

# Equity and Global Carbon Budgets – A Framework for Sharing of the Global Carbon Space

*In-session Workshop on Scale of Emissions Reductions to be  
Achieved by Annex 1 Parties  
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# Background

- Various principles have been enunciated to estimate equitable sharing of carbon space
- Various academic researchers in India are working on frameworks to operationalize the principle of sharing of carbon space based on equity in cumulative per capita emissions subject to a global budget
- Presentation outlines the approach, some illustrative results, and emerging conclusions

# Overview

- Goal and Basic Ideas
- Current status of occupation of global carbon space, and residual availability
- Equity-based rules for partitioning of carbon space
- Results and Implications

# Goal and Basic Ideas

- Development of a framework for a just, equity-based partitioning of the global carbon space in order to restrict temperature rise to less than 2°C
- Basic Idea I: Dual Character of CO<sub>2</sub> emissions – both as a `global warming agent' and `development necessity`
- Basic Idea II: Equal Per Capita Cumulative Share – Viable ethical basis for sharing the commons
- Basic Idea III: Nature imposes a global carbon budget

# The Global Carbon Budget

- Historical Emissions (Based on non-LULUCF data)
  - 1850-2009 ----> 332 Gt of C
  - 1850-1970 ----> 109 Gt of C
  - 1971-2009 ----> 223 Gt of C
  
- Future Emissions:
  - 2000-2050 ----> 1000 Gt of CO<sub>2</sub>  
(10% to 42% probability of exceeding 2 deg C)
  - 2000-2050 ----> 1440 Gt of CO<sub>2</sub>  
(29% to 70% probability of exceeding 2 deg C)

# Current Occupation of Carbon Space

	<b>*Non- LULUCF Only</b>		<b>Fair Share</b>
	<b>1850 Basis</b>	<b>1970 Basis</b>	<b>2009 Population Basis</b>
<b>USA</b>	28.8%	24.4%	4.6%
<b>EU</b>	26.1%	19.9%	7.2%
<b>Other Annex-1</b>	18.9%	21.5%	6.9%
<b>Non Annex-1</b>	26.2%	34.2%	81.3%

# Equity-based Rules for Sharing of Carbon Space

## Rule I:

- Countries cut "luxury emissions" if their current share  $>$  fair share of carbon space.
- Countries are allowed "development" emissions if current share  $<$  fair share of carbon space.
- Reduction in emissions even for developing countries if they can reach fair share at end of time period.
- No country is allowed to cross their fair share of total carbon space (stock + flow).

**Objective – Minimize deviation from fair share**

# Equity-based Rules for Sharing of Carbon Space

## **Rule II:**

- Total Global Emissions for 2000-2050 and 2051-2100 restricted by a Global Carbon Budget

**Objective – Minimize deviation from Global Budget**

## **Rule III:**

- Countries with per capita cumulative emissions above specified threshold have to cut emissions.

**Objective – Minimize deviation of per capita cumulative emissions from specified threshold**



# Constraints on emissions growth rates

- Max. Rate of Reduction – Two main examples
  - Option A: Back Loaded  
(From 1990 levels) 48% by 2020, 97% by 2050
  - Option B: Front Loaded  
(From 1990 levels) 63% by 2020, 99% by 2050
- Max growth rate allowed – specified as a multiple of current annual per-capita emissions growth rate

	Option-A	Option-B
2020	1.8 times	1.8 times
2030	1.5 times	2 times
2050	0.5 times	3 times

## Budgets between 2010 and 2050 (with 1850 as starting year)

Scenarios	Option-A (Gt of CO2)	Option-B (Gt of CO2)
I – Only Rule I	1702	1848
II – Only Rule I & III	1688	1828
III – Only Rule I & II	1444	1444
IV – Rule I, II & III	1434	1434

# Illustrative Result: Comparing Options A and B for Scenario IV

1850 Basis - Constant Population	Future Entitlements  2010-2050	Model Allocation ( Scenario IV , Option A) 2010-2050  Based on cuts (from 1990 levels) of 48% by 2020 and 97% by 2050 by Annex-I	Model Allocation (Scenario IV, Option B) 2010-2050  Based on cuts (from 1990 levels) of 63% by 2020 and 99% by 2050 by Annex-I
USA	-66.81	18.41	14.54
EU	-41.17	14.38	11.35
Other Annex-I	-19.43	17.39	13.71
Non Annex 1	427.14	248.02	258.58
Total	299.73	298.20	298.18

# Major Policy Implications

- Allocation or utilisation of carbon space – Cannot be determined by a single party alone (Within a budget if one gains the other loses)
- Necessary to distinguish between allocations or entitlements and physical access to carbon space
- Key feature is the over-occupation of global carbon space by the developed nations
- Consequence of over-occupation
  - In terms of entitlements, developed nations have now negative entitlements into the future
  - Over-occupation has restricted the physical availability of carbon space to developing nations
  - The need to observe a global carbon budget restricts developing countries from realizing their full entitlements