COP-15 and the ethics of climate change

José Eli da Veiga
Petterson Molina Vale

Which "key-Nations" are **responsible** for producing an agreement that guarantees compliment with science's requirements on emissions mitigation?

Post-Kyoto challenge

Annex 1 countries

Countries	Kyoto target 1990 to 2012	Variation 1990 to 2006
Kyoto ratifiers	**-4,3%**	**-15,4%**
Countries that will fulfill the target	-2,5%	-31,0%
Countries that will not fulfill the target	-1,3%	27,8%
Countries that may fulfill the target	-8,4%	1,4%
Non-Kyoto ratifiers	_	**16,6%**
Turkey	_	95,1%
United States	_	14,4%
TOTAL ANNEX 1	_	**-4,7%**

Source: United Nations Convention on Climate Change (UNFCCC).

Emissions variation (1990 – 2004)

World

	Variation 1990 to 2004
31 big emitters	27,53%
Countries whose emissions grew	40,90%
Countries whose emissions felt	-23,02%
52 small emitters	22,85%
92 irrelevant emitters	27,73%
TOTAL (177 countries)	26,98%
China	**126%**
India	**103%**
South Korea	**107%**
Iran	**99%**

Source: Human Development Report 2007 / 2008.

Past – historical responsibility

Present – technological capacity

Future – sustainability

(GARVIN, James. **The ethics of climate change. Right and wrong in a warming world.** London: Continuum, 2008.)

Country	% of total CO2 emissions (2004)	% of historical CO2 emissions (until 1990)	ArCo index
United States	18,20%	31,49%	0,747
Russia	5,24%	11,87%	0,480
Germany	2,41%	8,57%	0,682
United Kingdom	1,91%	8,18%	0,673
China	15,33%	5,40%	0,306
Japan	3,74%	3,69%	0,721
Canada	2,10%	2,16%	0,742
France	1,15%	3,42%	0,604
Indonesia	8,69%	0,34%	0,265
Brazil	4,73%	0,60%	0,330
(...)	**(...)**	**(...)**	**(...)**

Main conclusion:

List obtained =~ G20

ArCo index

ARCHIBUGI, Daniele & COCO, Alberto (2004) "A new indicator of technological capabilities for developed and developing countries (ArCo)." **World Development**, (32) 4: 629-654.

Merges UNDP's Technological Achievement Index (TAI) with UNIDO's Industrial Development Scoreboard and adapts for maximum coverage.

- **Technological creation index** - simple average of patents and scientific articles.
- **Technological infra-structure index -** simple average of internet penetration, telephone penetration and electricity consumption.
- **Human capital index -** simple average of **t**ertiary science and engineering enrollment, mean years of schooling and Literacy rate.

% of global emissions until 1990 (CDIAC)	Technological capacity (ArCo index)	% of global emissions in 2004 (CDIAC)
USA: 31.49%	Sweden: 0.867	USA: 22.20%
Russia: 13.85%	Finland: 0.831	China: 18.39%
Germany: 8.57%	Switzerland: 0.799	Russia: 5.59%
UK: 8.18%	Israel: 0.751	India: 4.93%
China: 5.40%	USA: 0.747	Japan: 4.62%
Japan: 3.69%	Canada: 0.742	Germany: 2.97%
France: 3.42%	Japan: 0.721	Canada: 2.35%
(...)	(...)	(...)

$$I_R(i) = \frac{\left(\frac{\frac{Emissions\ until\ 1990_i}{Total\ Emissions\ until\ 1990} + \frac{Emissions\ 2004_i}{Total\ Emissions\ 2004}}{2} \right) \times ArCo_i}{\sum_1^{177} I_r(i)} \times 100$$

	Country	Responsibility index
1	**United States**	35,25
2	**Russia**	7,80
3	**Germany**	7,11
4	**United Kingdom**	6,45
5	**China**	6,02
6	**Japan**	5,08
7	**Canada**	3,00
8	**France**	2,62
9	**Indonesia**	2,27
10	**Brazil**	1,67
11	**Italy**	1,40
12	**Australia**	1,34
13	**India**	1,26
14	**Korea**	1,05

	Country	Responsibility index
19	**Belgium**	0,90
20	**Netherlands**	0,82
21	**Mexico**	0,78
22	**Czech Republic**	0,64
23	**Iran**	0,57
24	**Argentina**	0,54
25	**Saudi Arabia**	0,44
26	**Sweden**	0,42
27	**Austria**	0,39
28	**Romania**	0,37
29	**Thailand**	0,35
30	**Venezuela**	0,34
31	**Turkey**	0,33
32	**Denmark**	0,28

Concluding remarks

15 countries with highest responsibility are in G20. Only five out of the 35 on the top of the list are not.

Technological alliance – exchange and cooperation.

Four instruments: carbon pricing; technology-push; efficiency standards; behavioral change.

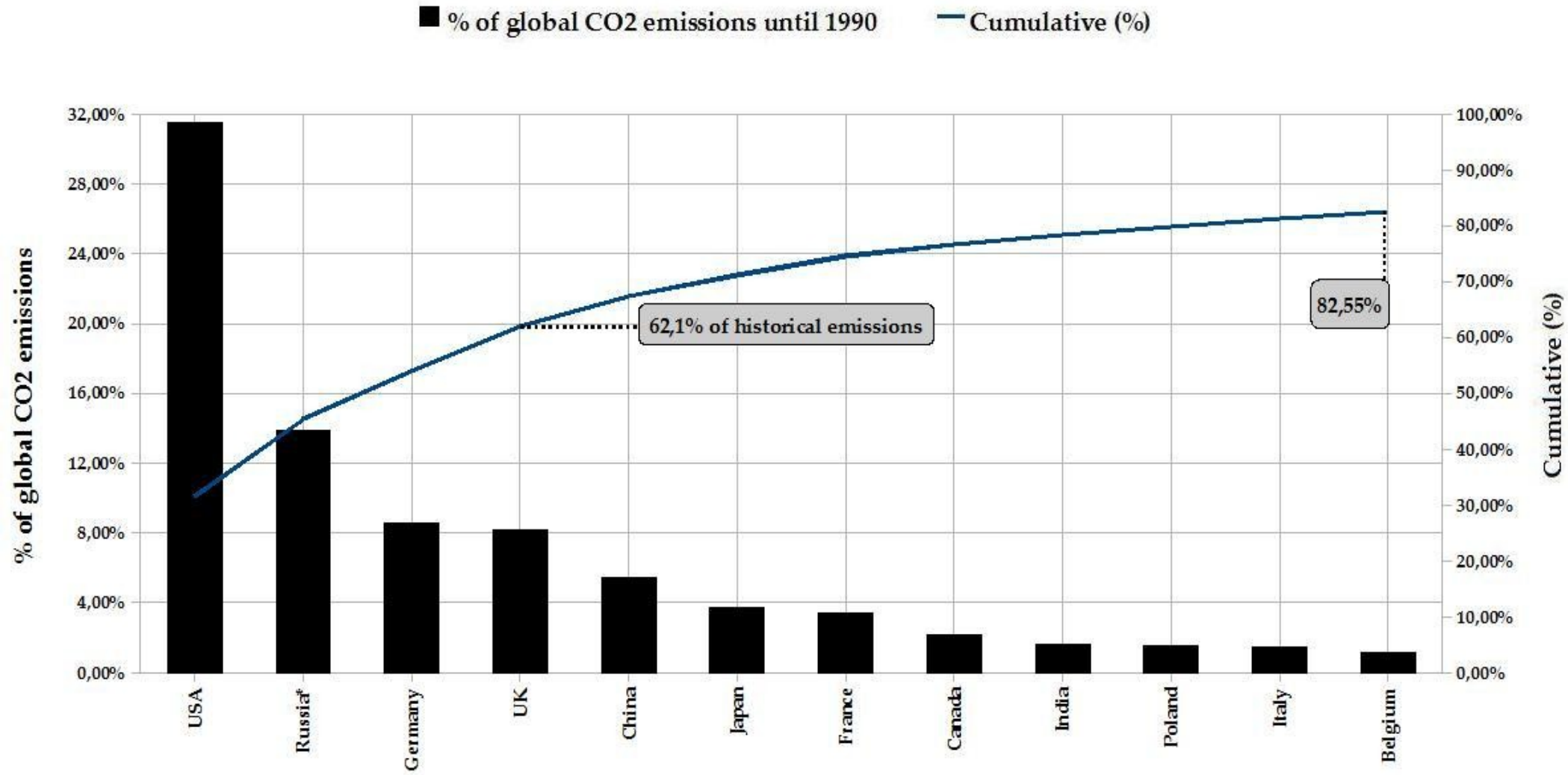
José Eli da Veiga
zeeli@usp.br
www.zeeli.pro.br

Petterson Molina Vale
pettersonvale@eco.unicamp.br
www.pettersonvale.blogspot.com

APPENDIX

Datasets

Estimates of historical responsibility for CO2 emissions



Source: Carbon Dioxide Information Analysis Center (CDIAC).

Technological leaders*

	Country	ArCo
1	Sweden	0,867
2	Finland	0,831
3	Switzerland	0,799
4	Israel	0,751
5	USA	0,747
(…)	(…)	(…)
25	Spain	0,516

Potential leaders

	Country	ArCo
26	Slovenia	0,507
27	Greece	0,489
28	Luxembourg	0,486
29	Slovakia	0,481
30	Russia	0,480
(…)	(…)	(…)
50	Romania	0,393

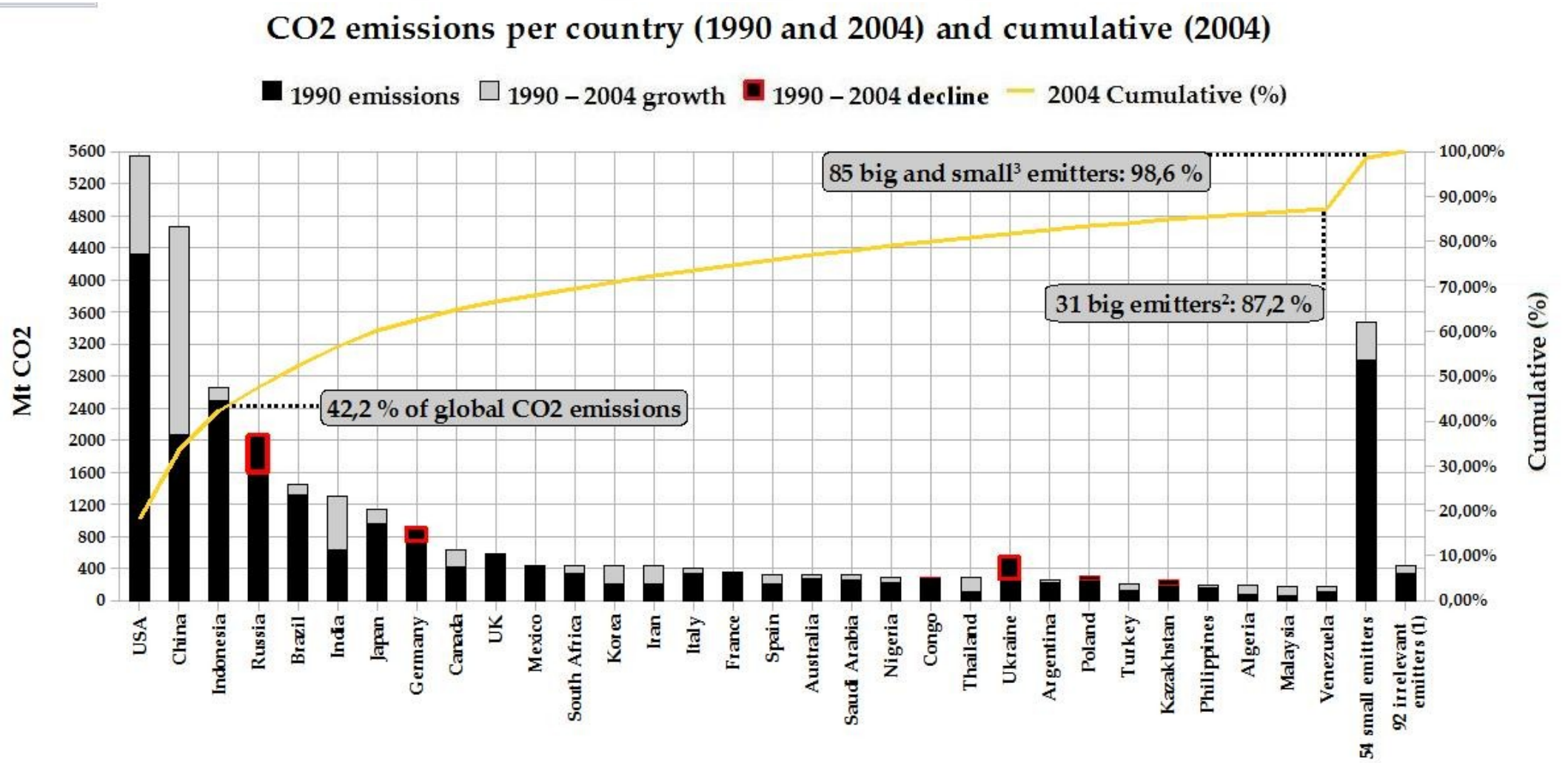
Latecomers

	Country	ArCo
51	Panama	0,382
52	Kazakhstan	0,381
53	Trinidad and Tobago	0,380
54	Qatar	0,380
55	Georgia	0,379
(…)	(…)	(…)
111	India	0,225

Marginalized

	Country	ArCo
112	Swaziland	0,222
113	Morocco	0,217
114	Namibia	0,217
115	Congo,	0,207
116	Kenya	0,204
(…)	(…)	(…)
162	Somalia	0,028

Source: ARCHIBUGI, Daniele & COCO, Alberto (2004) "A new indicator of technological capabilities for developed and developing countries (ArCo)." **World Development**, (32) 4: 629-654.



Source: Human Development Report 2007 / 2008.

1 – Countries with irrelevant emissions are those that lie bellow the median of the distribution (22 Mt). As a group, they represent 1.4% of total emissions.

2 – Big emitters are those who emitted more than the average of the complete series (172 Mt).

3 – Small emitters are those who emitted less than the average of the complete series (172 Mt), expect for the inferior outliers.