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A paradigm shift and Post-Kyoto international framework: - Japanese approach -

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Japan's formal position

Mr. Yukio Hatoyama's speech at the UN, Sept 22, 2009

- Mid-term target: 25% reduction in 2020 (base year 1990)
- Based on

1) a fair and effective international framework in which all major economies participate

2) agreement on ambitious targets by all major economies

- The above preconditions will never be met
- Hence no formal mid-term target now
- CANNOT accept an extension of the Kyoto Protocol (17% coverage is never effective)

Paradigm Shift

From Top-down to Bottom-up

- Collapse of the Kyoto Framework
- Pledge and Review (each country commits what it can achieve)
- A country will do its best (no penalty toward other countries)

Why the shift occur?

- International community was not convinced at 2 degree target (since pre-industrialization)
- Each country has its own priority

Science does not require 2 degree target

CO_2 concentration[a] (ppm)	CO_2-eq concentration[a] (ppm)	Global mean temperature increase above pre-industrial at equilibrium, using 'best estimate' climate sensitivity[b, c] (°C)	Peaking year for CO_2 emissions[d]	Change in global CO_2 emissions in 2050 (% of 2000 emissions)[d]
350–400	445–490	1.5–2.4	2000–2015	-85 to -70
400–440	490–535	2.4–2.8	2000–2020	-90 to -30
440–480	535–590	2.8–3.2	2010–2030	-90 to -5
480–520	590–620	3.2–4.0	2020–2060	-30 to +60
520–580	620–655	4.0–4.9	2050–2080	+25 to +85
580–700	655–1180	4.9–6.1	2060–2090	+90 to +140

IPCC AR5

- IPCC's role: Policy relevant but not policy prescriptive (No recommendation nor conclusion)

Article 2 of the UNFCCC

- Article 2

  Stabilization at the level not dangerous

  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

- IPCC WG3 Ch.1

-- the balancing of the risks of climate change (risks of gradual change and of extreme events, risk of irreversible change of the climate, including risks for food security, ecosystems and sustainable development) against the risk of response measures that may threaten economic sustainability.

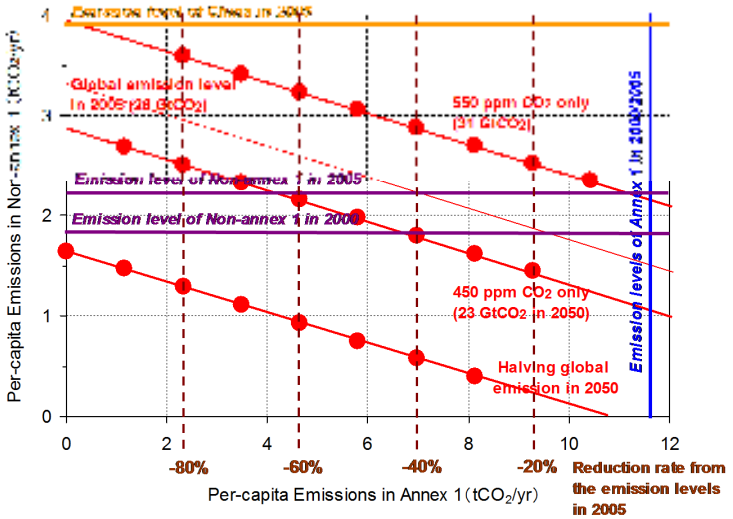
There is little consensus as to what constitutes anthropogenic interference with the climate system and, thereby, on how to operationalize Article 2.

- Sustainable Economic Growth

Feasibility of 2 degree (50% global reduction by 2050)

Per-capita Emissions for Global Targets

Source: RITE



China 3.9t→1.3t (80% reduction for Annex 1), 1.6t (zero emission for Annex 1)

Technology is a key toward substantial reduction

Room for Japan's contribution

- $CO2\ emissions = \frac{CO2\ emissions}{GDP} \times GDP$
- $\Delta CO2/CO2$

$$= \frac{\Delta(CO2\ emissions/GDP)}{CO2\ emissions/GDP} - \frac{\Delta GDP}{GDP}$$

$$= \text{Technology improvement ratio} + \text{GDP growth ratio}$$

Global BAU GDP in 2050 will be $122 Trillion. 80% reduction corresponds to $24.4 trillion, that is 23% less that that in 2000. Source: WB, UN and IPCC B2 scenario

To achieve 50% reductio-	
GDP loss(%)	Tech. imp. ratio(%)
0	3.856
10	3.601
20	3.485
30	3.262
40	3.005
50	2.701
60	1.174

Tech. imp. ratio of 1.227%	
CO2 reduction(%)	GDP loss ($)
0	58.710
10	62.039
20	66.968
30	71.097
40	75.226
50	79.355

BAU GDP growth ratio up to 2050 is 2.76%/yr (RITE estimate based on World Bank and IPCC SRES B2 Marker scenario).

Major economies must participate

(cumulative contributions to temperature increase)

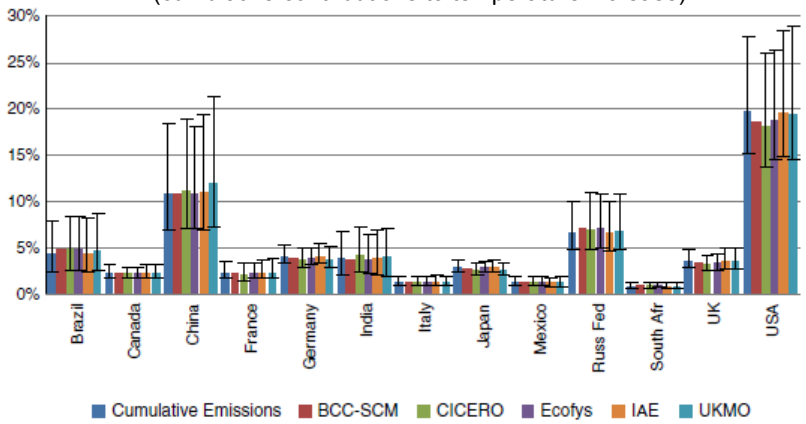


Fig. 4 Relative contribution to cumulative emissions (*first bar*) and to temperature increase in 2005 by different models (*bars 2* to *6*) from emissions from 1900 to 2005 of CO_2, CH_4 and N_2O including LUCF for selected countries. Error bars show the uncertainty only due to historical emission estimates. (BCC did not calculate uncertainty)

Niklas Hohne et al. Contributions of individual countries' emissions in climate change and their uncertainty, Climatic Change (2010)

Equity by various criteria
Japan's mid-term target

	Equal reduction from BAU	Equal MAC	Equal cost No trade	Equql cost With trade	Equal per capita	Triptych
Japan	**−9**	**±0**	**−8**	**−11**	**−18**	**−8**
USA	±0	±0	+1	+1	−2	±0
EU27	−27	−26	−30	−31	−22	−25
Annex 1	**−20**	**−20**	**−20**	**−20**	**−20**	**−20**
20% reduction case (upper) and 30% reduction case (lower) for Annex 1 as a group						
Japan	−20	−13	−20	−25	−28	−15
USA	−12	−14	−13	−10	−14	−16
EU27	−36	−34	−39	−42	−32	−32
Annex 1	−30	−30	−30	−30	−30	−30

Den Elsen et al. Analysing comparable greenhouse gas mitigation efforts for Annex 1 countries, Energy Policy 37 (2009).

US emissions in 2010 is assumed as +26% (in stead of -7%) in comparison to 1990.

Thank you

Is 2 degree increase dangerous?

- It is very likely that all regions will experience either declines in net benefits or increases in net costs for increases in temperature greater than 2-3 ℃ (above 1990 levels) （IPCC AR4 WG2 p.17）
- Corresponds to 2.6 to 3.6 degree since pre-industrialization
- No adaptation considered

  Unrealistic
- 2 degree is not the dangerous level

RCP (Representative Concentration Pathways)
Several stabilization pathways for IPCC AR5

RCP3PD(2.6)

3.7W/m2 : 450 ppm-CO2

RCP4.5 : 550 ppm-CO2

Category	Radiative forcing (W/m^2)	CO_2 concentration[a] (ppm)	CO_2-eq concentration[a] (ppm)	Global mean temperature increase above pre-industrial at equilibrium, using "best estimate" climate sensitivity[b], [c] (°C)	Peaking year for CO_2 emissions[d]	Change in global CO_2 emissions in 2050 (% of 2000 emissions)[d]	No. of assessed scenarios
I	2.5-3.0	350-400	445-490	2.0-2.4	2000-2015	-85 to -50	6
II	3.0-3.5	400-440	490-535	2.4-2.8	2000-2020	-60 to -30	18
III	3.5-4.0	440-485	535-590	2.8-3.2	2010-2030	-30 to +5	21
IV	4.0-5.0	485-570	590-710	3.2-4.0	2020-2060	+10 to +60	118
V	5.0-6.0	570-660	710-855	4.0-4.9	2050-2080	+25 to +85	9
VI	6.0-7.5	660-790	855-1130	4.9-6.1	2060-2090	+90 to +140	5
						Total	177

RCP8.5

RCP6.0 : 650 ppm-CO2

Source: Dr. K. Akimoto, RITE