

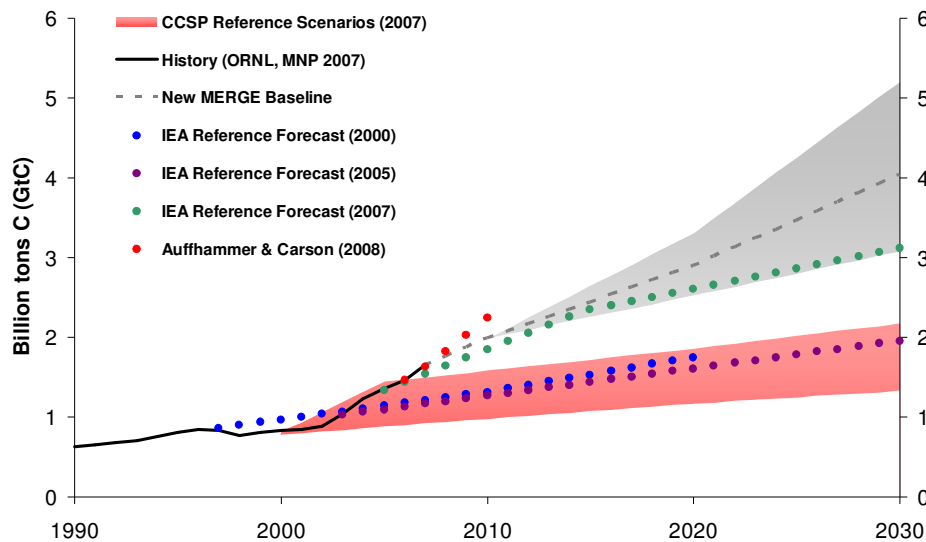


International Emissions Scenarios: The Role of Developing Country Participation

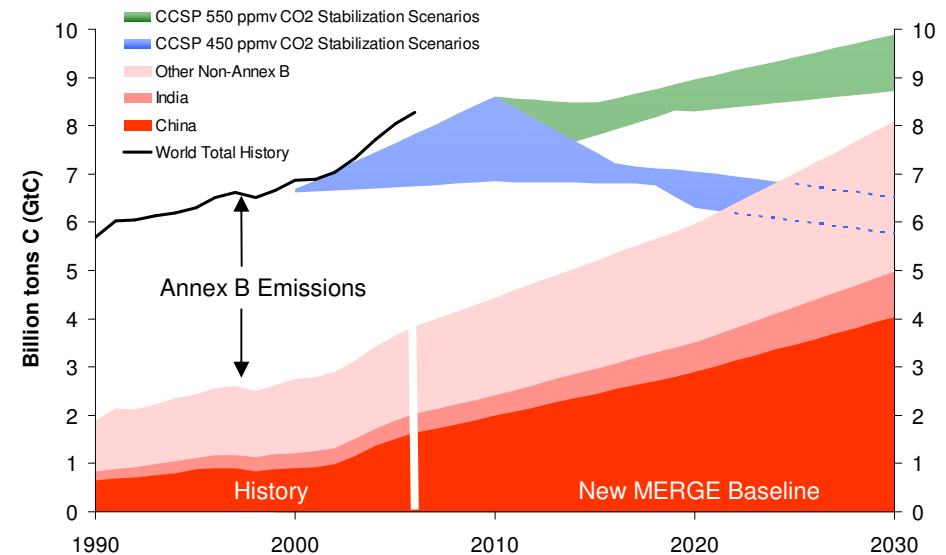
Geoff Blanford
Global Climate Change, EPRI
Environment Advisory Meetings
San Diego, CA
March 17, 2009

2008 MERGE Results

- Re-evaluated magnitude of developing country growth
- Much higher no-policy baseline for CO₂ emissions
- Major implications for stabilization with limited participation



CO₂ Emissions in China:
New Projections



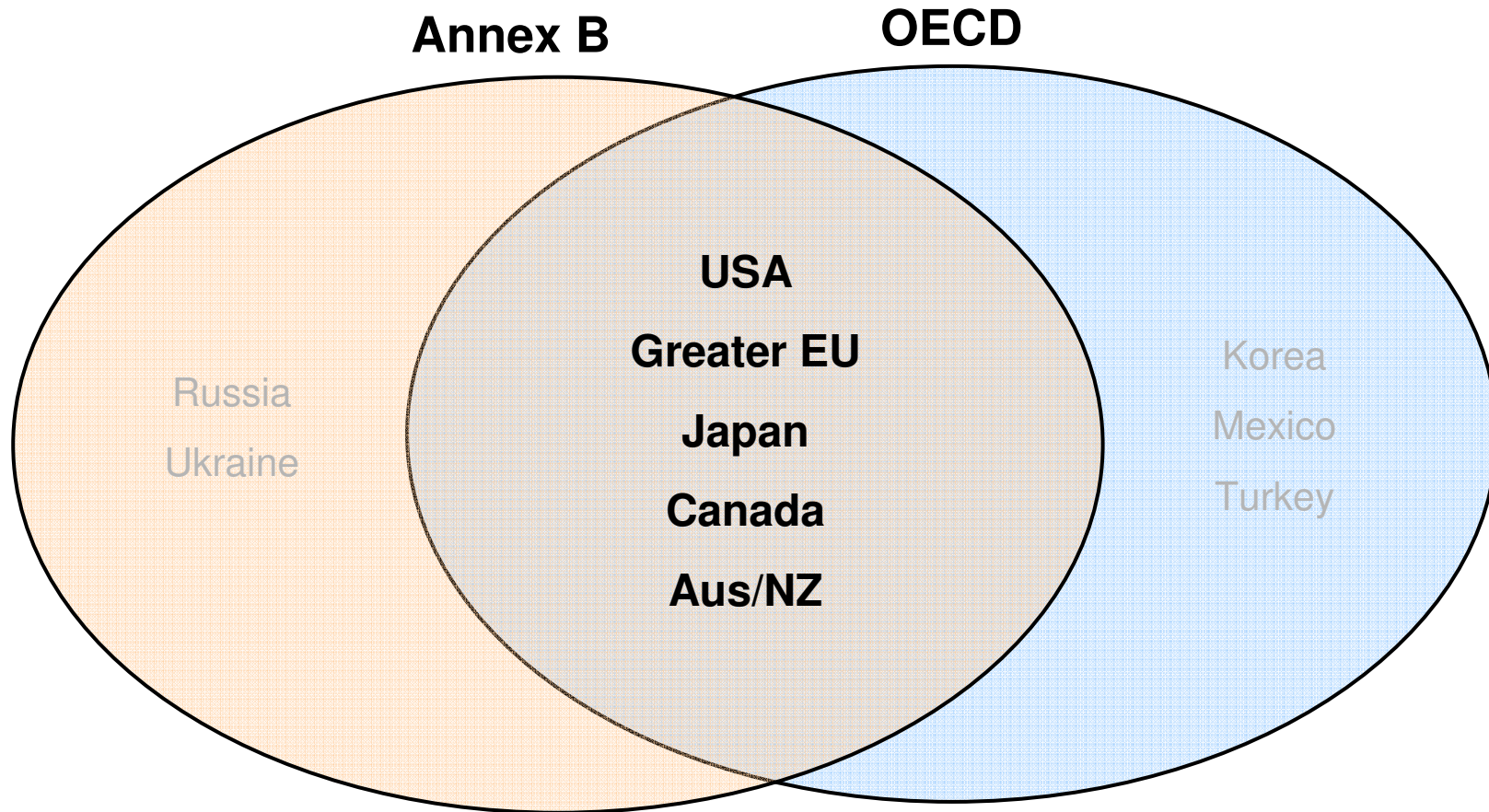
Non-Annex B CO₂ Relative to
Global Targets

Joint work with Richard Richels and Thomas Rutherford

Progress in 2009

- Global Recession – what does it mean?
- Analysis of specific scenarios with delayed accession of developing countries (Energy Modeling Forum study)
- Insights into role of non-CO₂ gases
- Relationship between global emission pathways and policy proposals in US

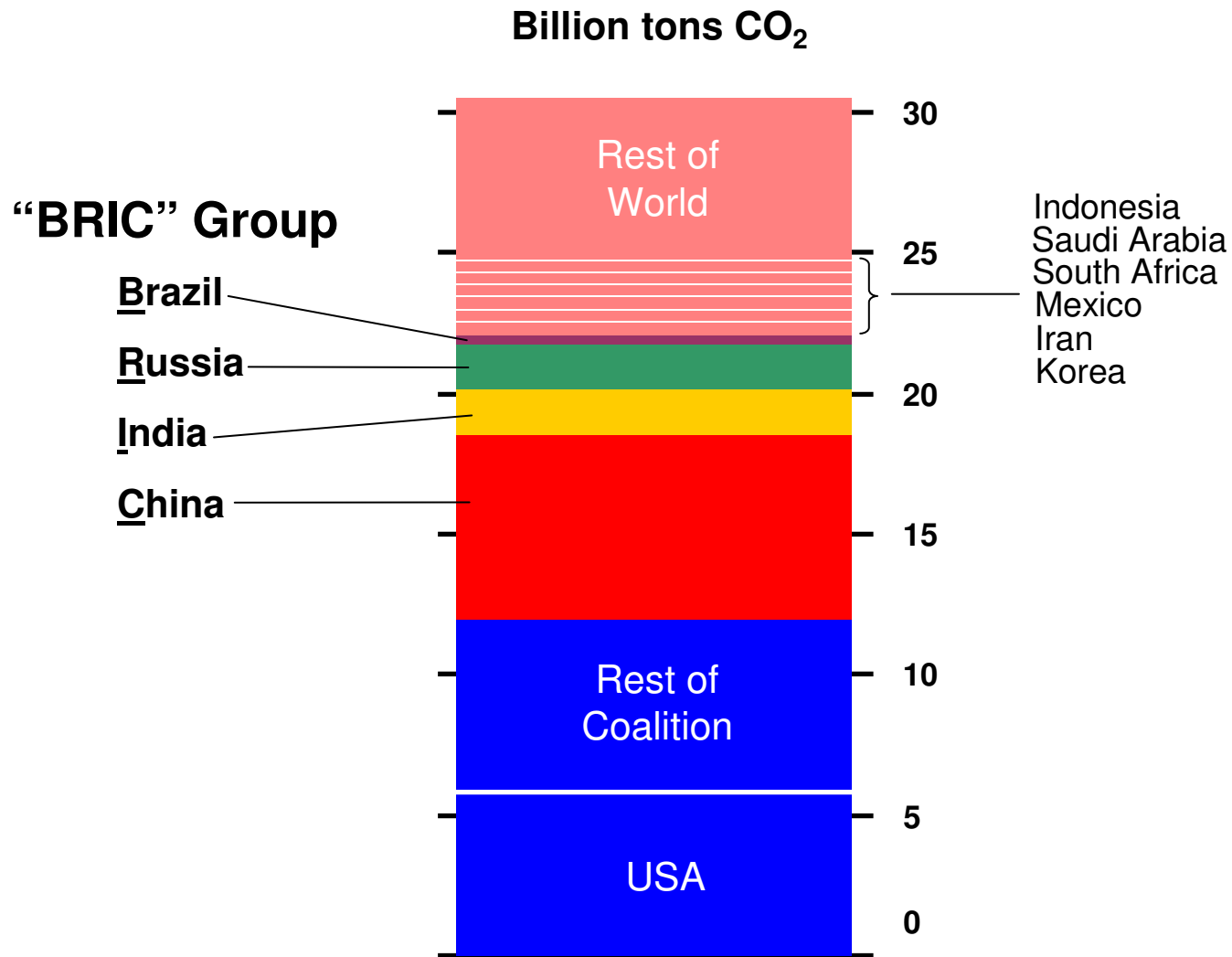
Coalition Countries: Ready to Participate Now



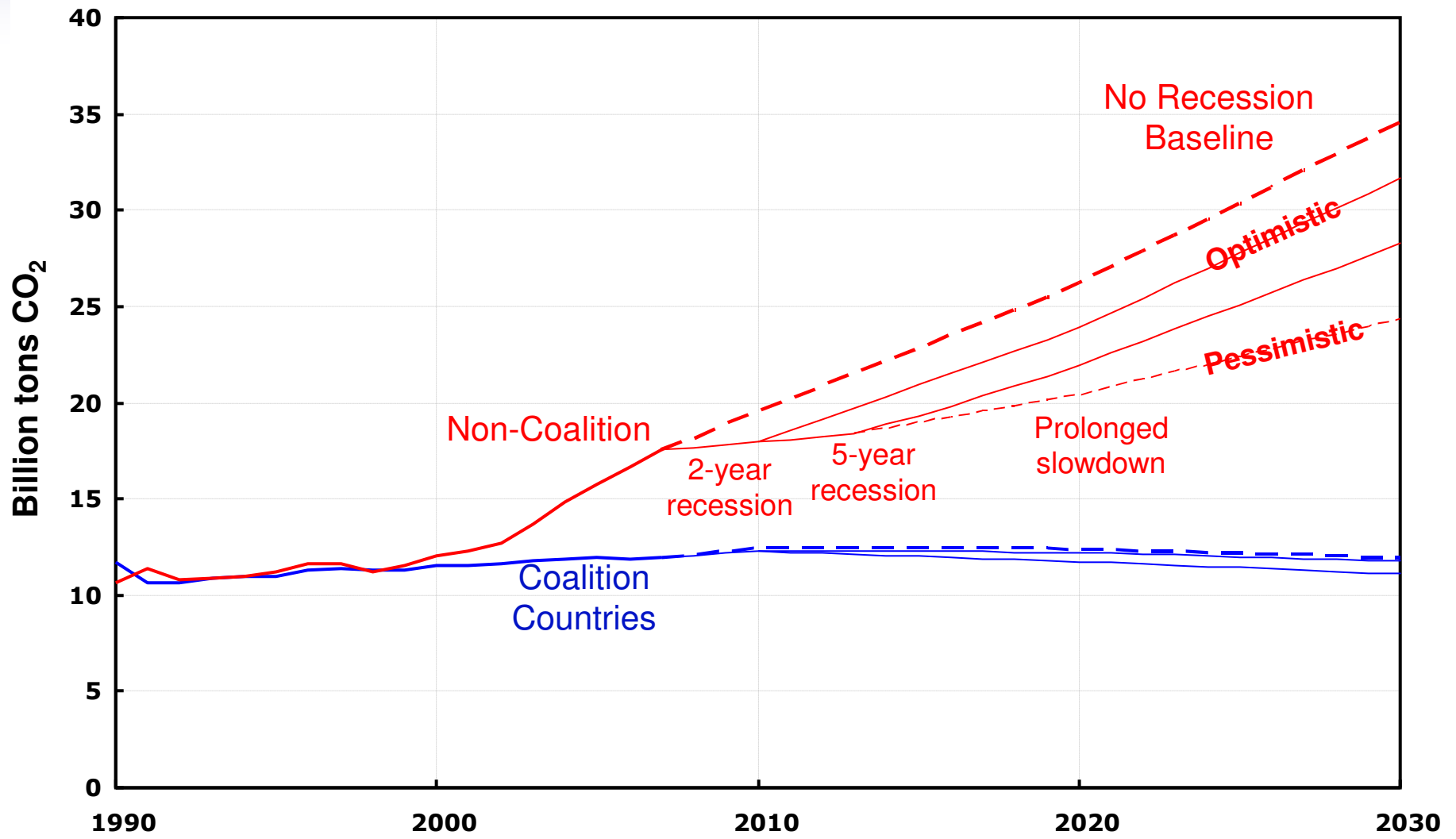
Non-Coalition Countries: Delayed Participation

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>

2007 Total CO₂ Emissions (Energy/Cement)



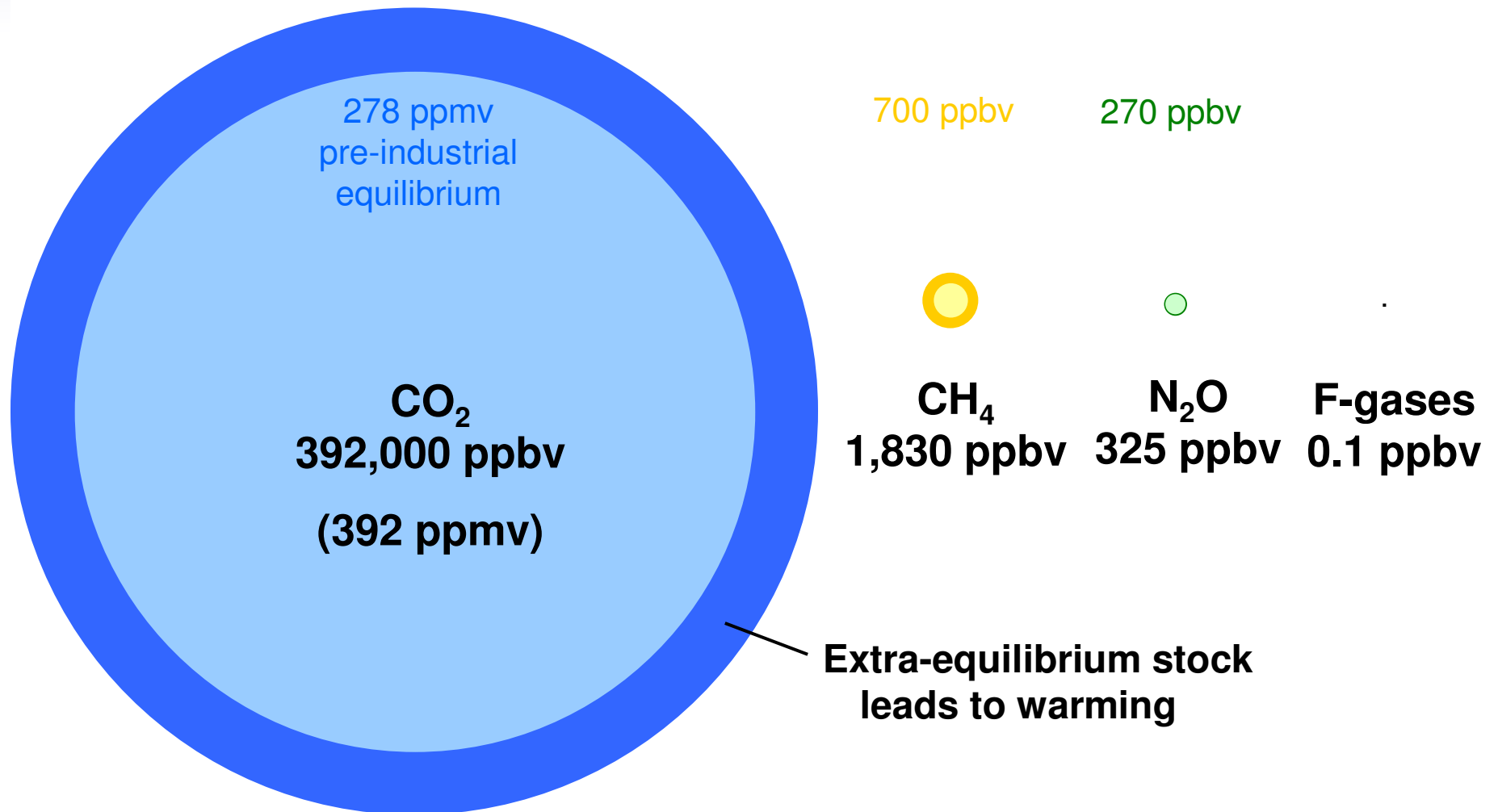
Baseline Emissions Adjusted for Recession



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

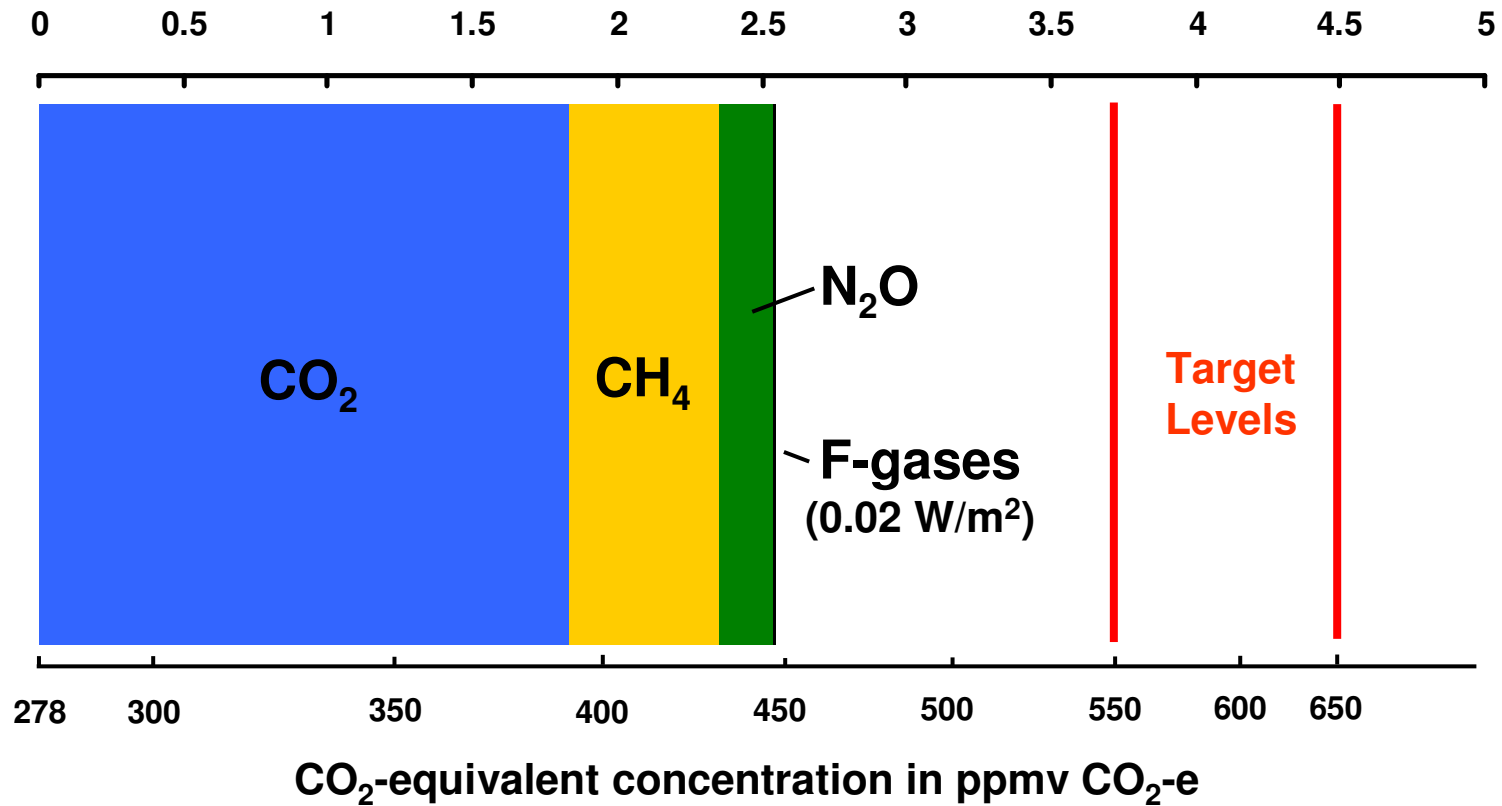
Projected 2010 Concentrations for Kyoto GHGs



Scale reflects atmospheric volume

Projected Radiative Forcing in 2010

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

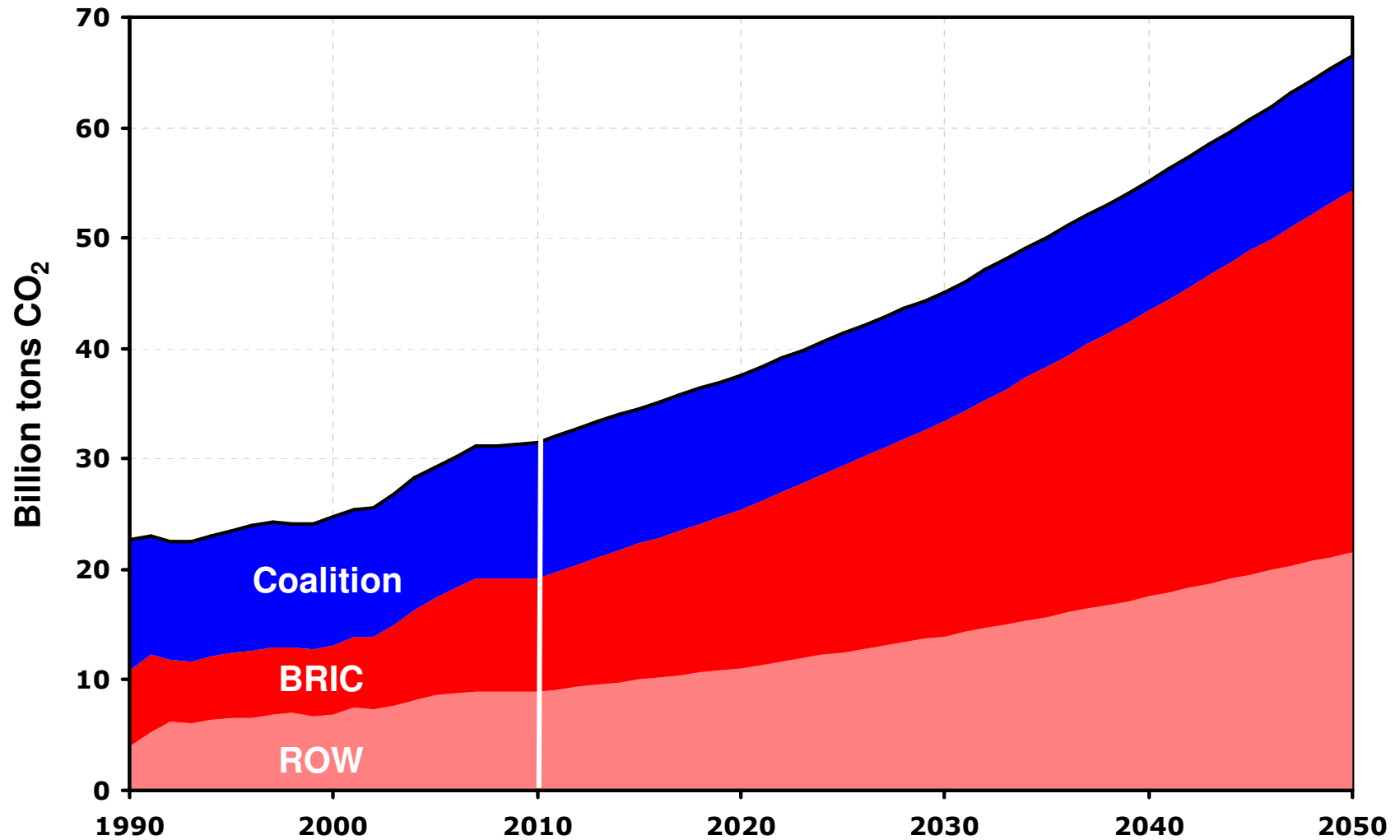


Stabilization Targets

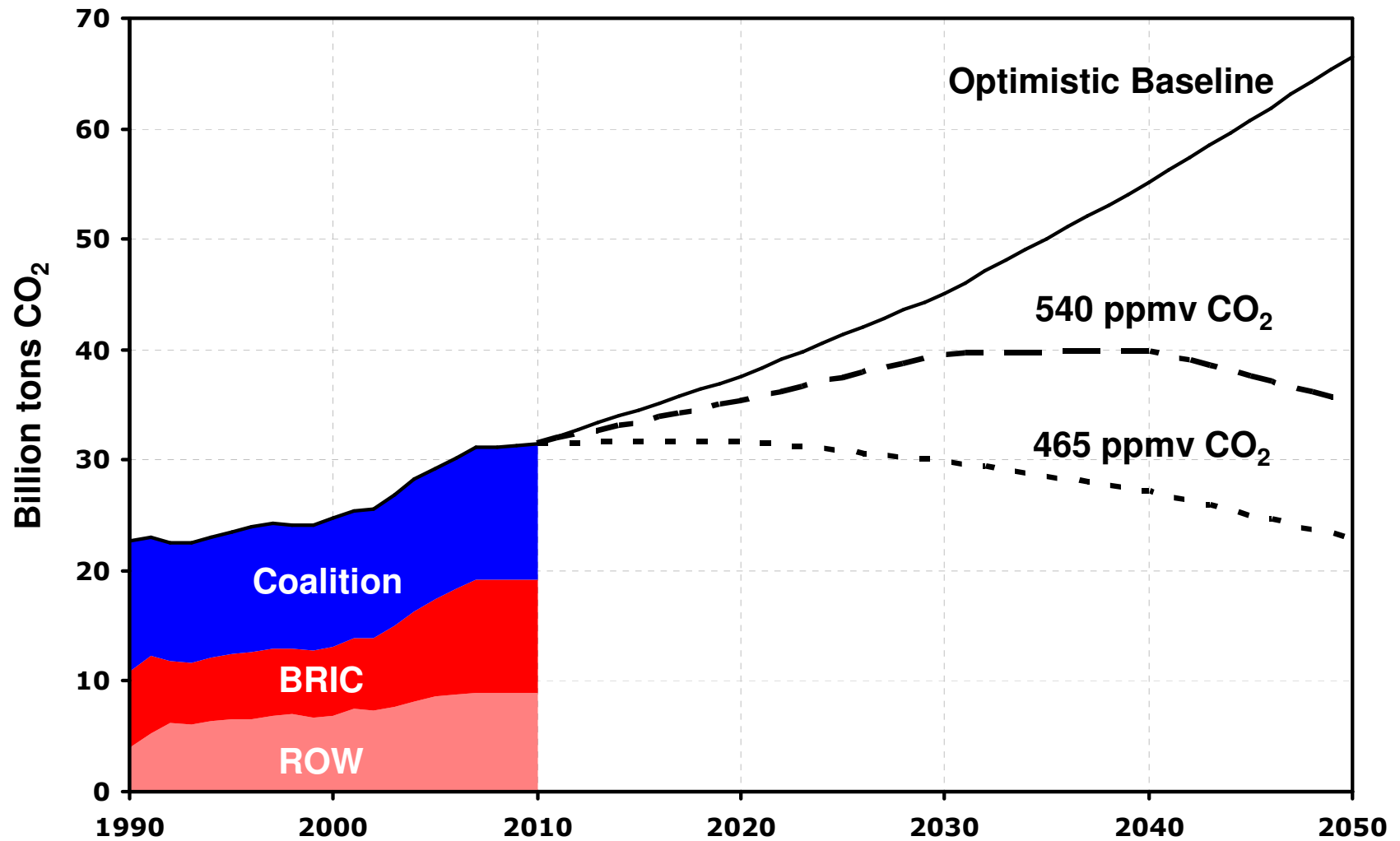
⇒ CO₂ limits implied by “residual” emissions from non-CO₂ gases

	CO ₂ -e concentration (ppmv)	Radiative Forcing (W/m ²)	RF from non-CO ₂ gases (W/m ²)	RF from CO ₂	CO ₂ -only concentration (ppmv)
2010 Levels	448	2.55	0.72	1.83	392
Target 0	450	2.6	0.95 (minimum)	1.65	380
Target 1	550	3.7	0.95 (minimum)	2.75	465
Target 2	650	4.5	0.95 (minimum)	3.55	540

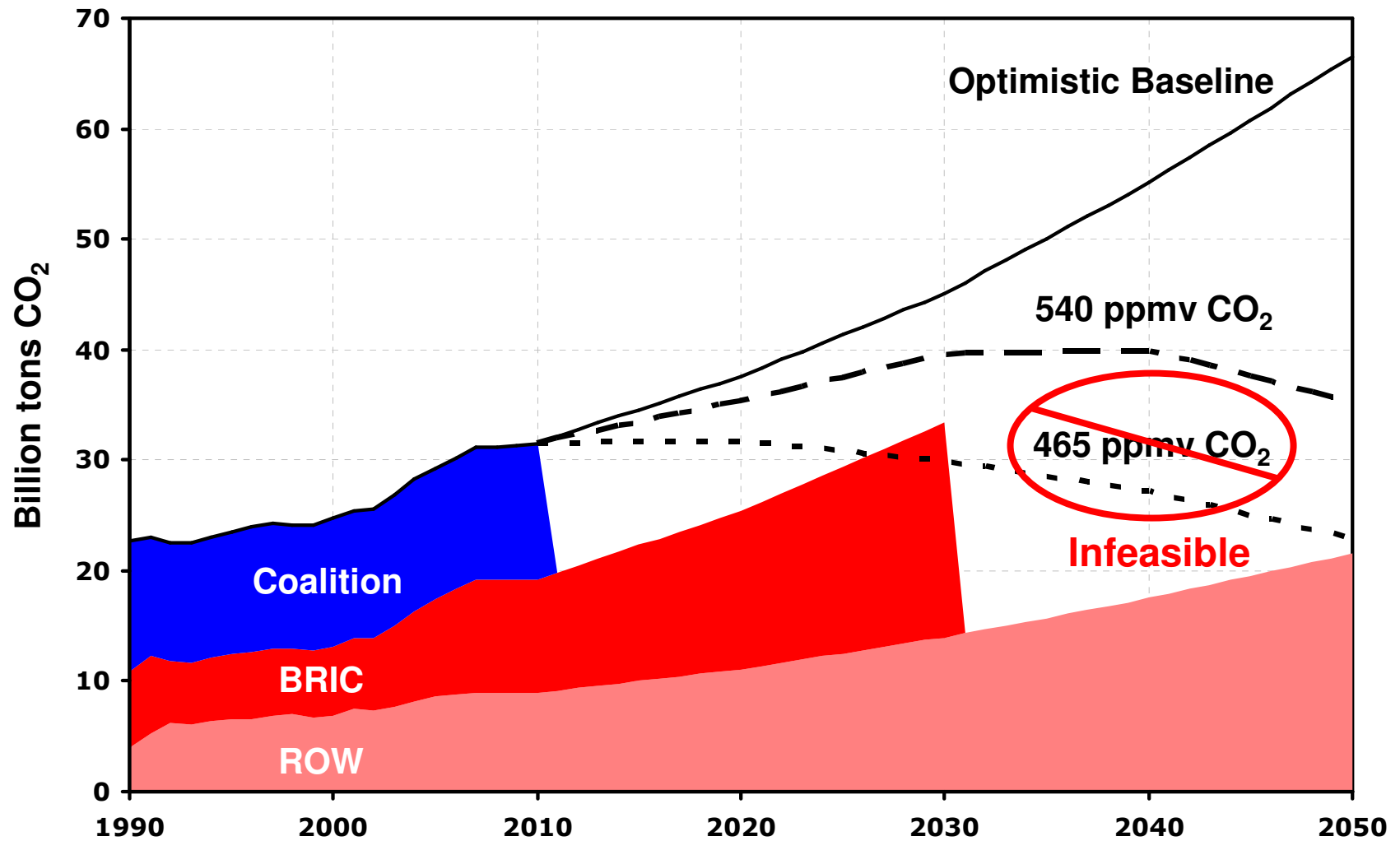
Global CO₂ in the Optimistic Baseline



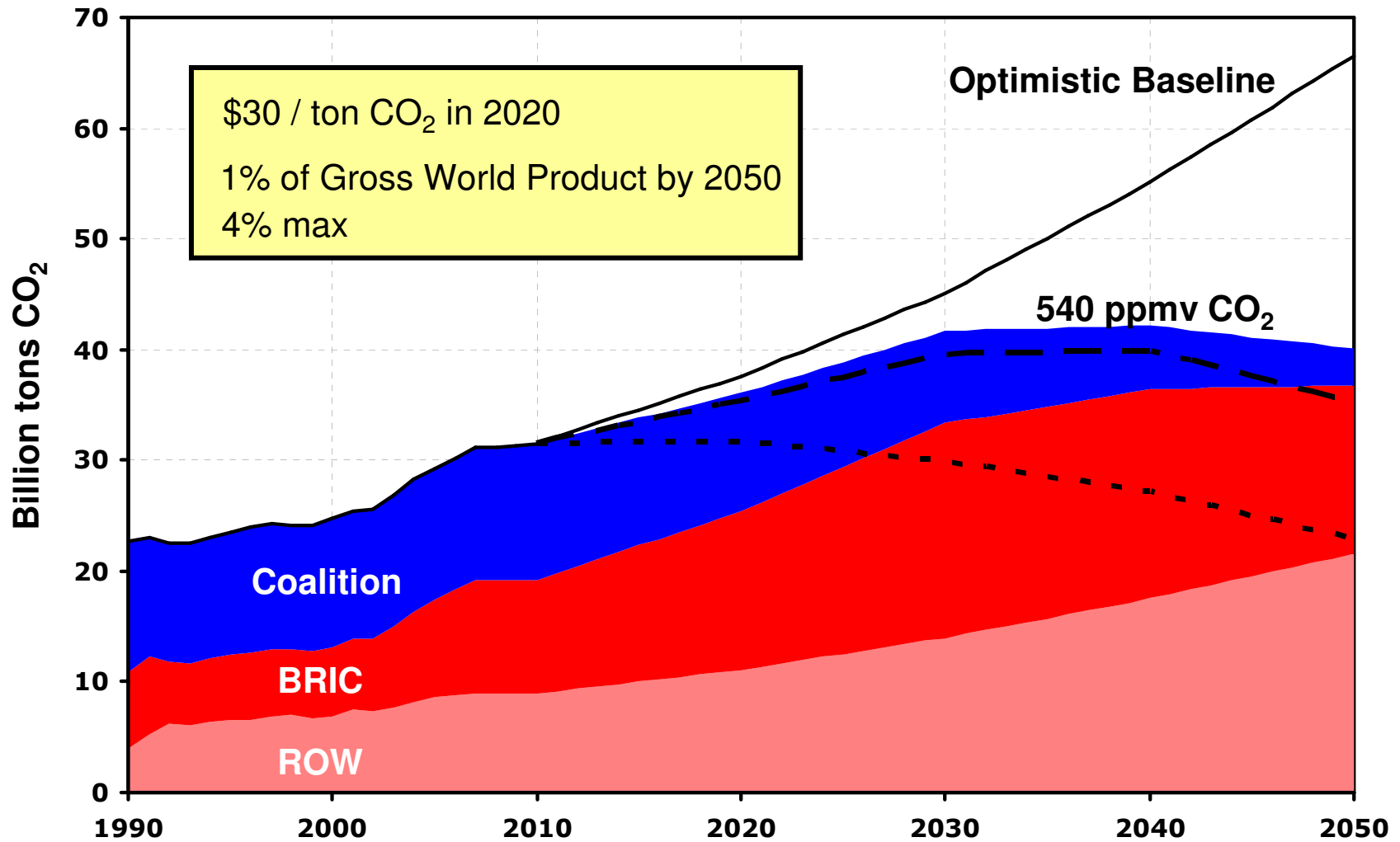
Optimal Global Stabilization Pathways



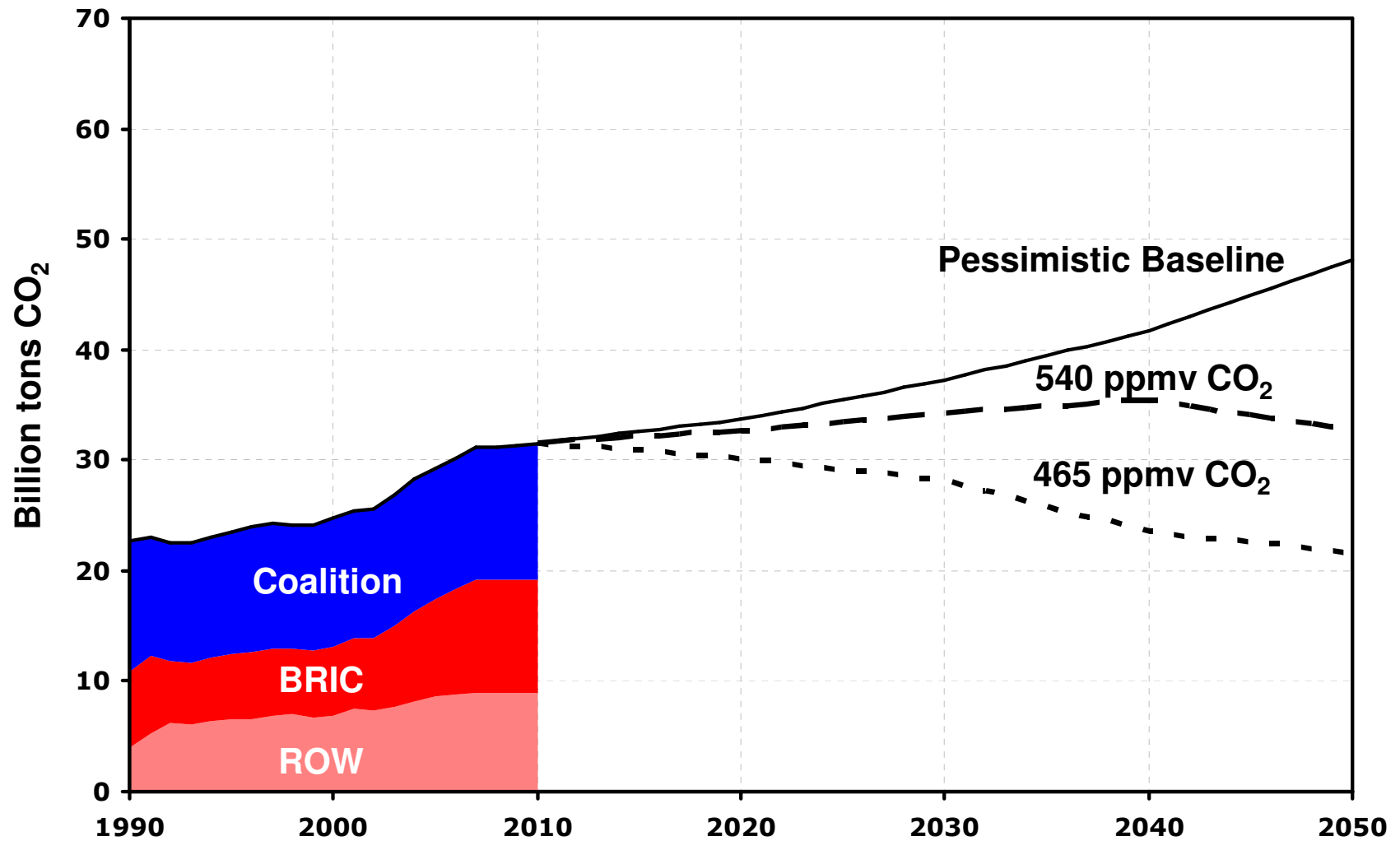
“Locked-in” Emissions from Non-Participants



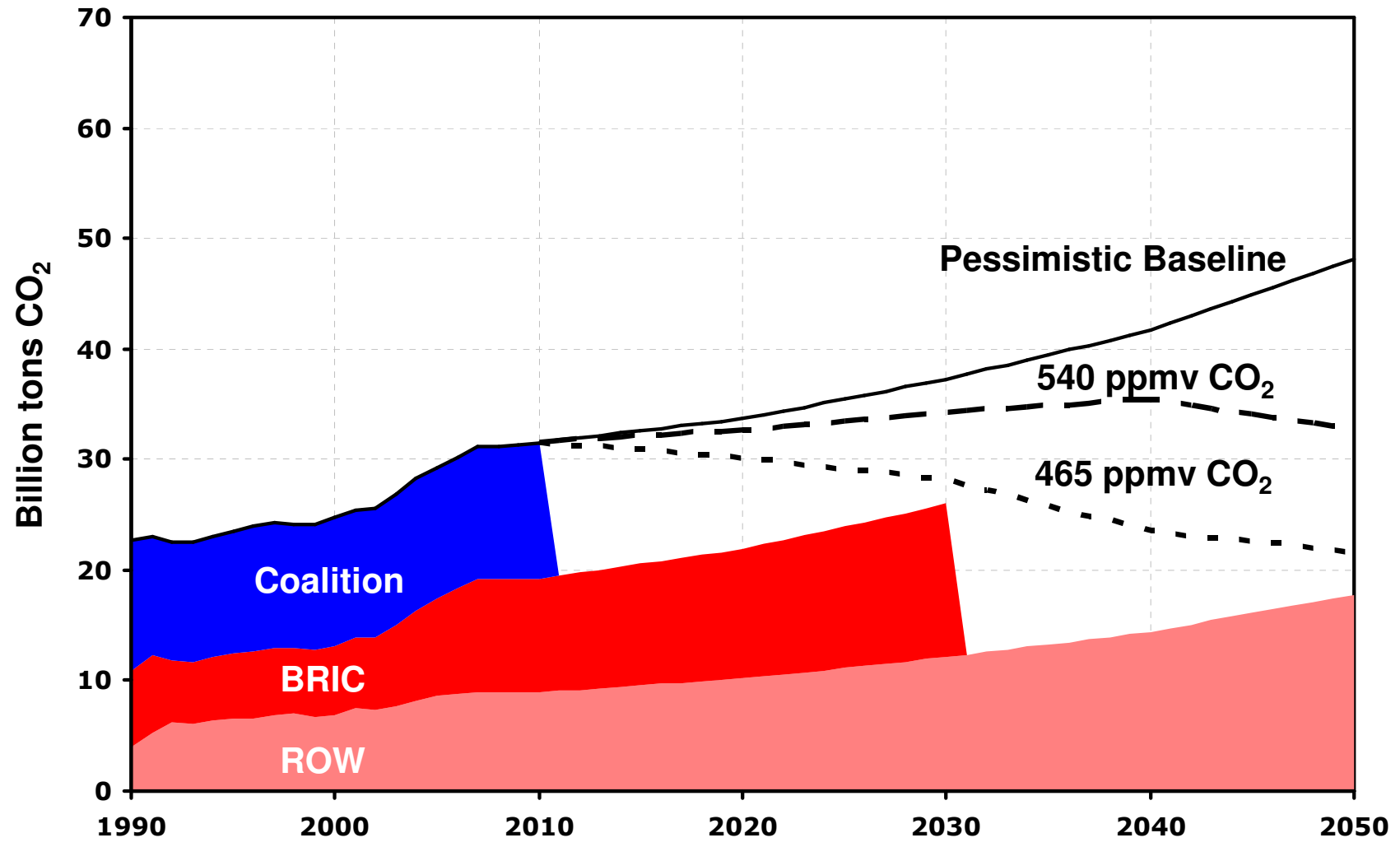
650 CO₂-e Target is Possible with Delay



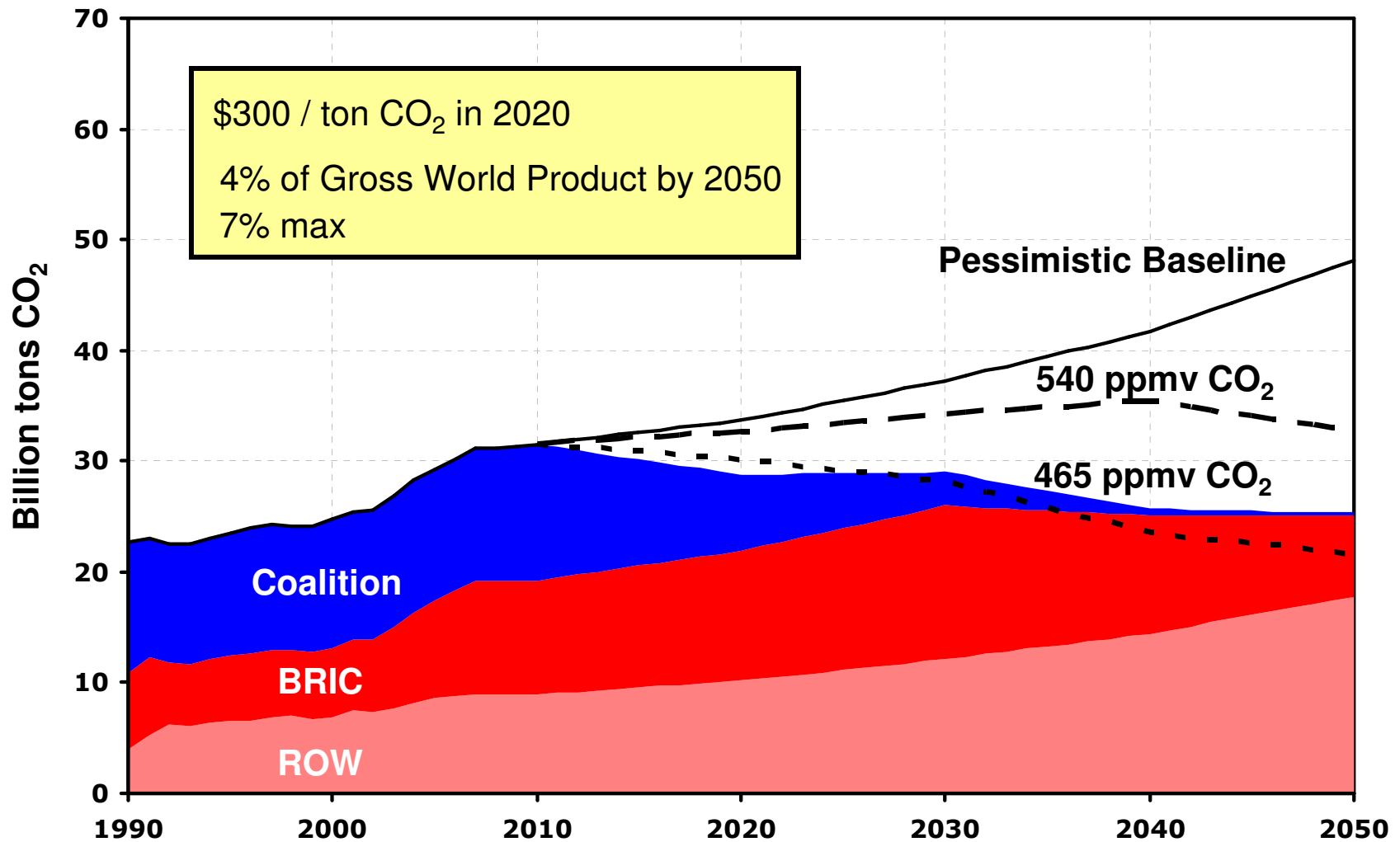
Optimal Paths w/ Pessimistic Economic Growth



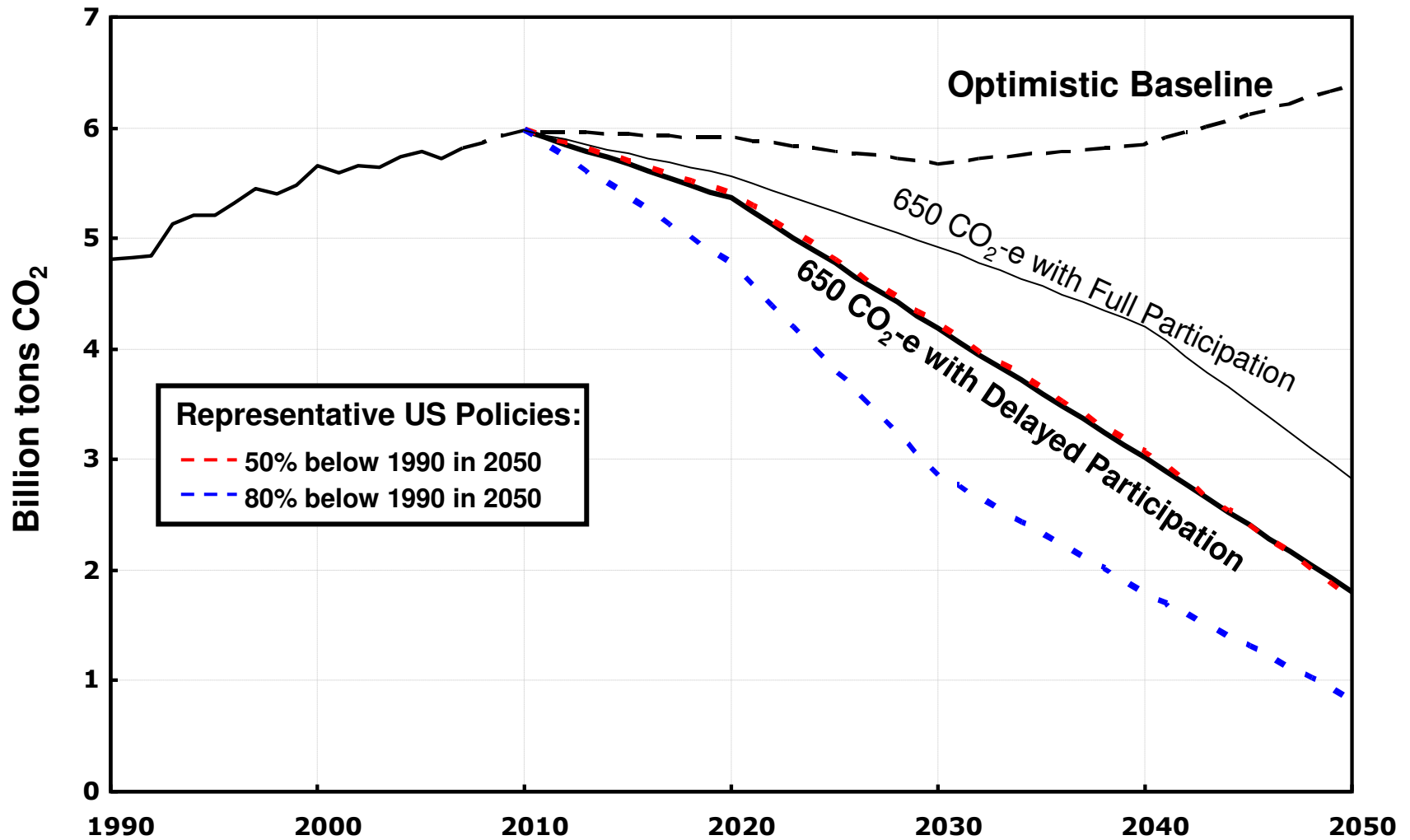
Now, 550 CO₂-e Target is Possible with Delay



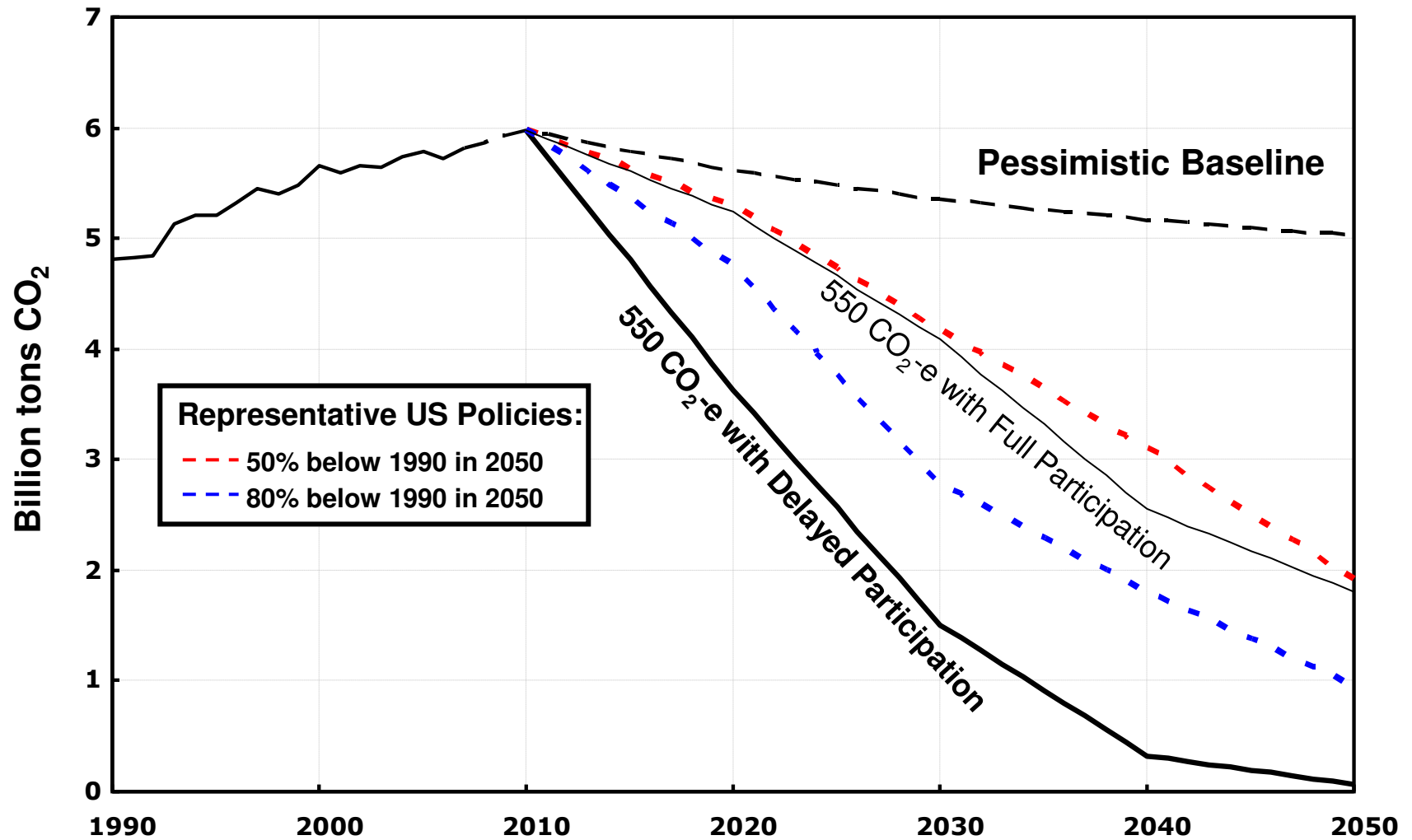
However, Requires Drastic Action in Coalition



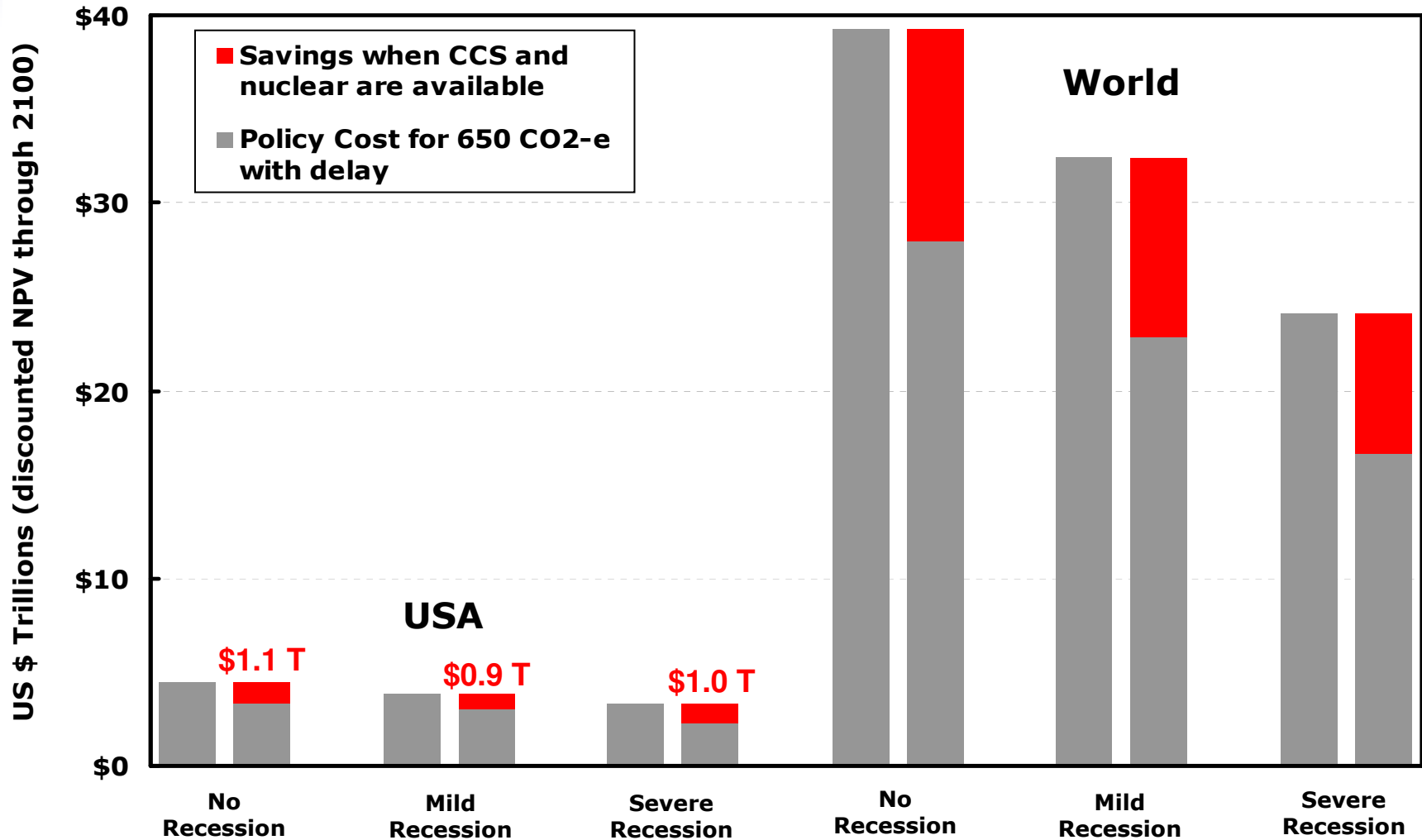
US CO₂ Emissions in Optimistic Case



US CO₂ Emissions in Pessimistic Case



R&D is Still a Good Investment



Conclusions

- 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
- Coalition benefits from incentives for earlier participation and technology adoption in developing world