

International Climate Change Policy after Paris
Harvard Kennedy School, July 14-15, 2016

Clubs, R&D and finance: Incentives for ambitious GHG emission reductions

Carlo Carraro

Vice Chair, IPCC WG III and Co- Chair, GGKP
University of Venice, FEEM and CMCC



Public good provision

Theory of global public good provision provides a clear message: an effective global agreement on climate change control is very unlikely

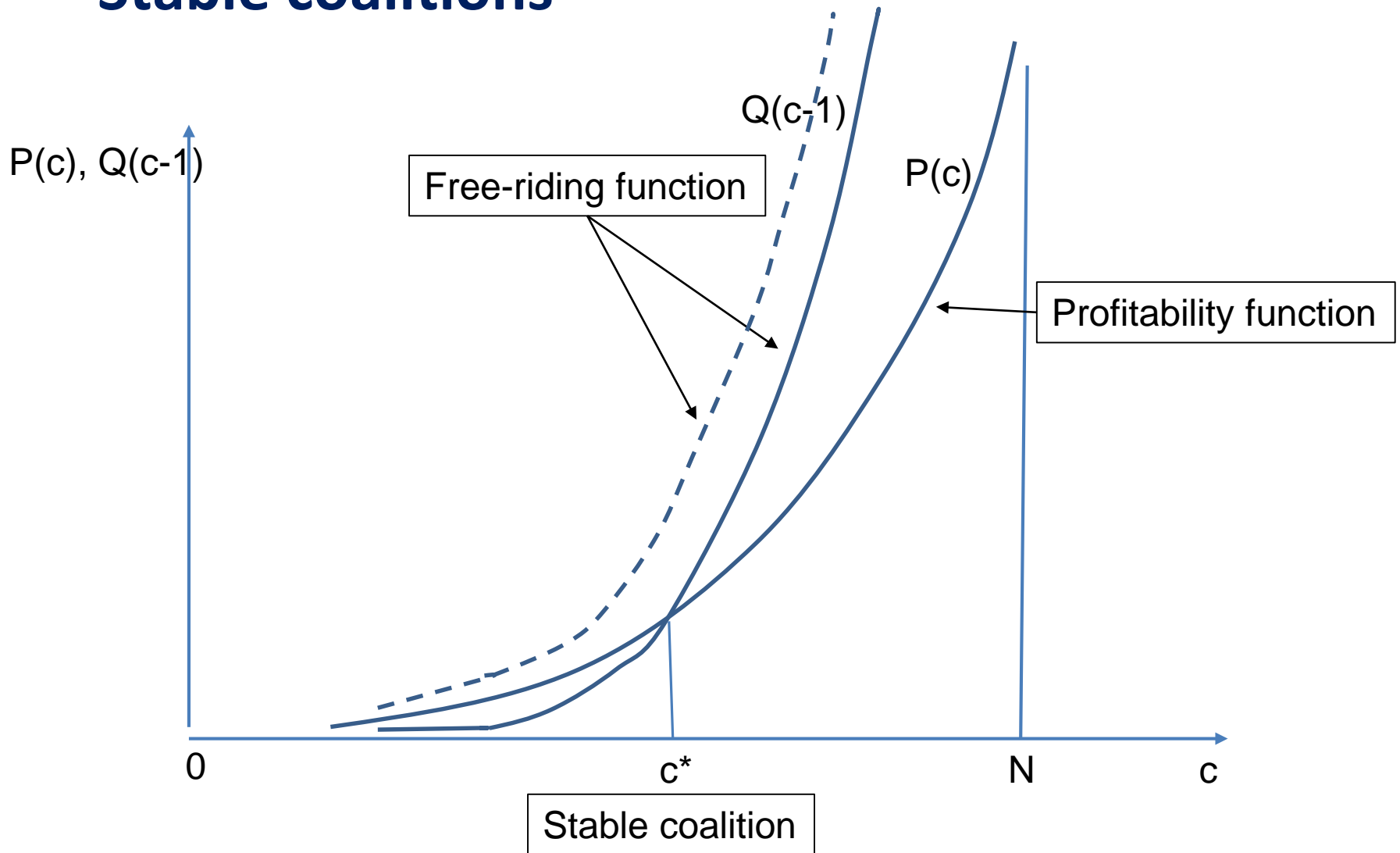
Even the formation of climate clubs is very unlikely unless:

- (i) countries joining the club get benefits that do not accrue to non participants and/or
- (ii) non participants are sanctioned by club members

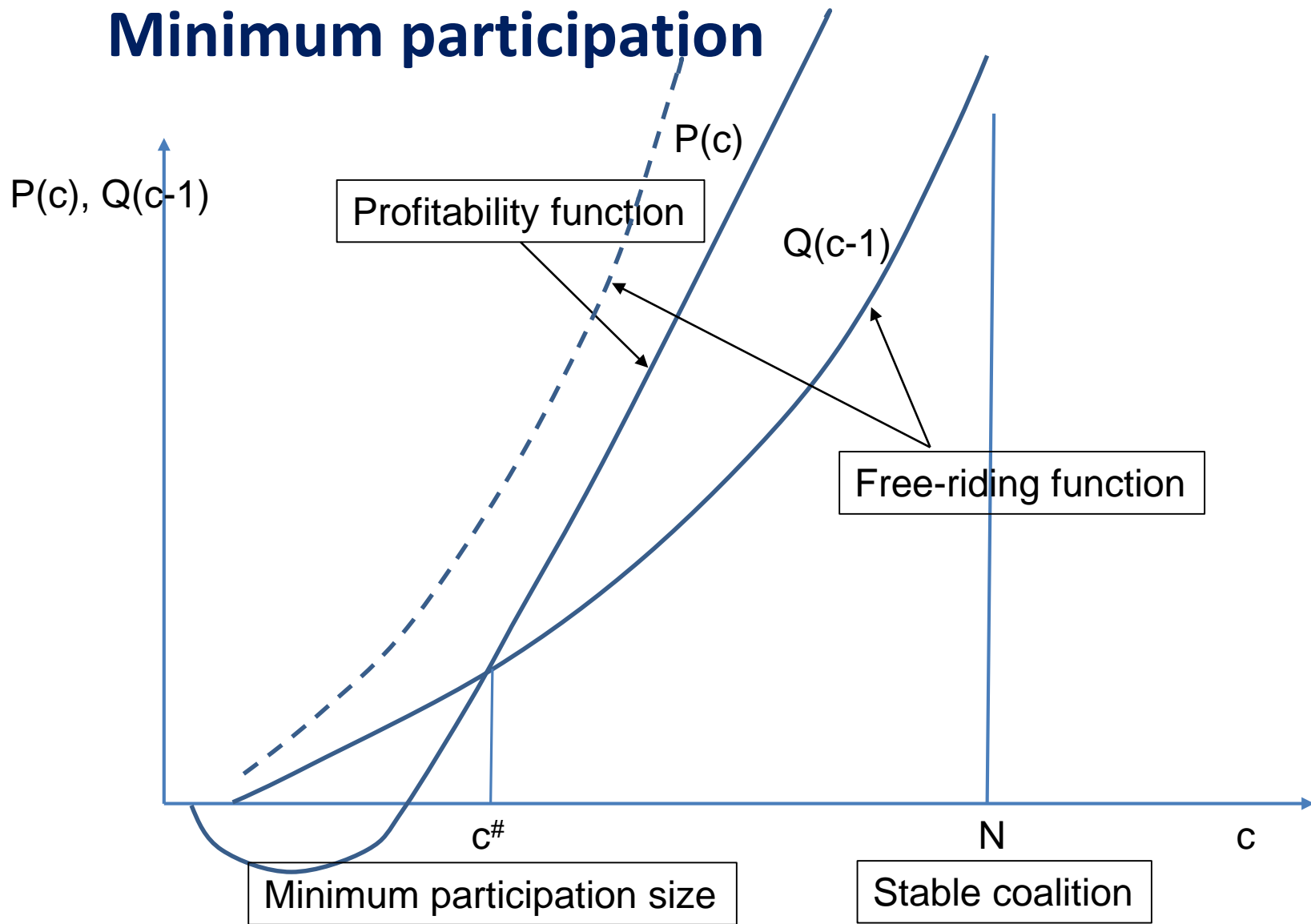
The latter is for example the case of trade sanctions often advocated to support the emergence of climate clubs

However, effective and non self-punishing (credible) trade sanctions are very unlikely as well

Stable coalitions

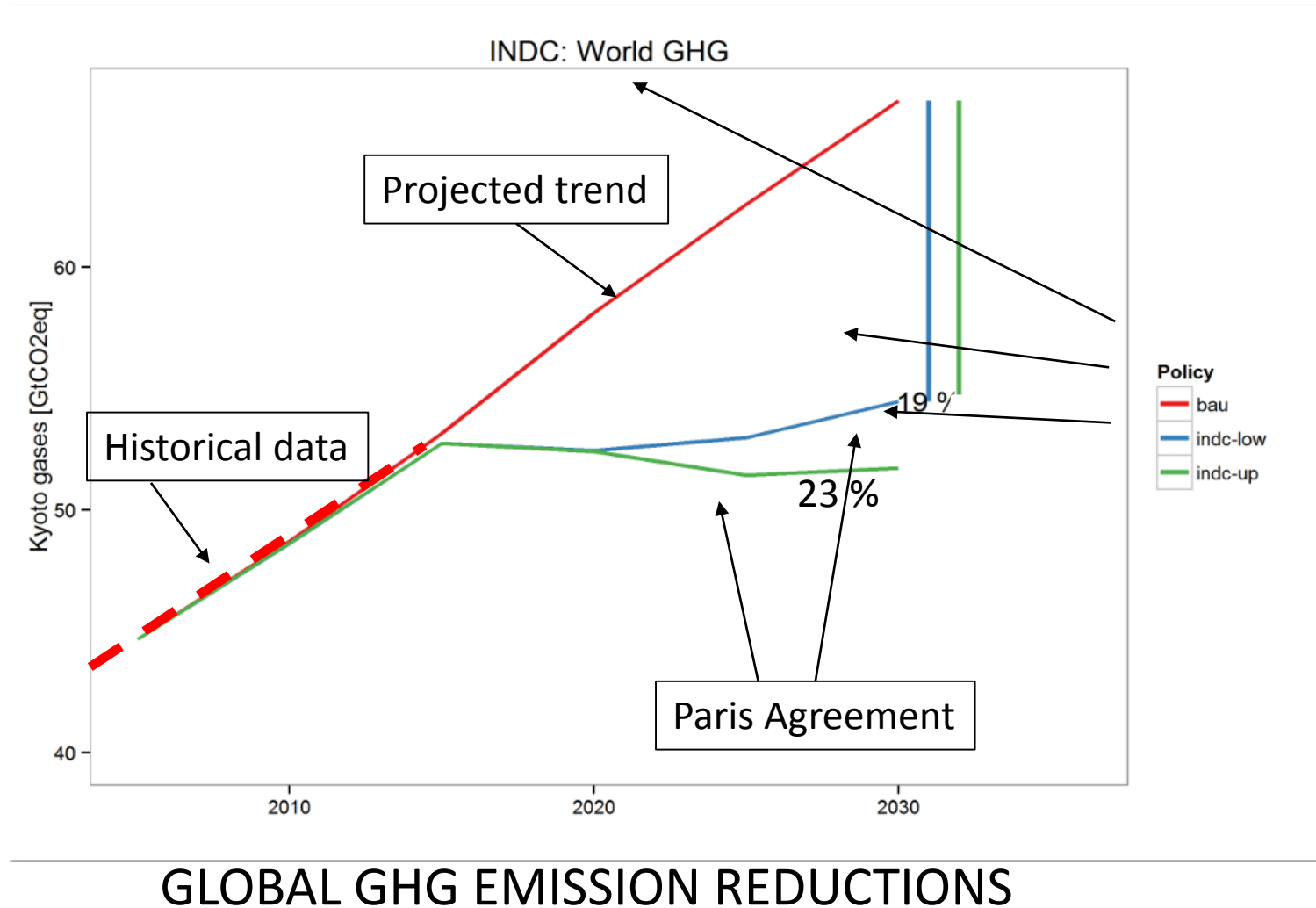


Minimum participation

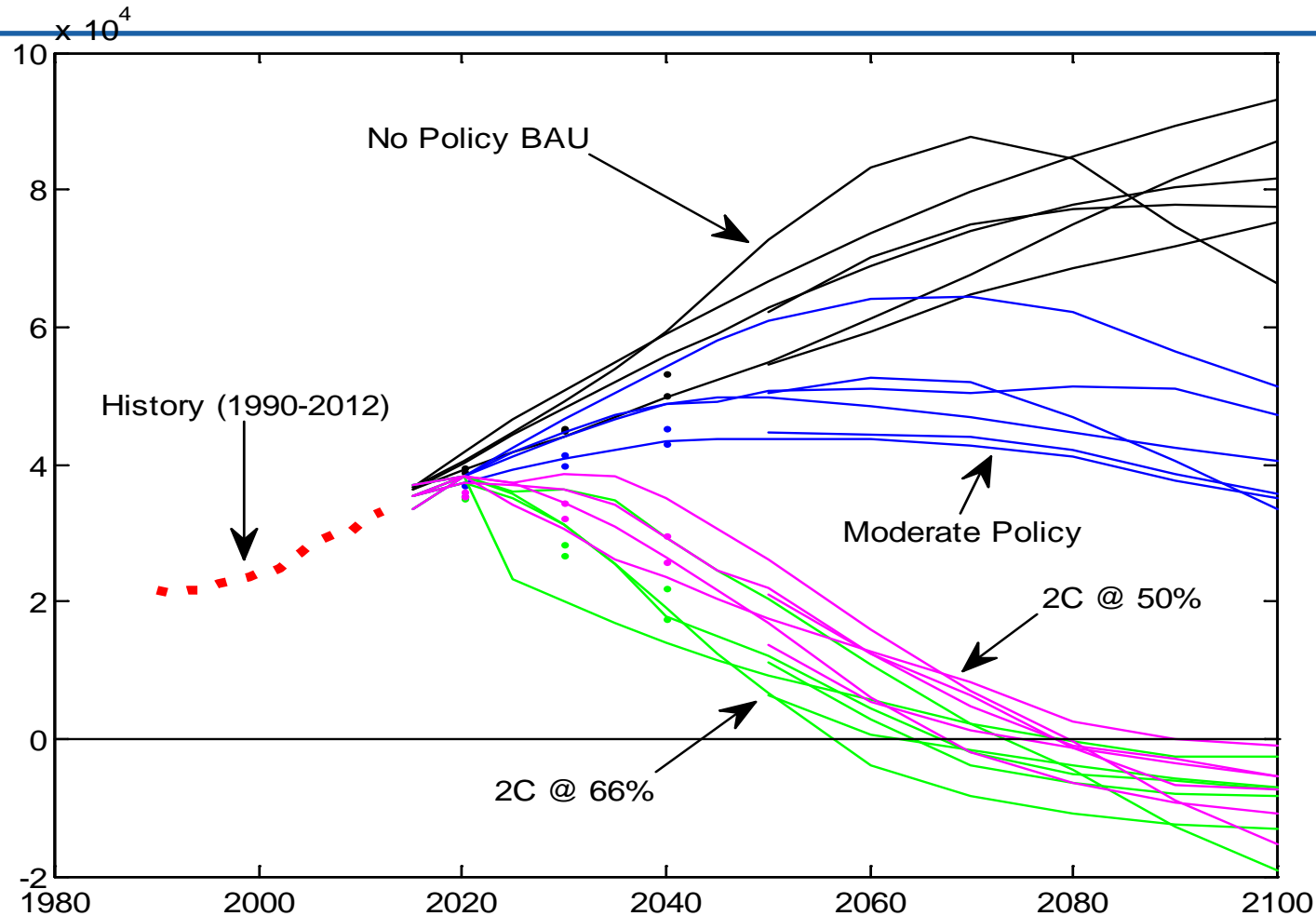


The Paris Agreement

In this context, the Paris agreement is probably one of the best outcomes one can envisage:



The Paris Agreement is largely insufficient if the goal is 2°C



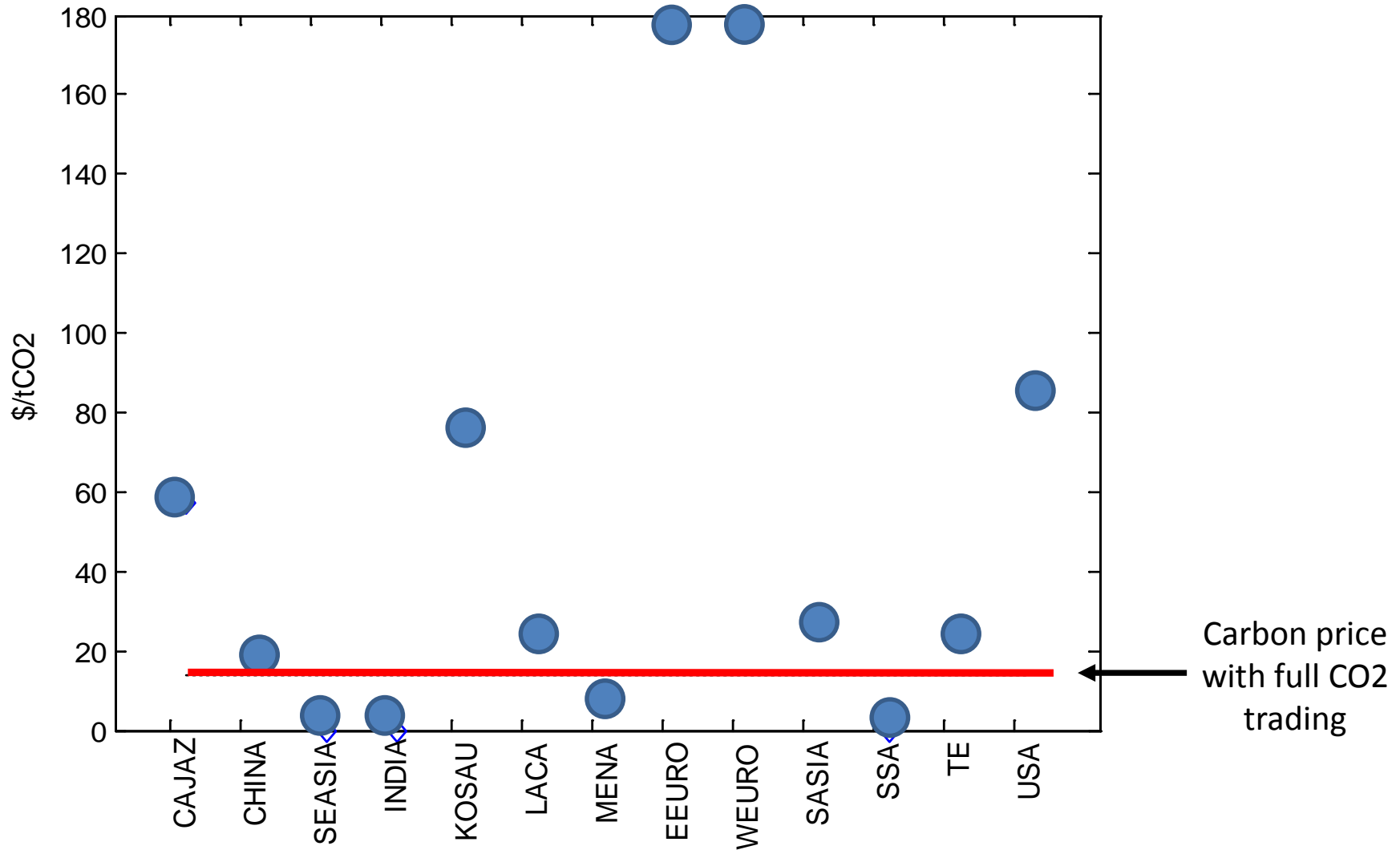
- Achieving 2C with sufficient probability would require departing from historical trends in emissions in the next 5-10 years at most (Source: historical data: EIA/IEA; Projections: LIMITS multi model ensemble)



How can ambitious emission reductions be achieved from 2030 onward?

- Phase-out of coal
 - Remove subsidies to fossil fuels
 - Diffusion of energy efficiency improvements
 - Carbon Pricing → Resources to support R&D and investments
 - Enhanced climate finance
 - Efficient allocation of abatement efforts
-
- Both R&D and Finance can play an important role in future agreements

PARIS AGREEMENT MARGINAL ABATEMENT COSTS IN 2030: EFFICIENCY GAINS ARE AVAILABLE



R&D, Finance and Climate Clubs

- Climate clubs crucially depend on the existence of excludable benefits for members or sanctions for non-members
- Given the low likelihood of trade sanctions to non-members, R&D investments and climate finance are two important sources of excludable benefits
- An R&D club or a finance club can provide important benefits to club members, benefits from which non-members can be excluded
- Examples: club green funds or insurance schemes, patents available to club members only or joint R&D programs (e.g. the Apollo program)



R&D, Finance and Climate Clubs

- R&D investments and climate finance can therefore be used to provide multiple benefits, e.g.:
 - New financial resources to support transition to low carbon economy
 - Technological innovations without which the 2°C target cannot be achieved
- and
- Incentives for climate club formation, which otherwise would not emerge



Thank you!

www.carlocarraro.org



Back up slides



What reference price for carbon?

The answer depends on:

- Technology availability
- Timing of actions
- Architecture of the agreement
- Distributional implications

Data sources

IPCC WGIII AR5 data base, publicly available at

<https://secure.iiasa.ac.at/webapps/ene/AR5DB/dsd?Action=htmlpage&page=about>

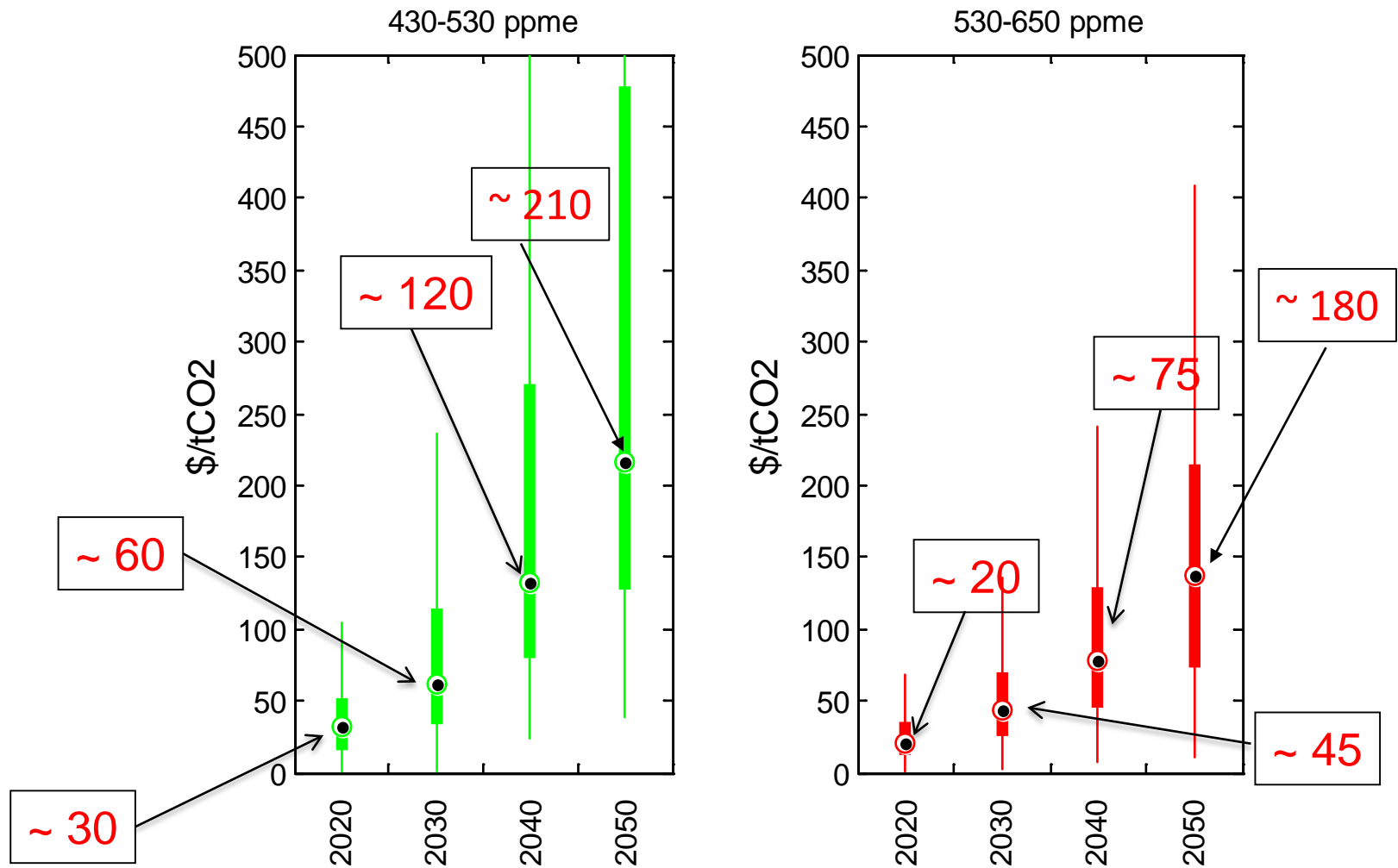
- 15 IAMs
- 1000 scenarios, spanning different climate targets and different policy architectures, and technological availability

LIMITS MIP (Tavoni et. al, Nature Climate 2015)

- 6 IAMs
- 2 non cooperative scenarios with different pledges (mimicking INDCs)
- 2 fully cooperative scenarios (450 and 500 ppm eq)
- 3 burden sharing schemes (tax, per capita convergence, equal costs)

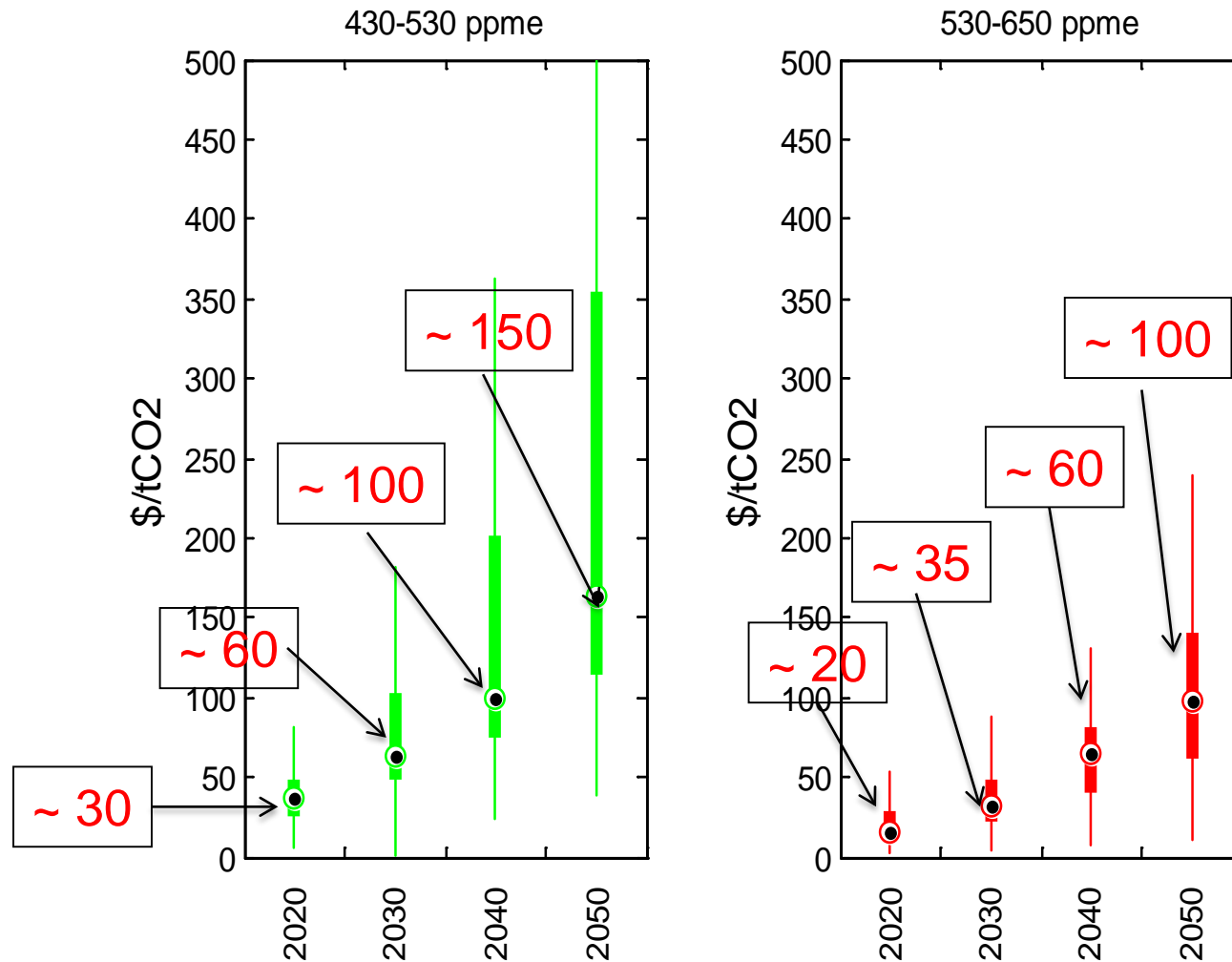
All data publicly available

Global carbon prices for different climate objectives



Boxplots of model results: the central mark is the median, the edges of the box are the 25th and 75th percentiles, the whiskers extend to approx 5-95%

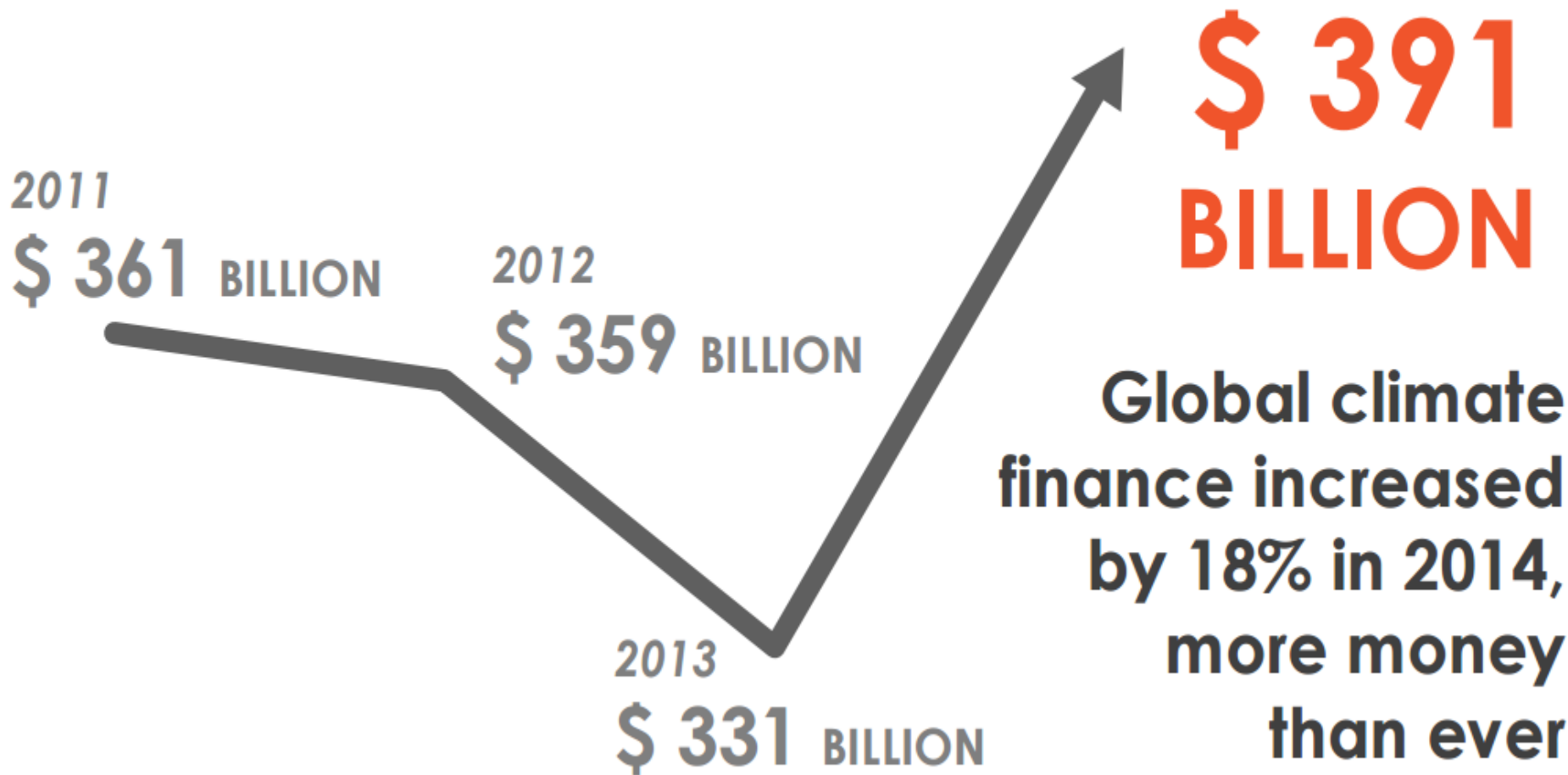
Global carbon prices: first best scenarios



Boxplots of model results: the central mark is the median, the edges of the box are the 25th and 75th percentiles, the whiskers extend to approx 5-95%

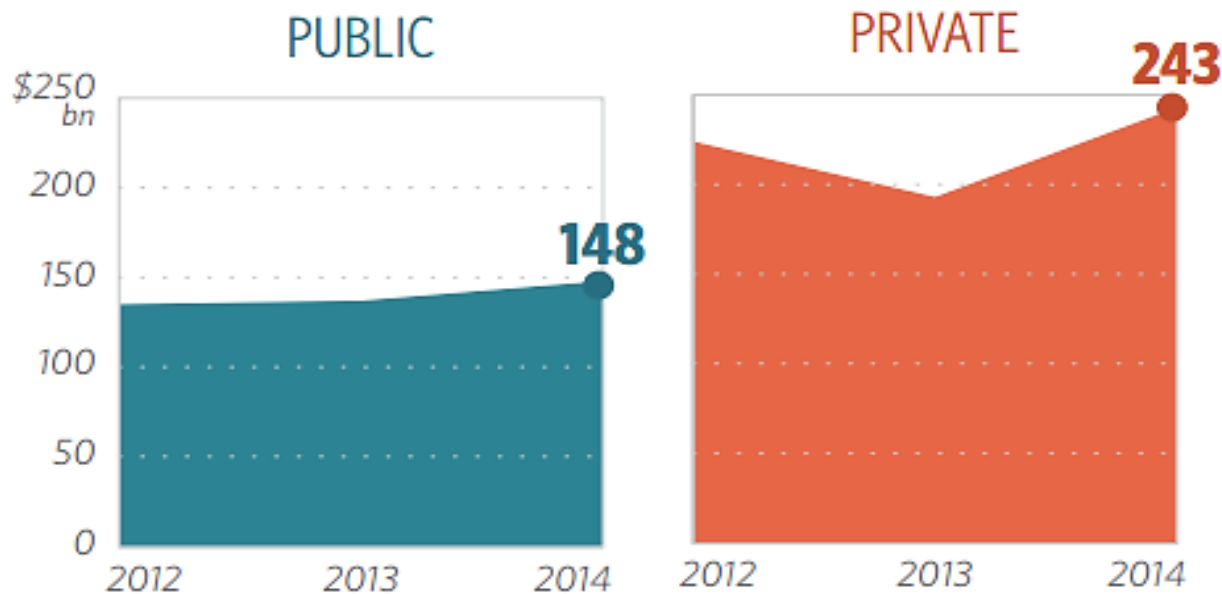
Total climate finance reached \$391 billion in 2014

TOTAL CLIMATE FINANCE IN 2014



Global climate finance flows reached at least USD 391 billion in 2014 as a result of a steady increase in public finance and record private investment in renewable energy technologies.

Figure 1. The evolution of total public and private finance, 2012-2014, in USD billion



Source: CPI analysis.

In 2014, public actors and intermediaries committed USD 148 billion, or 38% of total climate finance flows.

Uses of Climate Financing

93%
mitigation

- Renewable energy generation
- Energy efficiency in industry and buildings
- Sustainable transport
- AFOLU & livestock management

7%
adaptation

- Water supply management
- Climate-resilient infrastructure
- Coastal protection
- Disaster risk reduction
- AFOLU & natural resource management