



Feasible Climate Targets

Richard Richels
International Energy Workshop
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Venice, Italy

Presentation based on two recent papers by Blanford, Richels and Rutherford

1. “Revised Emissions Growth Projections for China: Why Post-Kyoto Climate Policy Must Look East”,
The Harvard Project on International Climate Agreements :
Website: www.belfercenter.org/climate
2. “Feasible Climate Targets: the Role of Economic Growth, Coalition Development and Expectations”
Energy Economics, forthcoming
e-mail: rrichels@epri.com

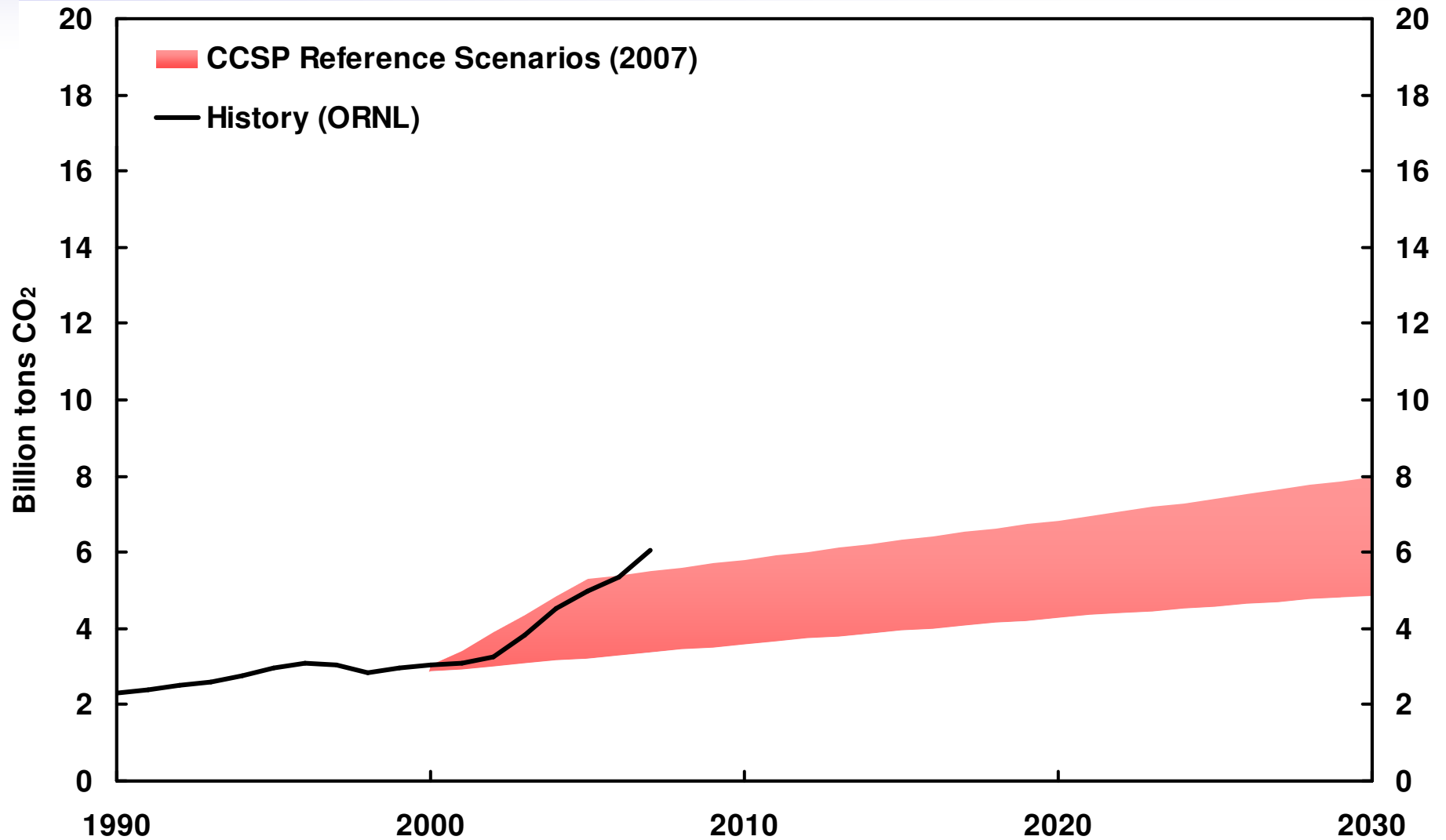
Outline of Presentation

- Update CO2 emissions in the absence of additional policy
- Reexamine stabilization scenarios

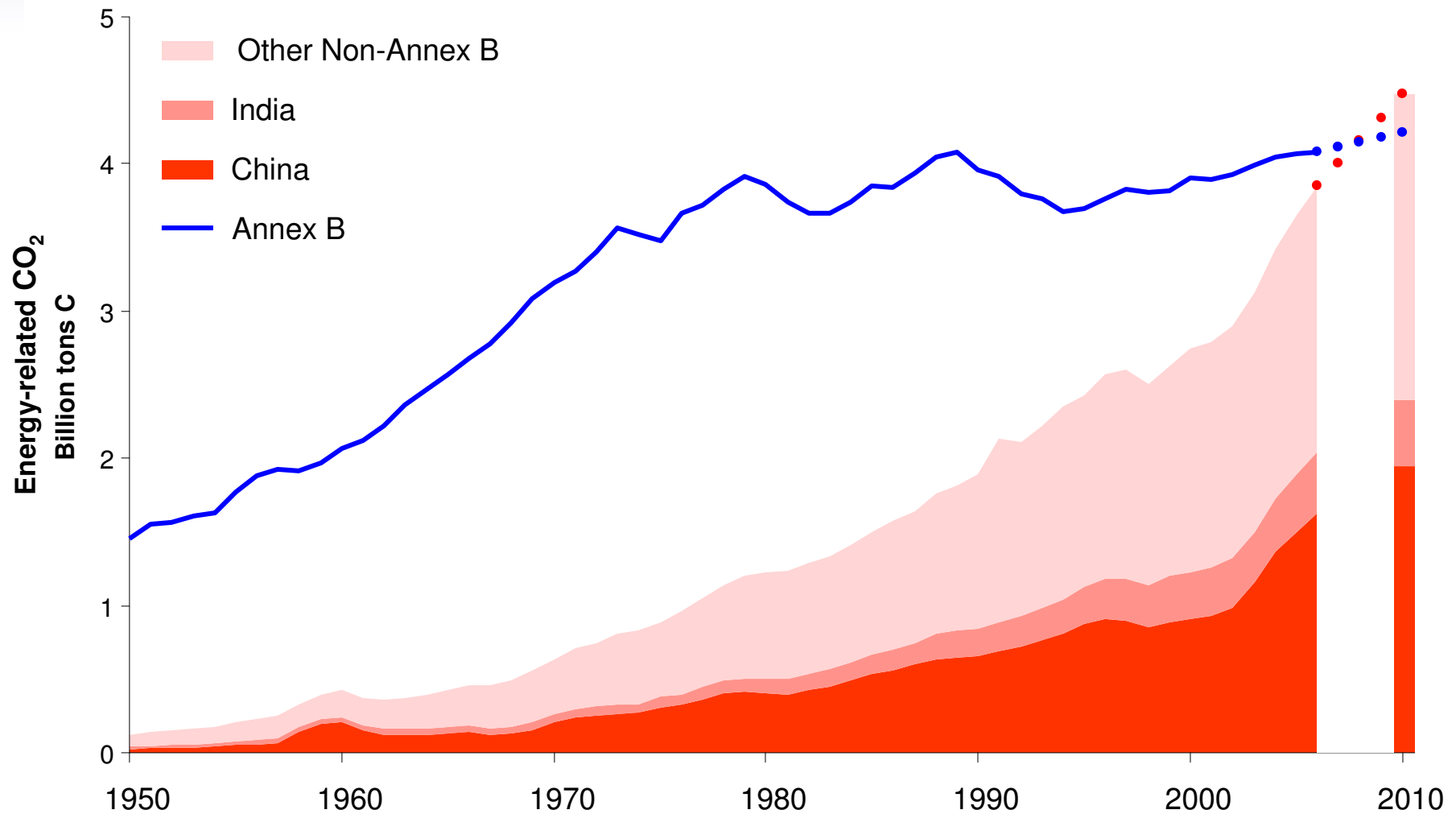
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- Update CO2 emissions in the absence of additional policy
 - accelerated growth in developing countries

Energy-related CO₂ emissions in China



Non-Annex B Emissions will surpass Annex B before 2010



Outline of Presentation

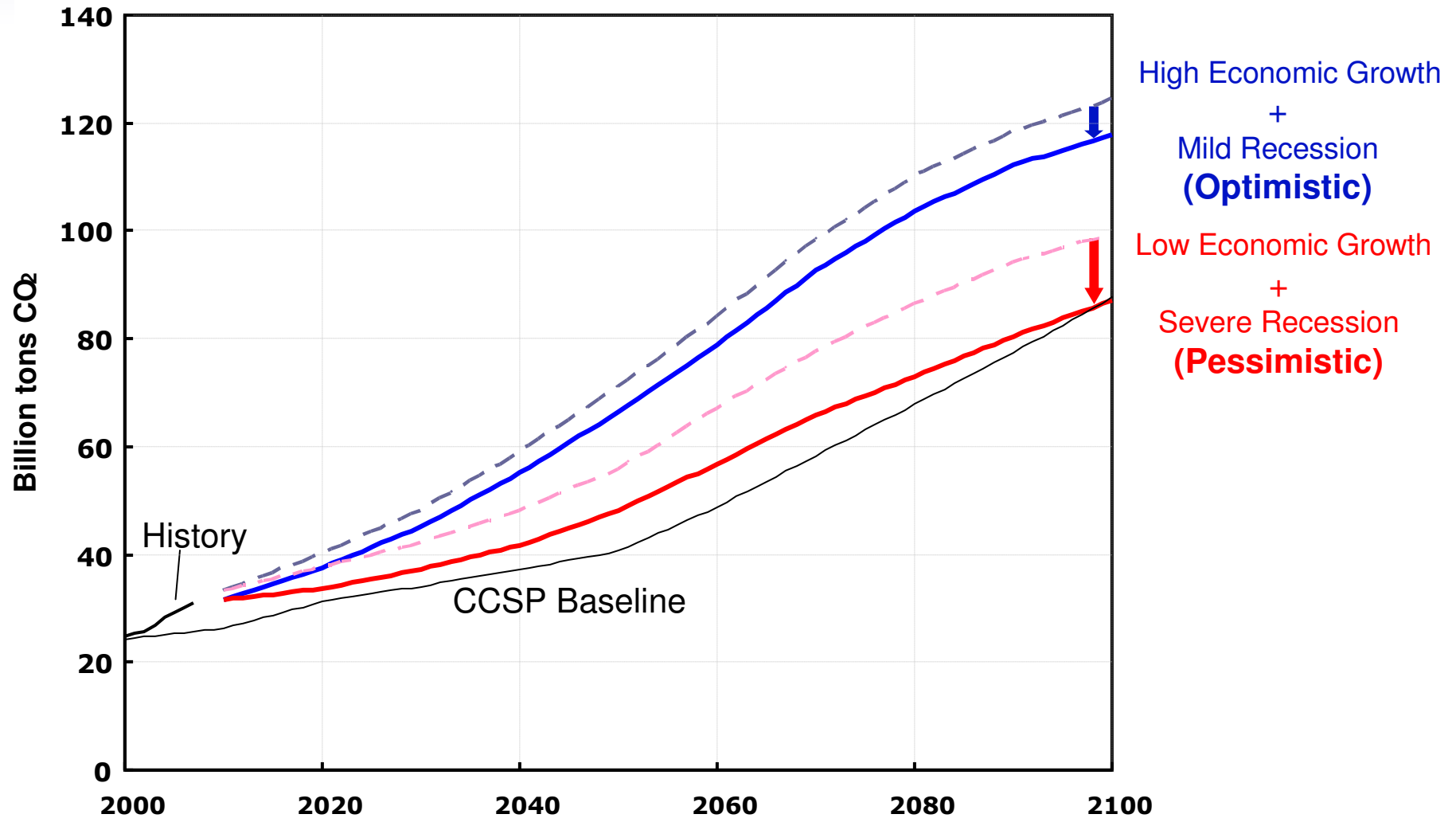
- Update CO₂ emissions in the absence of additional policy
 - accelerated growth in developing countries
 - impact of current recession

Mild and Severe Recession

Mild recession = 2 years of zero economic growth globally

Severe recession = 5 years of zero economic growth globally

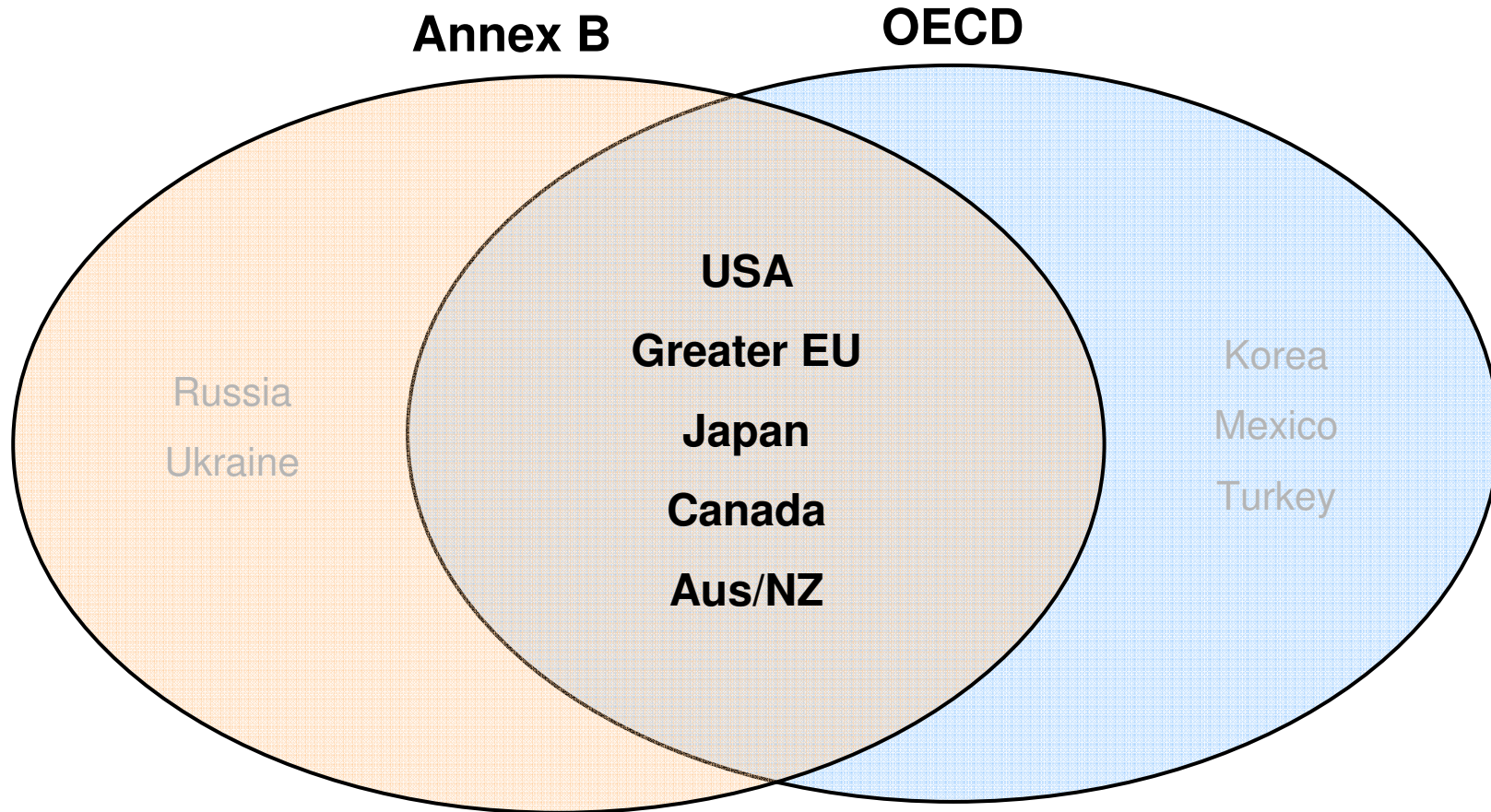
Baseline Global CO₂ Emissions to 2100



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 - accelerated growth in developing countries
 - impact of current recession
- Reexamine stabilization scenarios, in light of
 - composition of coalition

Coalition Countries: Ready to Participate Now

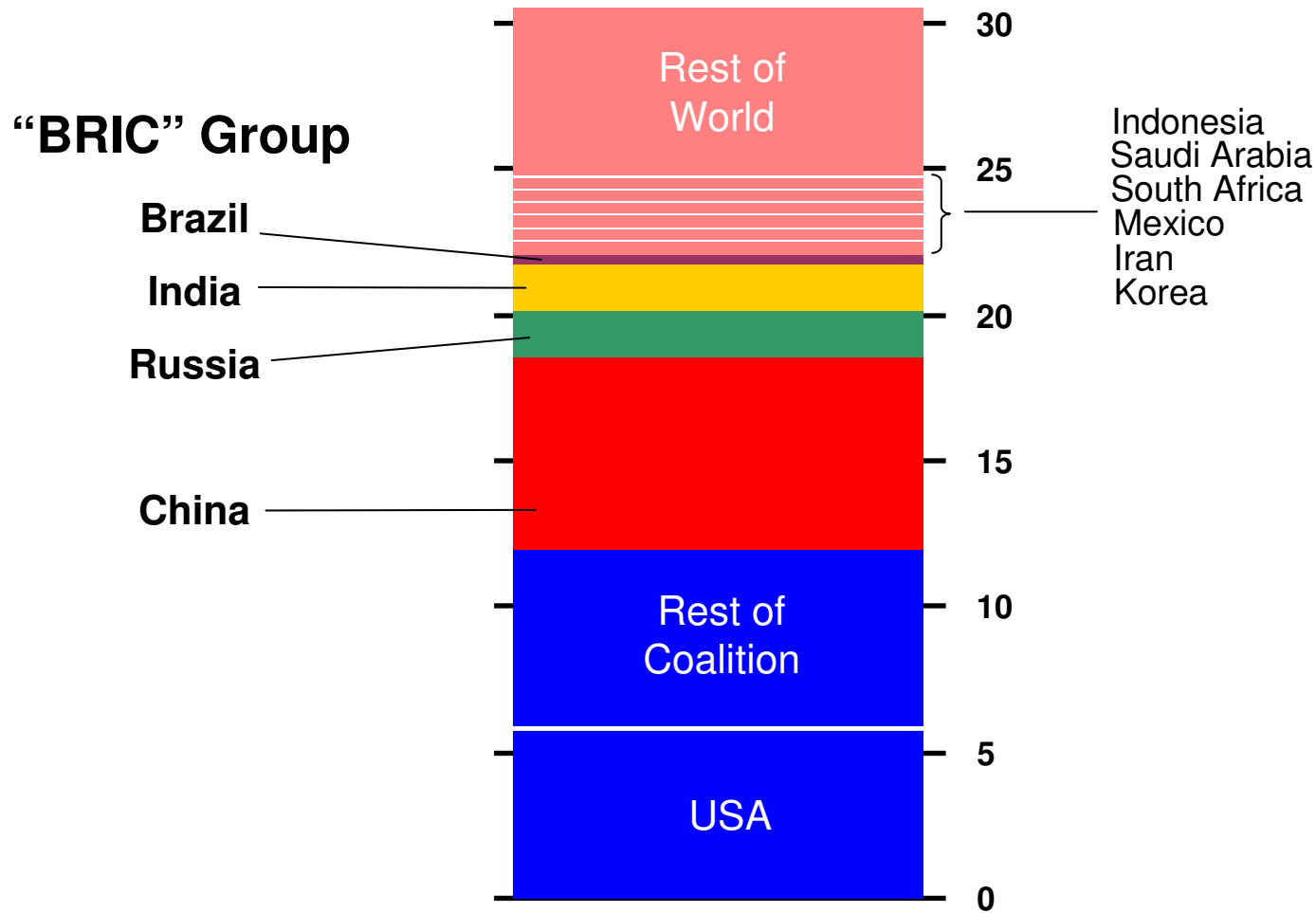


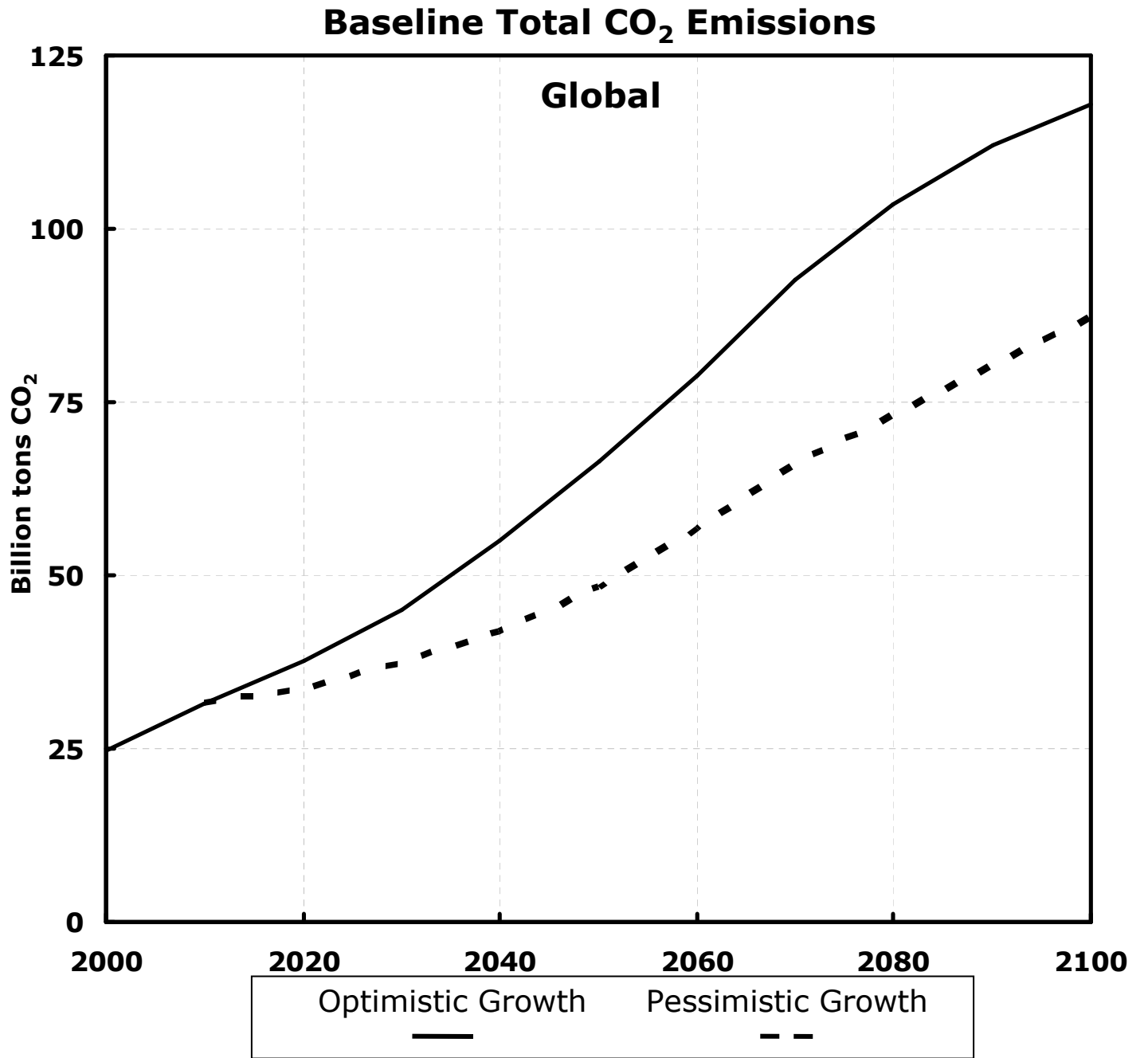
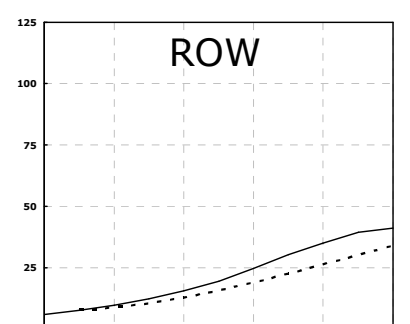
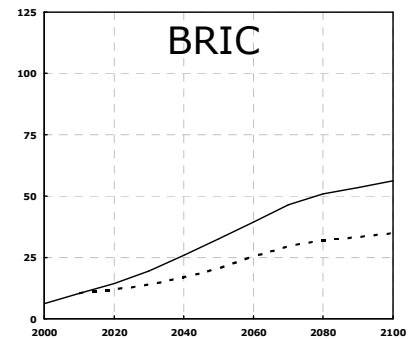
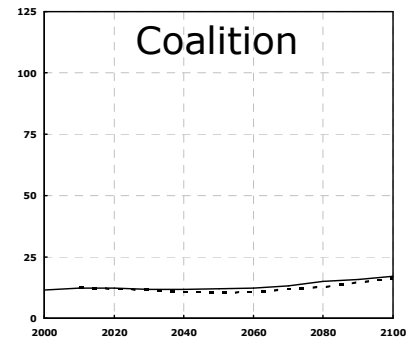
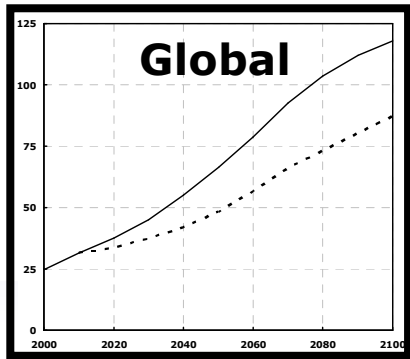
Non-Coalition Countries: Delayed Participation

Medium-Term Transition:	Long-Term Transition:
<p data-bbox="583 667 730 716">Brazil</p> <p data-bbox="569 764 745 813">Russia</p> <p data-bbox="590 862 724 911">India</p> <p data-bbox="583 959 730 1008">China</p> <p data-bbox="478 1243 835 1292">“BRIC” Group</p>	<p data-bbox="1234 667 1579 716">Rest of World</p> <ul data-bbox="1052 764 1732 1138" style="list-style-type: none"><li data-bbox="1052 764 1648 878">- Mid-income countries (e.g. Korea, Mexico)<li data-bbox="1052 927 1501 976">- OPEC countries<li data-bbox="1052 1024 1732 1138">- Poor countries (e.g. Sub-Saharan Africa) <p data-bbox="1234 1243 1579 1292">“ROW” Group</p>

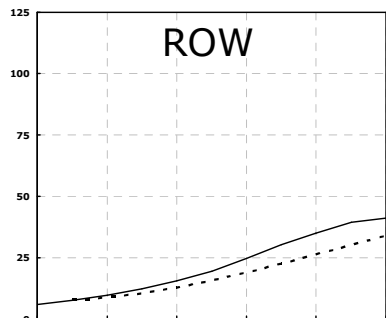
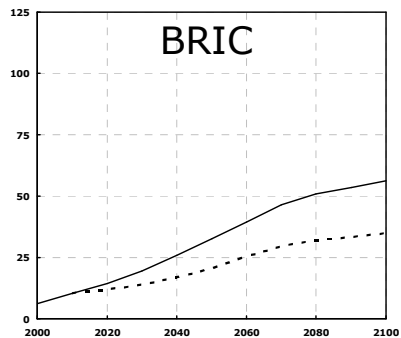
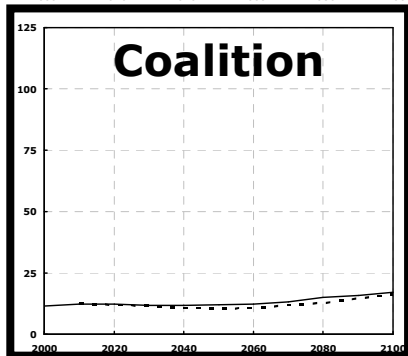
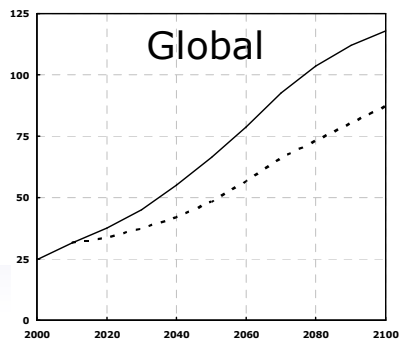
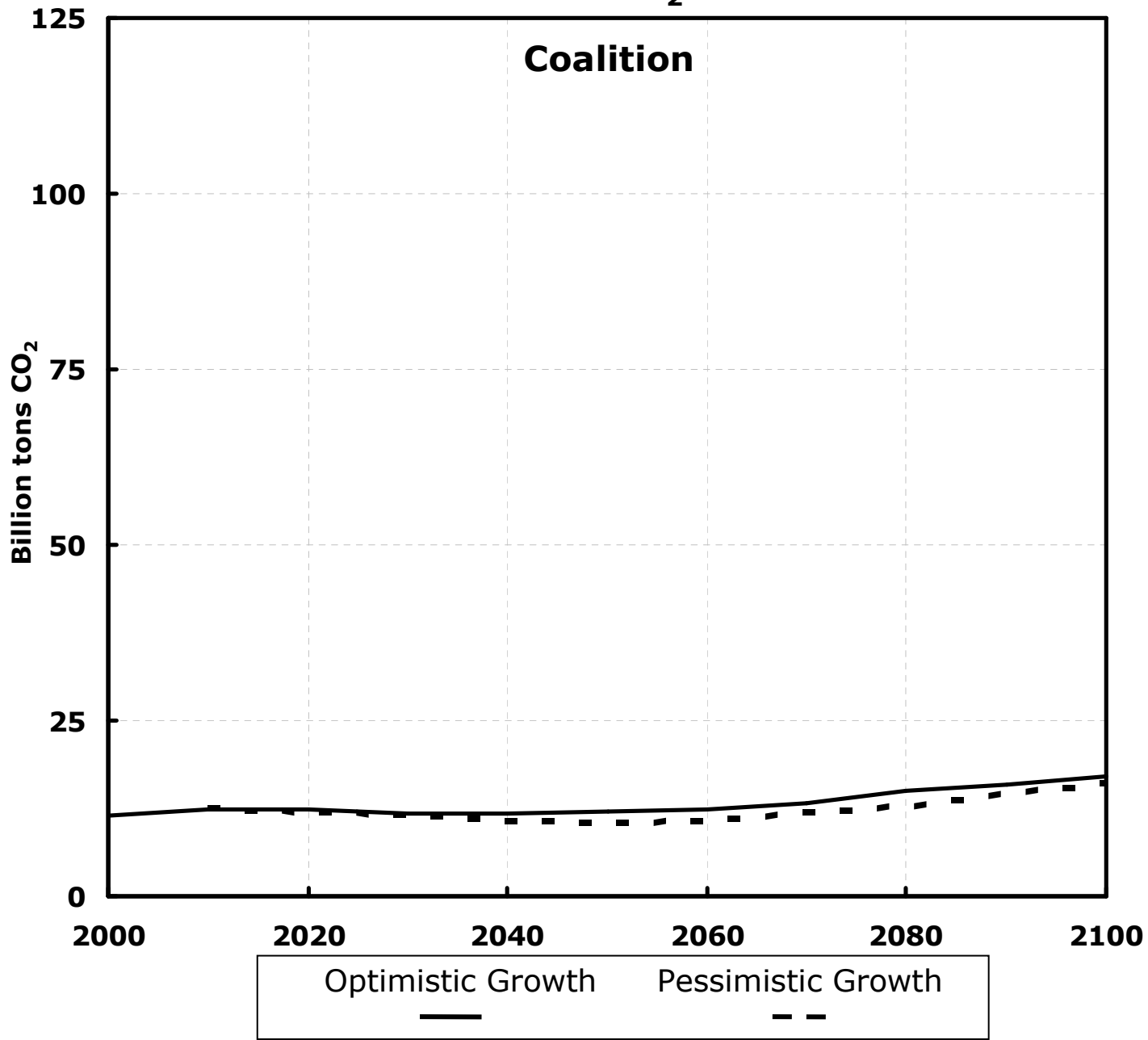
Non-Coalition emissions are 2x Coalition now (and growing twice as fast)

2007 Global CO₂ Emissions (billion tons)

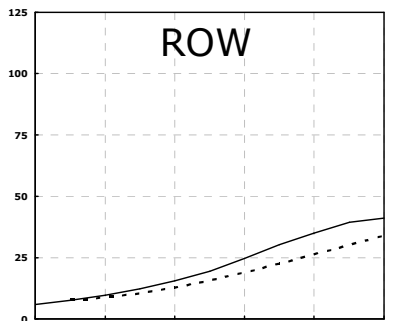
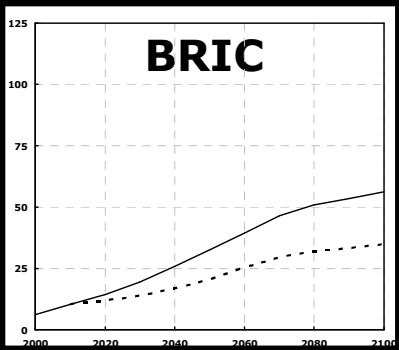
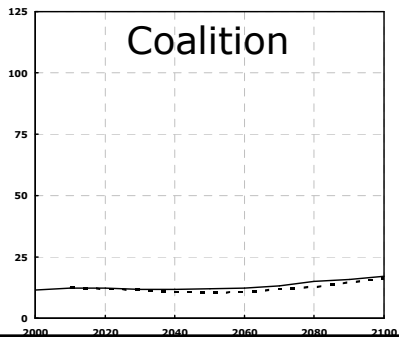
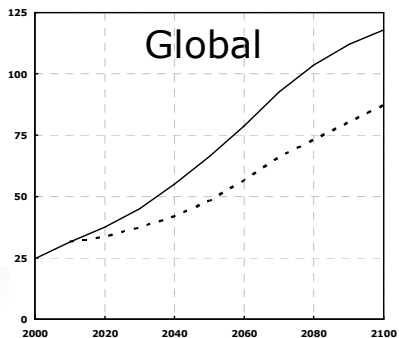
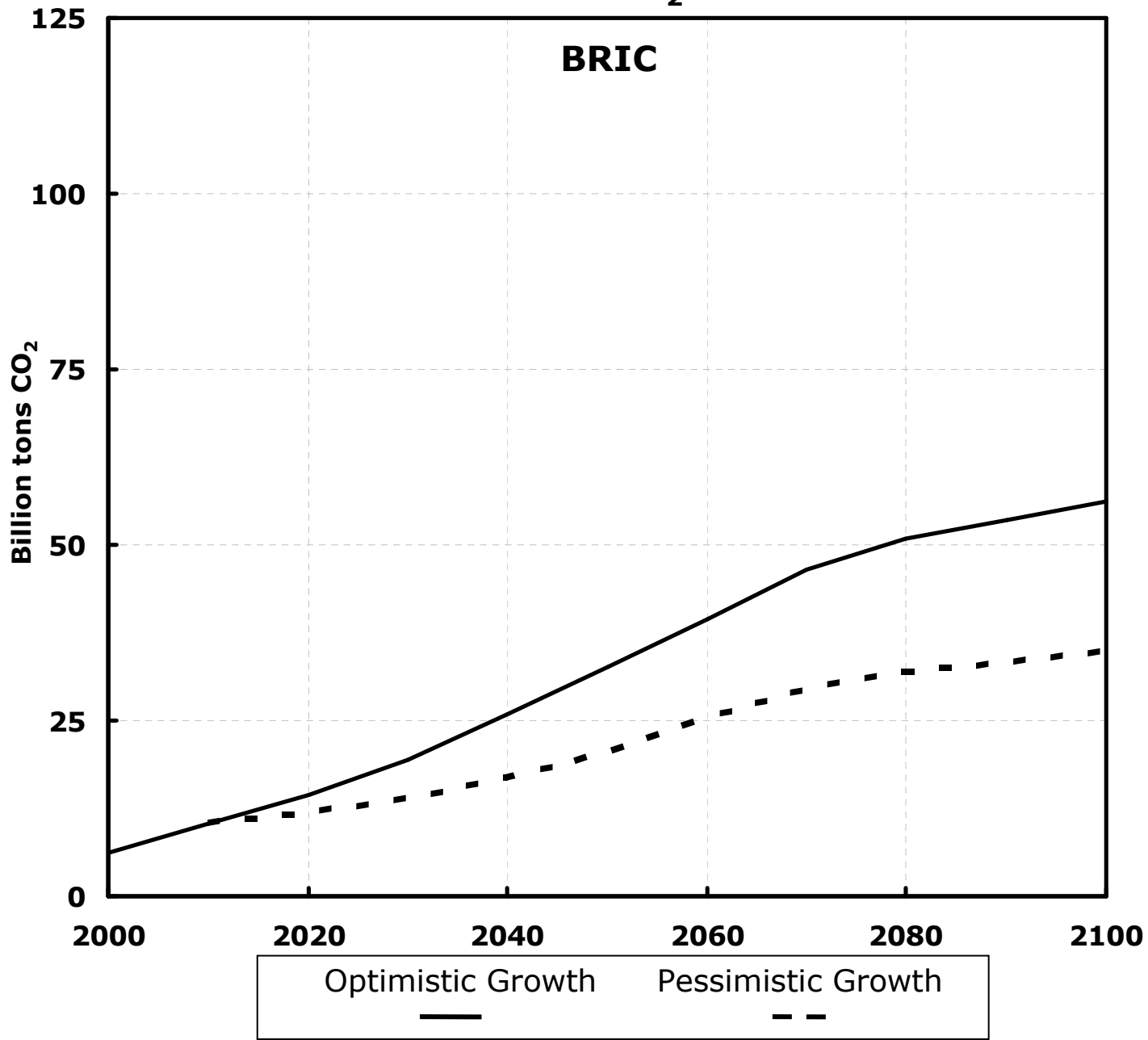


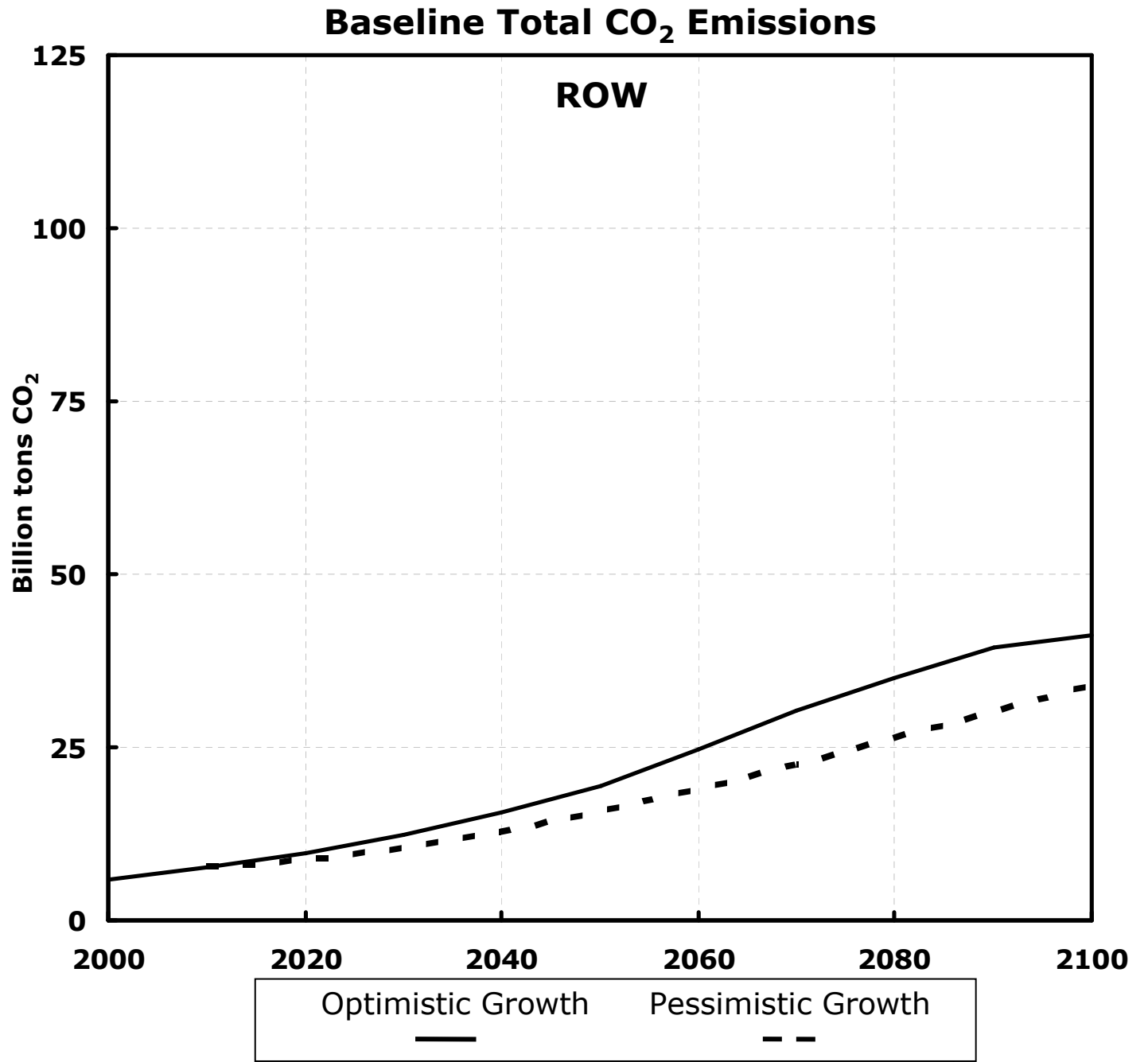
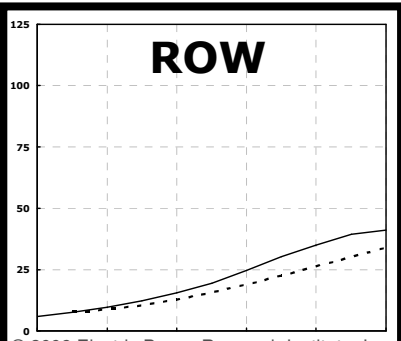
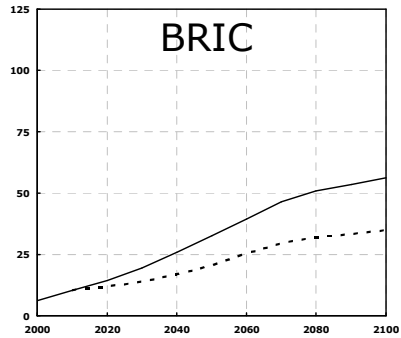
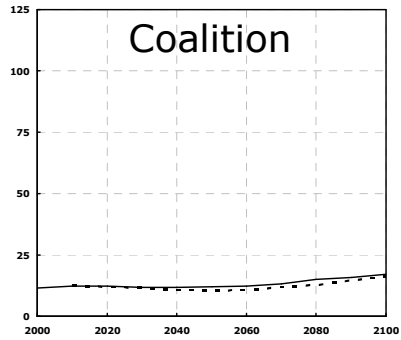
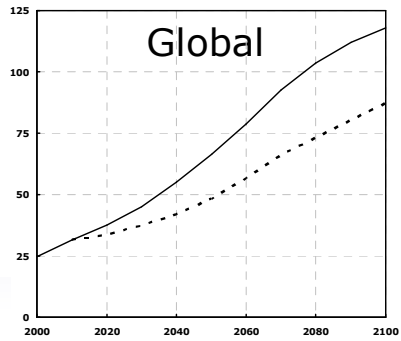


Baseline Total CO₂ Emissions



Baseline Total CO₂ Emissions



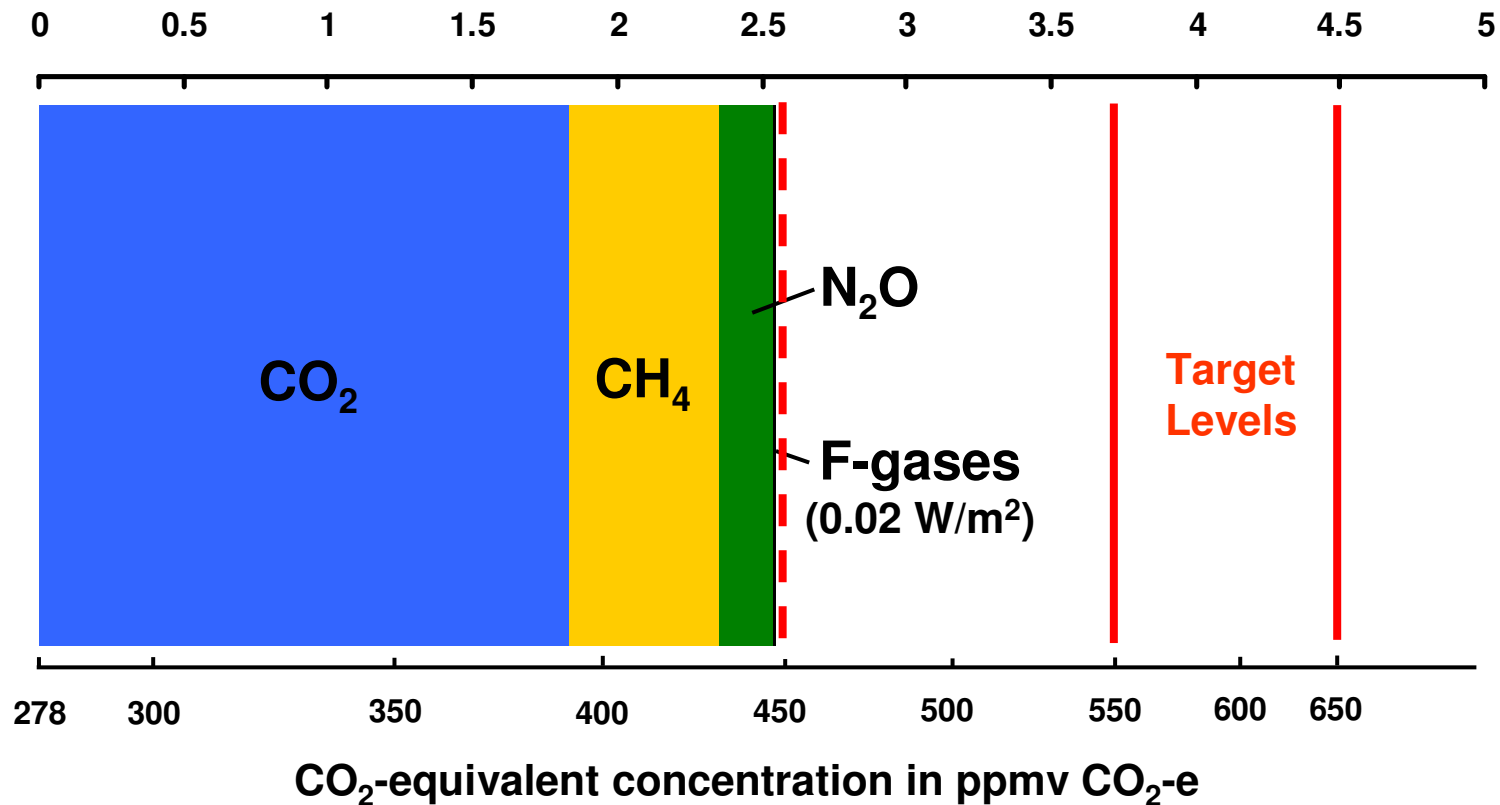


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- Reexamine stabilization scenarios, in light of
 - composition of coalition
 - nature of targets

Projected Radiative Forcing in 2010

Watts per square meter: Change in heat balance relative to pre-industrial



2010 Kyoto GHG total is 2.55 W/m² = 448 ppmv CO₂-e

Stabilization Targets

- Focus on CO₂, but take into account other Kyoto gases

	Radiative Forcing (W/m²)	CO₂-e Concentration (ppmv)	CO₂-only Concentration (ppmv)
2010 Levels	2.55	448	392
Target 1	3.7	550	465
Target 2	4.5	650	540

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 - entry into coalition

What is possible, at what cost, if...

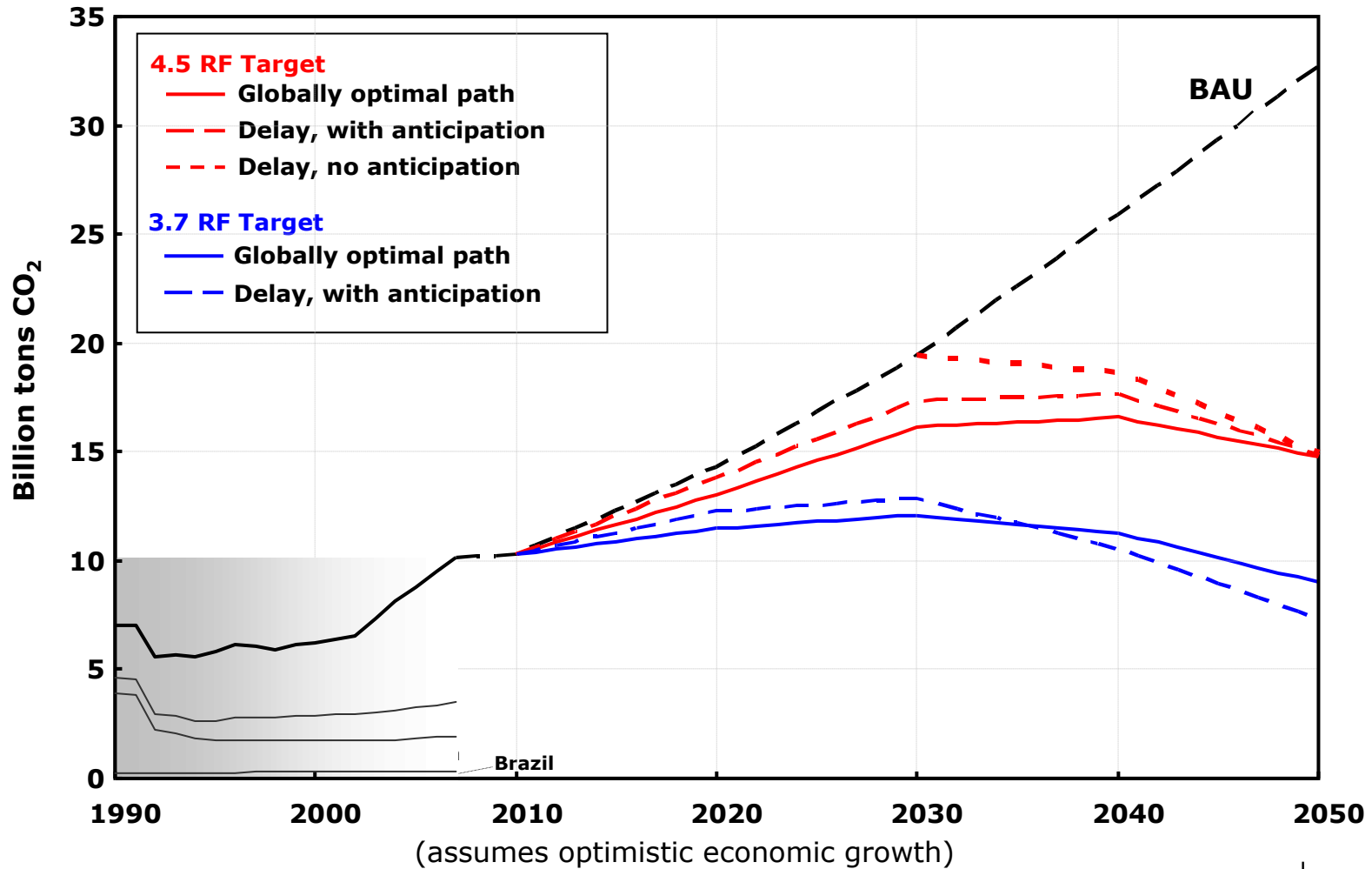
- Coalition countries begin abatement immediately
- BRIC Group (Brazil, Russia, India, China) begins abatement after 2030
- Rest of world (ROW) begins abatement after 2050
- MERGE model used to find least-cost stabilization pathway under these constraints

Defining Delayed Participation

- Without anticipation
 - Developing countries do not plan in advance for future target
- With anticipation
 - Developing countries do plan in advance for future target

Defining Delayed Participation

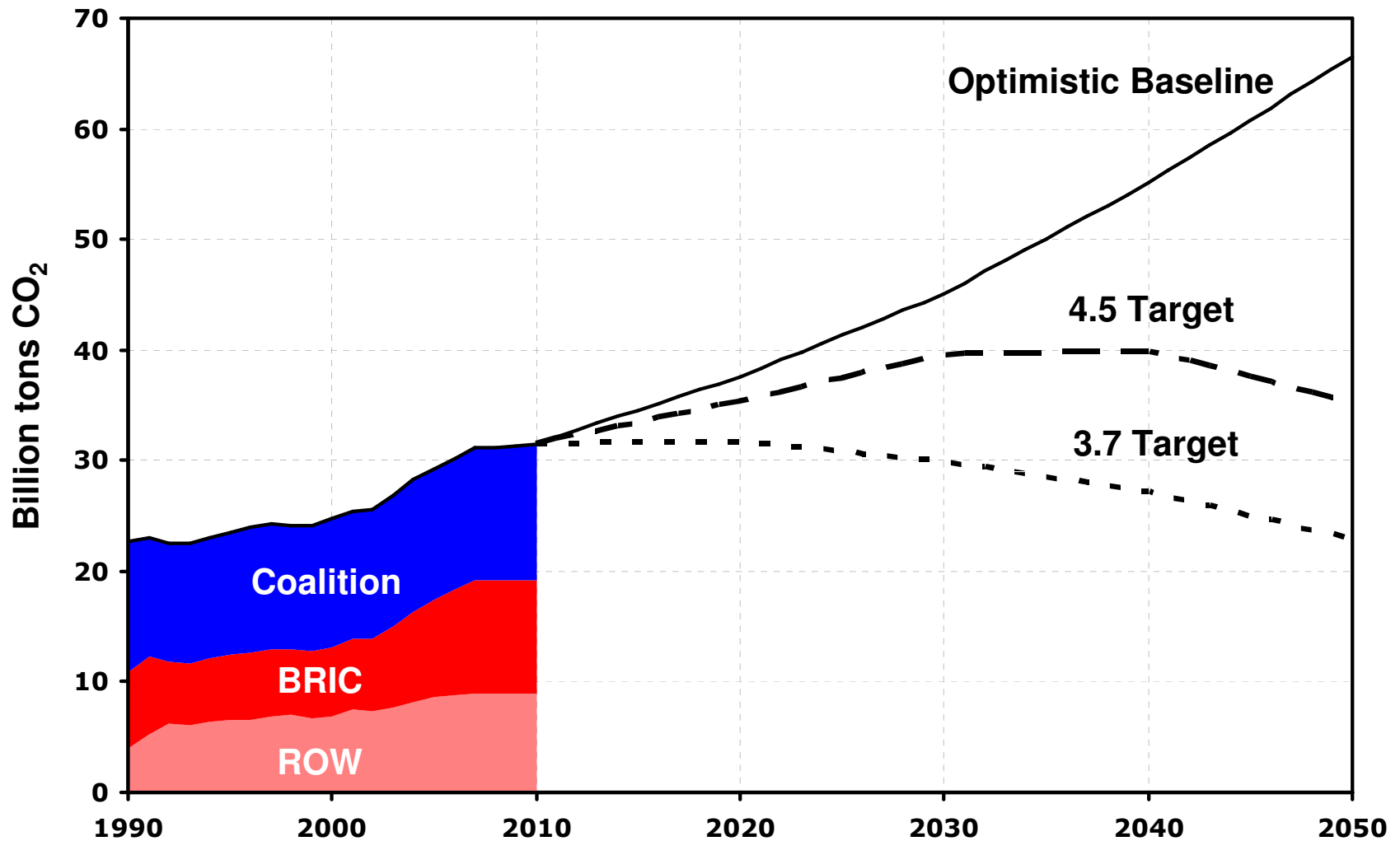
Total CO₂ Emissions from BRIC Region



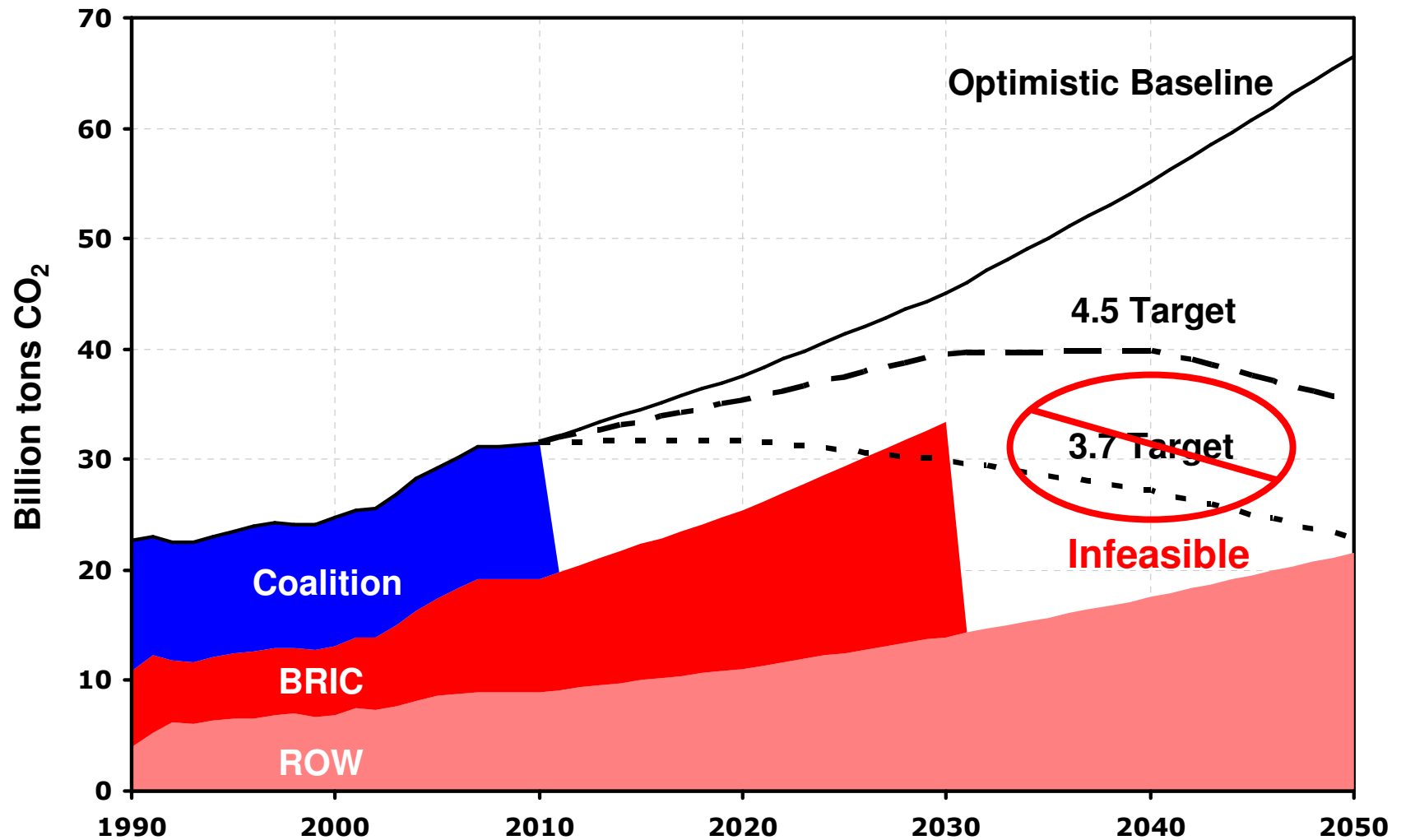
Defining Delayed Participation

- Without anticipation
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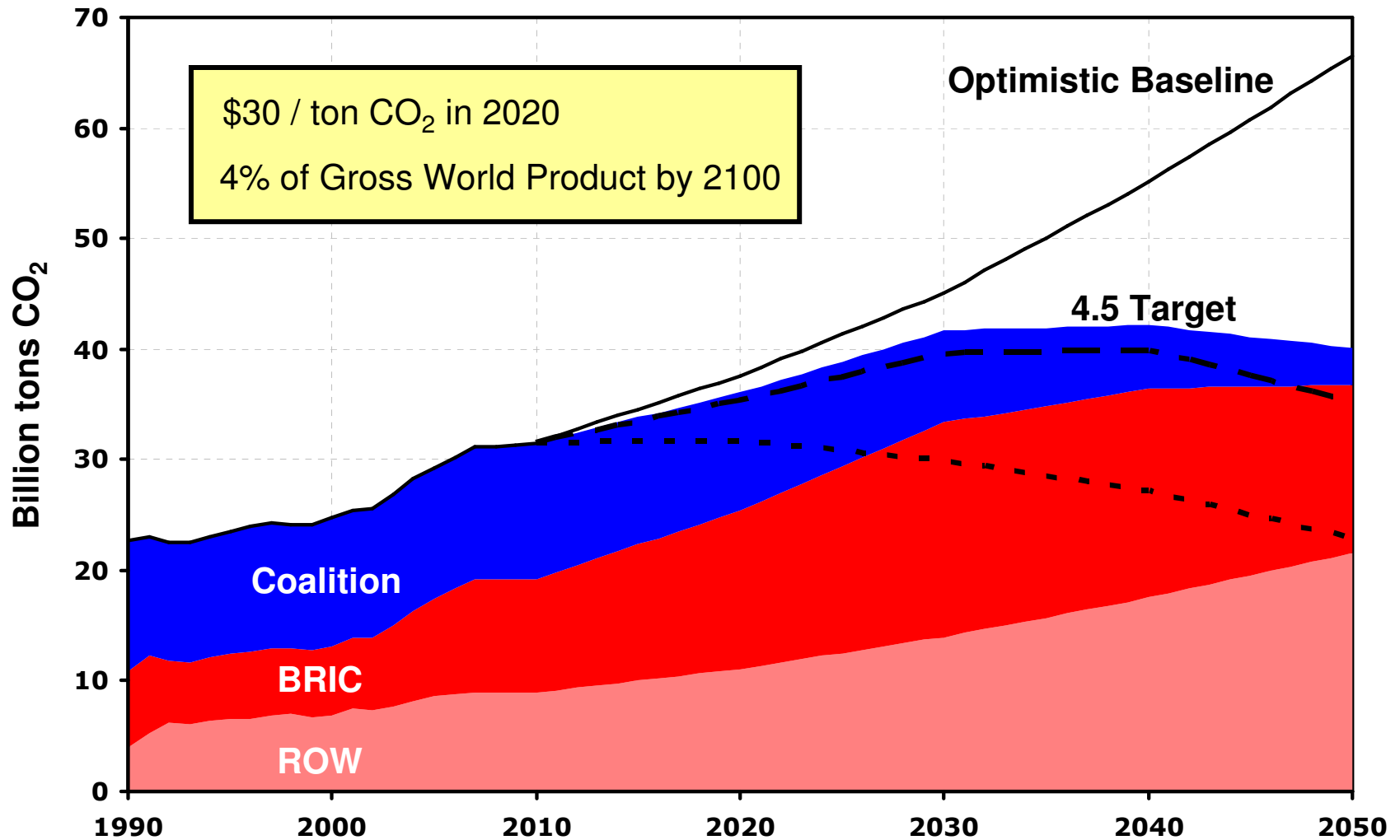
Optimal Global Stabilization Pathways



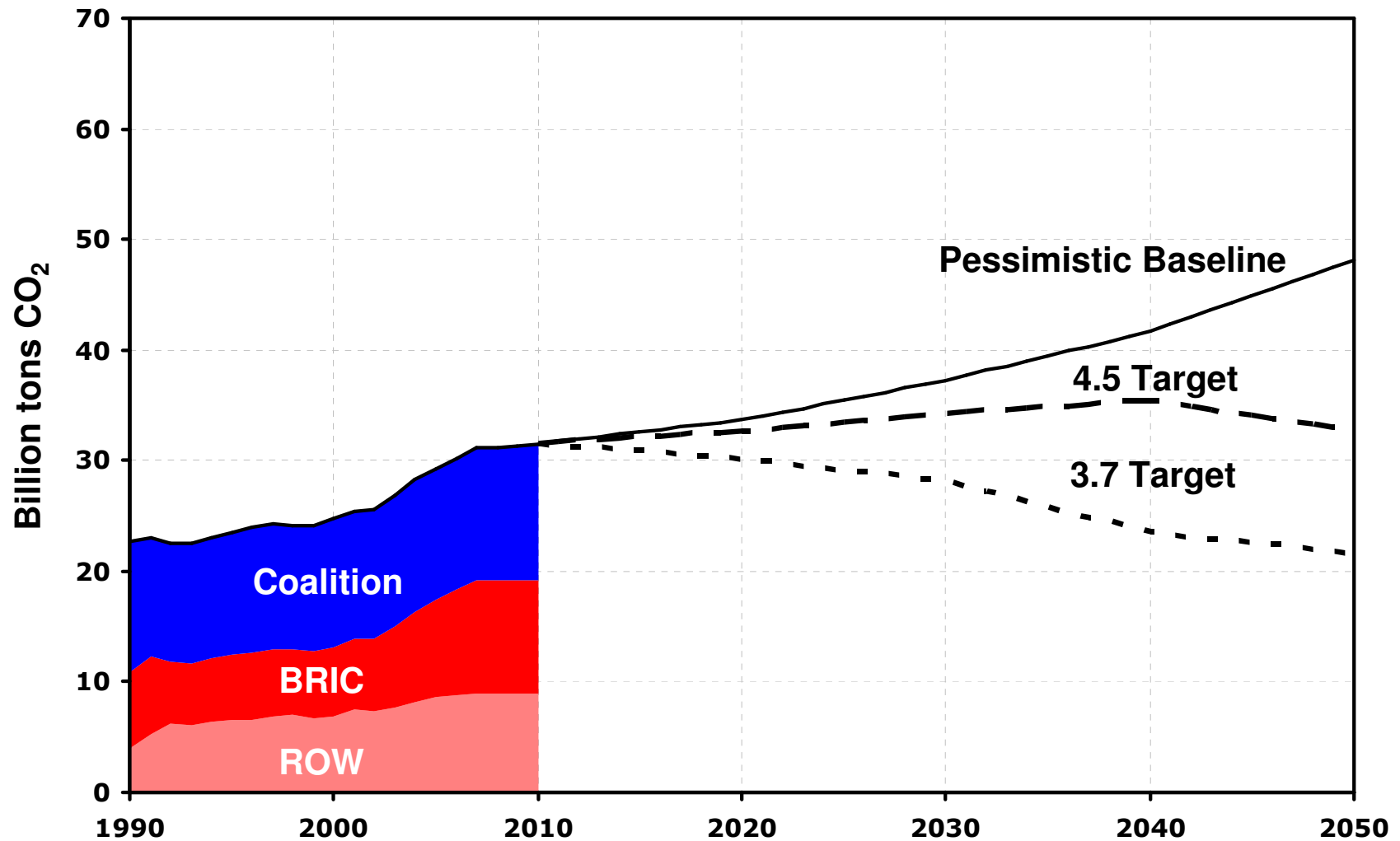
“Locked-in” Emissions from Non-Participants



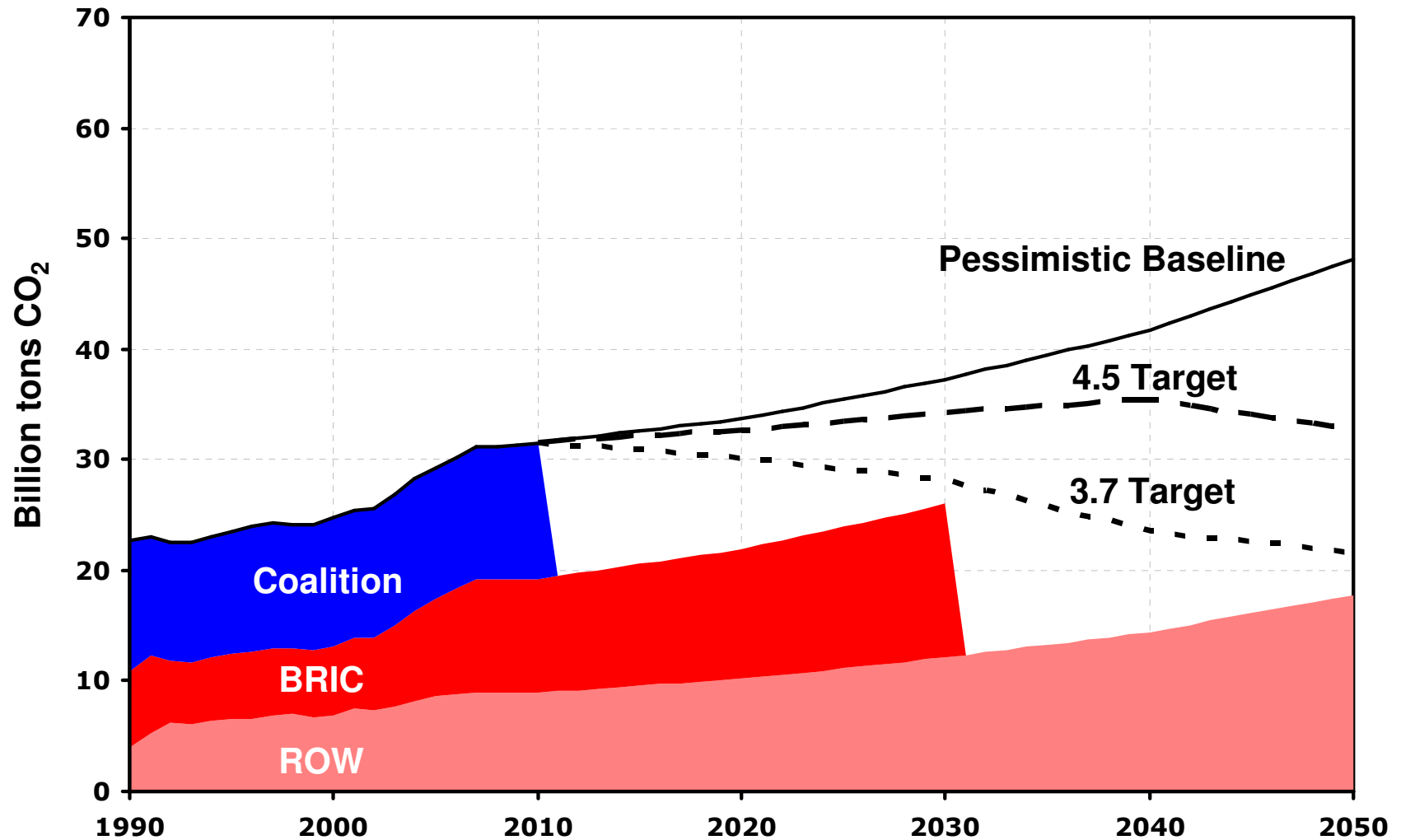
650 CO₂-e Target is Possible with Delay



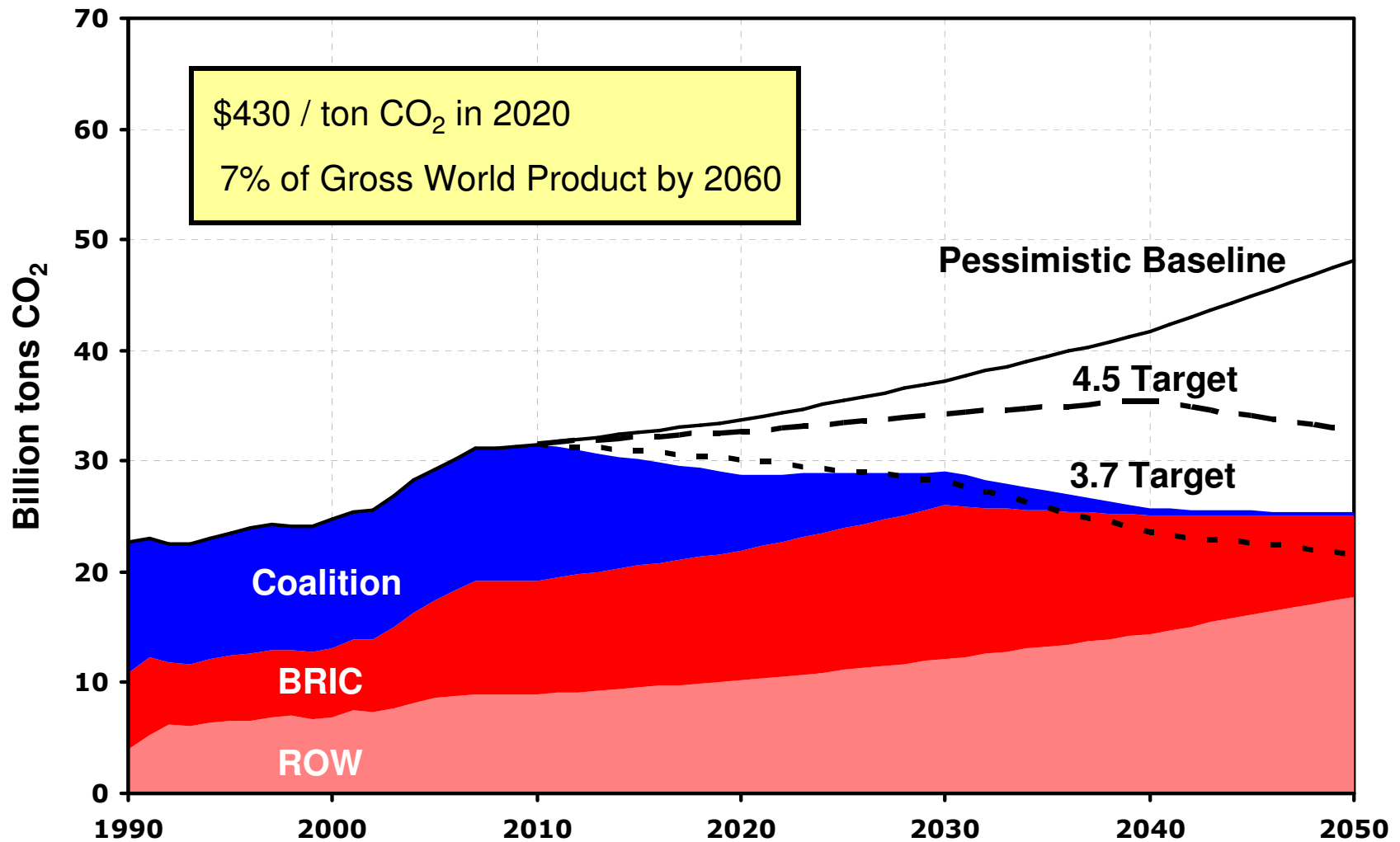
Optimal Paths w/ Pessimistic Economic Growth



Now, 550 CO₂-e Target is Possible with Delay



However, Requires Drastic Action in Coalition



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 - composition of coalition
 - Nature of targets
 - entry into coalition
 - alternative expectations regarding accession

What If..

- BRIC countries agreed today to join the coalition beginning in 2030
- ROW countries agreed today to join the coalition beginning in 2050

Question:

What is the value of anticipation?

Win-Win!

Reduction in GDP Loss with Anticipation of Future Participation

Radiative Forcing Target (W/m²)	Economic Growth Scenario	Savings for Coalition	Savings for BRIC
3.7 (550 ppmv CO₂-e)	Pessimistic	51%	31%

Conclusions

- Surprising Growth in developing countries shifts the dynamics of the stabilization problem
- Recession has an impact but does not change fundamental realities of the stabilization challenge
- With delayed participation by developing countries, achieving stabilization at:
 - 650 CO₂-e is reasonably possible
 - 550 CO₂-e is extremely difficult
 - 450 CO₂-e is in the rearview mirror
- A commitment on the part of the BRICs **now** to reduce emissions at some date in the **future** can be a win-win proposition



Thank you!

Temperature Increase Over Pre-industrial Level

