04
NOV

Climate Action beyond COP21: from International Negotiations to Universal Mobilisation?

Paris

Wednesday 4 November 2015
from 8:45 to 11:45 am

The aggregate effect of INDCs: what chances do we have to stay below 2°C?

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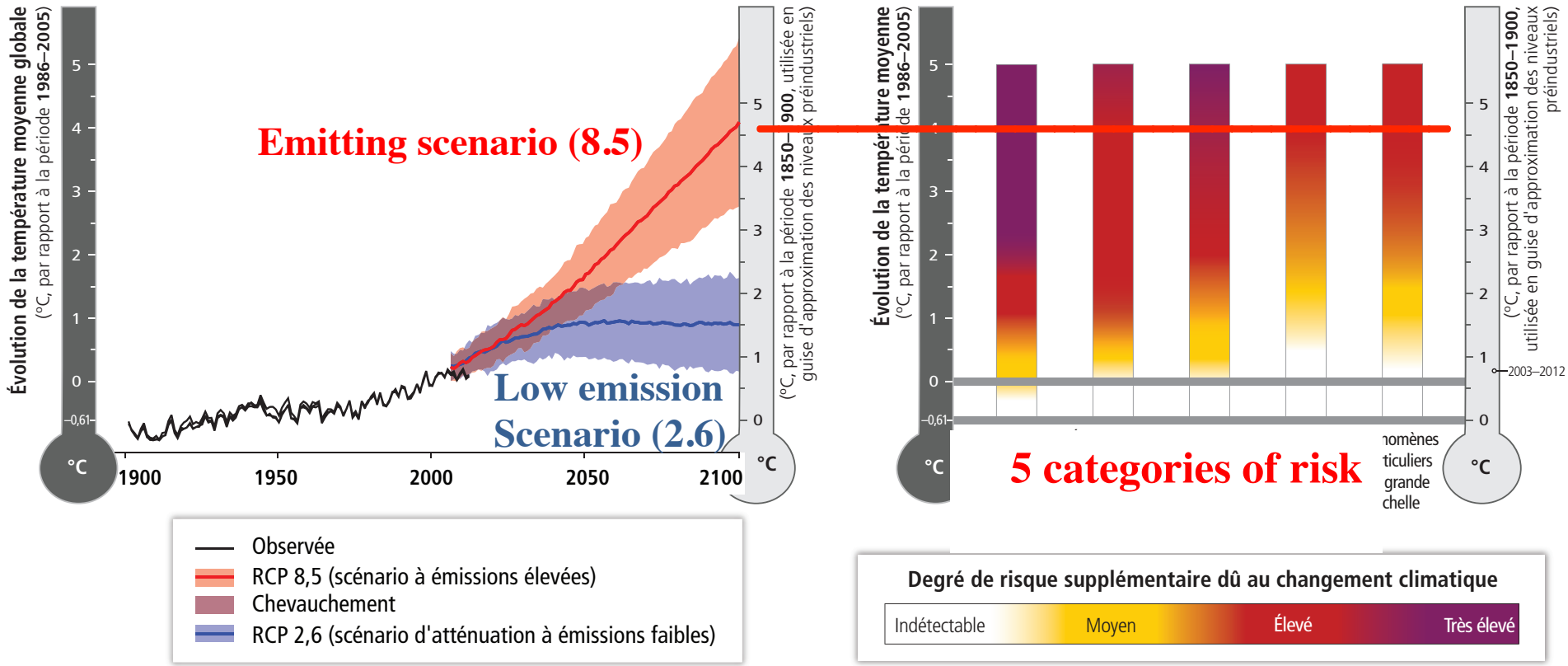
Climate Convention (UNFCCC) launched in1992, at the Rio Earth Summit (+ biodiversity and desertification)

Ultimate objective of the Climate Convention (article 2) :

- **To achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.**
- **Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.**

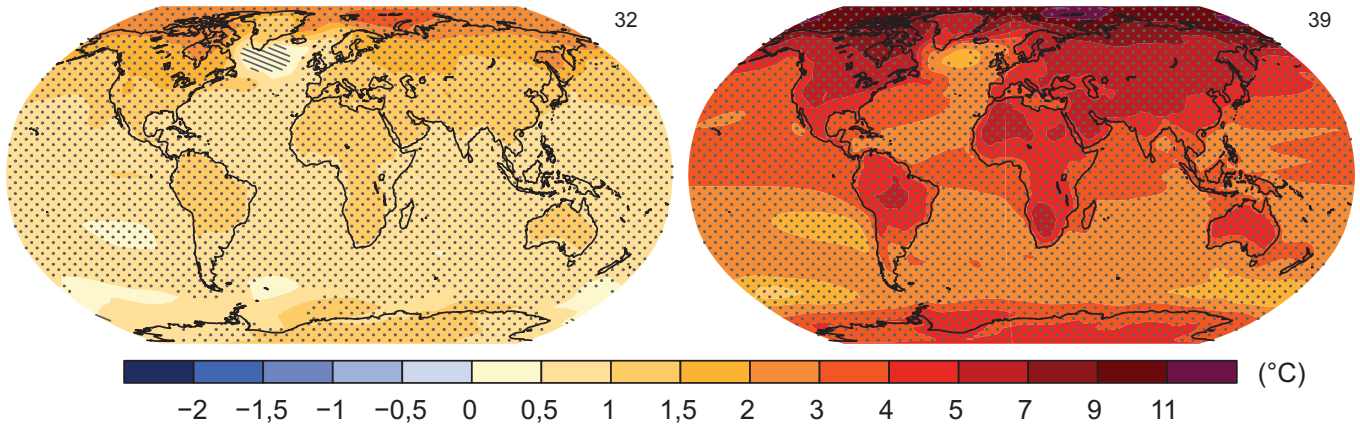
Stabilization requires GHG emission decrease

2°C objective : COP 15 Copenhagen (2009) ; Cancun (2010)



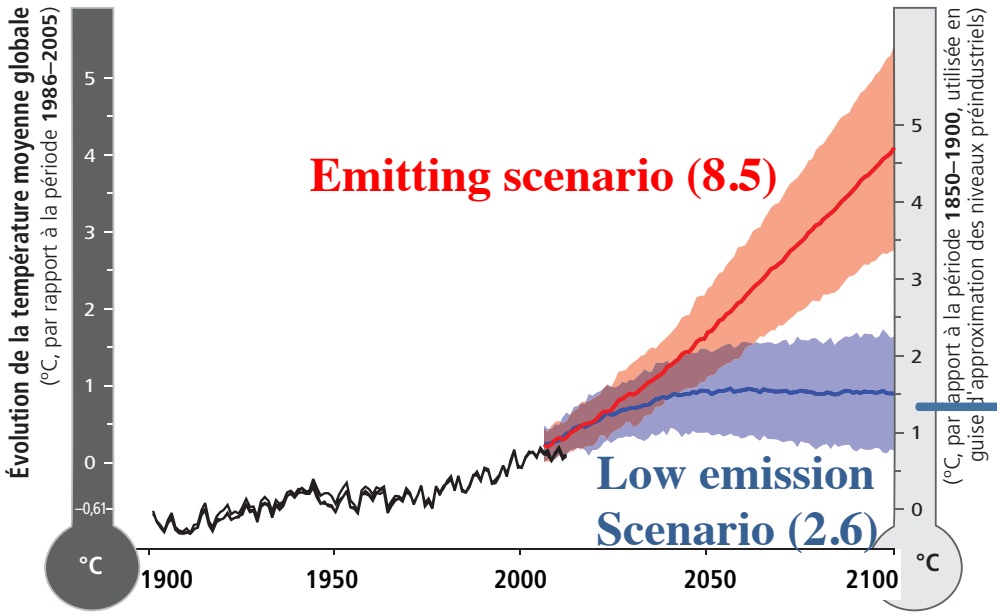
RCP 2,6 RCP 8,5

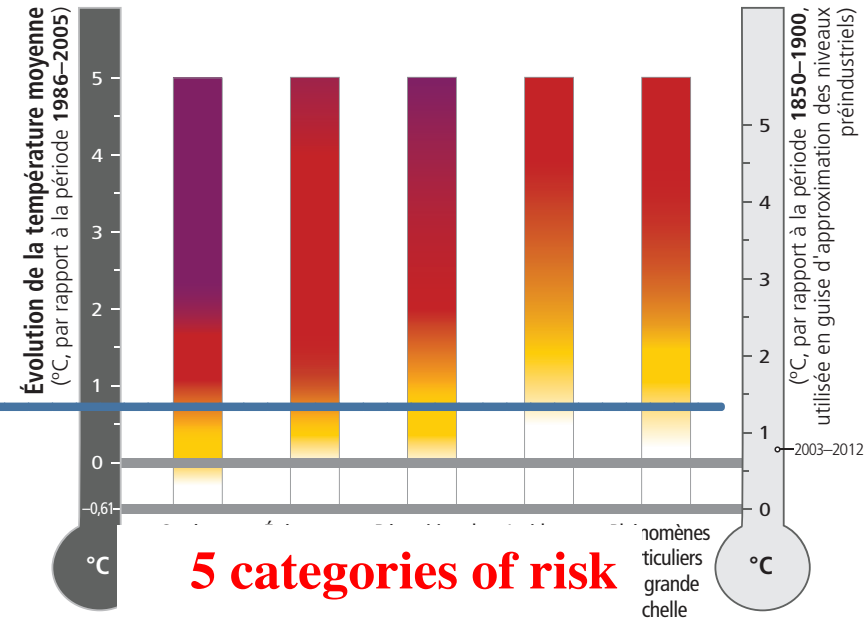
a) Évolution de la température moyenne en surface (entre 1986-2005 et 2081-2100)



If nothing is done
Very important effects for all categories

- **Ocean acidification, coral reefs**
- **Climate extremes**
  - **Droughts, floods, heat waves, cyclones**
- **Populations**
  - **Climate refugees, water resources, food security, security**
- **Biodiversity, agriculture, ecosystems, pollution, health,**
- **Irreversible processes**
  - **Sea-level, permafrost**



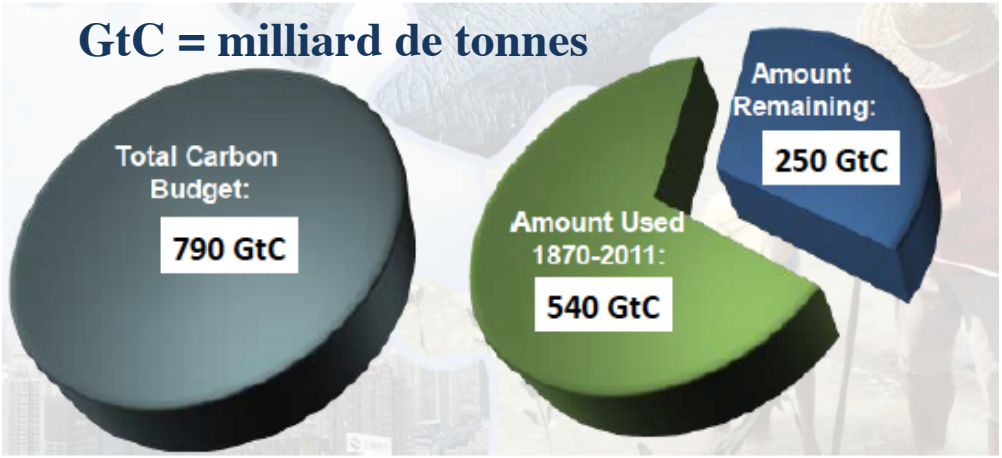


Observée
RCP 8,5 (scénario à émissions élevées)
Chevauchement
RCP 2,6 (scénario d'atténuation à émissions faibles)

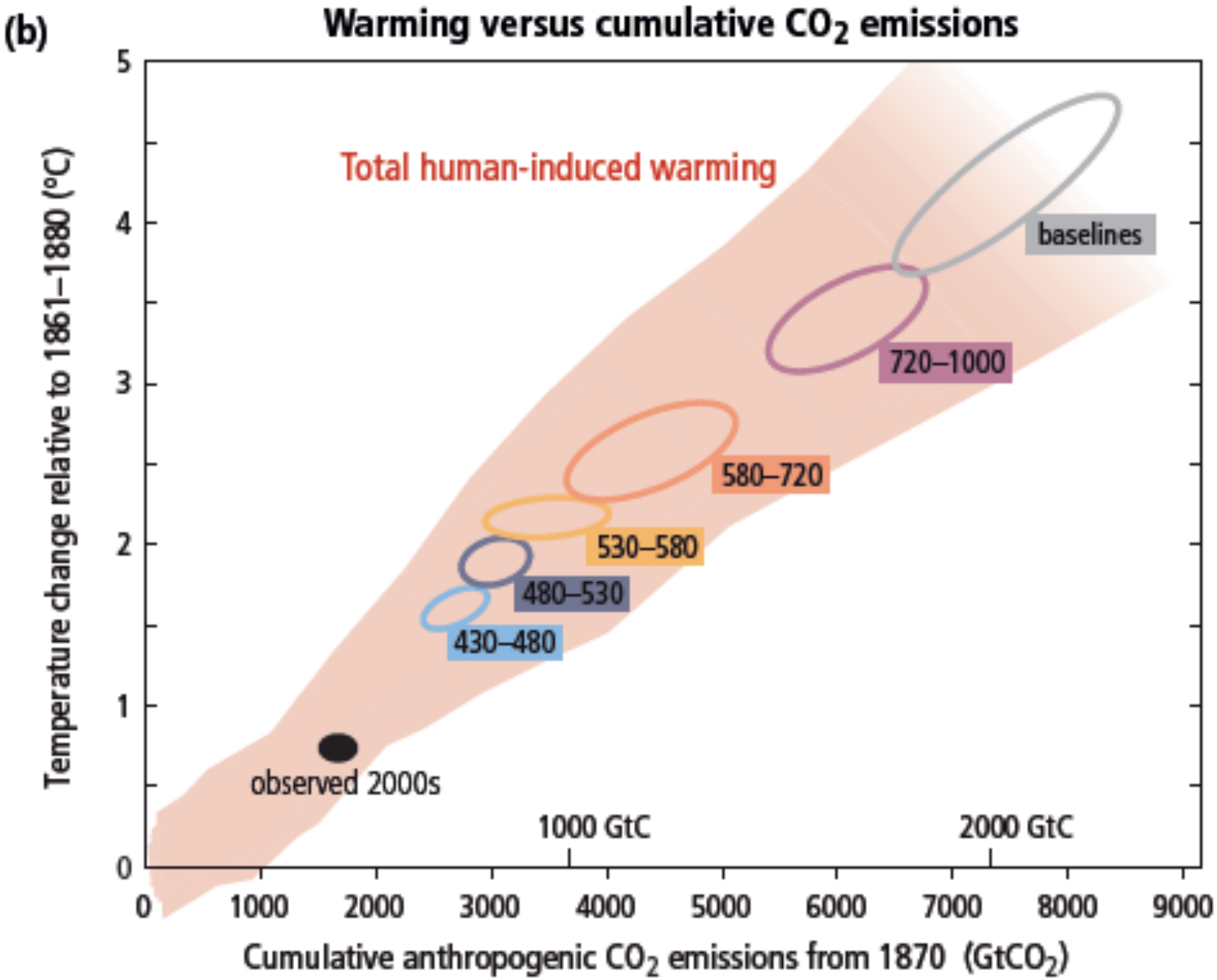
Degré de risque supplémentaire dû au changement climatique

Indétectable | Moyen | Élevé | Très élevé

Température at stabilization (long term) is roughly proportional to cumulative CO_2 émissions



Objective 2°C : we have already used 68% of our carbon budget

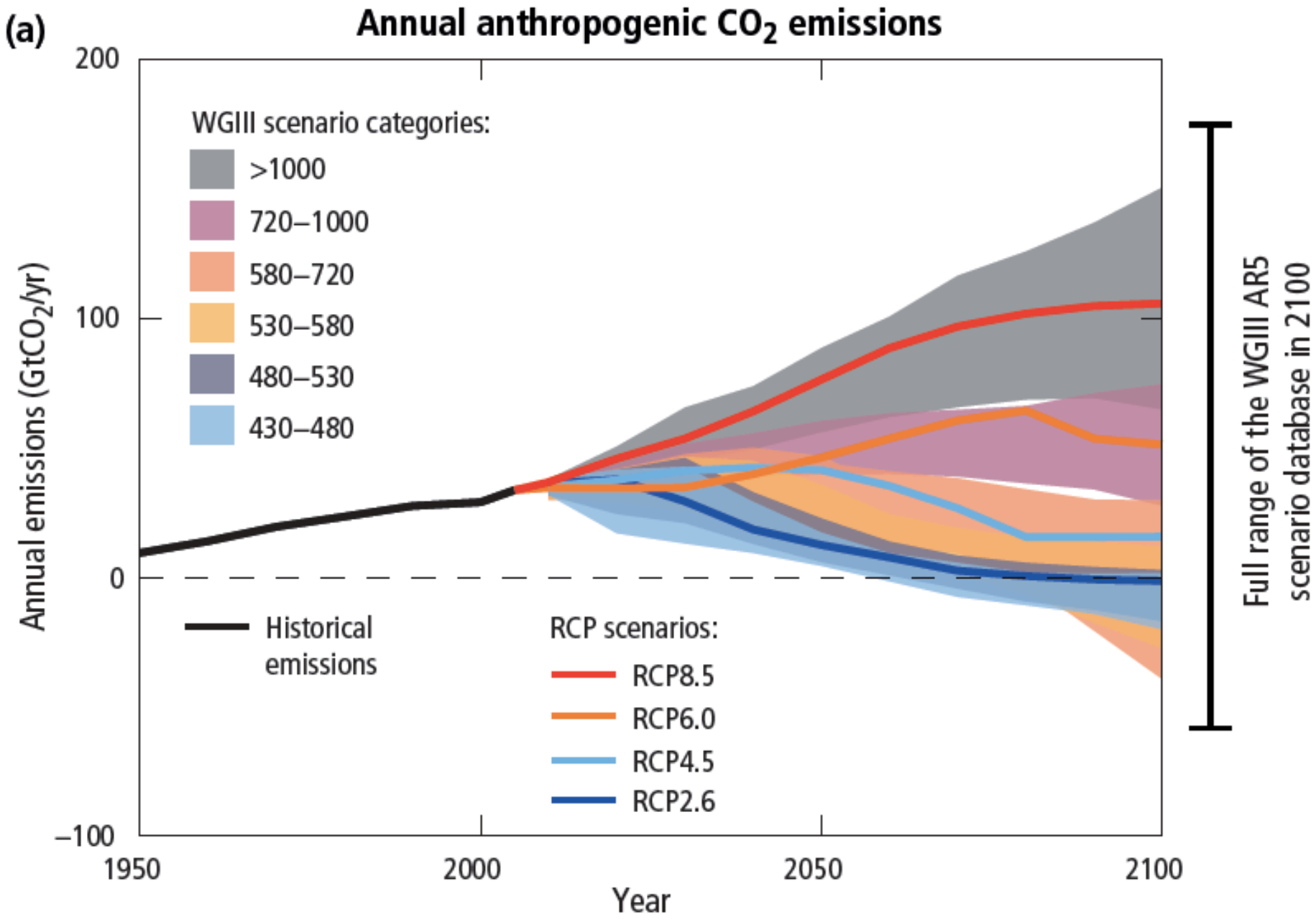

(b)
Warming versus cumulative CO_2 emissions
Total human-induced warming
baselines
720–1000
580–720
530–580
480–530
430–480
observed 2000s
1000 GtC
2000 GtC
Temperature change relative to 1861–1880 (°C)
Cumulative anthropogenic CO_2 emissions from 1870 ($GtCO_2$)
0
1
2
3
4
5
0
1000
2000
3000
4000
5000
6000
7000
8000
9000

WK3 Table 7.2

	Reserves 1471 GtC		Resources	
	[EJ]	[Gt C]	[EJ]	[Gt C]
Conventional oil	4 900 - 7 610	98 - 152	4 170 - 6 150	83 - 123
Unconventional oil	3 750 - 5 600	75 - 112	11 280 - 14 800	226 - 297
Conventional gas	5 000 - 7 100	76 - 108	7 200 - 8 900	110 - 136
Unconventional gas	20 100 - 67 100	307 - 1 026	40 200 - 121 900	614 - 1 863
Coal	17 300 - 21 000	446 - 542	291 000 - 435 000	7 510 - 11 230
Total	51 050 - 108 410	1 002 - 1 940	353 850 - 586 750	8 543 - 13 649

[1]Reserves are those quantities able to be recovered under existing economic and operating conditions (BP, 2011); resources are those where economic extraction is potentially feasible (UNECE, 2010a).

- *2°C : Less than 20% of CO_2 reserves should be used (+ other GHGs)*
- *Less than 25 years at the current rate of emissions ~ (10 GtC)*
- *Decrease between – 40 et – 70% between 2050 and 2010. We have to act now (stream 2) and divide by up to a factor of 3 betwwen 2020 and 2050. Carbon neutrality should be ensured at the end of the century.*
- *Technically feasible and economically viable.*


(a)
Annual anthropogenic CO_2 emissions
200
100
0
–100
Annual emissions ($GtCO_2$/yr)
1950
2000
2050
2100
Year
WGIII scenario categories:
>1000
720–1000
580–720
530–580
480–530
430–480
Historical emissions
RCP scenarios:
RCP8.5
RCP6.0
RCP4.5
RCP2.6
Full range of the WGIII AR5 scenario database in 2100

Science workshop on INDCs and the 2°C objective

3rd November 2015 – Paris – Université Pierre et Marie Curie, Tour Centrale, Salle des Conseils, 23rd floor – 4, place Jussieu, 75005 Paris

09:45 – 10:00	**GICN**	Patrick Criqui (EDDEN, CNRS)
10:00 – 10:15	**IEA**	Laura Cozzi (IEA)
10:15 – 10:30	**Climate Action Tracker**	Louise Jeffery (PIK) Michiel Schaeffer (Climate Analytics) Marcia Rocha (Climate Analytics)
10:30 – 10:45	**MIT / Climate Interactive**	Andrew Jones (Climate Interactive) John Sterman (MIT Sloan)
10:45 – 11:00	**ESRC–Grantham Institute**	Joe Cranston Turner (LSE)
11:00 – 11:15	**JRC-EU IPTS**	Kimon Keramidas (JRC-EU IPTS)
11:15 – 11:30	**Coffee break**	
11:30 – 11:45	**Danish Energy Agency**	Steffen Dockweiler (DEA)
11:45 – 12:00	**PBL**	Michel den Elzen (PBL)
12:00 – 12:15	**PNNL**	Haewon McJeon (PNNL)
12:15 – 12:30	**MILES project**	Christoph Bertram (PIK) Roberta Pierfederici (IDDRI)
12:30 – 12:45	**World Resources Institute**	TBD (WRI)
12:45 – 13:00	**FNH**	Samuel Lere (Fondation Nicolas Hulot)

Une agrégation des INDC

INDCs									2030		2030/référence			2030/2012	
MtCO2e GHG EDGAR 2012		1990	1995	2000	2005	2010	2012	INDC	inconditionnel/ min	conditionnel/ max	inconditionnel/ min	conditionnel/ max	référence	inconditionnel /min	conditionnel /max
	USA	5 852	6 027	6 602	6 764	6 263	5 871		4 735	4 599	-30%	-32%	/2005	-19%	-22%
	EU	5 343	4 836	4 648	4 660	4 385	4 221		3 206	3 206	-40%		/1990	-24%	-24%
	China	3 739	4 665	4 688	7 364	10 818	12 101		16 043	13 481				33%	11%
45%	Triad	14 935	15 528	15 938	18 788	21 465	22 193		23 983	21 286				8%	-4%
	Canada	684	697	746	1 062	888	1 100		743	743	-30%		/2005	-32%	-32%
	Mexico	497	501	565	618	636	648		759	623	-22,0%	-36%	/BAU	17%	-4%
	Brazil	1 732	1 833	1 663	2 124	3 168	2 930		1211	1 211	-43%		/2005	-59%	-59%
	South Africa	350	370	419	495	456	449		614	398	PPD	PPD	/PPD	37%	-11%
	Russia	3 251	2 563	2 583	2 309	2 306	2 409		2 276	2 276	-30%		/1990	-6%	-6%
	Japan	1 222	1 339	1 326	1 336	1 209	1 335		996	996	-25%		/2005	-25%	-25%
	South Korea	274	427	487	530	597	637		536	536	-37%		/BAU	-16%	-16%
	Australia	475	480	1 052	937	802	773		693	693	-26%		/2005	-10%	-10%
	India	1 324	1 569	1 797	1 918	2 607	2 839		6656	5984				134%	111%
	Indonesia	1 092	1 240	547	67	780	869	1800 in 2005	2046	1700	-29%	-41%	/BAU	135%	95%
28%	DDPP-10	10 901	11 020	11 184	11 395	13 450	13 988		16 530	15 160				18%	8%
	United Arab Emirates	72	93	114	143	193	205		307	266	50%	30%	/2012	50%	30%
	Egypt	139	155	184	243	280	295		384	384	30%		/2012	30%	30%
	Iran	283	370	448	573	527	548		712	712	30%		/2012	30%	30%
	Saudi Arabia	205	262	311	386	495	549		824	714	50%	30%	/2012	50%	30%
	Kazakhstan	357	244	207	291	347	362		303	267	-15%	-25%	/1990	-16%	-26%
	Malaysia	-151	-102	-139	317	332	323		372	372	15%		/2012	15%	15%
	Taiwan	137	186	249	291	306	326		375	375	15%		/2012	15%	15%
	Turkey	218	240	295	318	393	416	440 in 2012	929	929	-21%		/BAU	123%	123%
	Thailand	214	279	287	357	383	422	env. 378 in 2012 (	444	416	-20%	-25%	/BAU	5%	-1%
	Ukraine	945	545	416	406	365	374		567	567	-40%		/1990	51%	51%
	International Aviation	299	314	361	429	491	524		1557	906	0%	-15%	/BAU	197%	73%
	International Shipping	378	428	477	533	626	669		866	736	0%	-15%	/BAU	30%	10%
10%	Sup400-2012	3 098	3 012	3 211	4 287	4 738	5 014		7 639	6 644				52%	33%
	Other Annex 1 countries	329	235	175	174	176	172		227	227				-7%	-7%
	Other emerging countries	312	281	376	495	572	622		1 402	1 102				118%	71%
	Other high income oil exporters	83	110	105	144	172	184		263	228				45%	25%
17%	Rest of World	4 814	4 901	6 189	6 698	6 751	7 207		13 539	11 150				88%	55%
	Total (bottom-up)	**34 473**	**35 088**	**37 178**	**41 979**	**47 325**	**49 380**		**63 584**	**55 797**				29%	13%
	∑ submitted INDCs								51 301	46 135					
	∑ submitted + estimated INDCs								63 584	55 797					

Avec les hypothèses considérées, les INDC conduisent à des émissions en 2030 entre 55 et 60 $GtCO_2eq$.

Source : GICN, 2015

Caractérisation des contributions volontaires (INDC)

Groupe Interdisciplinaire sur les Contributions Nationales

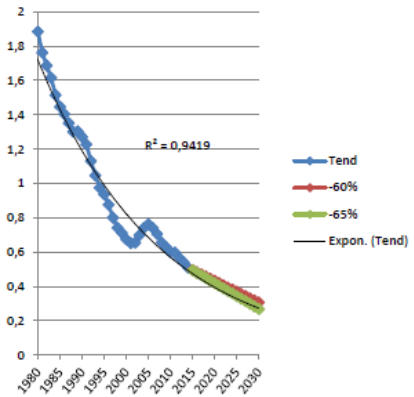
Olivier Boucher (LMD, CNRS)
Hélène Benveniste (IPSL, CNRS)

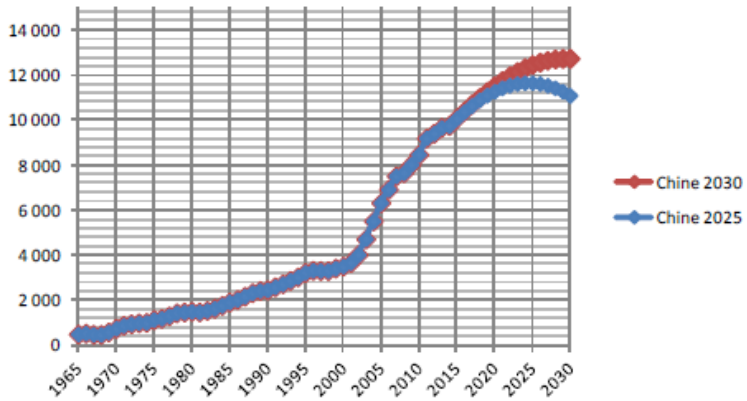
La Chine et l'Inde : des objectifs compliqués à évaluer

- Chine et Inde :
  - INDC en termes d'intensité carbone du PIB :

    $MtCO_2$/unité de PIB pour la Chine, $MtCO_2eq$/unité de PIB pour l'Inde
  - Hypothèses à faire sur leur croissance économique
- Solution choisie :
  - Chine : croissance diminuant de 7 à 5%/an ou 7 à 4%/an de 2015 à 2030

Intensité C du PIB



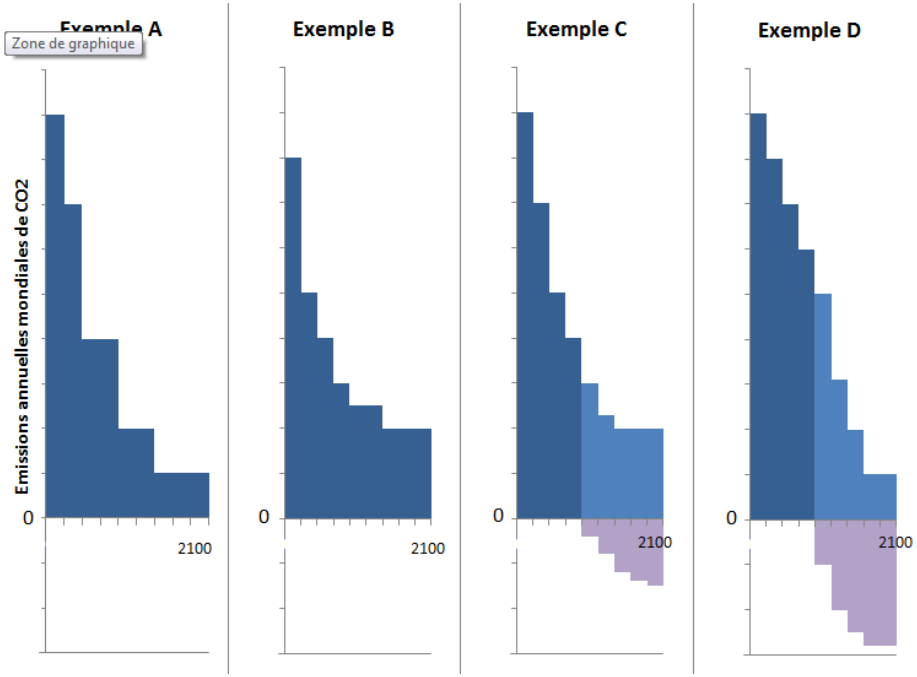


Emissions (Mt CO_2)

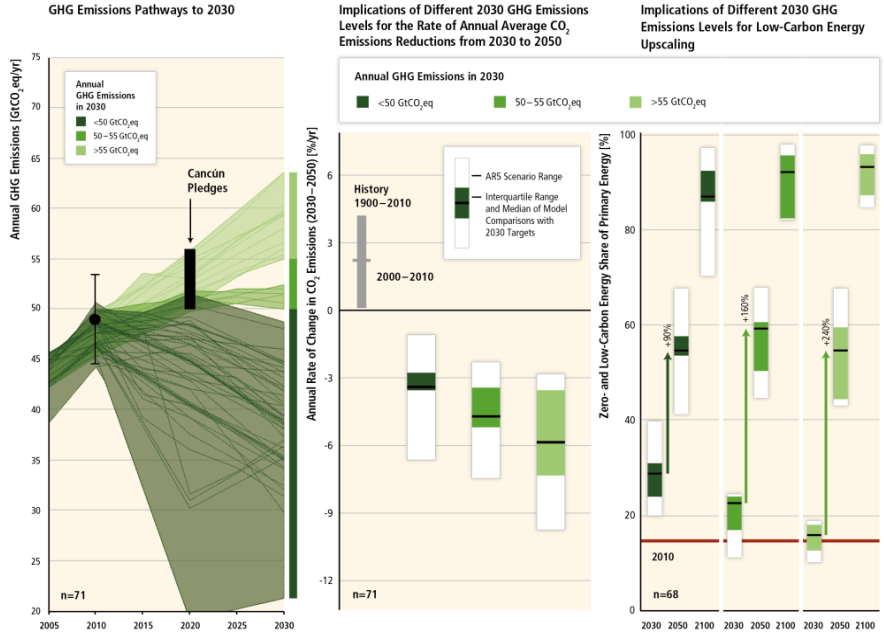
  - Inde : croissance diminuant de 6,5 à 5%/an ou 6,5 à 4%/an de 2015 à 2030

Le budget CO_2 et l'objectif de 2°C : scénarios et hypothèses

- Quels scénarios pour atteindre cet objectif long terme ?
- Quels points de passage en 2030, en 2050 ?

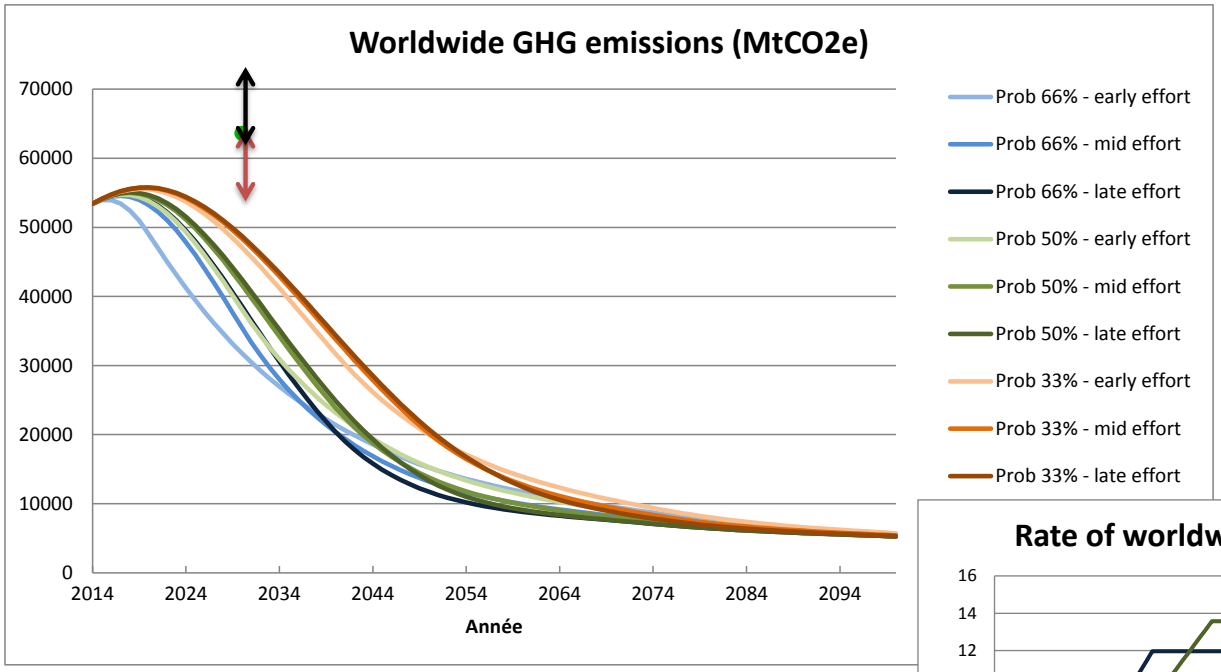


Différents budgets CO_2 correspondant à l'objectif 2°C, avec ou sans émissions négatives. Source : UNEP Gap Report, 2014 – GICN, 2015

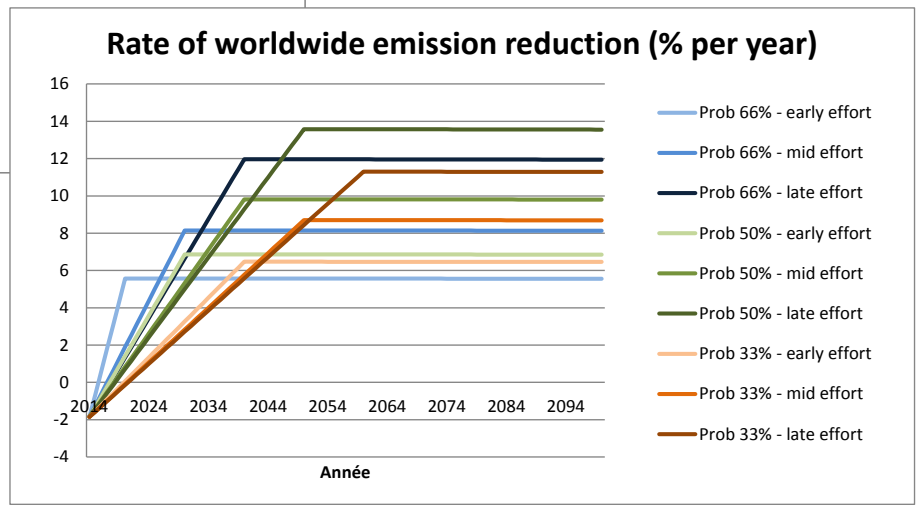


Différents scénarios permettant d'atteindre l'objectif 2°C, taux de réduction d'émissions et de déploiement d'énergies bas-carbone associés. Source : IPCC, AR5, SPM, 2014

Mise en regard des INDC avec le budget CO_2 : trajectoires par niveau de probabilité (1/2)



Source : GICN, 2015

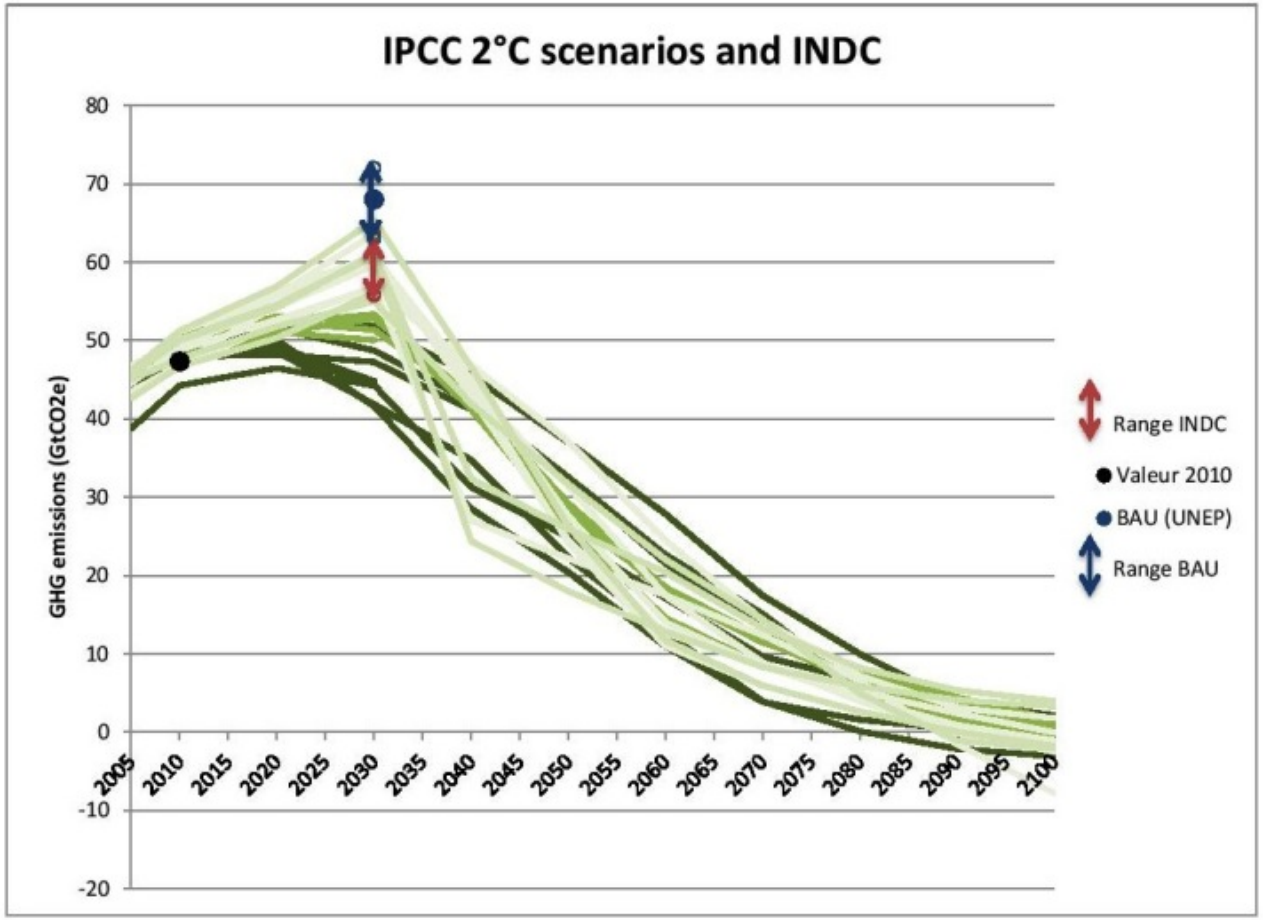


Trajectoires **SANS émissions négatives** pour différentes probabilités d'atteindre l'objectif 2°C et différentes dates d'effort maximal, et agrégation des INDC.

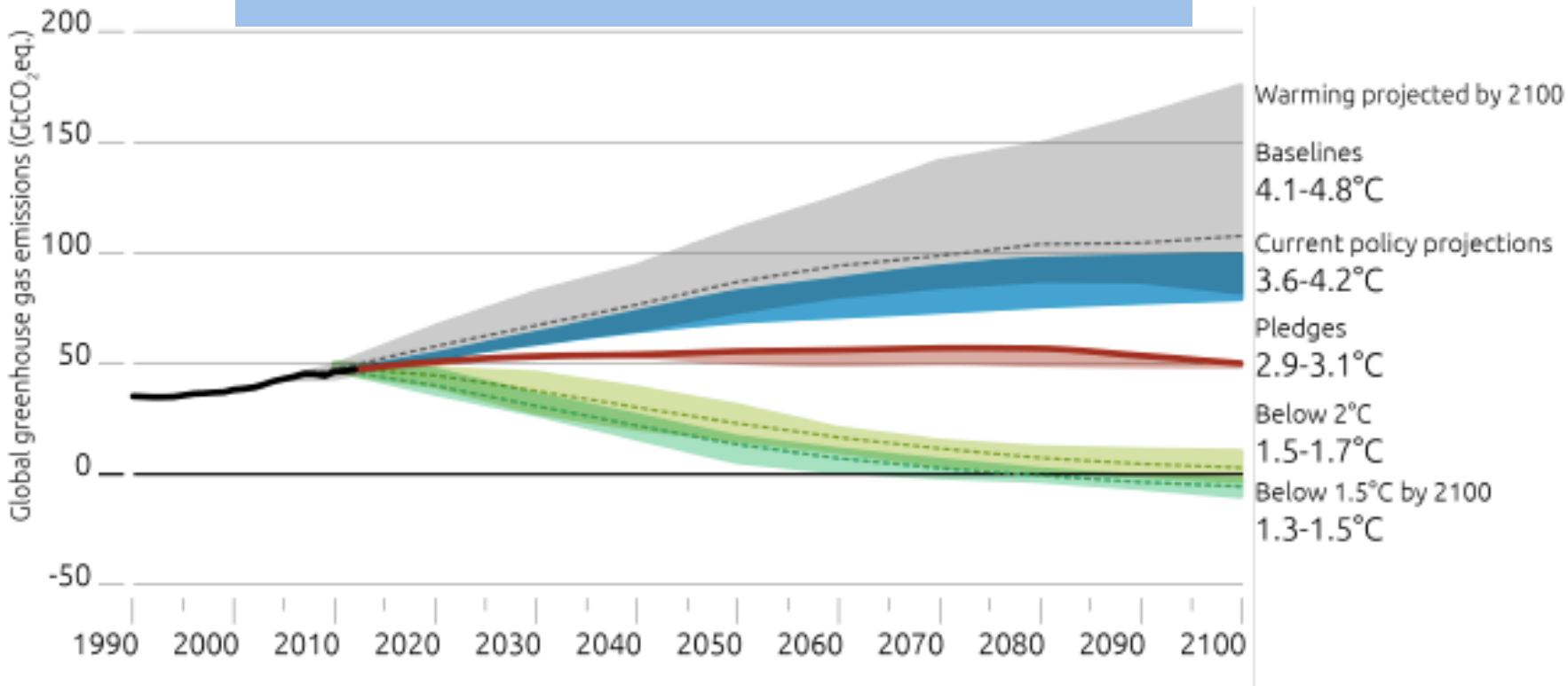
Mise en regard des INDC avec le budget CO_2 : trajectoires du GIEC

Différents scénarios permettant d'atteindre l'objectif 2°C, agrégation des INDC et BaU.

Source : IPCC, AR5, SPM, 2014 ; GICN, 2015

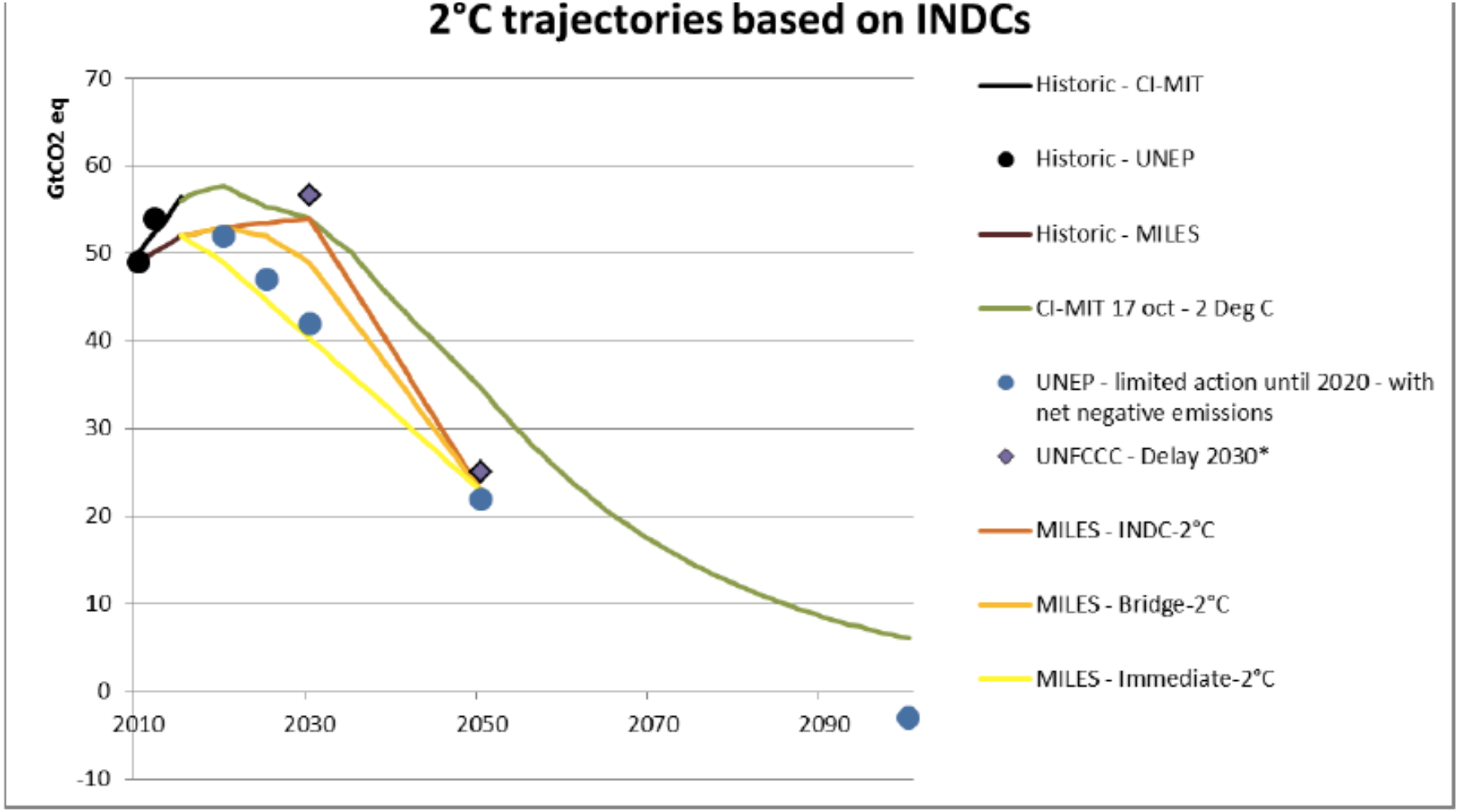


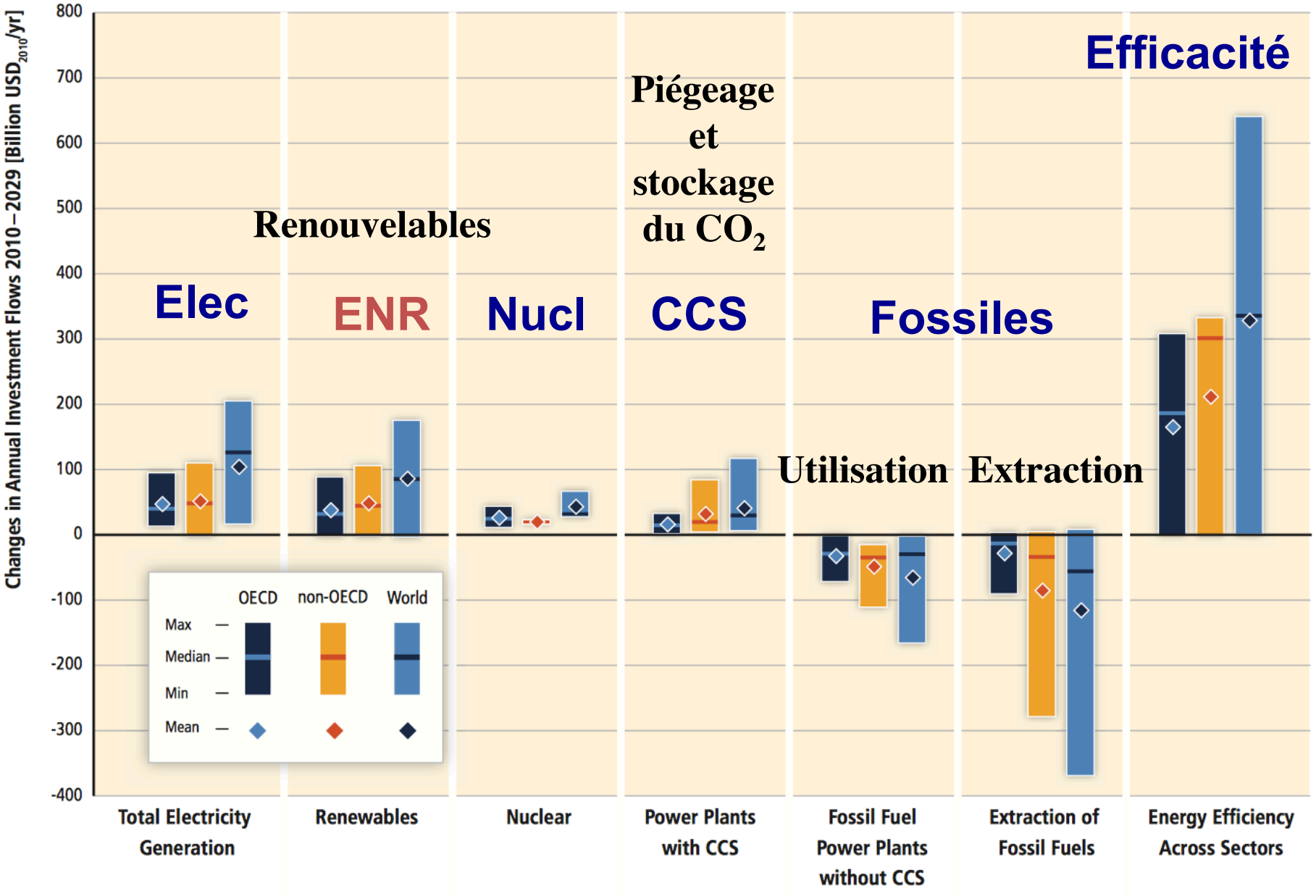
Climate Action Tracker



8/10/15 : 146 countries, 87% emissions, **2,°7**

Towards100 mds US $/ year ? OCDE : 61.5


2°C trajectories based on INDCs
GtCO2 eq
70
60
50
40
30
20
10
0
-10
2010
2030
2050
2070
2090
Historic - CI-MIT
Historic - UNEP
Historic - MILES
CI-MIT 17 oct - 2 Deg C
UNEP - limited action until 2020 - with net negative emissions
UNFCCC - Delay 2030*
MILES - INDC-2°C
MILES - Bridge-2°C
MILES - Immediate-2°C



Scénario sobre : modification des flux d'investissements