SPECIAL REPORT ON EMISSIONS SCENARIOS BY THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

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WHO WROTE IT?

- Intergovernmental Panel on Climate Change established by the World Meteorological Organization and the United Nations Environment Program.
- Writing team of: 50 members from 18 countries

HOW?

6 Steps

- Literature Review of existing scenarios
- Analysis of major scenario characteristics and drivers.
- Formed 4 storylines
- Quantified storylines with modeling
- Open review process, no official model or expert teams
- 3 revisions of the resultant scenarios

WHY?

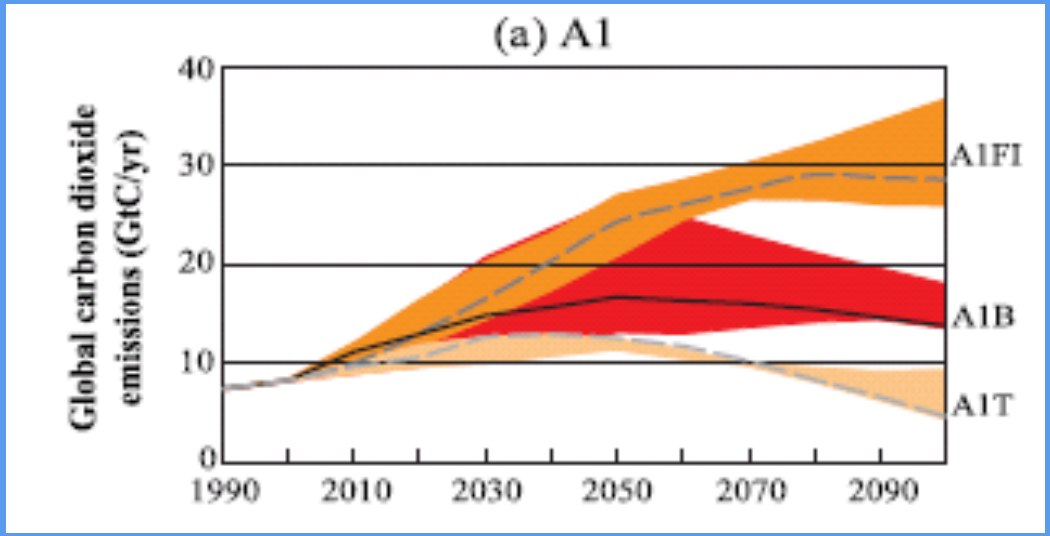
- To update the IPCC report from 1992 in light of new understanding.
- Tool with which to analyze future emission outcomes and driving forces
- Encompass the range of uncertainties of future Green House Gas (GHG) emissions
- Not intended to be policy recommendations, no preference is stated.

A1: 1.4 - 6.4°C

RAPID ECONOMIC GROWTH AND TECHNICAL PROGRESS

DRIVERS OF A1 SCENARIO FAMILY

- Successful global economic growth
- Regional average income per capita converge ($21,000 by 2100)
- Global population peaks at 10 billion by 2050 and levels out to about 7 billion
- Quick spread of new and efficient technologies



FOUR A1 GROUPS

- A1B: assumes a "balanced" progress across all resources and technologies from energy supply to end-use and "balanced" land use changes
- A1T: a "non-fossil" future, with rapid development of solar and nuclear technologies on the supply side and fuel cells used in energy end-use applications

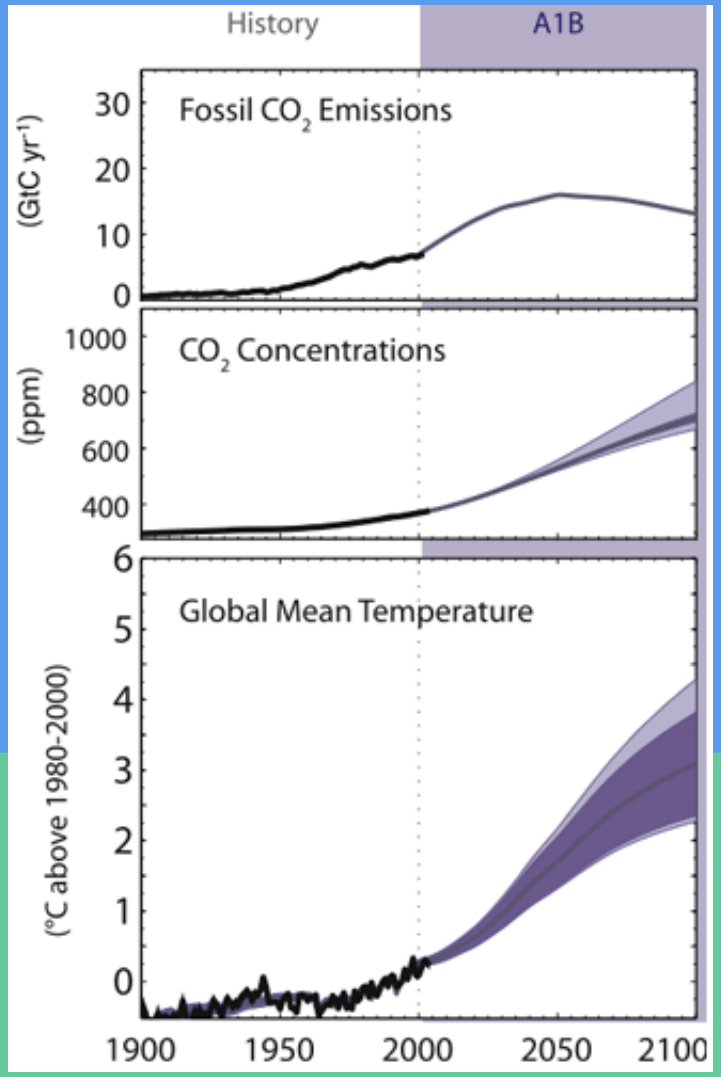
FOUR A1 GROUPS

- A1C: "clean coal" technologies are developed, generally environmentally friendly (with the exception of GHG emissions)
- A1G: an "oil and gas rich" future, swift transition from conventional resources to abundant unconventional resources

Referred to together as A1FI for the fossil fuel intensive scenarios

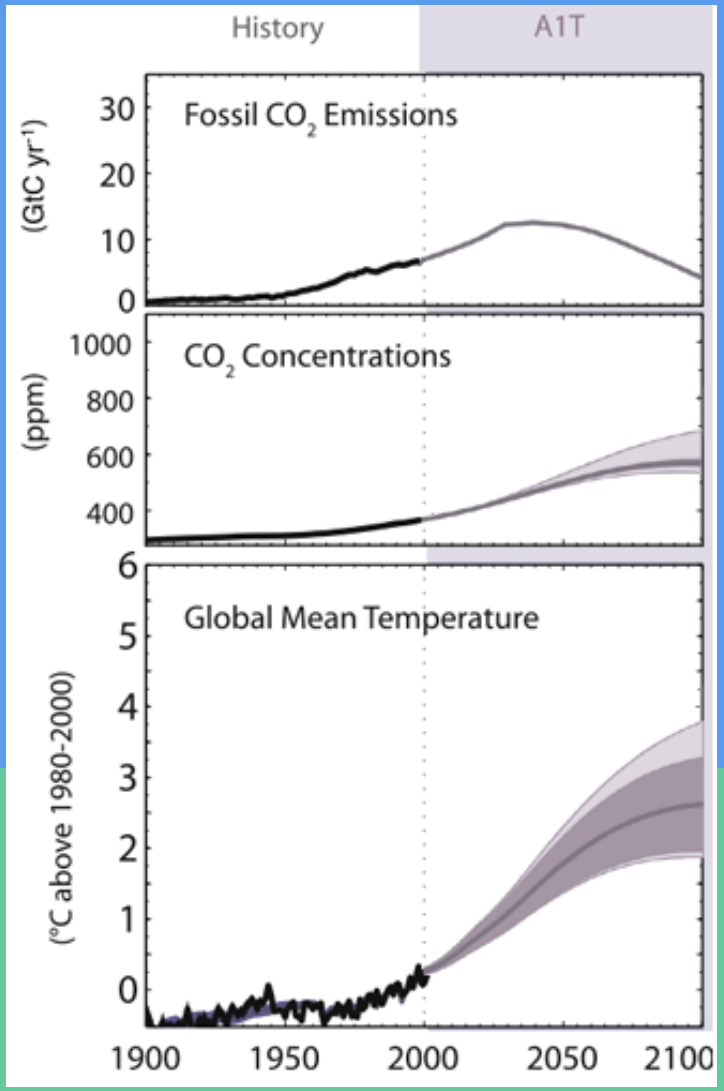
A1B CONSEQUENCES

- 1.7-4.4°C warming by 2090
- 0.21-0.48m sea level rise by 2090
- Steep increase in emissions due to fossil fuels in first decades of 21st century



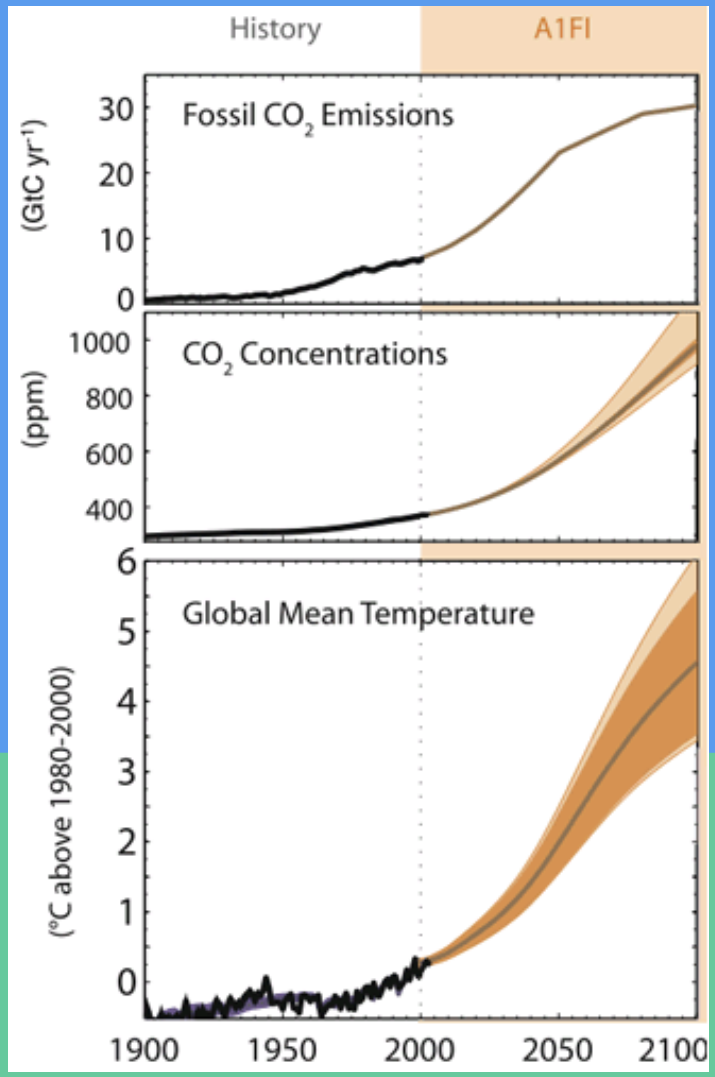
A1T CONSEQUENCES

- 1.4-3.8°C warming by 2090
- 0.20-0.45m sea level rise by 2090
- Shift towards nuclear and renewable energy sources



A1FI CONSEQUENCES

- 2.4-6.4°C warming by 2090
- 0.29-0.59 m sea level rise by 2090
- Countries with fossil fuel resources depend heavily on them



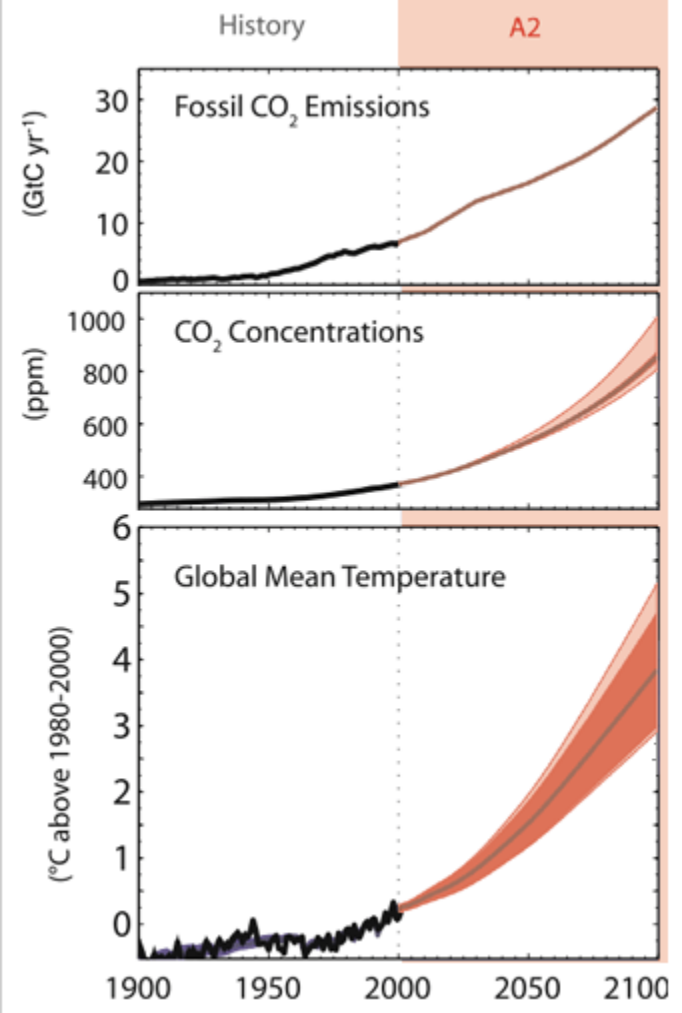
OVERALL A1 CONSEQUENCES

- Dietary patterns shift towards an increased consumption of meat
- High income translates into high car ownership, sprawling suburbia and dense transport networks
- Methane production rises until at least 2030, when population begins to decrease
- Concept of environmental quality changes from current emphasis on "conservation" of nature to active "management" of natural and environmental services

DRIVERS

- Low trade flows
- Relatively slow capital stock turnover
- Slower technological changes
- Economic growth is uneven but grows at a relatively medium rate

DRIVERS



- The A2 world "consolidates" into economic regions
- Less emphasis on economic, social, and cultural interactions between the regions

NEGATIVE CONSEQUENCES

- Population reaches 15 billion by 2100
- Low-income resource-rich regions generally rely on older fossil technologies
- Some regions move toward "leaner" government and more heterogeneous income distributions
- Initial high levels of soil erosion and water pollution
- Global environmental concerns are relatively weak

POSITIVE CONSEQUENCES

- High-income but resource-poor regions shift toward advanced post-fossil technologies
- Some regions move toward stronger welfare systems and reduced income inequality
- Local development of more sustainable high-yield agriculture
- attempts are made to bring regional and local pollution under control and to maintain environmental amenities

B1: 1.1 - 2.9°C

GLOBAL ENVIRONMENTAL SUSTAINABILITY

DRIVERS

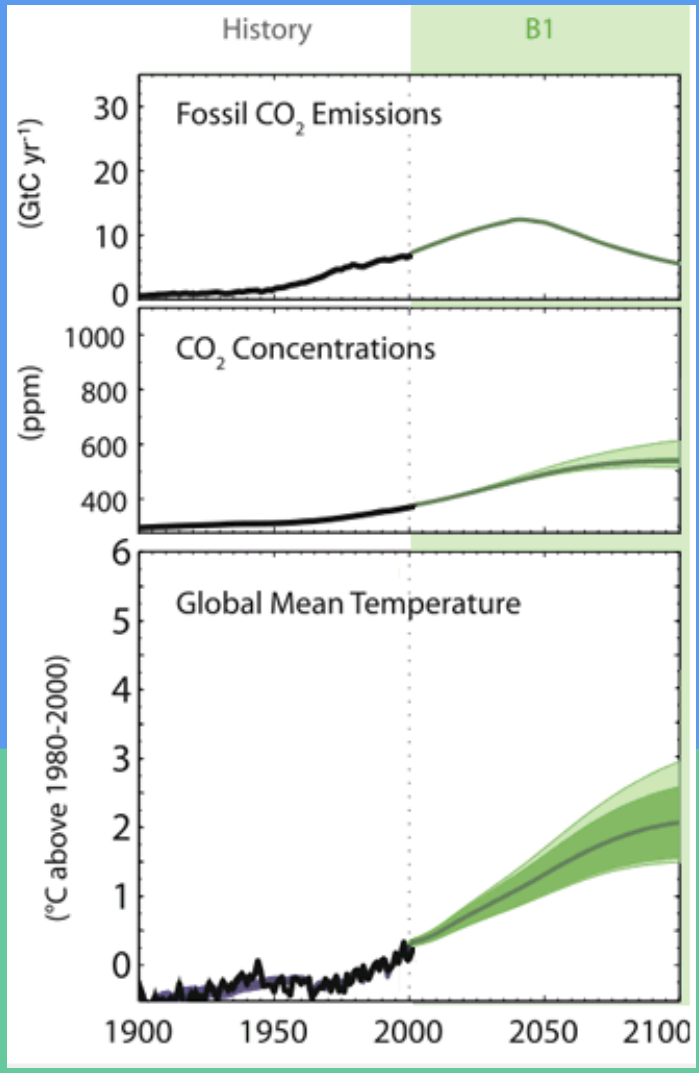
- Rapid demographic transition, driven by rapid social development (ex: education)
- High economic growth towards a service and information economy in all regions, resulting in a reduction in present income disparities
- Dematerialization of economic activities, saturation of material and energy intensive activities
- An emphasis on global solutions to economic, social and environmental stability
- Low population growth same as A1

POSITIVE CONSEQUENCES

- High levels of social consciousness and successful governance
- Strong reductions in income and social inequalities
- Introduction of clean and resource efficient technologies
- Developed concepts of "green" GDP, environmental conservation is emphasized
- Transboundary air pollution is basically eliminated in the long term

NEGATIVE CONSEQUENCES

- Emissions peak at 2050 at 19 Gt(C)/yr
- 1.1-2.9°C increase by 2100
- Sea level rise between 0.18-0.38m



SOCIAL AND ECONOMIC DRIVERS

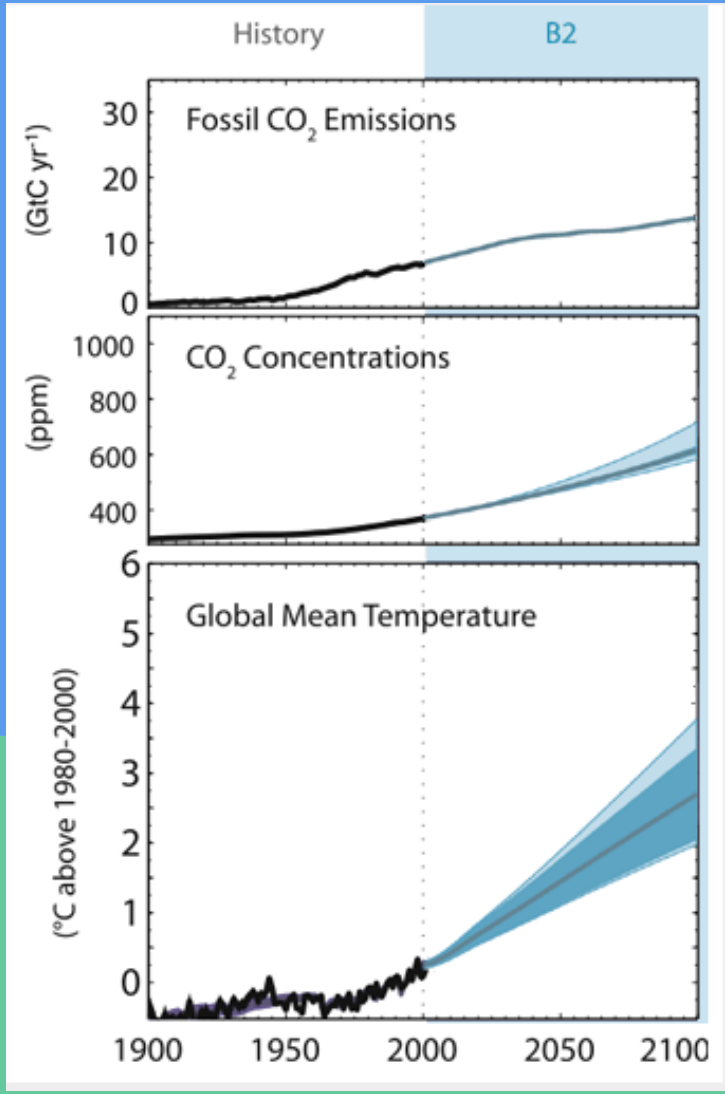
- environmentally aware citizens
- emphasis on environmental protection and social equity
- continuous population growth 7.6 billion by 2020 9.3 billion by 2050 10.4 billion by 2100
- Community initiative and social innovation
- Emphasis on local
- Per capita income $12,000 by 2050
- uneven technical advances, regionally based.
- Better integrated land use management
- Reliance on regionally available natural resources

POSITIVE CONSEQUENCES

- Rise in education and welfare programs
- Reduction in mortality and fertility rates
- Environmental protection is an international priority

NEGATIVE CONSEQUENCES

- Decentralized world of small competing group
- Slow development, particularly in currently developing parts of the world.
- 1.4-3.8°C warming by 2090
- .2-.43 m sea level rise



SRES PROJECTIONS

- The driving forces and emissions of each SRES scenario should be used together
- Alternative combinations of main scenario driving forces can lead to similar levels of GHG emissions by the end of the 21st century
- The worst case scenarios, A1F1 & A2, would have devastating consequences
- The scenario with the lowest temperature change, B1, still has serious impacts on the globe

SRES RECOMMENDATIONS

- Establishment of a program for on-going evaluations and comparisons of long-term emissions scenarios
- There is no single most likely, “central”, or “best-guess” scenario, either with respect to SRES scenarios or to the underlying scenario literature

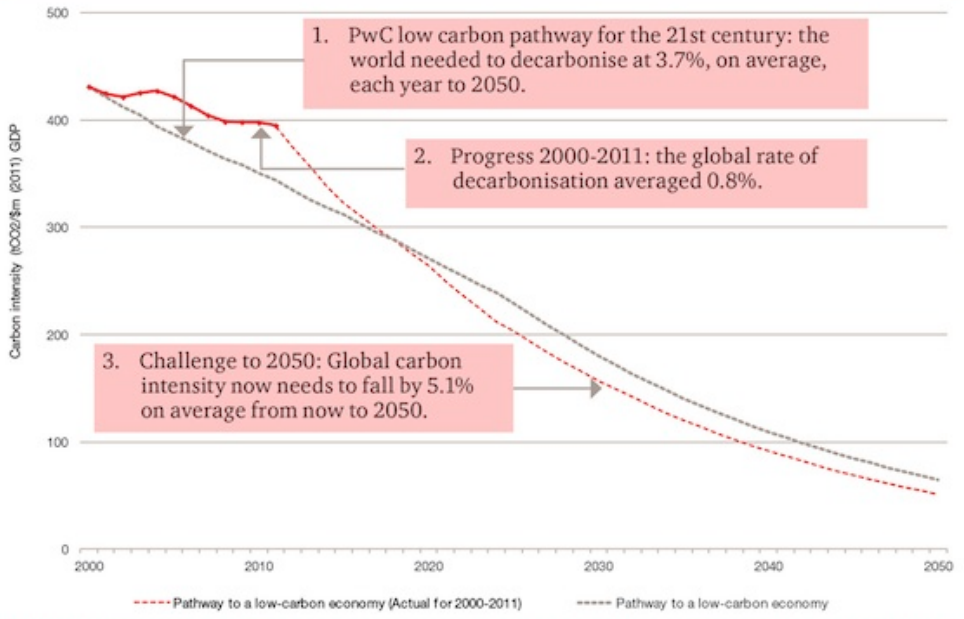
CURRENT PROJECTIONS

- The global economy now needs to cut carbon intensity by 5.1% every year from now to 2050 to keep to the 2°C target
- Sea level rise of 1 foot by 2050, then 4 to 6 feet (or more) by 2100, rising some 6 to 12 inches (or more) each decade thereafter
- Massive species loss on land and sea — perhaps 50% or more of all biodiversity

CURRENT PROJECTIONS

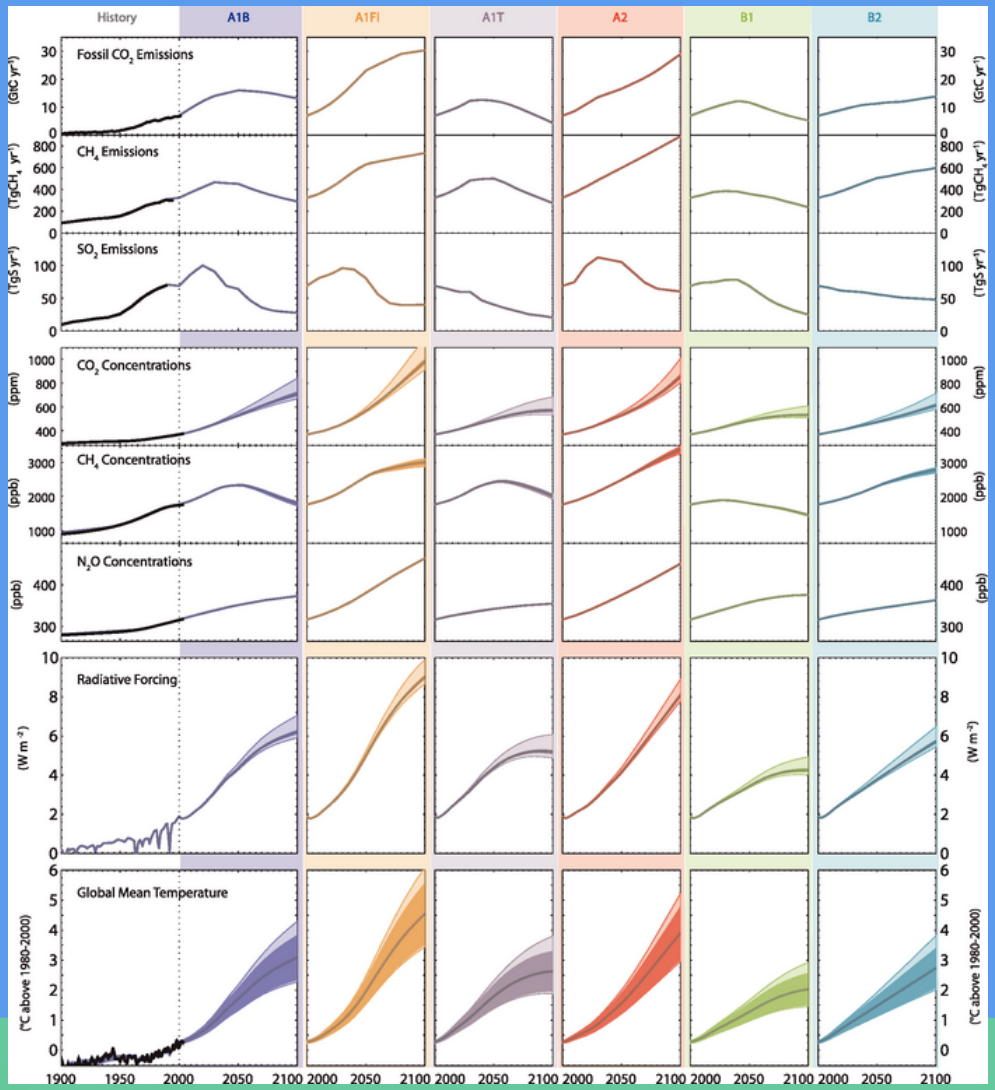
- getting to a 4°C scenario would imply nearly quadrupling the current rate of decarbonisation
- "business-as-usual is not an option."

Figure 1: PwC's Low Carbon Economy Index – Global*



* We use the carbon intensity for countries as a measure of progress towards a low carbon economy. The carbon intensity of an economy is the emissions per unit of GDP and is affected by a country's fuel mix, its energy efficiency and the composition of the economy (i.e. extent of activity in carbon-intensive sectors).

Source: PwC's analysis, data from World Bank (2012) and BP Statistical Review (2012)



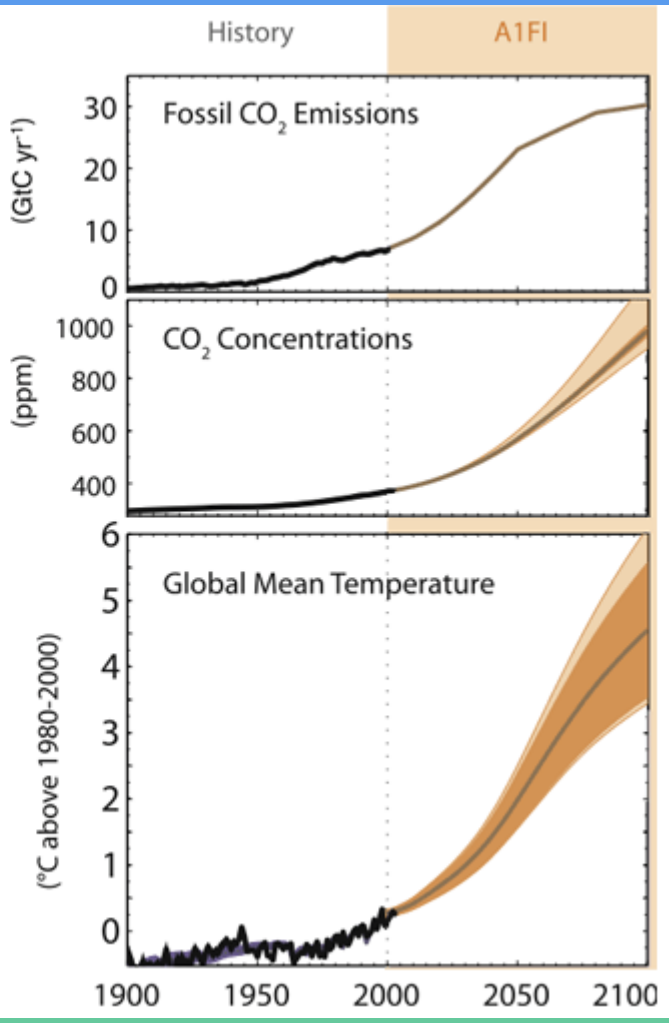
http://www.ipcc.ch/publications_and_data/ar4/wg1/en/figure-10-26.html

Scenario A1FI | Credits

The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system.

The three A1 groups are distinguished by their technological emphasis: **fossil-intensive (A1FI)**, non-fossil energy sources (A1T) or a balance across all sources (A1B) (where balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies).

Population: Low (~7 billion in 2100)
Economic Growth: Very high
Primary Energy Use: Very high (primarily fossil fuel sources)
Land-use Change: Low



Compare IPCC Scenarios Interactive

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