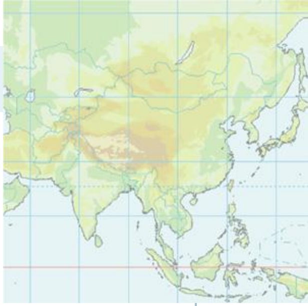

Integrated Knowledge-Based System for Scientific Low-Carbon Development Policymaking in Asia:

Focusing on the Big Win-Win

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Presented in:
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Bogor, Indonesia
November 24-26, 2014

Presentation Agenda

1. Elements of -…Science-Policy-… Nexus

2. 'Big win-win' from the Past Assessments
   - Attributing causality to Climate Change
   - Articulating Pathways to Low Carbon Future

3. Looking Forward: -...Policy-Science-…Nexus
   - Research driven by policy-makers' agenda
   - Science benchmarked to 'reality'
   - 'End-to-End' solutions that deliver multiple dividends
   - Community Driven; Cooperative Research

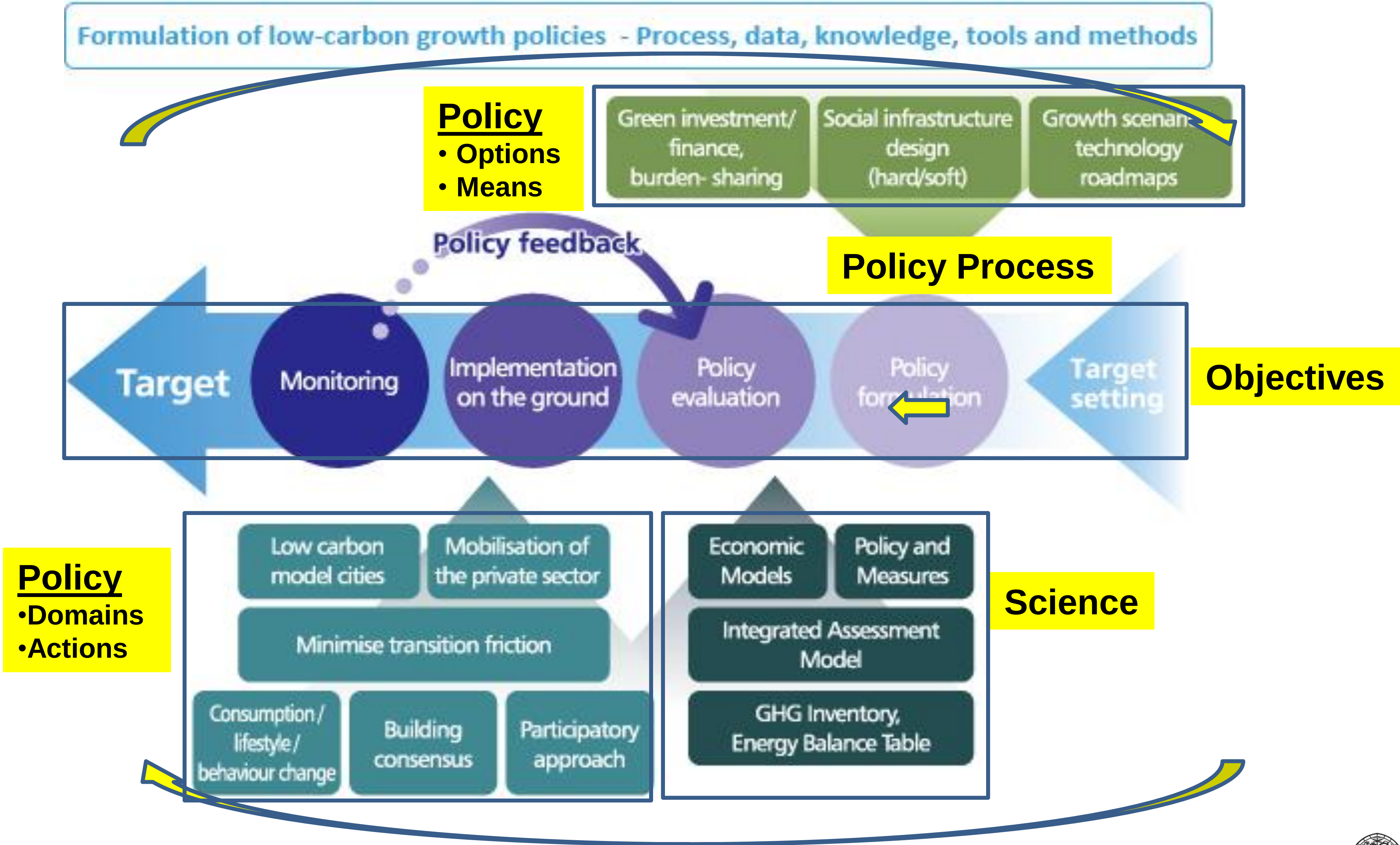
Elements of -…Science-Policy-… Nexus

1. Holistic and Integrative Perspective
   - What, Where, When?
   - How, Who?

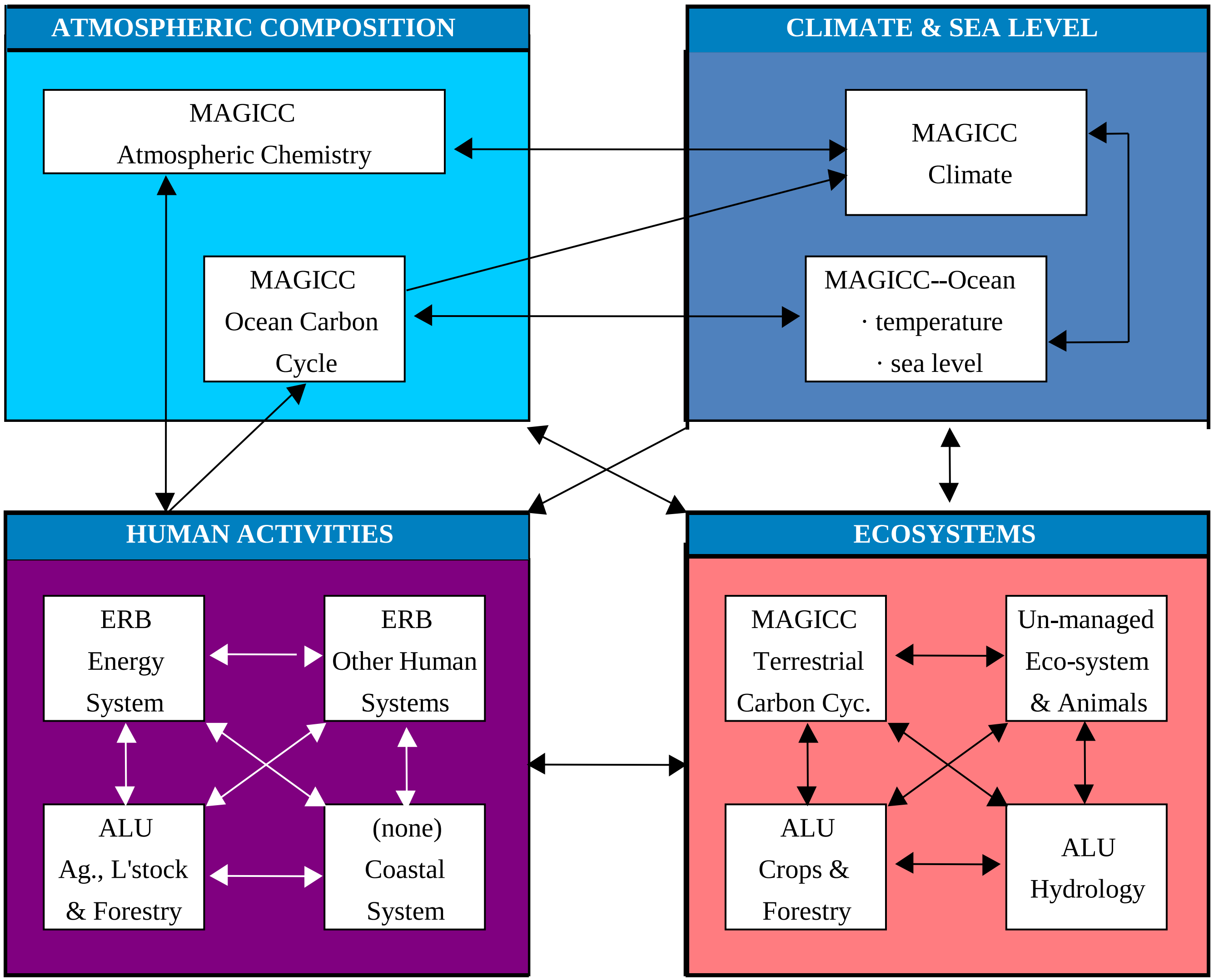
2. Policy relevant Science
   - Integration of:
     – Information across all Scientific disciplines
     – Develop methods and tools
   - Find ‘insights’, ‘implications’ and ‘means’ for policy formulation and implementation
   - Innovations & Information (Futuristic/Strategic Platforms)

3. Research informing Policy
   - Addressing key questions occupying policy-maker’s minds
   - Outreach at Policy Forums

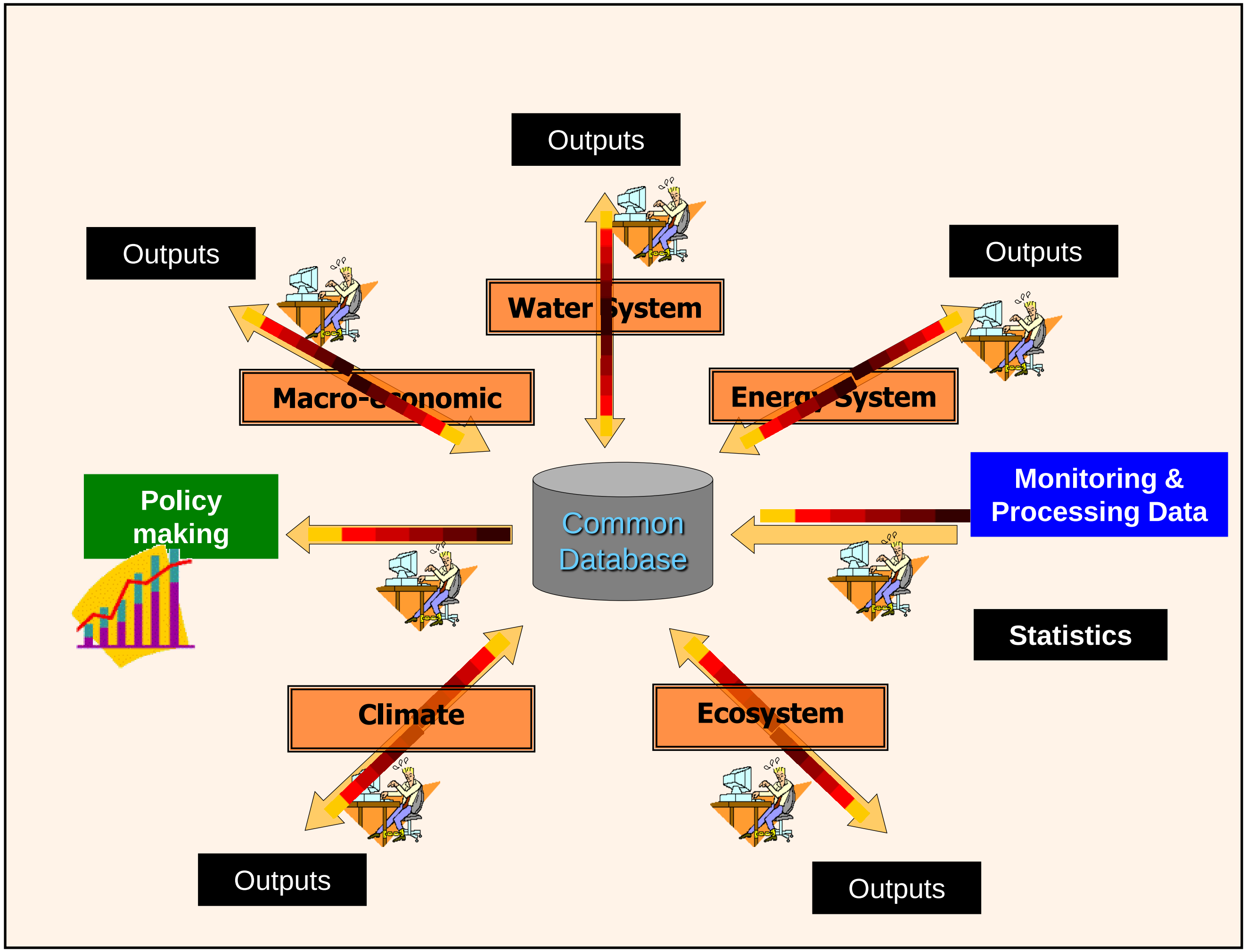
Policy and Science Nexus: What & How?



Integrated Policy Assessment Framework

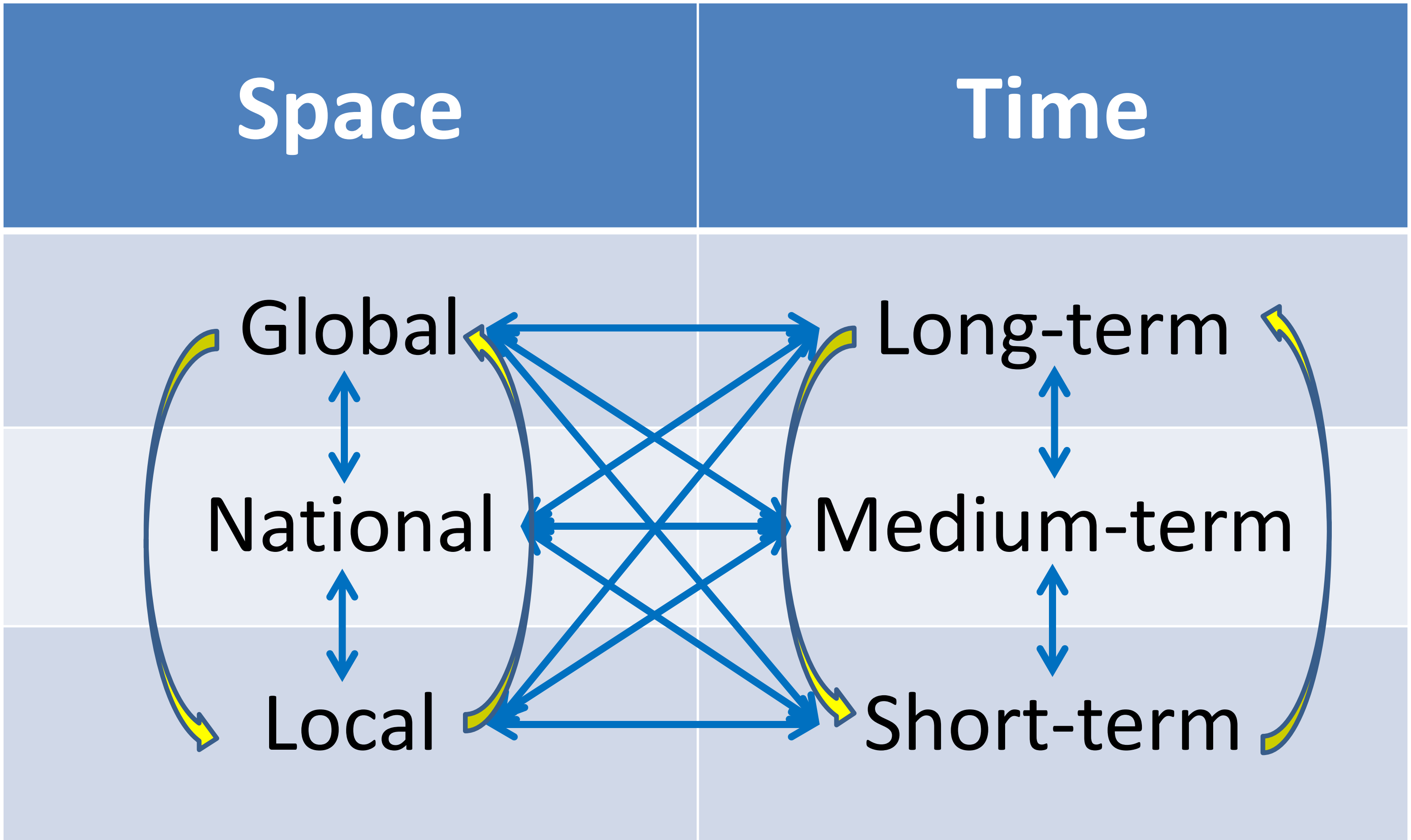


Shared Information: Strategic Databases



Courtesy: AIM Team, NIES, Japan

Policy and Science Nexus: Where, Who and When?



‘Big win-win’ into ‘Low Carbon Resilient Development’:

Select Examples of Present/Past Research Informing Policy

Evidence of Anthorpogenic Influence on Climate Change

IPCC SAR: The balance of evidence suggests a discernible human influence on global climate

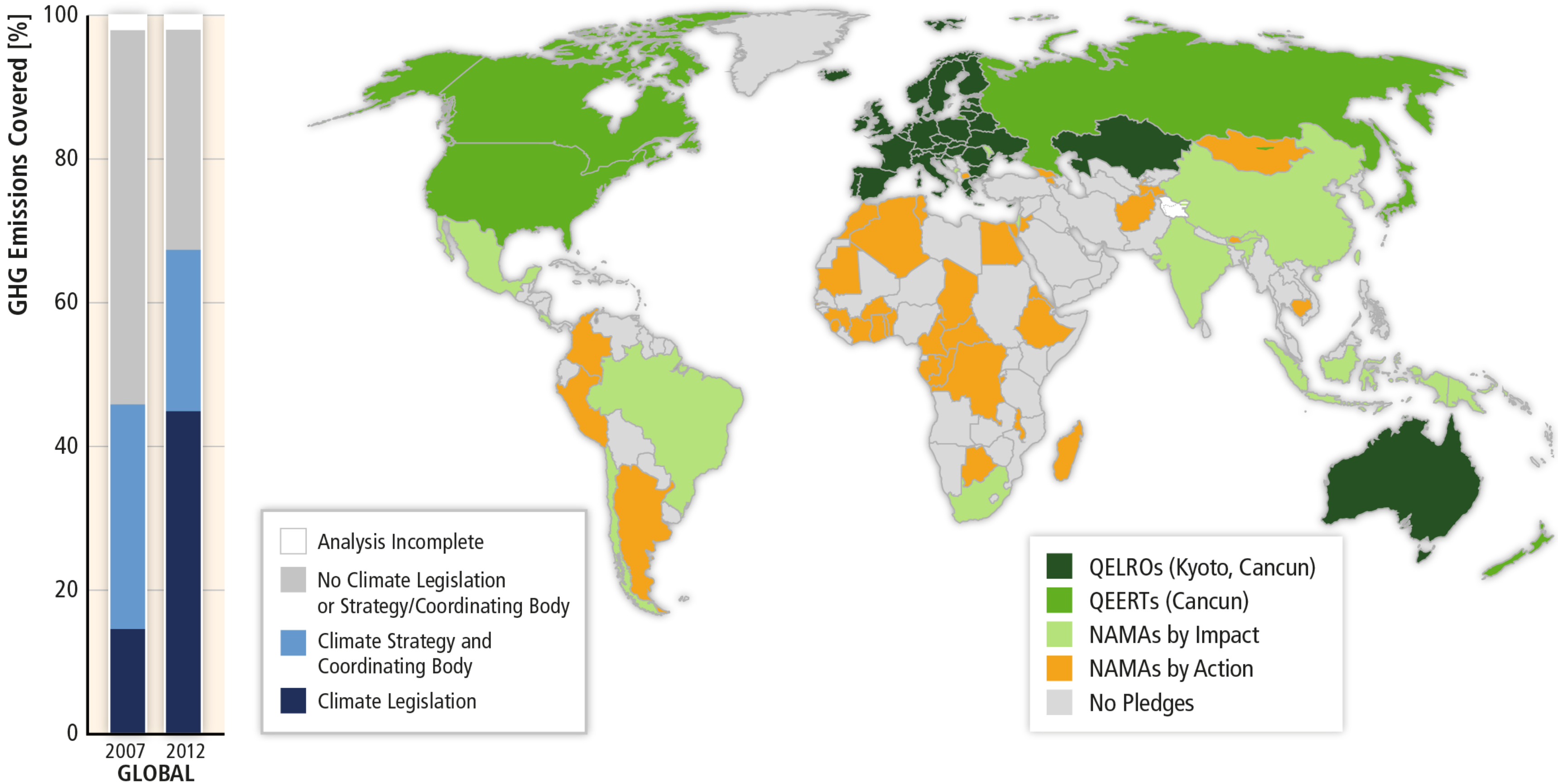
IPCC TAR: "There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities".[

IPCC AR4: Anthropogenic warming of the climate system is widespread and can be detected in temperature observations taken at the surface, in the free atmosphere and in the oceans. Evidence of the effect of external influences, both anthropogenic and natural, on the climate system has continued to accumulate since the TAR

IPCC AR5: it is "extremely likely" that human influence was the dominant cause of global warming between 1951 and 2010.[4]

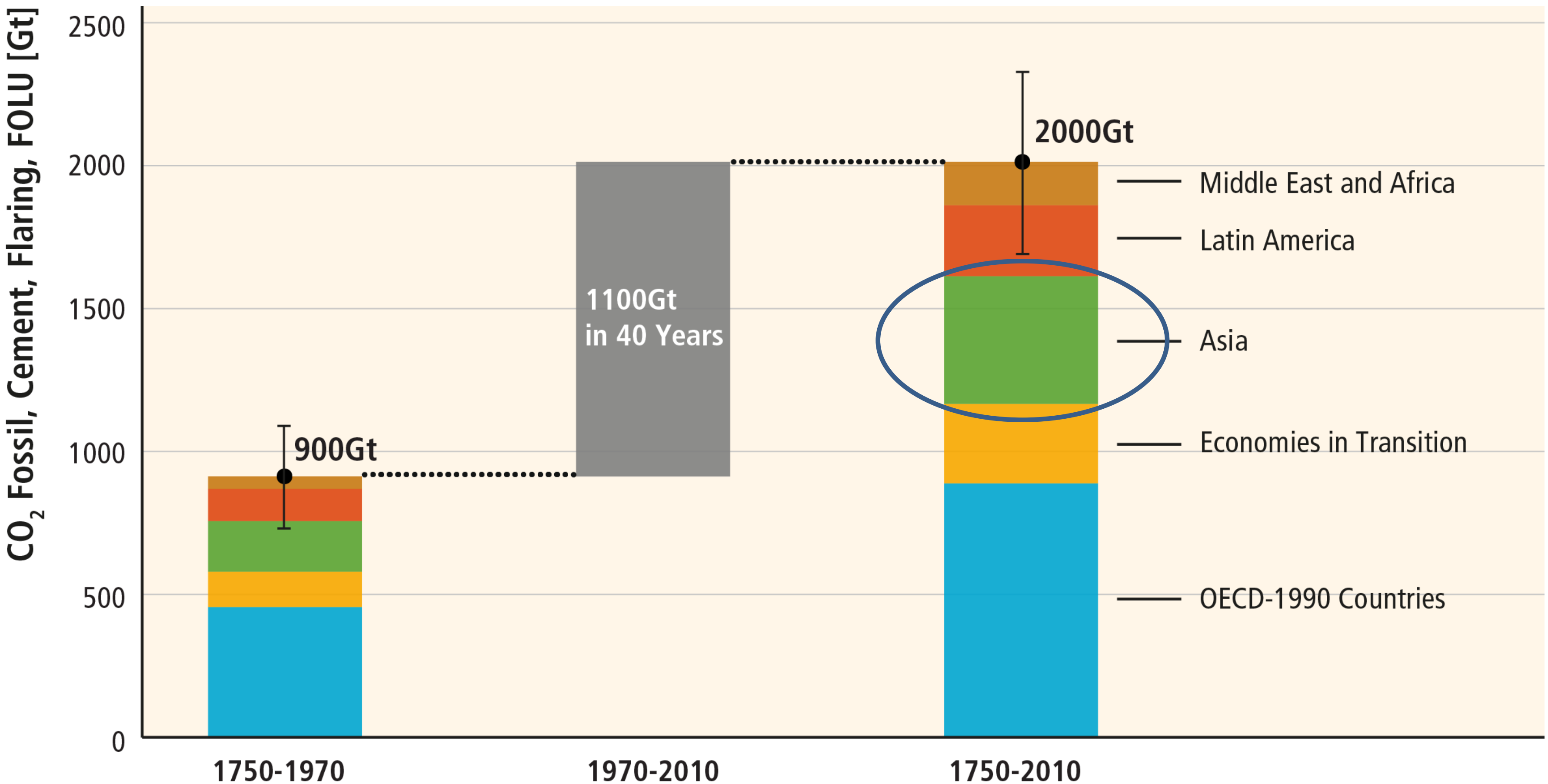
There has been a considerable increase in national and sub-national mitigation policies since AR4.

IPCC WGIII AR5



About half of cumulative anthropogenic CO2 emissions between 1750 and 2010 have occurred in the last 40 years.

IPCC WGIII AR5



Based on Figure 5.3

CO_2 Potential in Fossil Fuel Reserves Versus 2°C Budget

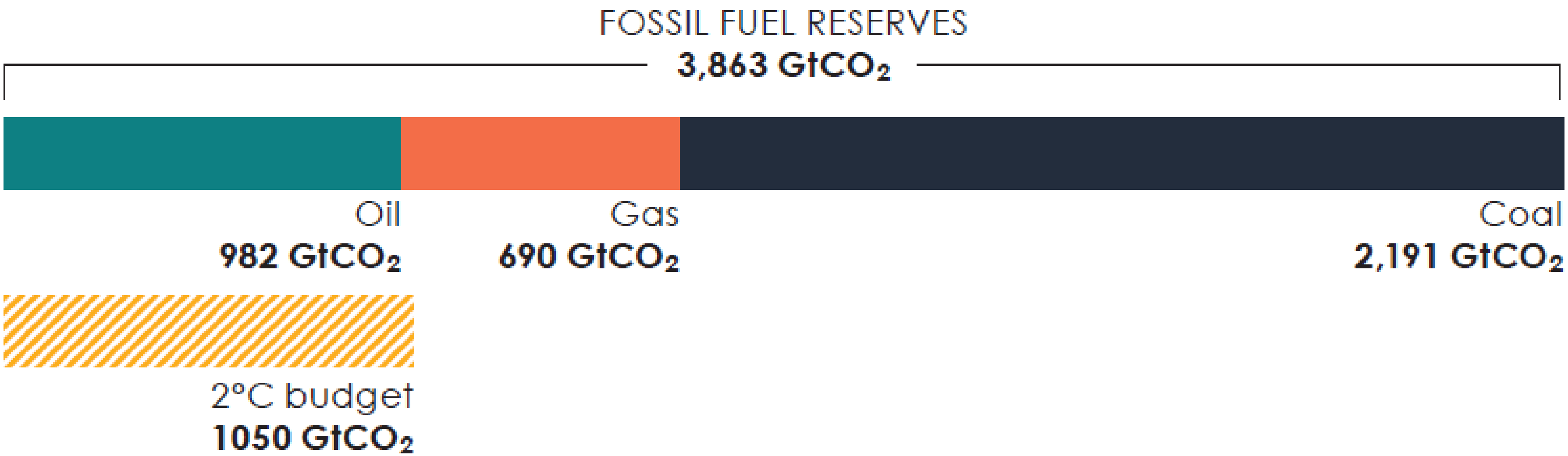


Figure 2: Conventional and unconventional fossil fuel reserves of coal, oil and gas, and the remaining global carbon budget compatible with scenarios limiting global mean warming to 2°C above pre-industrial temperatures. Source of Fossil Fuel Reserves: IPCC, 2011, Figure 1.7; Source of Carbon Budget: IPCC, 2013a and IPCC erratum, 2013b, adapted.

In addition, CO_2 estimate in Fossil resources is several times higher - 31352 to 50092 GT

Ref: IPCC AR5 WGIII Chapter 7 Table 7.2

India: Equitable Carbon Budget Allocation?

The Carbon Budget (IPCC AR5 WG1)

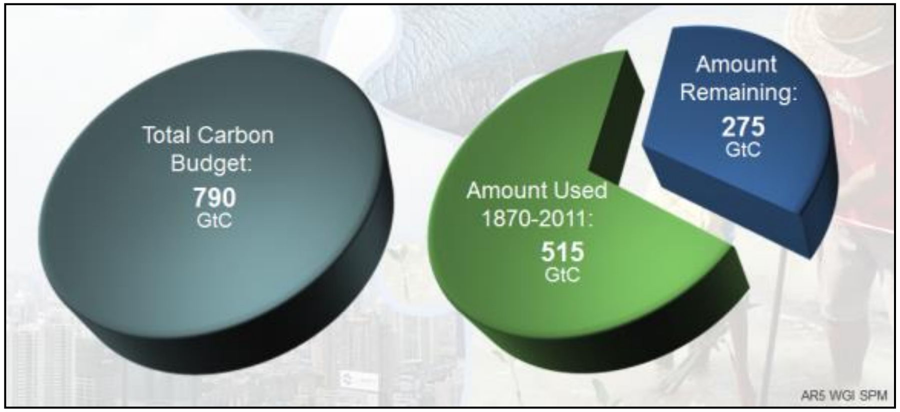
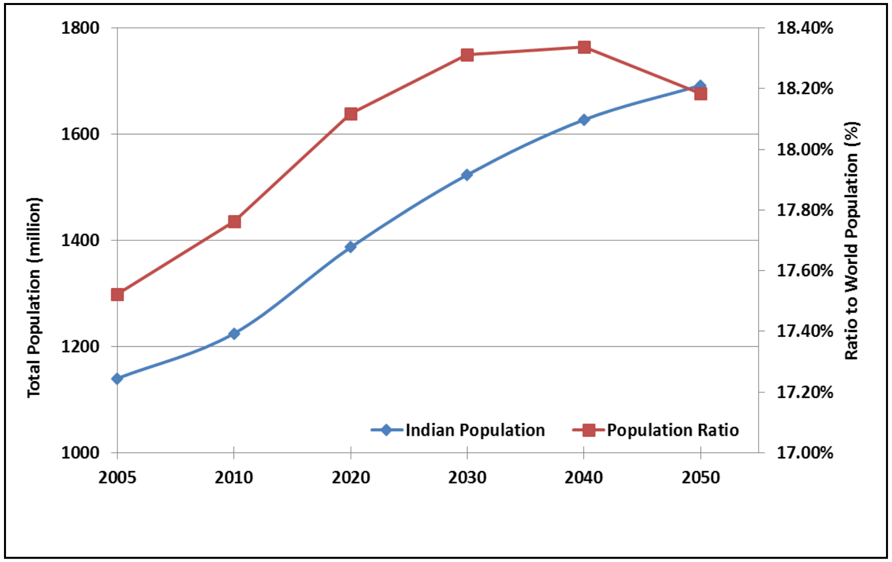


Figure 7.2 Population projections for India



Question: Can Per Capita Emissions Allocation be adequate (fair) for India?

a.18% of 275 GTC (between 2012-2100) = 51.56 GTC or 189 GT CO2e Emissions

b.India's expected emissions from 2012-2020 under current commitment 23 GT CO2e

c.Remaining budget 2020-2100 under current commitment 166 GT CO2e

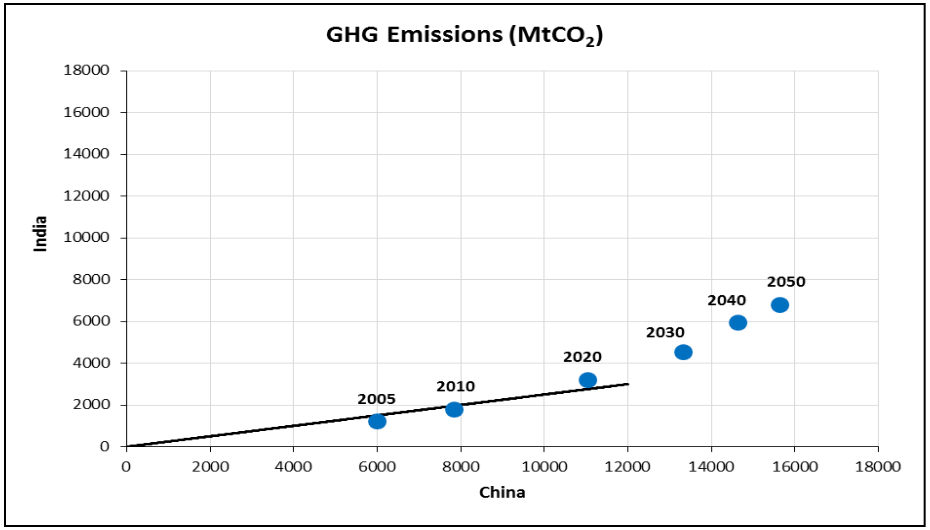
d.BAU Budget:

- **2020-2050 shall be 210 GT CO2e**
- **No emissions budget left after 2045!!**
- **If missed, then negative emissions (e.g. BECCS) in later periods**

e.Thus, even with per capita allocation, the mitigation costs on India shall be very high (upfront investments in infrastructures and high risks from new/imported technologies)

GHG Emissions and Intensity (under BAU): India and China
(Figures 8.2 and 8.3)

Figure 8.2 GHG emissions projections: India and China



Under BAU

a. China's emissions were **4 times** that of India in **2010**

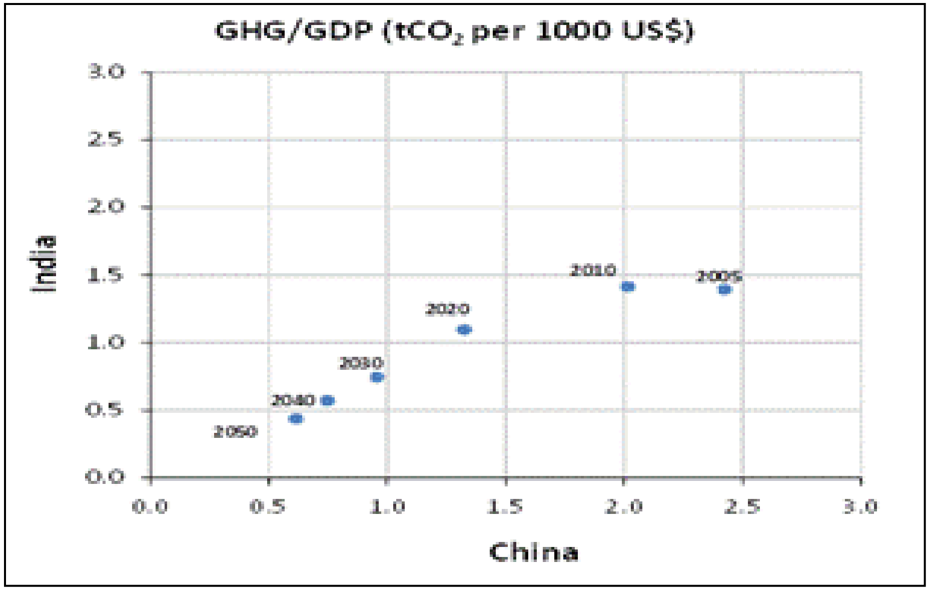
b. India's emissions will rise at faster pace

   i. *In **2030** China's emissions will be **3 times** that of India*

   ii. *In **2050** China's emissions will be **2.5 times** that of India*

c. India will require **higher decoupling** between GDP and emissions growth

Figure 8.3 Emissions intensity of GDP projections: India and China



Under BAU

a. China's emissions intensity of GDP was **30% higher** than India's in **2010.**

b. Emissions intensity is declining in both countries. And, they are **on track to meet their 2020 commitments**.

c. After 2020, their emissions and GDP shall get decoupled rapidly.

d. 2°C Stabilization will require higher **decoupling** between **GDP and emissions;** emissions intensity reaching zero or below zero by 2050.

Delayed mitigation significantly increases the challenge to reach low concentration targets

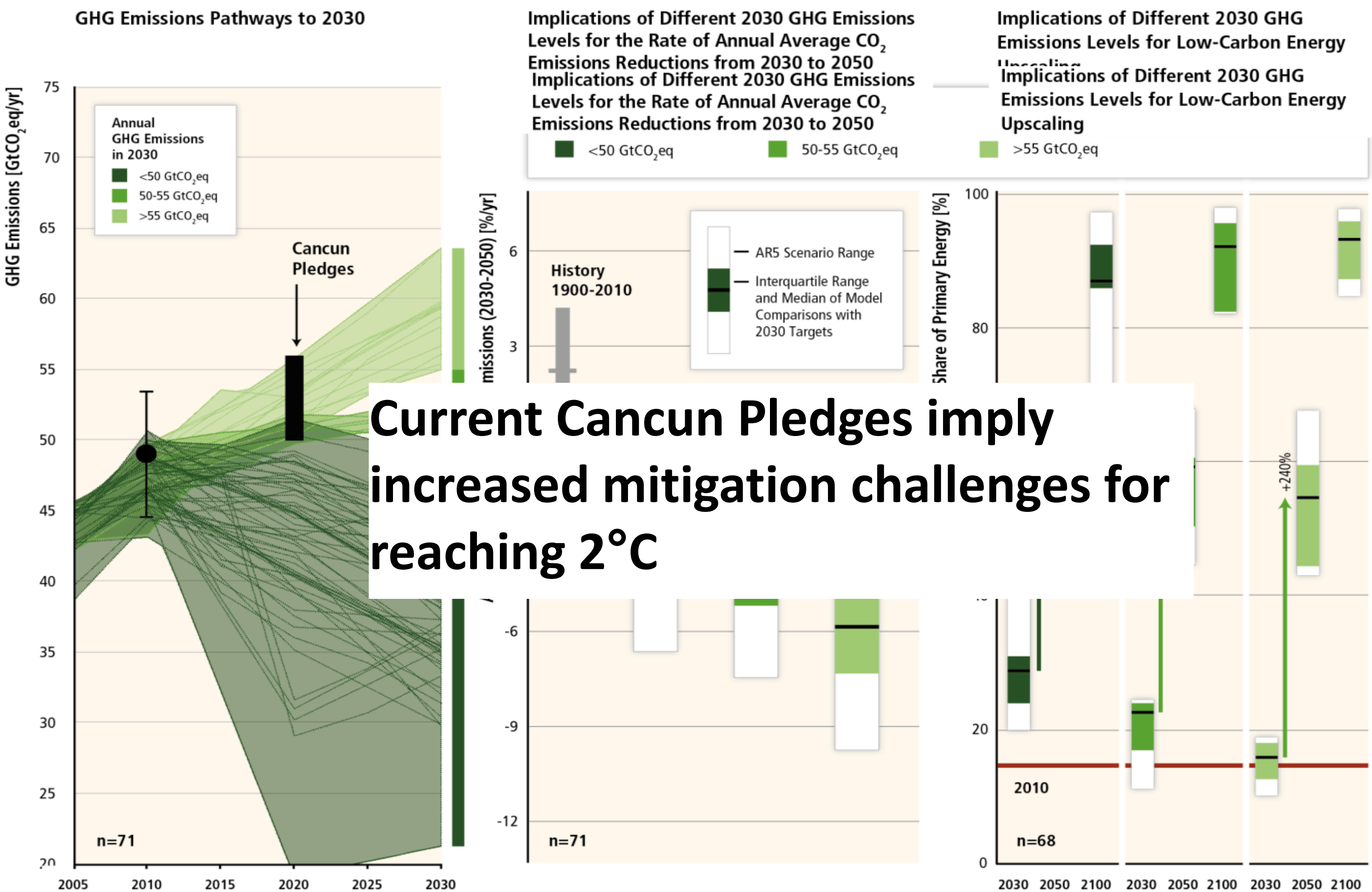


Figure SPM.5
IPCC WGIII AR5

In cost-effective 2°C mitigation strategies, emissions have peaked and emission levels in 2030 tend to be lower than today

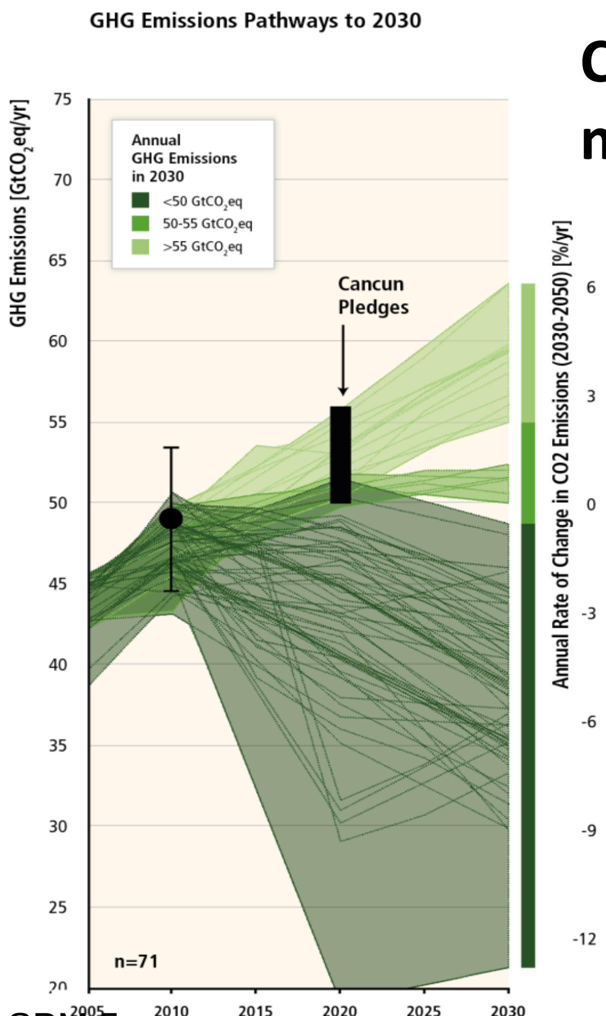


Figure SPM.5
IPCC WGIII AR5

Current Cancun Pledges imply increased mitigation challenges for reaching 2°C

Delayed mitigation

50 $GtCO_2e$

Cost-effective mitigation

Assessment building on work of AMPERE project
(Riahi et al., 2014, Tech. For. & Soc. Change, online first)

Substantial reductions in emissions would require large changes in investment patterns.

IPCC WGIII AR5

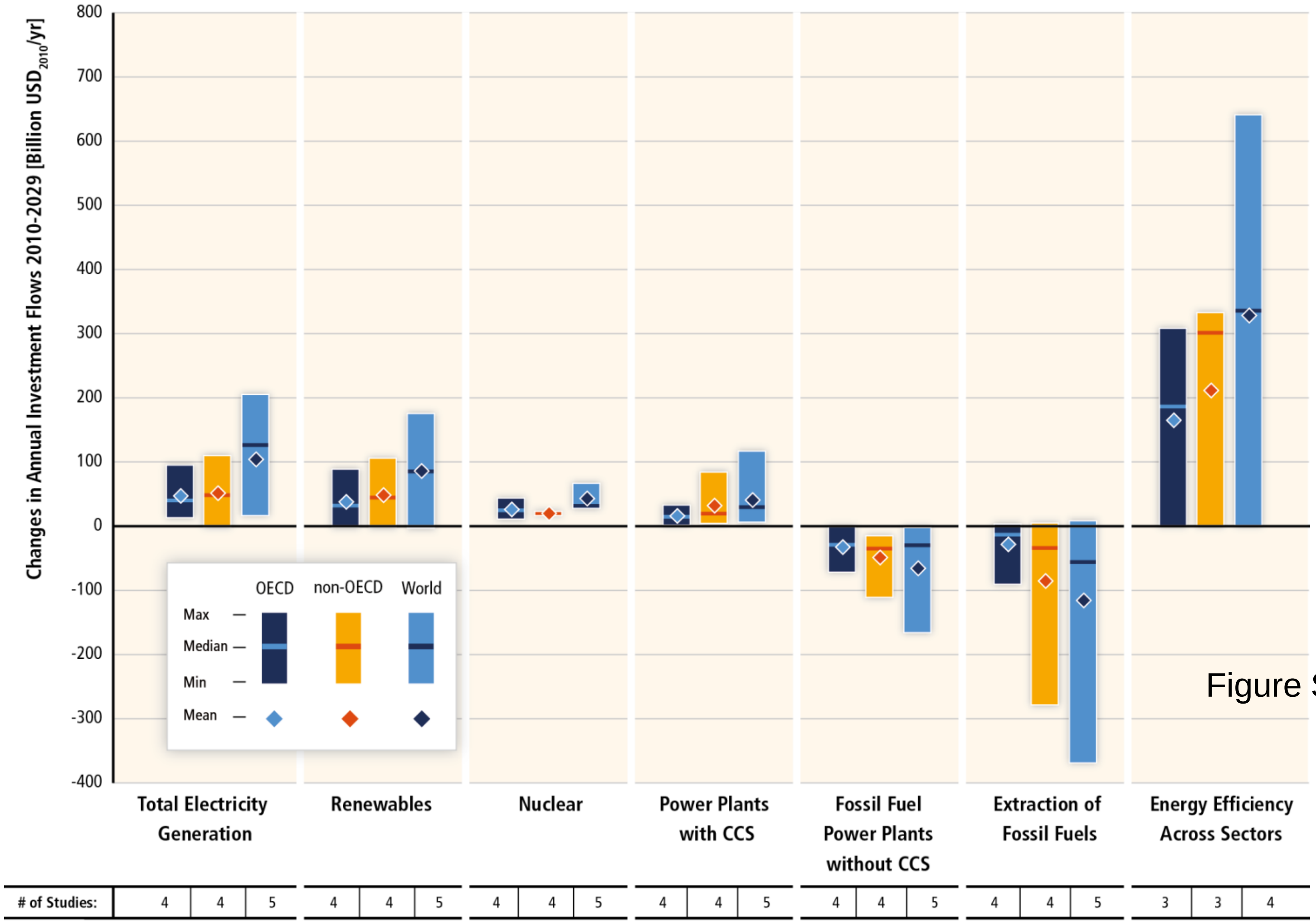


Figure SPM.9

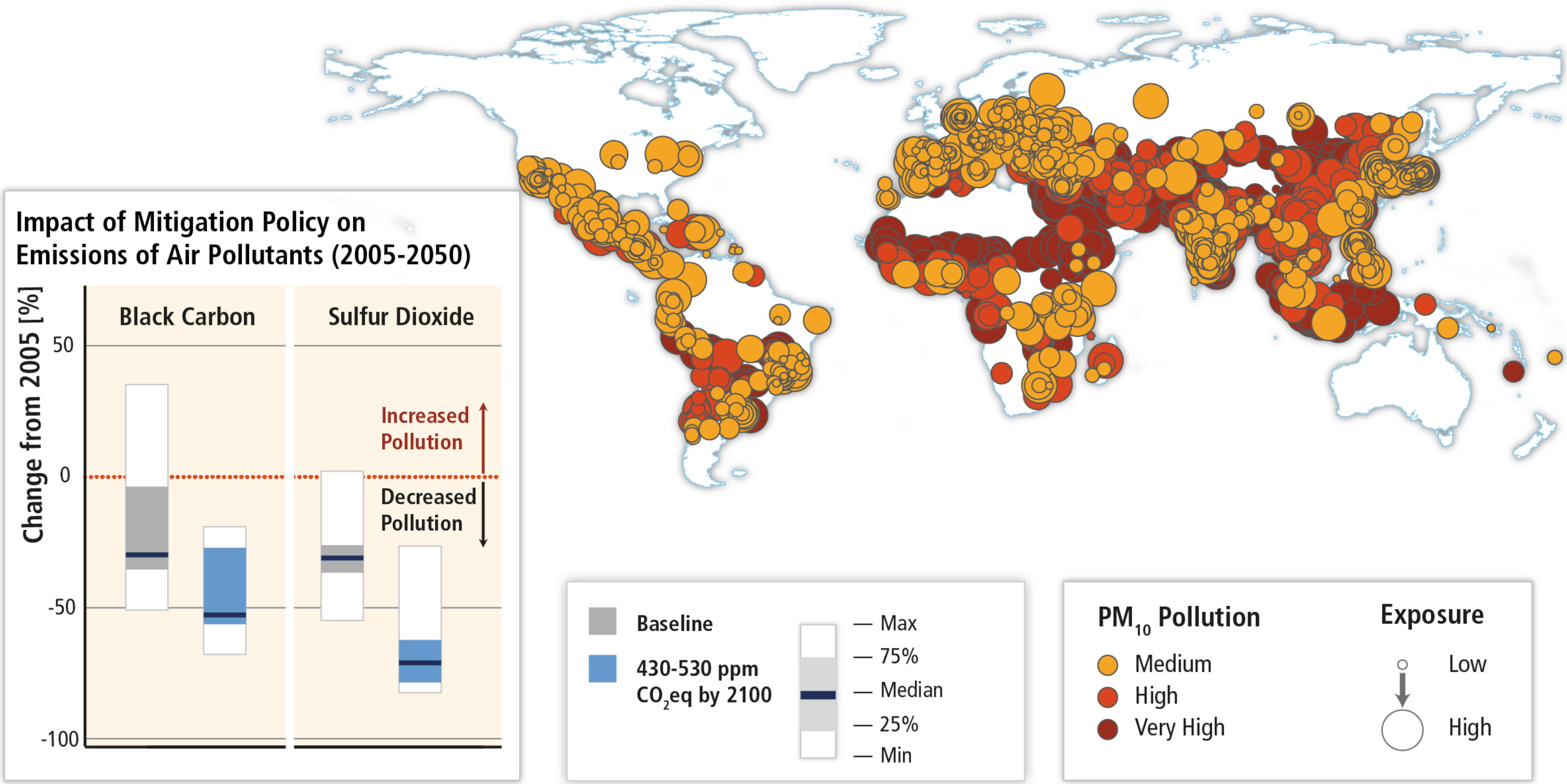
Mitigation costs vary widely, but are relatively modest compared to overall economic growth under idealized assumptions.

Table SPM.2	Consumption losses in cost-effective implementation scenarios			
	[% reduction in consumption relative to baseline]			[percentage point reduction in annualized consumption growth rate]
2100 Concentration (ppm CO_2eq)	**2030**	**2050**	**2100**	**2010-2100**
450 (430–480)	**1.7 (1.0–3.7)**	**3.4 (2.1–6.2)**	**4.8 (2.9–11.4)**	**0.06 (0.04–0.14)**
500 (480–530)	**1.7 (0.6–2.1)**	**2.7 (1.5–4.2)**	**4.7 (2.4–10.6)**	**0.06 (0.03–0.13)**
550 (530–580)	**0.6 (0.2–1.3)**	**1.7 (1.2–3.3)**	**3.8 (1.2–7.3)**	**0.04 (0.01–0.09)**
580–650	**0.3 (0–0.9)**	**1.3 (0.5–2.0)**	**2.3 (1.2–4.4)**	**0.03 (0.01–0.05)**

- By comparison overall consumption grows by 300-900% in the baselines
- Costs exclude benefits of mitigation (reduced impacts as well as other co-benefits (e.g. improvements for local air quality).

Mitigation can result in large co-benefits for human health and other societal goals

IPCC WGIII AR5



Based on Figures 6.33 and 12.23

Looking Forward: -...Policy-Science-...Nexus

- Rethinking Research Perspective
- Cooperative and Community Driven Research
- ‘Insights + Numbers’ with End-to-End Solutions

Rethinking Research Perspective

1. 'Horses for Courses' Approach to Research

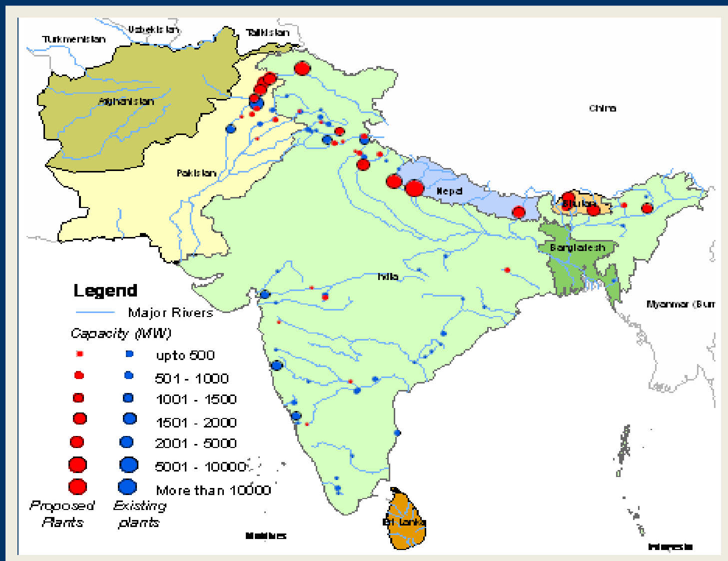
2. Align low carbon research with development research

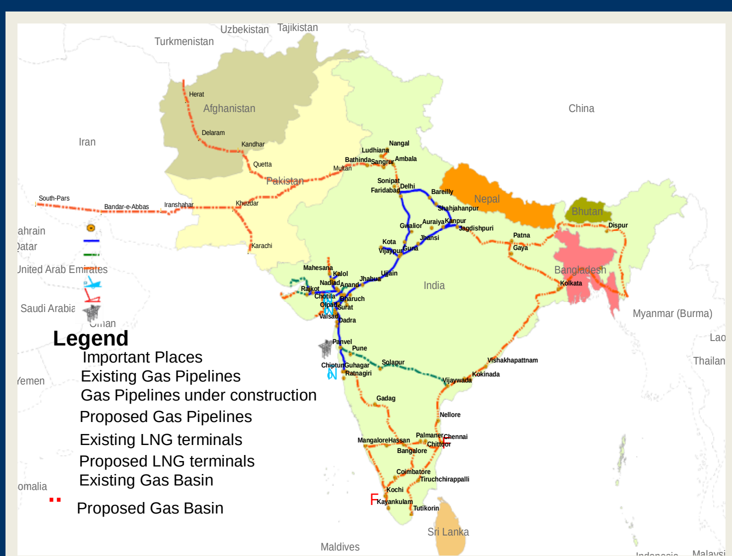
3. Look beyond obvious (conventional) options

4. Cooperation (low transaction costs & risks) + Competition (market efficiency)

5. New and Multiple Instruments to Facilitate Change

Integrated S-Asia Energy Market – Co-benefits





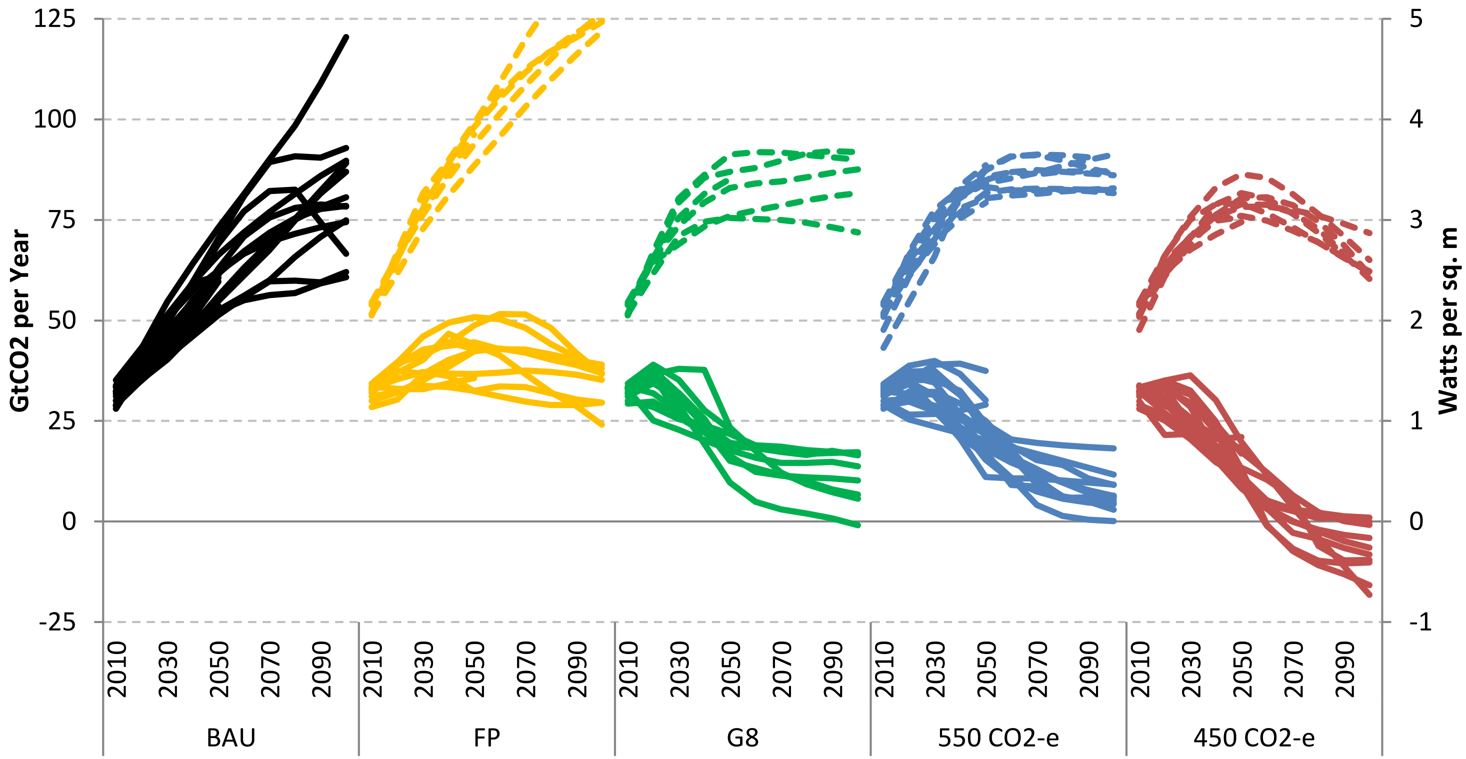
Co-benefits of South-Asia Integrated Energy-Water Market

Benefit (Saving) Cumulative from 2010 to 2030		$ Billion	% GDP
Energy	60 Exa Joule	321	0.87
CO_2 Equiv.	5.1 Billion Ton	28	0.08
SO_2	50 Million Ton	10	0.03
	Total	359	0.98

Spill-over Benefits / Co-Benefits

- More Water for Food Production (MDG1)
- 16 GW additional Hydropower (MDG1&7)
- Flood control (MDG1&7)
- Lower energy prices would enhance competitiveness of regional industries (MDG1)

Cooperative and Community Driven Research



FF&I CO2 emissions and radiative forcing

Ref:
1. Blanford, Kriegler, Tavoni, 2014, Climatic Change 123(3-4)
2. Kriegler, Weyant et al., 2014, Climatic Change 123(3-4)

'Insights + Numbers' with End-to-End Solutions

1. Research is framed to find generic 'insights' and 'numbers';
2. Reframing of research is therefore the needed to address dynamics at 'specifics' and propose 'End-to-End' solutions
3. Free market competition delivers economic efficiency where perfect 'rule of law' institutions exist; the diversity of contexts needs 'cooperation' to be the driving force of low carbon policies
4. Stakeholder engagement is vital for cooperation and to minimize 'transaction costs and risks' of implementing 'ideal' solutions
5. Shared and Inclusive vision is vital to propose and implement 'End-to-End' solutions

Linking Asian and Global Research

1. <u>Global Engagement:</u> Internationalize Regional Low Carbon Networks

2. <u>Purposive Cooperation:</u> Focused and Shared Research

3. <u>Shared Vision:</u> Organize Comparative Policy Research Exercises

4. <u>Practicality:</u> Research to Operationalize Policy Instruments

‘Good Practice’ examples show that policymakers have keen interest in low carbon policy research and would support the knowledge networks so long as research is purposive, inclusive and practical.

Conclusions: Looking Forward

1. **Low carbon research has made eminent contributions to climate policymaking**

2. **The shifting context needs research to find new directions and approaches**

3. **Research needs greater global engagement, especially of developing countries where new opportunities, in the short-run, may prevent long-term ‘lock-ins’**

4. **Target to Discover Big Win-Win opportunities**

5. **Low carbon research needs to be more sharing, caring and daring.**

Policymakers have shown keen interest in low carbon policy research and would support knowledge networks so long as research is purposive, inclusive and practical.

Thank you