

Sustainable low-carbon Asia

- backcasting methodology can identify possible leap-frogs to sustainable development**

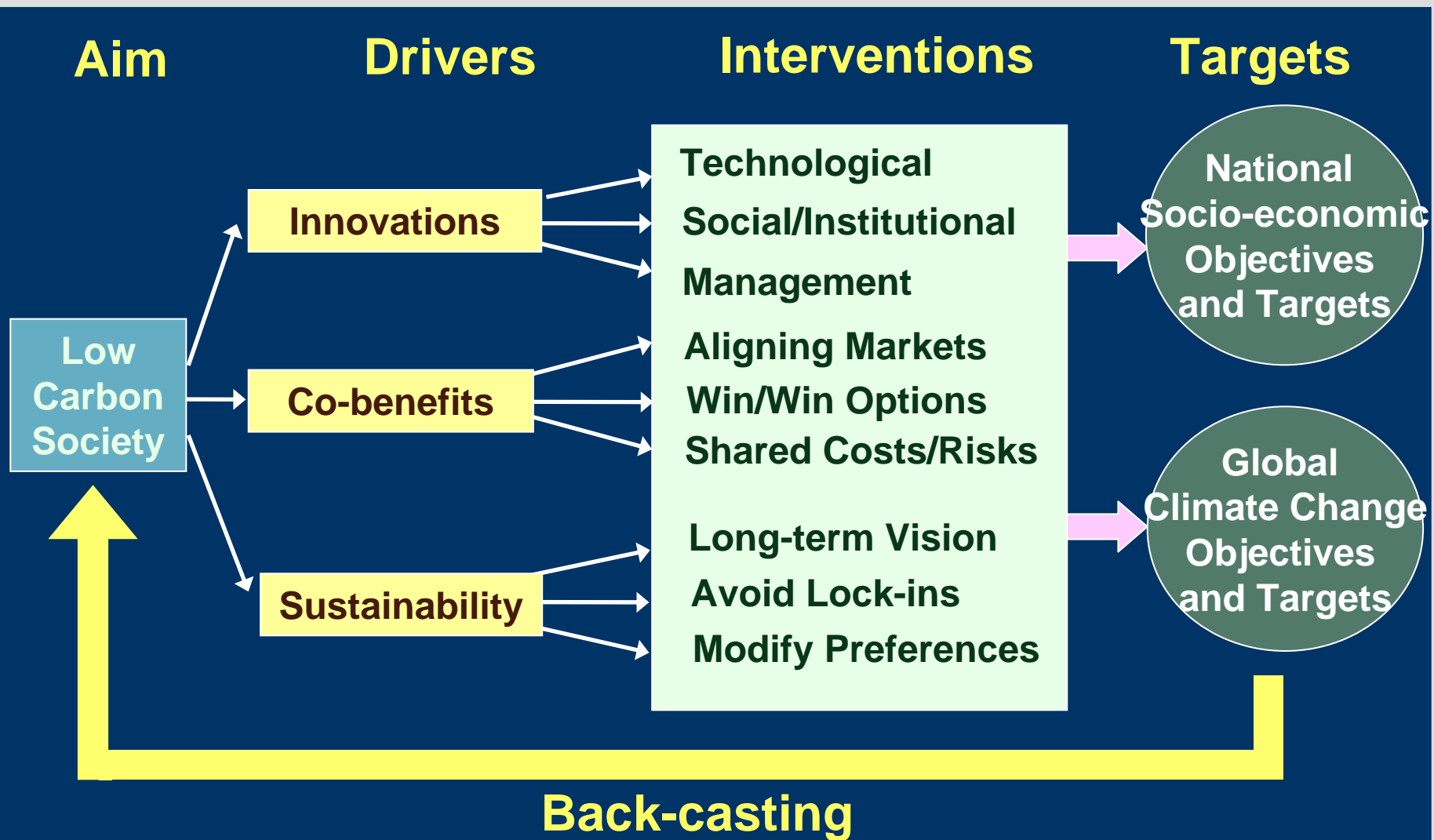
Mikiko Kainuma (NIES/Japan), Junichi Fujino (NIES),
Kejun Jiang (ERI, China) and P.R. Shukla(IIM, India)

COP14 Side Event on December 8, 2008

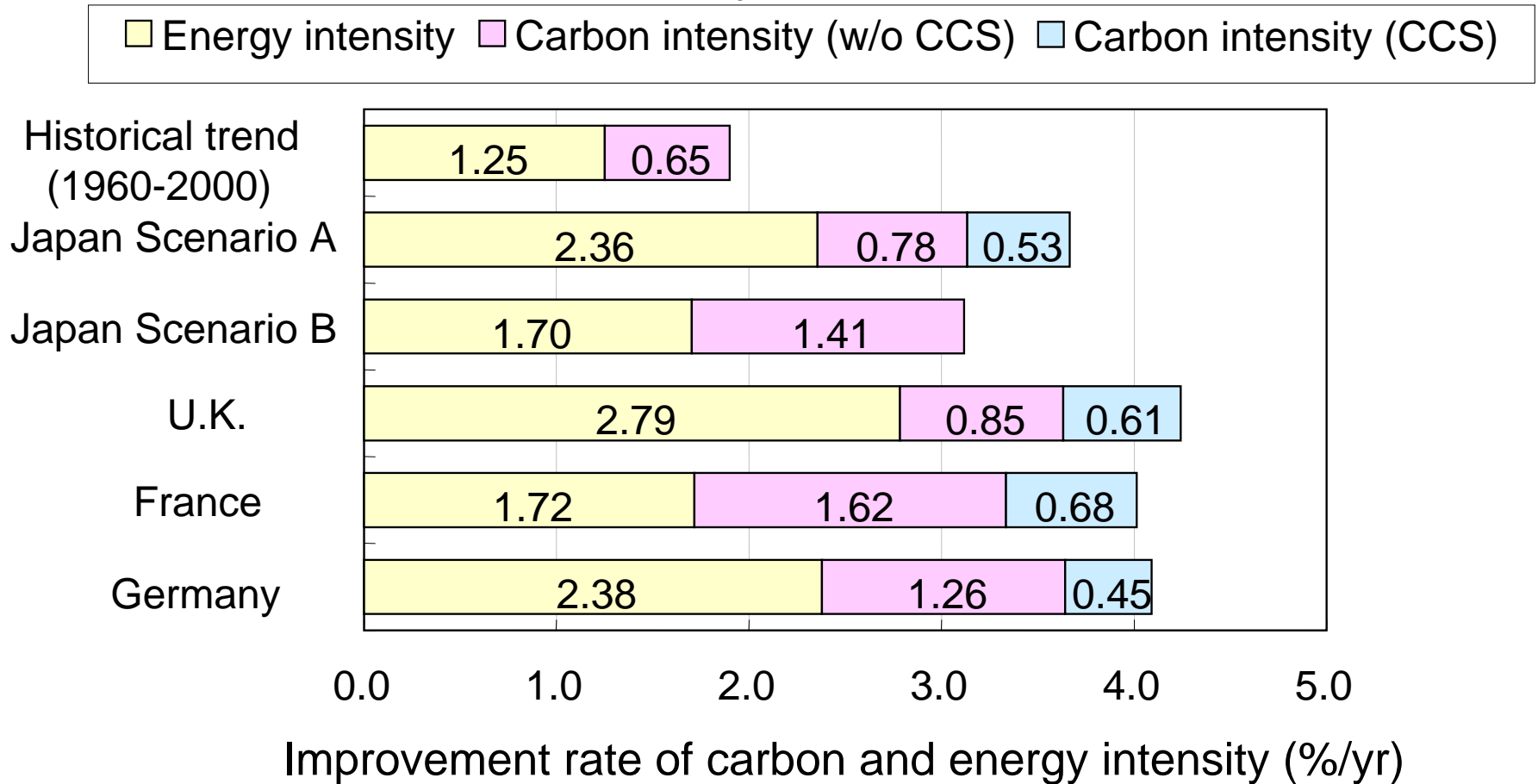
Aesculapian snake,

Poznań International Fair Ltd.

Sustainable Low Carbon Development



Required improvement rate of carbon and energy intensity to achieve low carbon society by 2050



Chinese Energy efficiency improvement:

4.3%/year as of target by 2010, 1.6%/year in 2006, 3.7% in 2007

Five domestic factors and the global trade environment that decide the realization of Asian low carbon societies

- (1) **Energy production, consumption facilities, equipment, and technology**: Energy supply facilities, energy-saving technology, and their production system
- (2) **Infrastructure**: Traffic infrastructure and system for LCS
- (3) **Human capital**: Human resource for developing, managing, and maintaining low carbon societies. Proxy index by number of technocrats, engineers and people's potential to accept related innovation.
- (4) **Institution**: Creation and existence of efficient market systems for energy and technology. Decentralized governance and privatization of related organization, international and domestic funding system, carbon-emission tax, emissions trading, etc.
- (5) **Social capital on reliability, custom, and norm**: Social environmental efficiency of individual level, community level and commercial markets. Energy efficient lifestyle and low material type lifestyle.

July 7-9 2008, Hokkaido, Japan

G8 HOKKAIDO TOYAKO SUMMIT



The volume of the image files is controlled
to reduce electricity consumption.

Japanese Former PM outlines green 'Fukuda vision' on 9th June 2008 pledged to cut of 60-80 per cent of greenhouse gas emissions based on current levels by 2050 in Japan.

Visions and Innovations

LCS house in 2050

Comfortable and energy-saving house

Utilizing solar power

Photovoltaic

Eco-life education

10-20% energy demand reduction

rooftop gardening

High efficiency lighting

【eg LED lighting】

Reduce 1/2
energy demand
Share 100%

High-insulation

Reduce 60% warming
energy demand,
share 100%

Fuel cell

share 0-20%

COP=5
share 30-70%

High efficiency appliances
reduce energy demand and
support comfortable and safe lifestyle

Good information for
economy and environment
makes people's behavior
low-carbon

Solar heating

Diffusion rate: 20-60%
(currently 8%)

Monitoring system equipped with appliances

Super high
efficiency air
conditioner

COP (coefficients of performance=8),
share 100%

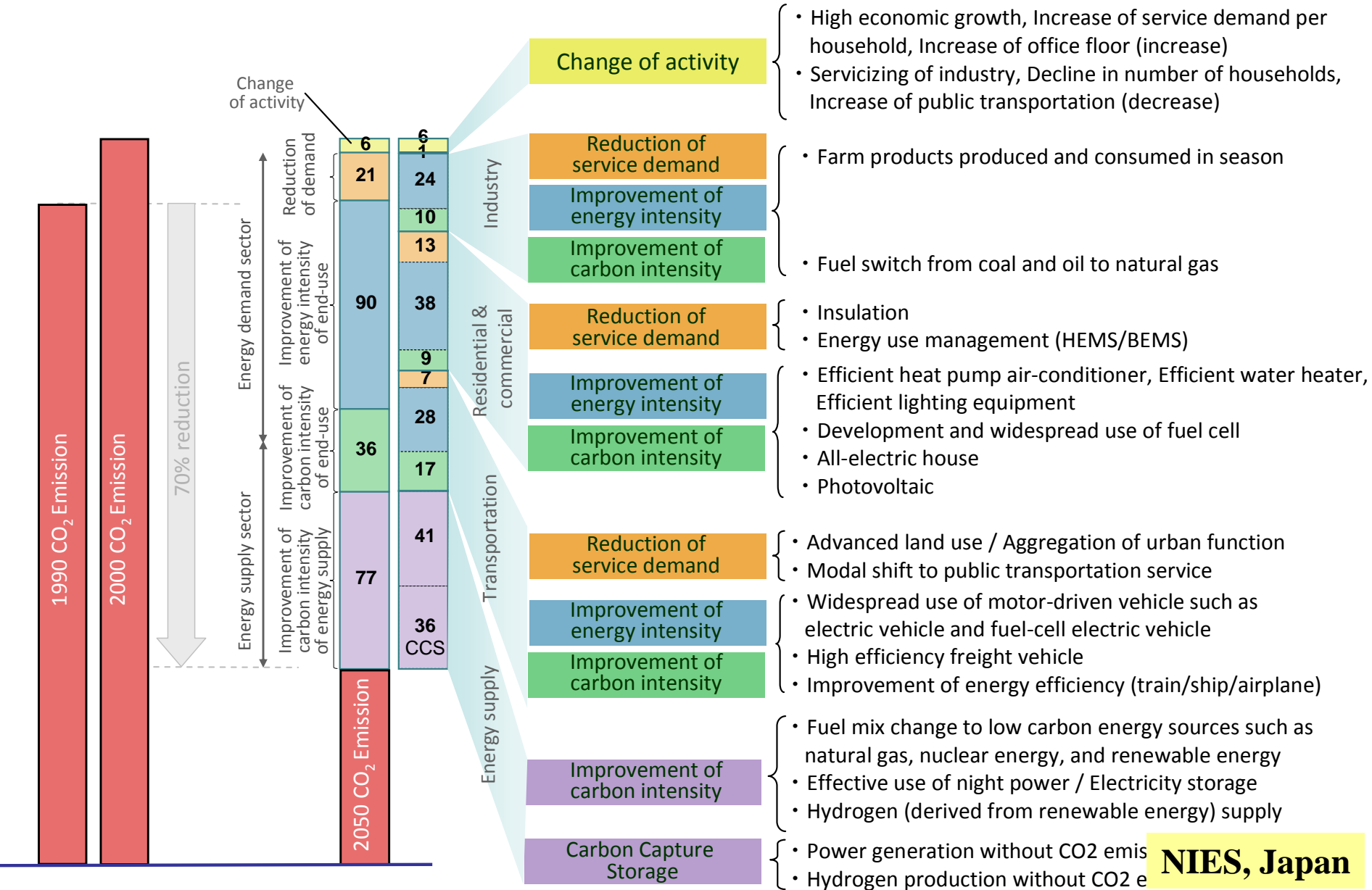
Stand-by energy reduction

Reduce 1/3 energy demand,
share 100%

GHG 70% reduction in 2050 Scenario A: Vivid Techno-driven Society

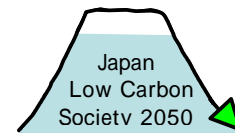
Demand side energy -40% + Low carbonization of primary energy + CCS

with moderate cost of technological options as 0.3% of GDP in the year of 2050

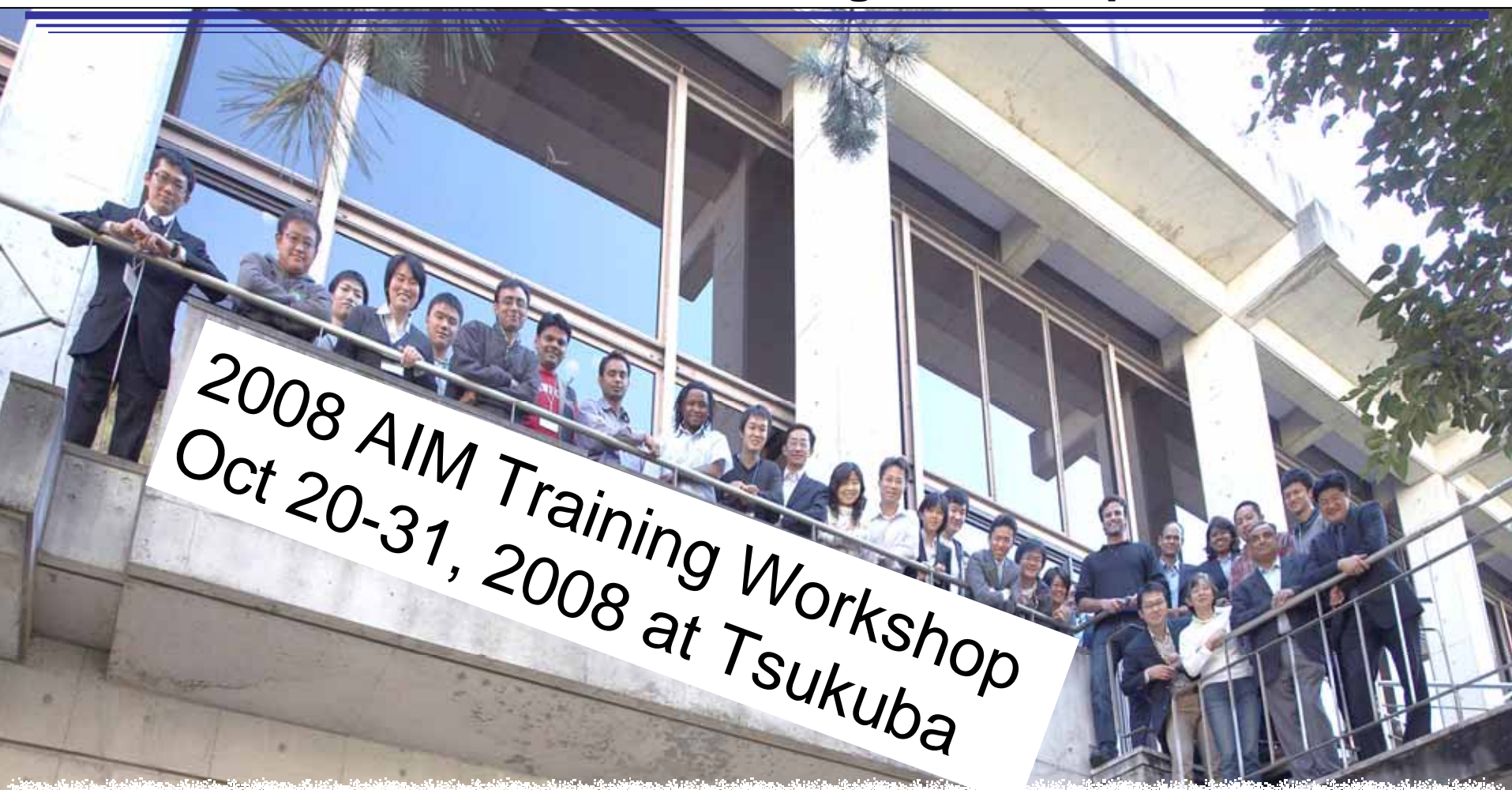




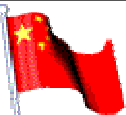
**We support country-wise LCS modeling
through SD for Asia-Pacific and the world**



- We have continued AIM Training Workshops since 1997 -



India



China



Thailand



Korea



Malaysia



Indonesia



Brazil



Russia



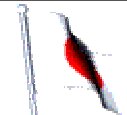
South
Africa



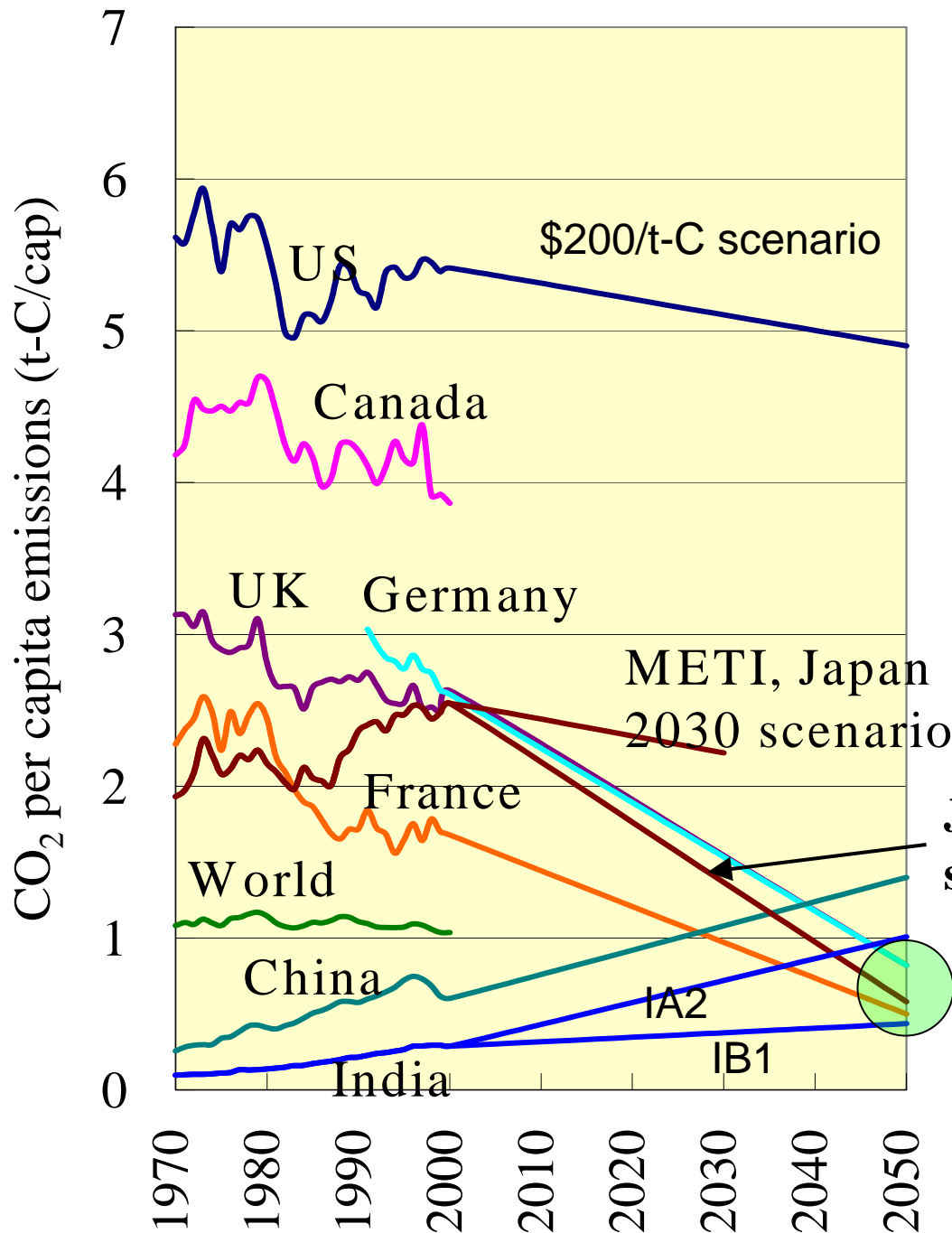
Taiwan,
China



USA



Japan



Current per capita CO₂ emissions and Target

US: delay for tech development, global warming business

EU: Initiatives toward LCS
Japan: Need long-term vision

Developing countries: earlier guidance toward LCS is key

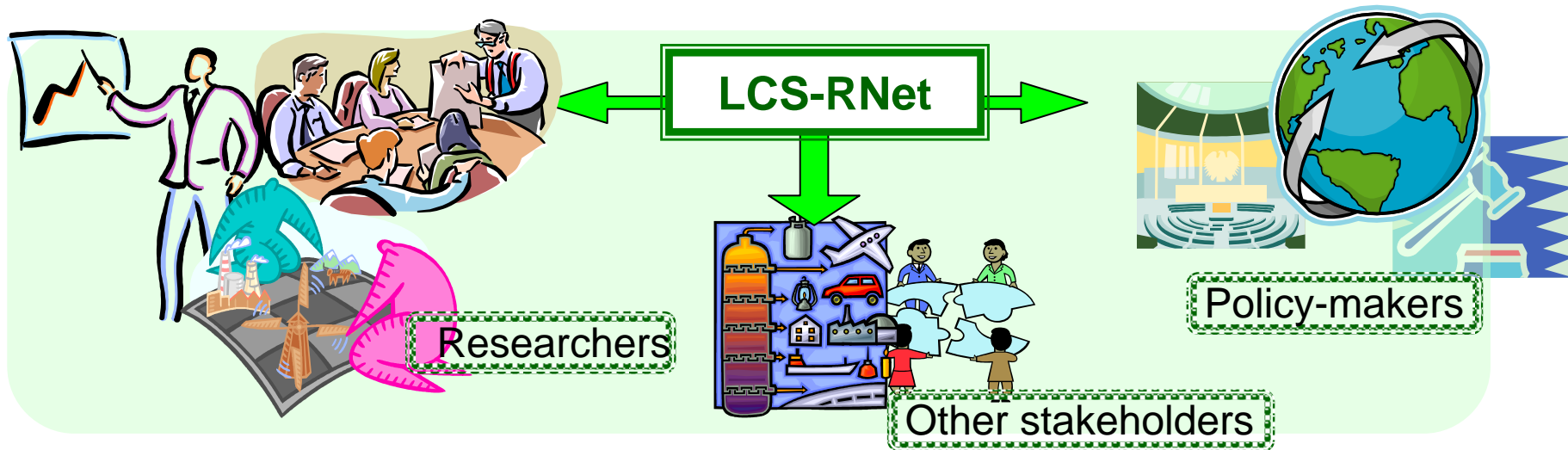
Japan 2050 scenario

Target for Low Carbon Society

Shuzo Nishioka, Junichi Fujino;
NIES COP11 and COP/MOP1 side event
Global Challenges Toward
Low-Carbon Economy (LCE), Dec.3, 2005

LCS-Research Network

Linkages and interactions between research activities and policy processes for science-based policy making towards LCS



- Information exchange and research cooperation amongst research institutions of any CRS related fields,
- Dialogues with policy-makers, businesses, citizens and others to share possible visions on future LCS,
- Contribution to international political processes on climate change including the G8 process by providing research outcomes and recommendations.

G8 Japan Initiatives

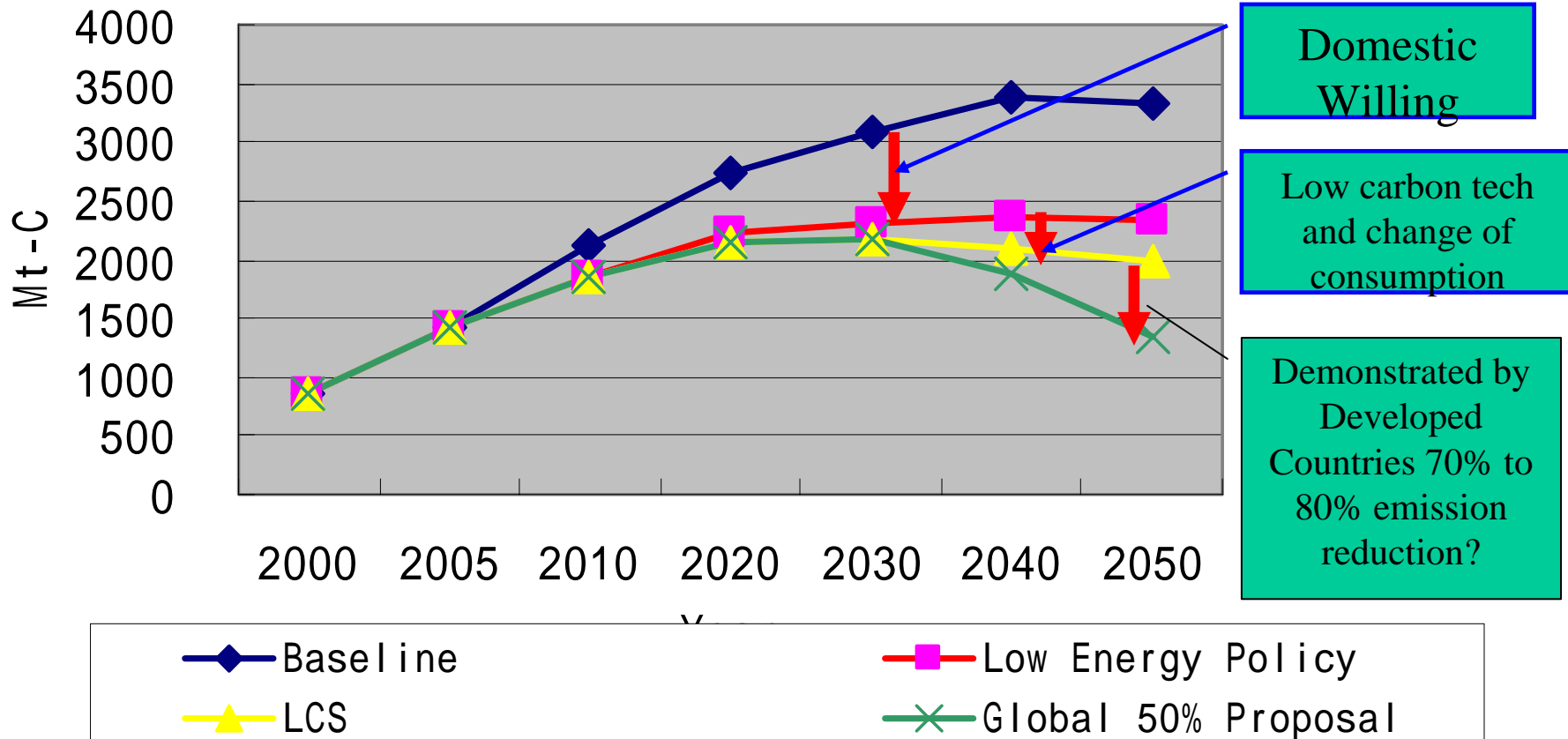
Low Carbon Society(LCS)/Economy(LCE) in China: what's the meaning?

- There is no specified emission target or level for a LCS/LCE.
- LCS/LCE 1: one is low carbon emission based on global long-term emission target.
- LCS/LCE 2: each economy could make full effort to reduce GHG emission with consideration on local resource availability.

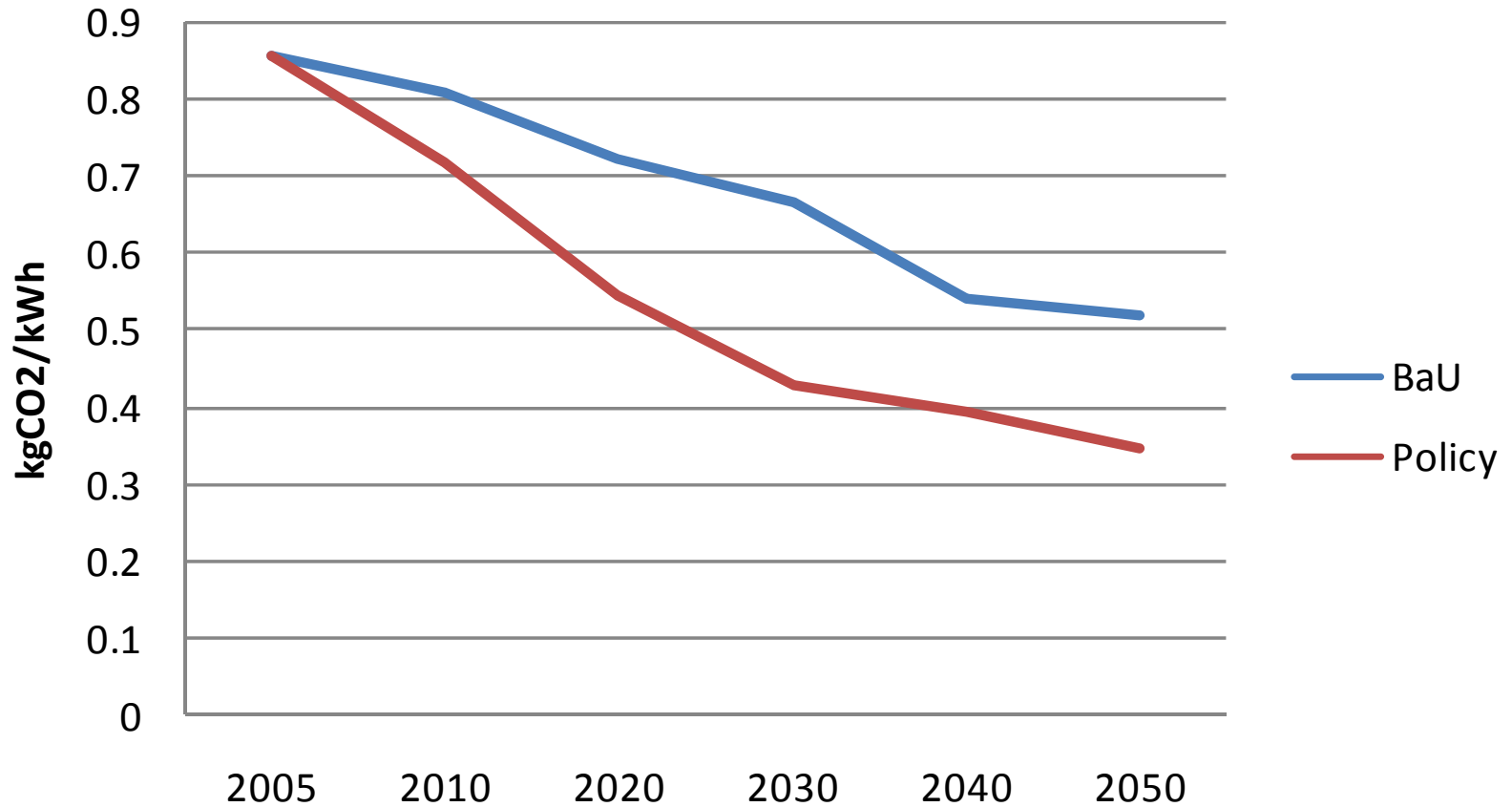
LCS/LCE in China: what's the meaning?

- changing economy structure, by controlling energy intensive products export, redirecting investment to non-energy intensive sector, pricing;
- make full effort to reach high energy efficiency in industry by 2030 in the world;
- develop widely renewable energy; develop unclear power generation;
- widely public awareness raising;
- enhancing sink;
- Reduce other GHGs(N₂O, HFC, PFC, SF₆)

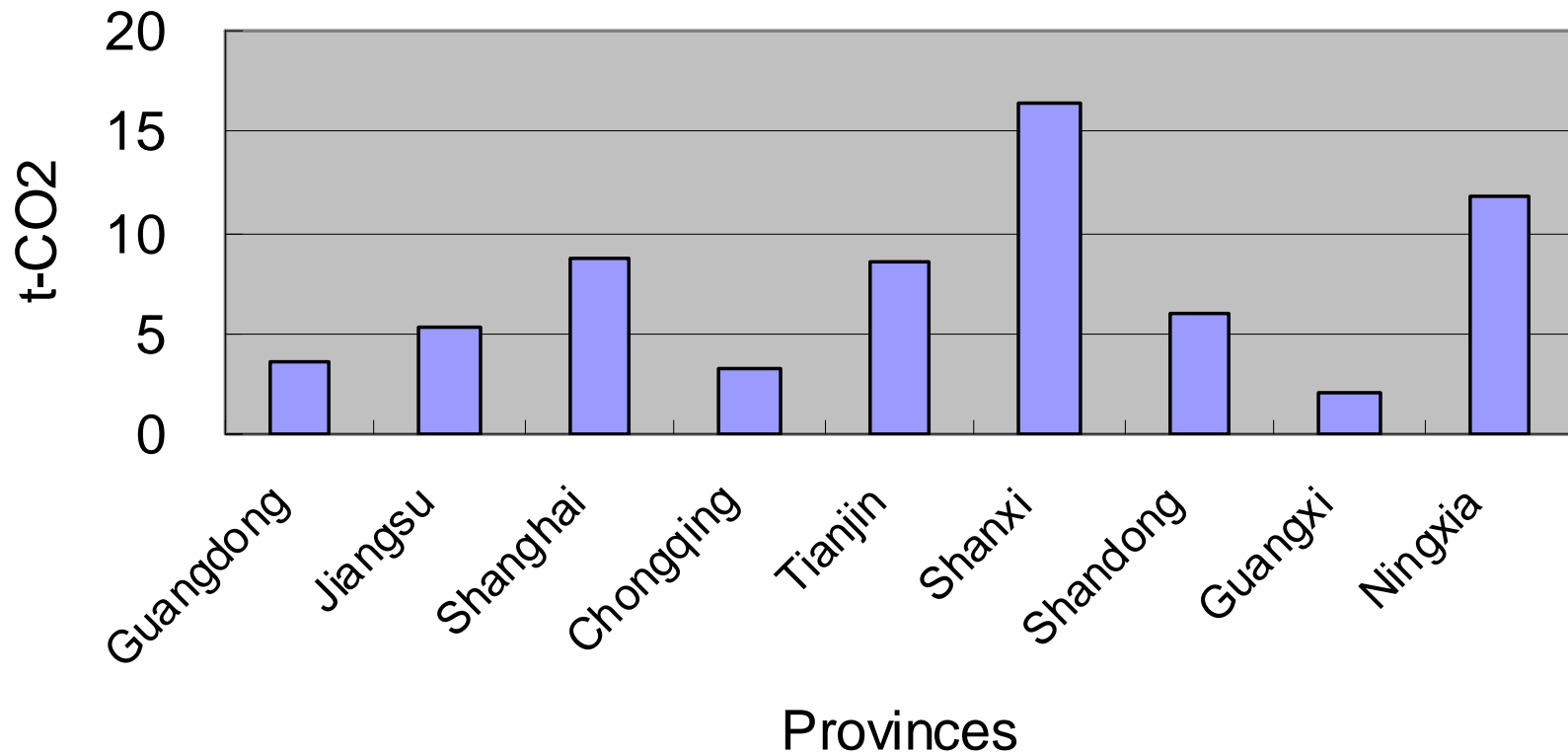
CO2 Emission from Energy Activities in China, IPAC Results



CO2 Emission Comparison



CO2 emission per capita, t-CO2



Tire 1 indicators for LCS/LCE

Classification	Indicators	Note
Emission indicators	GHG emissions	Setting up emission target
Intensity indicators	GHG emission per GDP GHG emission per capita	With similar target as energy intensity target in China ' s 11 th Five Plan
Financial indicators	Share of investment on LCE Total investment on LCE	Government input together with other investment
Sector indicators	GHG Emission of sectors GHG emission per GHG Emission per output	
Behavior indicators	Involvement from public Government effort	

Tire 2 indicators for LCS/LCE

Classification	Indicators	Note
Transport indicators	Share of public transport Non-mobility friendly transport	Share of road with nice bicycle lane, pedestrian side
Household	Low carbon life style: Low carbon campaign Share of renewable energy	Share of family register as Low carbon life style
Building	Share of energy saving building Share of buildings with solar Share of high efficiency lighting	
Low carbon technologies	Share of renewable energy in total energy Share of renewable energy in power generation Share of advanced technologies in major industry Other technologies	
Industry Sector	Emission/energy use per Emission/energy use per output Technology penetration rate Rate of recycle Investment on energy efficiency/emission reduction	

Energy intensity target

	Intensity, tce/10000yuan		Reduction
	2005	2010	%
Guangdong	0.79	0.66	16
Jiangsu	0.92	0.74	20
Shanghai	0.88	0.7	20
Chongqing	1.42	1.14	20
Tianjin	1.11	0.89	20
Shanxi	2.95	2.21	25
Shandong	1.28	1	22
Guangxi	1.22	1.04	15
Ningxia	4.14	3.31	20

Energy and Carbon: India Base Case

Assumptions

From 2005-2050:

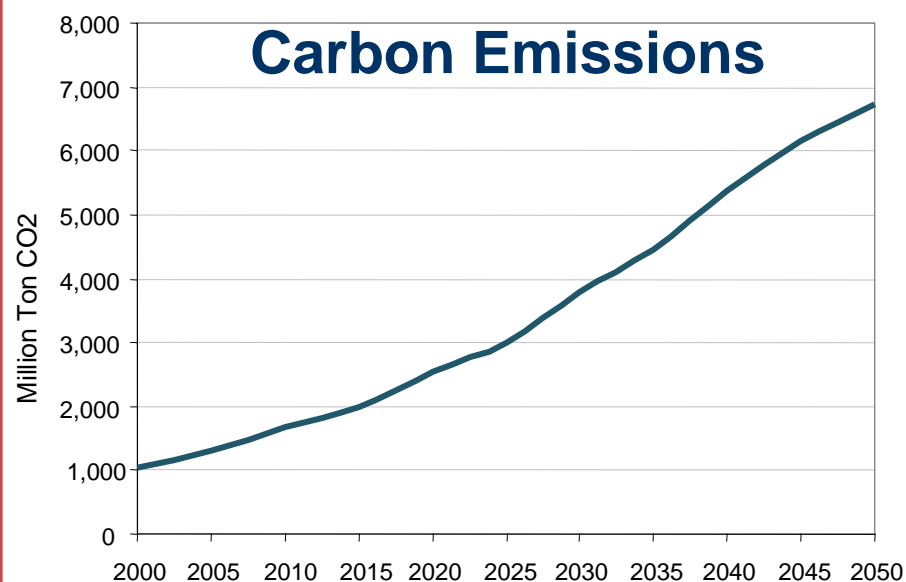
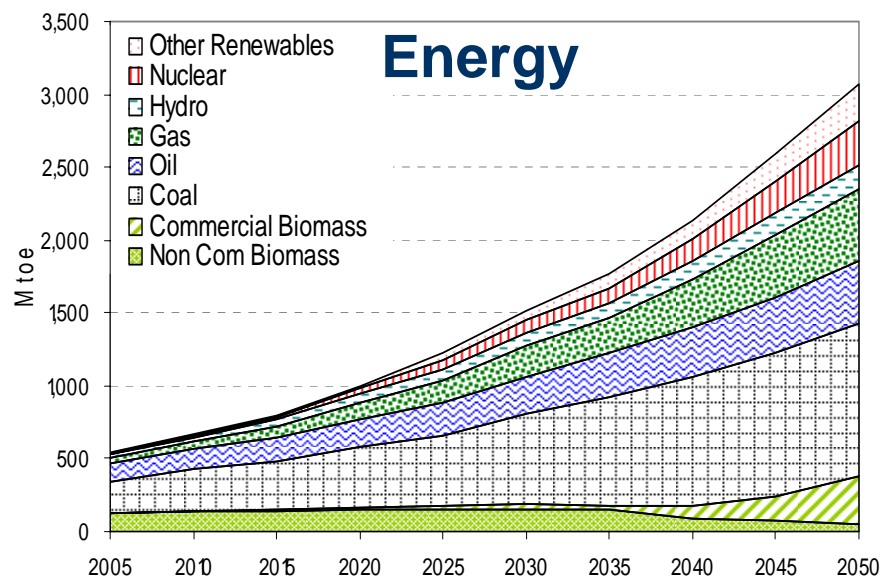
Annual Economic Growth: 7.2%

Annual Population Growth: 0.9%

Increase in 2050 over 2005

Economy 23 times

Population 1.56 times



Results: Energy and Carbon Intensity

Annual Improvement From 2005-2050:

Energy Intensity: 3.14 (%)

Carbon Intensity: 3.07 (%)

Decarbonization of Energy: -0.07 (%)

Direct Investment in Energy Projects:

2010-30: US\$ 1.2 Trillion

2030-50: US\$ 2.3 Trillion



Alternate Development Visions

Stabilization Target and Visions

1. Global Stabilization Target Assumption:

- 550 ppmv CO₂e Concentration
- 3.4 W/m²
- @ 3° C temperature increase (50:50)

2. Two Development Pathways for India:

(with same total CO₂ emissions from 2005 to 2050)

1. Conventional Vision: **Climate Actions at Margin of Conventional Development path**
2. 'Sustainability' Vision: **Aligning Climate Actions with Mainstream Development Actions**

What path shall best deliver national development goals while fulfilling Climate Commitments?

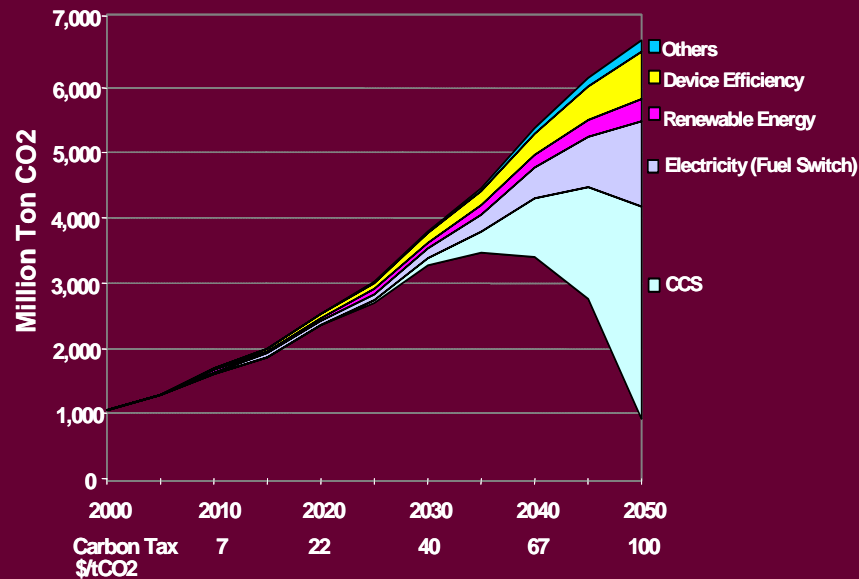


Alternate Development Visions



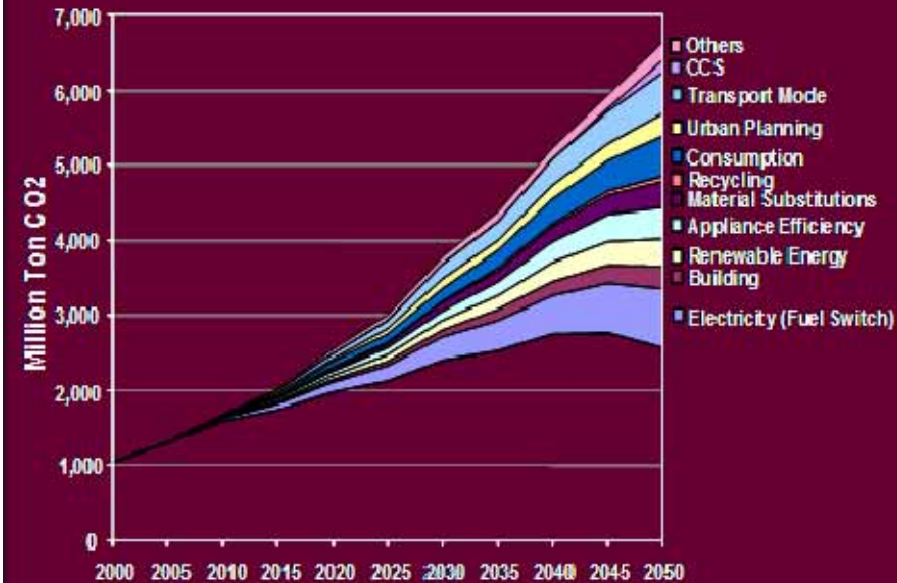
Conventional

1. Top-down/Supply-side actions
2. High Carbon Price as main instrument
3. Climate Focused Technology Push

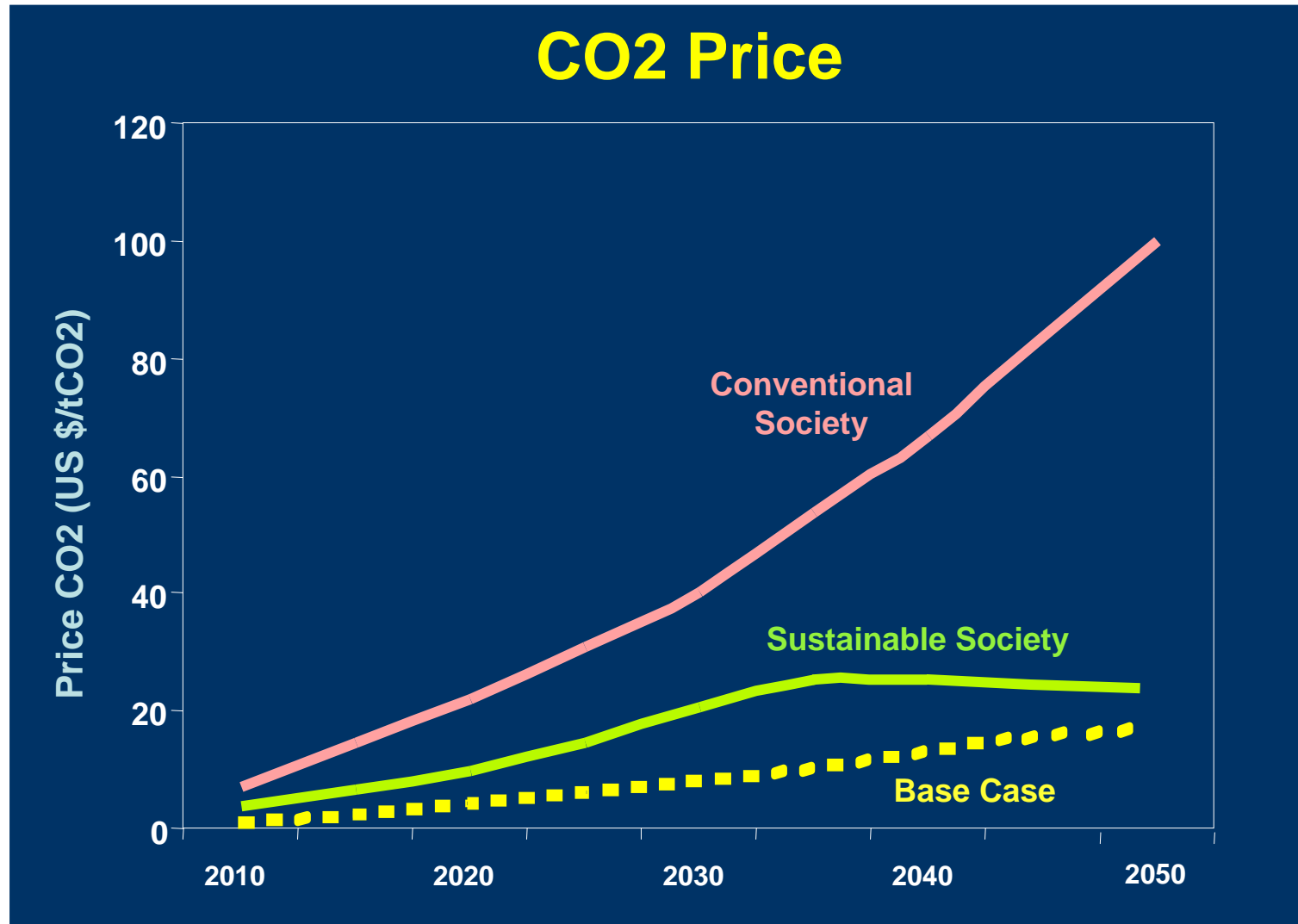


Sustainable

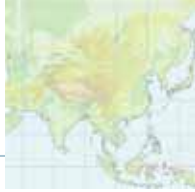
1. Bottom-up/Demand-side technology pull
2. Behavioural change
3. Diverse Technology portfolio



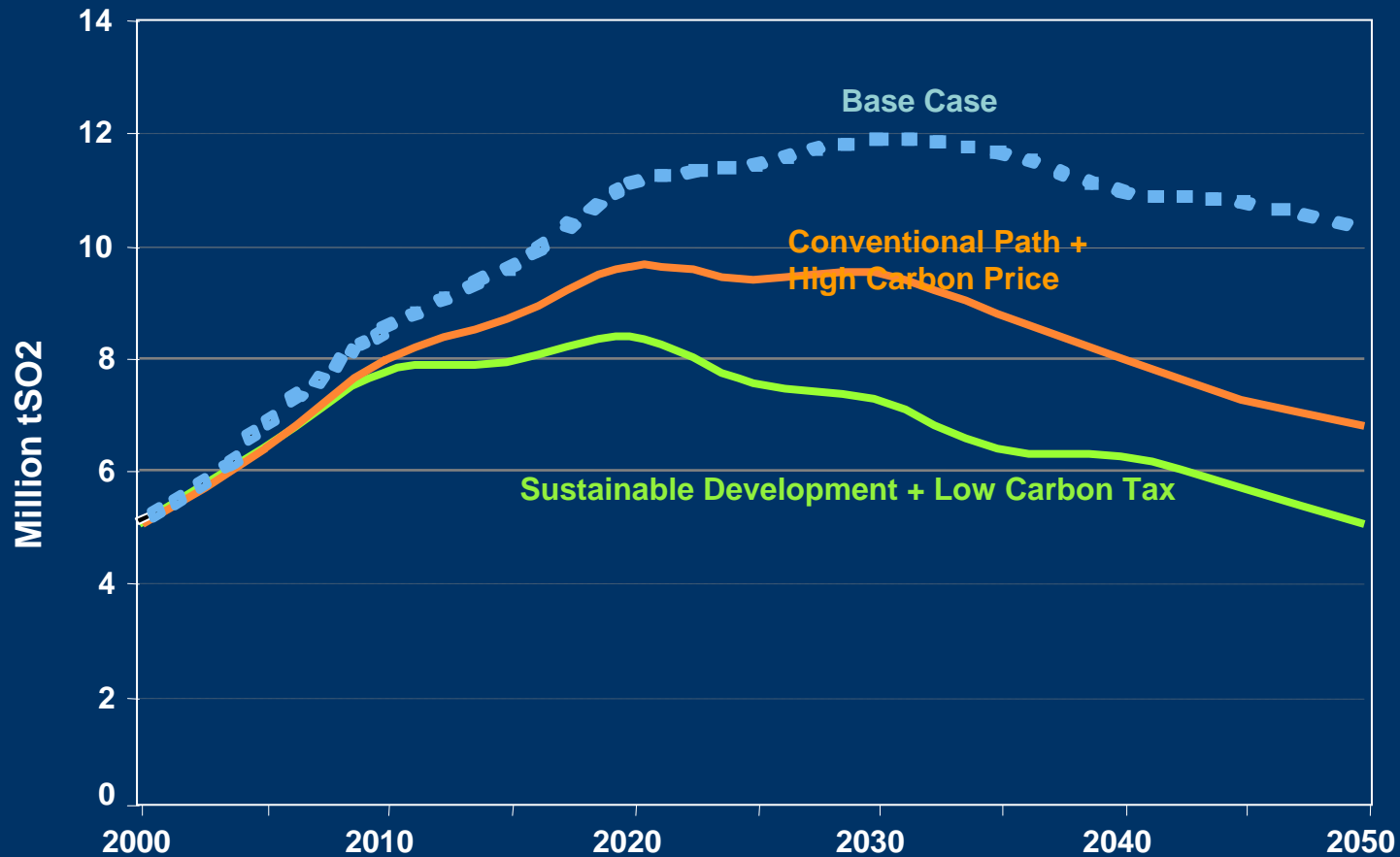
Social Cost of Carbon



Co-benefits of Alternate Choices



Co-benefits: SO₂ Emissions



How this matters to post-2012 negotiations?

- **Mainstream Climate Actions with Development Priorities**
 - Low Carbon Future at 'Lower' Social Cost of Carbon
 - Focus on Co-benefits (from Zero-sum to Positive-sum)
 - New framework to assess investments
- **Combination of Direct and Indirect Policies**
 - Combination of Market and Regulations (e.g. Carbon Price, Funds)
 - Investments in wider range of development choices
 - Investments that avoid long-term carbon emissions 'lock-ins'
 - More areas for technology cooperation
 - Measures to alter behavior (e.g. 3R)
 - Varied Targets (e.g. Energy Intensity, CAFE Standards)
 - Safety Valves

Thank you

