

Asia/World Energy Outlook 2015

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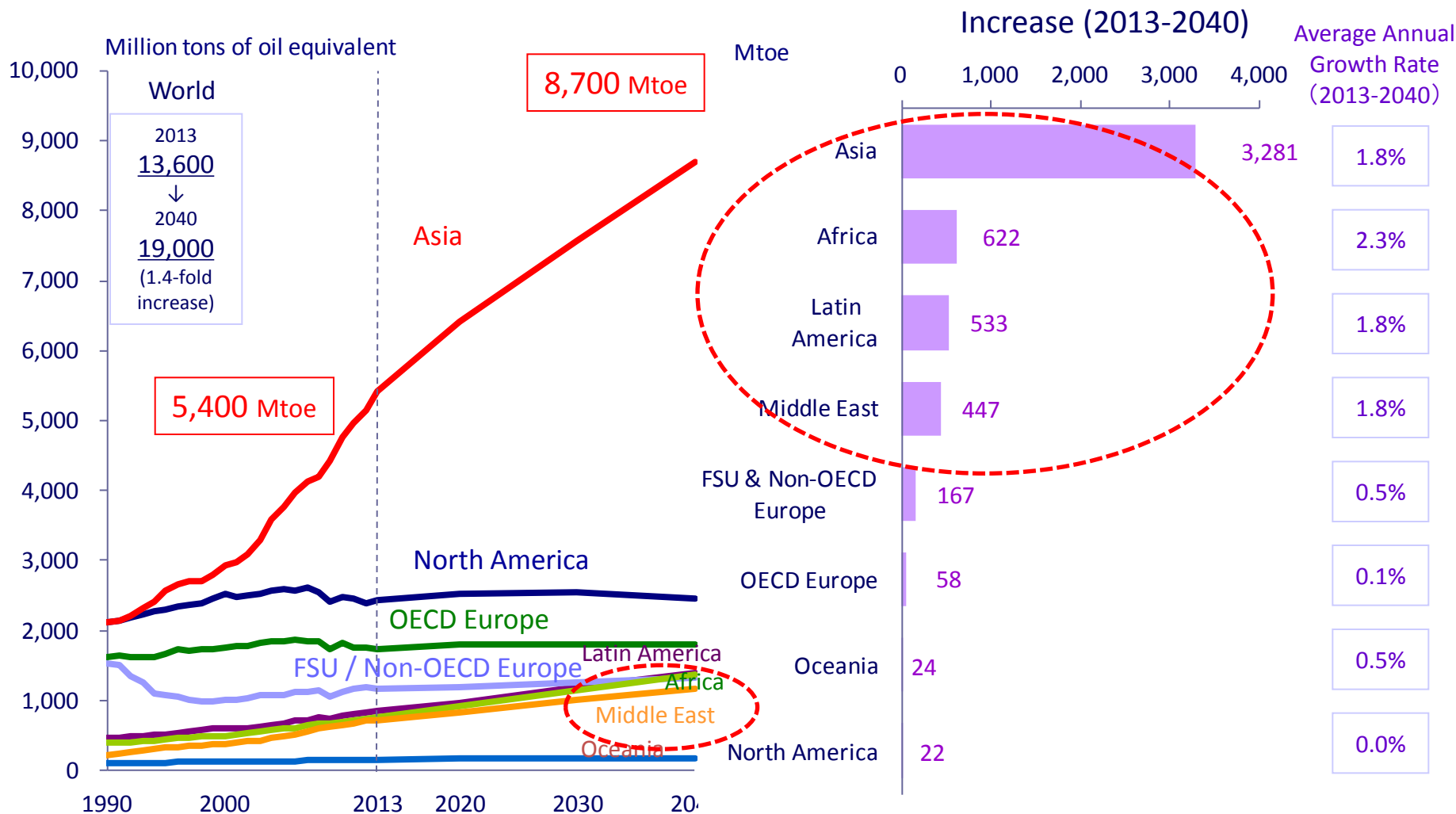
Introduction

Findings from “Asia/ World Energy Outlook 2015”

1. Energy Situation in Asia towards 2040
2. Lower Price Scenario towards 2030
3. Climate Change :Issues and Uncertainties

Primary Energy Demand by Region (World)

Reference Scenario



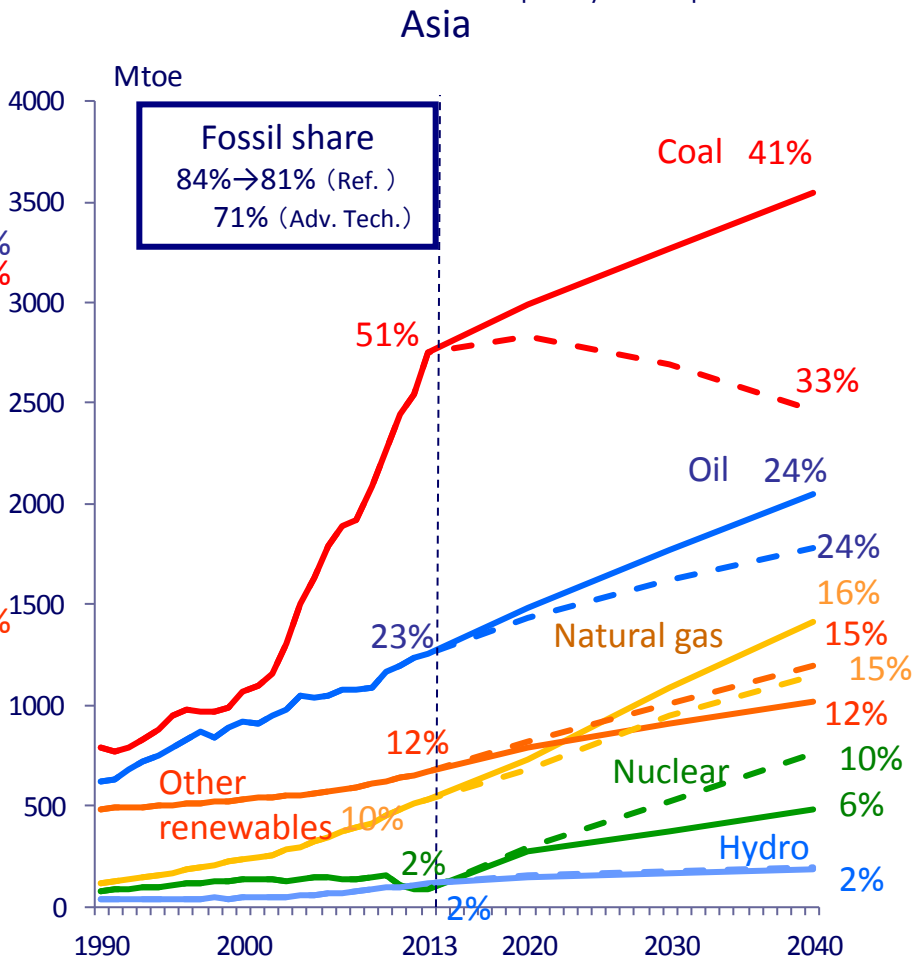
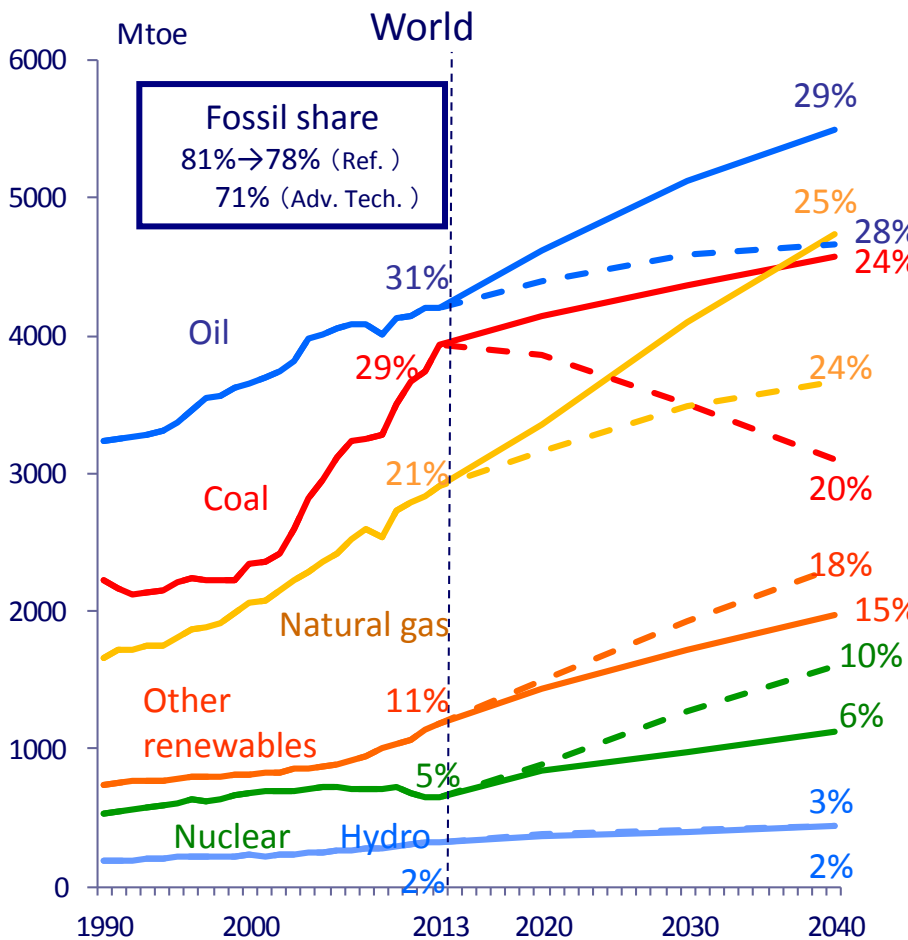
Source: IEEJ, Asia/ World Energy Outlook 2015

Primary Energy Consumption by Source

Solid lines: Reference
Dashed lines: Adv. Tech.



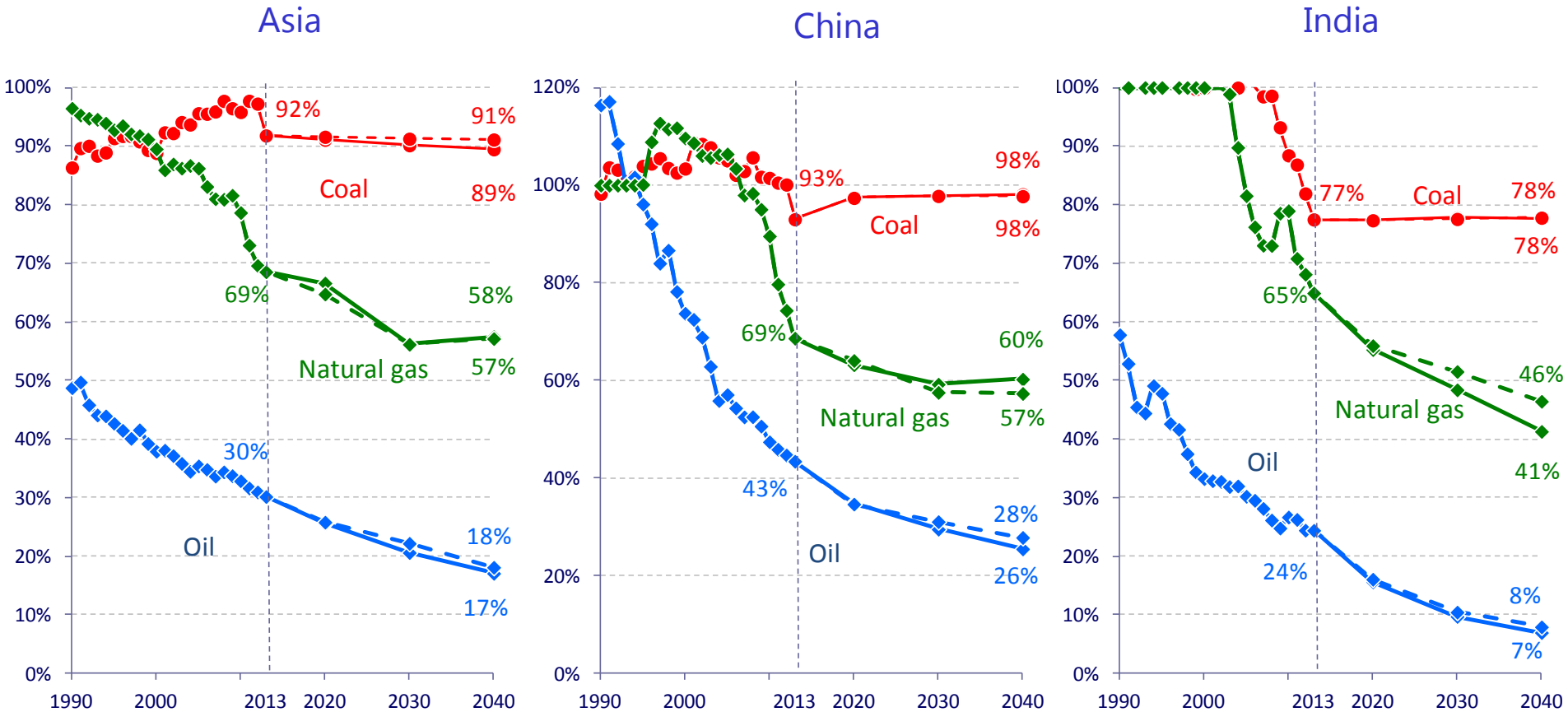
The percentages indicate the shares of total global/Asian primary consumption



Source: IEEJ, Asia/ World Energy Outlook 2015

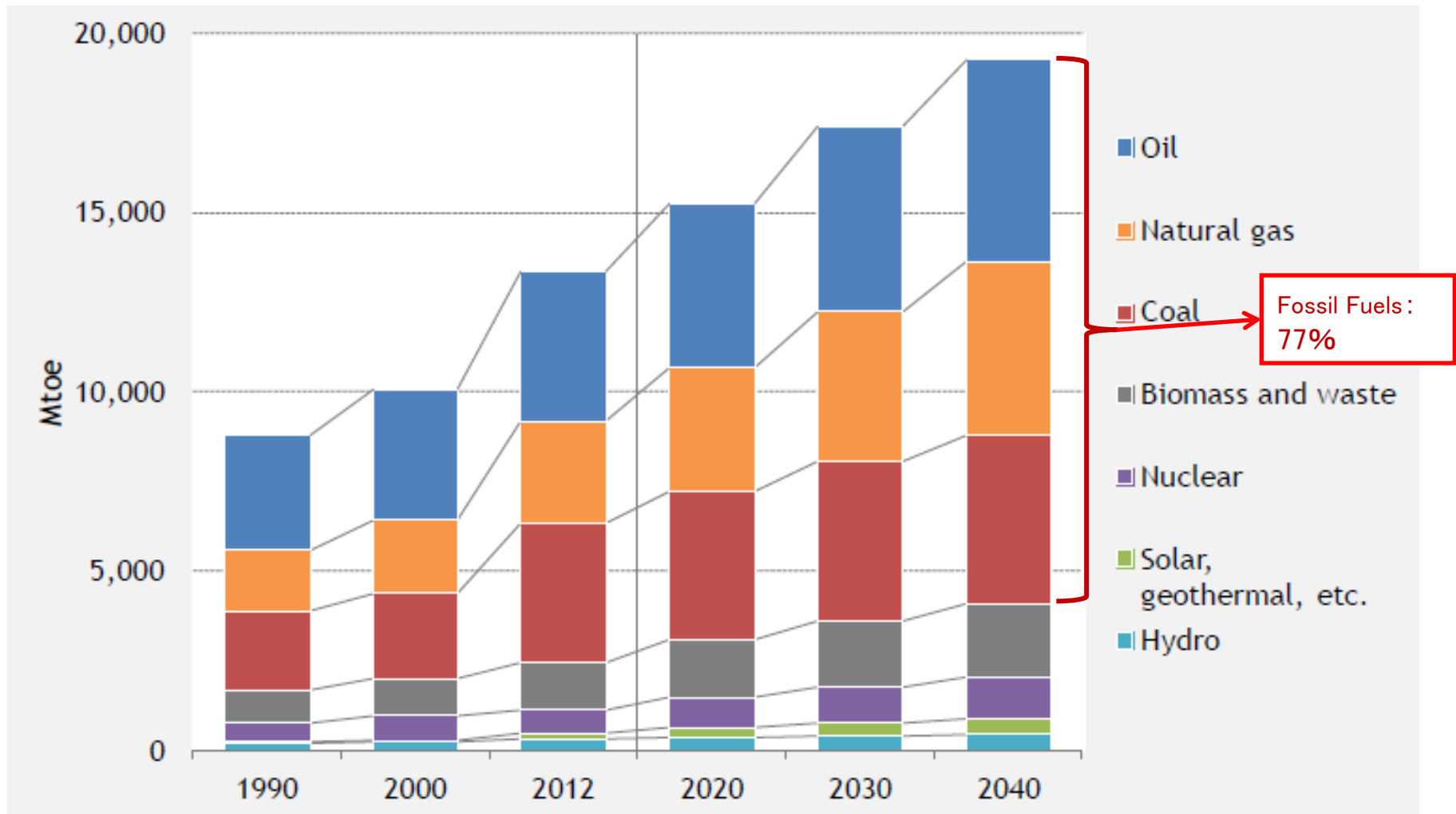
Energy self-sufficiency in Asia

Solid lines: Reference
Dashed lines: Adv. Tech.



Source: IEEJ, Asia/ World Energy Outlook 2015

World Primary Energy Supply (By Energy)



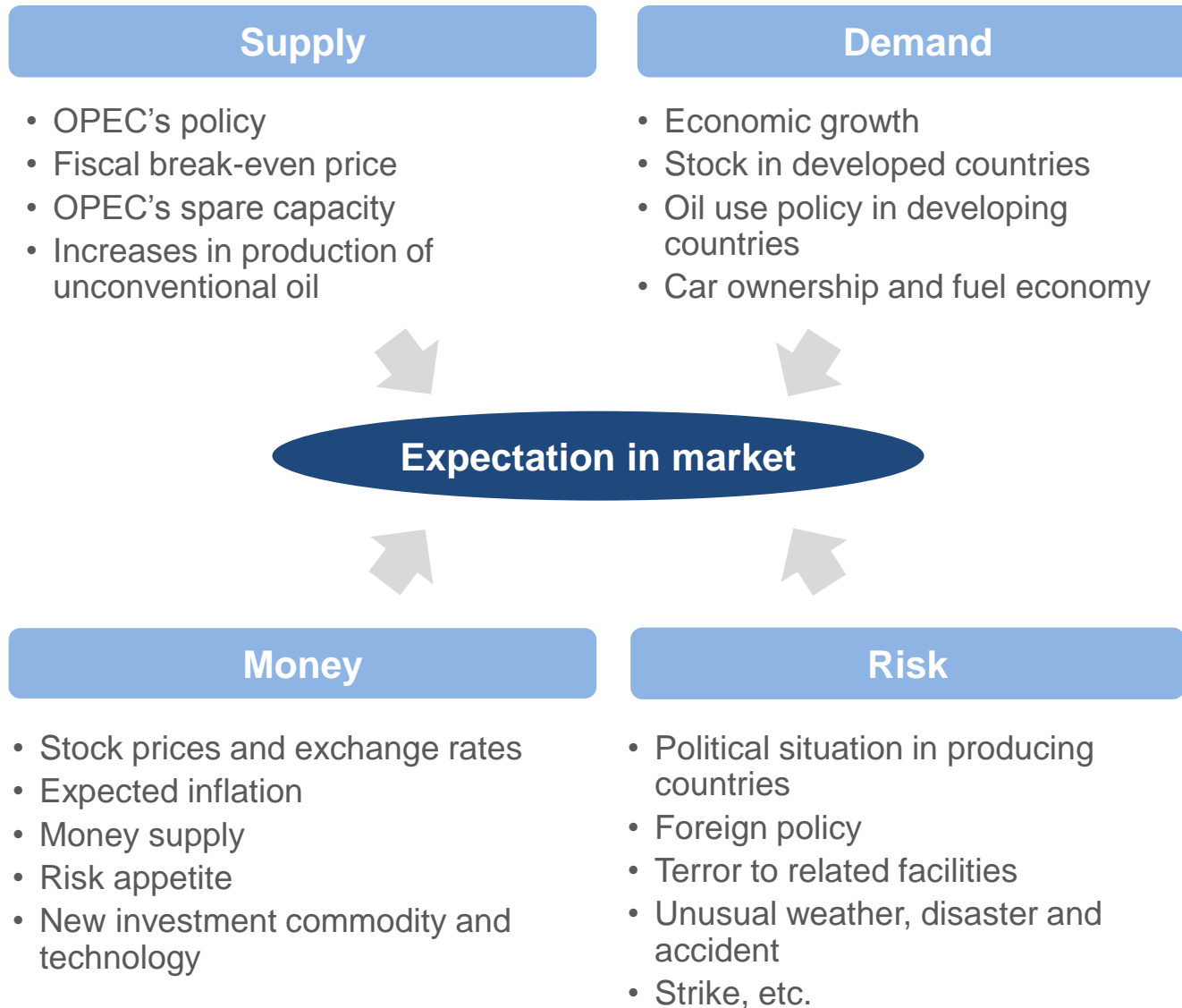
Source: Institute of Energy Economics, Japan, Asia/World Energy Outlook 2015

A light gray world map is centered in the background of the slide.

What do lower prices bring?



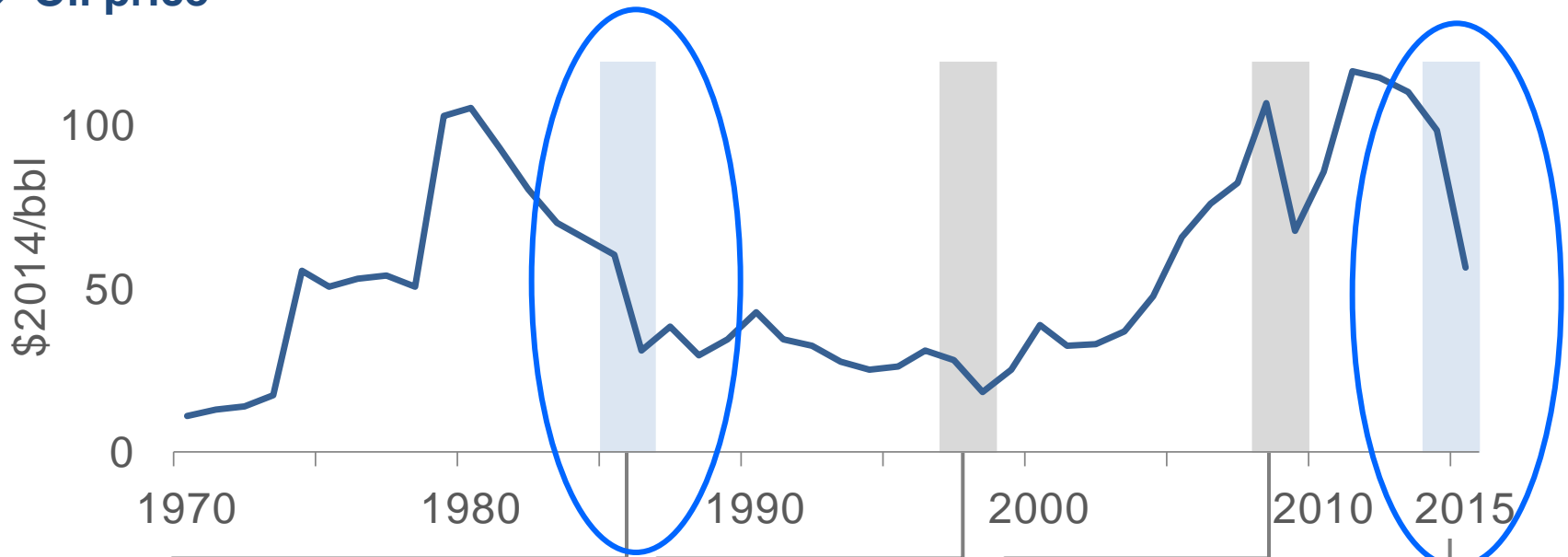
Various factors influence oil price



“History doesn’t repeat itself, but it does rhyme”

Mark Twain

❖ Oil price



Source: BP

- Decreases in demand and increases in supply by non-OPEC following high price after the oil crises
- Severe competition in OPEC
- Easy supply-demand balance affected by the Netback pricing

- Decreases in emerging economies' demand by the Asian financial crisis
- Expansion of OPEC production quota and excess production by the members over their quota

- Sharp drop of demand by the Lehman shock
- Expansion of production capacity by Saudi Arabia and others

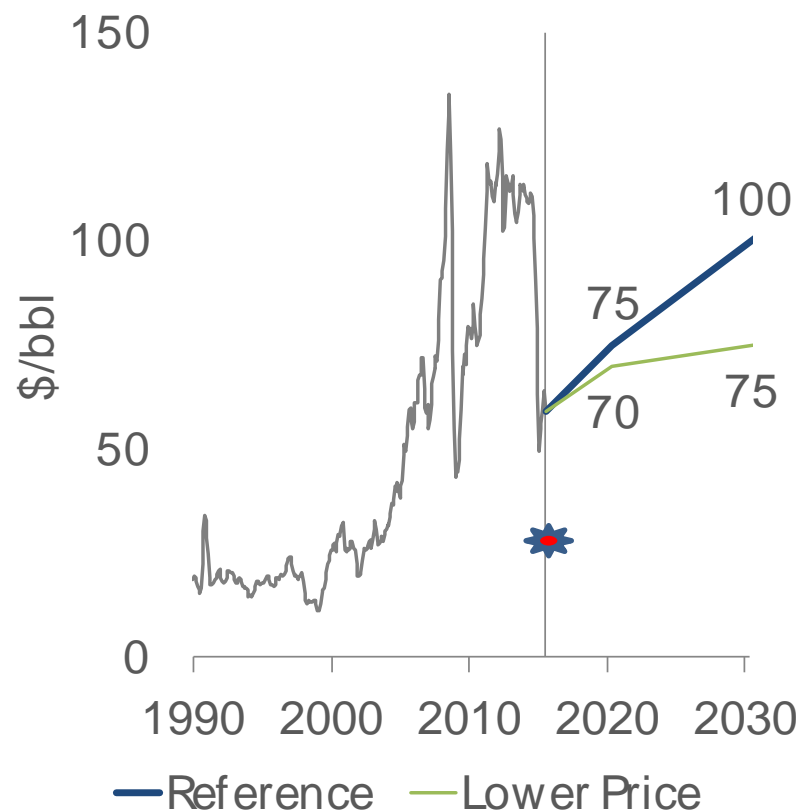
- Increases in supply by non-OPEC and OPEC
- Slow growth of global demand

We may see lower prices than the Reference Scenario

❖ Background of the scenarios

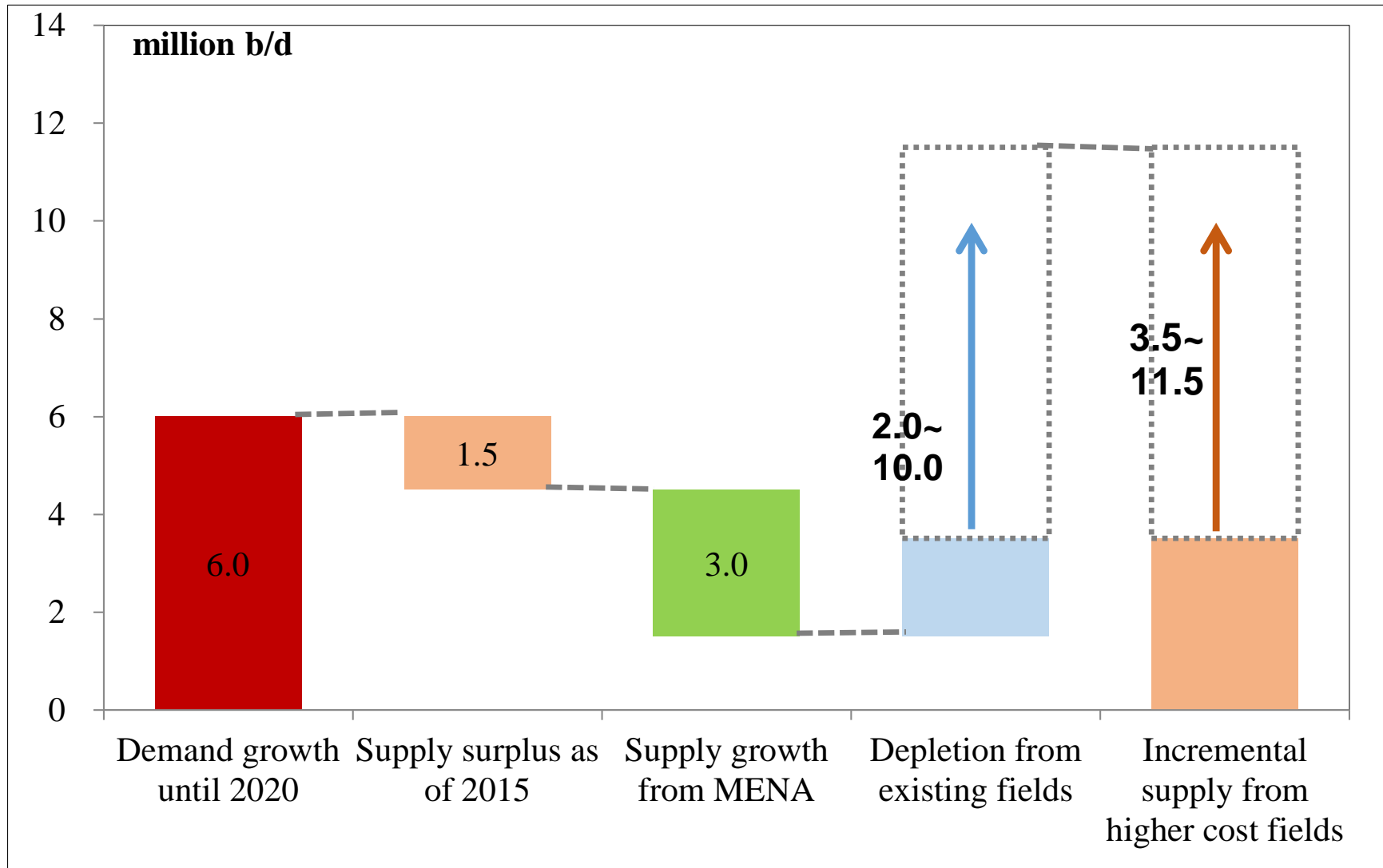
	Reference	Lower Price
Demand	Energy conservation and fuel switching in transport sector progress along the trend.	Strong energy conservation and fuel switching by non-fossil fuel progress.
Supply	<p>Conventional resources Development in each country follows its historical trend.</p> <p>Unconventional resources Production growth in the United States declines in and after 2020s. Slow development is seen in other countries.</p>	<p>Conventional resources Competition among low-cost producers such as OPEC, Russia, etc. continues. OPEC loses effectively its power as a cartel organisation.</p> <p>Unconventional resources Reaches to the highest levels both inside and outside the United States.</p>

❖ Assumption of oil price



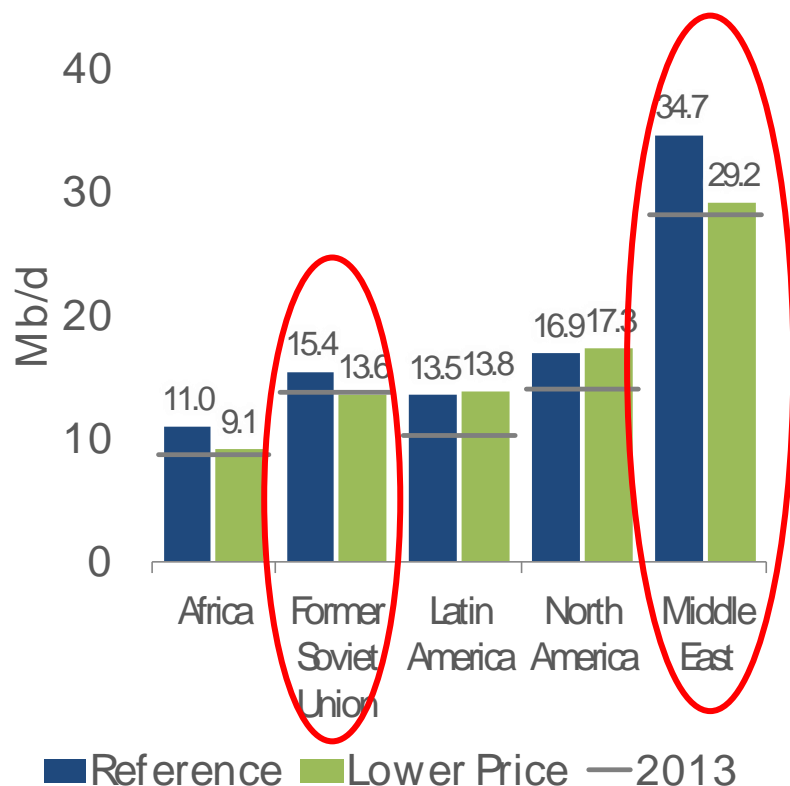
Note: Future prices are in \$2014.

Need for Higher Cost Oil Production

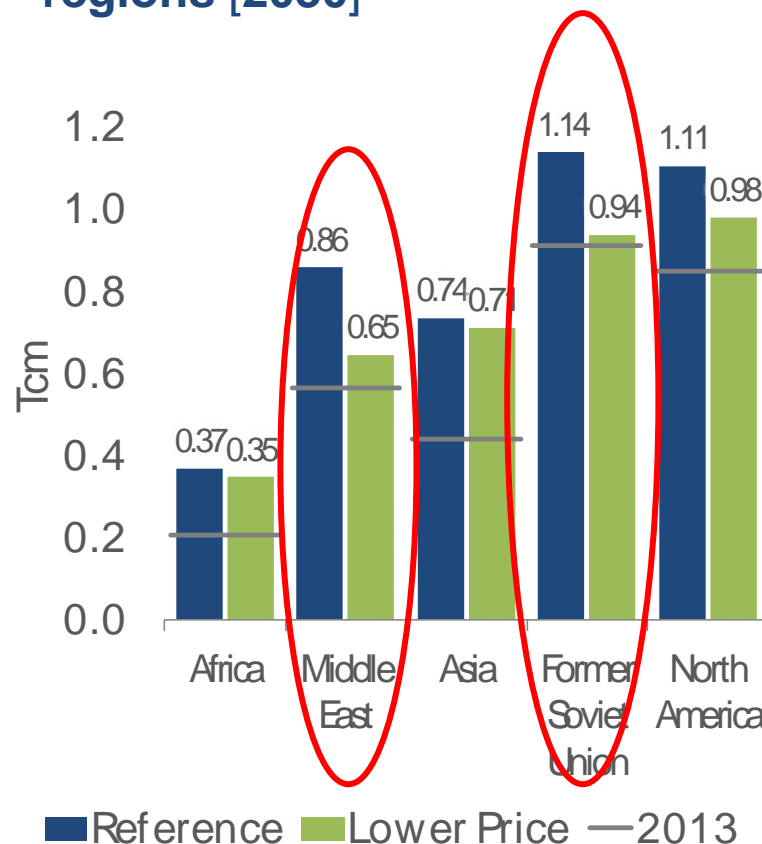


Source: Prepared by IEEJ based on IEA data and others

❖ Crude oil production in selected regions [2030]

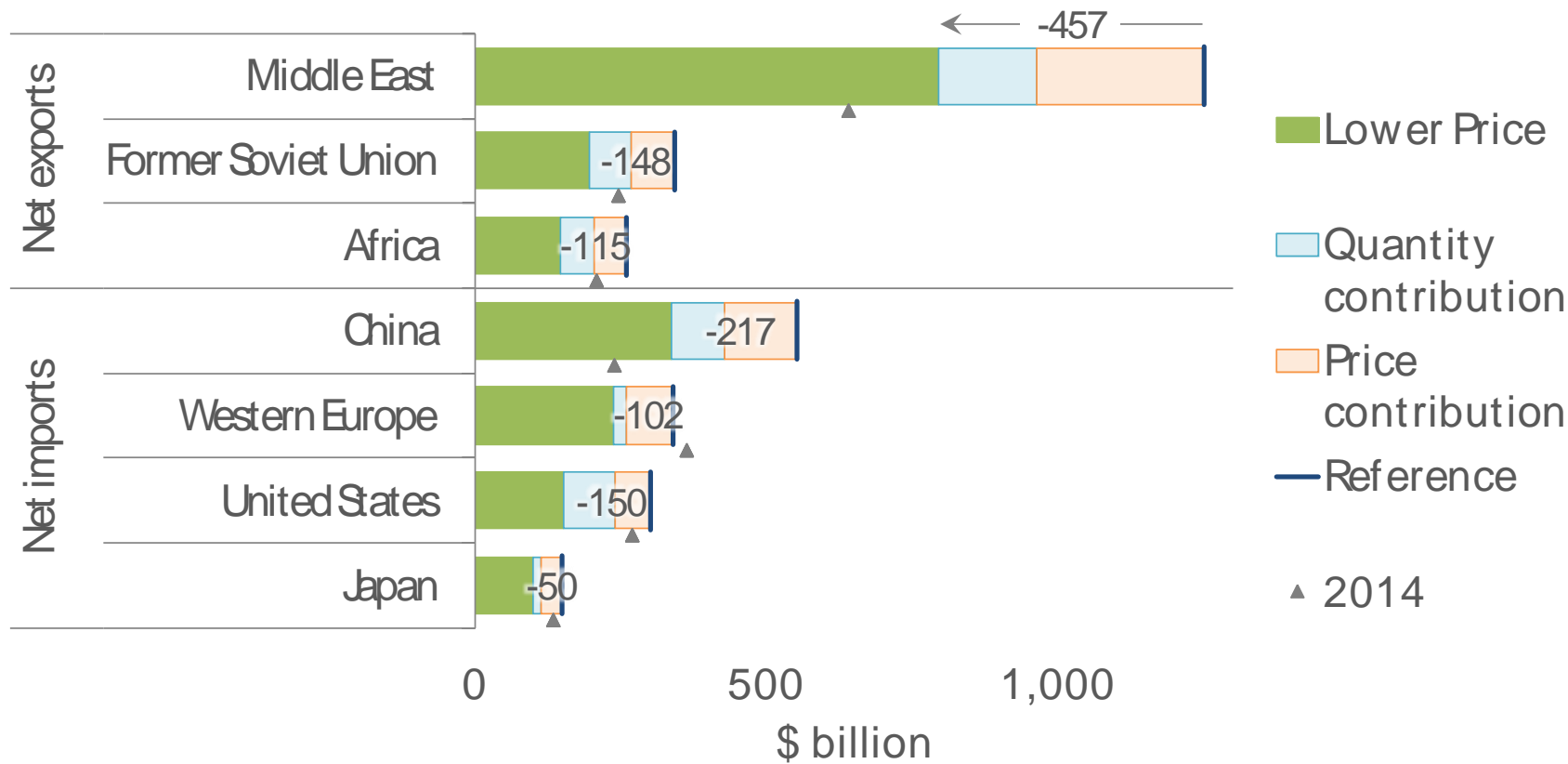


❖ Natural gas production in selected regions [2030]



Benefit for importing countries

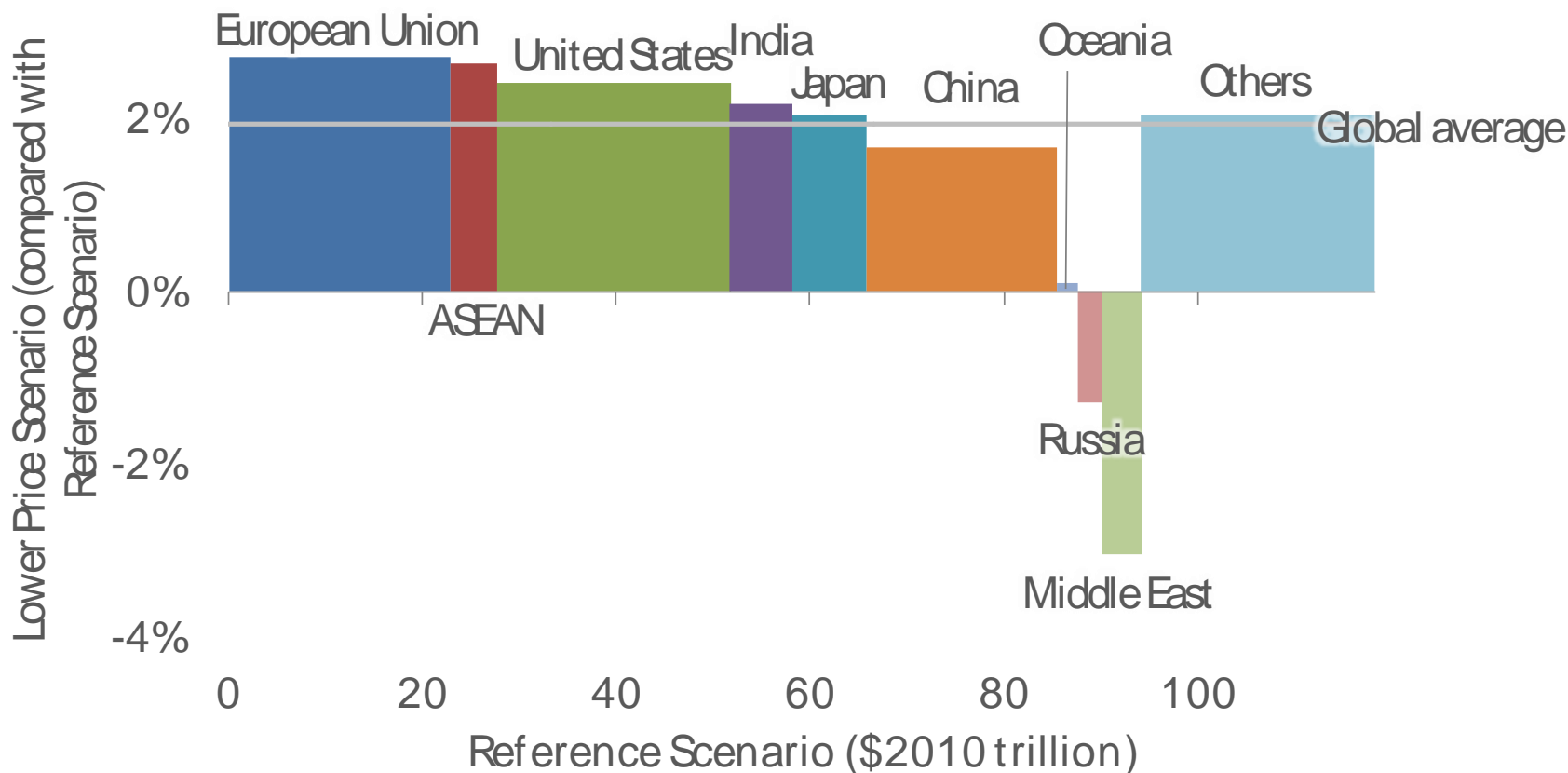
❖ Crude oil net imports/exports in selected regions [2030]




* Among the modelled 15 regions. Nominal value.

Lower Price is good for Global Economy but...

❖ Changes in real GDP [2030, compared with the Reference Scenario]



A faint, light gray world map is visible in the background of the slide, centered behind the title text.

Addressing Climate Change - Issues and Uncertainties -

The cover of the 'Asia/World Energy Outlook 2015' report. It features a dark background with a glowing, abstract pattern of lines and dots, possibly representing energy or data. The title 'Asia/World Energy Outlook' is in white text at the top, and '2015' is in a larger white font below it. The IEE logo is visible at the bottom left of the cover.

Asia/World
Energy
Outlook

2015

Scenarios in IPCC AR5 WG3

	Concentration of CO ₂ -eq in 2100, ppm CO ₂ -eq	Sub-category	Change in GHG emissions from 2010 to 2050, %	2100 temperature change relative to 1850-1900 (°C)*
RCP2.6	450 (430-480)	Overshoot (vast majority)	-72 to -41	1.5 - 1.7
	500 (480-530)	No overshoot	-57 to -42	1.7 - 1.9
		Overshoot	-55 to -25	1.8 - 2.0
	550 (530-580)	No overshoot	-49 to -19	2.0 - 2.2
		Overshoot	-16 to +7	2.1 - 2.3
RCP4.5	(580-650)		-38 to +24	2.3 - 2.6
	(650-720)		-11 to +17	2.6 - 2.9
RCP6.0	(720-1000)		+18 to +54	3.1 - 3.7

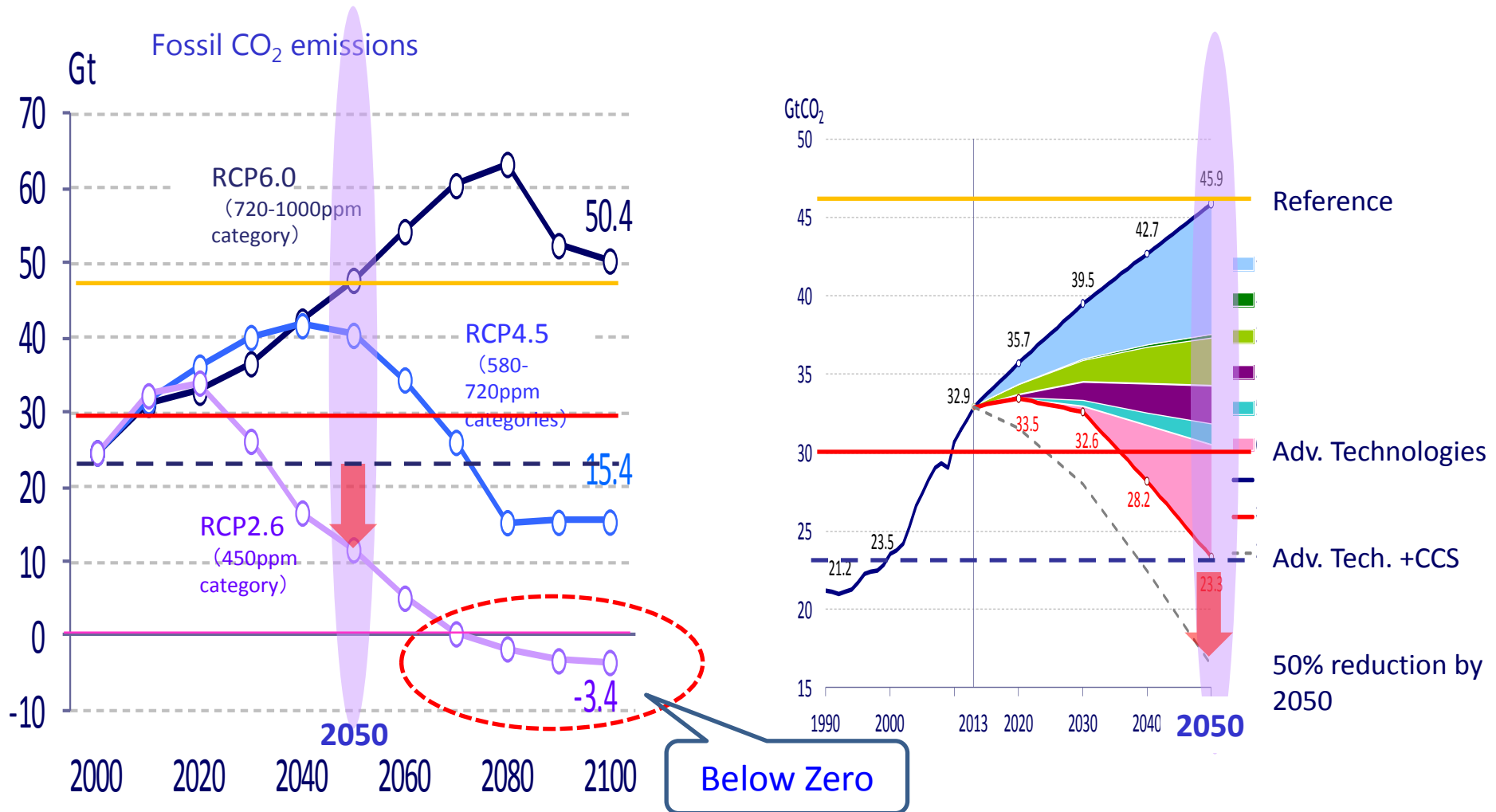
2 °C

BAU

*Temperatures in parentheses include carbon cycle and climate system uncertainties

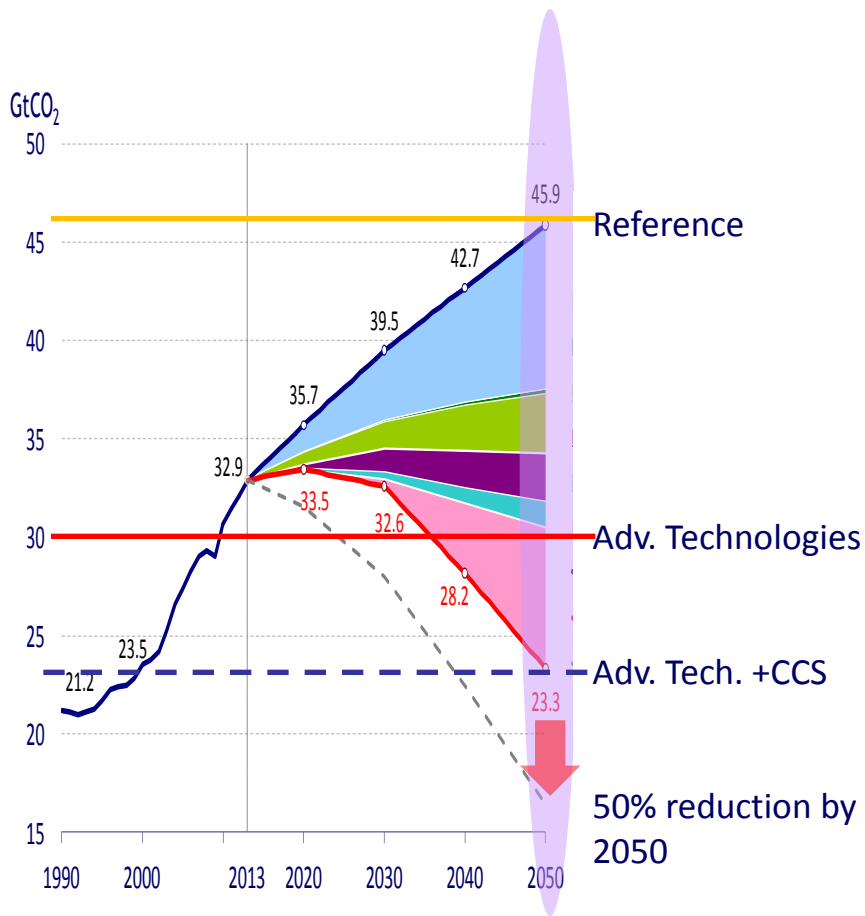
Source: IPCC AR5 WG3

IPCC 5th Assessment Report v.s. IEEJ Outlook

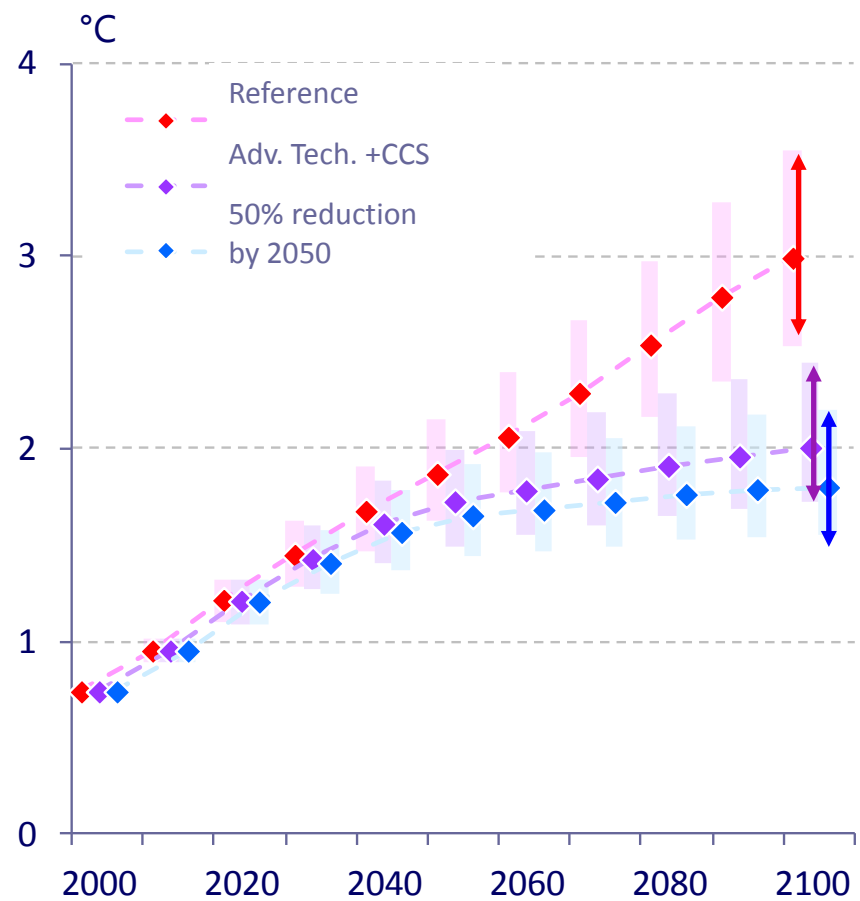


※Calculated using MAGICC 6.0
 Meinshausen, M., S. C. B. Raper and T. M. L. Wigley (2011). "Emulating coupled atmosphere-ocean and carbon cycle models with a simpler model, MAGICC6: Part I – Model Description and Calibration." Atmospheric Chemistry and Physics 11: 1417-1456.

How Much is Temperature Change ?



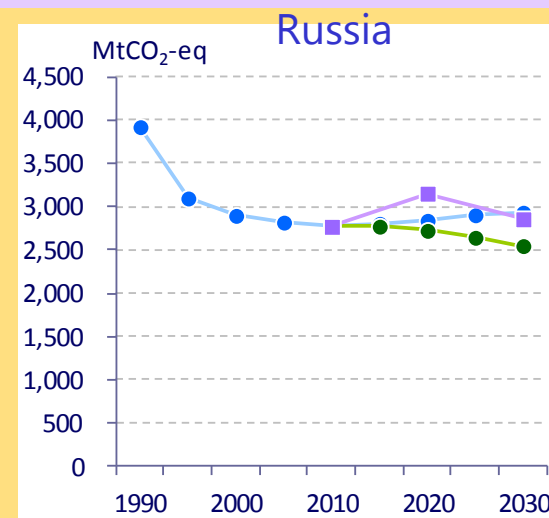
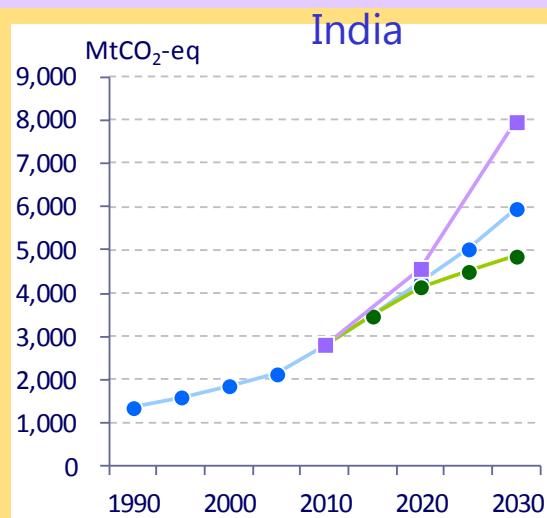
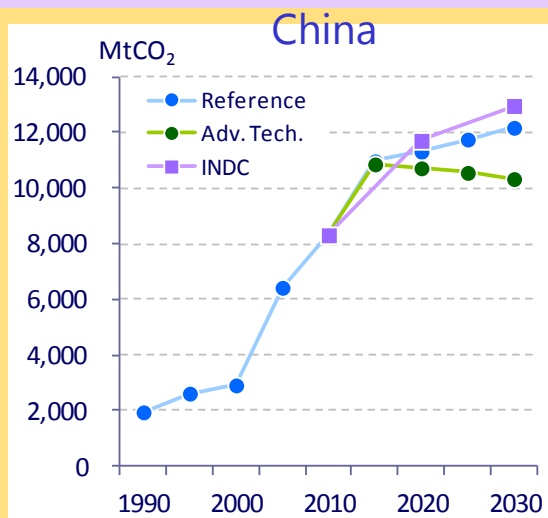
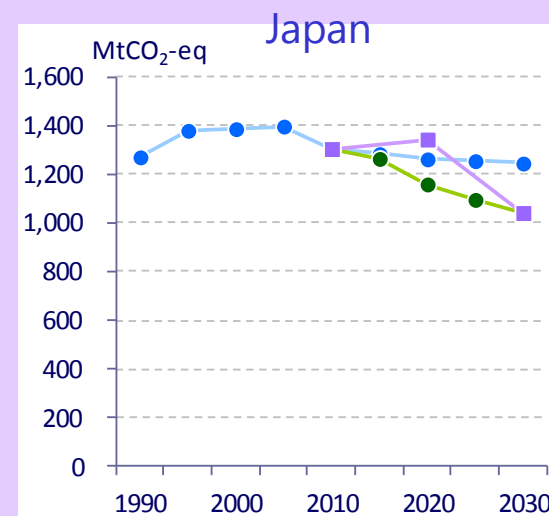
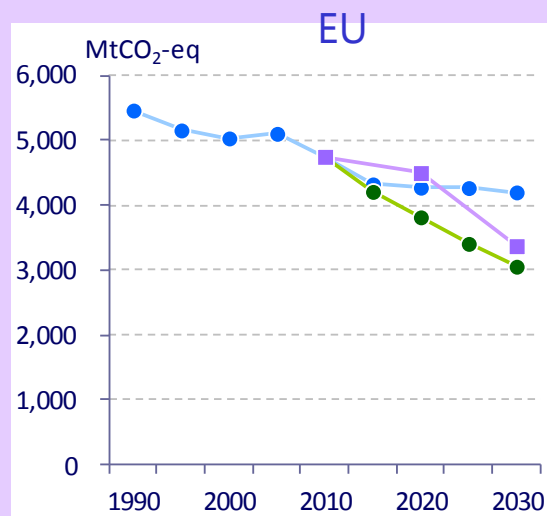
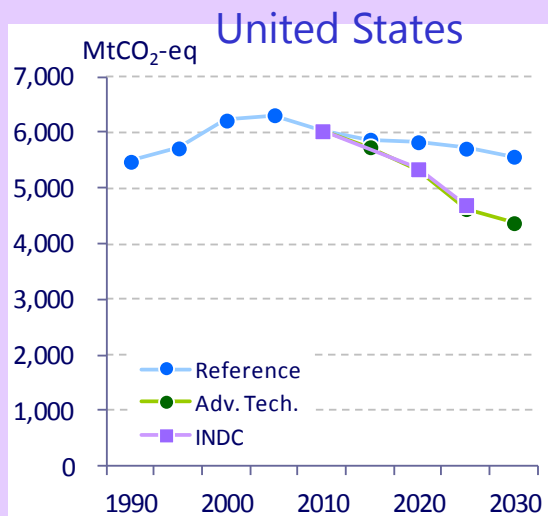
Temperature change from 1850-1900



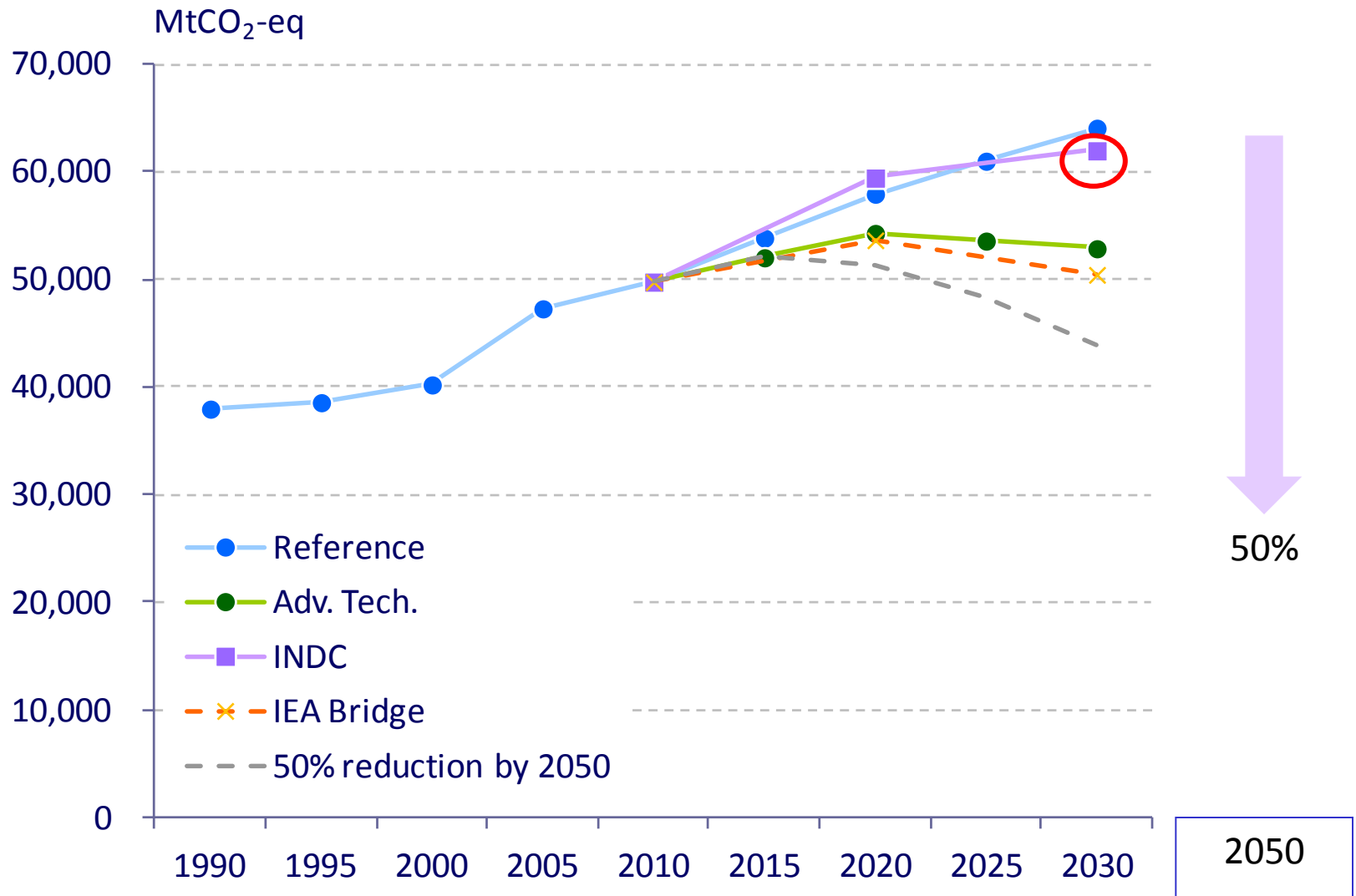
Intended Nationally Determined Contributions (INDCs) : major countries

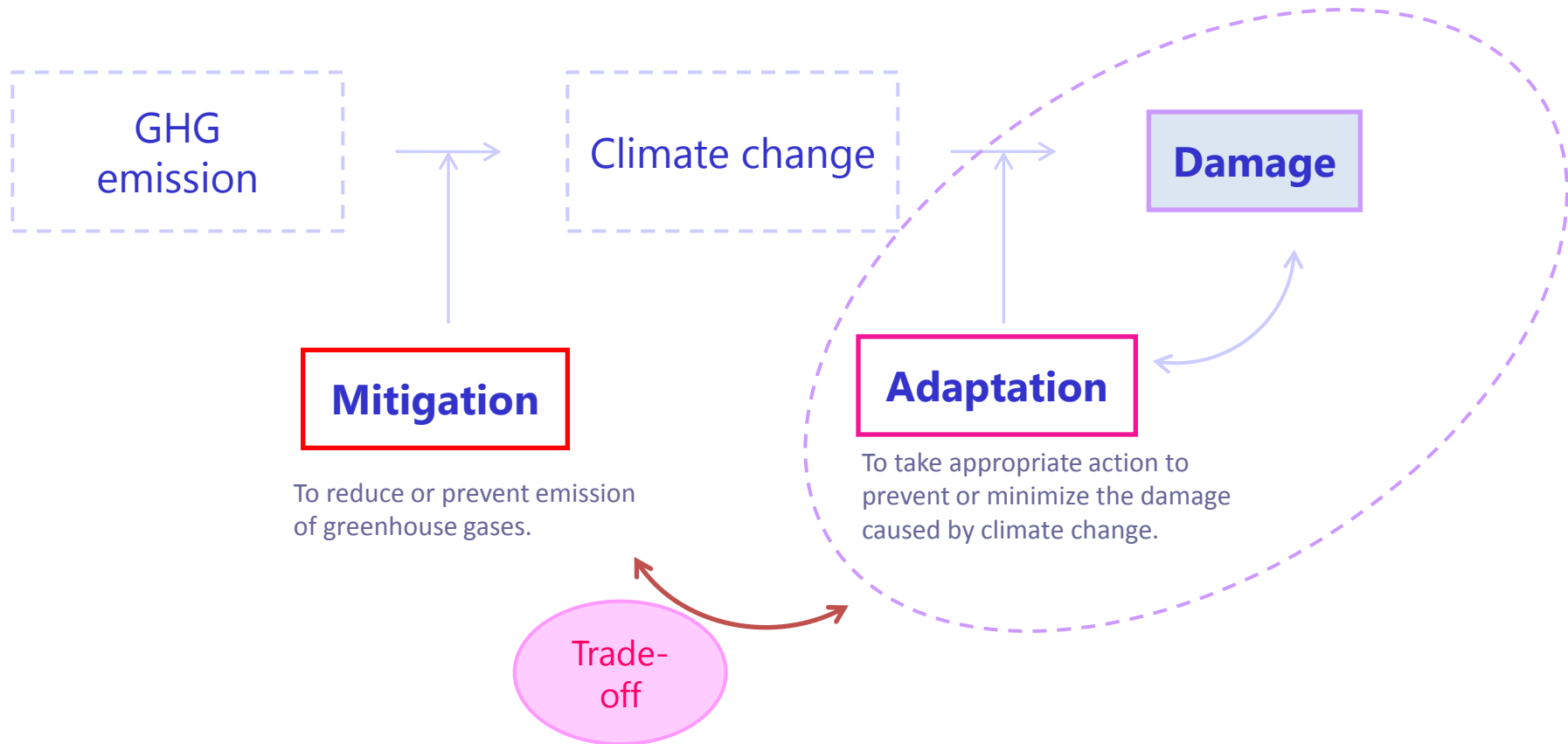
Party	Date of submission	Target type	Reduction target	Base year	Target year	Coverage
EU	Mar 6	Absolute emissions	40%	1990	2030	GHG
United States	Mar 31	Absolute emissions	26~28%	2005	2025	GHG including LULUCF
Russia	Apr 1	Absolute emissions	25~30%	1990	2030	GHG
China	Jun 30	GDP intensity	60~65%	2005	2030	CO ₂
Japan	Jul 17	Absolute emissions	26%	2013	2030	GHG
Indonesia	Sep 24	Reduction from BAU	29%	BAU	2030	GHG
Brazil	Sep 30	Absolute emissions	37% (43% for 2030)	2005	2025	GHG
India	Oct 1	GDP intensity	33~35%	2005	2030	GHG

Comparison of INDCs by country



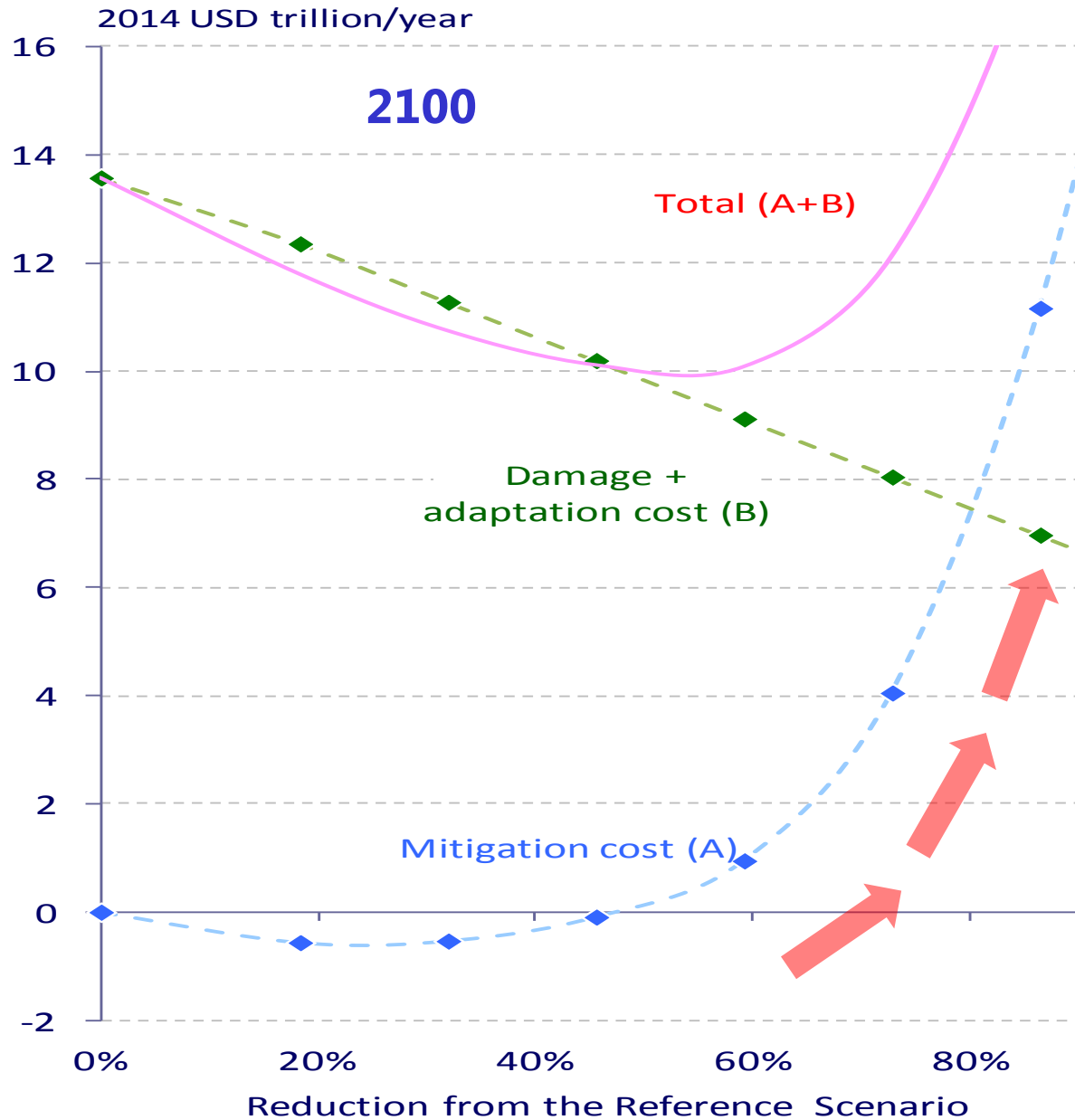
Comparison of INDCs with the Reference/Adv. Tech. Scenarios



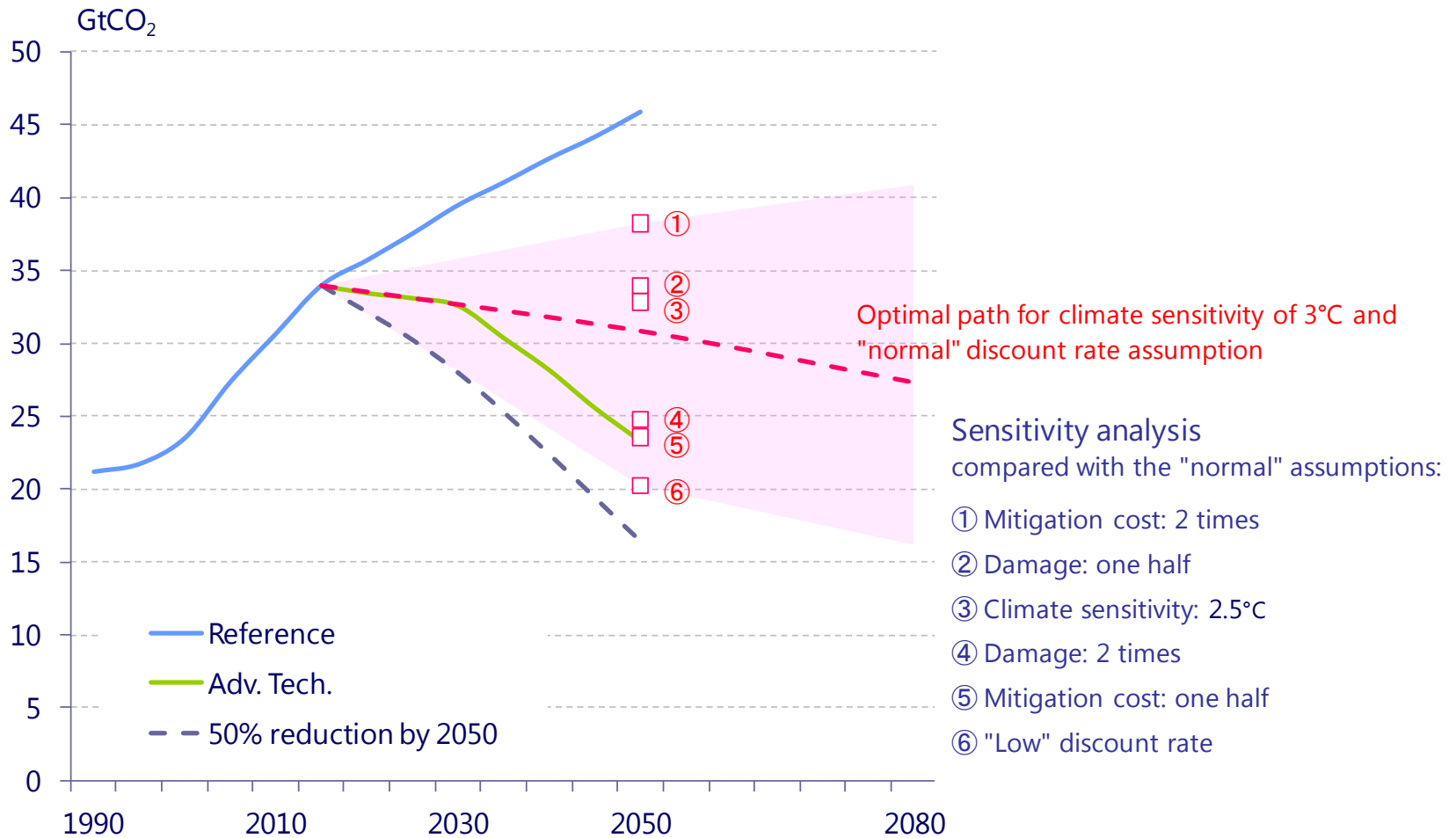


- There is a trade-off relationship among the mitigation, adaptation and damage costs. It is impossible to reduce all three costs at the same time.
- It would be realistic to expect a balance among the three, while minimizing the total cost.

Mitigation vs. Adaptation Costs in 2100



Example of the calculation of the long-term optimal path



Conclusion: Addressing climate change issues

Mitigation, adaptation and damage costs

- The **uncertainty** is **extremely large**.
- A trade-off** between "**mitigation**" and "**adaptation**" costs
 - ➔ **Optimal & realistic is to minimize the total cost**
- Future R&D** should aim to **reduce cost hike**.

Climate sensitivity

- "**Climate sensitivity**" may be **lower** than previous studies (IPCC AR5, WG1).
- **With lower climate sensitivity**, damage becomes smaller,
 - ➔ **a less ambitious mitigation path being optimal**.

INDCs (Intended Nationally Determined Contributions)

- The current **INDCs** do not curb GHG emissions sufficiently.
Parties should **reduce emissions further**.



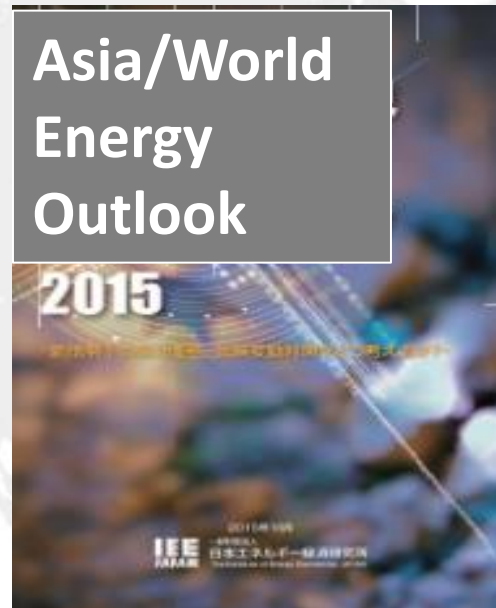
Actions required considering **various scenarios and options other than only** the "**450ppm**" scenario.

- **Innovative technologies** must be developed including CCS, CCU and artificial photosynthesis

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in the category of Energy and Resource Policy

Asia/World Energy Outlook

2015



IEEJ's **Asia/World Energy Outlook 2015**

Will be available at the site below:

<http://eneken.ieej.or.jp/en/whatsnew/421.html>