



**CHULALONGKORN UNIVERSITY**  
**Social Science Research Institute**  
**Winter School on**  
**Transformative Social Science**  
**for Sustainability and Social Justice**  
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# **Sustainability Transition: Introduction to a New Research Area in the Social Sciences**

**Hans Günter Brauch**

Adj. Prof., Free University of Berlin (Germany) ret.

**Chairman, Peace Research and European security Studies (AFES-PRESS)**

Editor, Hexagon Series on Human, Environmental Security and Peace

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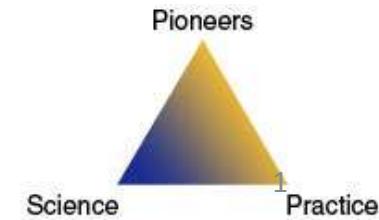
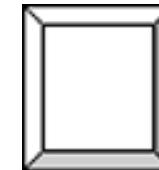
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# 1. Introduction

## Research context:

- We (**humankind**) have interfered into the earth system since the industrial revolution, primarily for last 50 years.
- Global environmental change is **anthropogenic**
- Crutzen: We have shifted from **Holocene to Anthropocene**
- Social construction of knowledge on this linkage occurred during past 5 decades (scientized), policy issue since 1988 and a security issue for past decade.**
- Since Copenhagen (COP 15, UNFCCC, 2009), global climate change negotiations and policy are paralyzed.**
- IPCC, 5<sup>th</sup> Assessment Report (WG 1), Sept. 2013: four physical impacts by 2100 will be severe but business as usual continues
- We are confronted with multiple deadlocks on many levels!**
- What should social scientists do to address this context?**

# 1.1. We are the Threats! We are the Victims!



# 1.2. Our Governments do not Seem to Care UN Climate Change Negotiations are Blocked!



- **UNFCC (1992)**
- **Kyoto Protocol (1997)**
  - Annex I country: -
  - Non-annex I countries: no reduction obligations
- **COP 15 (Copenhagen) 2009**
- **COP 16 (Cancun) 2010**
- **COP 17 (Durban) 2011**
- **COP 18 (Doha) 2012**
- **COP 19 (Warsaw) 2013**
- **COP 20 (Peru) in 2014**
- **COP 21 (Paris) in 2015**

Goal by 2015 agreement to enter into force by 2020: At present doubtful

# **1.3. What and Who is the Cause and Who are the Victims?**

## **What is the cause?**

- **Burning of hydrocarbons:**
  - Coal, Oil and gas
- **Modern economy:**
  - Energy, transportation
  - agriculture

## **Who is the victim?**

- **South: especially Asia**
  - China
  - India
- **But also the North**
  - USA (Katrina, Sandy)
  - Germany (2002, 2013) floods
- **We are all responsible:**
  - North and South
- **We both have to act**
  - North and South
  - Germany & Thailand<sup>6</sup>

## **Who is responsible?**

- **Historically: industrialized countries**
- **But increasingly: threshold countries**
  - 2007: China overtook USA

# 1.4. We Must be Part of the Solution! Knowledge and Innovation Matter!



## Social scientists must

- address causal linkages
- analyse many deadlocks obstacles, interests that prevent proactive action
- Economic & social development paths & life style changes

## Natural scientists (engineers)

- Basic & applied research
- Energy resources efficiency

## Jointly we must develop:

- Strategies for systems innovation & sustainability transition
- This requires multi-, inter- and transdisciplinary discussion, research and MA, PhD programmes

# 1.5. Transformative Social Science for Sustainability and Social Justice

Scientific goal and tool:

## Transformative Social Science

- **Social responsibility of the social & natural scientist**
- **Address, analyse & understand the new global challenges**
- **This requires new way of scient. cooperation, research, teaching**
  - Cluster approach of Chulalongkorn
  - **Intercluster cooperation**, e.g. between climate change & social development
  - **Global studies** that address these global issues (e.g. development, disasters, sustainability transition

Societal and policy goals

## Sustainability and Social Justice

- **Sustainability:**
  - Peace with nature (sustainable peace)
  - intergenerational
- **Global Equity:**
  - Historical: responsibility of industrialized countries
  - Now: also threshold countries
- **Social Justice:**
  - Transition to sustainability no technocratic (techn., econ., pol.)
  - But a social process where environmental & societal impacts must be included & considered
  - Cooperation across disciplines (horizontal coordination in government & organizations matter
  - Universities: major contribution

## 2. Emergence of Environment Policy & Sustainable Development (1987)

- Stockholm Conference on the Environment 1972
- Establishment of United Nations Environment Programme (UNEP)
- World Commission on Environment and Development (WCED) (Brundtland) of 1987; sustainable development goal formulated
- 1988: establishment of IPCC & negotiation mandates: UNFCC, CBD
- **UN Conference on Environment and Development (UNCED), Rio de Janeiro, June 1992: legally binding international treaties**
  - United Nations Framework Convention on Climate Change (UNFCCC)
  - United Nations Convention on Biological Diversity (CBD)
  - Mandate for UN Convention to Combat Desertification (UNCCD)
- World Summit on Sustainable Development (WSSD), Johannesburg, 2002
- **UN Conference (Rio+20), Rio de Janeiro, 2012: The Future We Want**

# 2.1. Major Achievements & Failures

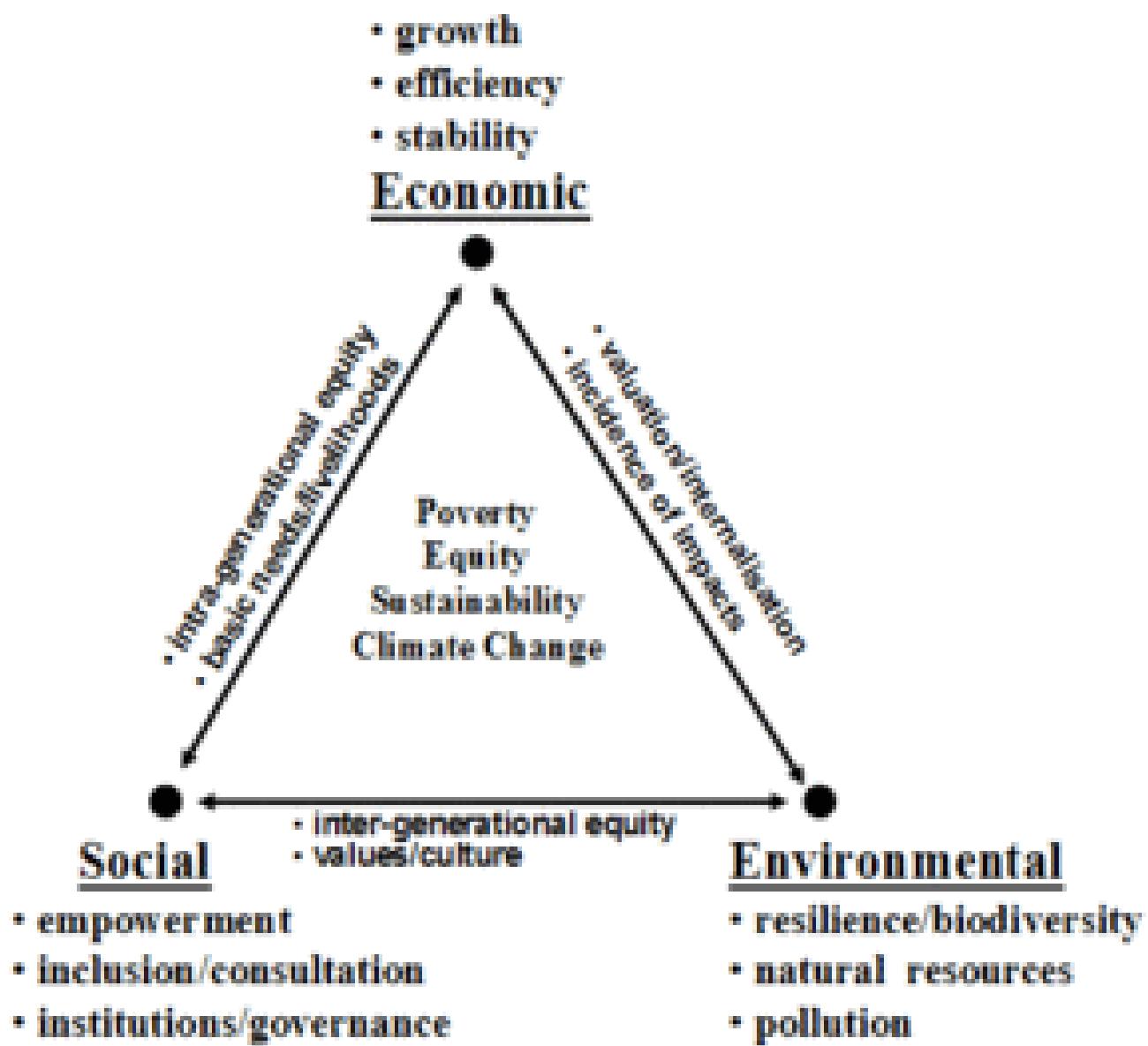
- **UNFCCC (1992): Process of Conference of Parties**
  - COP 1 (1995): Berlin Mandate for a Protocol
  - **COP 3 (1997): Kyoto Protocol**, with QELROs for Annex B countries (OECD and former Comecon countries of -5% by 2012)
    - USA never ratified the protocol no obligation: increase of emissions
    - Canada left in 2012: very high increase of emissions
    - Japan announced at COP 19 in Warsaw in 2013: cannot meet 1st obligation
  - **COP 15 (2009): Copenhagen failure to agree on Post KP-Regime**
  - COP 16 (2010): Cancun Accords: voluntary commitments
  - COP 17 (2011): Durban: Nonbinding goal for new regime by 2020
  - COP 18 (2012): Doha: Loss & Damages
  - **COP 19 (2013): Warsaw: recognizes the commitment by developed countries to jointly mobilize US\$100 billion annually by 2020 for meaningful mitigation actions & transparency of implementation, and importance of providing clarity on the level of financial support;**
  - COP 21 (2015): Paris: to agree on a Post Kyoto Treaty to enter into force in 2020
- **Future is highly uncertain, failure is possible, business as usual dominates**
- **UNCBD (biological diversity)**
  - Cartagena Protocol on Biosafety (2000, entered into force 2003)
  - Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (2010, not yet in force)
- **UNCCD: no legally binding protocol so far.**

## 2.2. Goal of Sustainability & Past 25 Years of Policy and Scientific Debates on Sustainable Development

### Political Concept of Sustainable Development (SD)

- Since the Brundtland Commission (1987) report, SD has become a key concept that has since guided both policy and scientific debates. It defined sustainable development as a form of development that
- “meets the needs of the present without compromising the ability of future generations to meet their own needs”.
- SD comprises two other concepts of “needs”, “in particular the essential needs of the world’s poor, to which overriding priority should be given; & the idea of limitations imposed by the state of technology & social organization on the environment’s ability to meet present & future needs”.
- For Brundtland Commission, “SD is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations”.
- This goal is close to the King’s “Sufficiency Economy” concept!

## 2.3. Sustainable Development Goal

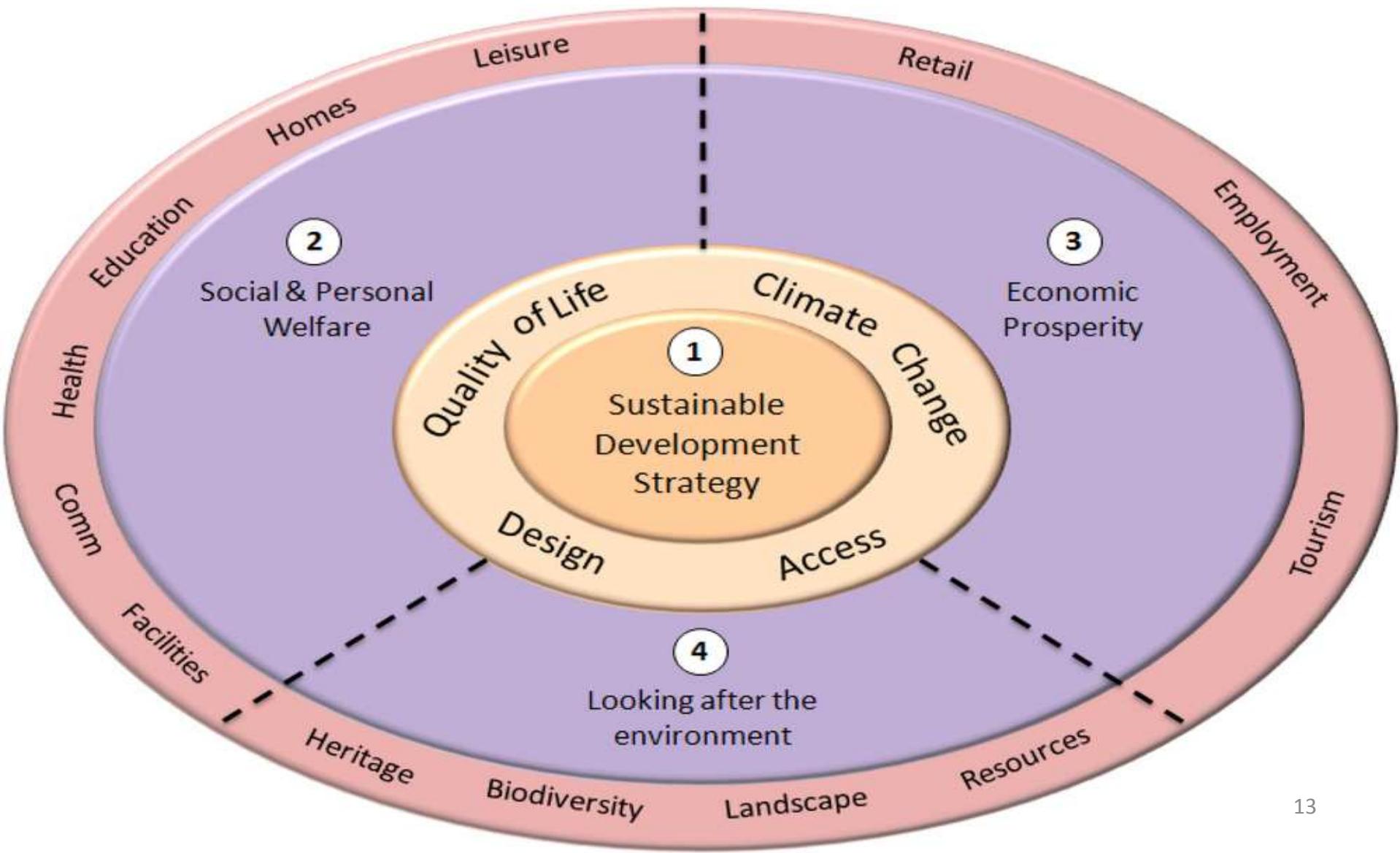


- Sustainable development is an organising principle for human life on a finite planet.
- It posits a desirable future state for human societies in which living conditions and resource-use meet human needs without undermining the sustainability of natural systems and the environment, so that future generations may meet their needs.

- Combines 3 -4 dimensions:

- social
- economic,
- environmental
- cultural (or institutional, as good governance)

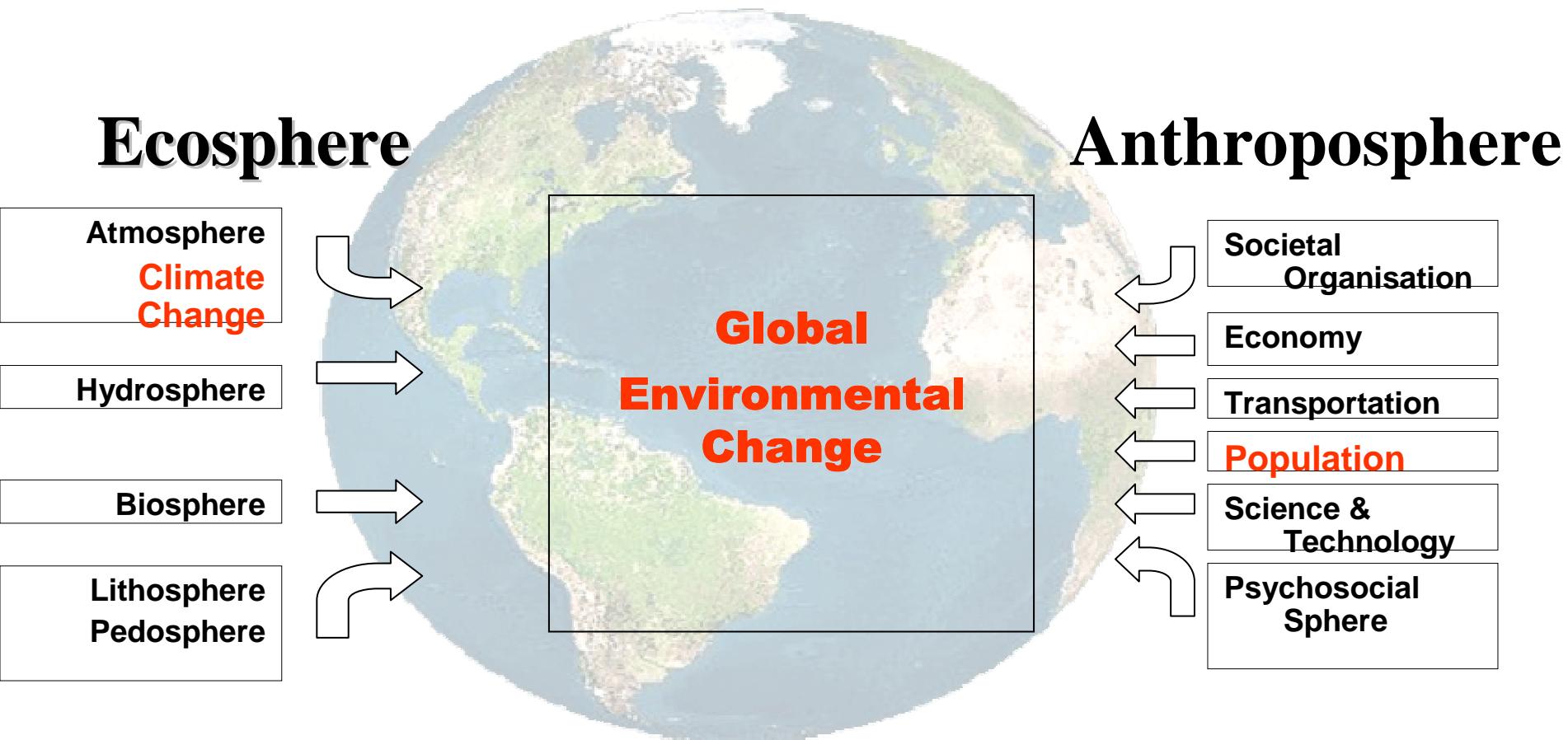
## 2.4. Sustainable Development Strategy



# 2.5. Scientific Debates on Sustainable Development and on Sustainability

- Today an ambiguous, disputed & essentially contested concept
- IUCN–World Conservation Union, in a report on *Caring for the Earth (1980)*, defined SD as “improving the **quality of human life** while living **within the carrying capacity of supporting ecosystems**”, where sustainability is understood as “a characteristic of a process that can be maintained indefinitely”
- Trzyna (1995) SD: multidisciplinary, social process, moral principle
- Neoclassical & ecological perspectives differ in assessment of likelihood of sustainable outcomes from real/world market economies.
- US National Research Council (NRC 1999) on *Our Common Journey: A Transition toward Sustainability* tried to
  - “reinvigorate the essential strategic connections between scientific research, technological development & societies’ efforts to achieve environmentally sustainable improvements in human well-being” focus on: 1) common concerns and differing emphases on SD, 2) trends and transitions, 3) exploring the future, 4) environmental threats and opportunities, 5) on reporting on transition, and 6) integrating knowledge and action.
- No study discussed the linkages between SD and ST and war, crises, conflict and world peace or sustainable peace.
- Goal of our Handbook: Sustainability Transitions and Sustainable Peace (40-60 chapters) in the Hexagon Book Series (2015)

## 2.6. Global Environmental Change (GEC)



GEC poses a threat, challenge, vulnerabilities and risks for human security and survival.

## 2.7. Global Environmental & Climate Change

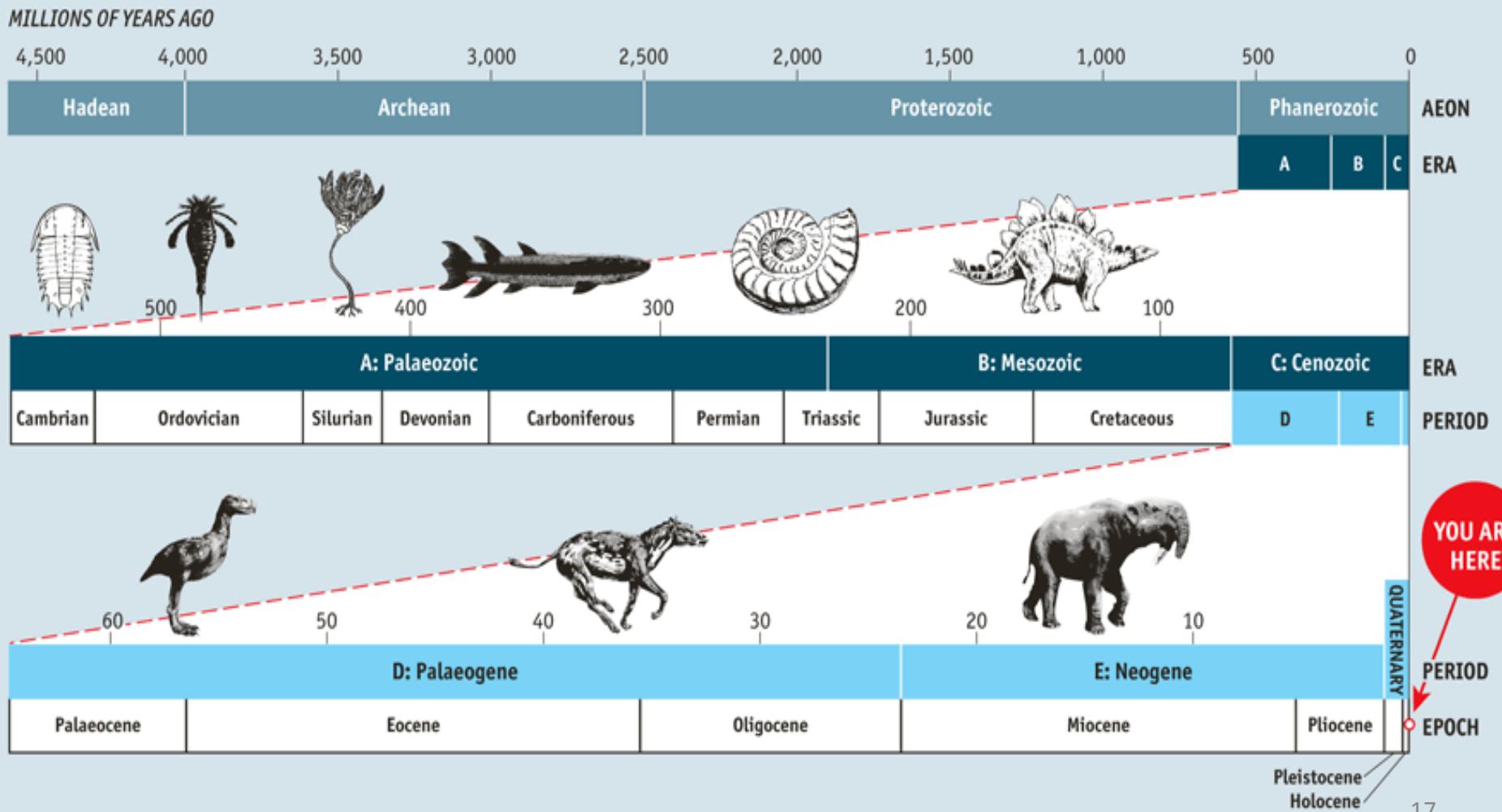
### Global Environm. Change (GEC) & Climate Change (GCC) are

- scientific issues since e 1970s, new topic in natural & social sciences
  - 4 Scientific Programmes
    - World Climate Change Programme (WCP)
    - Diversitas
    - International Geophysical Biological Programme (IGBP)
    - **International Human Dimensions Programme (1995 ff.)**
  - Amsterdam 2001: **Earth Systems Science Partnership (ESSP)**
  - Rio De Janeiro (2012): **Future Earth Initiative**
- political problems since late 1980s & they have been discussed as
  - Climate Change: 1988: issue of G7; 1990: UN GA mandate; 1992: Rio summit: UNFCC (1992) and Kyoto Protocol (1997)
  - Desertification: UNCCD (1994)
- security-related threats, challenges risks since 2002 (decade)
  - International, national and human security

### 2 Policy Debates and Scientific discourses:

- Climate change and (human) security (threat multiplier): HESP 8
  - Impacts of climate change on conflicts & resource conflicts
- Sustainability transition & sustainable Peace (HESP 10)

# 3. We (Humankind) are Changing Earth: From the Holocene to the Anthropocene



# 3.1. Five Historical Times & Past Grand Transformations

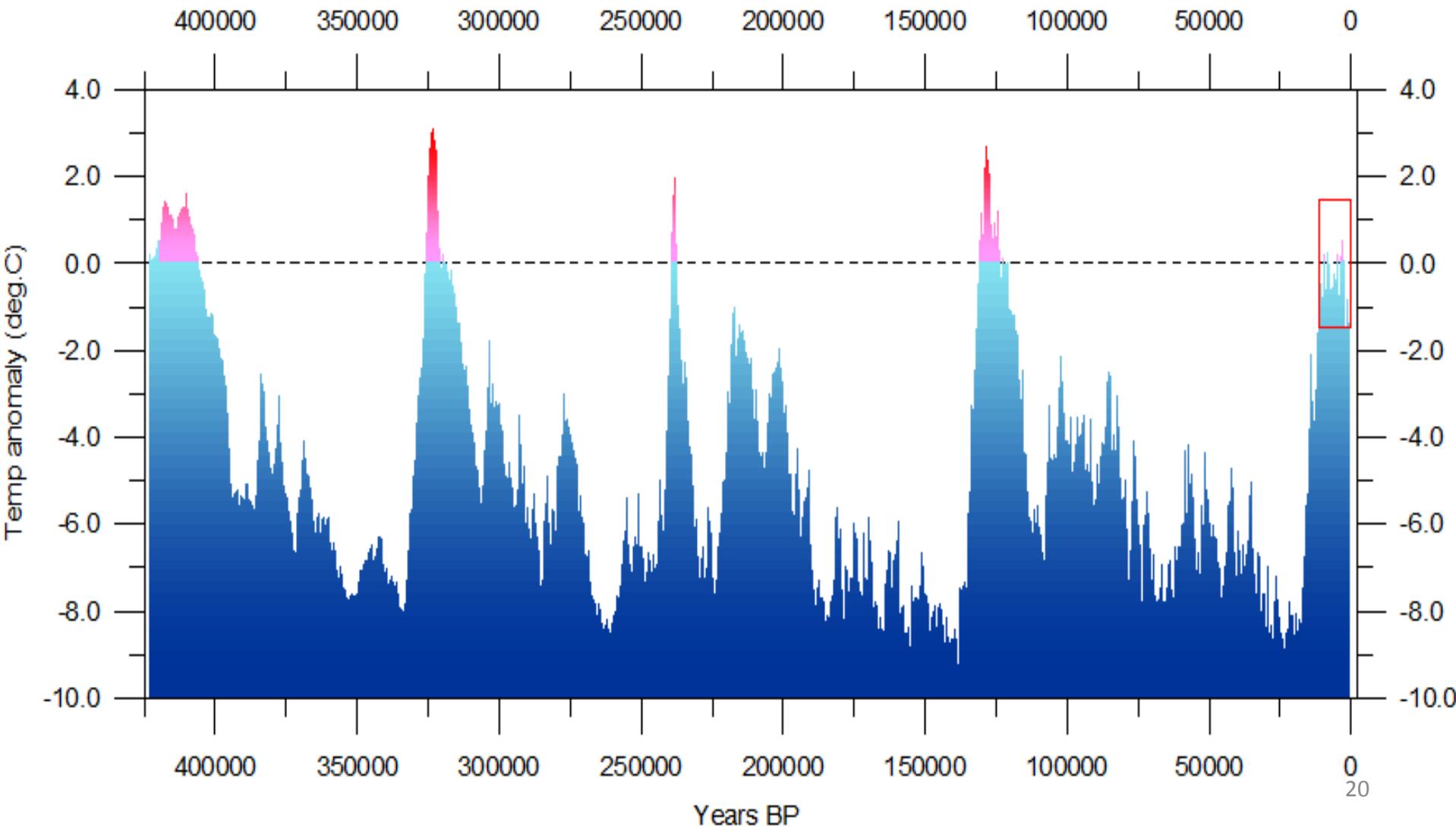
The five historical times are:

- a) the *geological times* of earth history (transition from the Holocene to the Anthropocene) [effect]
- b) the *time of the so far three technical revolutions so far* or the great transformations of the [cause]
  - Agricultural or neolithic revolution (6-10.000 year before present)
  - First Industrial revolution (Watt's steam engine): 1750/1782-1890/1914
  - Second industrial revolution (Electricity. Telephone, computer): 1890/1940-present
- c) the *time of changes in national & international order* due to revolutions & outcome of major wars, e.g. in modern times due to the American (1776), French (1789), Soviet (1917), and Chinese (1945–49) revolutions and the international systems of orders of Vienna (1815), Versailles (1919), and Yalta and San Francisco (1945), and the new international disorder since the end of the Cold War;
- d) the *time of repeating economic (business) cycles and political cycles* (duration of political presidencies or election periods of parliaments); and
- e) the *short time of major political, societal, or economic events* that have only in rare cases (as structure- changing events) were been instrumental for in creating major changes in national and inter-national order.

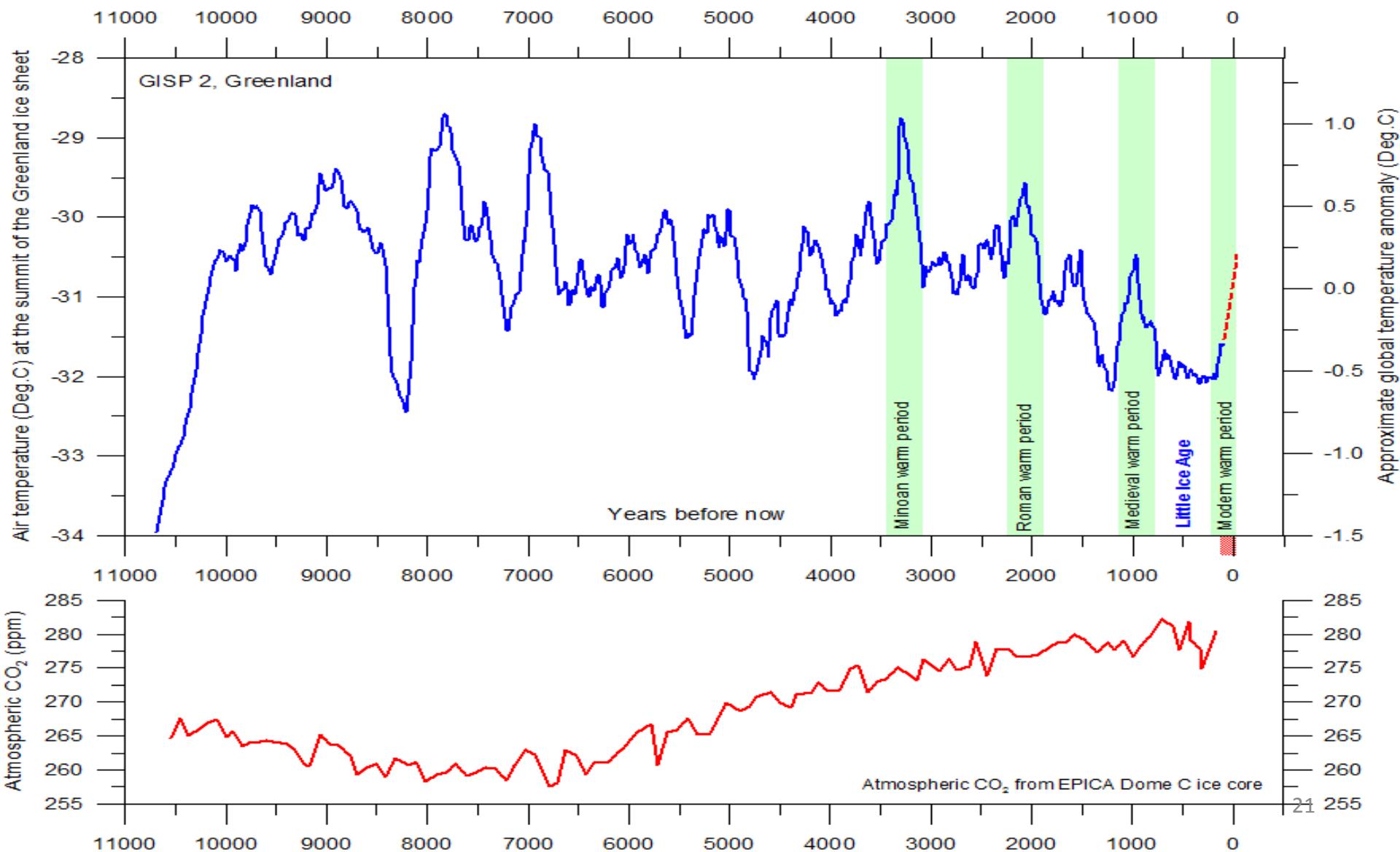
## 3.2. Climate Change & Sustainability Transition

- The emerging **scientific debate on ‘sustainability transition’ addresses the many scientific, societal, economic, political, and cultural needs to reduce GHG emissions.**
- These **cannot be achieved** simply by legally binding *quantitative emission limitation and reduction obligations* (QELROs), as in the framework of the **Kyoto Protocol (1997)**.
- These have so far failed to achieve their proclaimed aims during past two decades because of a lack of political will and capability to implement these legal obligations and policy declarations.
- **A continuation of the prevailing world view and ‘business-as-usual’ mindset may lead to**
  - ‘dangerous’ (+4°C world) or even
  - ‘catastrophic’ (4-6° world) climate changes and
  - major human catastrophes during this century if global temperature rises by 4-6°C above the pre-industrial average by end of 21st century.

### 3.3. Geological times: 400 000 years of climate history



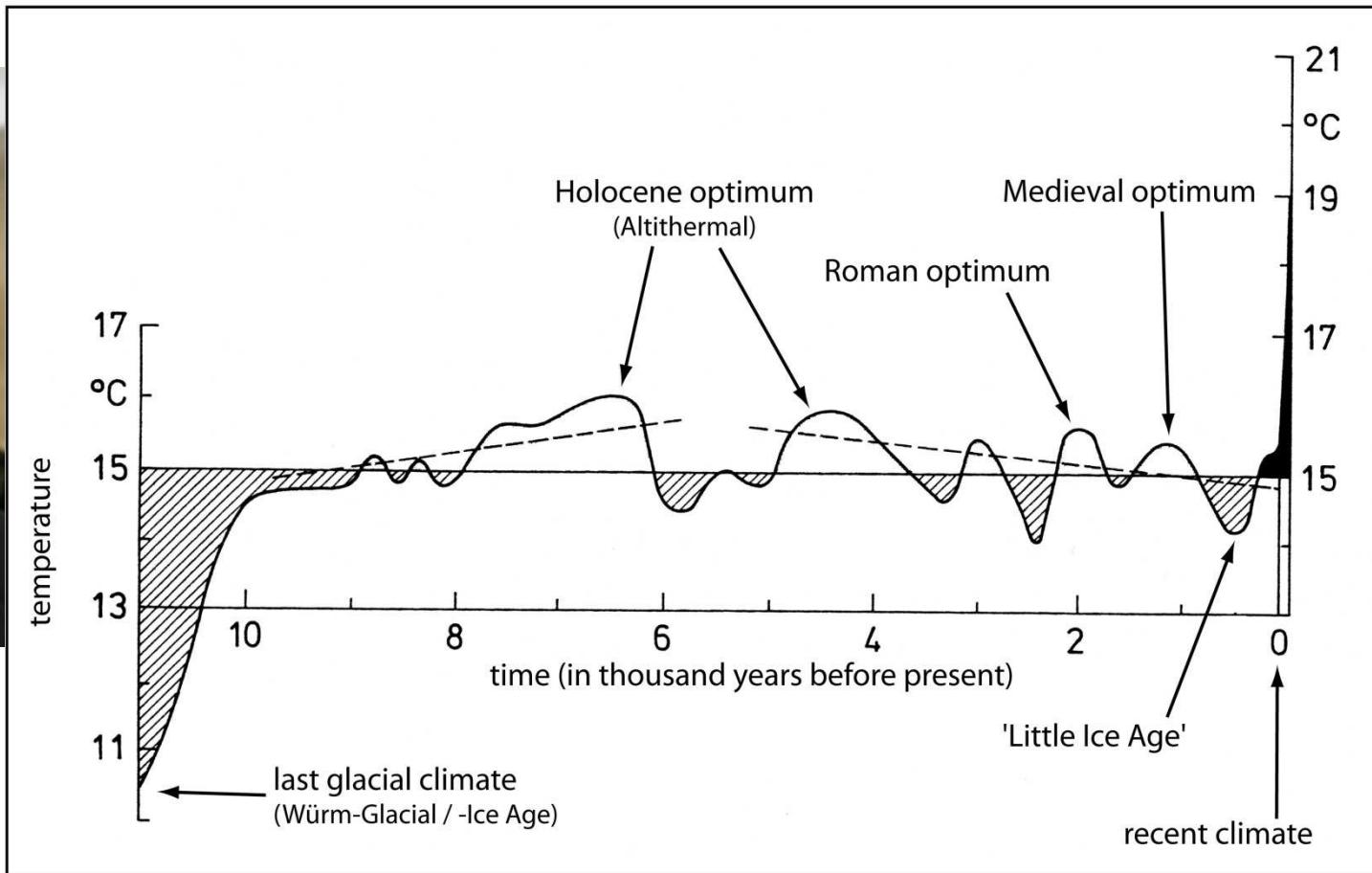
### 3.4. The Holocene (11600 BP-now)



### 3.5. From the Holocene (12.000 years b.p.) to the Anthropocene (1784 AD)

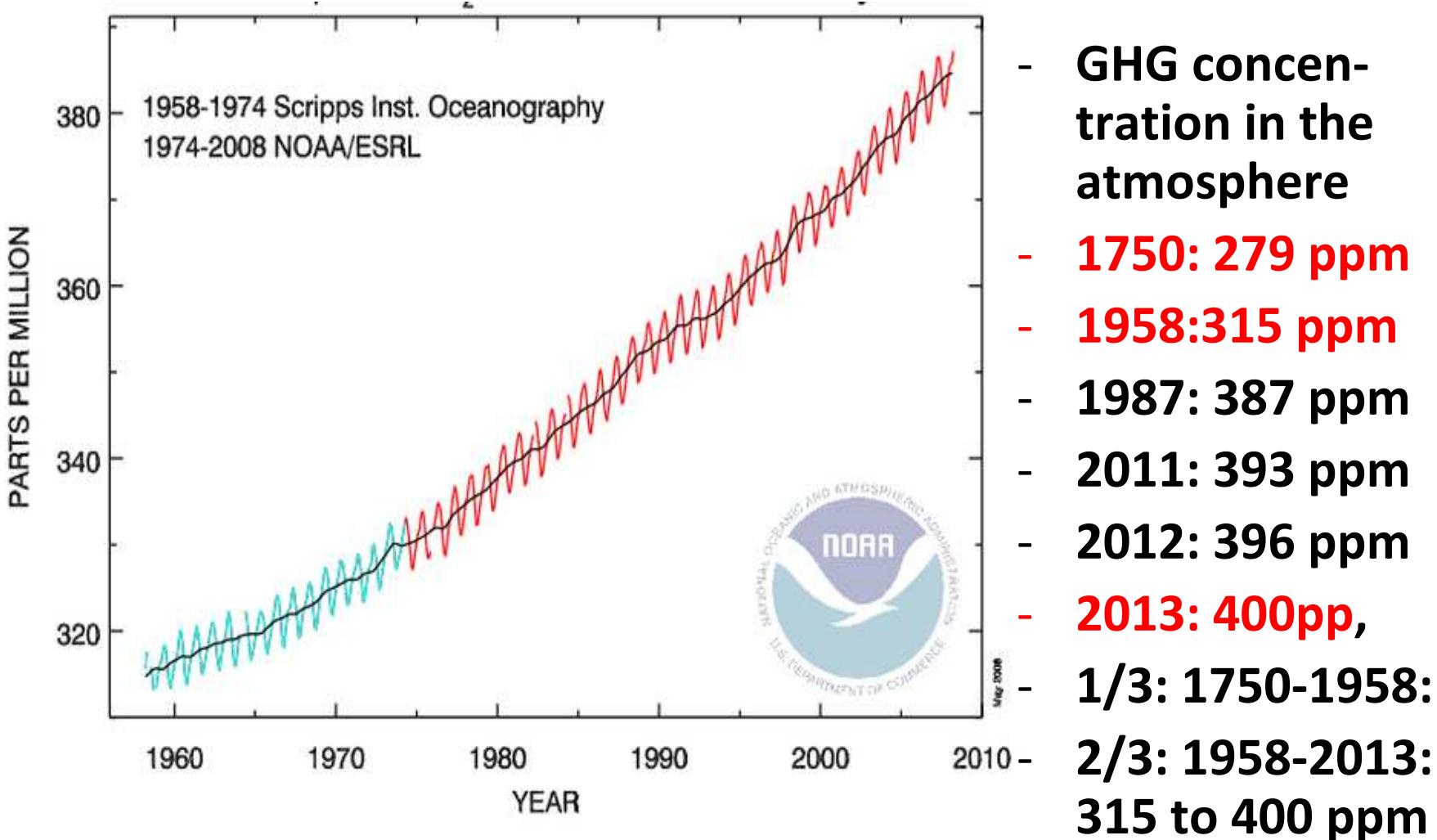


**Paul Crutzen,**  
**Nobel Laureate for**  
**Chemistry (1995)**



In Geology/geography: **Holocene** era of earth history since end of glacial period (10-12.000 years ago, Anthropocene, since industrial revolution (1784, J.Watt's invention of steam engine: anthropogenic climate change: burning of coal,oil,gas → GHG increase

### 3.6. Anthropogenic Climate Change in the Anthropocene Era (1750 to present)



# **4. Political Context: Diagnosis of a New Turning Point**

- Lack of Implementation of 3 of G-8 countries**
  - USA, Canada, Japan, Australia (major non-compliers)
  - No obligations: Non-annex 1 countries (South Korea, Mexico, Thailand)
- Paralysis of global climate and environmental negotiations**
  - Failure of COP 15 in Copenhagen: to approve follow-up to Kyoto Protocol
  - Modest results of COP 16 (Cancun), 17 (Durban), 18 (Doha), 19 (Warsaw)
- Prevalence of business-as usual thinking and policy action**
  - In both many industrialized & threshold countries
- Need for a new thinking and policy action towards achieving sustainable development policy goals by strategies of sustainable transition that contribute to conflict avoidance and peace building from the local to the global level**

# 4.1. Legal Obligations of the G8: UNFCCC (1992) & KP (1997)

**There is a weak not very specific legal commitment**

- **UNFCCC (1992): Art. 2, Objective:**

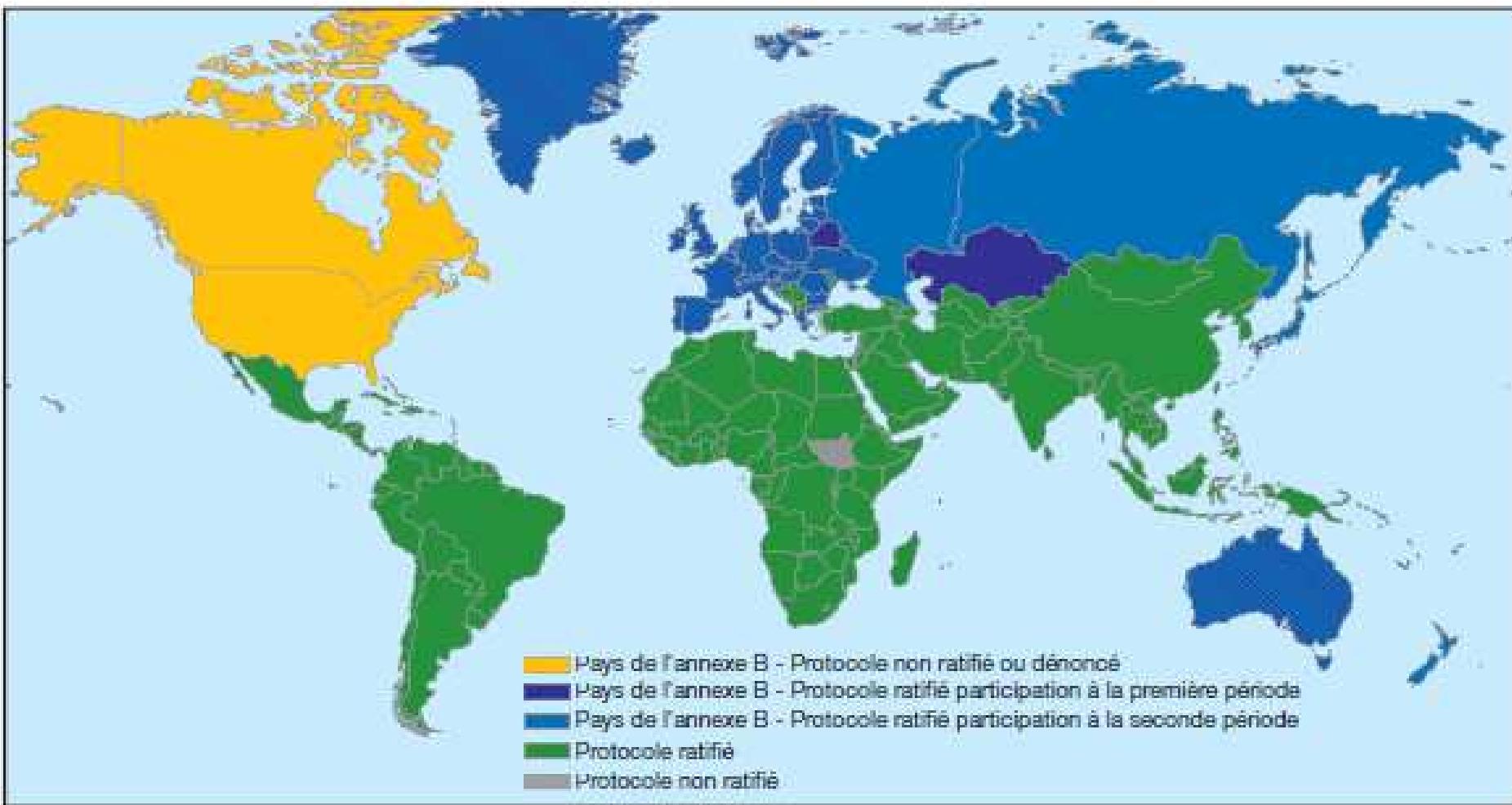
The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, **stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system**. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

- **Kyoto Protocol (1997): Art. 3,1:**

1. The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments inscribed in Annex B and in accordance with the provisions of this Article, with a view to reducing their overall emissions of such gases by **at least 5 % below 1990 levels in the commitment period 2008 to 2012.**

## 4.2. Countries: Parties of the Kyoto Protocol

Pays signataires du protocole de Kyoto au 30 septembre 2013



## **4.3. Climate Paradox: Performance & Implementation Gap of G-8 count.**

- **Regarding KP targets, G-8 countries mixed performance.**
  - As ‘Country in transition’ Russia highest GHG emissions reduction.
  - **The EU-28 met their targets under the KP & most members met their national targets under the EU’s ‘burden-sharing agreement’.**
  - Only Canada, US & Japan clearly failed to stabilize their GHG emissions by the year 2000 to the level of 1990 and to achieve the GHG reduction targets to which they agreed when they signed the KP.
  - 3 opted out of obligations, USA (no party), Canada (left), Japan (not bound)
- **2007-2011: G-8 promised to reduce GHG by 80% (2050)**
- **Climate paradox hypothesis applies to laggards in climate change performance. Canada, USA, Japan: high CO2 emissions per capita and Western ‘way of life’, which is a part of the Northern political culture and of the values, attitudes and behavior of most citizens.**
- **Climate paradox increases probability of violent conflicts**

## 4.4. Historical Emissions

**Table 1:** Top ten annual energy-related CO<sub>2</sub> emitters for the year 2009. Source: International Energy Agency, 2011: *CO<sub>2</sub> emissions from fuel combustion: highlights* (Paris: IEA).

Country	% of global total annual emissions	Tons of GHG per cap.
People's Republic of China	23.6	5.13
United States	17.9	16.9
India	5.5	1.37
Russian Fed.	5.3	10.8
Japan	3.8	8.6
Germany	2.6	9.2
Isl. Rep. Iran	1.8	7.3
Canada	1.8	15.4
South Korea	1.8	10.6
UK	1.6	7.5

**Table 2:** Top ten cumulative energy-related CO<sub>2</sub> emitters 1850–2008. Source: World Resources Institute, 2011: *Climate Analysis Indicators Tool: Indicators: GHG Emissions: Cumulative Emissions* (Washington DC: WRI).

Country	% of world total	Metric tonnes CO <sub>2</sub> per person
United States	28.5	1,132.7
People's Republic of China	9.36	85.4
Russian Fed.	7.95	677.2
Germany	6.78	998.9
UK	5.73	1,127.8
Japan	3.88	367
France	2.73	514.9
India	2.52	26.7
Canada	2.17	789.2
Ukraine	2.13	556.4

## 4.5. Achieving Kyoto Targets by EU-15 (2008-2012)

Pays	Objectif Kyoto pour 2008-2012 (en %) <sup>1</sup>	Moyenne annuelle d'UQA reçues pour la période 2008-2012 (en millions)	Moyenne annuelle 2008-2011 dont crédits et débits au titre de l'UTCP <sup>2</sup> en Mt CO <sub>2</sub> éq.	Évolution (en %) <sup>1</sup>	Distance à l'objectif Kyoto (en points)
Allemagne	- 21,0	974	927	- 24,8	3,8
Autriche	- 13,0	69	82	4,3	- 17,3
Belgique	- 7,5	135	128	- 11,8	4,3
Danemark	- 21,0	55	66	- 6,1	- 14,9
Espagne	15,0	333	353	21,8	- 6,8
Finlande	0,0	71	69	- 3,0	3,0
France	0,0	564	506	- 10,2	10,2
Grèce	25,0	134	121	13,0	12,0
Irlande	13,0	63	59	5,6	7,4
Italie	- 6,5	483	489	- 5,4	- 1,1
Luxembourg	- 28,0	9	12	- 8,0	- 20,0
Pays-Bas	- 6,0	200	202	- 5,4	- 0,6
Portugal	27,0	76	73	21,5	5,5
Royaume-Uni	- 12,5	682	589	- 24,5	12,0
Suède	4,0	75	60	- 16,4	20,4

1. Par rapport à l'année de référence, généralement 1990.

2. Utilisation des terres, leur changement et la forêt.

# 4.6. Performance: Annex 1 Countries: Europe, Economy in Transit., North America (except EU-15)

Pays	Objectif Kyoto pour 2008-2012 (en %) <sup>1</sup>	Moyenne annuelle d'UQA reçues pour la période 2008-2012 (en millions)	Moyenne annuelle 2008-2011 dont crédits et débits au titre de l'UTCF en Mt CO <sub>2</sub> éq.	Évolution (en %) <sup>1</sup>	Distance à l'objectif Kyoto (en points)
UE à 15	- 8	3 924	3 731	- 13	5
Bulgarie	- 8	122	62	- 53	45
Croatie	- 5	30	28	- 10	5
Estonie	- 8	39	20	- 54	46
Hongrie	- 8	108	67	- 42	36
Lettonie	- 8	24	10	- 60	52
Lithuanie	- 8	45	21	- 58	50
Pologne	- 8	530	383	- 32	26
République tchèque	- 8	179	135	- 30	22
Roumanie	- 8	256	122	- 56	48
Slovaquie	- 8	68	46	- 37	29
Slovénie	- 8	19	19	- 8	0
Australie	8	592	573	5	3
Islande	10	4	4	18	- 8
Japon	- 8	1 186	1 216	- 4	- 2
Liechtenstein	- 8	0	< 1	6	- 14
Monaco	- 8	0	< 1	- 16	8
Norvège	1	50	52	5	- 4
Nouvelle-Zélande	0	62	56	- 10	10
Russie	0	3 323	2 103	- 37	37
Suisse	- 8	49	51	- 4	- 4
Ukraine	0	921	389	- 58	58
<b>Total</b>	- 4	<b>11 528</b>	<b>9 088</b>	- 24	<b>20</b>
États-Unis <sup>2</sup>	- 7	n.a.	6 769	10	- 17
Canada <sup>3</sup>	- 8	n.a.	704	18	- 24
Bélarus <sup>4</sup>	- 8	n.a.	89	- 36	28
Kazakhstan <sup>4</sup>	0	n.a.	260	- 26	28

Pays de l'UE, pays de l'annexe B hors UE, pays de l'annexe B pour lesquels le protocole de Kyoto ne s'applique pas en première période.

1. Par rapport à l'année de référence, généralement 1990. 2. N'a pas ratifié le protocole. 3. A dénoncé le protocole fin 2011.

4. Les amendements ajoutant le Bélarus et le Kazakhstan à l'annexe B n'ont pas été ratifiés et ne sont donc pas appliqués.

# 4.7. GHG Emissions of G8 (1990-2009)

Country	UNFCCC (1992)		Kyoto Protocol (1997)		Re- duc- tion goal (%)	EU-15 Reduc- tion goal (%)	Performance (1990-2009)		
	Annex 1	Annex 2	Annex B	In transition			Burden- sharing agree- ment (1998)	GHG reductions in %	1990 (base year)
G8 countries								EU Eurostat (2011) IEA [2011]	UNFCCC (2009) Landuse change and forestry (LULUCF)
									Excl. Incl.
1) USA	X		X		-7		+6.7	+7.2	+5.6
2) Canada	X		X		-6		+20.4	+17.0	+29.8
3) Japan	X		X		-6		+2.7	-4.5	-5.0
4) Germany	X		X		-8	-21	-25.4 [-21.9]	-26.3	-23.0
5) UK	X		X		-8	-12.5	-27.1 [-15.2]	-26.9	-27.7
6) France	X		X		-8	0	-8.3 [+0.6]	-7.7	-12.9
7) Italy	X		X		-8	-6.5	-5.0 [-2.0]	-5.4	-13.3
8) Russia		X		X	0		-29.7	-36.9	-57.2

# 4.8. GHG Reduction Implementation Gap (2009)

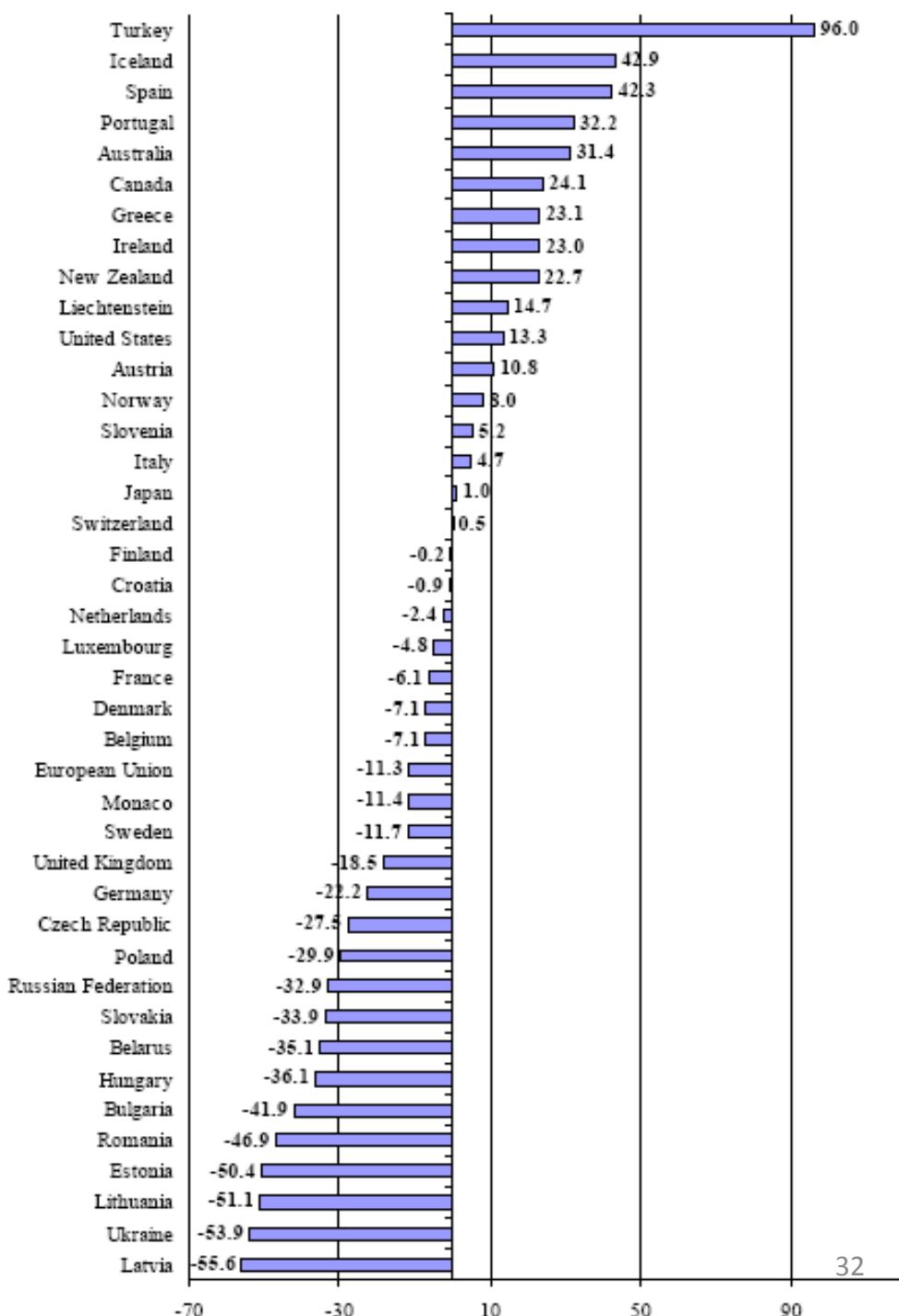
## QELRO, Kyoto Prot.

- EU countries: -8%
- Canada: -6%
- USA: - 7% (no party KP)
- Japan: -6%
- Australia: +8%

## Changes in GHG Emissions:

Annex I Part., 1990–2008  
(exc. [incl.] LULUCF (%)).

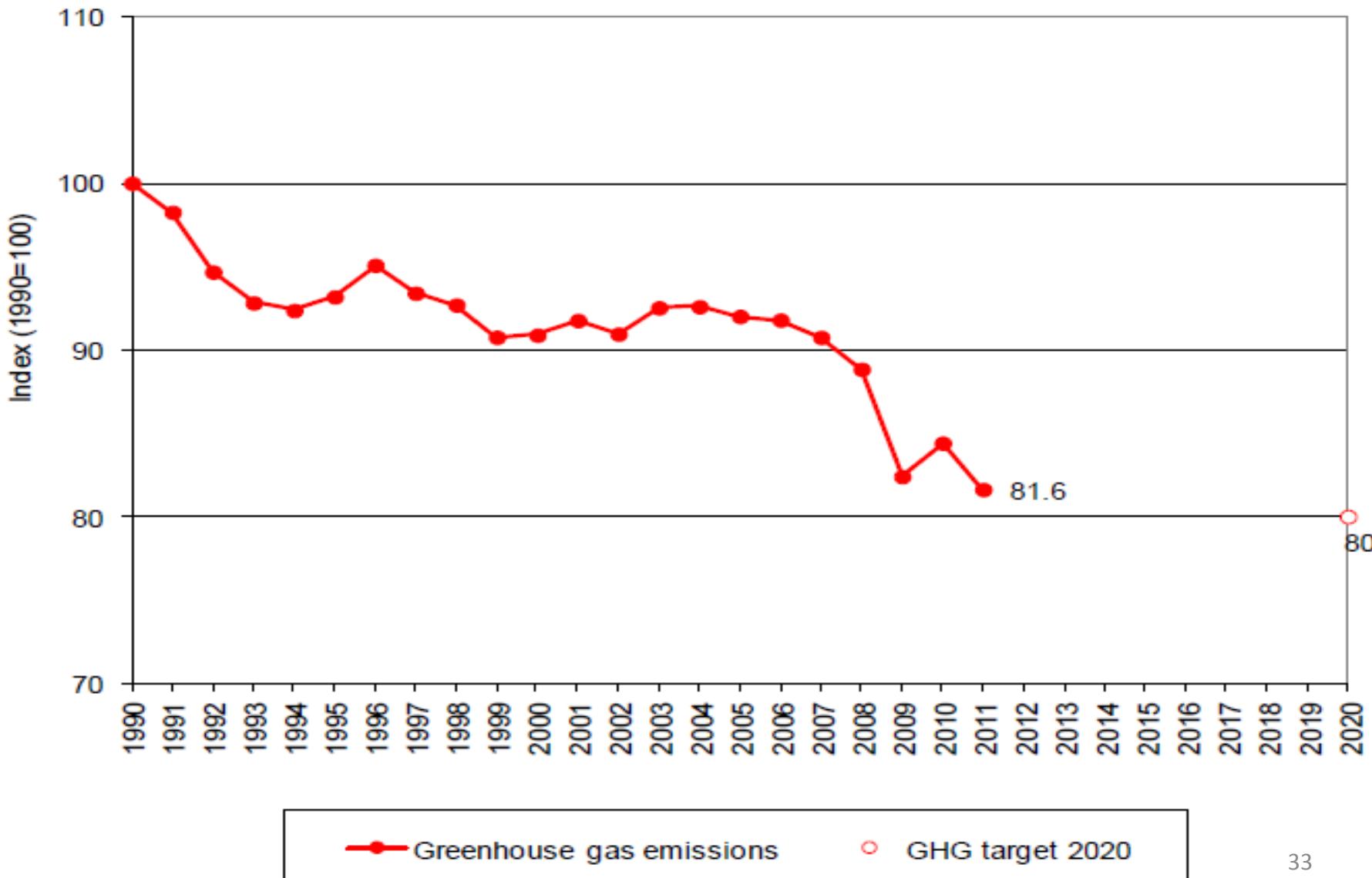
- EU countries:-11.3 [-13.3]
- Canada: + 24.1 [+33.6]
- USA: +13.3 [+15.3]
- Japan: +1% [-0.2]
- Australia: +31.4 [+33.1]
- Turkey: +96.0 [101.1]



# 4.9. E-27 GHG Emissions 1990-2011

Figure ES.1

EU-27 GHG emissions 1990–2011 (excl. LULUCF)



## 4.10. EU GHG Reduction Goals 2020

The EU also adopted in 2008 a decision to aim by 2020 at a 20/20/20 target:

- A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels
- 20% of EU energy consumption to come from renewable resources
- A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

10–11 December 2009, before COP 15 in Copenhagen  
European Council offered to increase its emissions reduction to 30% if other major emitting countries would commit to significant reductions under a global climate agreement.

# 4.11. Implementation of Renewable

## Goals

EU's progress on reducing green house gas emissions to tackle climate change & outlook on reduction targets for 2030 coming up in March 2014.

- According to the European Environment Agency, Europe is doing well on climate change.
- Only four out of 28 member states – namely Bulgaria, Denmark, France and Germany – show good progress on reducing emissions,
- Many states are lagging behind. **Belgium, France, Latvia, Malta, the Netherlands & United Kingdom for example have problems to meet their renewable targets.**
- Austria, Luxembourg and Spain are the three member states that are **struggling most to reduce emissions from transport and households.**
- Although the **economic recession** might have **facilitated the reduction** of industry-related emissions the **trend is going in the right direction**, argues the European Commission.
- Also in terms of **decoupling economic growth from emission developments** progress is visible. "The decoupling trend is the result of policies", says the institution.
- The **European Climate Foundation (ECF)** is less satisfied with the current developments and points out that more has to be done.
- Regarding the **green house gas emission targets for 2030** the European Commission and the European Climate Foundation are in disagreement. While a reduction of **40% is enough for the Commission, the ECF favours a reduction target of at least 50%**. A debate on this target will take place at the European Council in March 2014.

Source: Vi(eu)ws, 5 Nov. 2013: „[Story – 2030: Will Europe have the courage to fix its climate & energy tool](#)”, video interview is at:  
<http://www.vieuws.eu/environment/story-2030-will-europe-have-the-courage-to-fix-its-climate-energy-tools/>”>

## 4.12. GHG Reduction Goals of Germany by 2020

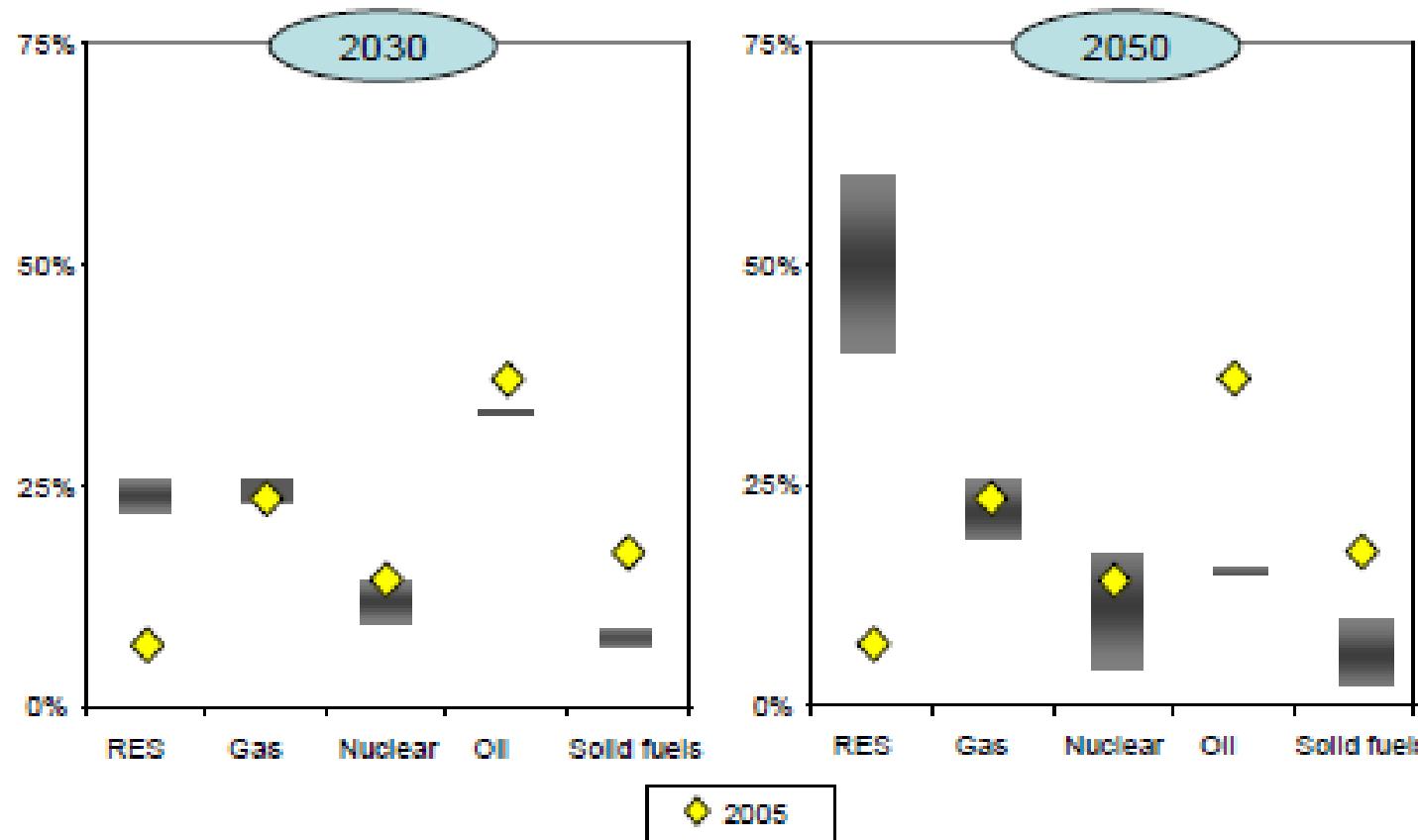
- The German Climate Agenda 2020 after G8 Meeting in Heiligendamm (2007) proposed eight measures to reduce 2020 levels of GHG emissions by 40%:
  - Modernising power stations
  - Doubling the number of CHP units
  - Increasing share of renewables in electricity production to 27%
  - Cutting electricity consumption by 11%
  - Improving the energy efficiency of buildings
  - Using more renewables for heating
  - Increasing fuel efficiency and use more biofuels in transport
  - Reducing methane and the emission of F-gases
  - The plan excludes a revival of nuclear power.
- After Fukushima: Move out of Nuclear Energy by 2021
- Coalition agreement of CDU and SPD of November 2013: to reduce 2020 levels of GHG emissions by 40% (difficult)

## 4.13. EU-27 Reduction Goal for 2050

- On 15 December 2011 the European Commission (2011) released its ***Energy Roadmap 2050***, according to which:
- The EU is committed to reducing greenhouse gas emissions to **80-95% below 1990 levels by 2050 in the context of necessary reductions by developed countries as a group**. The Commission analysed the implications of this in its '**Roadmap for moving to a competitive low-carbon economy in 2050**'.
- **The 'Roadmap to a Single European Transport Area' focused on solutions for the trans-port sector and on creating a Single European Transport Area.**
- In this Energy Roadmap 2050 the Commission explores the challenges posed by delivering the EU's decarbonization objective while at the same time ensuring security of energy supply and competitiveness. It responds to a request from the European Council.
- **This requires a sustainable transition in the energy sector.**

# 4.14. EU Decarbonization Scenarios – 2030 and 2050 (comp, with 2005 in %)

**Graph 1: EU Decarbonisation scenarios - 2030 and 2050 range of fuel shares in primary energy consumption compared with 2005 outcome (in %)**



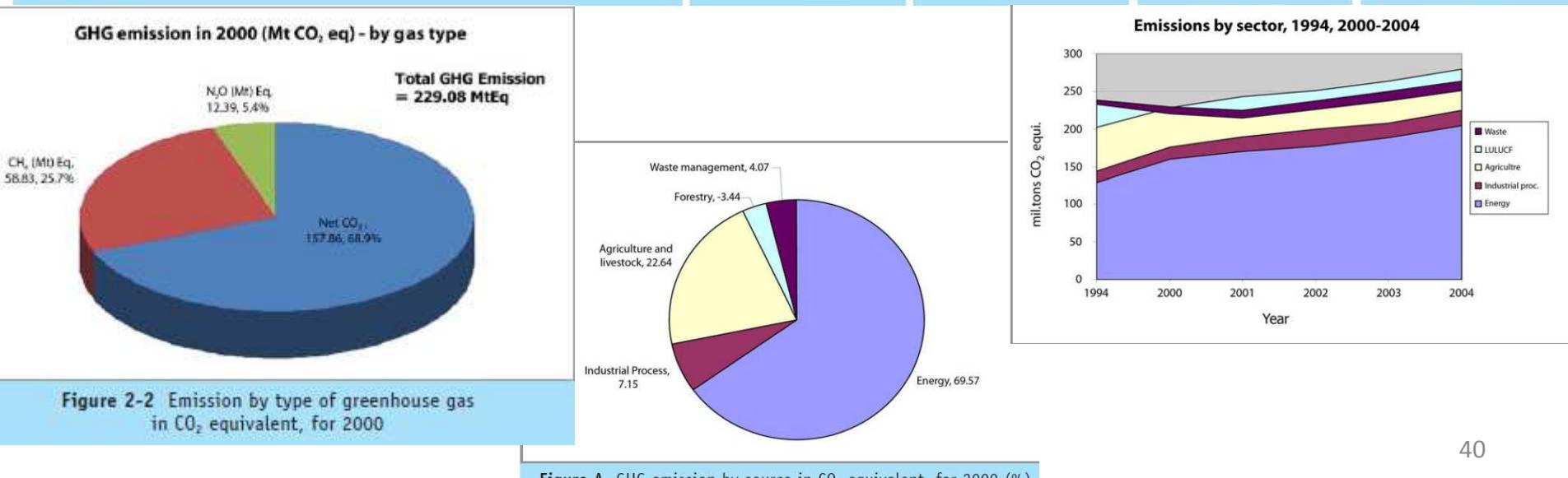
# 4.15. Thailand – UNFCCC National Communications (2000->1994, 2011->2000)



# 4.16. Second National Communication to UNFCCC (2011)

## Data for 2000

Main Greenhouse Gas	CO <sub>2</sub> emissions (Gg)	CO <sub>2</sub> removals (Gg)	CH <sub>4</sub> (Gg)	N <sub>2</sub> O (Gg)
Total national emissions and removals	210,231.2	-52,374.0	2,801.5	40.0
1. Energy	149,914.6	0.0	413.9	2.5
2. Industrial processes	16,059.3	0.0	6.4	0.6
4. Agriculture			1,977.0	33.4
5. Land use change and forestry	44,234.1	-52,374.0	10.4	0.1
6. Waste	23.3		393.8	3.3



# 4.17. CO<sub>2</sub> Emissions in Energy Sector

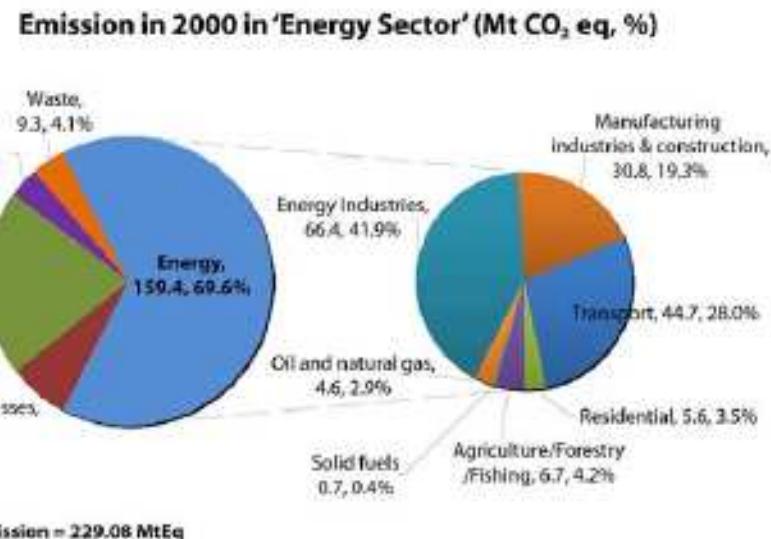


Figure 2-3 Emissions from the energy sector in CO<sub>2</sub> equivalent, for 2000

CO<sub>2</sub> form energy sector, 1994, 2000-2004

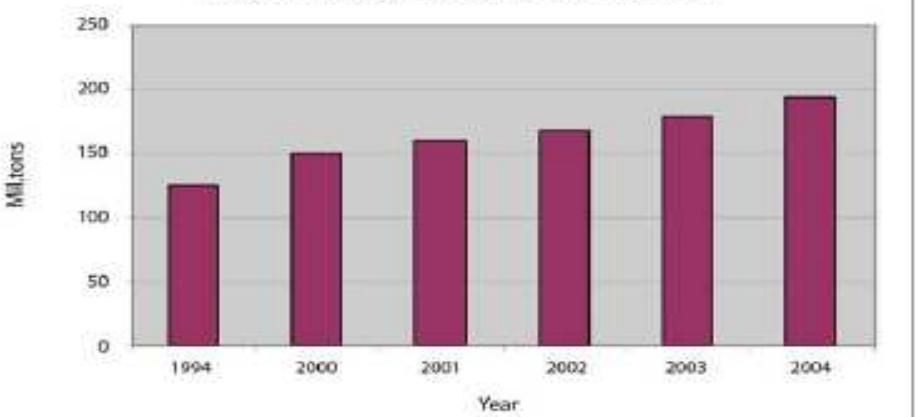


Figure 2-10 Thailand CO<sub>2</sub> emissions from the energy sector, 1994, 2000-2004 (million tons)

- Source: Second national communication of Thailand to UNFCCC of 2011 (data of 2000). From 2000-2012 CO<sub>2</sub> emissions increased probably more than 50%)

Emission from 'Agriculture' in 2000 (Mt CO<sub>2</sub>, eq, %)

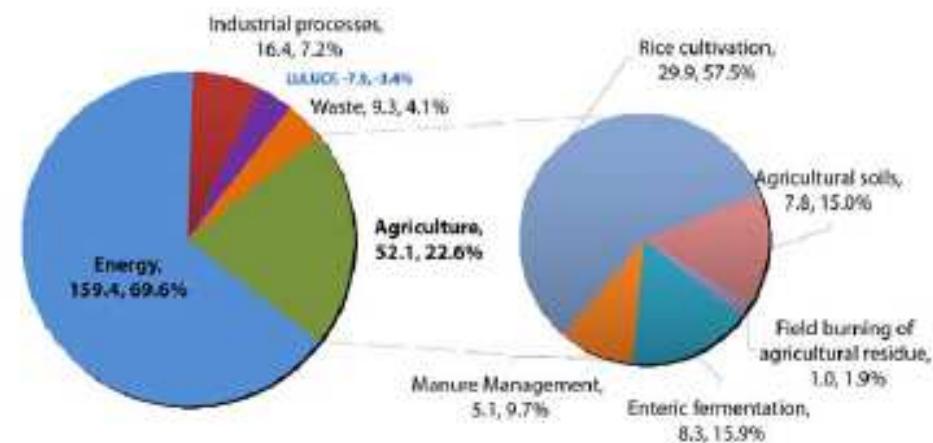


Figure 2-5 Greenhouse gas from all sectors and agriculture, by source in CO<sub>2</sub> equivalent, in 2000

# 4.18. International Energy Agency (2013) on Thailand's Emissions (1990-2010)

IEA (CO<sub>2</sub> Emissions from Fuel Combustion, 2012 (3/2013).

1) GHG emissions (sec. approach) 1990-2010: World: +44.4%

- Malaysia: +272%, Vietnam: +658%, China: +223.5%; Thailand: +208.7%, Singapore: 114.1% , Asia: +160.4%

• Thailand 1990: 80.5; 2000: 158.1; 2010: 248.5 mio. tons of CO<sub>2</sub>

2) Total primary energy supply (Mio. ton, oil equivalents)

Malaysia: +237.1%, Vietnam: +231.5%, China: +183.3%; Thailand: 180,0+%, Singapore: 184.3% , Asia: 115.3+%

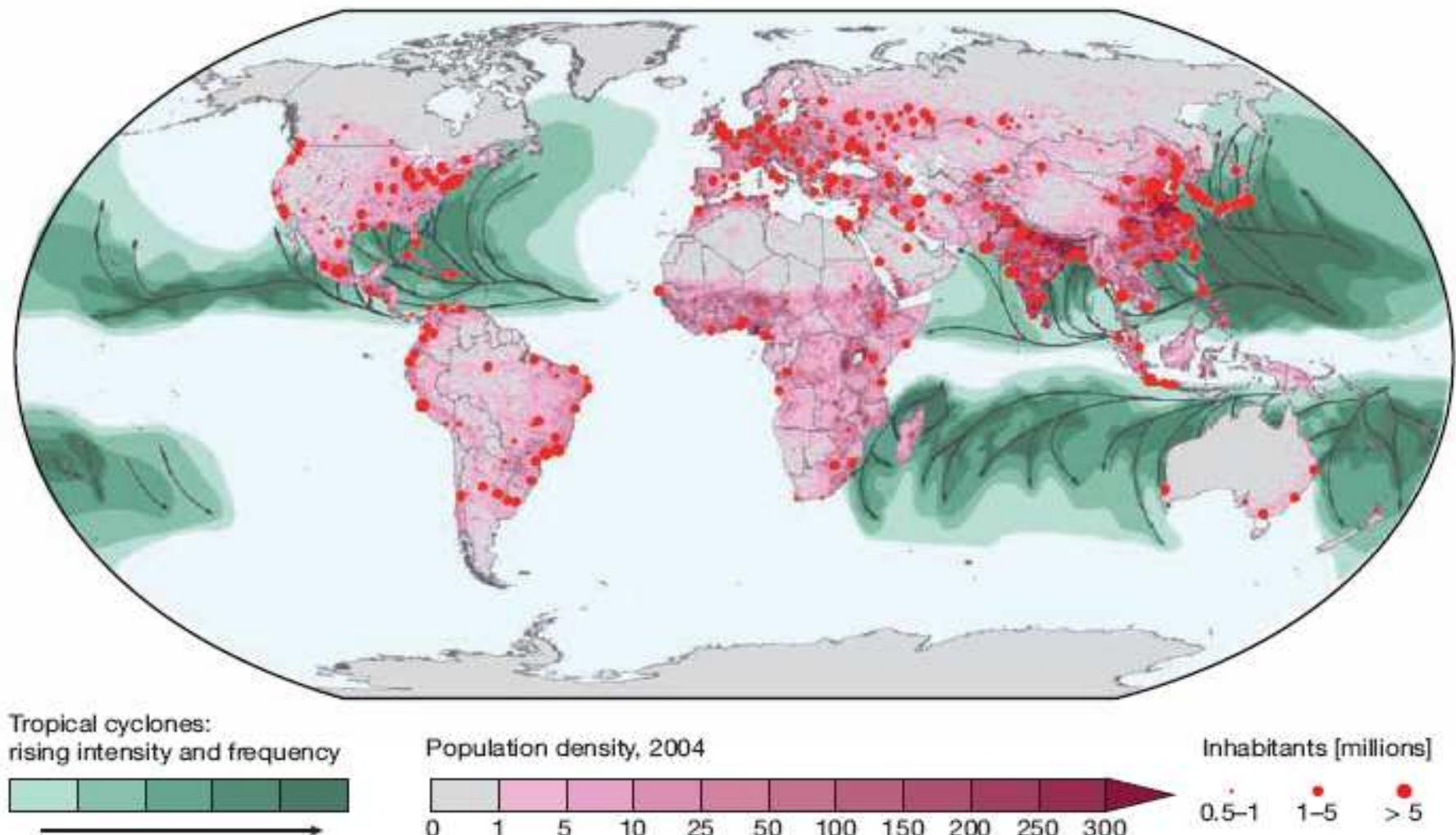
3) Per capita emission by sector in 2010 (kg CO<sub>2</sub> / capita):

Total CO<sub>2</sub> Emissions from fuel combustion: 6 514, Vietnam: 1 501, China: 5 395; Thailand: 3 596, Singapore: 12 395 , Asia: 1 494

Transportation: Malaysia: 1494, Vietnam: 348, China: 382;

Thailand: 801, Singapore: 1580, Asia: 237

# 4.19. Tropical Cyclones: Threat to Megacities



**Figure 6.4-1**

Tropical cyclone threat to urban agglomerations.

Cartography: Cassel-Gintz, 2006.

Source: WBGU

# 4.20. Disasters: Killed, Affected & Economic Damage

Disaster	Date	No Killed	Disaster	Date	No Total Affected
Earthquake (seismic activity)	26-Dec-2004	8,345	Drought	Apr-2008	10,000,000
Flood	5-Aug-2011	813	Flood	5-Aug-2011	9,500,000
Storm	27-Oct-1962	769	Flood	10-Oct-2010	8,970,653
Flood	19-Nov-1988	664	Drought	Mar-2010	6,482,602
Earthquake (seismic activity)	Jun-1955	500	Drought	Jan-1999	6,000,000
Storm	3-Nov-1989	458	Flood	30-Jun-1996	5,000,000
Flood	10-Oct-2010	258	Drought	Feb-2002	5,000,000
Flood	3-Jan-1975	239	Flood	1-Aug-1995	4,280,984
Flood	1-Aug-1995	231	Flood	Oct-2002	3,289,420
Flood	20-Aug-2006	164	Flood	3-Jan-1975	3,000,093

Disaster	Date	Dammage (000 US\$)
Flood	5-Aug-2011	40,000,000
Flood	27-Nov-1993	1,261,000
Earthquake	26-Dec-2004	1,000,000
Storm	3-Nov-1989	452,000
Drought	Jan-2005	420,000
Flood	Dec-1993	400,100
Flood	Aug-1978	400,000
Flood	19-Jan-1984	400,000
Flood	10-Oct-2010	332,000
Flood	31-Oct-1993	319,850

**Main Disasters in Thailand: recent & CC-related**

# 4.21. 2nd National Communication (2011)

Table 3-2 Disaster and damages in Thailand, 2001-2006

Year		2001	2002	2003	2004	2005	2006
Storm	Frequency (times)	1,061	594	3,213	3,834	1,313	1,883
	Provinces (number)	70	67	76	76	57	65
	Household (number)	32,100	23,070	146,024	70,818	32,449	30,296
	Public utility loss (mil.baht)	501.0	213.3	457.4	398.4	148.9	92.4
	Provinces (number)	51	68	63	64	71	61
	Household (number)	7,334,816	2,939,139	1,399,936	1,970,516	2,768,919	2,960,824
Drought	Loss (mil. Baht)	72.0	508.8	174.3	190.7	7,565.9	495.3
	Provinces (number)	60	72	66	59	63	58
	Household (number)	919,699	1,373,942	485,436	619,797	763,847	1,673,822
Flood	Loss (mil.baht)	3,666.3	13,385.3	2,050.3	850.7	5,982.3	9,627.4

## 4.22. Energy-related CO<sub>2</sub> Emissions for EU27, US, Japan, Russia, China & India (1990-2030)

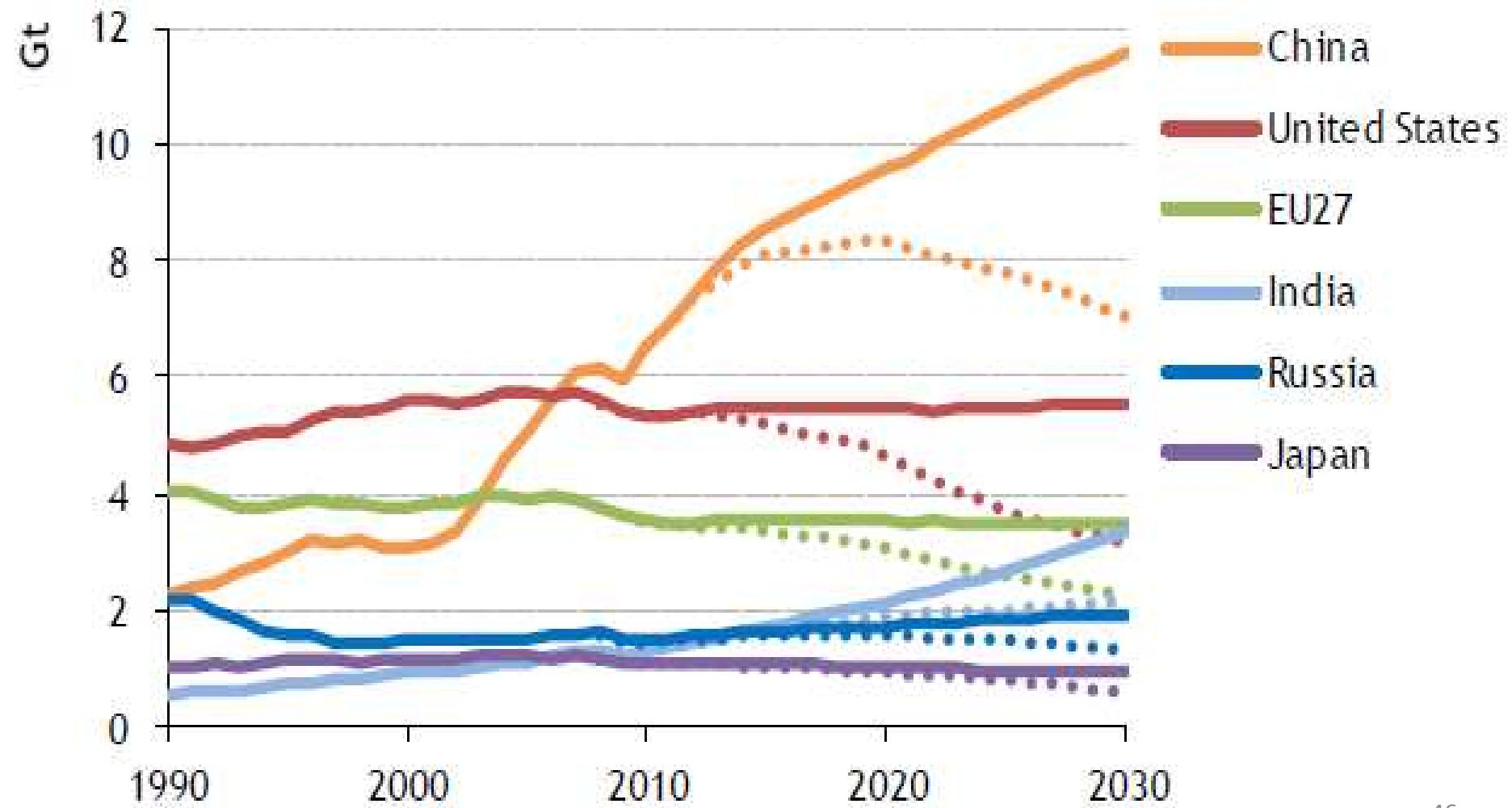


Figure 7.5. Global GHG emission pathways: Baseline and mitigation cases to 2050 compared to 2100 stabilisation pathways

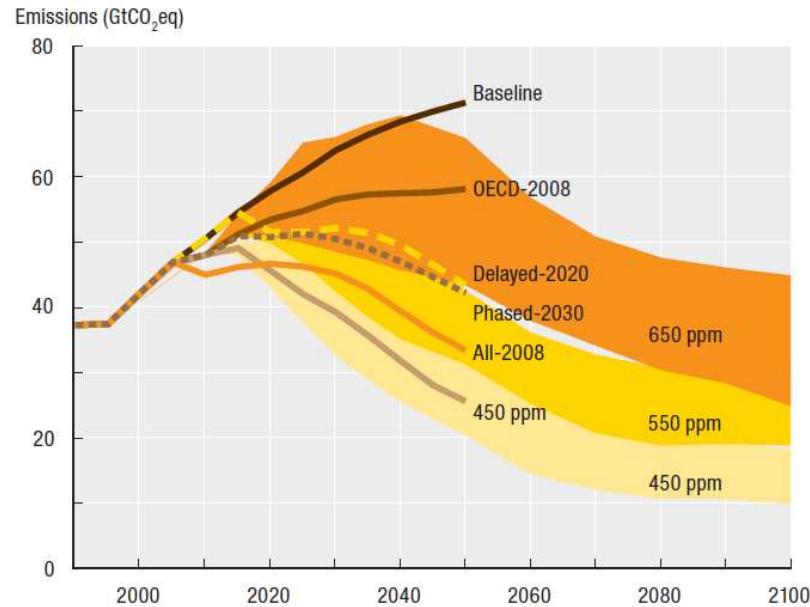
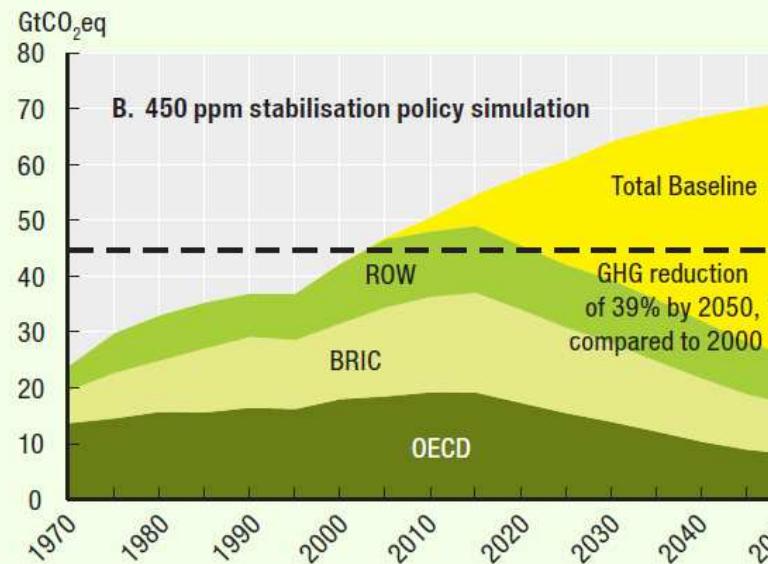
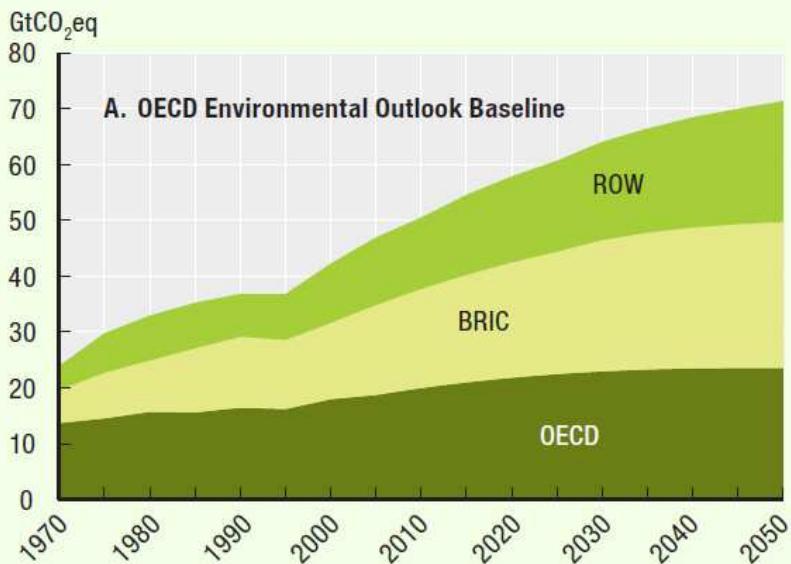
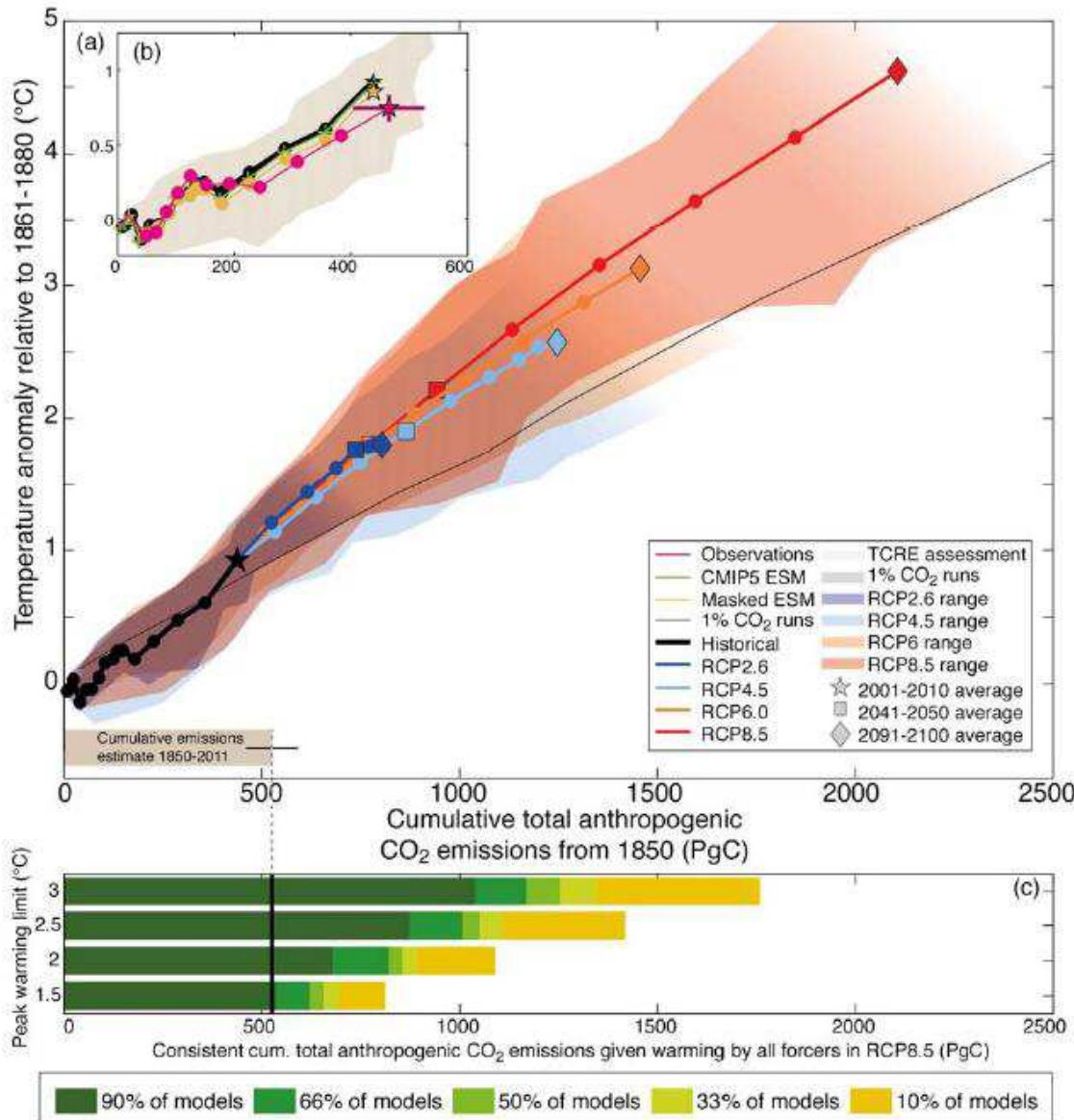


Figure 0.2. Total greenhouse gas emissions (by region), 1970-2050



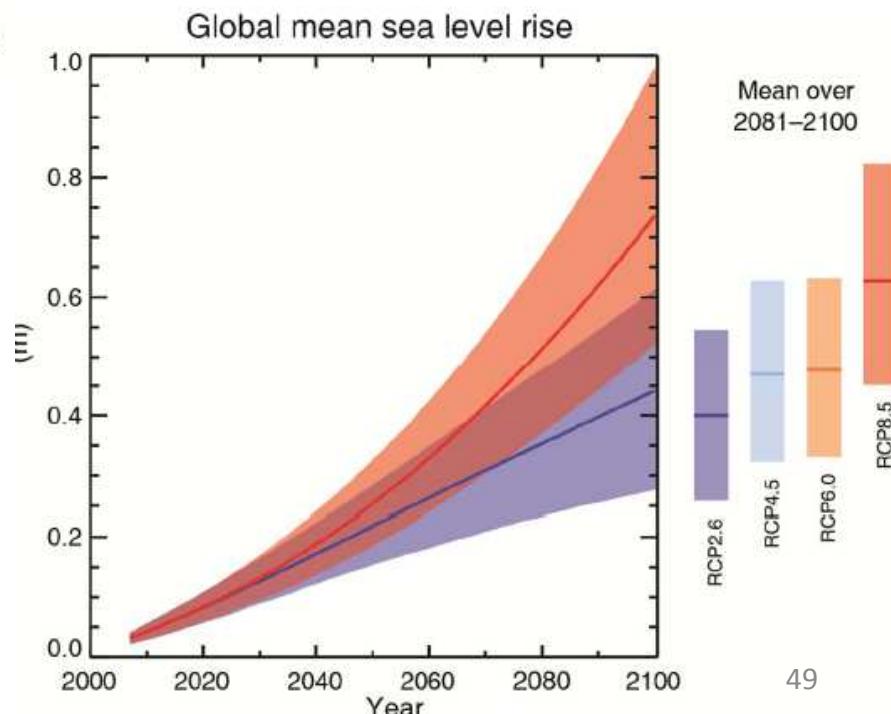
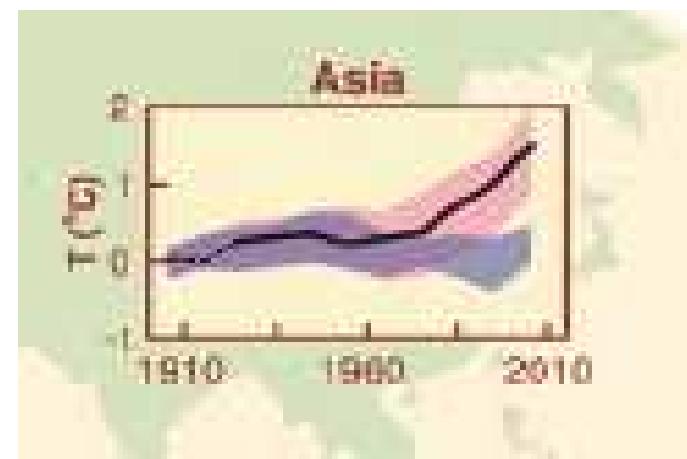
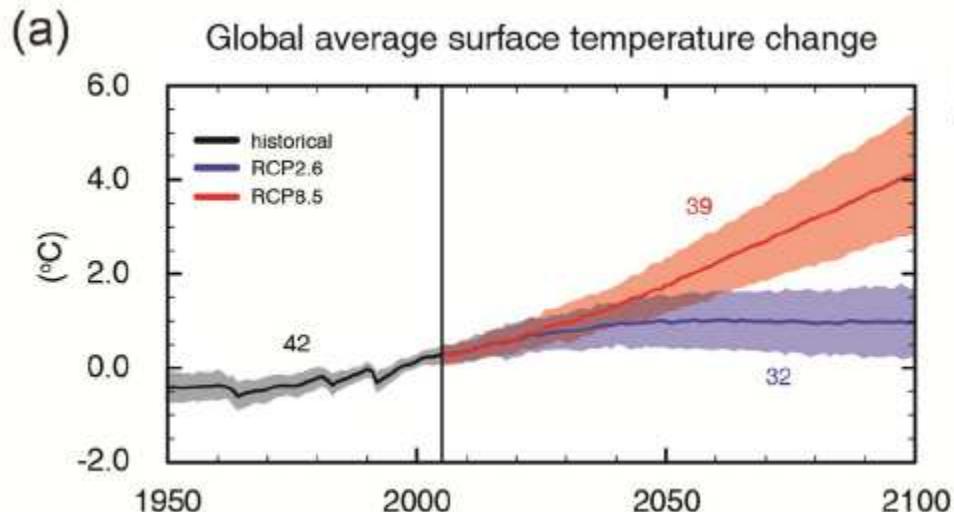
# 4.24. IPCC, 5th Assessment Report, 2013



## 4 Physical affects:

- Temperature increase (cumulative anthropogenic CO<sub>2</sub> emissions since 1870)
- Precipitation change
- Sea level rise: to up to 1 metre is possible 2100
- Extreme events
  - Tropical storms (typhoons, Cyclons, Hurricanes)
  - Winter Storms
  - Floods
  - Land slides
  - Droughts
- Societal effects

# 4.25. IPCC, 5th Assessment Report, 2013



- By 2100 most likely mean increase of 1-4°C
- Sea-level rise between 40 cm and 1 metre

# 4.26. IPCC, 5th Assessm. Report, 2013

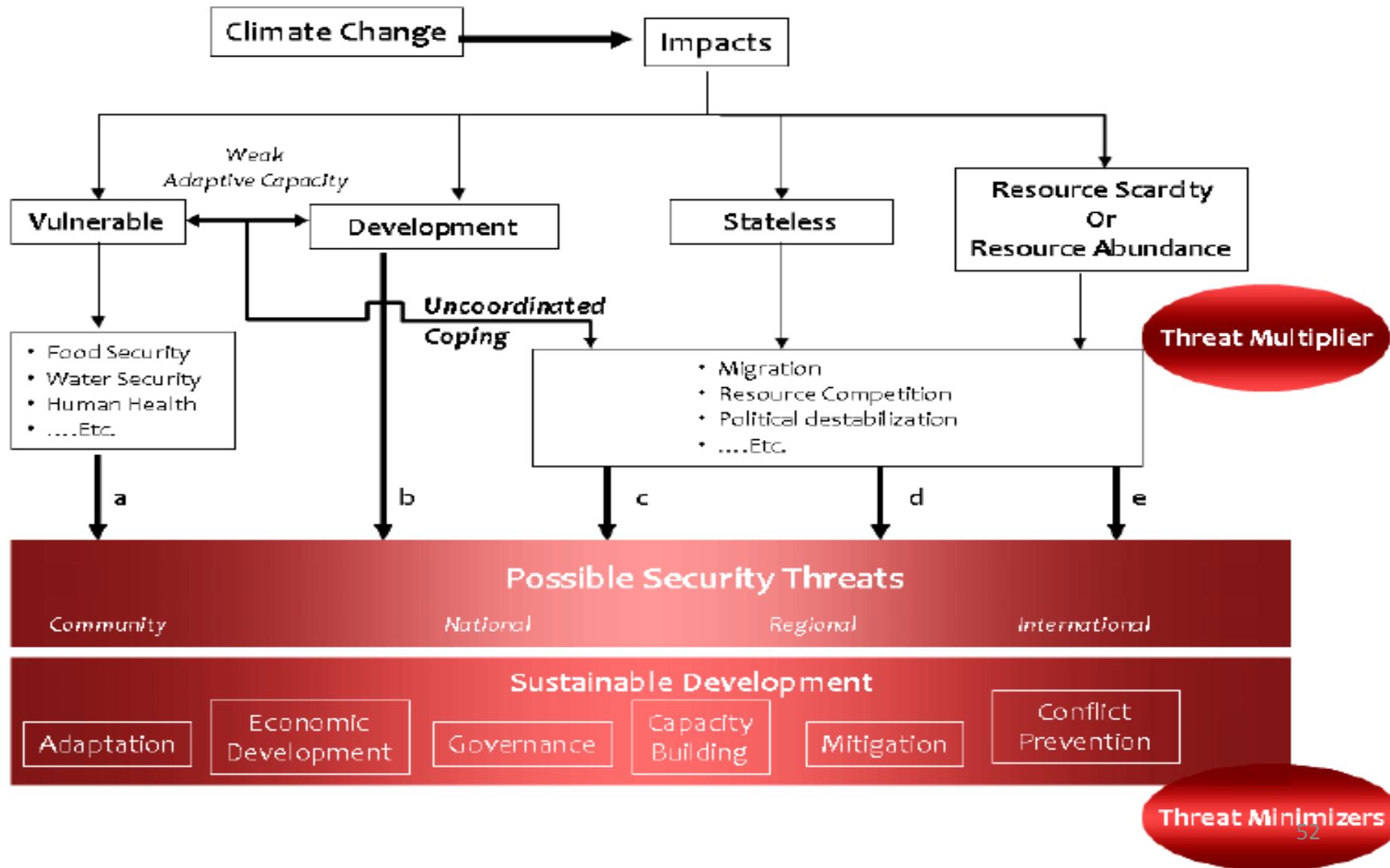
Variable	Scenario	2046–2065		2081–2100	
		mean	likely range <sup>c</sup>	mean	likely range <sup>c</sup>
Global Mean Surface Temperature Change (°C) <sup>a</sup>	RCP2.6	1.0	0.4 to 1.6	1.0	0.3 to 1.7
	RCP4.5	1.4	0.9 to 2.0	1.8	1.1 to 2.6
	RCP6.0	1.3	0.8 to 1.8	2.2	1.4 to 3.1
	RCP8.5	2.0	1.4 to 2.6	3.7	2.6 to 4.8
		mean	likely range <sup>d</sup>	mean	likely range <sup>d</sup>
Global Mean Sea Level Rise (m) <sup>b</sup>	RCP2.6	0.24	0.17 to 0.32	0.40	0.26 to 0.55
	RCP4.5	0.26	0.19 to 0.33	0.47	0.32 to 0.63
	RCP6.0	0.25	0.18 to 0.32	0.48	0.33 to 0.63
	RCP8.5	0.30	0.22 to 0.38	0.63	0.45 to 0.82

## 4.27. Sea Level Rise in Asia, IPCC, TAR (2001: 569)

Country	SLR (cm)	Potential land loss		Population exposed	
		km <sup>2</sup>	%	million	%
Bangladesh	45	15,668	10.9	5.5	5.0
		29,846	20.7	14.8	13.5
India	100	5,763	0.4	7.1	0.8
Indonesia	60	34,000	1.9	2.0	1.1
Japan	50	1,412	0.4	2.9	2.3
Malaysia	100	7,000	2.1	>0.05	>0.3
Pakistan	20	1,700	0.2	n.a.	n.a.
Vietnam	100	40,000	12.1	17.1	23.1

**Vietnam is the most vulnerable country** to climate change due to sea-level rise in South East Asia. In South-East Asia food & fibre, biodiversity, coastal ecosystems, human health and land degradation are highly vulnerable to climate change while water resources and human settlements are moderately vulnerable.

# 5. Emergence of a Dual Discourse: UN Sec. Gen. Ban-Ki Moon Report (11-9-2009)



# 5.1 Two Policy Debates & Scientific Discourses

Climate change & (inter)national and  
human security (global, national, local)

- What will be the security effects for ASEAN region and Thailand by 2050 & 2100?
- Sea Level rise in Vietnam of 1 metre exposing 23% of population -> migration pressure (internal, external)
- What will be the economic effects of more frequent big floods as of 2011 and droughts for Thailand in this century?

Climate change & sustainable development (sustainability transition

- ← Business as usual: dangerous & catastrophic climate change
- ← Severe security implications
- Response: Adaptation, Mitigation, Resilience Building
- Focus on cause: GHG emissions (burning of coal, oil, gas)
- Address: strategies for gradual decarbonization of economy
- Goal of sustainable development & of strategies for sustainability transition

## 5.2. Emergence of the Scientific & Policy Debates on ‘Sustainability Transition’

- Scientific discourse in natural sciences on **earth systems analysis (ESA)** or **earth systems science (ESS)**, ‘**sustainability science**’ (**SuS**) involving natural and social sciences, and on **ST**, primarily in the social sciences.
- **Policy debate** has addressed proposals for a **global green deal** and **green growth**, that are increasingly being addressed by inter- and supranational organizations, such as the **UN**, **UNEP**, **OECD**, and the **EU**.
- Since 2009, ***Sustainability Transitions Research Network (STRN)*** has focused on “persistent sustainability problems in such sectors as **energy, transport, water and food**” from the perspective of “**various scientific communities**” on the ways
  - in which society could combine economic & social development with reduction of its pressure on the environment. A shared idea among these scholars is that due to the specific characteristics of the sustainability problems (ambiguous, complex) incremental change in prevailing systems will not suffice. **There is a need for transformative change at the systems level, including major changes in production, consumption that were conceptualized as ‘sustainability transitions**
- Routledge Series, vol. 1: „**seek to understand transitions dynamics, and how and to what extent they may be influenced.**“ ...The transition to sustainability has to compete with other developments, and it is uncertain which development will gain the upper hand. ... The authors ... closely **address the need for transitions, as well as their dynamics and design**. Thereby they concentrate on historical cases as well as on contemporary examples.

# 6. Emergence of the Research on Sustainability Transition

**US National Academy of Science (NAS) Report of 1999:  
Sustainability transition' research has evolved since 2004:**

- Clark, Crutzen, Schellnhuber: ‘Science for Global Sustainability’ (2004).
- **Dutch Knowledge Network on Systems Innovation & Transition**
  - complex systems analysis,
  - socio-technological and a governance perspective”.
- Relies on research that has evolved since 1990s when “innovation & technology scholars ... started to address environmental innovation and sustainability transitions more explicitly:
  - *technological innovation systems approach* (TIS) and
  - *multi-level perspective* (MLP) approaches has contributed.
- **‘Sustainability Transitions Research Network’ (STRN, 2009/2010),**
- ‘Routledge Studies in Sustainability Transitions’ (2010),
- Journal ‘*Environmental Innovation and Sustainability Transitions*’ (2011)
- **WBGU Report on a ‘Social Contract for Sustainability’ (2011)**

# 6.1. KSI definition & STRN goals

- **Dutch Knowledge Network on Systems Innovation & Transition (KSI)**
  - Sustainability transitions are one of the great challenges of 21st century. Both scientists and politicians agree on the fact that our system is in need of fundamental transformation.
  - After WW II the Western world realized in a few decades a welfare state with prosperity for most people. By 1970 a growing number of groups pointed to social and environmental risks which have come along with that progress.
  - Food crises, climate crises, financial and economic crises **increased the sense of urgency**. It is certain that **sustainable development will require a set of deep structural changes of modern societies**. Such processes of change are called transitions and take time, lots of time.
- **Sustainability Transitions Research Network (STRN)**
  - to provide a **meeting place** for the international and multi-disciplinary community of scholars working in the field of sustainability transitions;
  - to **deepen the scientific understanding** of sustainability transitions through a program of networking, research coordination and synthesis activities;
  - to be a **leading resource for practitioners** such as actors in the arenas of policy making, civil society, and business who are working to advance societies into more sustainable directions.

## 6.2. Sustainability Transitions Research Network

- STRN is a wholly independent research-driven network governed by a steering group composed of leading researchers in the field. Membership of the STRN is open to anyone who is interested in research on sustainability transitions. The network aims to provide a space where researchers can engage in a vibrant intellectual exchange on the challenges of sustainability and find help and support in accessing resources, research topics and audiences for their work.
- STRN works to improve **scientific understanding of sustainability transitions through a program of networking, research coordination and synthesis activities** organized around **eight research themes** (see the network's [\*\*research agenda\*\*](#)) that together define the research and policy challenges that the network is currently engaged with. The network promotes an active, energetic and well connected research community with an associated international journal ([\*\*\*Environmental Innovation and Societal Transitions\*\*\*](#)).
- STRN coordinates scientific capacity within the network towards the production of foresight reports on strategic sustainability policy questions. The ambition of the network is to support the development of a sustainability transitions research community internationally, and provide an independent, authoritative and credible source of analysis and insight into the dynamics and governance of sustainability transitions.
- This website provides further information about people, projects, upcomin

## 6.3. STRN Mission Statement: Research Priorities

- 1) To deepen the empirical basis for sustainability transitions research, deepening our answers to the questions – what are transitions and how can we steer them?
- 2) To move from concepts to theory, implying a deepening of the set of concepts already developed rather than the developing of many more concepts.
- 3) To explore transition processes occurring across multiple regions and outside of Europe.
- 4) To take the transitions approach into new problem domains such as health, education, and social security and the welfare state.

A variety of (highly institutionalised) processes tend to perpetuate existing systems:

- the knowledge, capabilities and employment of various actors relevant to the maintenance of existing systems;
- the technical infrastructures and institutions (that have developed over time to service those systems);
- the economies of scale and markets of incumbent systems;
- the social significance of these systems, and their links to political power;
- the mutually reliant clusters of technologies used by these systems; and,

# **6.4. STRN Mission Statement: Research Priorities**

## **2.1. Understanding transitions**

This theme focuses on the theoretical concepts and frameworks that can be applied to the analysis of sustainability transitions. In particular it focuses on synthesizing perspectives and approaches that can help to frame the study of transitions.

## **2.2. Governance, power and politics**

Research that focuses on improving our understanding of how purposeful governance processes can actively engage with and shape sustainability transitions; with a focus on the politics that are involved and the ways in which power plays out.

## **2.3. Implementation strategies for managing transitions**

Research focused on assessing the impact and effectiveness of instruments that aim to influence sustainability transitions in practice. And, building on lessons learnt, research that focuses on the design and testing of a next generation of instruments for managing transition processes.

## **2.4. Civil society, culture and social movements in transitions**

This theme addresses the role of civil society, culture and social movements in the initiation and acceleration of sustainability transitions.

# **6.5. STRN Mission Statement: Research Priorities**

## **2.5. The role of firms and industries in transitions**

This theme addresses the role of firms and industries in developing markets that can help to initiate and enable sustainability transitions.

## **2.6. Sustainable Consumption: Transitions in practice and everyday life**

This theme focuses on the importance of consumption patterns in research on sustainability transitions, highlighting the need for a debate about what exactly sustainable consumption might entail and study of the ways in which sustainability transitions are played out in changes to everyday life, consumption and practices.

## **2.7 The geography of transitions**

Until now transition theory has paid too little attention to the spatiality of transitions  
- Why do transitions occur in one place and not in another? What is the role of cities and regions in transition processes?

## **2.8. Modelling transitions**

Research on the modelling of transitions is aiming to reproduce social complexity in formal mathematical models drawing upon the science of complex systems and evolutionary economics. The goal is to develop a capacity to undertake formal analysis of transition policies and management.

## 6.6. Two Parallel Discourses

- The parallel discourse on '**sustainability transition**' addresses both the causes and impacts of GEC and GCC by facing & coping with both and **avoiding the projected societal consequences of dangerous or catastrophic climate change** and of possible tipping points in the climate system.
- From this perspective the goal of 'sustainable development' and the perspective on '**sustainability transition**' refer to a much wider research agenda than the relatively narrow focus on environmental and technological innovations that is a primary focus of many researchers in the STRN.
- Process of '**transition**' refers to multiple long-term evolutionary and revolutionary transformative changes.
- These must be distinguished since they have **different transformative results**. We may address them with four hypotheses:

# 6.7 Four Hypotheses

- We are in the midst of a **global transition in earth history** from the '**Holocene**', **to the 'Anthropocene'** that began with human interventions into the **earth system** and that has resulted in a rapid increase in GHG emissions in the atmosphere.
- The **impacts of the grand transformations** of the first & second industrial revolution have resulted in a complex global environmental change and in anthropogenically-induced climate change, besides natural climatic variations & increasing destruction of the biodiversity. This resulted in an exponentially growing accumulation of GHG in the atmosphere this has also affected almost all environmental services.
- The **societal impacts** of four physical effects of 'anthropogenic global climate change' and of biodiversity loss may result in **major international, national, and human security dangers**.
- Since 2005 an alternative discourse on '**sustainability transi-tions**' or on '**transitions to sustainable and resilient development**' has begun to evolve. It addresses new directions in the 'study of long-term transformative change' that also needs to focus on resilient societies.

# 7. Dimensions of Research and Debate on Sustainability Transition

- **Temporal Dimension (History)** Cases of Long-term transformative change: industrial revolution(s)
- **Spatial Dimension (Geography)**, e.g. in urban & rural environments
- **Scientific Dimension (Natural sciences)**: scientific revol.
- **Societal Dimension (Sociology, political science, anthropology, social psychology)**: Demand side, humans
- **Economic Dimension (economics)**: processes & output
- **Political Dimension (political science, law)**: politics (process), framework (polity), policy (fields or sectors: energy)
- **Cultural Dimension (anthropology, cultural studies, humanities & arts)**: life styles, ways of life, tradition.knowledge

## 7.1. Temporal Dimension of Sustainability Transition

- As with the previous “great transformation” (Polanyi 1944) caused by the industrial revolution, the debate on ‘sustainability transition’ refers to another **long-term but a far more comprehensive transformative change**.
- With regard to the “policy implications of sustainability transitions”, Voß et al. (2009) pointed to a long- term orientation of policy frameworks and argued that
  - Sustainability transitions typically span over several decades and are therefore at odds with the usual spans of attention prevalent in political processes ...
  - In order to support long-term structural shifts, policies have to interact with many transformative changes as they unfold. Long-term policy design thus needs to be flexible, adaptive and reflexive (Voß et al. 2009)

## 7.2. Spatial Dimension of Sustainability Transition

Within the evolving discourse on ST, proposal of a spatial dimension by Coenen, Benneworth & Truffer was more limited; they argued that

- an explicit analysis of the geography of transitions contributes to transition literature in various ways.
  - Firstly it provides a **contextualization and reflection on the limited territorial sensitivity** of existing transitions analysis. The majority of empirical studies have been conducted in a small number of countries, primarily the Netherlands, UK or Scandinavia, with an increasing interest in Asian countries.
  - Secondly, it explicitly acknowledges and **investigates a variety of transition pathways**.
  - Thirdly, it encompasses not only greater emphasis but also better conceptual & theoretical devices for understanding the **international, trans-local nature of transition dynamics**.

More recently, Coenen and Truffer (2012: 1) claimed that

- environmental innovations & sustainability related initiatives have received increasing attention in the recent **economic geography and regional studies** literature.
- In how far **sustainability concerns might also lead to fundamental transformations in technologies, industries and life styles** (so-called sustainability transitions) has however found much less resonance.
- **Sustainability transitions have been in the focus of scholars from the field of innovation studies.**
- **However, these approaches mostly disregarded spatial aspects of sustainability transitions until recently.**

## 7.3 Scientific Dimension of Sustainability Transition

- Development of new scientific & technological knowledge is crucial for initiating processes for multiple transitions towards sustainability.
- 1999: US National Academy of Science (NAS): in a report: **Our Common Journey: A Transition Toward Sustainability** noted that “many human needs will not be met, life-support systems will be dangerously degraded, and the number of hungry and poor will increase”.
- The NAS also argued that “a successful transition toward sustainability is possible over the next two generations” but that this would require “**significant advances in basic knowledge, in the social capacity and technological capabilities to utilize it, and in the political will to turn this knowledge to action**” (NRC 1999: 160).

## 7.4. Emerging Scientific ST Discourse

- **2001:** Amsterdam conference on Earth Systems Science resulted in **Earth System Science Partnership (ESSP)** linking the four scientific research programmes
- **2004:** Clark/Crutzen/Schellnhuber provided conceptual context for the **Dahlem Workshop on “Earth Systems Science and Sustainability” (2003)**, where they pointed to “the need for harnessing science and technology in support of efforts to achieve the goal of environmentally sustainable human development in the Anthropocene”
- **2005:** KSI started to work on Sustainability transition (John Grin, co-chair)
- **2009:** Amsterdam Conference on Sustainability Transition resulted in Sustainability Transition Research Network (STRN)
- **2010:** Routledge Series on Sustainability Transitions was launched
- **2011:** Elsevier: Environmental Innovation and Sustainability Transition
- **2011:** WBGU. Report: A Social Contract for Sustainability ([Dropbox](#))
  - We are currently witnessing the emergence of a new scientific paradigm that is driven by unprecedented planetary-scale challenges, operationalized by transdisciplinary centennium-scale agendas, and delivered by multiple-scale co-production based on a new contract between science and society.
- **2011:** Oswald Spring/Brauch: Fourth Sustainability Revolution (FSR)
- **2011:** Brauch/Dalby/Oswald Spring: A Political Geoeconomy for the Anthropocene

## 7.5. Societal Dimension of Sustainability Transition

- Political, economic, and societal strategies for ‘sustainability transition’ cannot be implemented against the wishes, values, and preferences of the people concerned.
- Such a long-term and global transformative change requires not only ‘hard’ changes in the systems of production, energy, and transportation, as well as in human settlements and habitats, but also many ‘soft’ changes in human values, belief systems, world views, and mindsets.
- The societal dimension of the scientific discourse on sustainability transition has so far focused on the changes needed in human values, perception, and behaviour that will result in new lifestyles, ways of life, and patterns of consumption.
- These goals have been promoted by leading scientists, by certain policymakers, and by religious and social movements such as the simplicity movements that call for a simple lifestyle with no negative effects on nature.

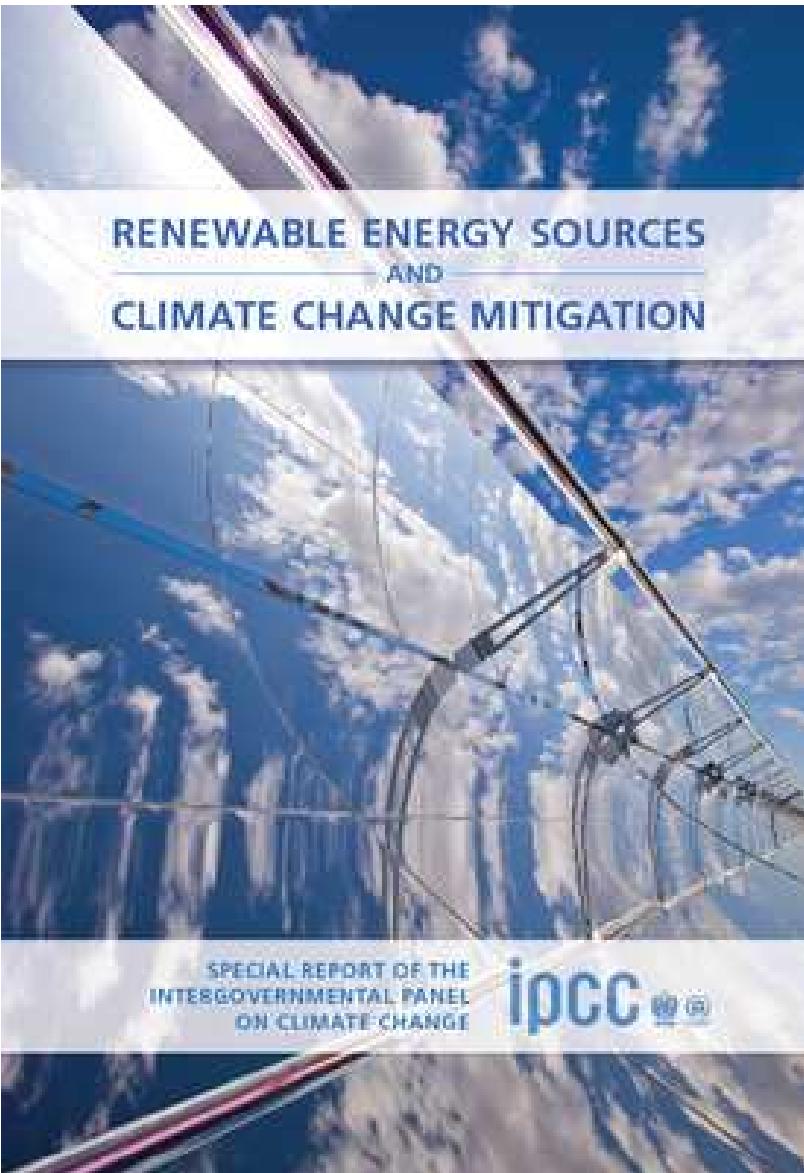
## 7.6. Economic Dimension of ST

- Energy sector: 2/3 of GHG emissions, changes in land use (deforestation & agriculture): 1/4 of GHG emissions.

WBGU (2011: 109) has argued that:

- Fundamental **changes in the technological development paths of all countries are necessary** in order to provide the chance of achieving elemental development goals like access to food, clean water, basic health care, or poverty reduction, to the 50% of the population so far denied this chance, whilst remaining within the planetary boundaries. ...
- Central elements of the transformation into a sustainable and **climate-friendly society are the comprehensive decarbonization of the energy system**, as well as significant **energy efficiency improvements**, particularly **in end-use efficiency**.
- The **determined realization of a climate compatible development path** is pos-sible. ... These include ... **facilitating economic development through universal access to safe and modern energy, improving long-term supply security, and a de-escalation of international conflicts with regard to energy resources**, positive effects on employment in structurally weak regions, and the reduction of many of the current systems' negative effects on the environment ...
- **Building the transformation-relevant technology and infrastructure requires substantial investments, and the development of new financing concepts and business models for energy services.** In the long run ... these initial investments will be more than compensated by ... **reduced fuel and security costs, less damage to the environment, and avoidance of costs associated with adapting to climate change, and with the consequences of climate change** (WBGU 2011: 109).

# 7.7. IPCC SRREN Report (2011)

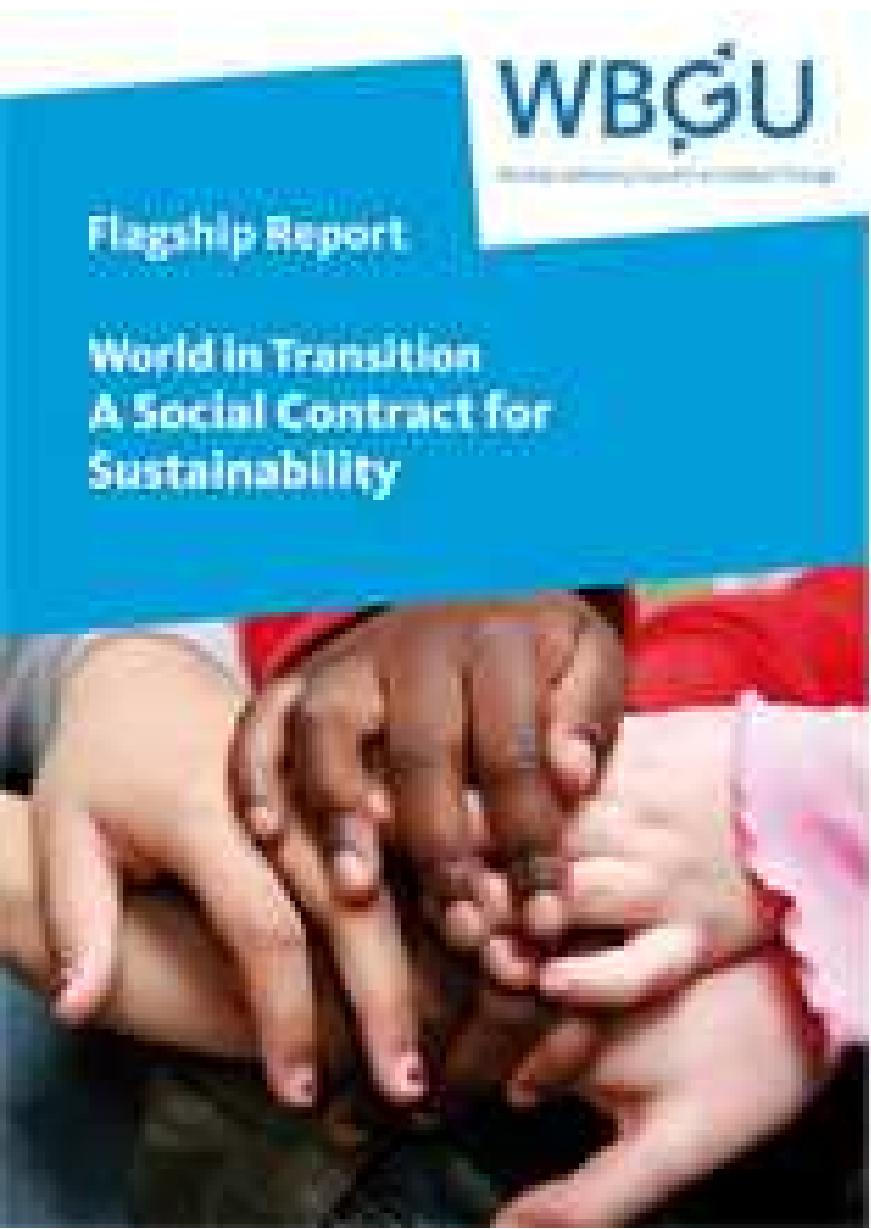


- **IPCC's (2011) Special Report on Renewable Energy Sources and Climate Change Mitigation (SRREN)**
- IPCC, 2011: **IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation. Prepared by Working Group III of the Intergovernmental Panel on Climate Change** [O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlömer, C. von Stechow (eds)]. Cambridge Univ. Press, Cambridge- New York, 1075 pp.
- WBGU's (2011: 119) assessment,
  - “**the sustainable potential of renewable energies is fundamentally sufficient to provide the world with energy**”.

## 7.8. IPCC SRREN Report (2011)

- According to IPCC's Summary for Policymakers (2011: 15):
  - “There are **multiple pathways for increasing the shares of RE across all end-use sectors.**”
  - This applies specifically to the transport, building, and agricultural sectors and requires long-term integration efforts including investment in enabling infrastructure; modification of institutional and governance frameworks; attention to social aspects, markets and planning; and capacity building in anticipation of RE growth.
  - Furthermore, integration of less mature technologies, including biofuels produced through new processes (also called advanced biofuels or next-generation biofuels), **fuels generated from solar energy, solar cooling, ocean energy technologies, fuel cells and electric vehicles, will require continuing investments in research, development and demonstration (RD&D), capacity building and other supporting measures.**

## 7.9. ST of other Economic Sectors

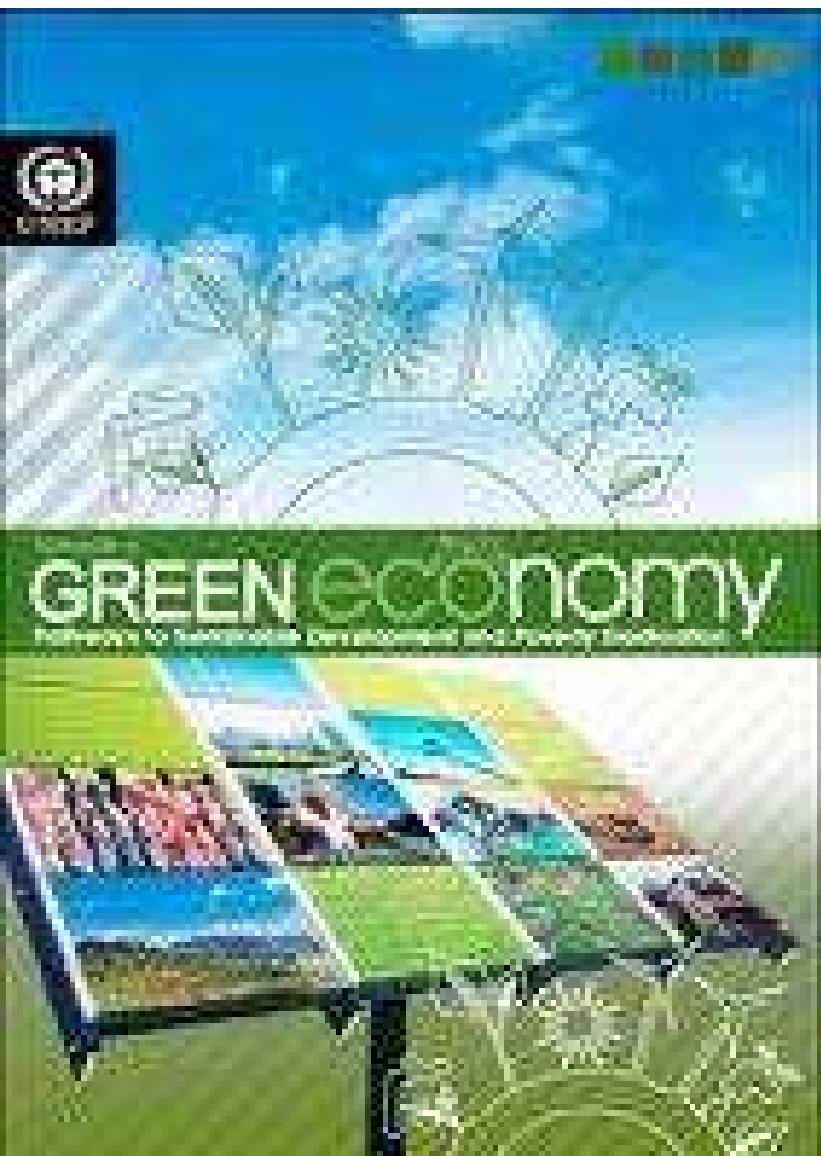


- Besides the fundamental transformation of the energy sector, WBGU Report (2011) proposed **an intensification of policies of sustainable production and consumption and major initiatives in buildings, living, and land use planning, in mobility and communication, and in food**;
- these will require both **climate-compatible agricultural management (supply site)** and a change in **dietary habits (demand site)**.

## 7.10. ST of other Economic Sectors

- Initiating & intensifying the move towards a low-carbon society and economy requires major investments & new and additional financial resources, such as **phasing out fossil energy and agricultural subsidies, taxation of international transport and international financial transactions, and development assistance and financing via the carbon market.**
- Besides the **decarbonization of world economy, “overco-ming energy poverty”** and “to provide universal access to modern, clean and safe energy in the form of electricity or gaseous energy carriers by 2030” together present the second major challenge for a sustainable energy transition.

# 7.11: UNEP's Green Growth Report



- **Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication**
- The Green Economy Report is compiled by UNEP's Green Economy Initiative in collaboration with economists and experts worldwide. It demonstrates that the greening of economies is not generally a drag on growth but rather a new engine of growth; that it is a net generator of decent jobs, and that it is also a vital strategy for the elimination of persistent poverty. The report also seeks to motivate policy makers to create the enabling conditions for increased investments in a transition to a green economy.  
[Download the Full Report](#) (631 p. - 43MB)
- <http://www.unep.org/greenconomy/greenconomyreport/tabid/29846/default.aspx>

# 7.12. OECD Reports



## Green Growth and Sustainable Development Forum:

### •OECD Green Growth Studies Series

[http://www.oecd-ilibrary.org/environment/oecd-green-growth-studies\\_22229523](http://www.oecd-ilibrary.org/environment/oecd-green-growth-studies_22229523)

OECD Green Growth Strategy aims to provide concrete recommendations & measurement tools, incl. indicators, to support countries' efforts to achieve economic growth & development, while ensuring that natural assets continue to provide the resources & environmental services on which well-being relies. The strategy proposes a flexible policy framework that can be tailored to different country circumstances and stages of development.

### •How to unlock investment in support of green growth?(5-6.12.2013)

<http://www.oecd.org/greengrowth/gg-sd-2013.htm>

# 7.13. Sustainable Transformation of Cities

- Initiating **sustainable transformation in cities** with the highest energy growth potential can become a major force of innovation and investment in new infrastructure. This **requires new governance actors** (Corfee-Morlot et al. 2009) who can reduce traffic by a “spatial integration of urban functions”, thus “achieving a high quality of life for inhabitants”. Further, “**energy infrastructure integration** (CHP technology, heating & cooling systems, smartgrids, electromobility, etc.) can benefit considerably from the spatial density” (WBGU 2011). While “**land-use systems cannot become completely emissions-free**”, nevertheless “a significant contribution from land use” is needed, including “stopping deforestation and switching to sustainable forest management, as well as the promotion of climate-friendly agriculture and dietary habits” (WBGU 2011:173).

## 7.14. Political Dimension of ST

- **Political dimension of ‘ST’ was extensively discussed & many approaches, analysis, & proposals were made**
- **Grin (2010: 223)** suggested that the transition to sustainable development can **no longer rely on centralized government institutions of political administrative steering**, given the “more prominent role of the interactions between the state, market, and society”.
- **Grin argued that a governance perspective “allows us to consider transition management, strategic niche management and interrelated processes in the real world”, for three reasons:**
  - First, it contributes to the *historical contextualization of the transition* towards a sustainable society in late modernity. ...
  - Second, a **governance perspective emphasizes not only the nature of transitions** as profound changes in both established patterns of action and the structure in which they are embedded, but also how these changes in practices and structure in a particular domain are influenced by long-term, societal trends exogenous to that domain. ...
  - **Transforming established patterns of action and their structural context is bound to run into resistance and inertia.** ... This suggests a third positive feature of a governance perspective: it pays attention to dealing with the politics intrinsic to transitions and systems innovation.

# 7.15. Political Dimension of ST

- Focusing primarily on structural change in innovative systems, Coenen & Truffer (2012: 6) argued in ST research
  - explorative scenarios, experimentation and learning ... constitute important elements in specific policy programs.
  - reflexive policy framework that built on work of **Constructive Technology Assessment** has become known as **Strategic Niche Management**. ...
  - Other contributions have worked out foresight based scenario methods to identify potential development trajectories for entire countries, sectors, technological fields or firm level strategic planning processes
- A more encompassing policy framework has later been developed in Netherlands as **Transition Management** comprises 5 main elements:
  - (1) Establishing a **transition arena** (i.e. a broad constituency of representatives from industry, politics, and society that accompany the ongoing planning and implementation process),
  - (2) developing a **vision of a future sustainable sector structure**,
  - (3) identifying **pathways towards these future states** by means of backcasting methods,
  - (4) setting up **experiments for particularly interesting development options**
  - (5) **monitoring, evaluation and revisions**.

## 7.16. Studies on the Political Dimension of ST

- Studies by **Grin (2010)** and **in 't Veld (2011)** link the intensive scientific debate on global environmental & climate governance to process of ST.
- From a US perspective, **John C. Dernbach** (2008) discussed legal aspects of the process of “Navigating the U.S. Transition to Sustainability”
- Several studies addressed the governance aspects and perspectives of sustainability transition (Loorbach 2007), and governance aspects have also been discussed prior to the Rio+20 summit.
- **But hardly any proposals regarding international governance for ST, e.g. the upgrading of UNEP from a programme to a specialized agency, were adopted in outcome document in Rio in June 2012 (*Future We Want!*)<sup>19</sup>.**

# **8. Need for Transformative Social Science for Sustainability Transition**

Oswald Spring and Brauch (2011) argued

- We must overcome the prevailing business-as usual (BAU) mindset of policymakers
- We must challenge the dominant worldviews in science. We need a new scientific revolution towards sustainability
- We have rethink about the American & Western ways of life: plenty & waste economy -> move towards a sufficiency economy (vision of the King of Thailand).
- We have to rethink forms of governance and democracy that reinforce BAU (USA, Canada, Japan, Australia etc.)

## **8.1. Addressing Obstacles to ST: Overcoming Old Mindsets & World Views**

- Oswald Spring and Brauch (2011) argued that in the Anthropocene humankind is confronted with opposite ideal-type visions:
  - **Business-as-usual in a Hobbesian world where economic and strategic interests and behaviour prevail, leading to a major crisis for humankind in inter-state relations that will destroy the Earth** as the habitat for humans and ecosystems and put the survival of the vulnerable at risk (see the ‘market first’ and ‘security first’ scenarios of UNEP 2007).
  - **The need for a transformation of global cultural, environmental, economic** (productive and consumptive patterns), and **political** (with regard to human and interstate) **relations** (see the ‘sustainability first’ scenario of UNEP 2007).

## 8.2. Alternative Visions & Strategies

- Both visions refer to totally different strategies for coping with GEC:
  - In the first vision of **business-as-usual, Cornucopian perspectives predominate** that suggest primarily market mechanisms, technical fixes, and the defence of economic, strategic and national interests by adaptation strategies that are in the interests of OECD countries.
  - In the alternative vision of a **comprehensive transformation, a sustainable perspective** has to be implemented and developed into effective new strategies and policies with different goals and using different means, based on global equity and social justice.

## 8.3. Consequences of Both Visions

- The consequences of both opposing scientific visions and the competing policy perspectives are:
  - **The vision of business-as-usual** with minimal reactive adaptation and mitigation strategies will most likely increase the probability of a ‘**dangerous climate change**’ or **catastrophic GEC** with both linear and chaotic changes in the climate system and their sociopolitical consequences. This represents a high-risk approach.
  - To avoid these consequences the **alternative vision and sustainability perspective requires a change in culture (thinking on the human-nature interface), world views (thinking on systems of rule, e.g. democracy vs. autocracy, and on domestic priorities and policies, as well as on interstate relations in the world), mindsets** (strategic perspectives of policymakers), and **new forms of national and global governance.**

## 8.4 Alternative Vision

- This alternative vision refers to the need for a “**new paradigm for global sustainability**” and for a “**transition to [a] much more sustainable global society**” aimed at peace, freedom, material well-being, and environmental health.
- **Changes in technology and management systems** alone will not be sufficient, but “**significant changes in governance, institutions and value systems**” are needed, resulting in a fourth major transformation following “the stone age, early civilization and the modern era”.
- These **alternative strategies should be “more integrated, more long-term in outlook, more attuned to the natural dynamics of the Earth System and more visionary”**.
- These many changes suggested by natural scientists require a ‘**Fourth Sustainability Revolution**’.

## 8.5. Three Obstacles

### Results of Business as Usual: The Climate Paradox

- I argue that Canada, USA, Japan and rapidly industrializing threshold countries (G-20), who account for more than eighty per cent of GHG emissions, have faced a climate paradox due to their inability or lack of political will to implement their legal commitments or policy declarations. However, the different performance of the climate laggards and the of new climate change leaders show that it is not the ‘system of rule’) but rather the different political cultures in Europe and in North America that have influenced different policy performance.

### Neo-Malthusian Dead End: Securitization to Militarization

- Hobbesian pessimists, concerned about the national security implications of global environmental and climate change that are being interpreted by the dominant realist policy mindset, have used this argument to adjust their force structure and military means to be able to cope with these major challenges. From this, primarily US-focused, national security perspective on climate change, the securitization of the impacts of climate change as a force multiplier may result in militarization.

### The Cornucopian Dead End of Geo-engineering

- From the opposite ‘Cornucopian’ perspective, the solution to the challenges posed by global environmental and climate change may be technical fixes that have been offered by those who call for macro-scale projects of geo-engineering.

## 8.6 Towards a Sustainable Transition with Sustainable Peace

- The prevailing **policy mindset** that favoured policy solutions based on ‘business as usual’ resulted in a **climate paradox** and in a comprehensive paralysis of global multilateral environmental governance, at Copenhagen (2009), Cancun (2010), Durban (2012), Rio de Janeiro (2012) and Warsaw (2013).
- The **narrow neo-Malthusian national security perspective** on the security implications of climate change may result in **militarization**, while the **Cornucopian perspective believes that market mechanisms & technical fixes could cope with the impacts of anthropogenic climate change.**

# **9. Relevance for Chulalongkorn University and Thailand**

Build on existing initiatives

- **Cluster approach** (link clusters on climate change and social development addressing implications of global environmental change for Thailand and potentials for a sustainable economic and social development): discussion group (regular seminar, joint research projects, joint English language teaching programmes, like MAIDS)
- **Develop transformative social science goals** for a regular discussion between sociology, political science as a potential conceptual framework for a research school on global and regional studies.

# 9.1 Initiative for Chula at 100 (2017)

- Consider a policy report that addresses the deadlocks, opportunities & potentials for reform regarding the
- Political divisiveness of the political elites & lack of ability to compromise to overcome the political deadlock
- Assess the results of the economic and social development of Thailand during the past century and projecting different sustainable development paths including their probable societal consequences
- Consider a possible sustainability transition research and policy reform agenda for Thailand until 2020, 2030 & 2050.
- Publish the selected results also in English for a global scientific audience

# 10. Conclusions

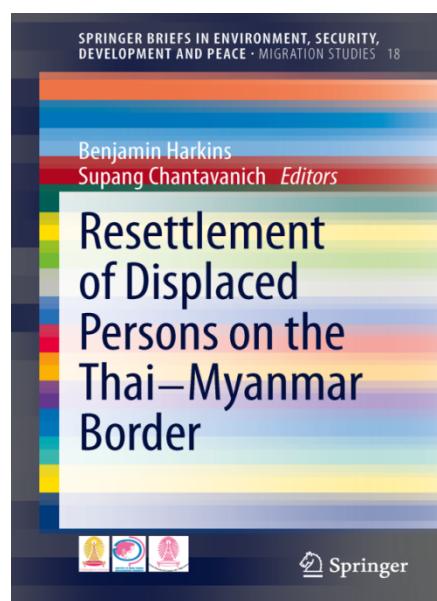
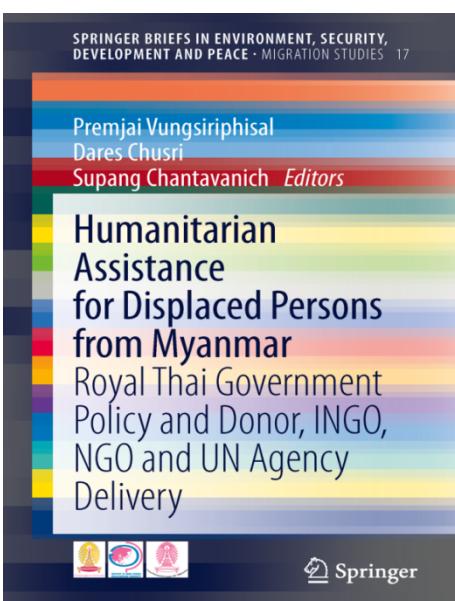
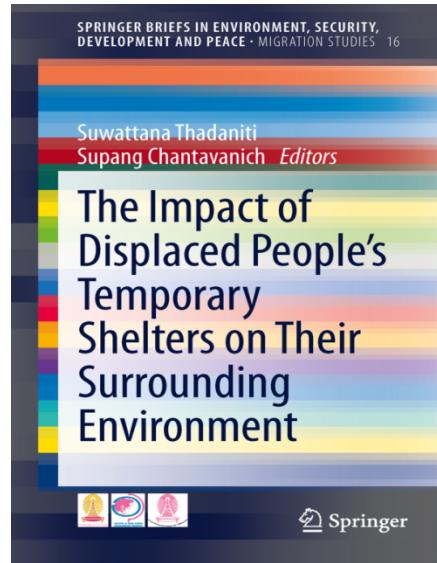
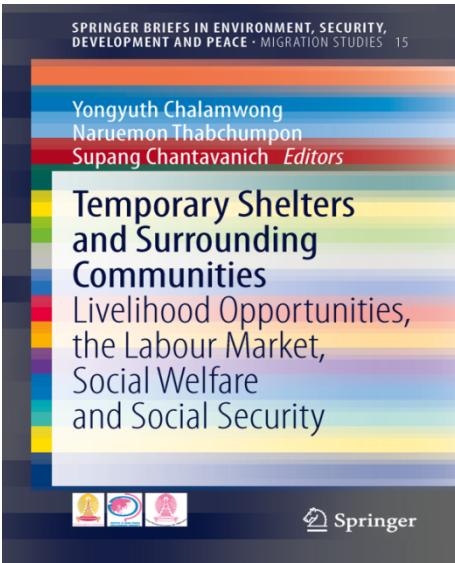
- The goal was to outline, introduce and to offer an overview on **Sustainability Transition as a New Research Area in the Social Sciences in Europe** that may be relevant for the Social and Political Sciences at Chulalongkorn University & international networking in the ASEAN region
- **To consider whether sustainability transition** may be an issue to involve the divided political elites in a dialogue on a future economic and social development path that take the potential environmental impact and the consequences for social justice into account.

# **Thank you for your attention and patience**



**Text soon for download at:**  
**<http://www.afes->**

# Possible Venue for Winter School Results



Yongyuth Chalamwong - Naruemon Thabchum-pon, Supang Chantavanich (Eds.): *Temporary Sheltered and Surrounding Communities. Liveli-hood Opportunities, the Labour Market, Social Welfare and Social Security* (Heidelberg – New York – Dordrecht – London: Springer-Verlag, 2014).

Suwattana Thadaniti, Supang Chanta-vanich (Ed.): *The Impact of Displaced People's Temporary Shelters on their Surrounding Environment* (Heidelberg – New York – Dordrecht – London: Springer-Verlag, 2014).

Premjai Vungsiriphisal, Dares Chusri, , Supang Chantavanich (Eds.): *Humanitarian Assistance for Displaced Persons from Myanmar. Royal Thai Government Policy and Donor, INGO/NGO and UN Agency Delivery* (Heidelberg – New York – Dordrecht – London: Springer-Verlag, 2014).

Benjamin Harkins, Supang Chantavanich (Eds.): *Resettlement of Displaced Persons on the Thai–Myanmar Border.* (Cham – Heidelberg – New York – Dordrecht – London: Springer-Verlag, 2014).