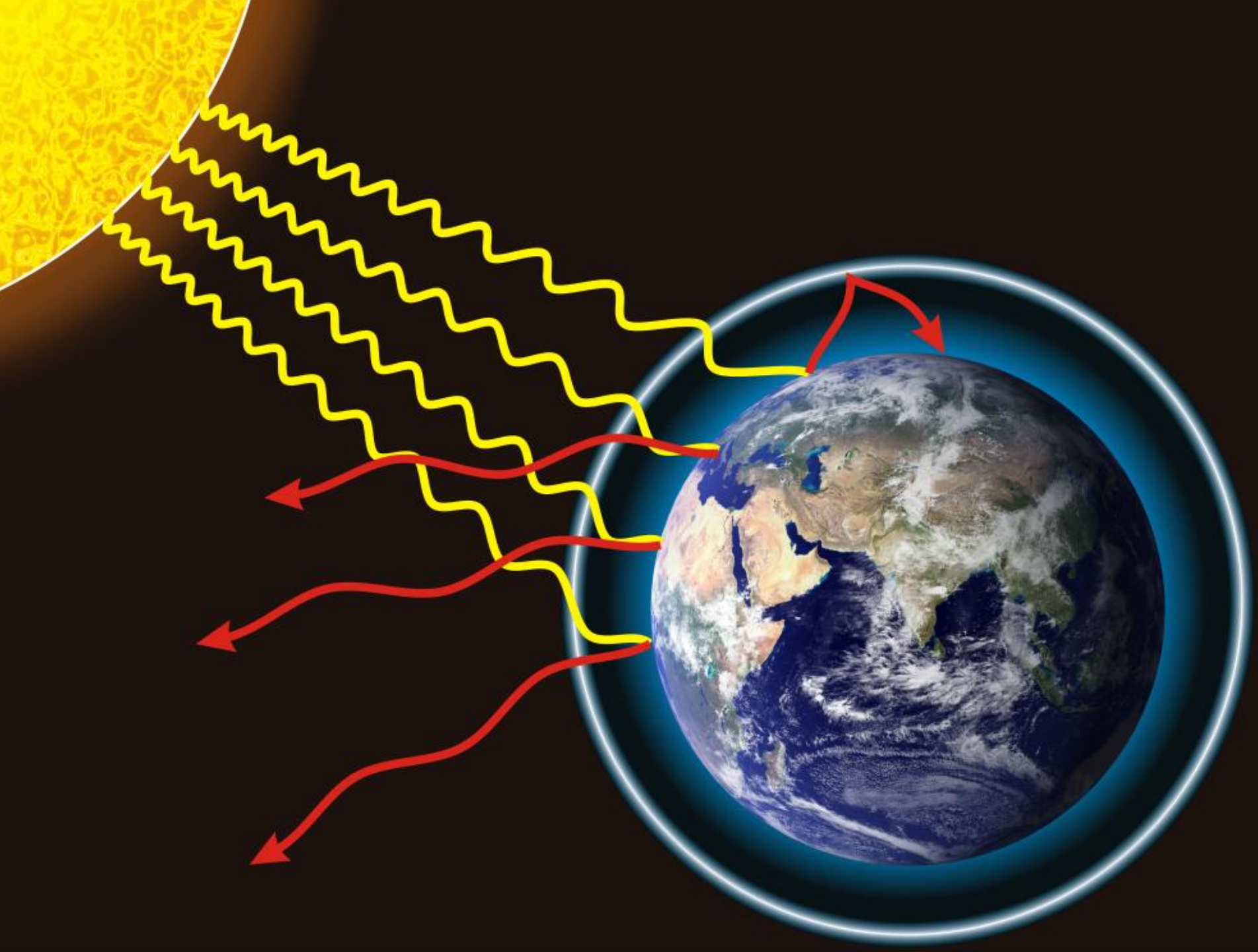


Climate Change Risk and Opportunities after Copenhagen

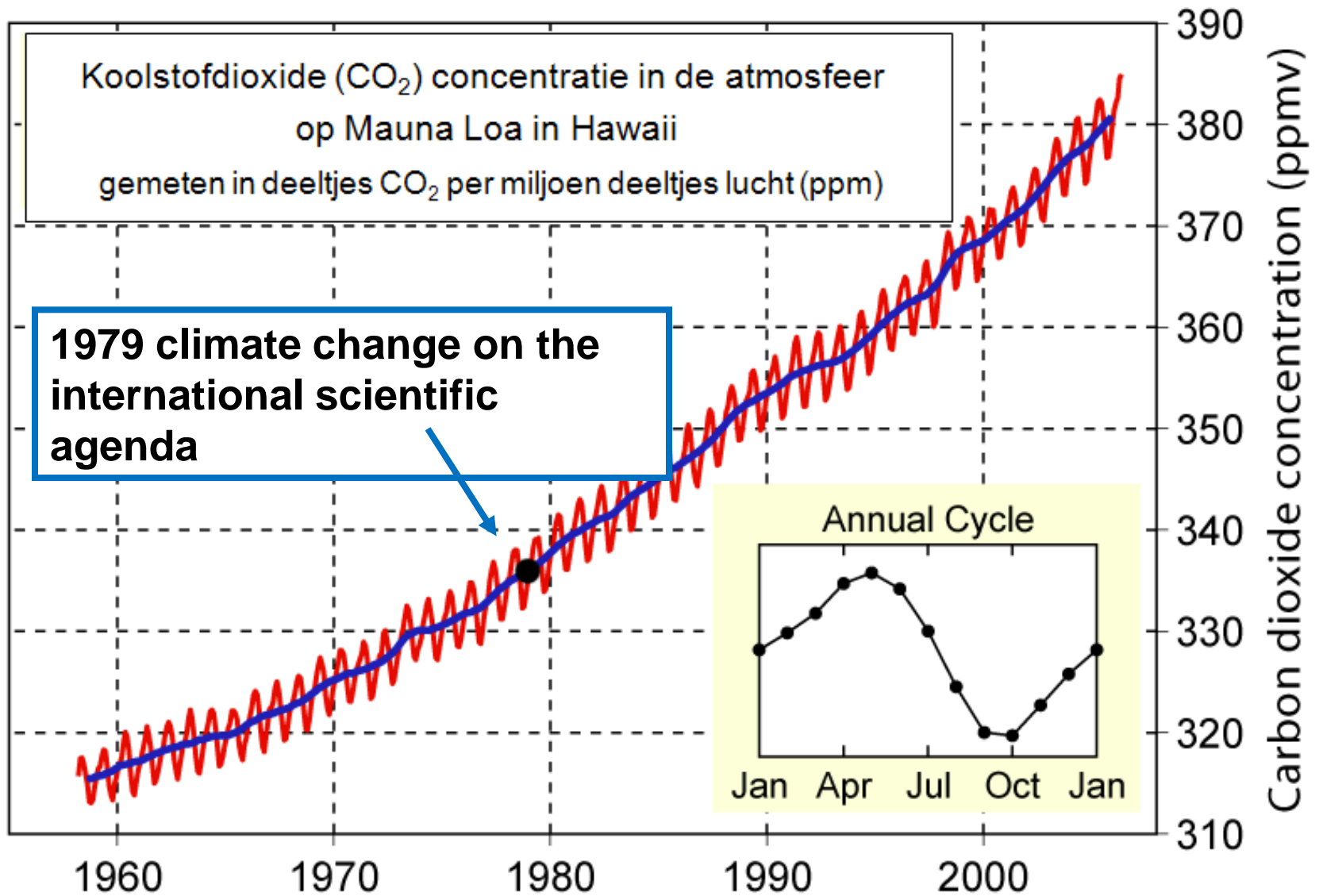
Holland Gateway
Schiphol, Januari 28, 2010

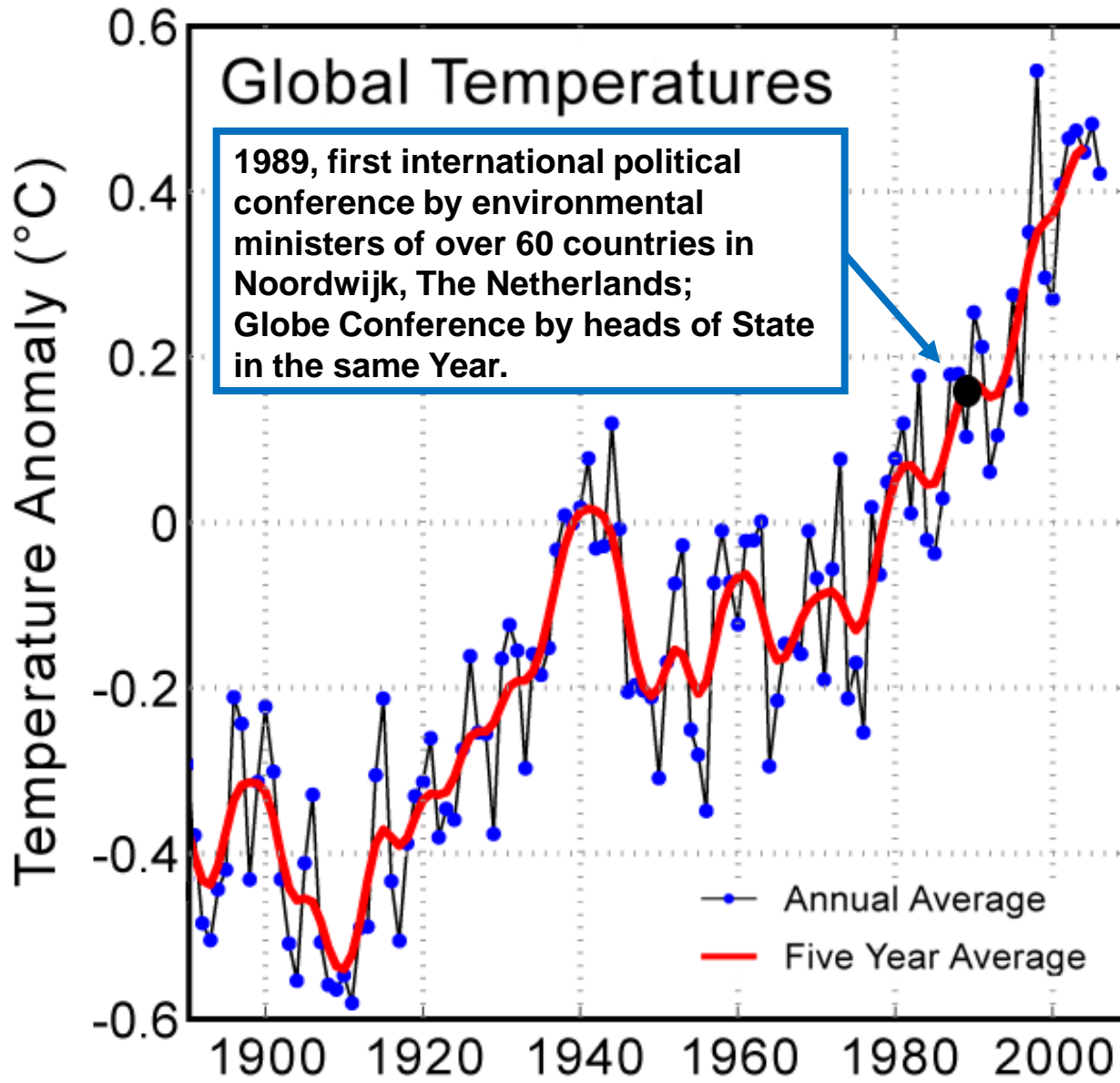
lecture by prof. Pier Vellinga
Wageningen University and Vrije Universiteit Amsterdam



Climate Change is real

- 1. Founded on a well established theory supported by laboratory tests on the effect of CO-2 on radiation transmission;**
- 2. Increase of CO-2 in the atmosphere is undisputed and from fossil origin;**
- 3. The relation between earth temperature and CO-2 concentration in the past (ice ages etc.) supports the greenhouse theory and it's practical implications for earth temperature;**
- 4. Present rate and pattern of temperature increase (1970-2010) supports the greenhouse theory and earlier projections (by Ahrenius 1901, and by IPCC 1991);**
- 5. Since about 1970 the effect of increasing greenhouse gasses is outpacing the variability of earth temperature caused by solar variation, vulcano's, El Nino and others.**





Critical factors for policies and measures to reduce the human pressure on global climate

- 1. Increase in scientific understanding;**
- 2. Increasing visibility of the effects of climate change in temperature, and ice melt and in nature;**
- 3. Technological progress in developing climate neutral energy sources: grid parity within sight;**
- 4. Linking of three societal agenda's: addressing climate change, energy security and (green) jobs....**

Development of international policies

Noordwijk **1989**: political agreement about “ **stabilisation** of emissions at 1990 level by 2000”, and agreement to avoid dangerous interference with the climate system.

Rio de Janeiro **1992**: UN Climate Treaty with principles of international sharing of responsibilities and actions, confirming stabilisation at 1990 levels by 2000.

Kyoto Protocol **1997**: **reduction** of emissions by industrialised countries by **5 %** with respect to 1990 levels by 2010;

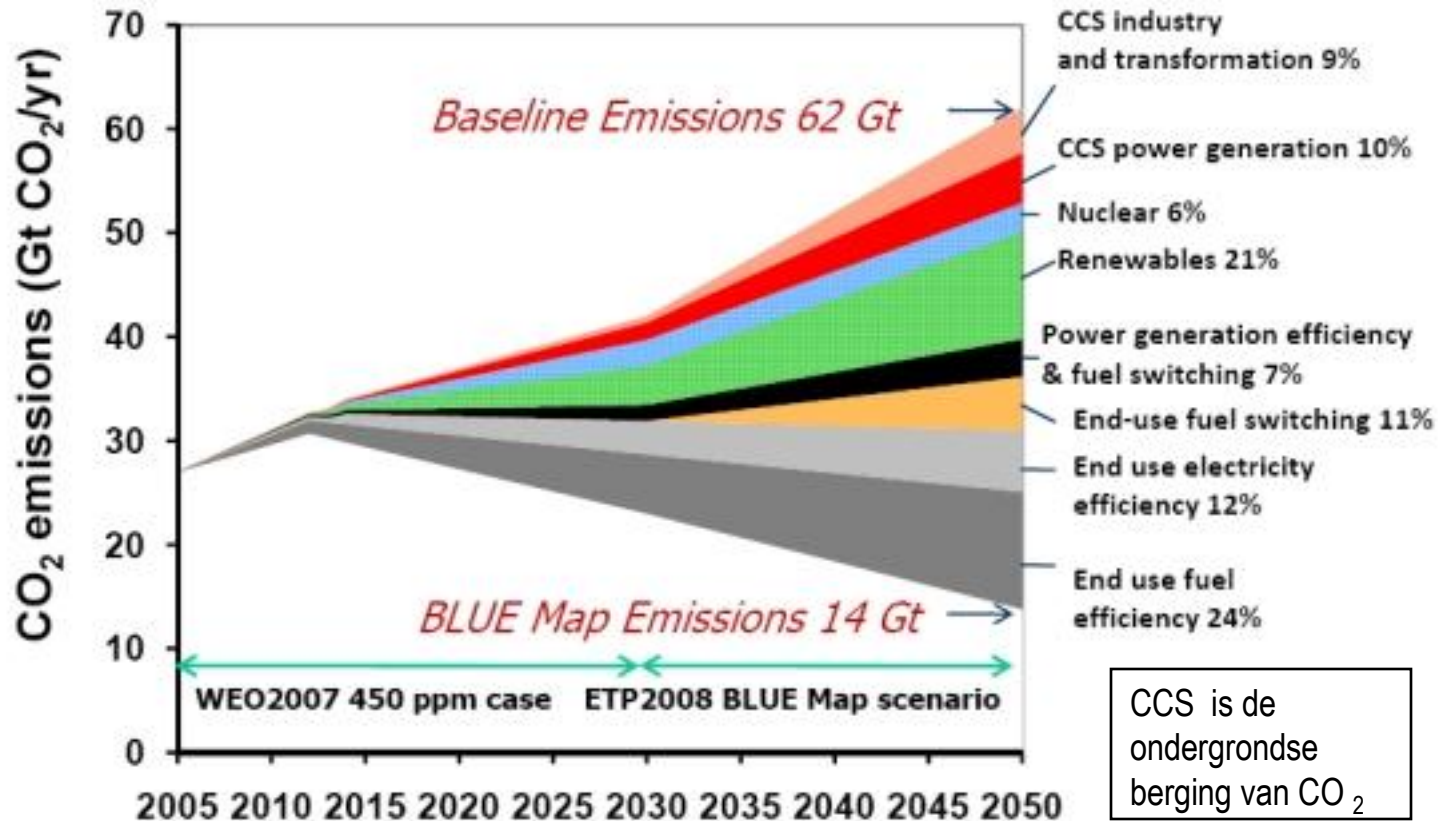
Copenhagen **2009**: “Copenhagen accord” by all major countries: **reduction of emissions 17 to 30 percent** by industrialized countries (EU with 1990 as reference, USA with 2005 as reference). China, India and Brazil ready to reduce 20 to 40 % as compared to business as usual. Significant funds for international cooperation; Global average temperature rise to be limited to **max. 2 degrees**.

Evaluation of Copenhagen

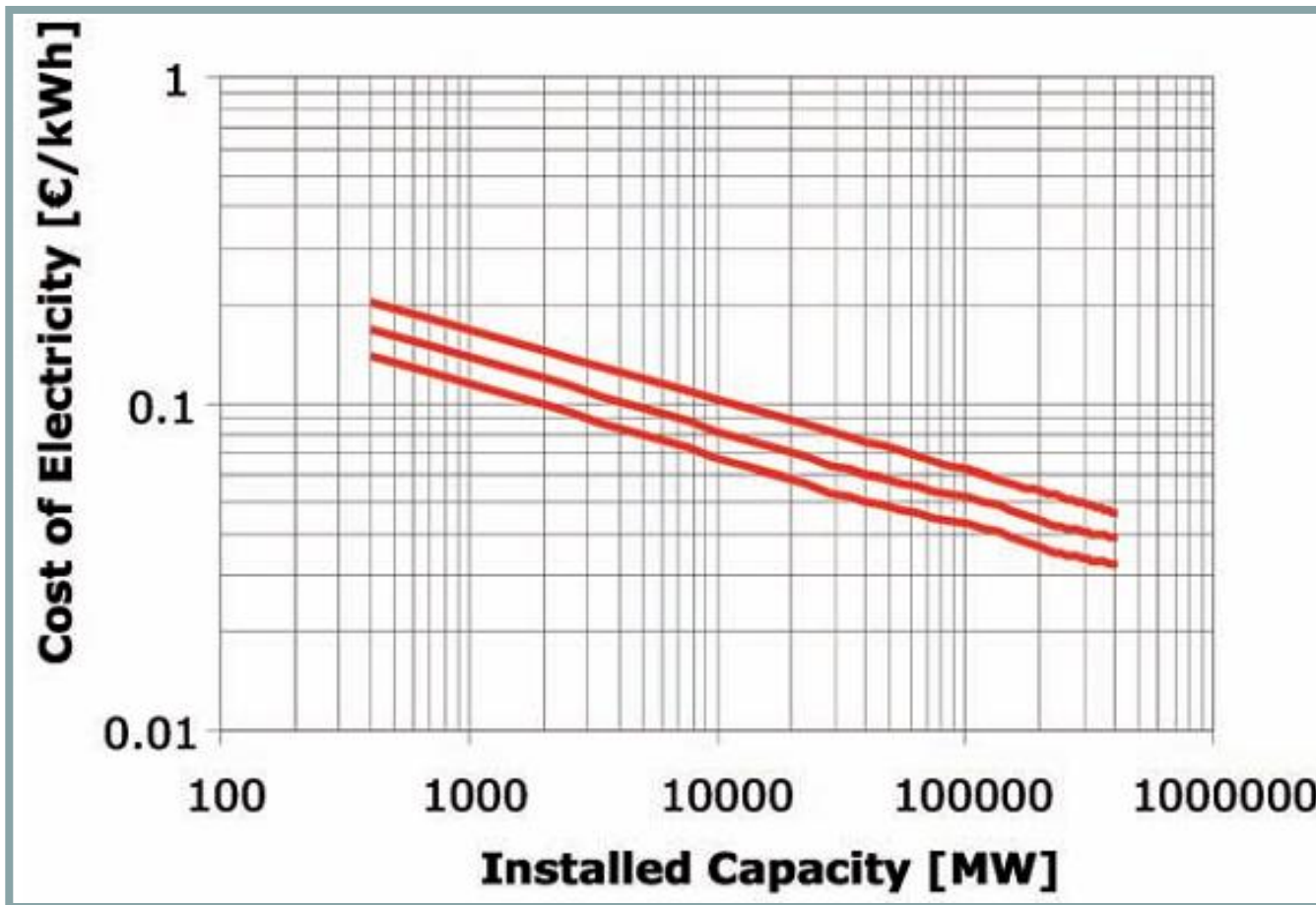
- UN top-down “binding agreement” approach failed;
- Pledge and Review approach more in line with national sovereignty regarding energy (Mexico 2010)
- Major states and regions, under increasing public pressure, will develop their own regulatory system to reduce CO-2;
- International companies will call for an international level playing field.

Energie bronnen om klimaatverandering te beperken

450 ppm scenario



Cost curve for concentrated solar power



Energy opportunities, with national and international potential in fields where the Netherlands has a comparative advantage.



Offshore wind

Opportunities:

- Logistical planning and construction by off-shore industries
- Maintenance and expertise in running off-shore wind energy systems.

Opportunities

- Development of green gas;
- Carbon capture and storage reservoir and hub around Rotterdam also for biogas;
- Further development of reservoir and hub function international gas market.



Gas hub, carbon hub / green gas



Electric car/ smart grid

Opportunities

- The Netherlands as a pilot for smart grid development and use;
- The Netherlands as pilot for electric cars;

Opportunities:

- Development of high quality biomass and development of international chains in trade and transport of biomass;
- Green chemistry and biobased economy: biomass materials, food and energy cascades.....linking the agricultural sector and the chemical sector.



Green raw materials/bio-resources