

SCIENCE FOR POVERTY ERADICATION AND SUSTAINABLE DEVELOPMENT

JEFFREY D. SACHS

IAP Workshop

,Manaus, Brazil, 4 December 2014



A WORLD IN FLUX

- 1. GLOBAL-SCALE PRODUCTION SYSTEMS**
- 2. RAPID ICT-ENABLED TECHNOLOGICAL CHANGE**
- 3. RAPID POPULATION GROWTH IN AFRICA AND SOUTH ASIA AND AGING IN THE HIGH-INCOME COUNTRIES**
- 4. WORLDWIDE DECLINE OF MIDDLE-SKILLED JOBS**
- 5. EXTREME ENVIRONMENTAL CRISES**
- 6. ECONOMIC AND GEOPOLITICAL MULTI-POLARITY**

***Sustainable Development* as a Framework for Action**

Sustainable Development is the Holistic Integration of Economic, Social, and Environmental Objectives in an Approach to Scientific Analysis, Governance, Problem Solving, and Human Action

The UN Member States are now negotiating **Sustainable Development Goals (SDGs)** to be adopted in September 2015

2015 is the Decisive Year for Setting Sustainable Development Goals

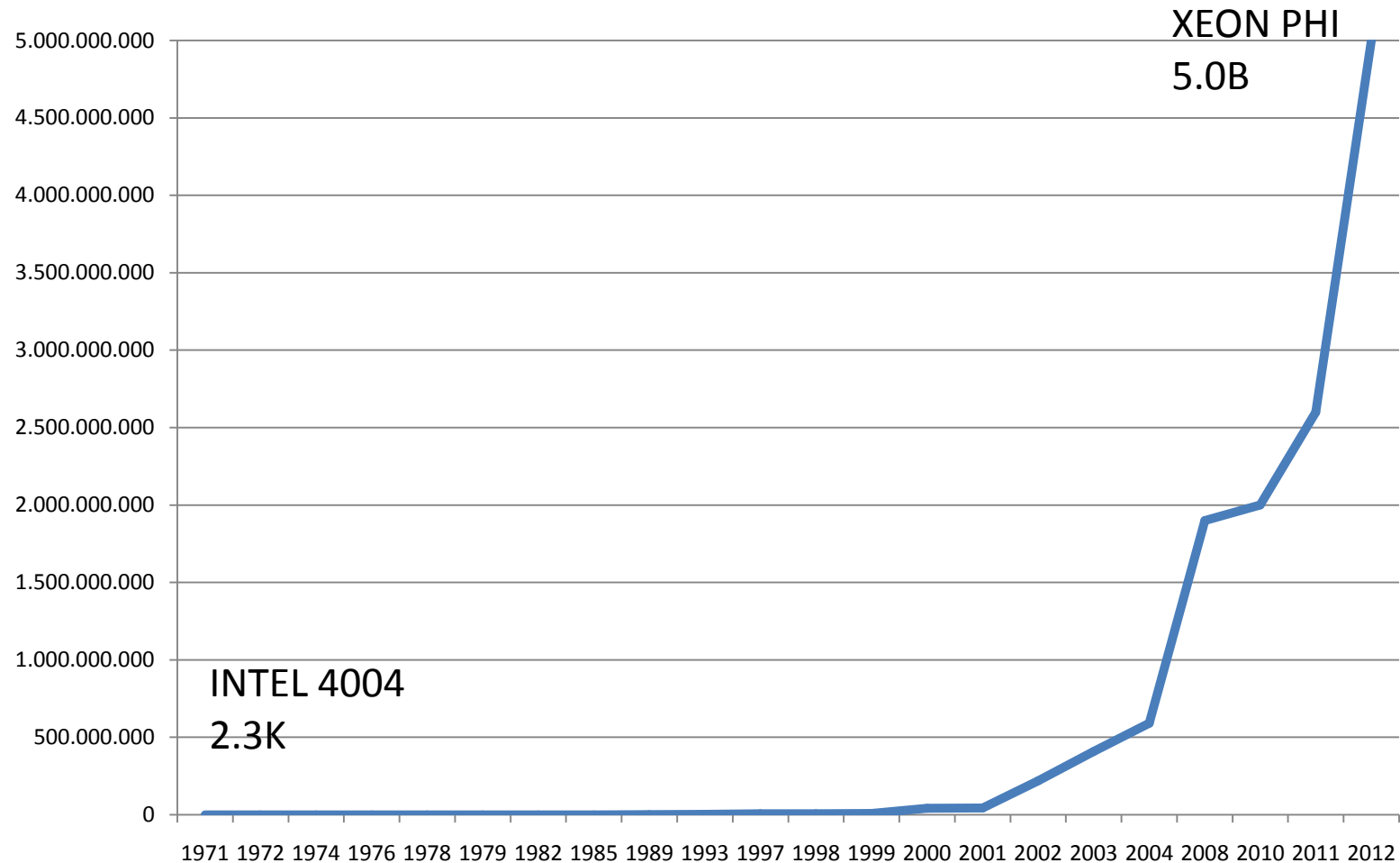
Financing for Sustainable Development (Addis Ababa, July 2015)

Sustainable Development Goals (UN HQ, September 2015)

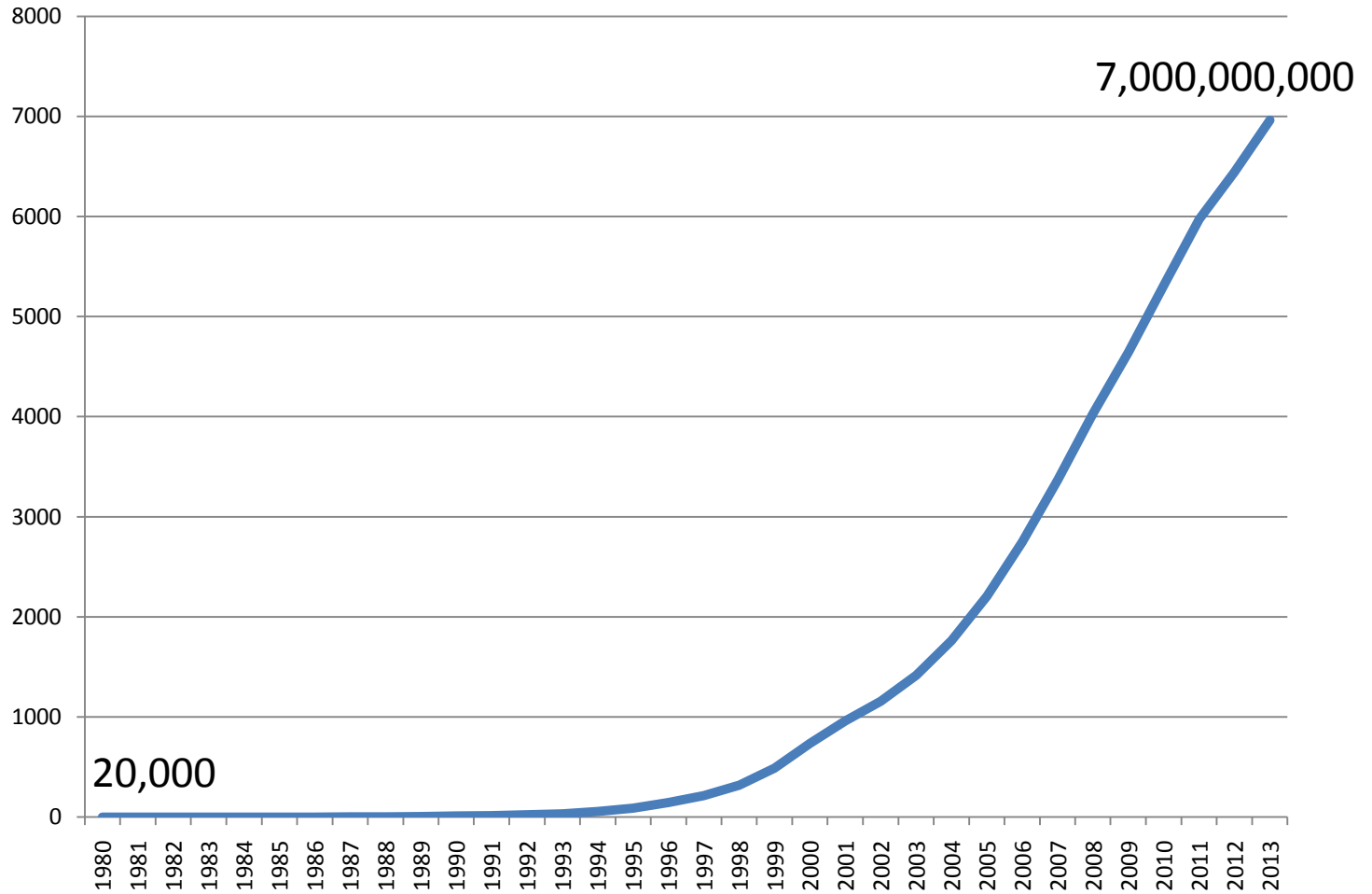
Climate Change Agreement at COP21 (Paris, December 2015)

OUR BEST HOPE: THE INFORMATION AGE

(TRANSISTOR COUNT ON INTEL MICROPROCESSORS)



Mobile Subscribers Worldwide, 1990-2013



Cost per Genome



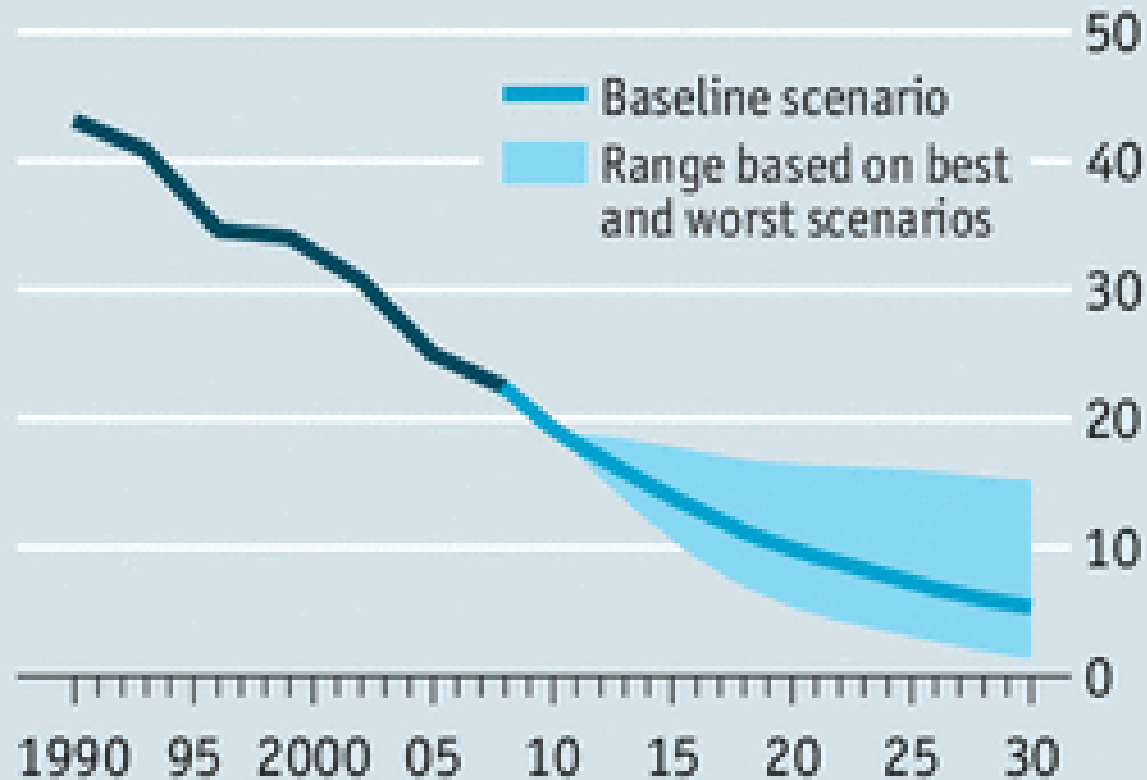
HALVING OF COST ROUGHLY EVERY NINE MONTHS

PROGRESS DURING THE MDG ERA

Hooray!

1

Global poverty rate, %

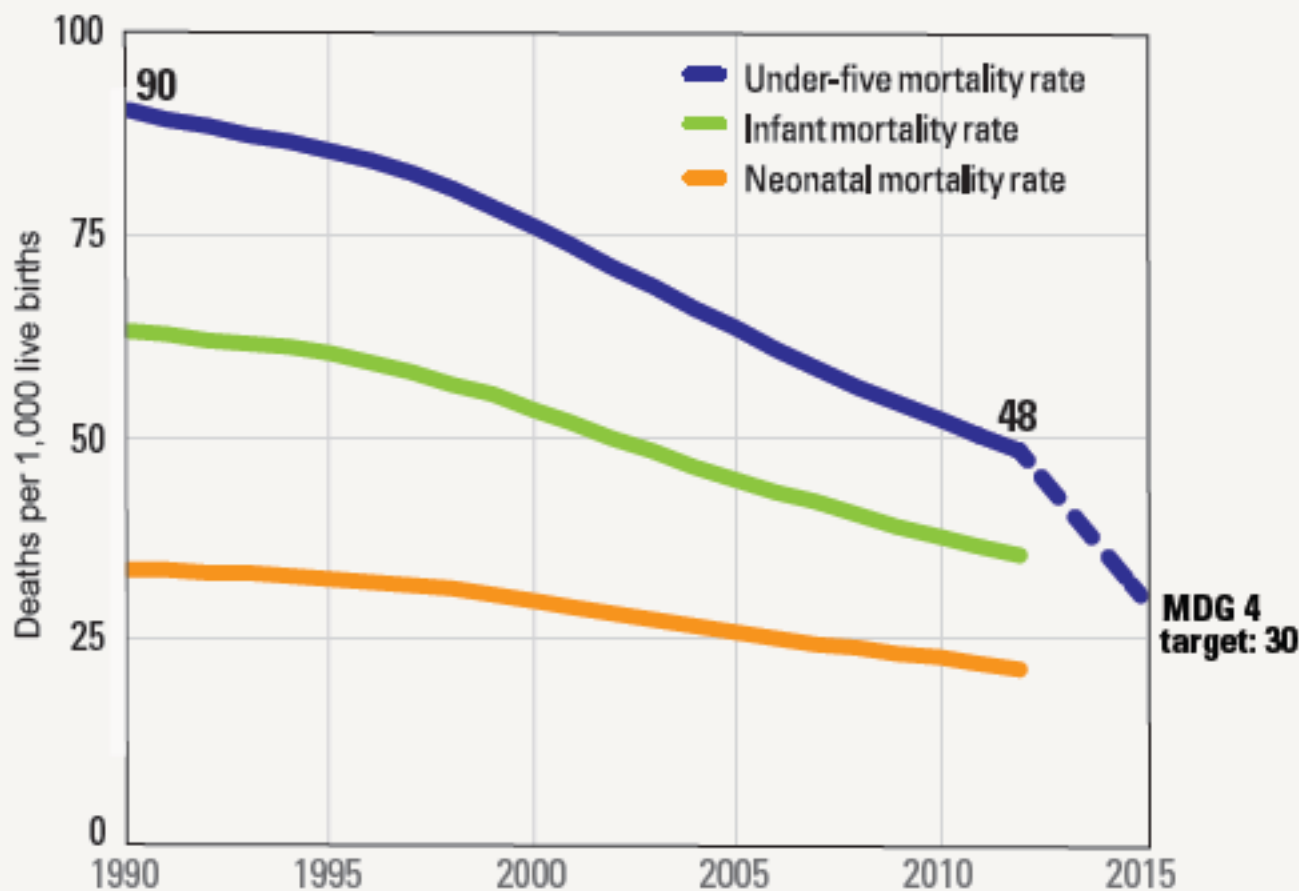


Source: Laurence Chandy, Natasha Ledlie and Veronika Penciakova

The global under-five mortality rate has almost halved since 1990

FIG. 1

Global under-five, infant and neonatal mortality rates, 1990–2012



Source: UN Inter-agency Group for Child Mortality Estimation (IGME) 2013.

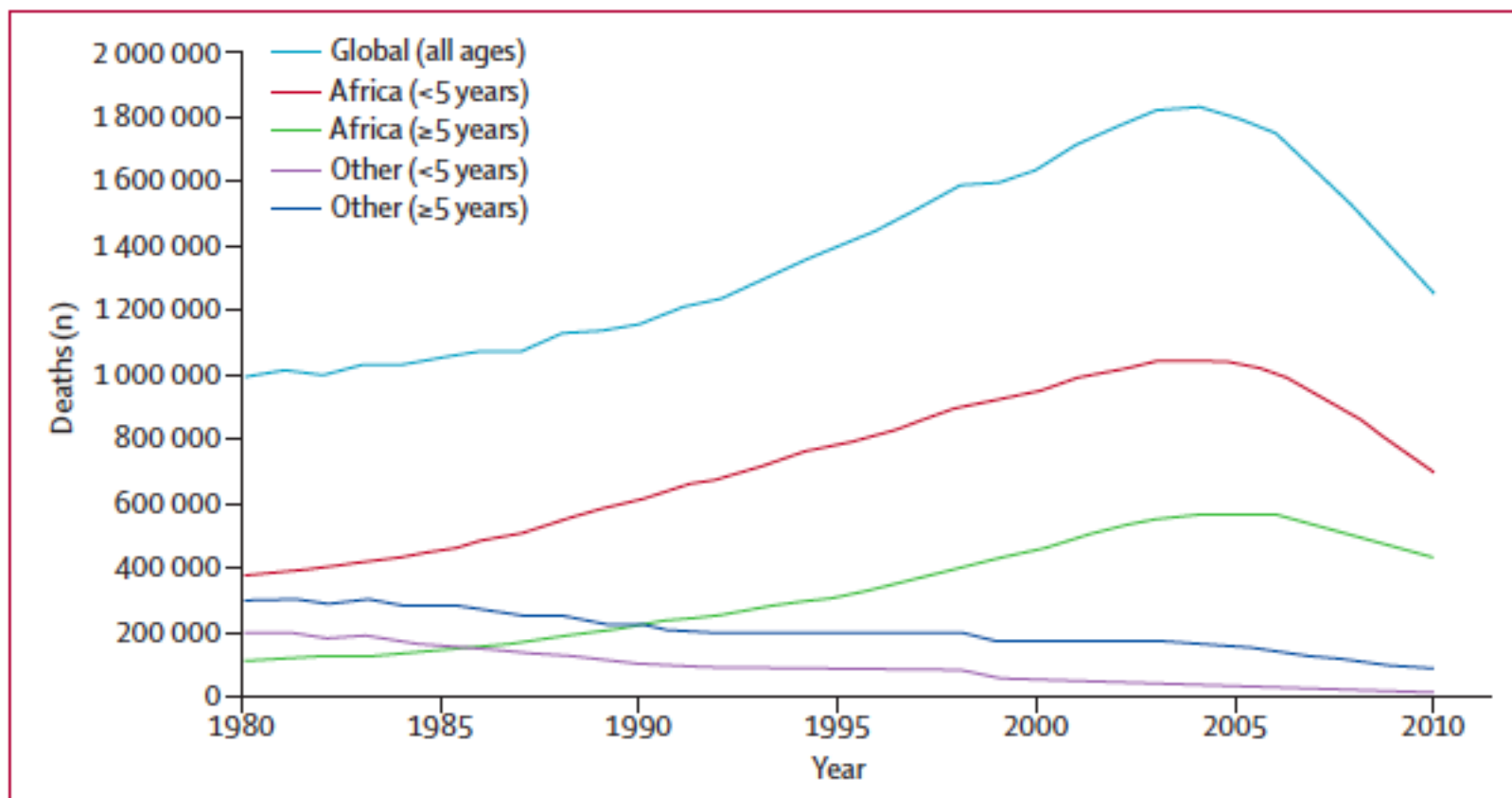


Figure 2: Trends in global malaria deaths by age and geographical region, 1980 to 2010

Global malaria mortality between 1980 and 2010: a systematic analysis

Christopher J L Murray, Lisa C Rosenfeld, Stephen S Lim, Kathryn G Andrews, Kyle J Foreman, Diana Haring, Nancy Fullman, Mohsen Naghavi, Rafael Lozano, Alan D Lopez

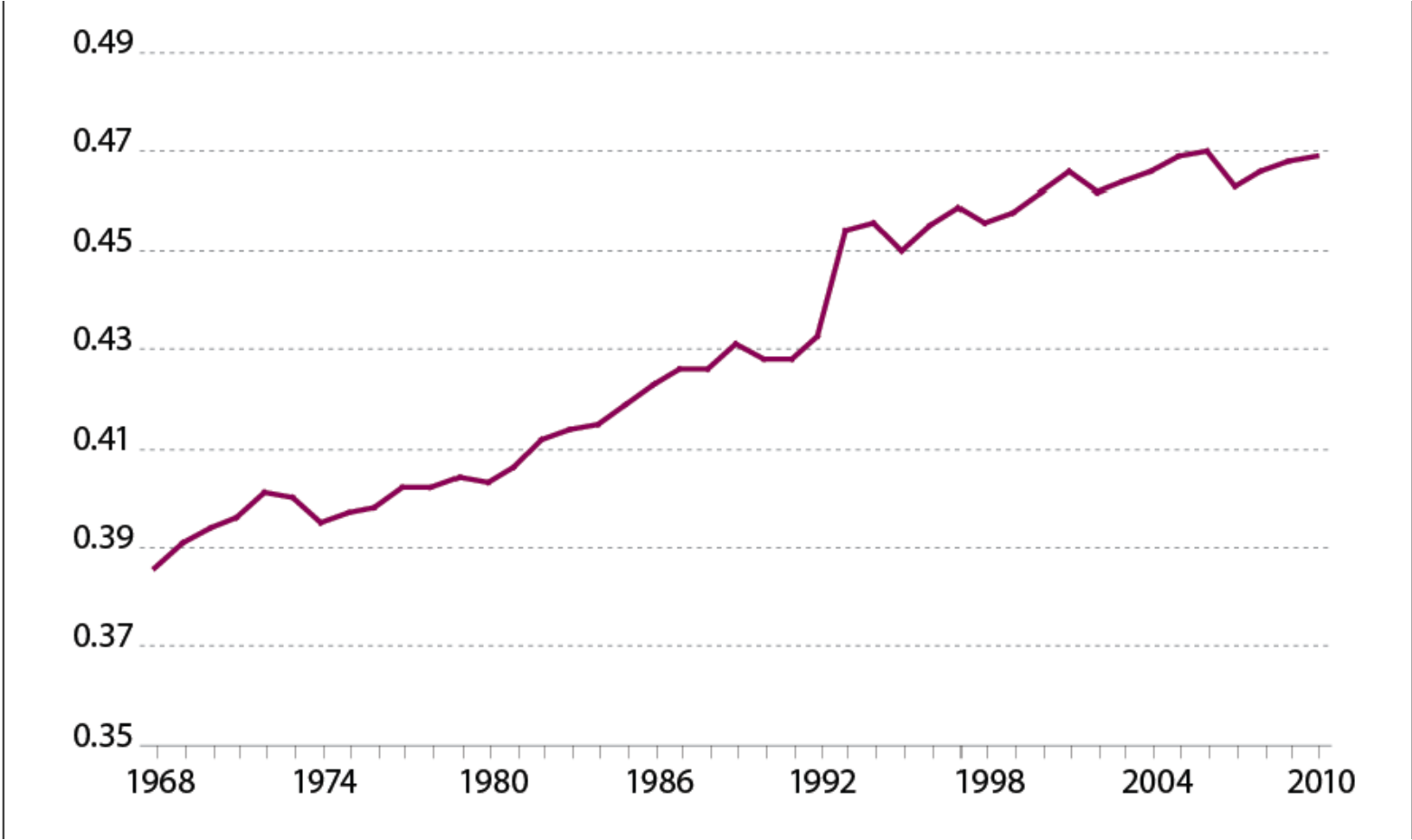
Lancet (2012) 379: 413–31

YET ECONOMIC GROWTH AND POVERTY
REDUCTION ARE HAMPERED BY TWO
FUNDAMENTAL HURDLES:

GROWING INCOME INEQUALITY AND
SOCIAL EXCLUSION

GROWING ENVIRONMENTAL CRISES

GINI COEFFICIENT IN US, 1968-2010



SOURCE: US CONGRESSIONAL RESEARCH SERVICE 2012

GINI COEFFICIENT IN CHINA, 1981-2012



Sources: Gini coefficients for the years 1986–2001 are from Ravallion and Chen (2007), 2002 from Gustafsson et al. (2008), 2003–2012 from the National Bureau of Statistics.

THE GROWING INCOME DIVIDE RESULTS FROM:

RISING RETURNS TO SKILLS AND HENCE SKILLS GAP

TECHNOLOGICAL DISPLACEMENT OF WORKERS

POLITICAL SYSTEMS DIRECTED TOWARD THE WEALTHY

DECREASING EDUCATIONAL MOBILITY OF THE POOR

ECOLOGICAL LOSSES INCURRED HEAVILY BY THE POOR

GLOBALIZATION OF FINANCIAL FLOWS



Tunis, January 2011



Cairo, January 2011



Athens July 2011



Tel Aviv, August 2011



Chile, August 2011



New York City, November 2011



Madrid, September 2012



Istanbul, June 2013



Rio de Janeiro, June 2013

AFRICA'S POPULATION SCENARIOS

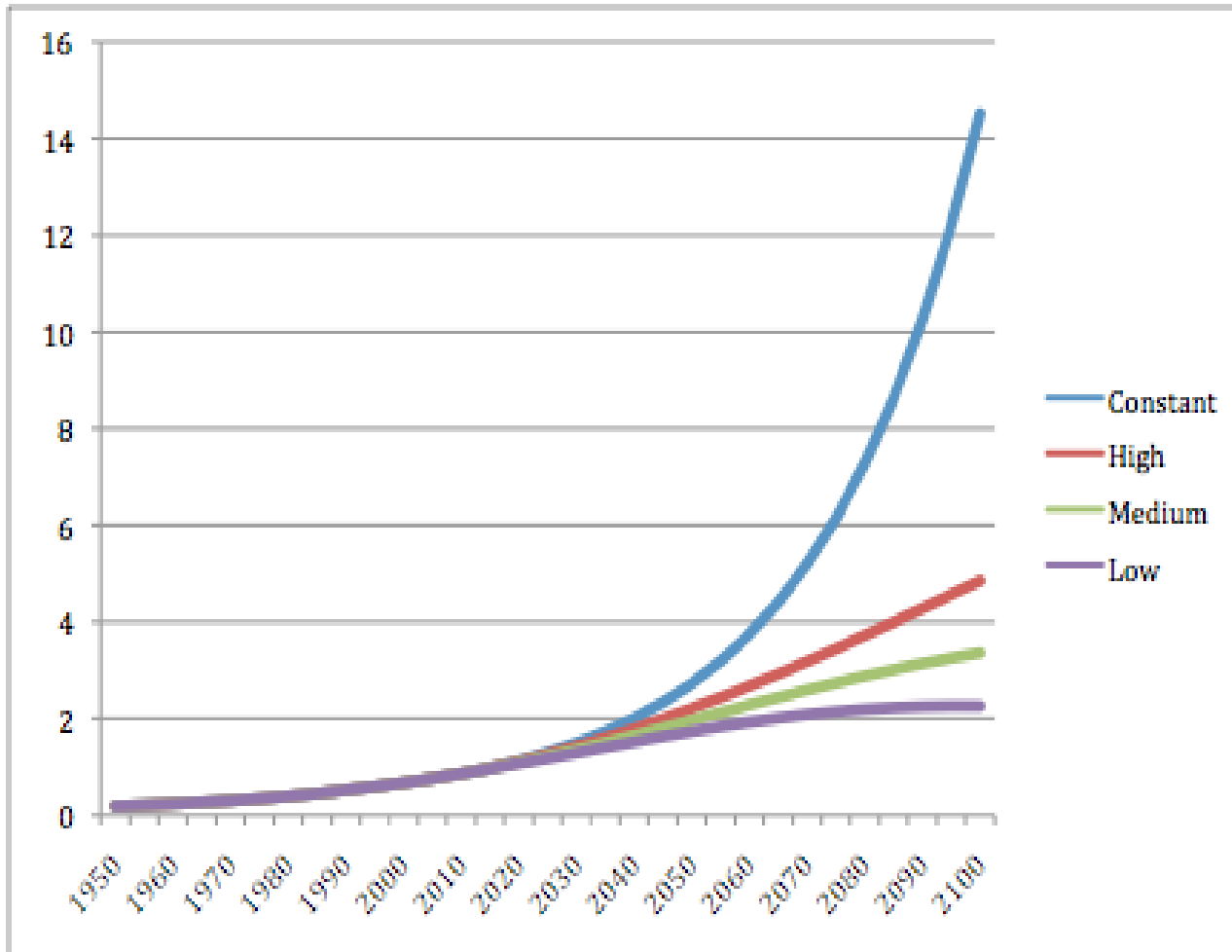
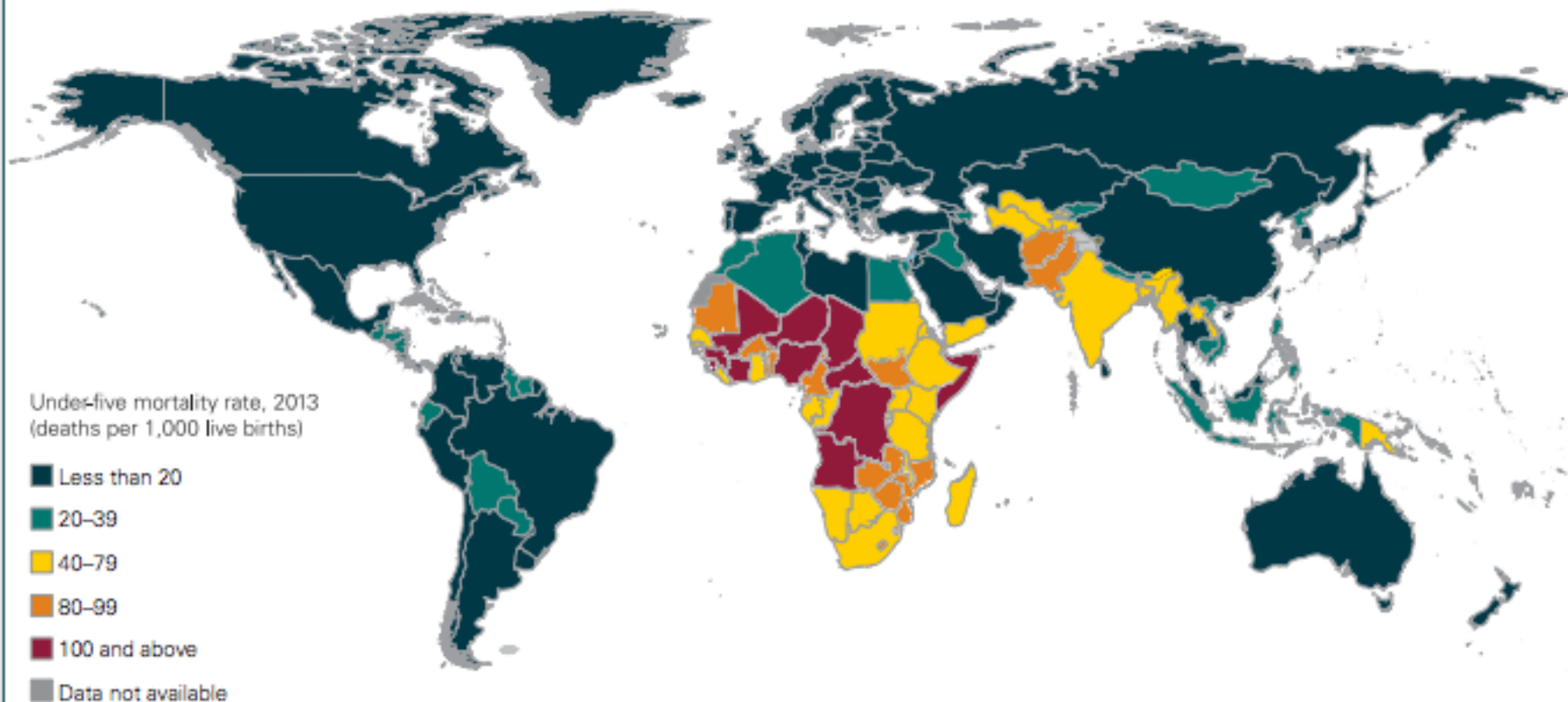


Figure 5.15: UN SCENARIOS FOR POPULATION IN SUB-SAHARAN AFRICA, 1950-2100

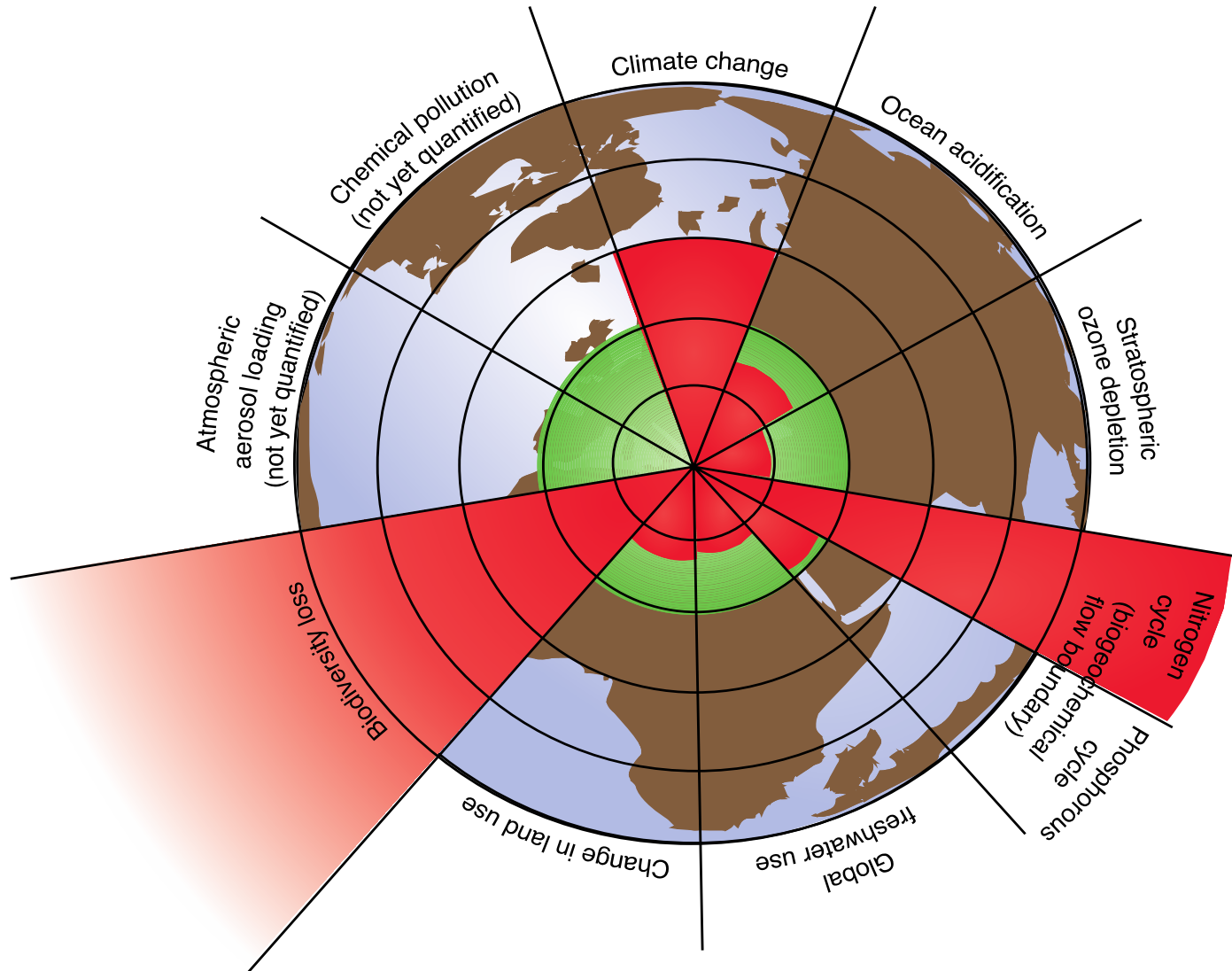
MAP
1

Children in Sub-Saharan Africa and Southern Asia face a higher risk of dying before their fifth birthday



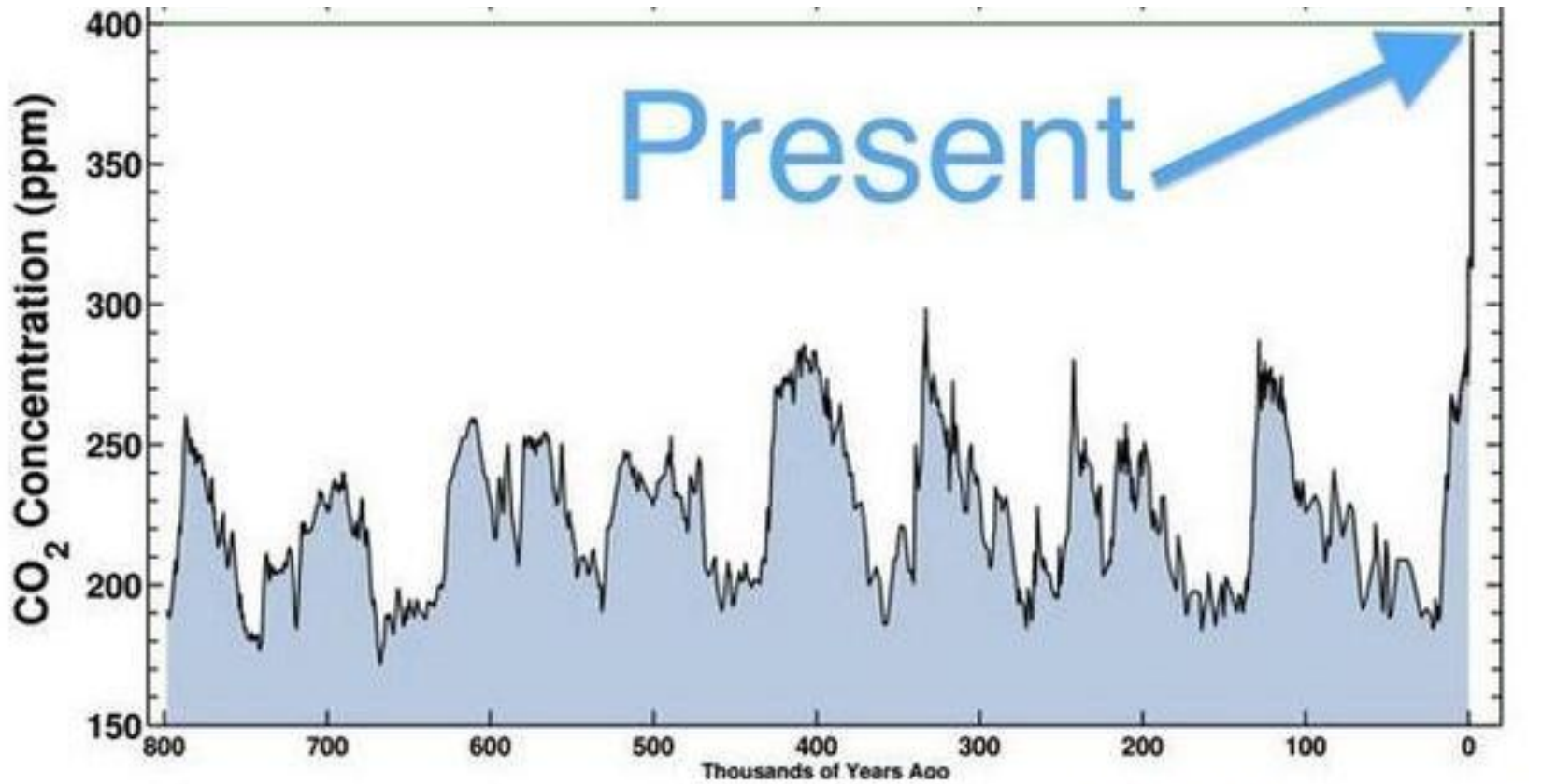
Notes: The classification is based on unrounded numbers. This map is stylized and not to scale. It does not reflect a position by UN IGME agencies on the legal status of any country or territory or the delimitation of any frontiers.

“PLANETARY BOUNDARIES”



Source: Rockström et al 2009a)

IN APRIL, 2013, CO₂ CONCENTRATION REACHES
400 PPM FOR FIRST TIME IN 3 MILLION YEARS



Scripps Institution of Oceanography

Ice core data before 1958



JAGUARY DAM, SAO PAULO STATE, JANUARY 2014



SUMATRA FOREST FIRES, MARCH 2014



BOSNIA, May 16 2014

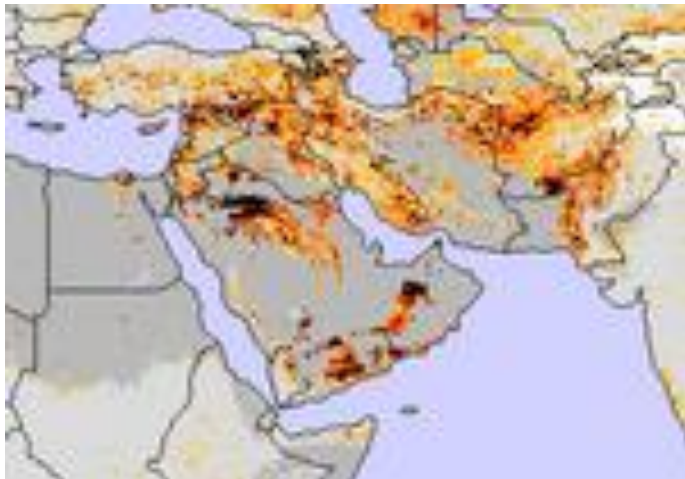
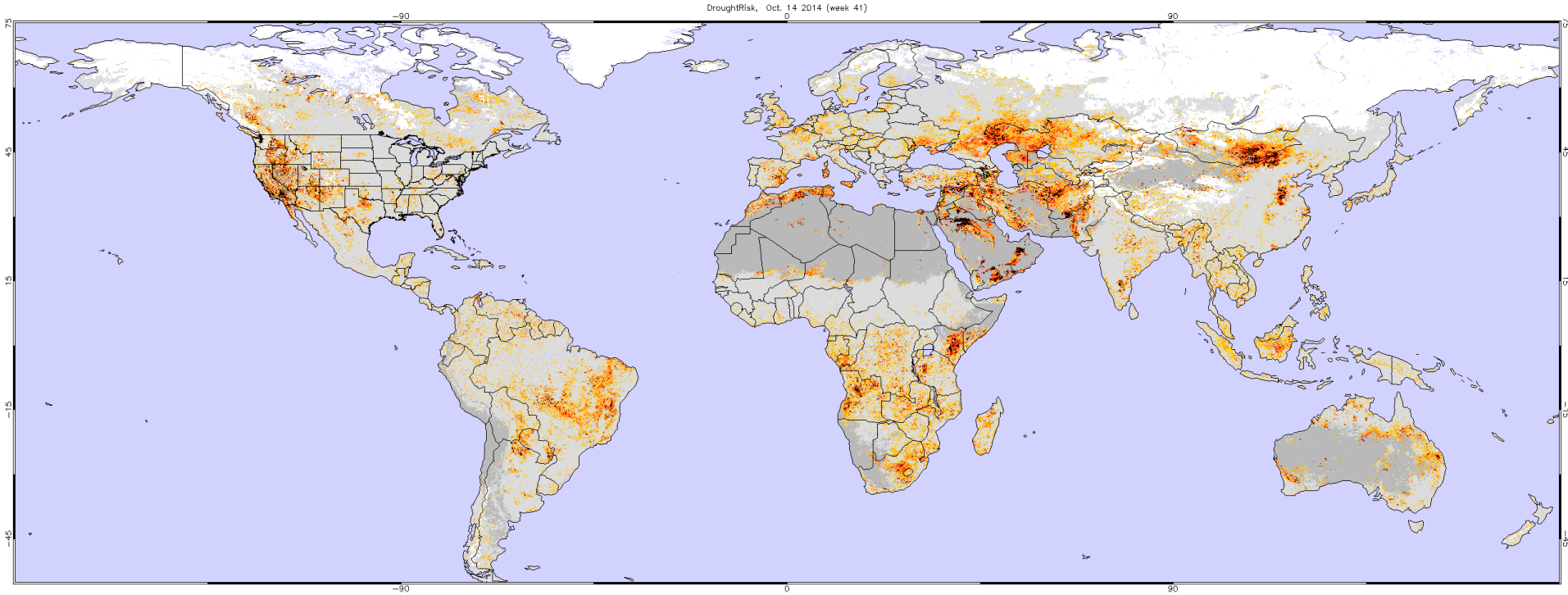
California Drought Monitor, May 2014





STEVENS CREEK RESERVOIR, MAY 2014

CURRENT DROUGHT RISK MAP, OCTOBER 2014



INSET FOR THE MIDDLE EAST AND WEST ASIA

http://www.star.nesdis.noaa.gov/smcd/emb/vci/VH/vh_browse.php



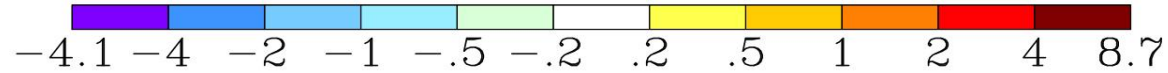
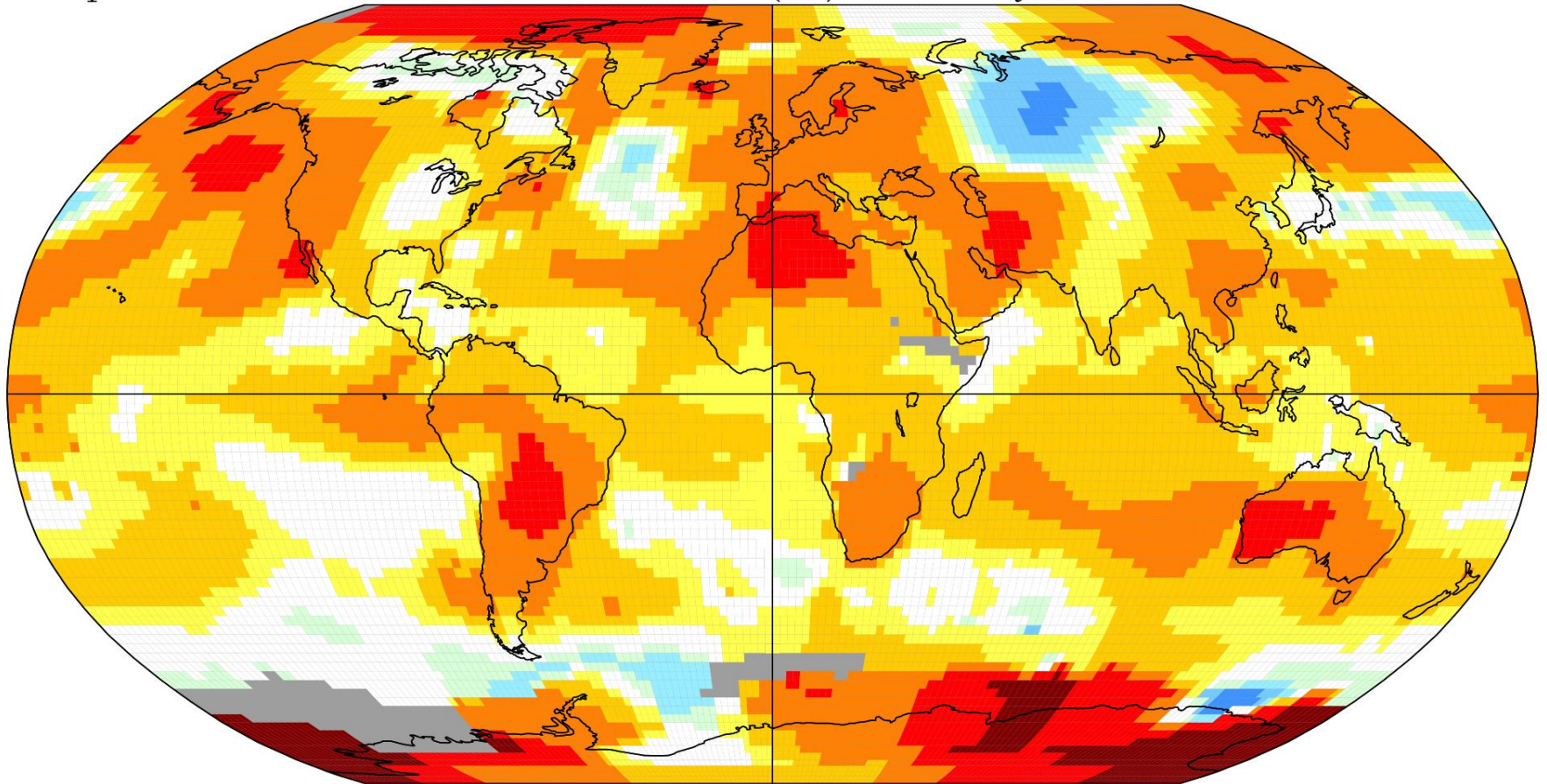
HIROSHIMA FLOODS, AUGUST 2014

HOTTEST APRIL, MAY, JUNE, AUGUST, SEPTEMBER AND OCTOBER ON RECORD

September 2014

L-OTI(°C) Anomaly vs 1951-1980

0.78



THE THREATS OF EMERGING DISEASES

EBOLA



MERS



SARS



AVIAN FLU



Challenges to Meet the Sustainable Development:

Rapid Technological Transformation

Equity in Social Service Provision

Community Protection of Natural Resources

Strengthening of Local Governance

Sharing Work, Learning, and Leisure

Restraining Arbitrary Corporate Power

Responsible investing and Financial Markets

Re-Democratizing Our Democracies

Identifying Shared Global Values

CURRENT DRAFT LIST OF SDGS

END POVERTY

END HUNGER

HEALTH FOR ALL

EDUCATION FOR ALL

GENDER EQUALITY

SUSTAINABLE WATER AND SANITATION

SUSTAINABLE ENERGY FOR ALL

SUSTAINABLE GROWTH AND JOBS

SUSTAINABLE INFRASTRUCTURE AND INDUSTRIALIZATION

REDUCE INEQUALITIES

SUSTAINABLE CITIES

SUSTAINABLE CONSUMPTION AND PRODUCTION

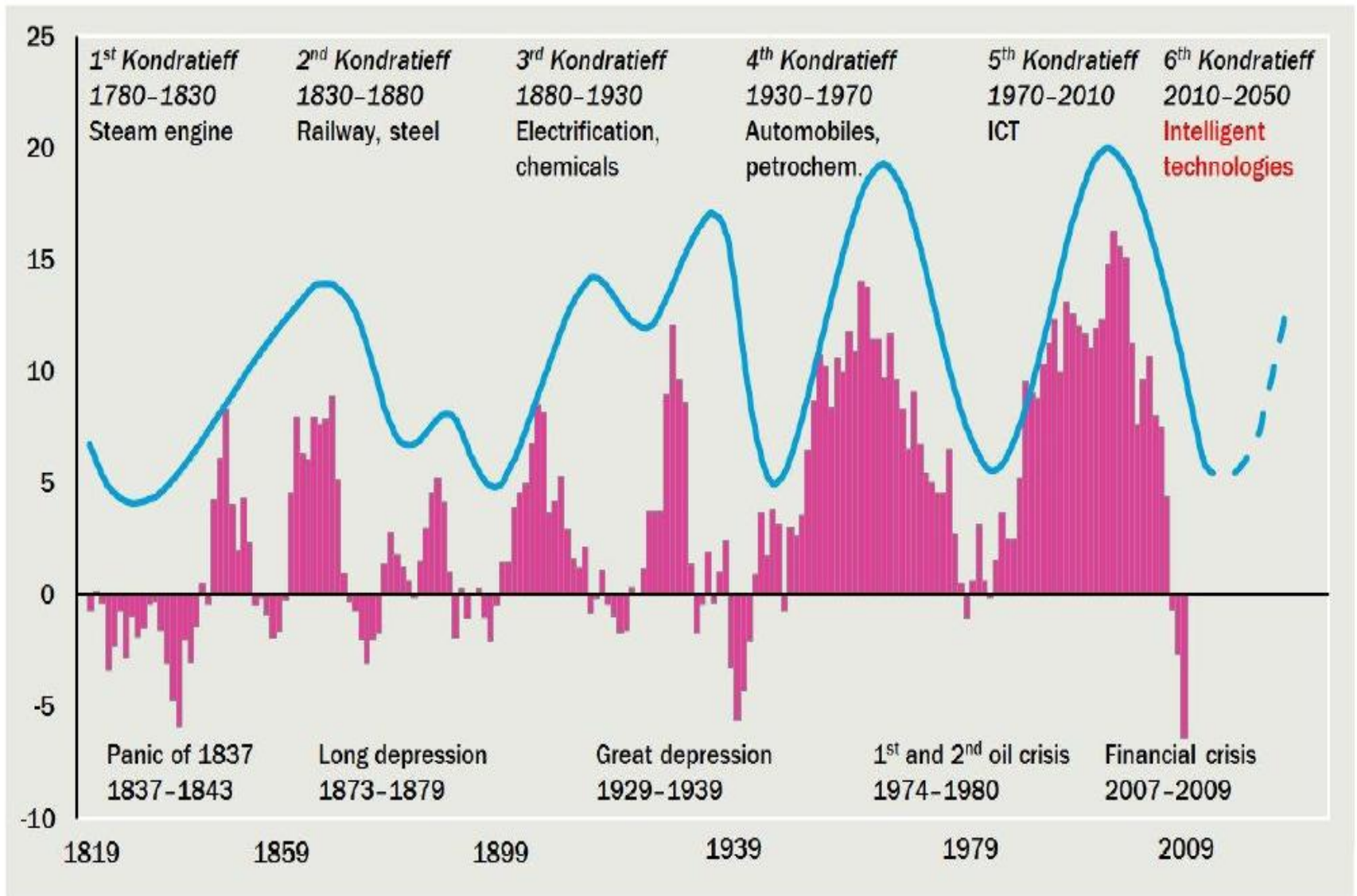
TACKLE CLIMATE CHANGE

CONSERVE MARINE ECOSYSTEMS AND RESOURCES

CONSERVE TERRESTRIAL ECOSYSTEMS AND RESOURCES

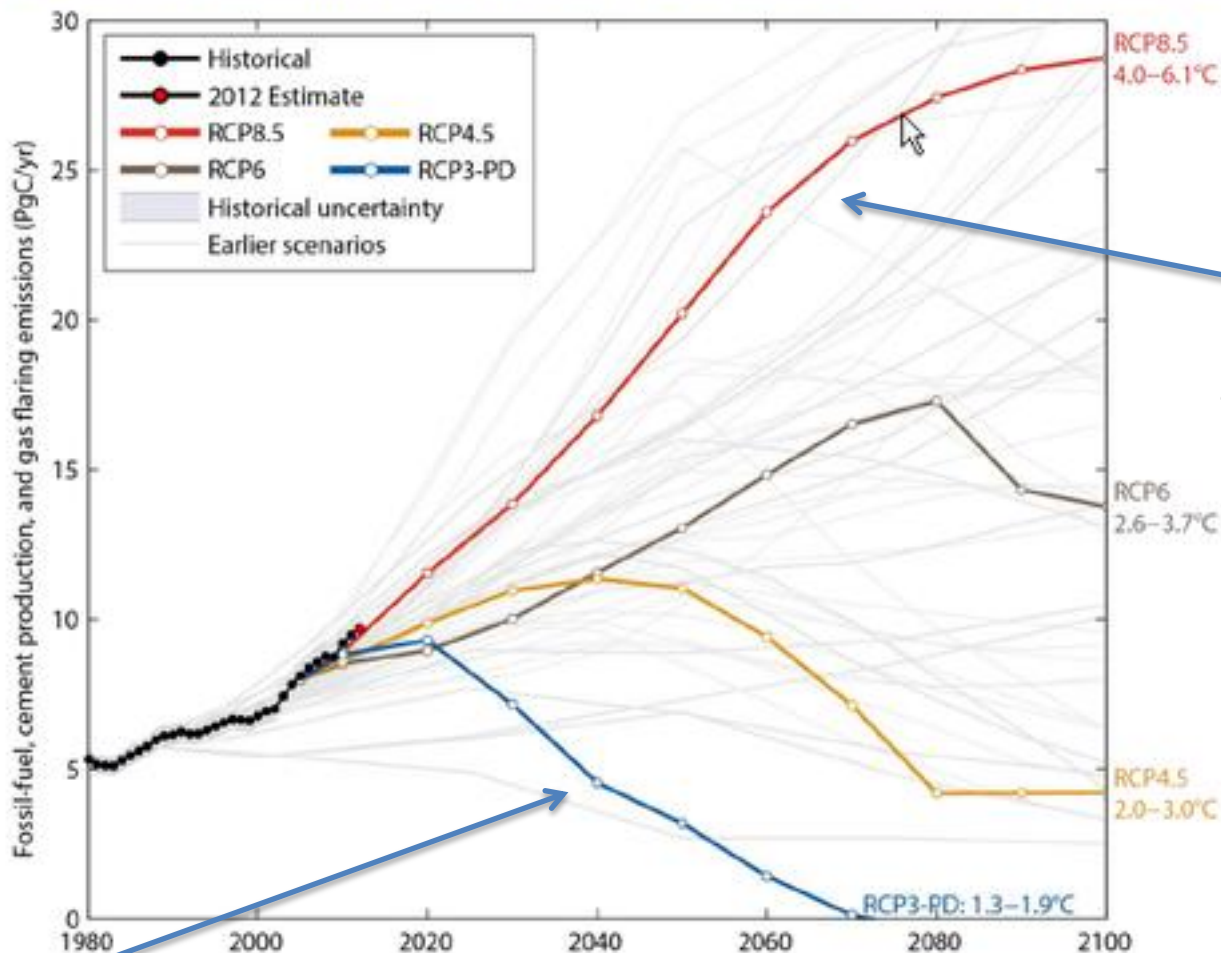
ACHIEVE PEACEFUL AND INCLUSIVE SOCIETIES

STRENGTHEN THE MEANS OF IMPLEMENTATION



SIXTH WAVE SHOULD BE SUSTAINBLE GROWTH BUILT ON DIGITAL REVOLUTION

Emissions are heading to a 4.0-6.1°C “likely” increase in temperature
Large and sustained mitigation is required to keep below 2°C



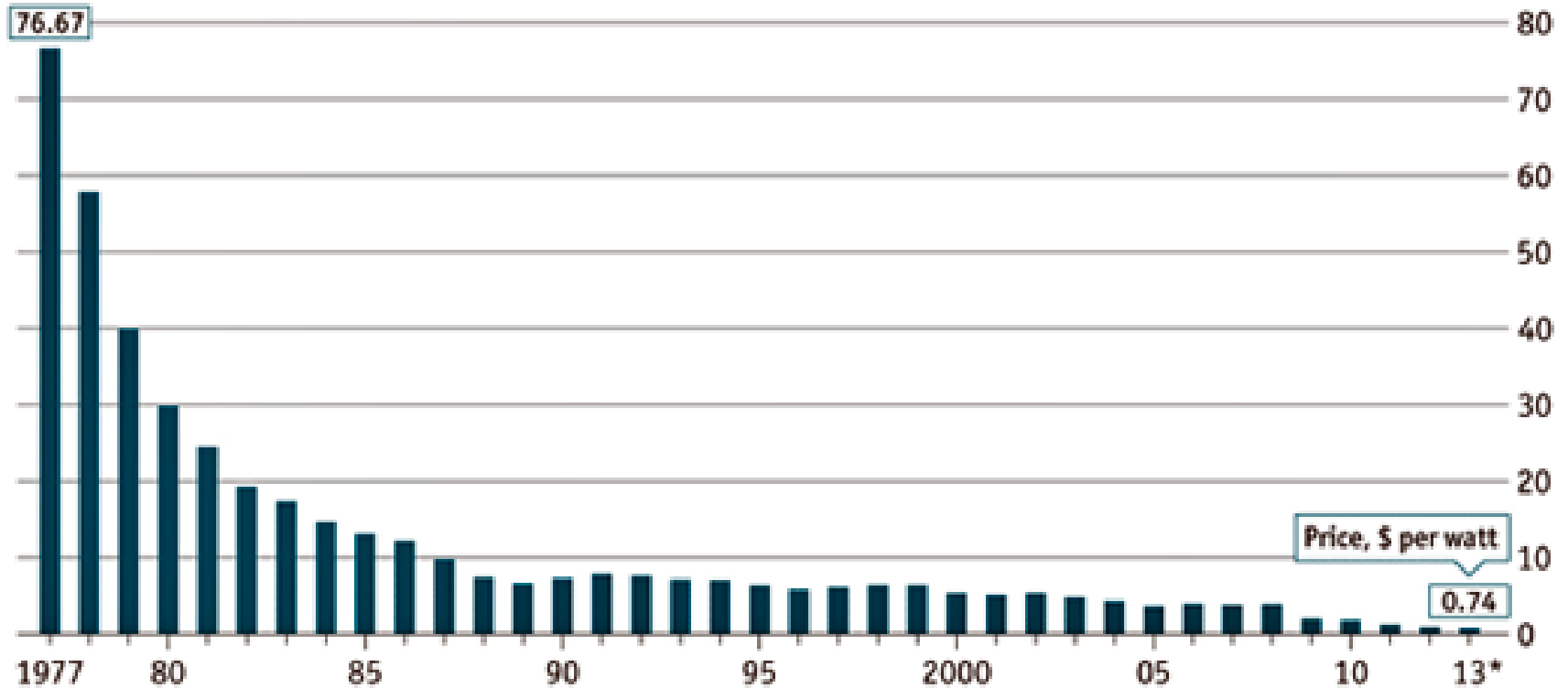
Linear interpolation is used between individual datapoints

Source: [Peters et al. 2012a](#); [Global Carbon Project 2012](#);

2-degree C

The Swanson effect

Price of crystalline silicon photovoltaic cells, \$ per watt



Source: Bloomberg New Energy Finance

*Forecast

CRITICAL “SYSTEMS” PRIORITIES:

SUSTAINABLE ENERGY SYSTEMS

SUSTAINABLE AGRICULTURE AND NUTRITION

SUSTAINABLE URBANIZATION (“SMART CITIES”)

HEALTH, EDUCATION, AND MEANINGFUL WORK
FOR ALL

WILL NEED TECHNOLOGICAL BREAKTHROUGHS

EXAMPLES OF DIRECTED SCIENCE AND TECHNOLOGY:

VACCINES, MEDICINES, AND DIAGNOSTICS

RADAR

CRYPTOGRAPHY

NUCLEAR ENERGY

COMPUTING

SEMICONDUCTORS

SATELLITES AND SPACE SCIENCE

INTERNET

HUMAN GENOME PROJECT

HIGGS BOSON (CERN)

BRAIN INITIATIVE

NEED NEW GLOBAL PUBLIC-PRIVATE PARTNERSHIPS
FOR:

LOW-CARBON ENERGY SYSTEMS

RESILIENT AND SUSTAINABLE AGRICULTURE

SMART ICT-ENABLED URBAN SYSTEMS

ICT-ENABLED HEALTH, EDUCATION, GOVERNANCE

2015 IS THE DECISIVE YEAR OF DIPLOMACY, AND PERHAPS “LAST CHANCE” FOR A SAFE CLIMATE

THE 2015 OPPORTUNITIES:

- REINVIGORATE DEVELOPMENT ASSISTANCE
- ADOPT THE SDGS
- CREATE A CLIMATE AGREEMENT BASED ON THE 2-DEGREE C LIMIT
- HEALTH FOR ALL – GLOBAL FUND FOR HEALTH
- EDUCATION FOR ALL – GLOBAL FUND FOR EDUCATION
- BOLSTER PUBLIC-PRIVATE PARTNERSHIPS FOR SUSTAINABLE TECHNOLOGIES

KEY ROLES OF SCIENTIFIC-ENGINEERING COMMUNITY

- (1) Understanding mechanisms: climate, biodiversity, economic dynamics
- (2) Monitoring and mapping Earth system states
- (3) Developing integrated Physical-Human systems frameworks (“green economy,” “smart cities,” “circular economy”)
- (4) Directed technological advancement (e.g. “deep decarbonization” through RDD&D)
- (5) Institutional Innovation for Sustainable Development
- (6) Shared global framework and communication