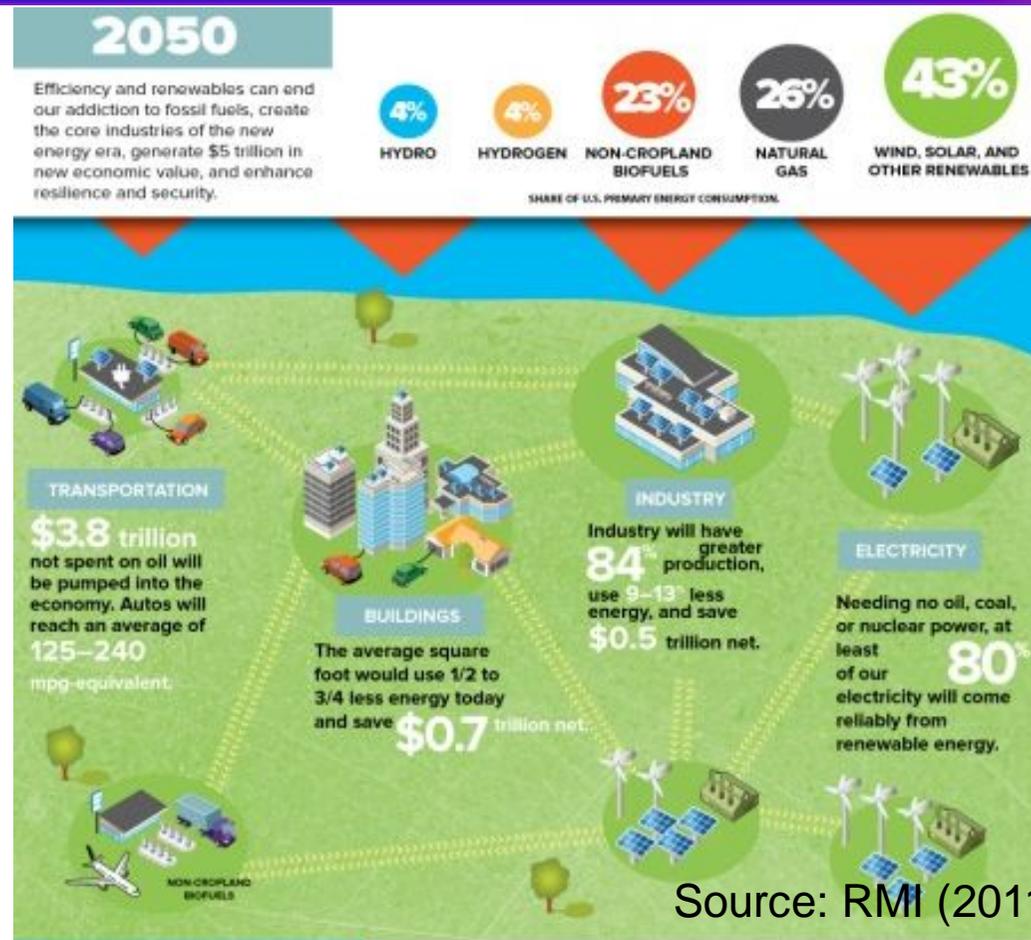
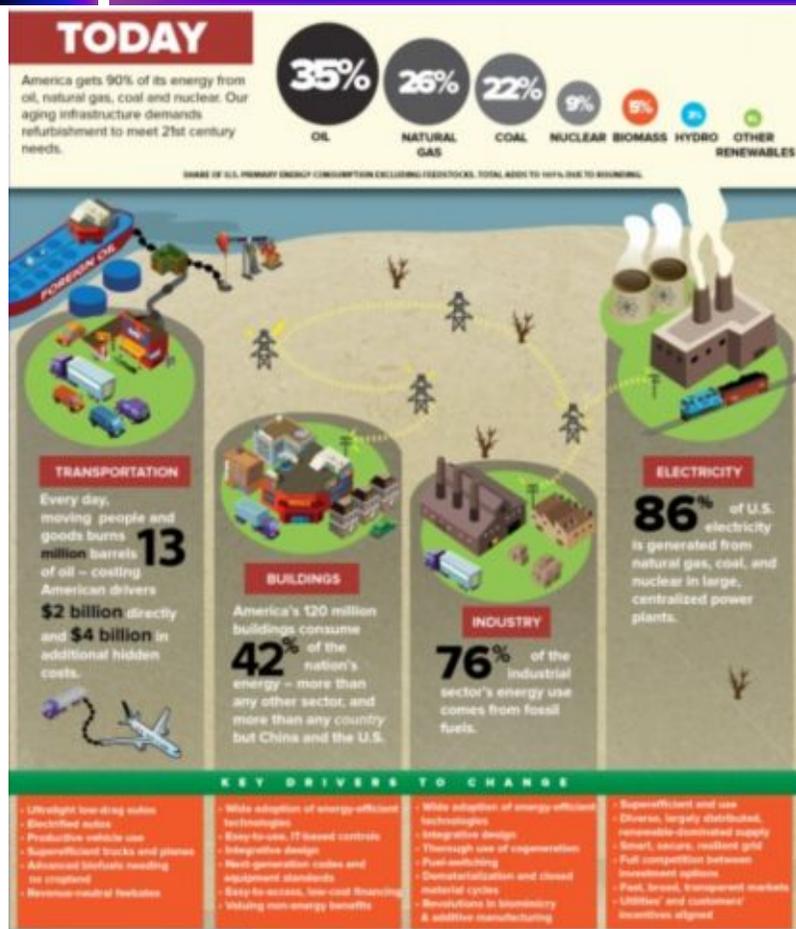
| ■ SELECTED INDICATORS | | 2008 | → | 2009 | → | 2010 |
|---|------------------------|-------|---|-------|---|-------|
| Global new investment in renewable energy (annual) | <i>billion USD</i> | 130 | → | 160 | → | 211 |
| Renewables power capacity (existing, not including hydro) | <i>GW</i> | 200 | → | 250 | → | 312 |
| Renewables power capacity (existing, including hydro) | <i>GW</i> | 1,150 | → | 1,230 | → | 1,320 |
| Hydropower capacity (existing) | <i>GW</i> | 950 | → | 980 | → | 1,010 |
| Wind power capacity (existing) | <i>GW</i> | 121 | → | 159 | → | 198 |
| Solar PV capacity (existing) | <i>GW</i> | 16 | → | 23 | → | 40 |
| Solar PV cell production (annual) | <i>GW</i> | 6.9 | → | 11 | → | 24 |
| Solar hot water capacity (existing) | <i>GW_{th}</i> | 130 | → | 160 | → | 185 |
| Ethanol production (annual) | <i>billion liters</i> | 67 | → | 76 | → | 86 |
| Biodiesel production (annual) | <i>billion liters</i> | 12 | → | 17 | → | 19 |
| Countries with policy targets | # | 79 | → | 89 | → | 96 |
| States/provinces/countries with feed-in policies ¹ | # | 71 | → | 82 | → | 87 |
| States/provinces/countries with RPS/quota policies | # | 60 | → | 61 | → | 63 |
| States/provinces/countries with biofuels mandates | # | 55 | → | 57 | → | 60 |



Brookings-Battelle Clean Economy Industry Categories and Segments (USA)

| | |
|--|--|
| Agricultural and Natural Resources Conservation | Conservation Organic Food and Farming Sustainable Forestry Products |
| Education and Compliance | Regulation and Compliance Training |
| Energy and Resource Efficiency | Appliances Battery Technologies Electric Vehicle Technologies Energy-saving Building Materials Energy-saving Consumer Products Fuel Cells Green Architecture and Construction Services HVAC and Building Control Systems Lighting Professional Energy Services Public Mass Transit Smart Grid Water Efficient Products |
| Greenhouse Gas Reduction, Environmental Management, and Recycling | Air and Water Purification Technologies Carbon Storage and Management Green Building Materials Green Chemical Products Green Consumer Products Nuclear Energy Pollution Reduction Professional Environmental Services Recycled-Content Products Recycling and Reuse Remediation Waste Management and Treatment |
| Renewable Energy | Biofuels/Biomass Geothermal Hydropower Renewable Energy Services Solar Photovoltaic Solar Thermal Waste-to-Energy Wave/Ocean Power Wind |

Alternative futures



Source: RMI (2011)

China and the 'Green Economy'

- ❑ China has the highest public market financing in the clean energy sector
- ❑ The United States ranks 3rd in total clean energy investment in 2010, behind China and Germany. In 2008, the United States ranked first
- ❑ China has secured \$47.3 billion of asset financing in 2010 for clean energy projects. The U.S. attracted \$21 billion in 2010
- ❑ 60% of all clean energy technology IPOs in the world in 2010 were from Chinese companies
- ❑ According to Ernst and Young, for the first time, China beat the U.S. in terms of its attractiveness for renewable energy investment
- ❑ China received 20% of total global clean energy investment in 2010, while the U.S. saw 19%. In 2004, China only had 3% of the total, while the U.S. received 20% of investment.⁷
- ❑ China attracted \$54.4 billion clean energy financing in 2010, a 39% increase over 2009 and equal to the entire amount of clean energy investment worldwide in 2004. Similar financing in the U.S. stagnated last year at \$34.4 billion, approximately equal to 2007 levels
- ❑ China is expected to lead the world in overall number of patents filed in 2011, surpassing the United States and Japan for the first time
- ❑ China ranks 2nd in estimated number of people engaged in scientific and engineering research and development
- ❑ China has seen the largest increase of any nation in its innovation score over the last decade, up 19.5 points (compared to a 2.7 point increase in U.S. score)
- ❑ China is creating 16 national energy research and development centres intended specifically to drive innovation in the clean energy sector
- ❑ By the end of 2011, national Chinese R&D expenditures are targeted to rise 11% over levels earlier in the year
- ❑ Eight of ten companies with the largest R&D budgets have established R&D facilities in China, India, or both
- ❑ There has been a 600% increase in the number of college graduates in science fields in China between 1995 and 2005

New Global Keynesianism

- Anti-crisis policies should include the funding of public research infrastructures
 - In the first place the funding does not involve a nationalization of the firm or the use of taxpayers' money without any counterpart. By contrast, while the IPR is paid at its private value, it is transferred in the public arena where it has a greater public good value and decreases costs for many producers.
 - Secondly, financial support is granted to firms who have proved to be innovative. A powerful stimulus for new investments is given to the most efficient firms. On the one hand, these firms receive fresh funds but, on the other hand, having sold the old intellectual property rights, they face tough competition. Therefore, they have an urgency to invest in the production of new intellectual assets, which boosts aggregate demand.
 - Thirdly a monopoly price for the asset is replaced by the lower competitive price, which has again a positive effect on aggregate demand.
 - Finally, the "anti-commons" problem is eased; everyone can now invest in new knowledge with the awareness that complementary pre-existing knowledge is less likely to be owned by other firms. The policy decreases the costs of future risky transactions necessary to use the fruits of innovation. While the immediate funding goes to incumbent innovative firms, which may often belong to the richer countries, the increase of the knowledge freely available to everyone has widespread beneficial effects and contributes to the overall development of the world economy.
- Pagano (2008)

Obstacles of Capitalism

- ❑ Inequality, Unemployment & Poverty
- ❑ Neo-liberalism, Corruption & the 'hollowed-out' State
- ❑ Monopolies, Oligopolies and Cartels
- ❑ Financialisation & Commodification of Life/Nature ...

Systemic Challenges

- ❑ Reskilling and Retooling
- ❑ Employment
- ❑ Localisation
- ❑ Innovation-facilitated
Development

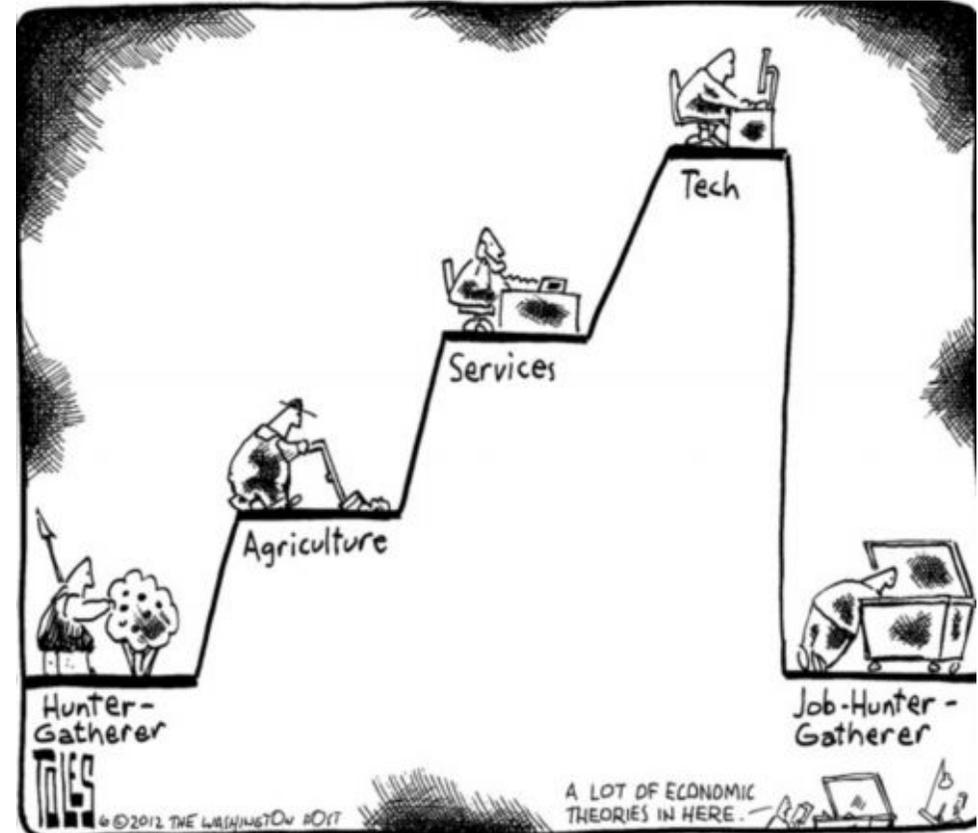
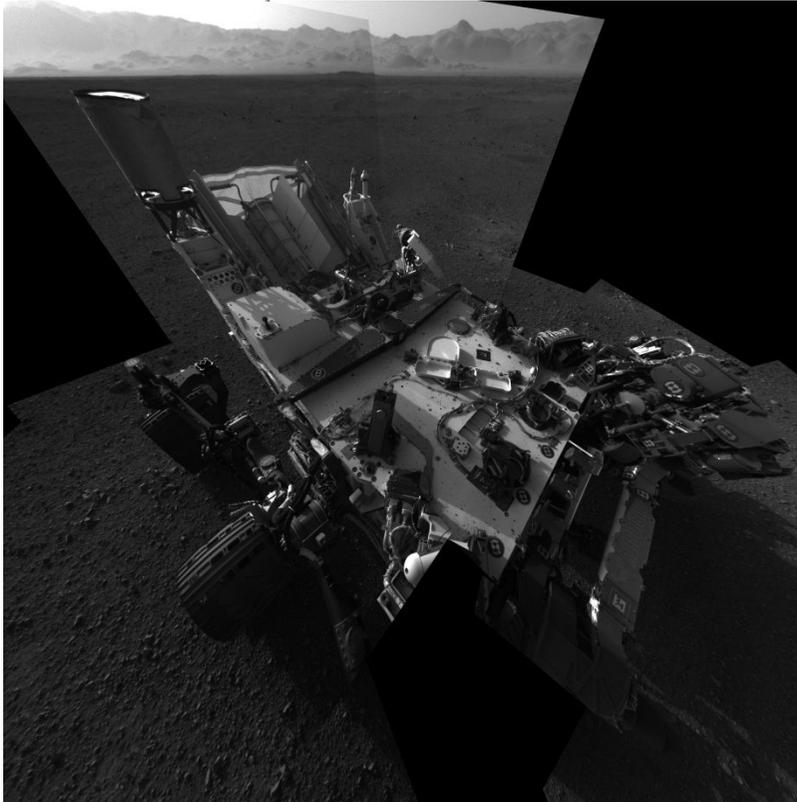
Policy Challenges

- ❑ Global Socio-economic and Political Consensus
- ❑ Expanding local productive competences
- ❑ Building local resilience and adaptive capabilities
- ❑ Enabling Global Frameworks
 - ❑ Global Citizenship
 - ❑ Global Governance
 - ❑ Global Foresight ...

Conclusions

- ❑ *Planning, Regulation, Monitoring, Evaluating and Learning*
- ❑ Facilitate Equality, Redress and Sustainable Development Outcomes
- ❑ Support and consolidate public goods in Science and Technology
- ❑ Advance anti-Hegemonic Geo-political coalitions and alliances

Post-script



Source: NASA/JPL-Caltech



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Thank you, ...r

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