Aperçu des premières évaluations globales des (I)NDCs

principaux résultats robustes, principales incertitudes

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Chaire Modélisation prospective
au service du développement durable

1. Evaluations des ***émissions*** associées aux INDCs
2. Evaluations des ***coûts*** associés aux INDCs
3. Evaluation du ***changement structurel*** associé aux INDCs

5 analyses publiées:

- Aldy, J., W. Pizer, M. Tavoni, L. Aleluia Reis, K. Akimoto, G. Blanford, C. Carraro, et al. 2016. « ***Economic Tools to Promote Transparency and Comparability in the Paris Agreement*** ». *Nature Climate Change* advance online publication.
- Fujimori, S., I. Kubota, H. Dai, K. Takahashi, T. Hasegawa, J. Liu, Y. Hijioka, T. Masui, et M. Takimi. 2016. « ***Will international emissions trading help achieve the objectives of the Paris Agreement?*** » *Environmental Research Letters* 11 (10): 104001.
- Iyer, G. C., J. A. Edmonds, A. A. Fawcett, N. E. Hultman, J. Alsalam, G. R. Asrar, K. V. Calvin, et al. 2015. « ***The Contribution of Paris to Limit Global Warming to 2 °C*** ». *Environmental Research Letters* 10 (12): 125002.
- Rogelj, J., M. den Elzen, N. Höhne, T. Fransen, H. Fekete, H. Winkler, R. Schaeffer, F. Sha, K. Riahi, et M. Meinshausen. 2016. « ***Paris Agreement Climate Proposals Need a Boost to Keep Warming Well below 2 °C*** ». *Nature* 534 (7609): 631-39.
- Vandyck, T., K. Keramidas, B. Saveyn, A. Kitous, et Z. Vrontisi. 2016. « ***A global stocktake of the Paris pledges: Implications for energy systems and economy*** ». *Global Environmental Change* 41: 46-63.

2 analyses en cours de publication:

- Benveniste, H., Boucher, O., Criqui, P., Guivarch, C., Le Treut, H. « ***Impacts of nationally determined contributions on 2030 global greenhouse gas emissions: uncertainty analysis and distribution of emissions*** ».
- Vrontisi, Z., Luderer, G., Saveyn, B., Bertram, C., de Boer, H., Drouet, L., Fragkiadakis, K., Fricko, O., Fujimori, S., Guivarch, C., Keramidas, K., Kitous, A., Krey, V., Kriegler, E., O Broin, E., Paroussos, L., Riahi, K., Tavoni, M., van Vuuren, D. "***Implementing the Paris Agreement: system transformation and the contribution towards 1.5°C-2°C targets***".

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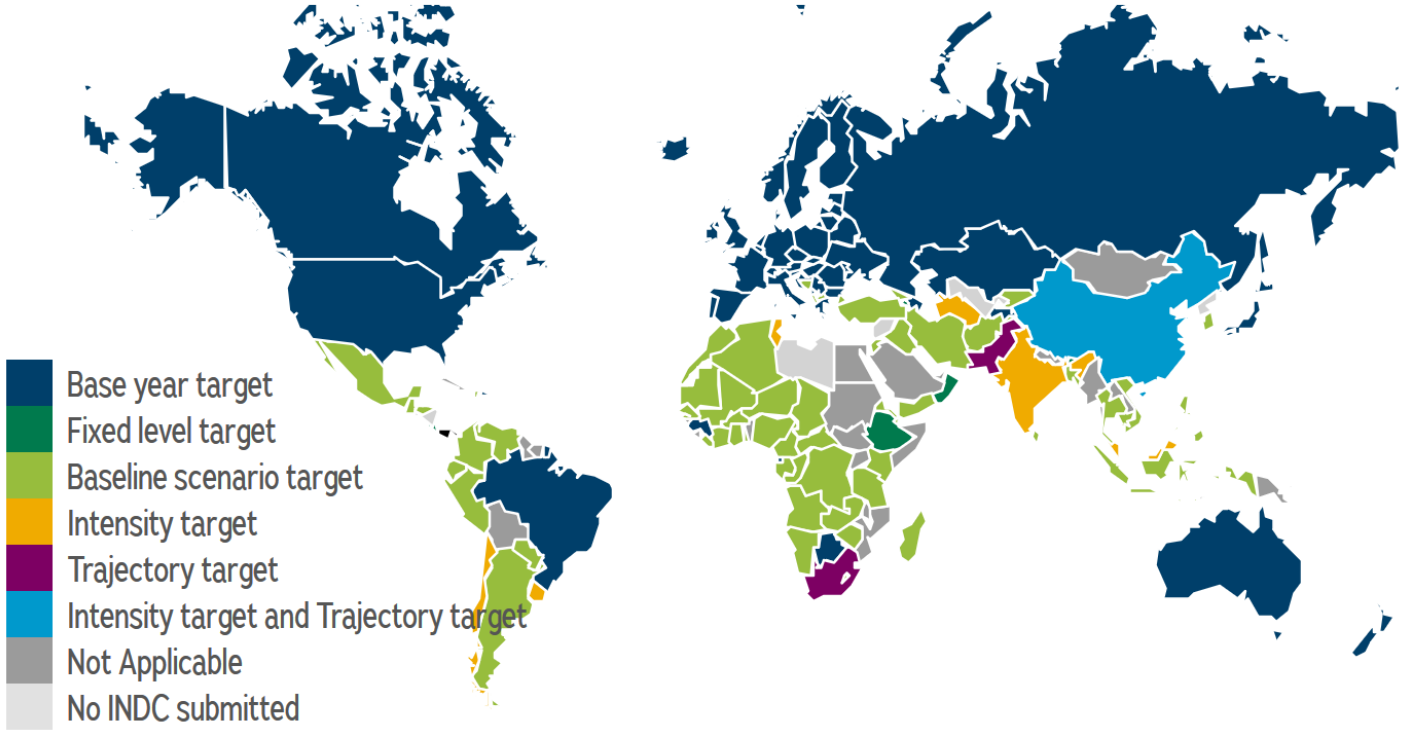
- Intended Nationally Determined Contributions (contributions déterminées au niveau national) au cœur de l'Accord de Paris

162 INDCs soumises, pour **189** pays, représentant **98.8%** des émissions mondiales.

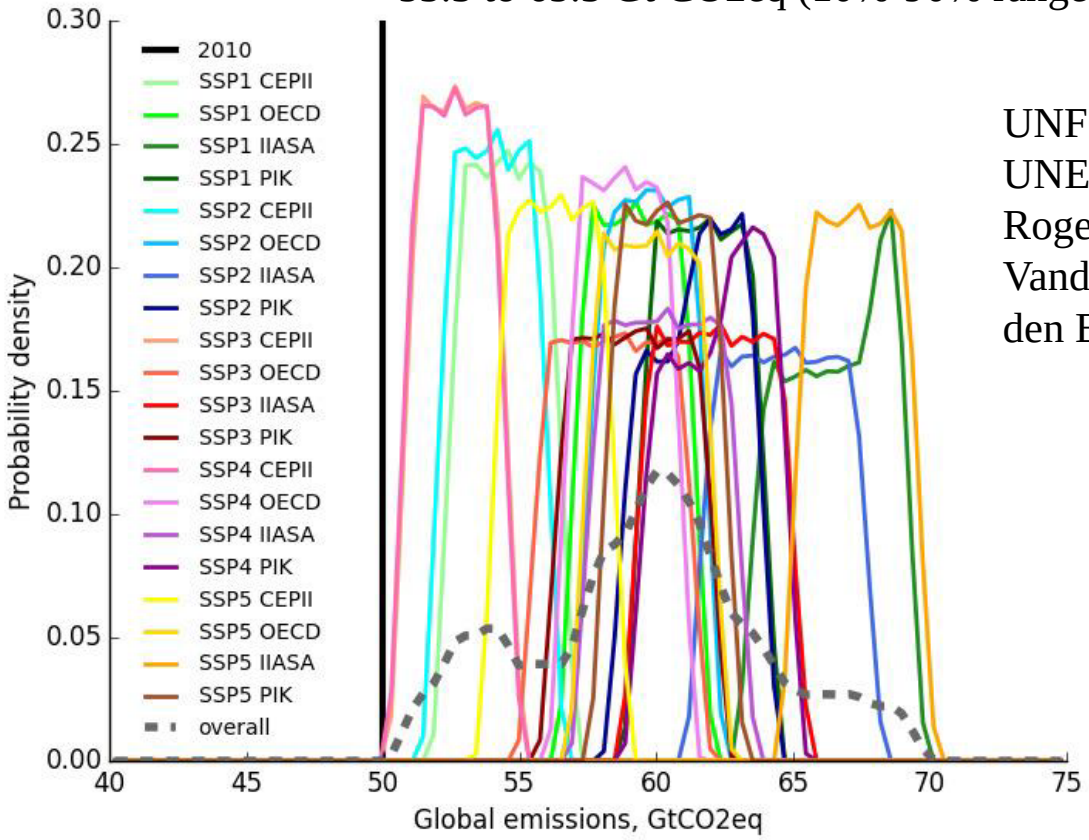


Source: CAIT WRI

→ « Traduire » les INDCs pour en évaluer les implications dans les modèles d'évaluation intégrée.

Résultat 1:
Des émissions en 2030 supérieures à celles d'aujourd'hui, une fourchette d'incertitude de ~10 GtCO2eq

53.3 to 65.3 Gt CO2eq (10%-90% range)

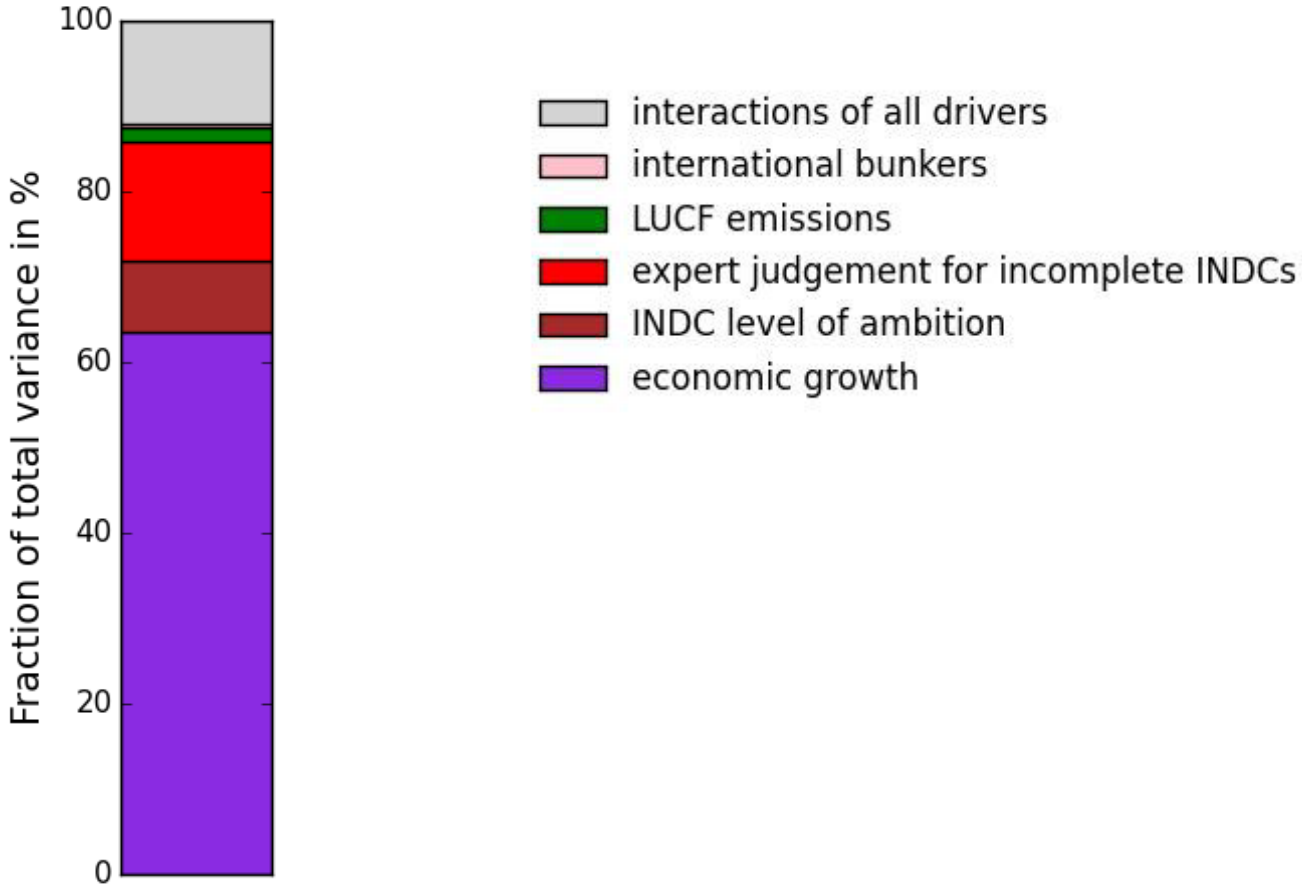


UNFCCC: 52.0-59.3 Gt CO2eq
UNEP Gap: 52-59 Gt CO2eq
Rogelj et al.: 52-58Gt CO2eq
Vandyck et al.: 56 Gt CO2eq
den Elzen et al.: 51-58 Gt CO2eq

Probability distribution function of global greenhouse gas emissions in 2030
for 20 growth scenarios,
5 Shared Socioeconomic Pathways (SSP) * 4 data sources (CEPII, OECD, IIASA, PIK)

Benveniste et al.

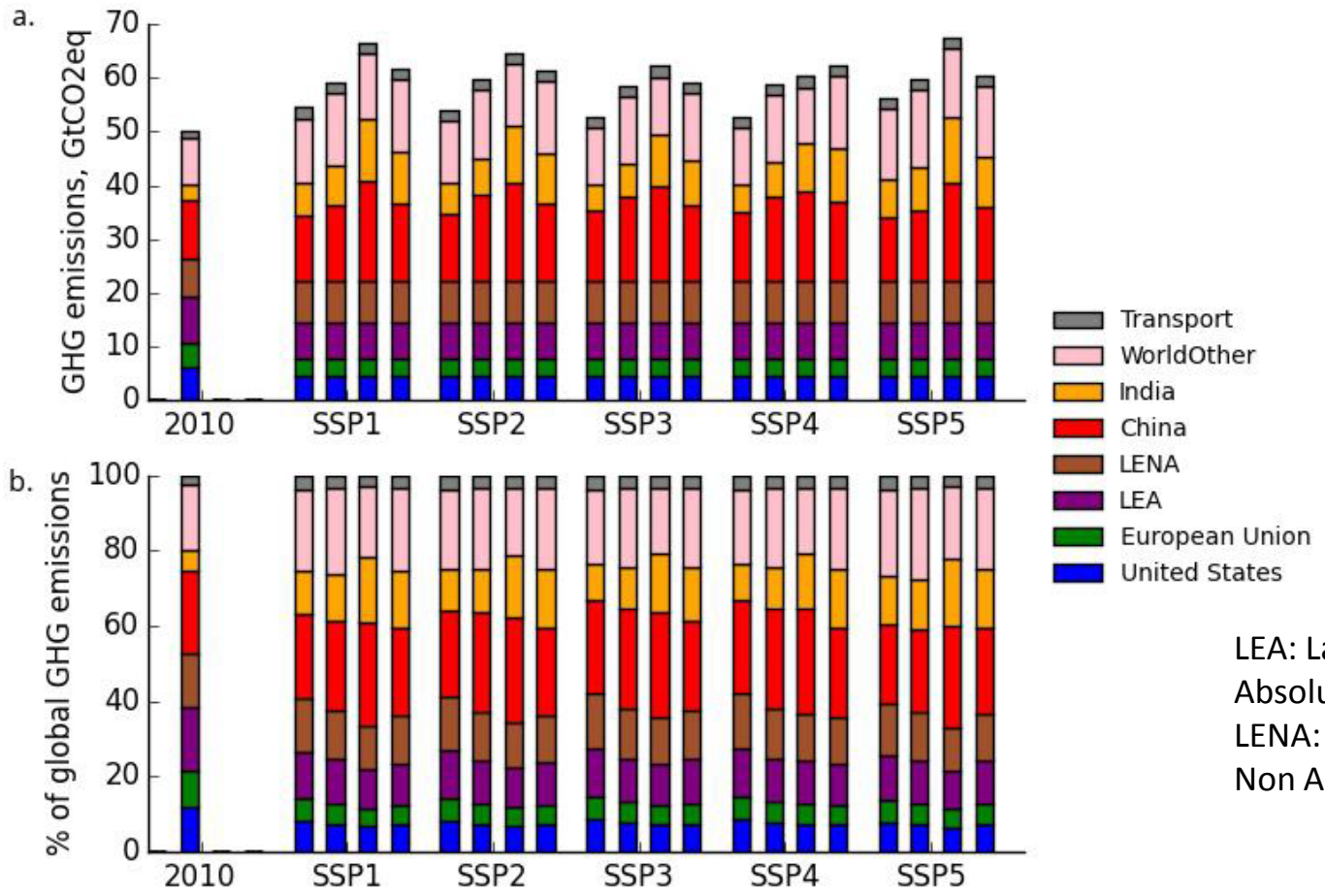
Résultat 2:
L'incertitude sur la croissance des pays ayant donné leur INDC en intensité carbone (Chine, Inde, ...) comme principale source d'incertitude



Fraction (%) of the total variance in 2030 global greenhouse gas emissions explained by the identified set of drivers.

Benveniste et al.

Résultat 3:
Un déplacement des émissions vers les grands émergents et les pays en développement

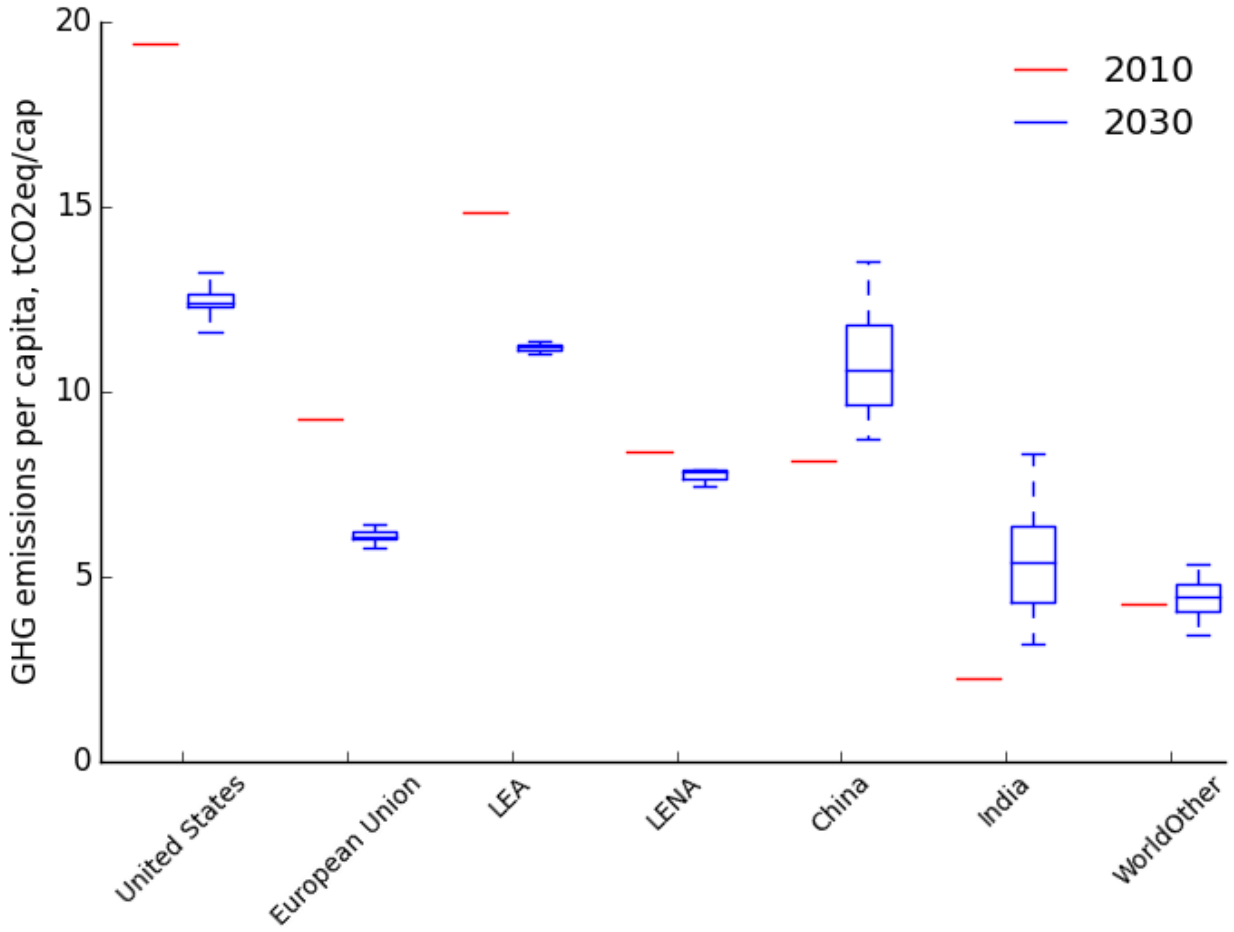


LEA: Large Emitters with Absolute target
LENA: Large Emitters with Non Absolute target

Contributions of countries to 2010 and 2030 global emissions. Absolute **(a)** and relative **(b)**, for the 5 Shared Socioeconomic Pathways (SSP) growth scenarios * 4 data sources (from left to right: CEPII, OECD, IIASA, PIK).

Benveniste et al.

Résultat 4:
Une réduction des inégalités en termes d'émissions par habitant



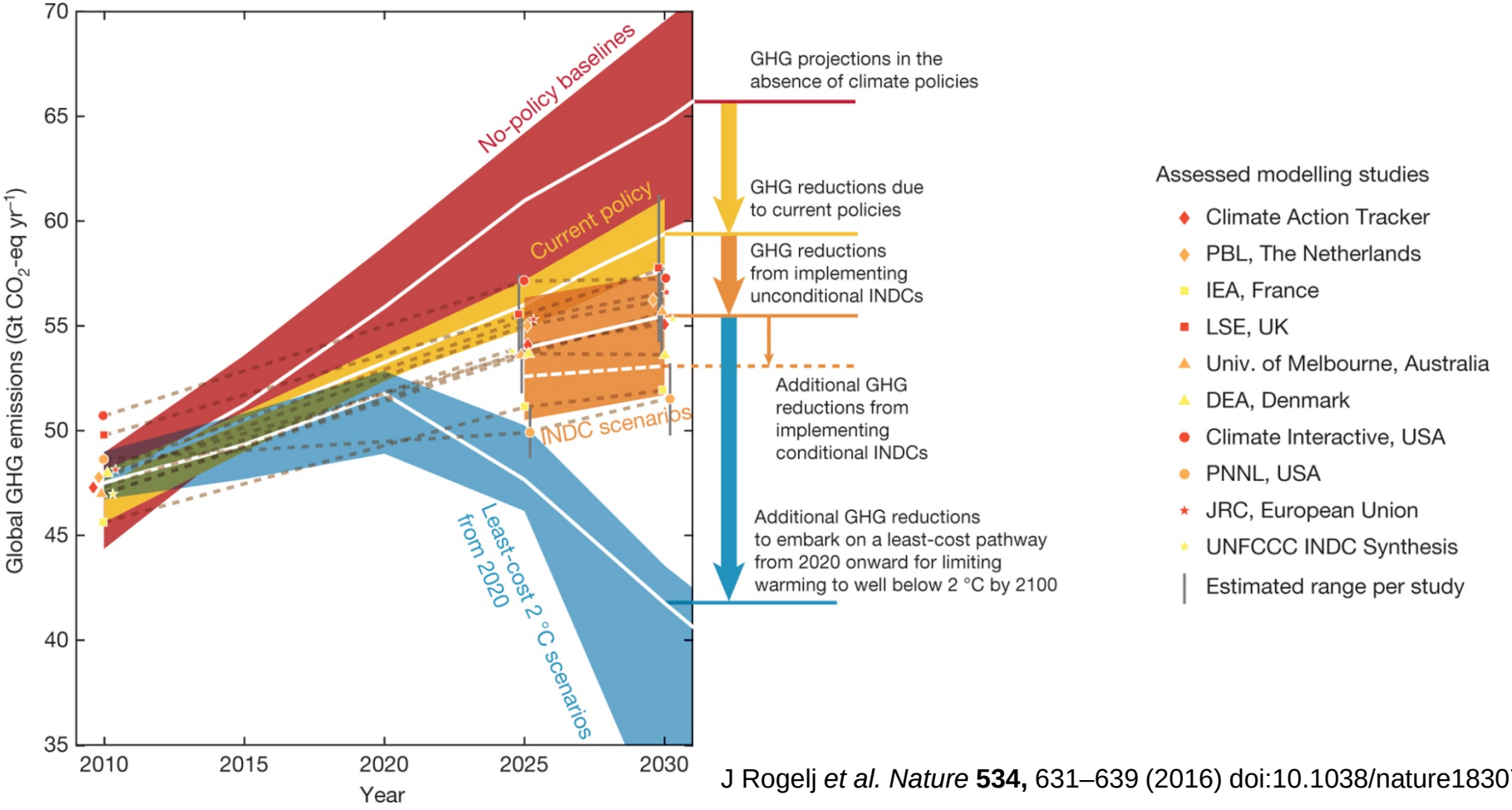
LEA: Large Emitters with Absolute target
LENA: Large Emitters with Non Absolute target

Evolution of **greenhouse gas emissions per capita** (in ton CO2eq per capita) between 2010 (in red) and 2030 (in blue) for various countries and groups of countries.

Benveniste et al.

Résultat 5:
Une déviation par rapport à la baseline, mais un “gap” d’ambition

Global greenhouse gas emissions as implied by INDCs compared to no-policy baseline, current-policy and 2 °C scenarios



J Rogelj *et al. Nature* **534,** 631–639 (2016) doi:10.1038/nature18307

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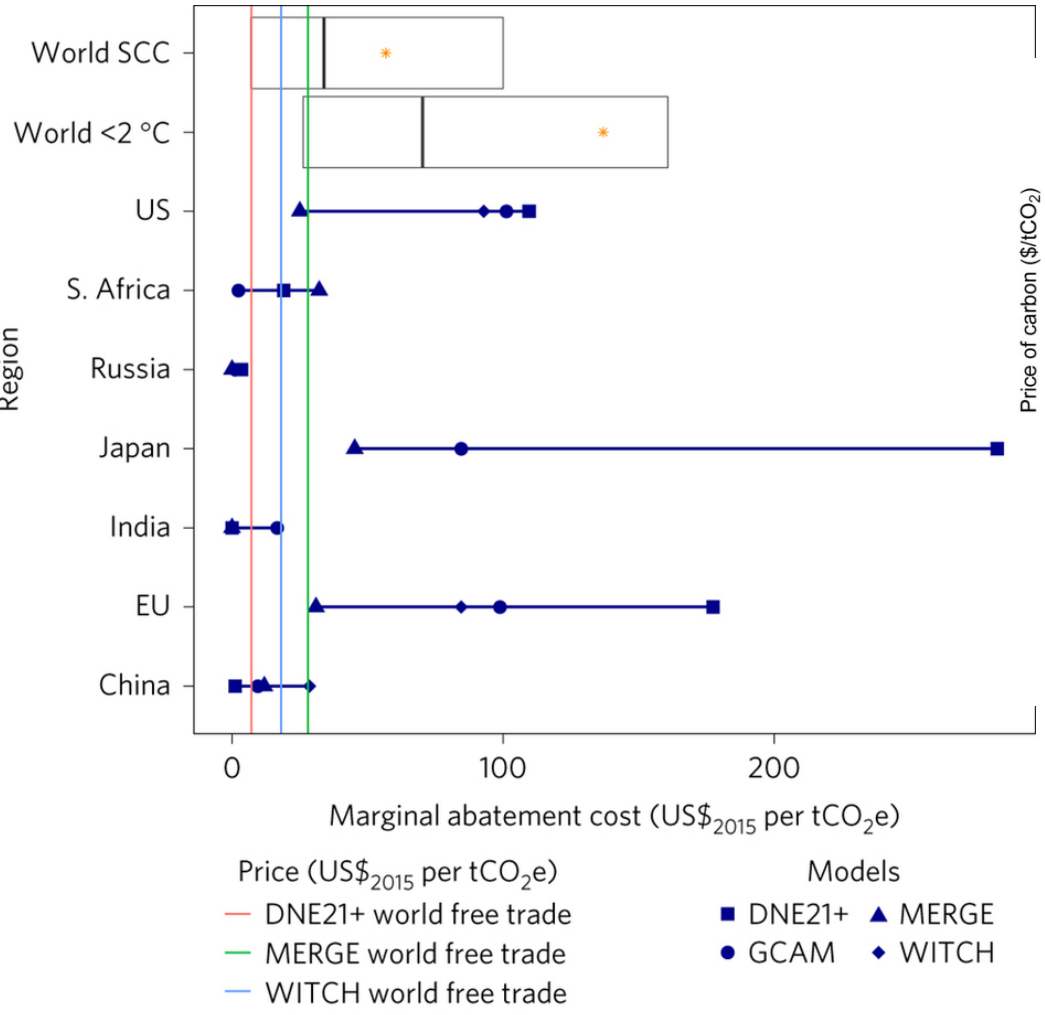
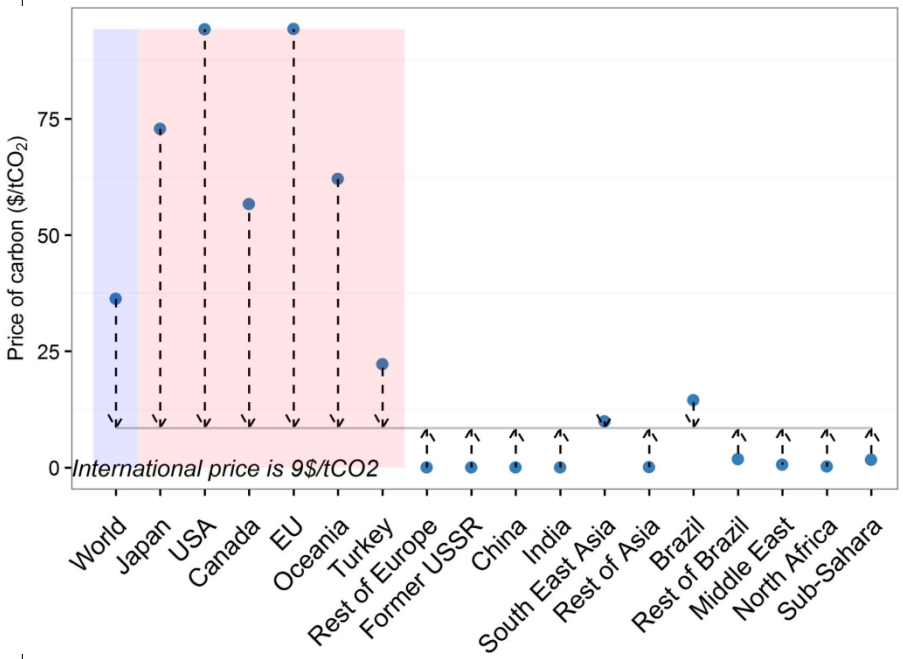
Résultat 6:
Une large fourchette de prix implicites du carbone,
Des prix élevés dans les pays de l'OCDE, faibles ailleurs



Aldy et al. 2016



Carbon prices for all regions in the INDC_w/ET and INDC_w/o ET scenarios. The blue area is the global total and the red area is OECD countries.

Fujimori et al. 2016

(Résultat?) 7:
Pas de résultat robuste sur les coûts en termes de PIB ou de bien-être, pas d'accord sur le signe pour Chine et Russie, large intervalle pour Afrique

		Cost (% GDP)
US	DNE21+	0.42
	WITCH	0.76
	GCAM	0.84
	MERGE	0.28
EU	DNE21+	0.59
	WITCH	0.51
	GCAM	0.57
	MERGE	0.31
China	DNE21+	−0.20
	WITCH	1.60
	GCAM	0.04
	MERGE	0.72
India	DNE21+	0.00
	WITCH	0.59
	GCAM	0.13
	MERGE	0.12
Japan	DNE21+	0.47
	GCAM	0.13
	MERGE	0.22
Africa	DNE21+	2.11
	GCAM	0.01
	MERGE	0.64
Russia	DNE21+	0.23
	GCAM	0.01
	MERGE	−0.47

Aldy et al. 2016

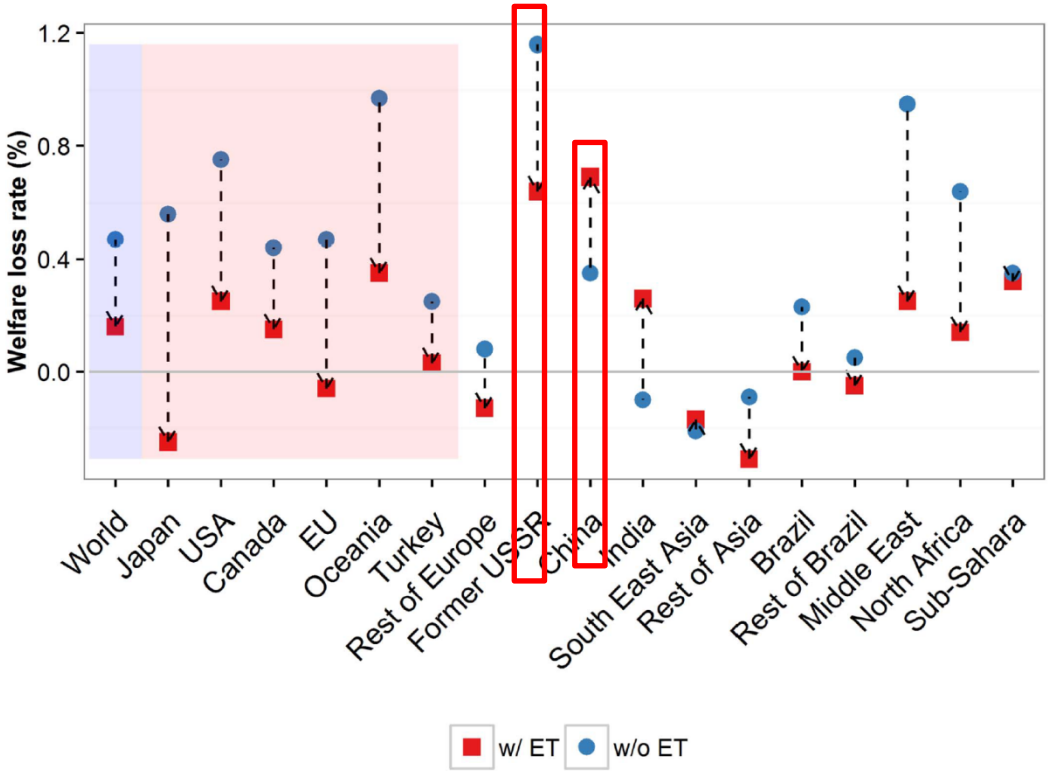


Figure 2. Welfare loss rates in the year 2030 compared to the baseline scenarios for all of the regions in the INDC_w/ET and INDC_w/o ET scenarios. The blue area is the global total and the red area is OECD countries.

Fujimori et al. 2016

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Résultat 8:
Les INDCs induisent des réductions principalement dans le secteur énergétique
L'écart avec une scénario 2°C est le plus grand pour les secteurs de demande

T. Vandyck et al. / Global Environmental Change 41 (2016) 46–63

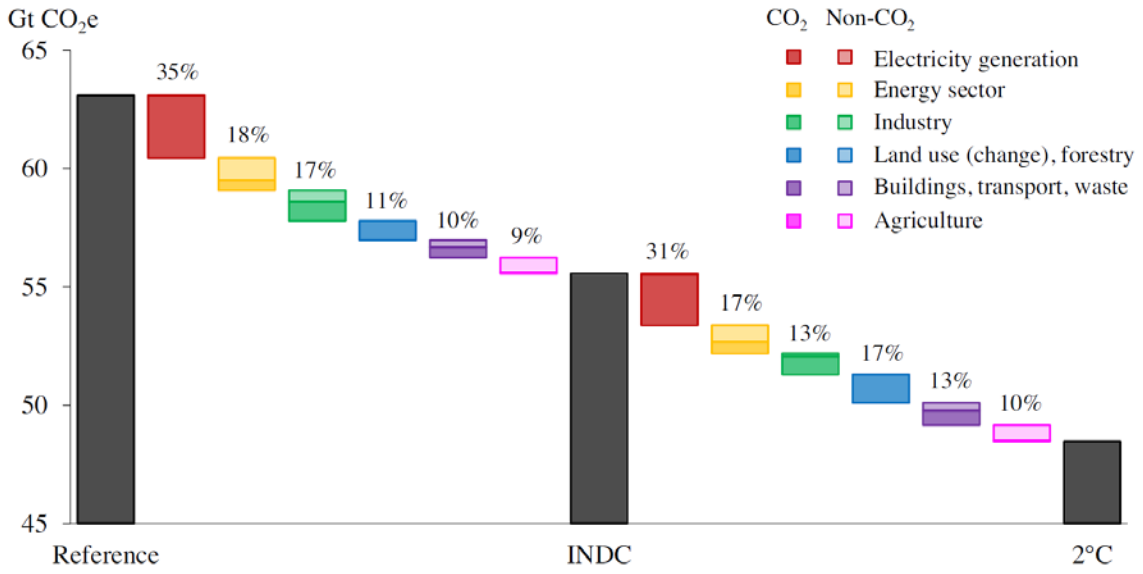
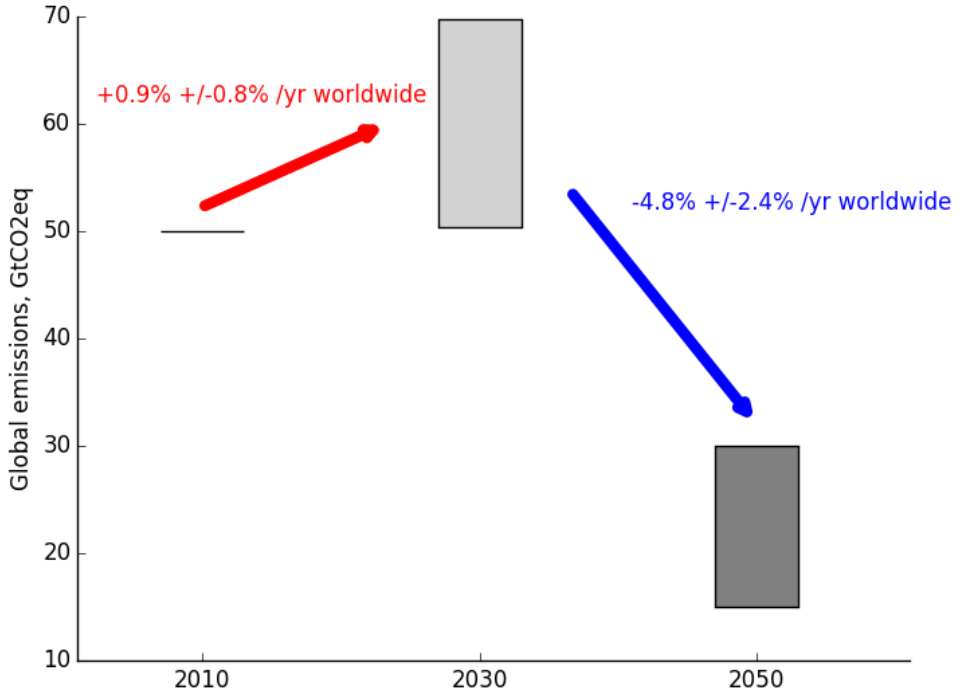


Fig. 3. Sector contributions to greenhouse gas emission reductions in 2030. The percentage above the bars indicates the share in reductions between scenarios. CO_2 emissions exclude sinks. The darker, lower end of the bar represents CO_2 reductions, while the upper part in a lighter colour shows the reductions in non-CO_2 greenhouse gases. Non-CO_2 emission reductions in electricity generation and CO_2 emissions in agriculture are hardly visible, while emission reductions from land use, land use change and forestry (LULUCF) only cover CO_2 emissions. Energy sector emissions include greenhouse gases emitted during extraction, production, transformation (e.g. refining) and transport of energy fuels and associated fugitive emissions.

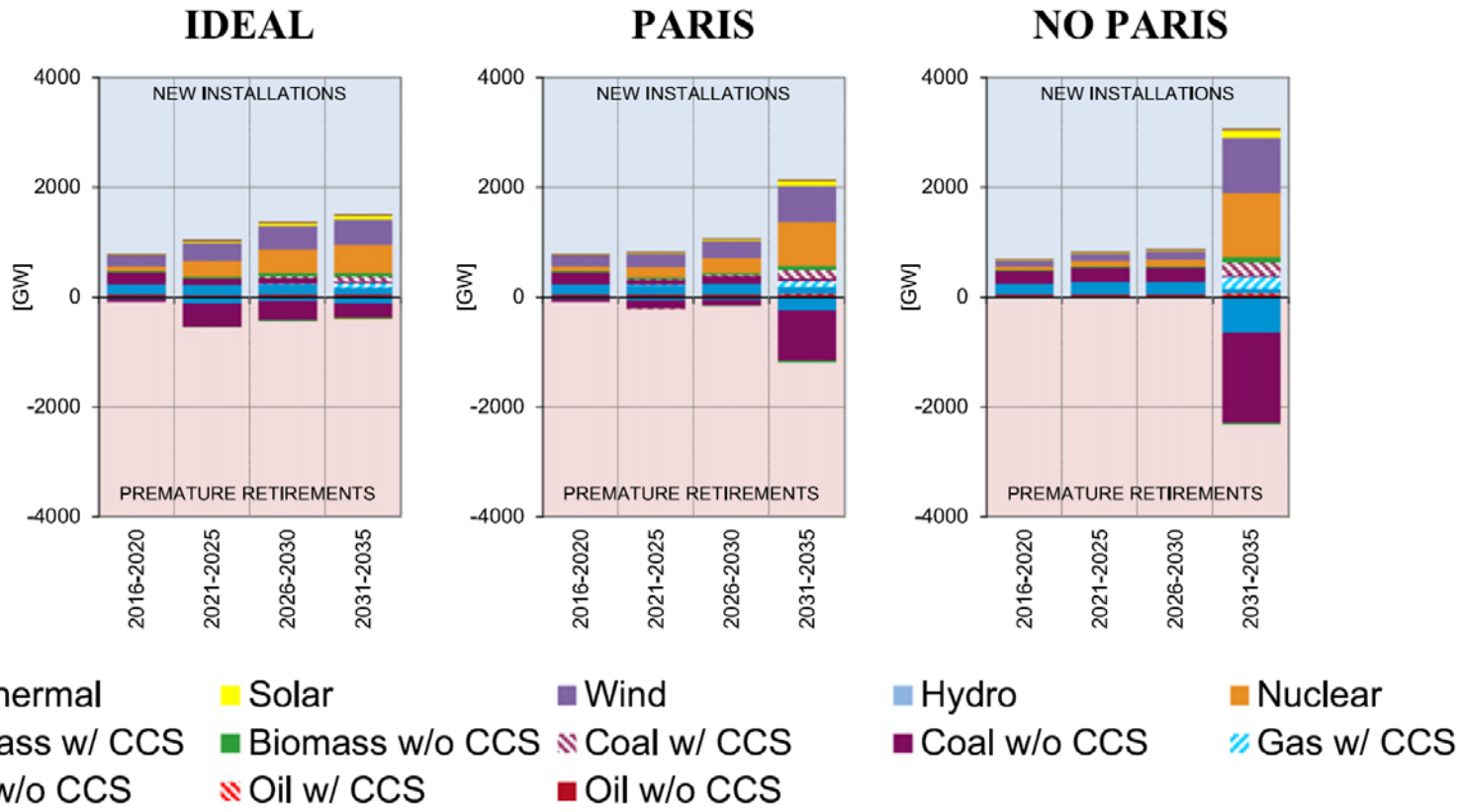
Résultat 9:
La nécessité d'une décroissance des émissions très rapide post-2030...



Global emissions and uncertainty ranges in 2010, 2030 and 2050.
The 2030 range is determined considering INDCs, while the 2050 range corresponds to the Intergovernmental Panel on Climate Change (IPCC) milestone if global warming is to be limited to 2°C since pre-industrial times (i.e., a 40 to 70% emissions reductions in 2050 compared to 2010). Arrows indicate the average rate of change in annual global emissions for the periods 2010-2030 and 2030-2050.

Résultat 9:
La nécessité d'une décroissance des émissions très rapide post-2030...
... impliquant des "investissements échoués"?

NEW CAPACITY INSTALLMENTS AND PREMATURE RETIREMENTS OF INSTALLED CAPACITY



new capacity installments and premature retirements (retirements before natural shutdown at the end of lifetime) of installed capacity in the electricity generation sector.

Iyer et al., 2015

En guise de conclusion:
Et maintenant la mise en oeuvre des INDCs...

2 points clés

– Measurement-Reporting-Verification:
  - Au délà du suivi des émissions…
  - suivre les politiques et le changement structurel

– Augmenter l’ambition?
  - Une question d’alignement avec les objectifs de développement
  - Une question de financement

Methods

Country	Country grouping	Ambition range	Type of INDC	Base year / BAU level	Assumption to translate INDC to 2030 emissions
United States	N/A	-26 to -28% in 2025	Absolute /base year	2005	-30 to -32% in 2030
European Union	N/A	-40% in 2030	Absolute /base year	1990	Direct INDC
China	N/A	-60 to -65% in 2030; peak by 2030	Intensity + peak	2005	GDP scenario + constraint on peak
India	N/A	-33 to -35% in 2030	Intensity	2005	GDP scenario

Large Emitters with Absolute target (LEA)

Australia	LEA	-26 to -28% in 2030	Absolute /base year	2005	Direct INDC
Brazil	LEA	-43% in 2030	Absolute /base year	2005	Direct INDC
Canada	LEA	-30% in 2030	Absolute /base year	2005	Direct INDC
Japan	LEA	-25% in 2030	Absolute /base year	2005	Direct INDC
Kazakhstan	LEA	-15 to -25% in 2030	Absolute /base year	1990	Direct INDC
Russian Fed.	LEA	-25 to -30% in 2030	Absolute /base year	1990	Direct INDC
Ukraine	LEA	-40% in 2030	Absolute /base year	1990	Direct INDC

Large Emitters with Not Absolute target (LENA)

Egypt	LENA	N/A	Sectoral	N/A	+30% emissions in 2030/2010
Indonesia	LENA	-29 to -41% in 2030	Absolute /BAU	2881 Mt CO_2eq	Direct INDC
Iran	LENA	-4 to -12% in 2030	Absolute /BAU	Not available	+30% emissions in 2030/2010
Korea Republic	LENA	-37% in 2030	Absolute /BAU	850.6 MtCO_2eq	Direct INDC
Malaysia	LENA	-35 to -45% in 2030	Intensity	2005	Not mentioning if LULUCF emissions are included: +15% emissions in 2030/2010
Mexico	LENA	-22 to -36% in 2030	Absolute /BAU	973 MtCO_2eq	Direct INDC
Saudi Arabia	LENA	-130 Mt CO_2eq in 2030	Absolute /BAU	Not Available	+30% emissions in 2030/2010
South Africa	LENA	398 to 614 Mt CO_2eq in 2030	Value	N/A	Direct INDC
Taiwan	LENA	-50% in 2030	Absolute /BAU	428 Mt CO_2eq	Direct "INDC"
Thailand	LENA	-20 to -25% in 2030	Absolute /BAU	555 Mt CO_2eq	Direct INDC
Turkey	LENA	-21% in 2030	Absolute /BAU	1175 Mt CO_2eq	Direct INDC
United Arab Emirates	LENA	N/A	Sectoral	N/A	+30% emissions in 2030/2010

Methods

Country	Country grouping within World Other	Ambition range	Type of INDC	Base year / BAU level	Assumption to translate INDC to 2030 emissions
Andorra	Other Annex 1 countries	-37% in 2030	Absolute /BAU	0.53 Mt CO_2eq	Direct INDC
Belarus	Other Annex 1 countries	-28% in 2030	Absolute /base year	1990	Direct INDC
Iceland	Other Annex 1 countries	-40% in 2030	Absolute /base year	1990	Direct INDC
Monaco	Other Annex 1 countries	-50% in 2030	Absolute /base year	1990	Direct INDC
New Zealand	Other Annex 1 countries	-30% in 2030	Absolute /base year	2005	Direct INDC
Norway	Other Annex 1 countries	-40% in 2030	Absolute /base year	1990	Direct INDC
Switzerland	Other Annex 1 countries	-50% in 2030	Absolute /base year	1990	Direct INDC
Chile, Philippines, Singapore, Viet Nam	Other Emerging countries	N/A	Various	N/A	-30 to -45% intensity in 2030/2005 GDP scenario Based on Chilean INDC
Bahrain, Brunei Darussalam, Kuwait, Oman	Other Oil exporting countries	N/A	Various	N/A	-30 to -40% intensity in 2030/2005 GDP scenario
Other countries	Rest of World	N/A	Various	N/A	-30 to -45% intensity in 2030/2005 GDP scenario

International Aviation	Transport	N/A	N/A	N/A	906 to 1200 Mt CO_2eq: 2 scenarios of fuel efficiency improvement 1 traffic forecast
International Shipping	Transport	N/A	N/A	N/A	0 to -15% /BAU BAU: 1025 Mt CO_2eq, uniformly growing emissions in 2010-2030