



Comparability of Effort in International Climate Policy Architecture

Motivations for comparability

- Normative / ethical approaches for burden-sharing
 - Compliance metrics
 - Facilitative—supporting cooperation and future ambition
 - How might parties measure the effort of others?
 - “individuals tends to react to the positive actions of others with positive responses and the negative actions of others with negative responses” Ostrom (1998).
- **does not need to be one measure or agreement**

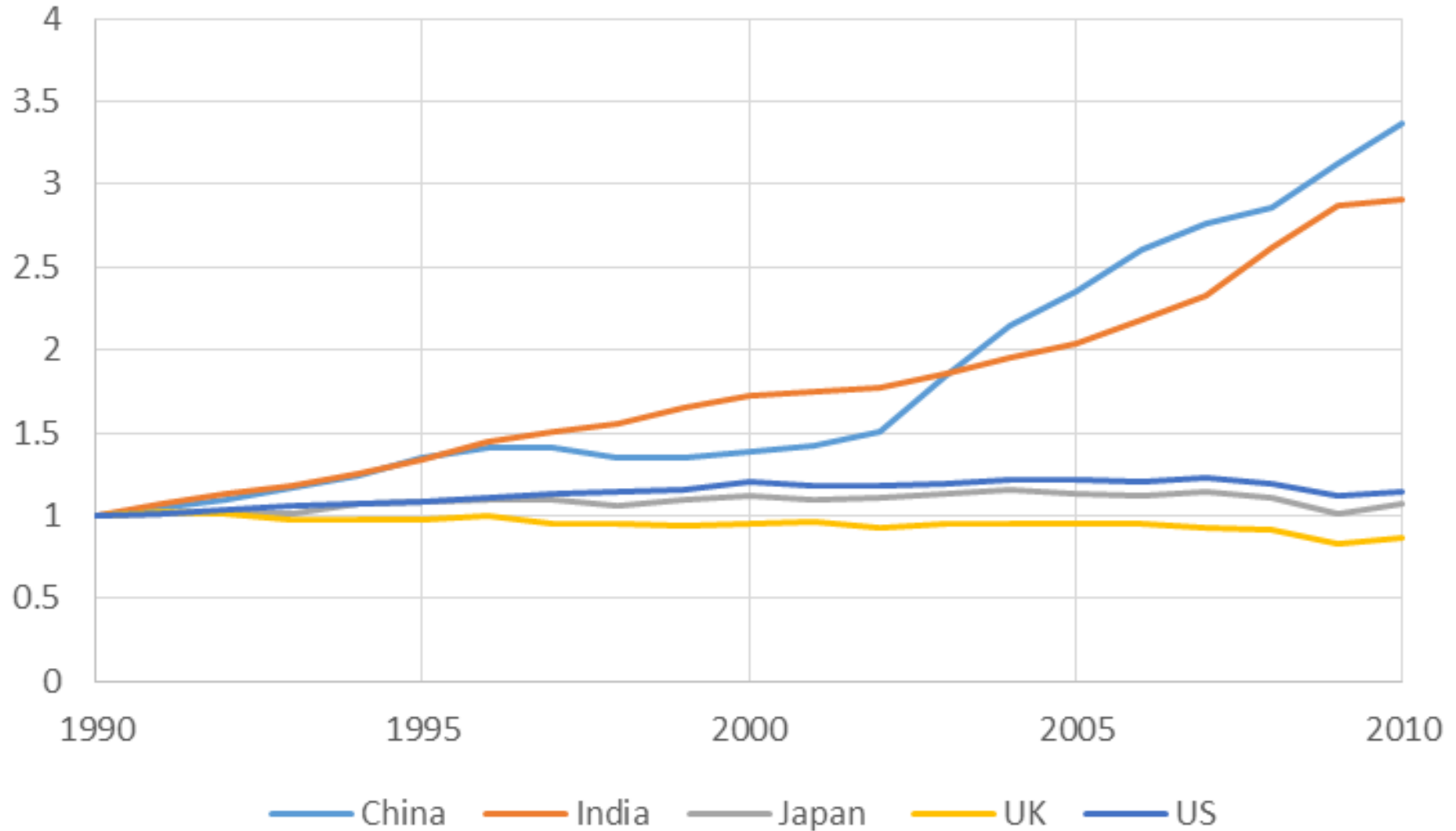
Principles for metrics

- Comprehensive: captures the notion of “effort” in the widest possible sense. Similar countries ought to exhibit similar values in a “fair” agreement
- Measurable and replicable: directly observable or based on transparent analysis
- Universal: can be applied to efforts by a broad set of countries

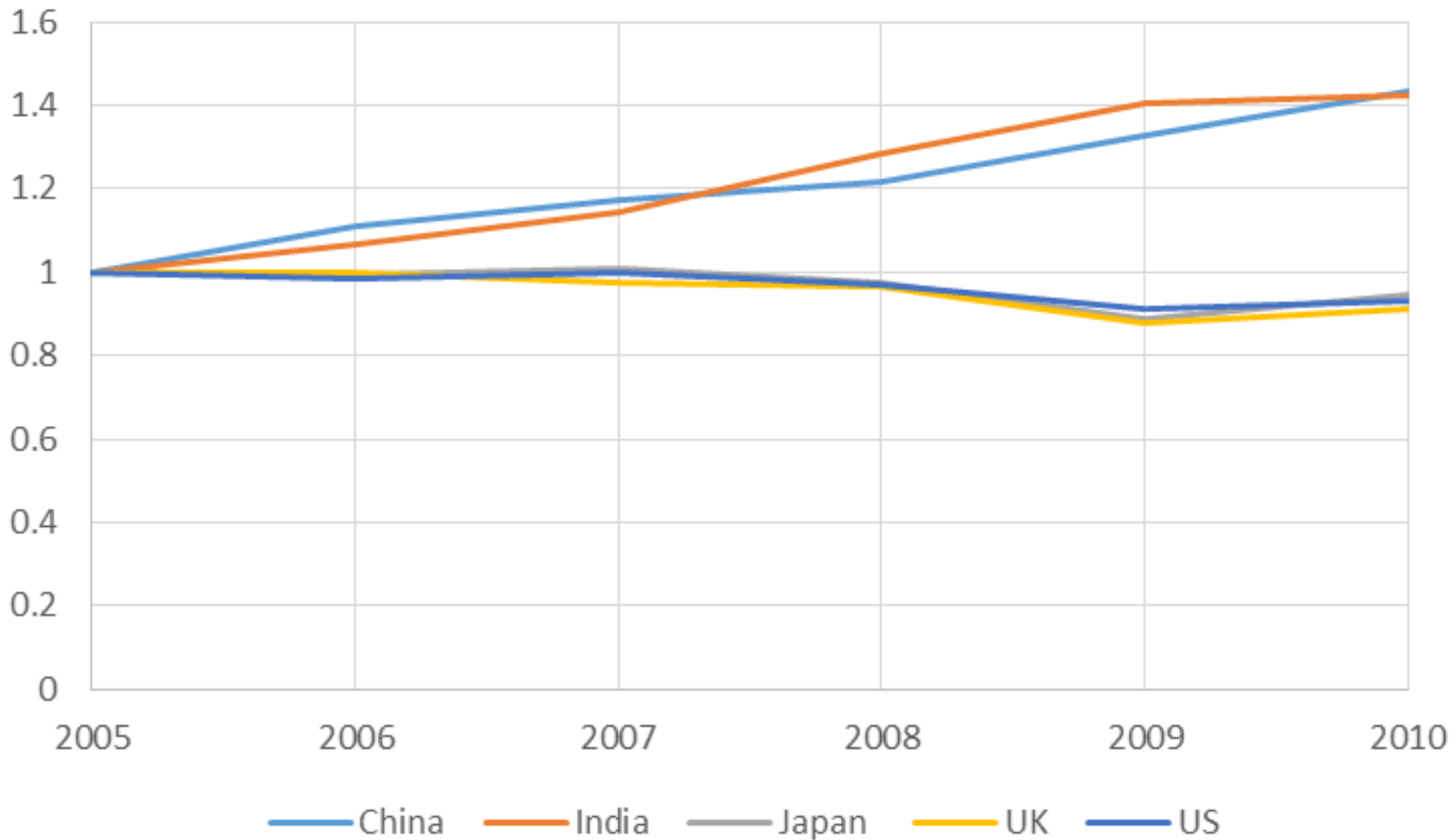
Families of effort metrics: Emissions (and other physical measures)

- Potential measures
 - Relative to base year or forecast level
 - Relative to population or economic activity, absolute or change over time

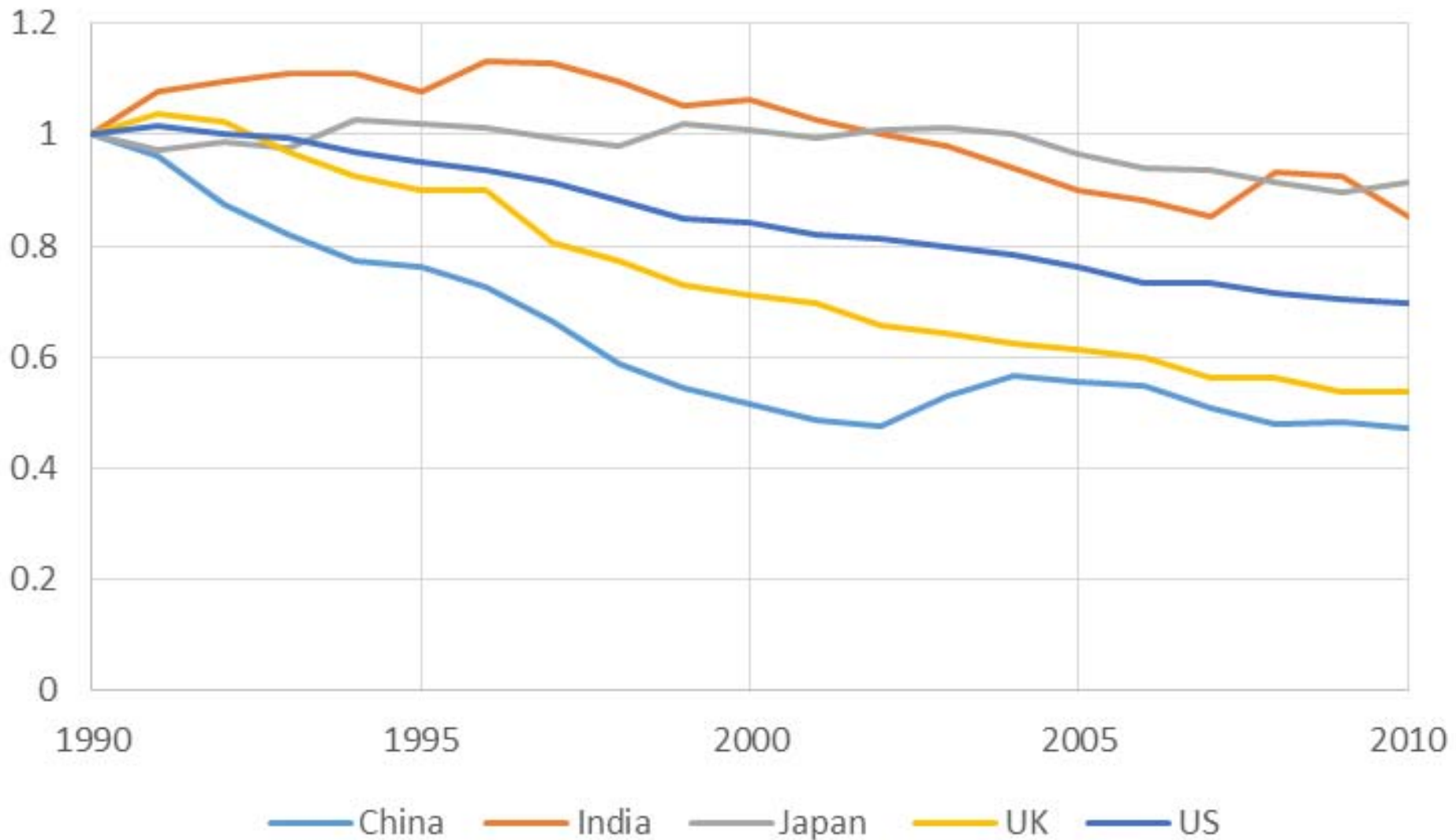
Emissions growth since 1990 (%)



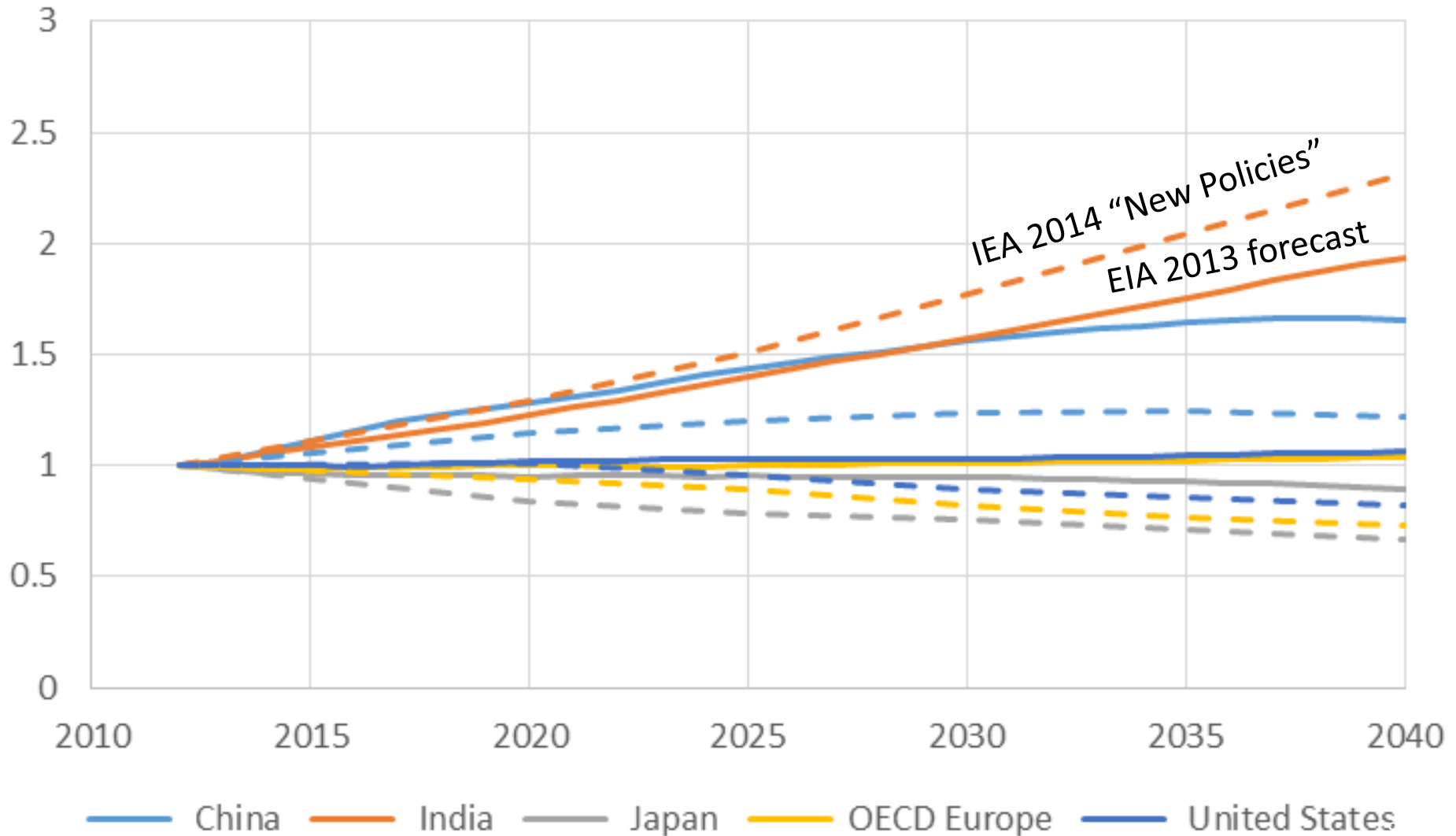
Emissions growth since 2005 (%)



CO₂/GDP growth since 1990 (%)



CO₂ Forecasts (EIA 2013, IEA 2014 “New Policies”)



Families of effort metrics:

Emissions (and other physical measures)

- Potential metrics
 - Relative to base year or forecast level
 - Relative to population or economic activity, absolute or change over time
- Pros/Cons
 - Reflects environmental outcome (+)
 - Generally measurable (+)
 - Choice of base year / index will re-rank (+/-)
 - Relative to forecast may be best notion of “effort” but less measurable (-)

Families of effort metrics:

Prices

- Potential metrics
 - Carbon dioxide or energy
 - Taxes / carbon price or net price of energy
 - Absolute levels or change over time

Energy Prices and Energy Taxes

(2010, change since 1997, for select OECD Countries)

Country	Average Energy Price (2012US\$/MMBTU)	1997-2010 Change in Energy Price (percentage)	Average Energy Tax (2012US\$/MMBTU)	1997-2010 Change in Energy Tax (percentage)
United States	24.1	+72%	1.0	-2%
United Kingdom	61.5	+29%	6.4	-30%
France	58.4	+28%	5.9	-34%
Germany	59.7	+51%	9.2	+29%
Japan	47.5	+34%	1.9	+12%
Canada	33.6	+77%	2.7	+86%
Australia	37.8	+67%	2.4	+9%
Mexico	24.0	+33%	0.6	-56%

Families of effort metrics:

Prices

- Potential metrics
 - Carbon dioxide or energy
 - Taxes / carbon price or net price of energy
 - Absolute levels or change over time
- Pros/Cons
 - Carbon price reflects marginal effort (+)
 - Market prices are observable (+)
 - Reflect long-term investment incentives (+)
 - Exchange rates can be problematic (-)
 - Does not easily capture non-price policies (-)

Families of effort metrics:

Costs

- Potential metrics
 - Absolute or relative to GDP
 - Estimate for actual policies or least cost alternative
- Pros/Cons
 - Most closely reflects “effort” (+)
 - Not observed; requires modeling (-)
 - Actual policy costs could reward costly but ineffective policies (-)

Developing multiple metrics to compare prospective emissions commitments

	US	EU	China
Emissions			
Versus 1990	-13% (in 2025)	-40% (in 2030)	<requires modeling>
Versus 2005	-27% (in 2025)	-38% (in 2030)	<requires modeling>
Versus 2025	-21%*	<requires modeling>	<requires modeling>
Versus 2030	<requires modeling>	-39%*†	<requires modeling>
Δ (CO2/GDP) 2010-25	-4.2% per year*	<requires modeling>	<requires modeling>
Δ (CO2/GDP) 2010-30	<requires modeling>	-4.3% per year*†	<requires modeling>
Price			
CO2 2025	<requires modeling>	<requires modeling>	<requires modeling>
Δ fossil energy 2010-25	<requires modeling>	<requires modeling>	<requires modeling>
Δ electricity 2010-25	<requires modeling>	<requires modeling>	<requires modeling>
Cost			
\$ policy cost v. BAU	<requires modeling>	<requires modeling>	<requires modeling>
\$ cost / \$ GDP	<requires modeling>	<requires modeling>	<requires modeling>

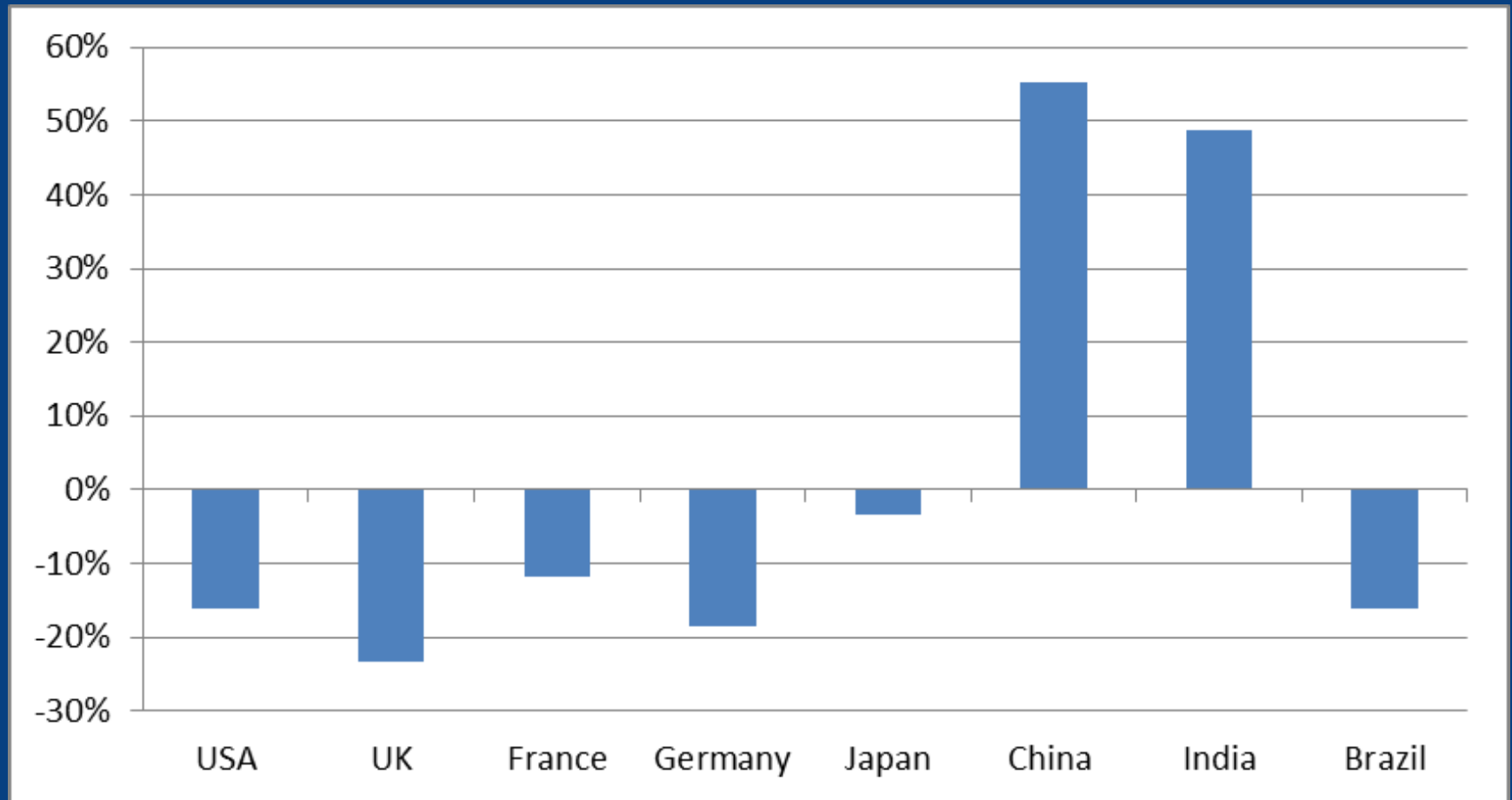
*Forecast based on US EIA International Energy Outlook 2013

†EU = OECD Europe

When do we measure effort?

- Prospectively (ex ante), when commitments are being made, in order to try to increase the ambition of current commitments.
 - Prospectively, emission commitments can be compared to historic levels or a forecast baseline (and possibly in relation to population or income).
- Retrospectively (ex post), after efforts are realized, in order to increase the ambition of the next iteration of commitments.
 - Retrospectively, emission outcomes can be compared to historic levels, previous forecasts, or a counterfactual outcome absent policies.

2010 actual emission levels relative to forecast (published in 2000)



RETROSPECTIVE ANALYSIS WILL REQUIRE MODELING 16

Summary of comparability metrics

Motivation is to facilitate cooperation and ambition

- Emissions (and other physical measures)
Relative to base year or forecast level; relative to population or economic activity; absolute or changes
- Prices
Carbon dioxide or energy; levels or changes
- Costs
Actual policies or least-cost alternatives

No single metric satisfies all of our principles; the more comprehensive measures of effort require modeling and therefore tend to be less measurable / reliable / universal.