

# Future strategies for mitigating climate change

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past and future

## 2 important conclusions of IPCC AR-5 WG1 report

1. It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20<sup>th</sup> century.
2. In order to stabilize the global surface temperature it is needed to reduce eventual anthropogenic emission of CO<sub>2</sub> to almost zero.

# Main messages of IPCC AR-5 WG3 report

1. It is highly probable that the scenario of stabilizing GHG intensity at 450 ppm CO<sub>2</sub> eq. ⇒ the rise of global surface temperature will be stabilized by less than 2 degrees since pre-industrial era.
2. It is highly probable that Cancun pledge of COP will lead the rise in global surface temperature to 3 degrees.

# Cancun Pledges of major developed countries

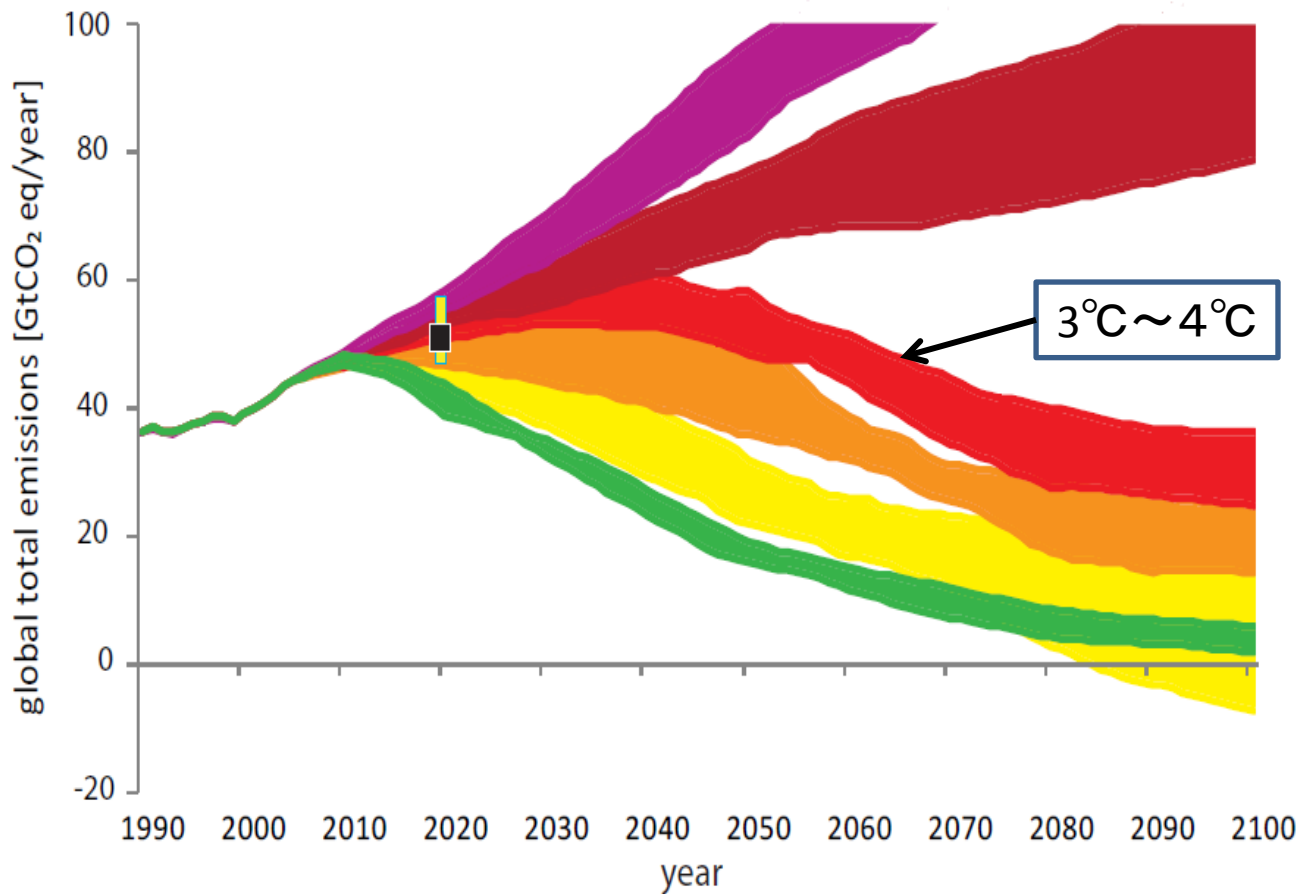
<b>countries</b>	<b>Rate of emission Reduction: target at 2020</b>	<b>Standart year</b>	<b>Notes</b>
<b>Australia</b>	<b>25%</b>	<b>2000</b>	
<b>EU</b>	<b>30%</b>	<b>1990</b>	
<b>Japan</b>	<b>25%</b>	<b>1990</b>	<b>Changed in 2013 to 3.8 % reduction since 2005</b>
<b>Russia</b>	<b>25%</b>	<b>1990</b>	
<b>USA</b>	<b>17%</b>	<b>2005</b>	

# Fig. : Cancun pledges and future changes of global surface temperature

Source: UNEP, The emissions gap report, Tech.summary , Fig.2, 2010

Likely avoided temperature increase of IAM scenarios.

Bar superimposed in 2020 shows expected emissions from the pledges.



**Legend:**

Emission levels consistent with a likely temperature increase (T) in the 21st century of:

- T > 5°C
- 4°C < T < 5°C
- 3°C < T < 4°C
- 2.5°C < T < 3°C
- 2°C < T < 2.5°C
- T < 2°C

→ range of pledge cases

→ median range of pledge cases

<sup>15</sup>The gaps between the coloured bands come about because this report mainly compiled pathways from low greenhouse gas stabilisation scenario.

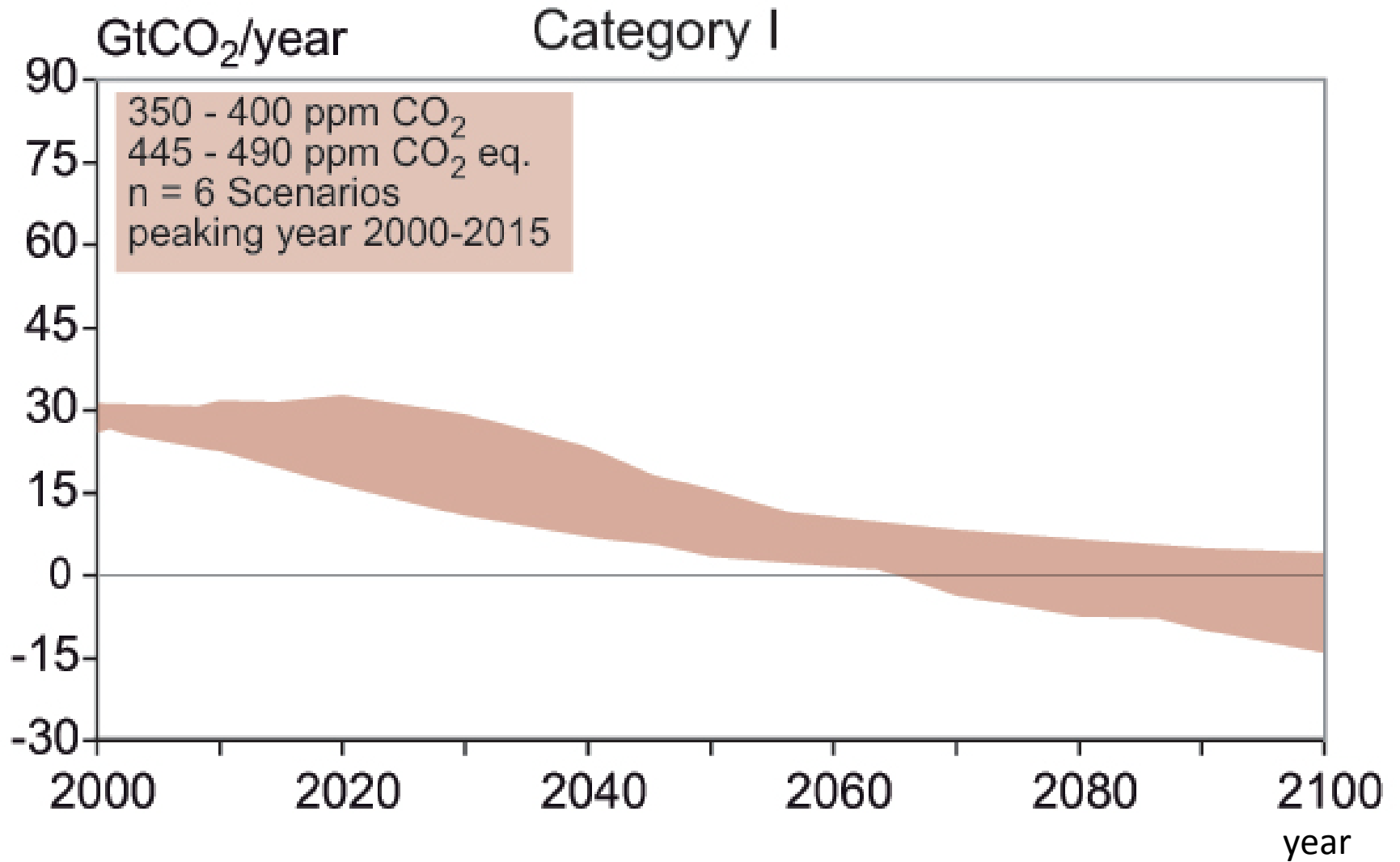


Fig. CO<sub>2</sub> emission for 2 degree target.

Source: IPCC AR-4 WG3 SPM

# Difficulties in achieving the target of halving GHG emission by 2050

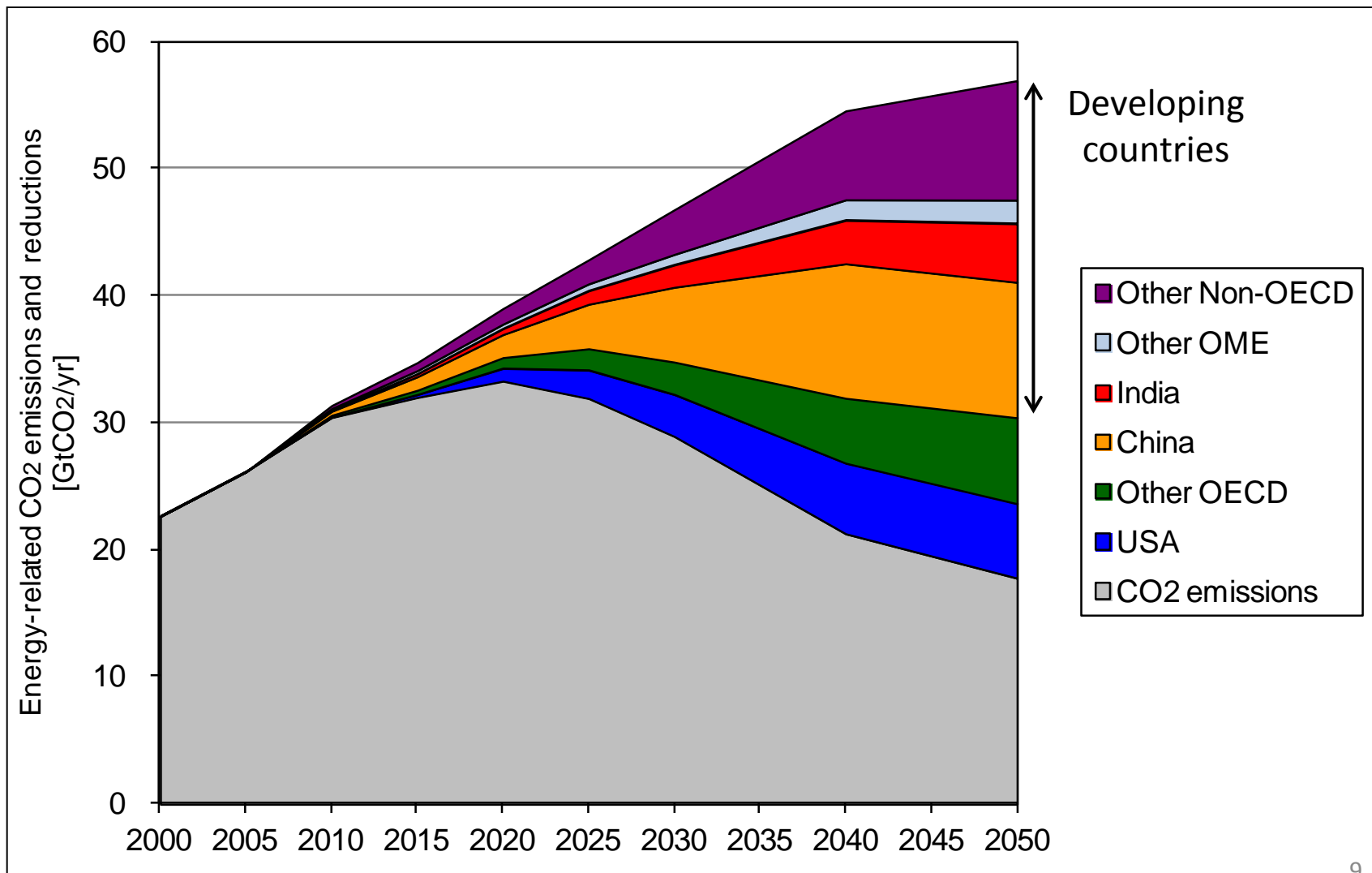
1. 2 degree target  
⇒ halving GHG emission by 2050
2. Difficulties in achieving the target of halving Emission by 2050
  - a. Global emission by reduced by 3/4 of the emission in BAU case
  - b. More than half of emission reduction by developing countries required

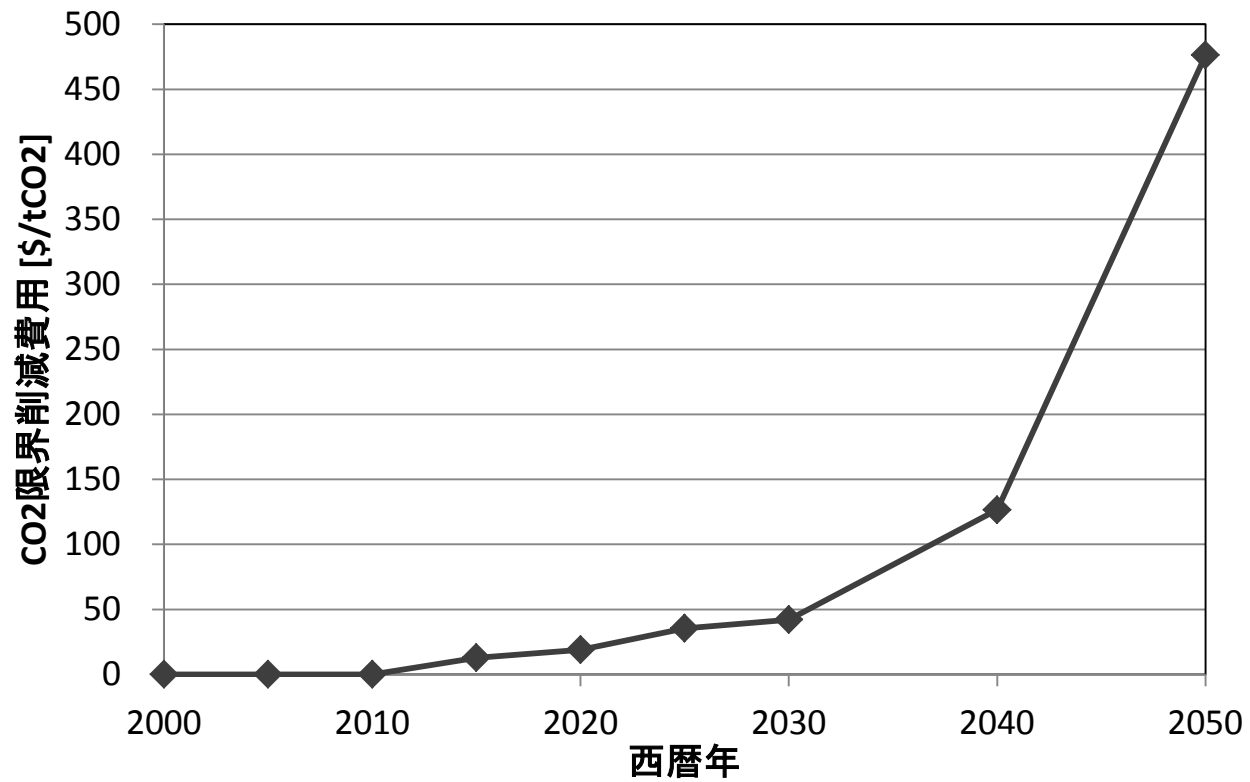


# Energy related CO2 Emission reductions by Region

## —Halving Global GHG emission in 2050—

Notes:scenario develeoped by RITE





**Fig. Marginal cost of reducing GHG emission  
- In case of halving global GHG emission -**

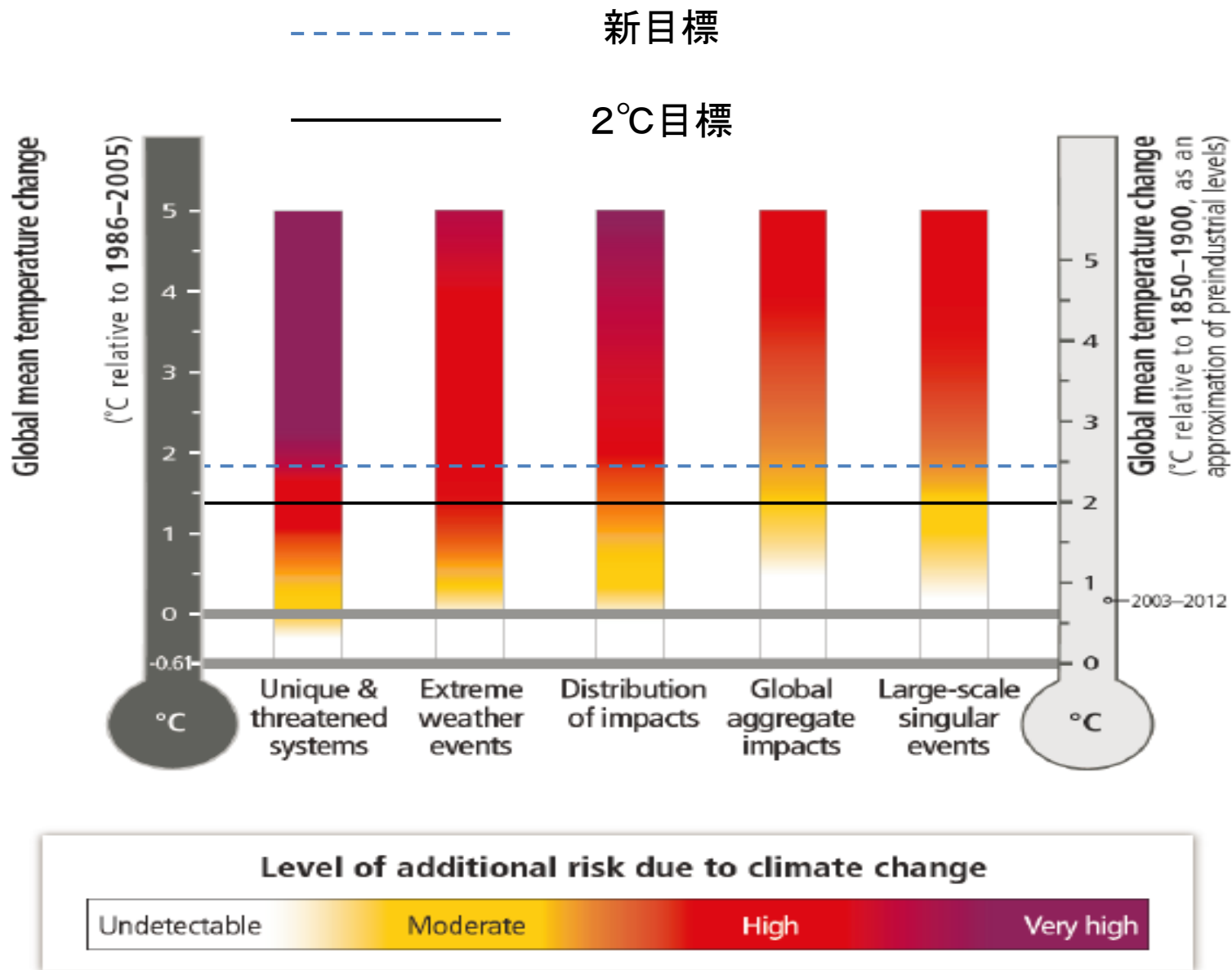
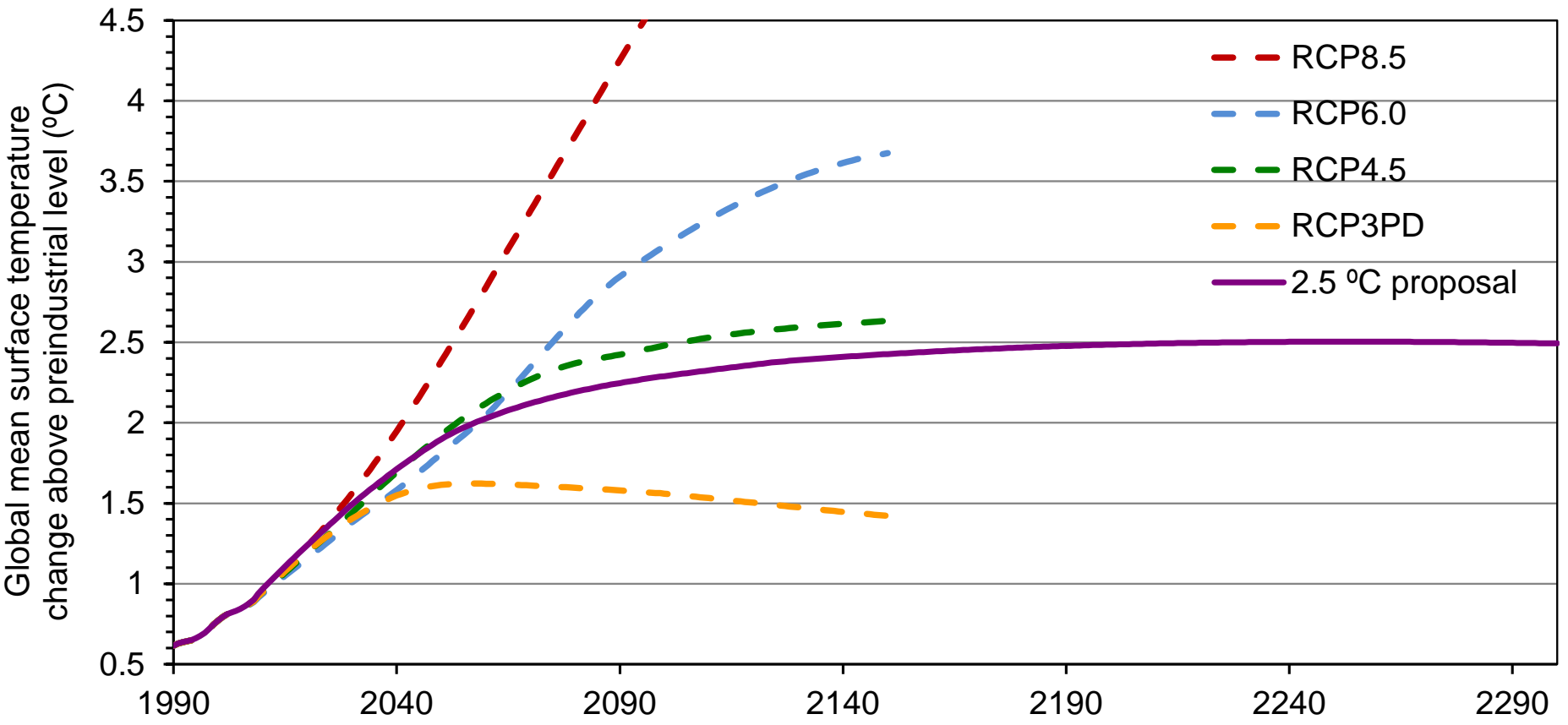


図: IPCC WG2 第5次報告における温度上昇影響図

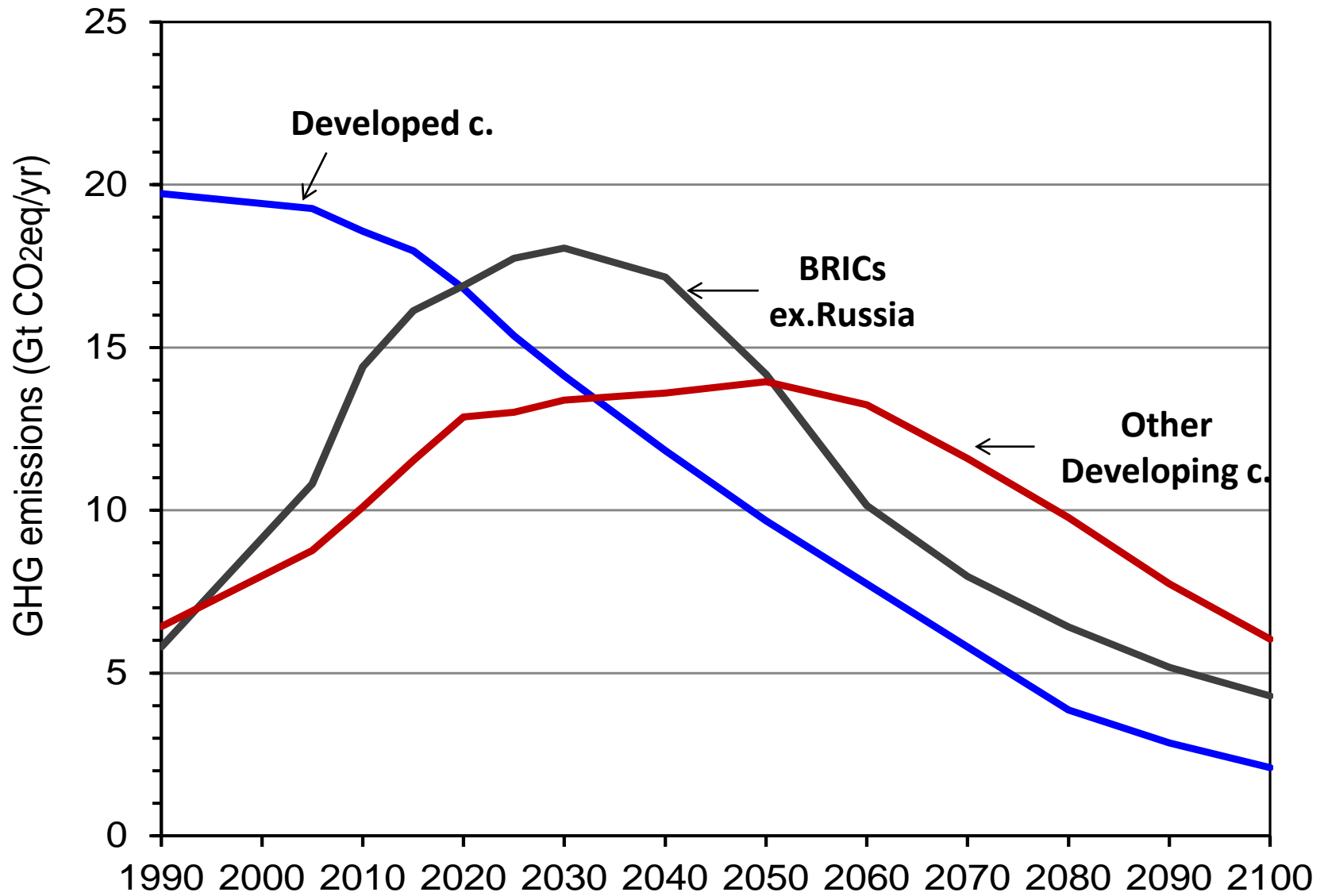
# New proposal by Kaya

1. 2 degree target  $\Rightarrow$  2.5 degree target
2. developed countries  
    halving GHG emission by 2050
3. developing countries
  - 1) BRICs except Russia: peaking in 2030
  - 2) Other developing countries:  
    peaking in 2040

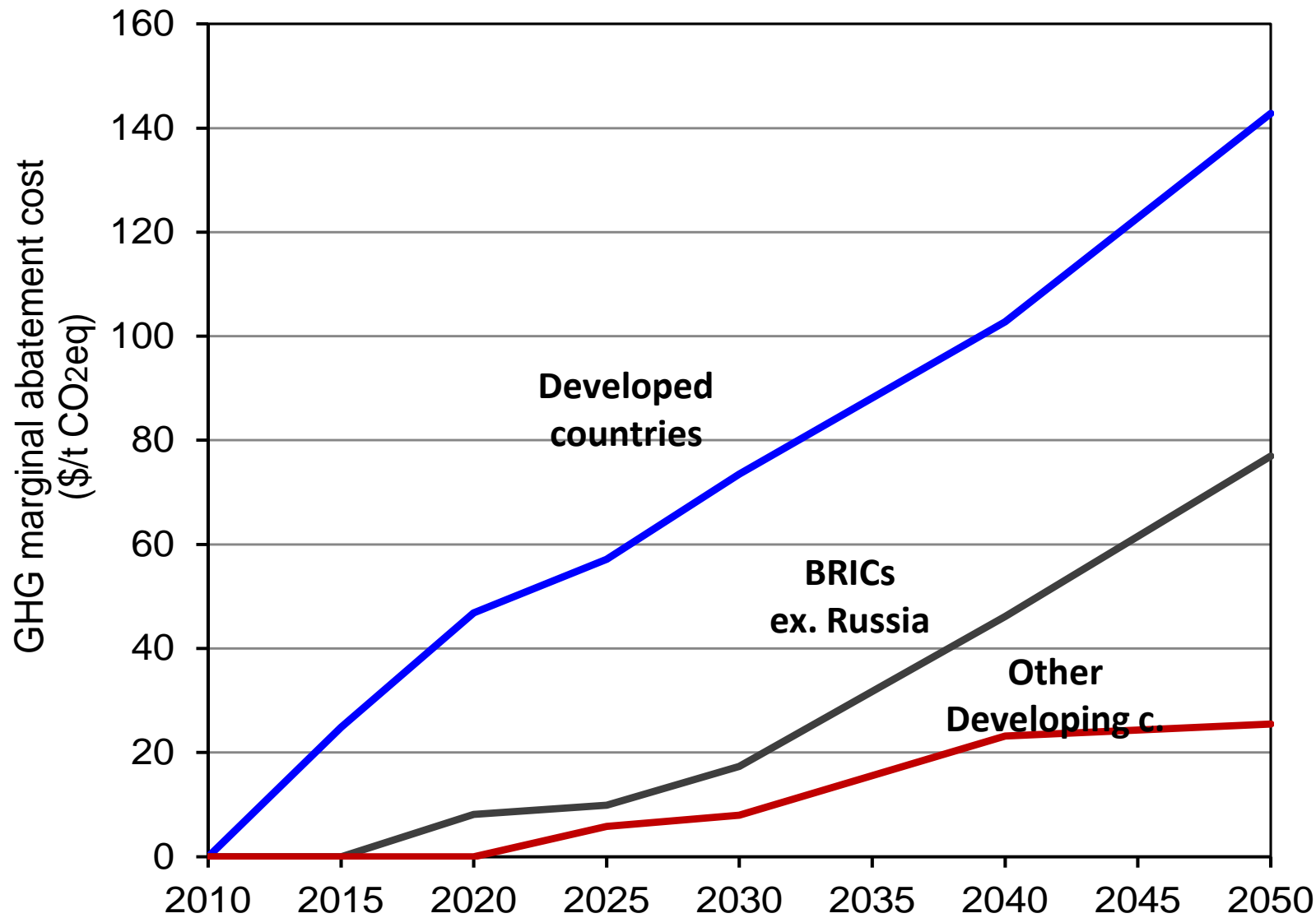
# RCP: IPCC scenarios developed for its AR-5



**Fig. Trends of the global surface temperature  
- 2.5 degree target case -**



**Fig. GHG emissions in case of halving 2050 emission  
( scenario developed by use of RITE DNE 21 model )**



**Fig. Marginal cost for reducing GHG emission**

# 2030 Energy Scenarios for Japan

## — Framework of the scenarios —

1. To keep the framework of 2010 Energy Fundamental Plan as much as possible.
2. To keep operation of all the nuclear power plants younger than 40 in 2030, except those of Fukushima Dai-ichi and Dai-ni.  
Their average capacity utilization rate is 80%.
3. To introduce renewables so that they cover more than 20% of total power generation in 2030.



# 2030 Energy Scenarios for Japan

## — details of power generation —

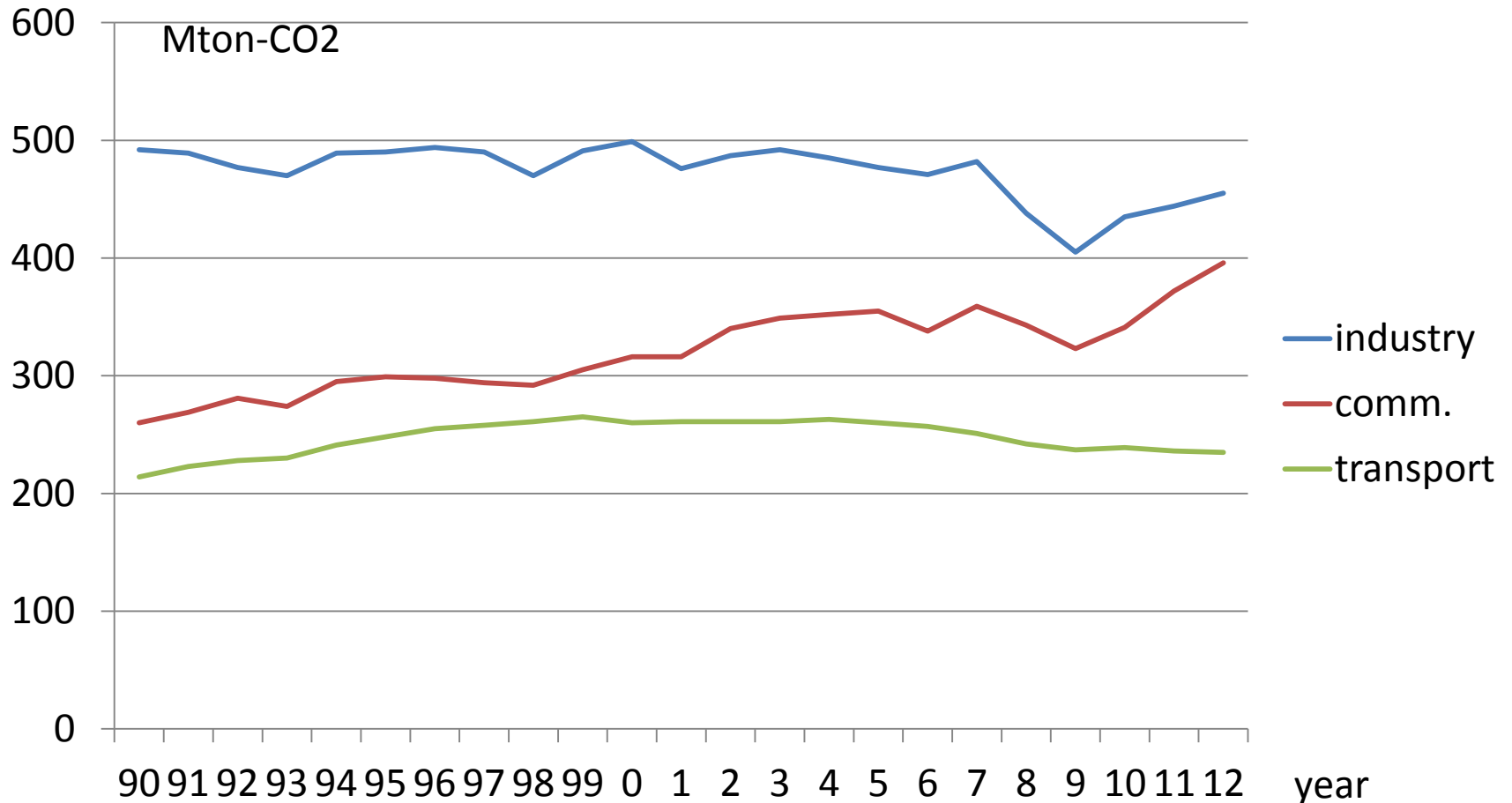
	2007	2030 Scenario 1 moderate case	2030 Scenario 2 ambitious case
nuclear	22 %	16 %	16%
Fossil fuel	71 %	63.4 %	61.0 %
coal		(42%)	(10%)
oil		( 8 %)	(10%)
gas		(50 %)	(80%)
Renewables	7 %	20.6 %	22.9 %
hydro	7	10.6	10.6
solar	—	5.6(53Gw)	7.9(75Gw)
wind	—	3.4(19Gw)	3.4(19Gw)
other	—	1.0	1.0
Total power	1.20 × 10 <sup>12</sup> kWh	1.0 × 10 <sup>12</sup> kWh	1.0 × 10 <sup>12</sup> kWh

# CO2 emission in 2030

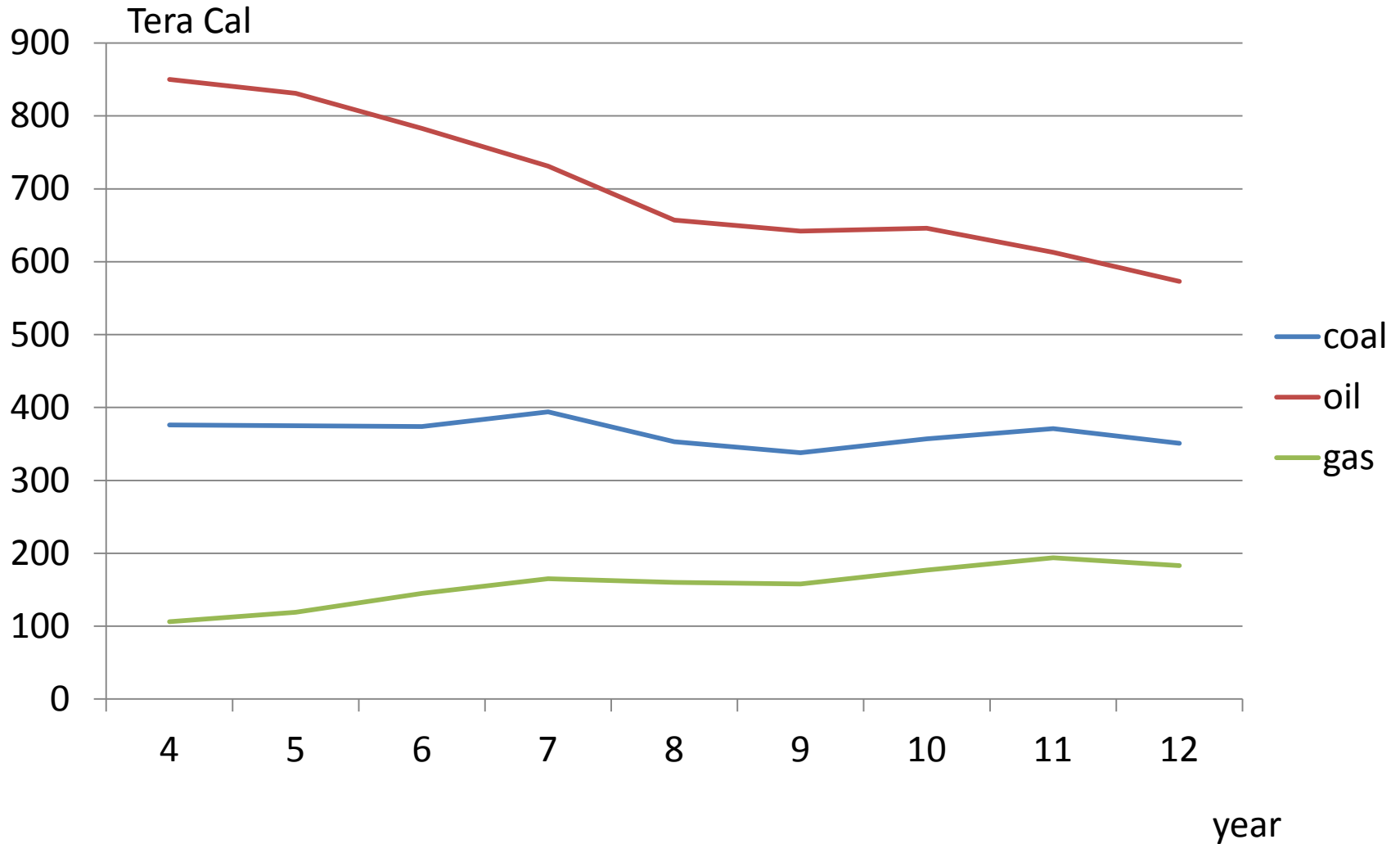
## - 2 new scenarios -

	Moderate scenario	Ambitious scenario	2010 energy Fundamental plan
Reduction in CO2 2007= standard year	23 %	31 %	40 %
Reduction in CO2 1990= standard year	12 %	20 %	30 %

# Trends of CO2 emission of Japan



# Fossil fuel demand in industries - Japan, 2004~2012-



# Future directions of industry sector for mitigating climate change

1. To make efforts for reducing total energy
2. To increase the ratio of gas to coal  
in every sector
3. To make efforts for utilizing CCS for coal  
fired power plants
4. Promotion of voluntary plan for realizing  
low carbon society