THE GLOBAL CLIMATE CHANGE HAZARD

SCIENCE and POLICY

dr. Tibor Faragó - hon. professor, Tibor_Farago@)t-online.hu
former national (Hungarian) focal point for the IPCC and the UNFCCC

Science-policy interlink

Changing global climate system

Implications: env. and socio-economic impacts

Mitigation: response policies

Conclusions

SCIENCE-POLICY INTERLINK

SCIENCE

- **1938 significant human contribution to greenhouse gas emissions may lead to global climate change ..**
- **1988 Intergovernmental Panel on Climate Change (IPCC): established**
  * provide governments with a comprehensive assessment of the most up-to-date scientific knowledge on issues related to climate change
  * science-based information: policy-relevant but not policy prescriptive
- **2007**
  4th comprehensive report of the IPCC
- **2013/14**
  the 5th report of the IPCC

POLITICS/POLICY-MAKING

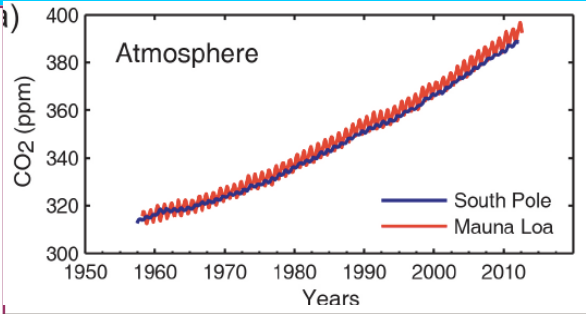
- **1988 UN resolution: international coop. is needed to combat this hazard**
- **1992 UN Framework Convention on Climate Change:**
  developed countries commit to stabilize emissions by 2000
  1997 Kyoto Protocol:
  developed countries commit to lessen emissions by 5% by 2012
- **2007- new negotiations >> no outcome in 2009 Copenhagen**
- **2010- new negotiations**

  2015 agreement in Paris?

GLOBAL ENVIRONMENTAL CHANGE:

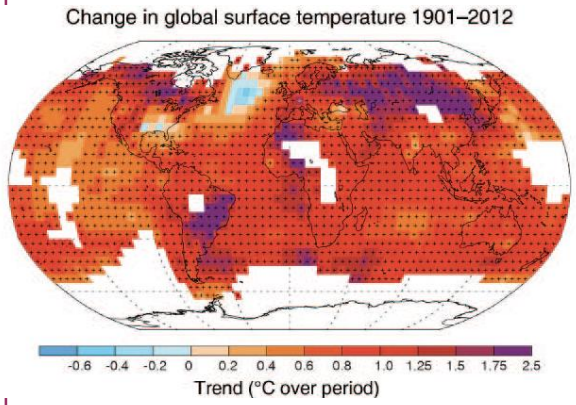
changing state of the global climate system (IPCC 5th report 1st part)

- **Changes - detection**
  - ***Atm. concentrations*** of greenhouse gases have increased:
    *CO_2 has increased by 40% since pre-industrial times
    *CO_2, methane and nitrous oxide conc-s have increased to levels unprecedented in at least the last 800,000 years
  - ***Warming*** of the climate system is unequivocal
    *the atmosphere and ocean have warmed
    *in the Northern Hemisphere, 1983–2012 was likely the warmest 30-year period of the last 1400 years
    *the amounts of snow and ice have diminished, glaciers have continued to shrink almost worldwide
    *sea level has risen



CO_2 concentrations 1958-

- **Attribution - cause-effect relations*: human factors?***
  - ***Human influence*** on the climate system is clear: evident from the increasing atm. ghg concentrations, positive radiative forcing, observed warming, and understanding of the climate system.
  - Increase of atm. CO_2 is ***primarily due to fossil fuel emis-s + from net land use change*** emissions (deforestation etc.).
  - There are many other anthropogenic sources of the ghg-s.



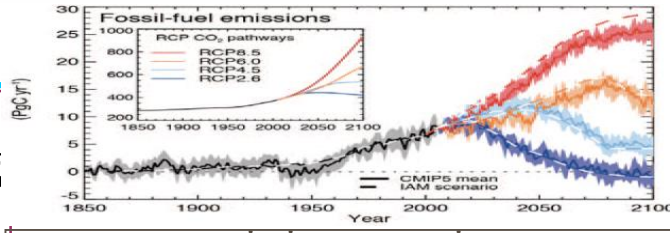
The globally averaged combined land and ocean temperature data: increase of 0.89°C over the period 1901-2012

CHANGING GLOBAL ENVIRONMENT:

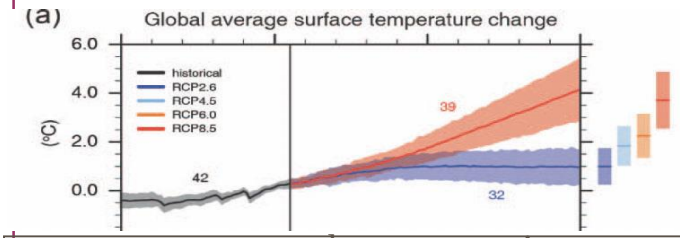
the future ..

- **Scenarios ~** conditional assessments
  - ***Cont'd emissions*** of ghg-s will cause further warming and changes in all components of the cl. system.
  - ***Global surface temperature change*** by the end of the 21st century is projected to likely exceed ***1.5°C*** relative to the average for 1850-1900.
    RCP2.6: *+1.0°C* RCP4.5: *1.8°C* RCP6.0: *2.2°C* RCP8.5: *3.7°C*
  - ***Regional changes***:
    *surface temp. change will not be regionally uniform;
    +warming over land will be larger than over the ocean
    +warmer days, nights; +heat waves:
    increased freq./duration of over most land areas
    *changes in the global water cycle will not be uniform
    +heavy precip. events: incr-d freq., intensity, amount over most mid-latitude land areas .. (very likely)

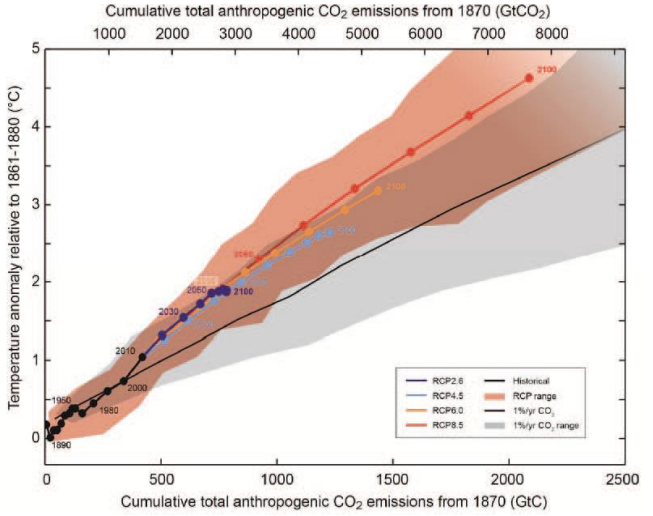
- **Still manageable?** – basis for relevant policies
  - ***Cumulative emissions*** of CO_2 largely determine global mean surface warming by the late 21st century and beyond.
  - ***Limiting climate change*** will require substantial and sustained reductions of greenhouse gas emissions



.emissions scenarios
(for various concentration pathways)



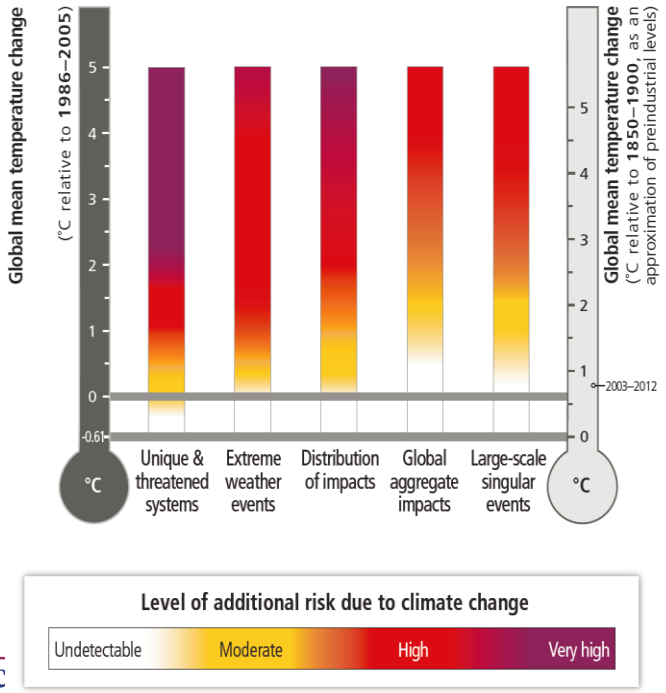
temperature change scenarios



ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS:

implications of the global change (IPCC 5th report 2nd part)

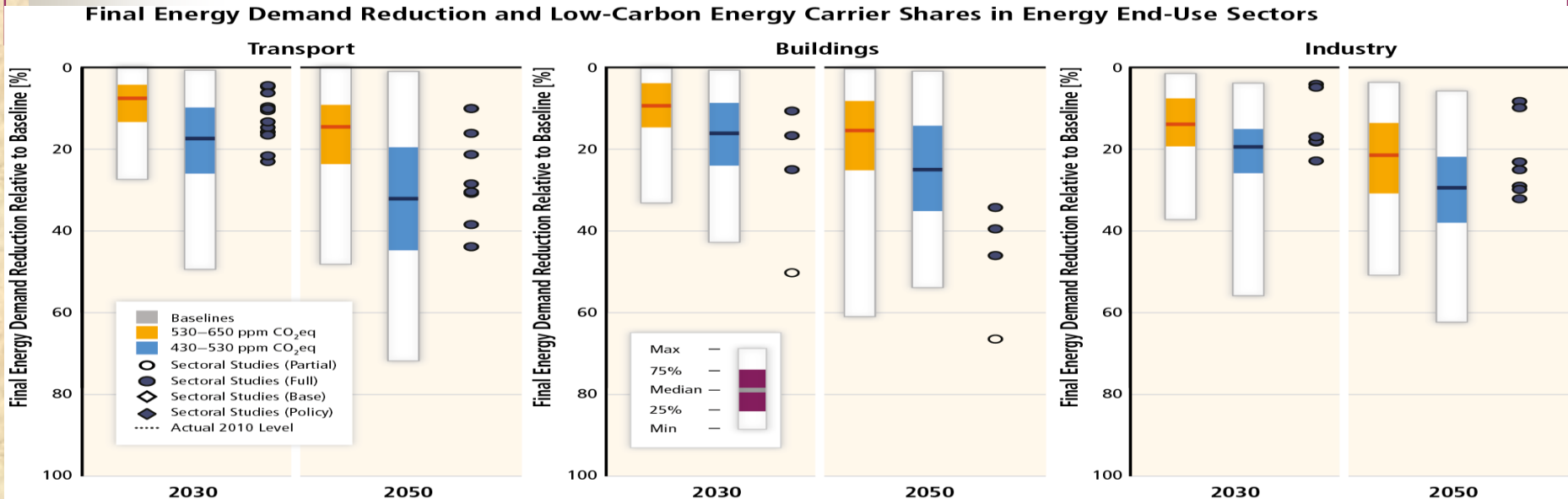
- **Recent impacts**
  - In recent decades, changes in climate have caused ***impacts on natural and human systems*** on all continents and across the oceans:
    + hydrological systems + shrinking ***glaciers***
    + negative impacts of climate change on ***crop yield***s have been more common than positive impacts
  - Impacts from recent ***climate-related extremes,*** such as heat waves, droughts, floods, cyclones, and wildfires
- **Future: key risks = reasons for concern**
  - There are various implications of warming and of adaptation limits for people, economies, ecosystems.
  - Increasing magnitudes of warming increase the likelihood of severe, pervasive, and irreversible impacts. ***Some risks of climate change are considerable at 1 or 2°C above preindustrial levels.***
- **Adverse impacts – manageable?**
  - relevant policies
    * develop ***adaptation plans*** and policies
    * integrate climate-change considerations into broader development plans



RESPONSE POLICIES:

mitigation of climate change (IPCC 5th report 3rd p.t)

- **The „target" (accepted by policymakers)**
  - Limiting warming to 2°C involves ***substantial technological, economic .. challenges***.
  - For this: ghg atm. ***concentrations in 2100: ~ 450 ppm*** CO_2eq – now (!) 400ppm
- **General policy approach** (for ≤2°C)
  - Lower CO_2eq emissions globally: ***2050 by 40-70%*** comp. to 2010; in 2100: ~zero emissions
- **Sectoral mitigation efforts** (for ≤2°C) ~some also for adaptation (building, forestry)
  - large-scale changes in energy systems and land use .. + many other sectros ..
  - in the ***energy supply sector***
  - in the final ***energy demand: reductions*** in transport, building, industry
  - in using ***low carbon energy carriers: increases*** in transport, building, industry



CONCLUSIONS:
how science is ackowledged ..

- **What happened**
  - ***2ºC "threshold"*** was adopted by consensus
  - ***New commitments*** by many developed countries (Kyoto Protocol "prolonged"):
    EU 20% by 2020, but w/o USA, RF, AUS, JP, NZ
    EU "offered" conditionally 30% emissions reduction by 2020
  - The importance of ***adaptation*** was also recognized universally.
  - Many developed and developing countries
    have formulated ***national mitigation and adaptation strategies***.
- **What did not happen (yet?)**
  - It is still unclear when the "prolonged" Kyoto Protocol will enter in force.
  - It is still unclear if some of the key emitters are ready for binding commitments.
- **What may happen for the „sake" of 2015**
  - ***The science*** based advices e.g. from the new IPCC report will be taken into account.
  - The EU+ will take ***further "unilateral" steps***:
    mitigation commitments by 2030 with relevant sectoral targets and actions.
  - Some other developed and some developing countries also offer ***mitigation actions***.
  - 2015 a balanced ***"Paris Protocol"*** will be
    on the table with significant flexibilities ..