HAL open science

Changement climatique et transition énergétique au VIetnam

Minh Ha-Duong

▶ To cite this version:

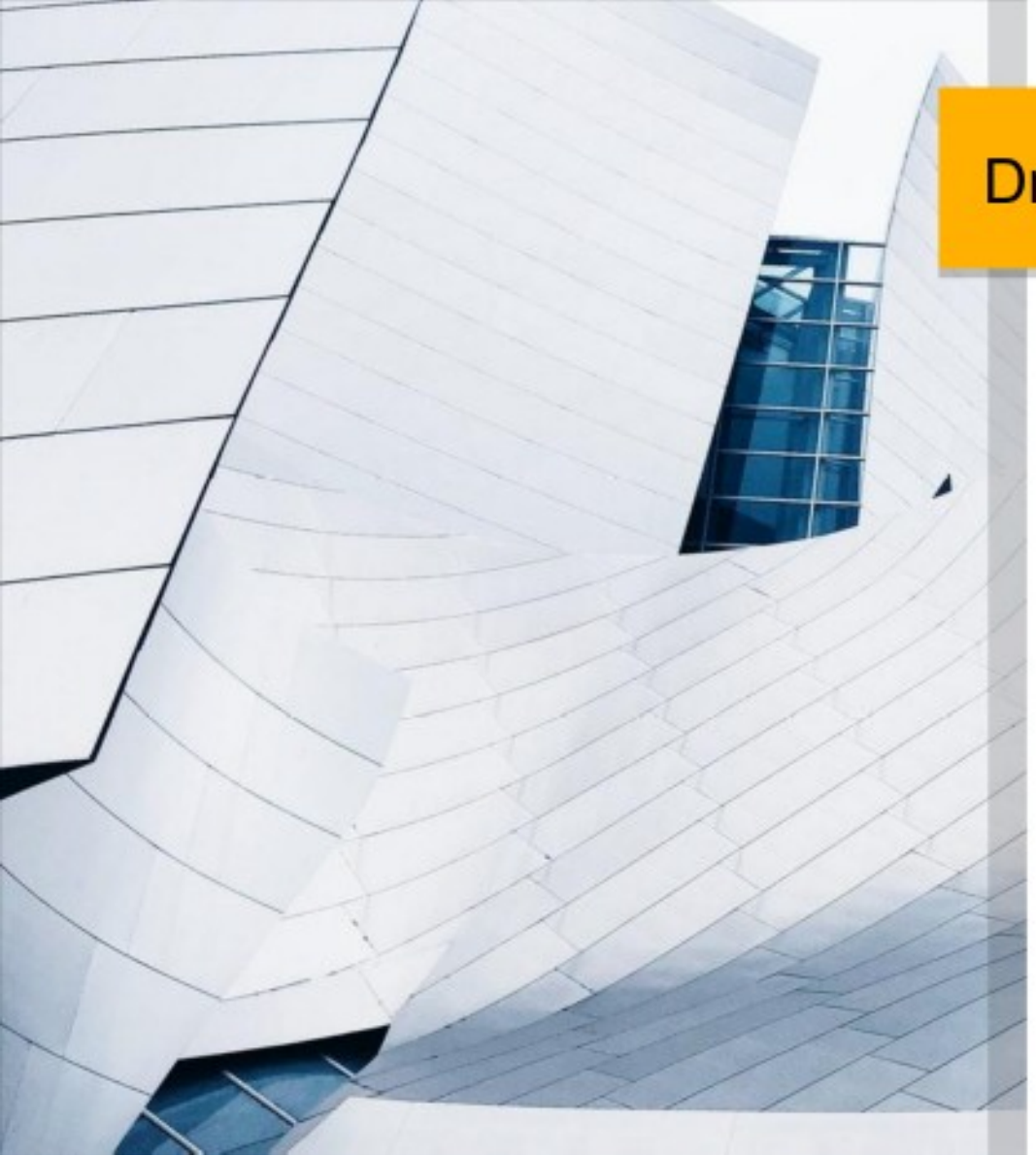
Minh Ha-Duong. Changement climatique et transition énergétique au VIetnam. École thématique. Cours de SVT, Hanoi, Vietnam. 2018, pp.55. hal-04486382

HAL Id: hal-04486382
https://hal.science/hal-04486382v1

Submitted on 1 Mar 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Dr. Ha Duong Minh

Changement climatique et transition énergétique au Vietnam

Lundi 3 décembre 2018, 10h30 – 12h30
Lycée Français Alexandre Yersin

1) Le métier de chercheur et ses lieux
2) Le changement climatique, pourquoi agir ?
3) La transition énergétique au Vietnam

Dr. Minh Ha-Duong en bref :

- Directeur de recherche au CNRS
- Fondateur du laboratoire CleanED à l'USTH
- Fondateur du Think Tank VIET
- Auteur principal du GIEC, co-lauréat du Prix Nobel de la Paix en 2007

Filter

Show [doi], [OAI], [URL]

Minh Ha-Duong's Publication List

Clean Energy and Sustainable Development

About me

I founded the Clean Energy and Sustainable Development lab (CleanED) at the University of Science and Technology of Hanoi (USTH) in December 2014.

My research is on energy, climate change, society, economics and uncertainty. I am interested in imprecise probabilities, especially using possibility theory for scenario-making and the Transferable Belief Model for expert opinion fusion, with applications to environmental and energy economics issues such as climatic change and carbon capture and storage...

I also work on the social and economic aspects of carbon capture and storage. My CCS blog in French was at CaptageStockageCO2.eu (webarchived). I also used to commit zeroc at nu

Peer-reviewed articles

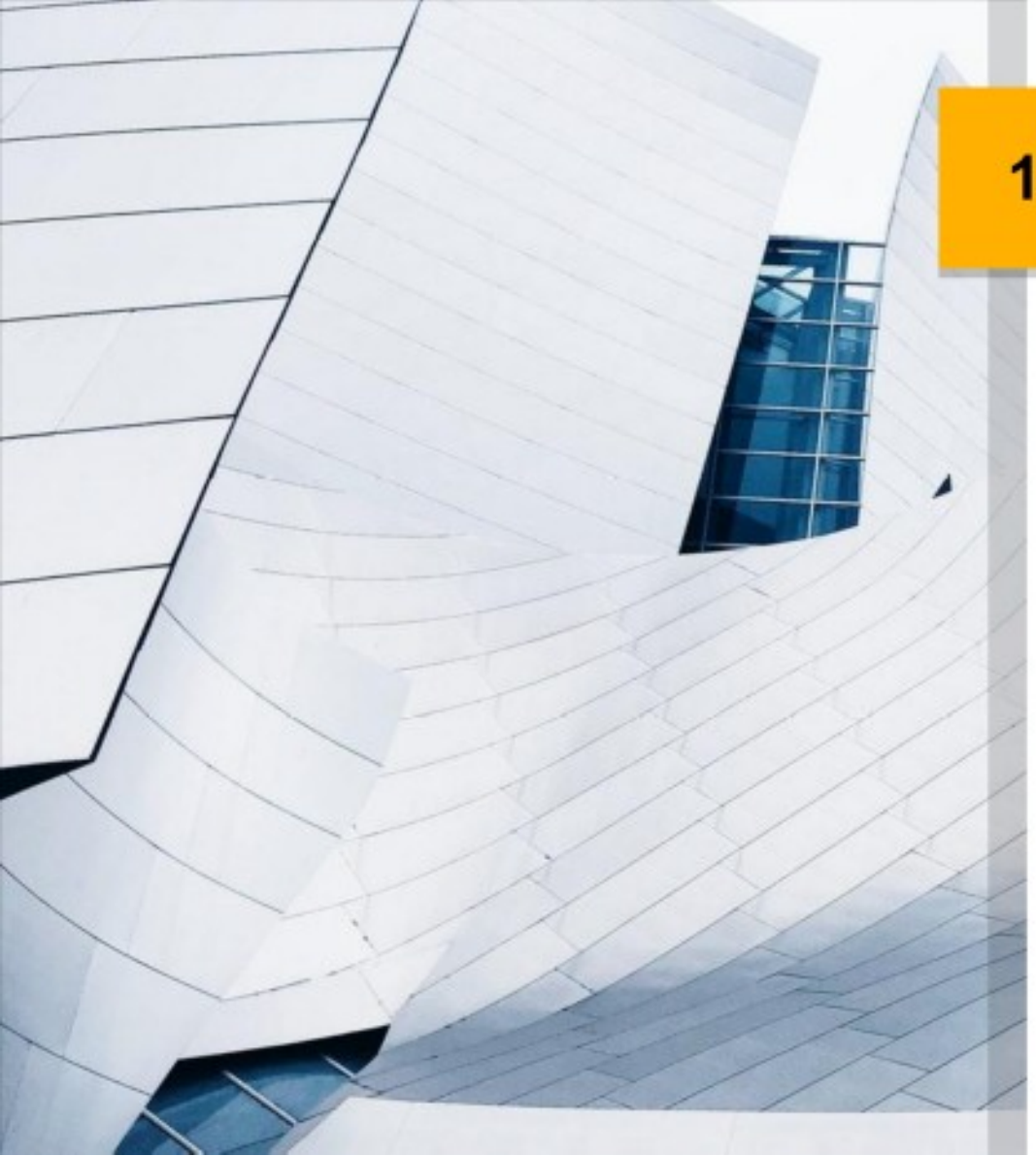
41. Ha-Duong, Minh and Hoang Anh Trinh Nguyễn (Nov. 2017a). **"Two Scenarios for Carbon Capture and Storage in Vietnam"**. *Energy Policy* 110, pp. 559–569.
40. Nguyễn, Hoai Son and Minh Ha-Duong (2017). **"Family size, increasing block tariff and economies of scale of household electricity consumption in Vietnam from 2010 to 2014."** *External Economics Review / Tạp chí Kinh tế Đối ngoại* 101, pp. 1–11.
39. Ha-Duong, Minh, Lan Anh Nguyễn, Tracey Strange, and An Ha Truong (2016). **"Social acceptability of large infrastructure projects in Vietnam"**. *Field Action Science Reports* 14, pp. 72–81.
38. Nguyễn, Hoang Anh Trinh and Minh Ha-Duong (Dec. 2015a). **"Low Carbon Scenario for the Power Sector of Vietnam: Externality and Comparison Approach"**. *GMSARN International Journal* 9.4, pp. 137–146.
37. Nguyễn, Hoang Anh Trinh and Minh Ha-Duong (June 2015b). **"Perspective of CO_2 Capture & Storage (CCS) development in Vietnam: Results from expert interviews"**. *International Journal of Greenhouse Gas Control* 37, pp. 220–227.
36. Nguyễn, Hong Nam, Minh Ha-Duong, and Laurent Van De Steene (2015). **"A critical look on rice husk gasification in Cambodia: engineering and sustainability"**. *Journal of Science and Technology (Vietnam Academy of Science and Technology)* 53.3A. IFGTM 2015 special issue. Presented in Hue, Vietnam, 28-30 July 2015., pp. 247–252.
35. Bielicki, Jeff M., Guillaume Calas, Richard S. Middleton, and Minh Ha-Duong (June 2014). **"National Corridors for Climate Change Mitigation: Managing Industrial CO_2 Emissions in France"**. *Greenhouse gases: science and technology* 3.4, pp. 262–277.
34. Boucher, Olivier, Piers M. Forster, Nicolas Gruber, Minh Ha-Duong, Mark G. Lawrence, Timothy M. Lenton, Achim Maas, and Naomi E. Vaughan (2014). **"Rethinking climate engineering categorization in the context of climate change mitigation and adaptation"**. *WIREs Clim Change* 5.1, pp. 23–25.
33. Ha-Duong, Minh and Venance Journé (May 2014). **"Calculating nuclear accident probabilities from empirical frequencies"**. *Environment Systems and Decisions* 34.2, pp. 249–258.
32. Benito-Garzón, Marta, Minh Ha-Duong, Nathalie Frascaria-Lacoste, and Juan Fernández-Manjarrés (2013a). **"Extreme Climate Variability Should Be Considered in Forestry-assisted Migration"**. *BioScience* 63.5, p. 317.
31. Benito-Garzón, Marta, Minh Ha-Duong, Nathalie Frascaria-Lacoste, and Juan Fernández-Manjarrés (2013b). **"Habitat restoration and climate change: dealing with climate variability, incomplete data and management decisions with tree translocations"**. *Restoration Ecology* 21.5, pp. 530–536.
30. Dumas, Patrice and Minh Ha-Duong (Apr. 2013). **"Optimal growth with adaptation to climate change"**. *Climatic Change* 117.4, pp. 691–710.
29. Ha-Duong, Minh and Rodica Loisel (2011). **"Actuarial risk assessment of expected fatalities attributable to carbon capture and storage in 2050"**. *International Journal of Greenhouse Gas Control* 5, pp. 1346–1358.
28. Nguyễn, Nhan Thanh, Minh Ha-Duong, Sandra Greiner, and Michael Mehling (2010). **"Improving the Clean Development Mechanism Post 2012: A Developing Country

Parcours scolaire

- Prépa au Lycée Louis le Grand à Paris
- Polytechnique (X88)
- Thèse Analyse et politique économique (1995)
- Habilitation à Diriger les Recherches (2005)

Et aussi

- Agrégation de Mathématiques
- Ingénieur du génie rural, des eaux et forêts
- 1e année DU Langues'O
- Chercheur visiteur à Carnegie Mellon University
- Moniteur de Planche à Voile



1.2 Lieux de la recherche

- CNRS : Organisme de recherche
- USTH : Université

- CleanED : Laboratoire
- VIET : Think tank

Le CNRS

Le Centre national de la recherche scientifique est une institution de recherche parmi les plus importantes au monde. Pour relever les grands défis présents et à venir, ses scientifiques explorent le vivant, la matière, l'Univers et le fonctionnement des sociétés humaines.

3,3 milliards
d'euros de budget

33 000
personnes au service de la recherche

1 144
laboratoires de recherche en France et à l'étranger

USTH FACTSHEET

- Vietnamese public New Model University
- Created in 2010
- Supported & accredited by France
- All PhD lecturers
- 450 Bachelor, 105 Master (academic year 2018/2019)
- 60% do internships aboard
- Not HUST – ĐH Bách Khoa

INFORMATION AND COMMUNICATION TECHNOLOGY

BIOTECHNOLOGY

ENERGY

WATER-ENVIRONMENT-OCEANOGRAPHY

AIR TRANSPORT OPERATIONS MANAGEMENT

ADVANCED MATERIALS SCIENCE AND NANOTECHNOLOGY

QUANTITATIVE COMPUTATIONAL FINANCE

SPACE

8 MASTER TRAINING PROGRAMS

Missions du département

Engage society

- Consult in solar energy and other domains
- Vietnam Sustainable Energy Alliance
- VIET :

  Vietnam Initiative for the Energy Transition

Teach

- 3yr Bachelor in Energy
- 2yr Master in Energy
- 3yr PhD

Research

CleanED

http://cleaned-usth.com

CleanED partners

CIRED
Centre International de Recherche sur l'Environnement et le Développement

cnrs

ENVIDATEC

European Climate Foundation

THE WORLD BANK

République Française
Ambassade de France au Vietnam

wellcome

Agora Energiewende

WWF

SNV Vietnam

GreenID

LIVE&LEARN Environmental Education

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

ASEAN

Robert Gordon University Aberdeen

KYUSHU UNIVERSITY

UCC University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

USAID FROM THE AMERICAN PEOPLE

VIET

Vietnam Initiative for Energy Transition Social Enterprise

We started this company to accelerate the Energy Transition process in Vietnam towards a low carbon economy based on renewable energy sources.

We are a **think tank**: a group of specialists who undertake intensive study of important policy issues, connecting researchers and decision-makers. We add analytical rigour to an otherwise politicized discussion of hot issues.

We are specialized in the energy transition and climate policy.

We are not affiliated with an academy, university or company.

We will remain at equal arm's length distance to all Party cliques, close to but not part of the Government.

Quasi-independent: Financed by international private donors initially, aiming to diversify into domestic sources.

Reach : Vietnam energy policy decision-makers.

Inputs

People
High-level spokeperson
Lead scientist
Associate founders
Specialists and analysts staff

Ressources
Principal funding
Philanthropy funding
Projects funding

Know-how
Advice from international council including AGORA

Influence
Management control board with funders

Activities → Outputs

Policy dialogue strategy

Activities	Outputs
Convening dialogue with stakeholders Putting forward proposals	More active energy transition community Influence key decision makers

Knowledge translation strategy

Activities	Outputs
Continuous intelligence on (inter)national energy transition research & policy developpments	Policy notes, briefing documents, comments on draft legislation Open data & publications

Knowledge production strategy

Activities	Outputs
Topical studies, e.g. energy security, power market designs & incentives, Mekong Delta region high renewables...	Open-access peer reviewed results Technical reports Energy sector scenarios, modeling capacity

Outcomes

2020 objectives
The think-tank is recognized as an important institution contributing to the energy transition in Vietnam.
Power Development Plan 8 has no new coal plants, 20% less total coal capacity and 20% more renewable than PDP7A.

2030 goals
The majority of electricity comes from renewable.
No coal power plant to open or expand after 2030 an official national goal.
Energy intensity of GDP compares to neighbors.

2050 ultimate outcome
Eighty percent of electricity from renewable sources.
Vietnam GHG emissions less than 3 tCO2eq/capita and decreasing.

Positive external enablers assumptions
Success to attract co-funding
Can attract and retain high-level spokeperson and other staff

External risks assumptions
Government clamps foreign funding
External influence on research choices and diffusion of results
Disclosure and diffusion of energy issues becomes sensitive

Conclusion partie 1

Un chercheur travaille dans
un laboratoire ou
un think tank

qui peuvent faire partie
d'une université ou
d'un organisme de recherche.

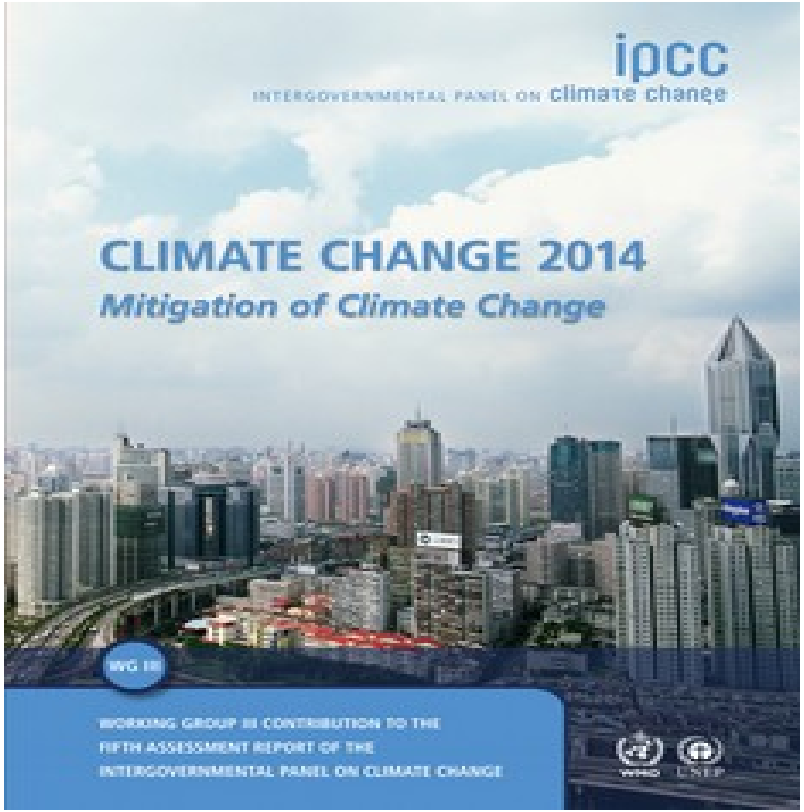
Dr. Ha Duong Minh

2. Le changement climatique, pourquoi agir ?

Les rapports du GIEC, produit du travail de scientifiques du monde entier

1 résumé pour Décideurs
1 résumé technique

16 chapitres
235 auteurs
900 relecteurs
Plus de **2000** pages
Près de **10,000** références
Plus de **38,000** commentaires



Messages à retenir

1) Chaque demi degré compte

2) L’objectif est la neutralité carbone en 2050

1. Chaque demi degré compte

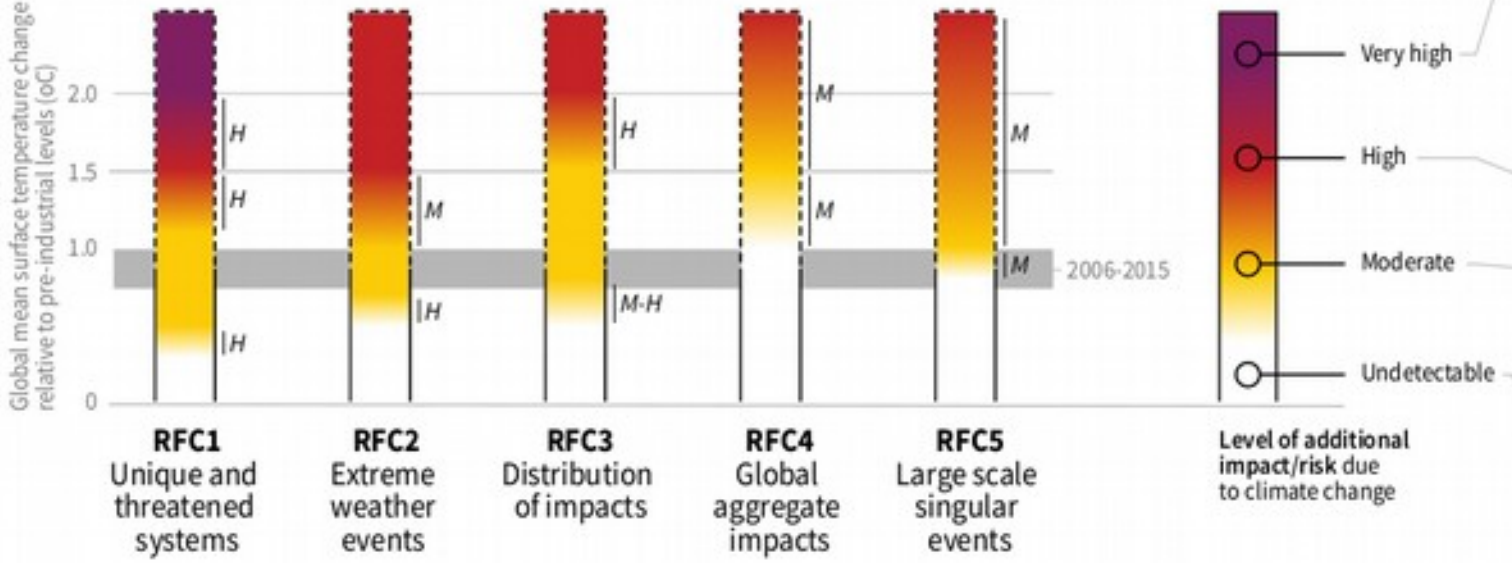
La température moyenne globale est un indicateur simple, mi-politique mi-scientifique.

Le changement climatique a des effets :

- Locaux, amplifiés en régions polaires
- Sur tous les milieux, océans et biosphère
- Inconnus, potentiellement rapides et irréversibles

different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)



Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.

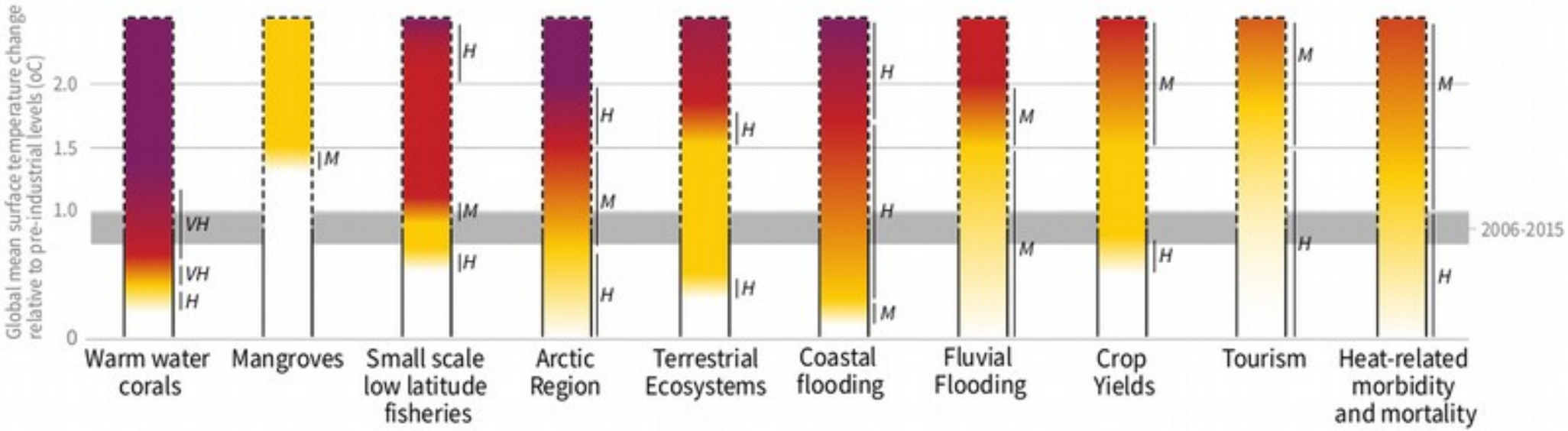
Red indicates severe and widespread impacts/risks.

Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.

White indicates that no impacts are detectable and attributable to climate change.

Source : IPCC (2018) Global warming of 1.5°C.

Impacts and risks for selected natural, managed and human systems



Où en sommes nous ?

- Spirale de la température globale moyenne
- Spirale de la banquise au pôle Nord

Source : http://www.climate-lab-book.ac.uk

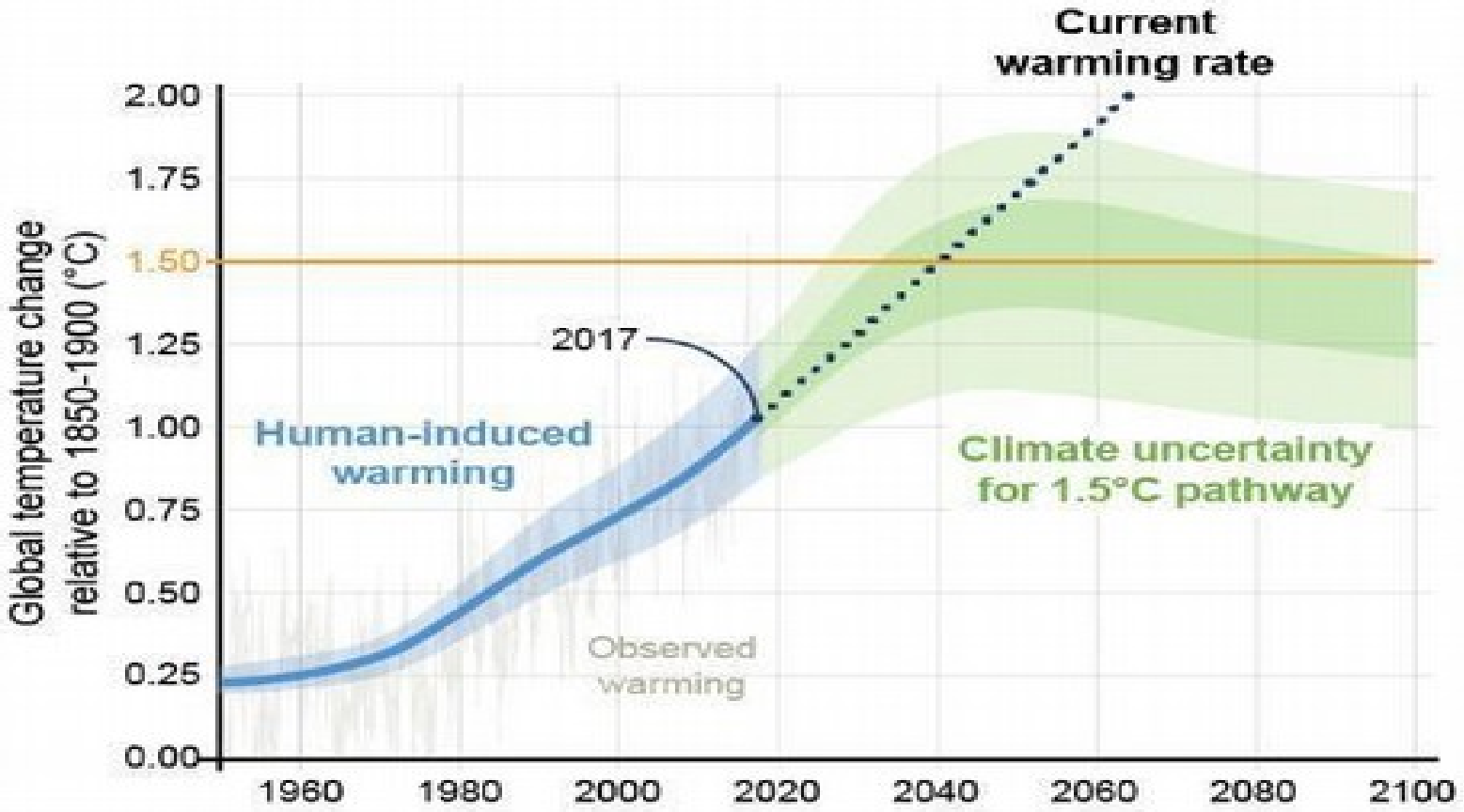
2. Objectif neutralité carbone 2050

- Ce qu’il faudrait faire pour atteindre 1.5°C
- Pourquoi est-ce si difficile

Viser les étoiles, atteindre la lune.

FAQ1.2: How close are we to 1.5°C?

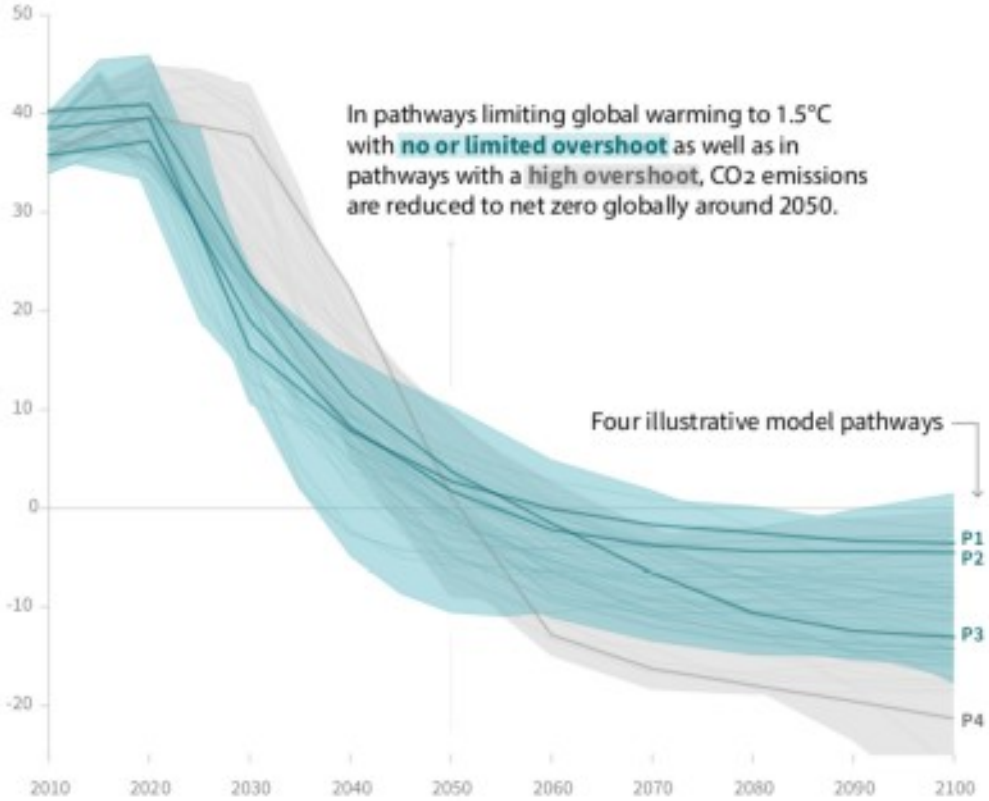
Human-induced warming reached approximately 1°C above pre-industrial levels in 2017



IPCC (2018) Special Report on 1.5°C

Global total net CO_2 emissions

Billion tonnes of CO_2/yr

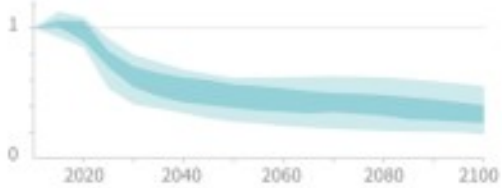


Timing of net zero CO_2
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios

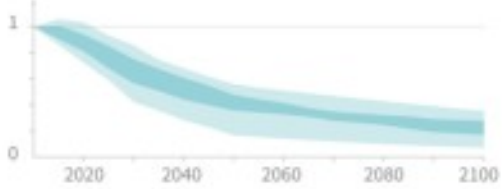
Non-CO_2 emissions relative to 2010

Emissions of non-CO_2 forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

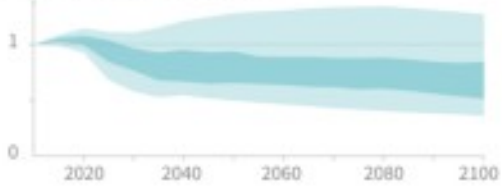
Methane emissions



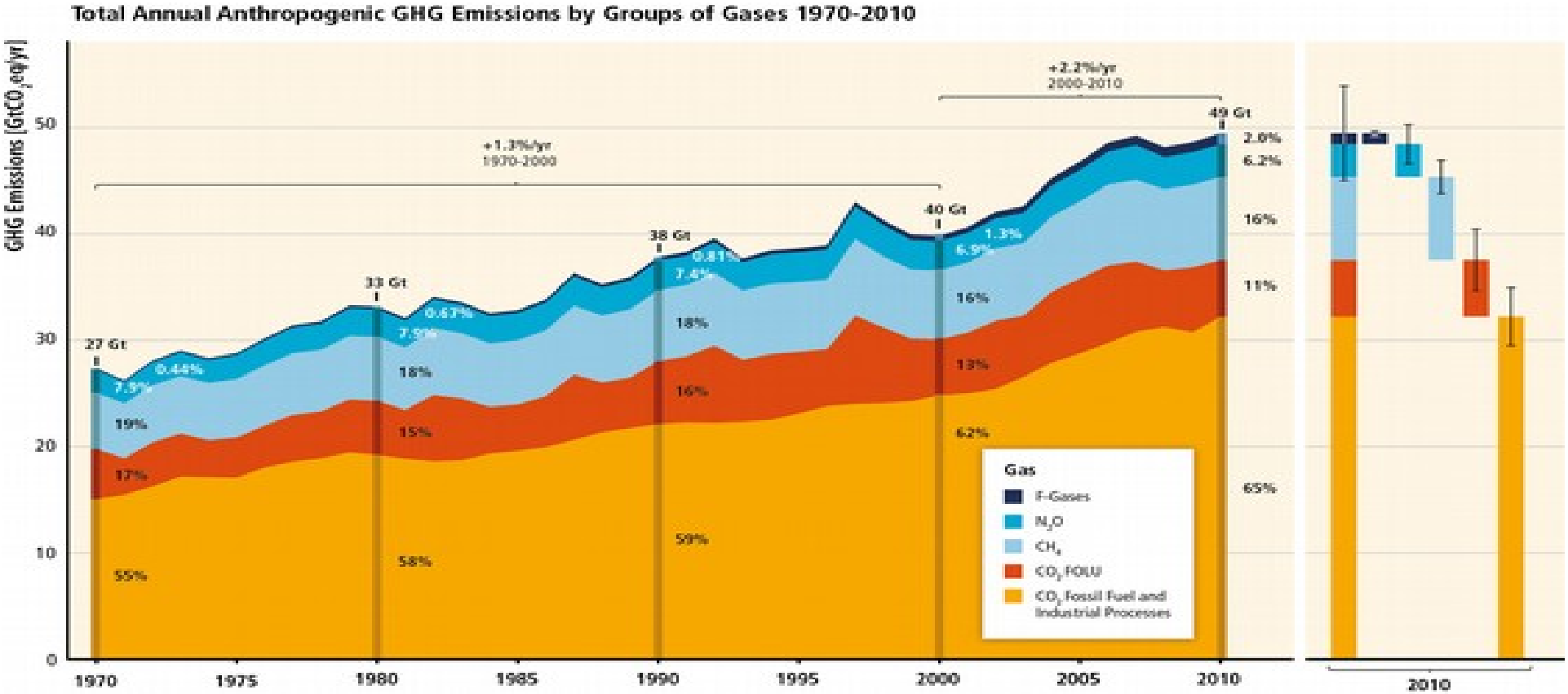
Black carbon emissions



Nitrous oxide emissions



Les émissions de GES accélèrent malgré les efforts de réduction. Les surcroit est constitué pour l'essentiel de CO_2 émis par combustion d'énergies fossiles et par des processus industriel



Source : IPCC AR5, SPM1

Les émissions par tête restent très différentes entre pays du monde

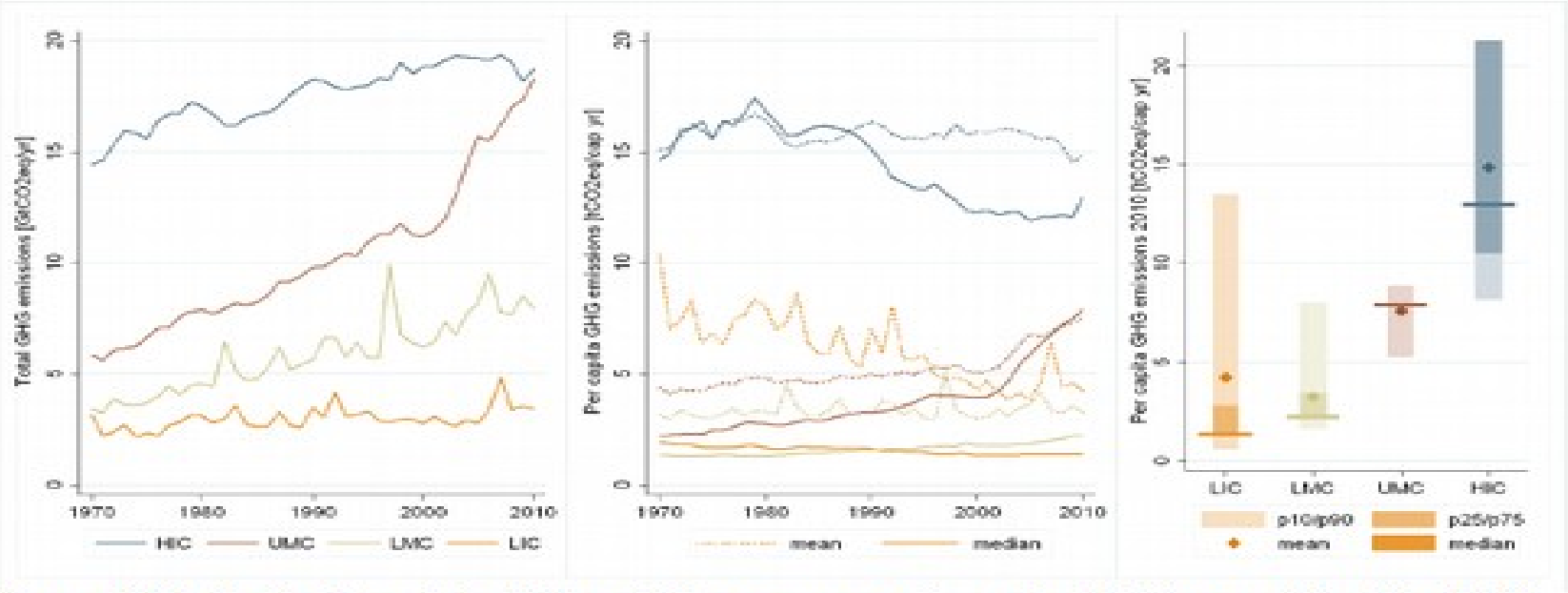


Figure TS.4. Regional trends in GHG emissions per economic region: High Income Countries (HIC), Upper-Middle income Countries (UMC), Lower-Middle income Countries (LMC), Low Income Countries (LIC). Left panel shows the total annual GHG emissions 1970-2010 in gigatonnes of CO_2eq per year (Gt/yr). Panel in the middle shows trends in annual per capita mean and median GHG emissions 1970-2010 in tonnes of CO_2eq (t/cap/year). Right panel shows the annual per capita GHG emissions in 2010 in tonnes of CO_2eq (t/cap/yr). Shadings show the 10th to 90th percentile range (light) as well as the 25th to 75th percentile range (dark). The horizontal bar identifies the median and diamond the mean. [Figure 1.4, Figure 1.8]

Conclusion

1) Chaque demi degré compte

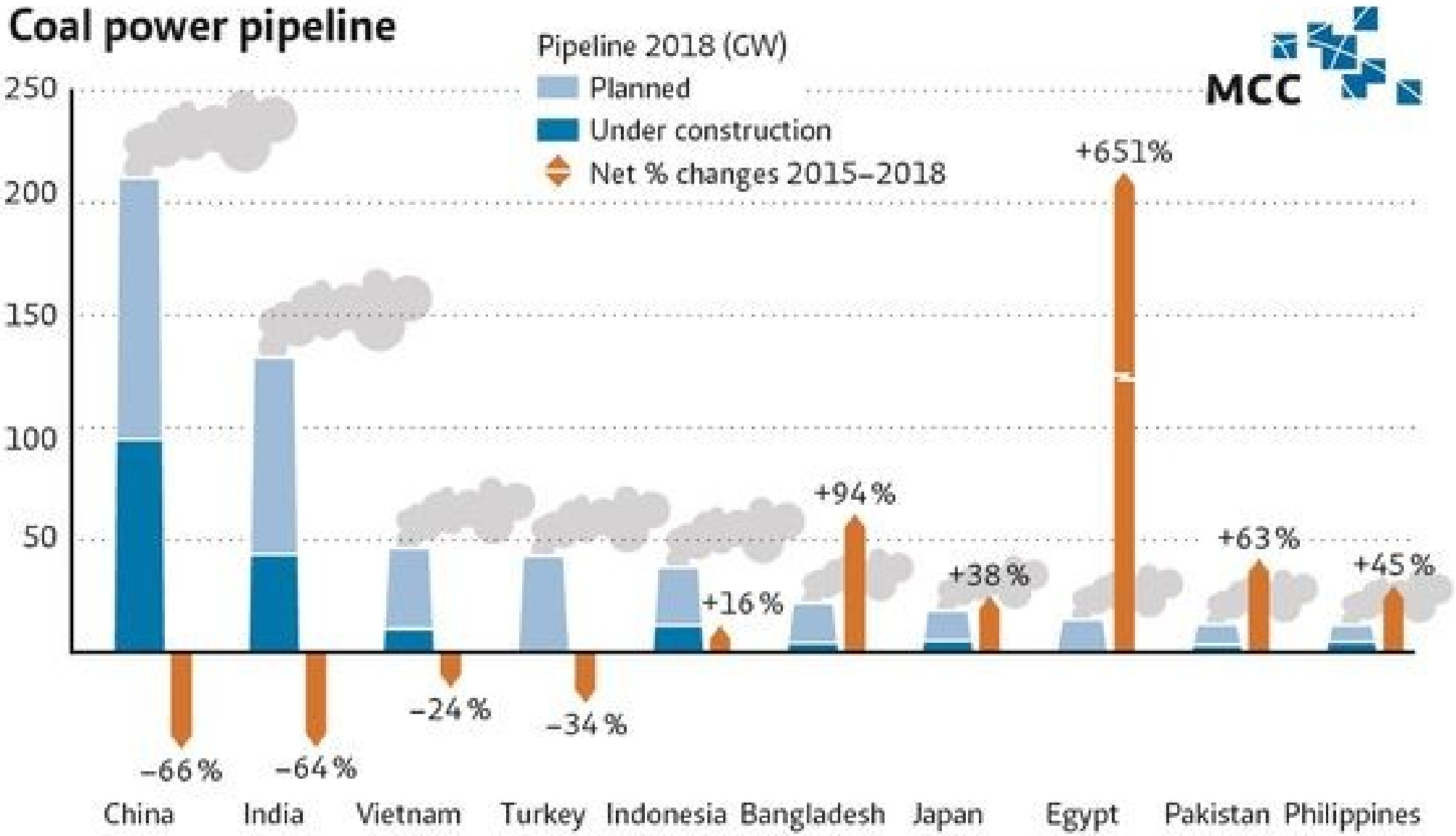
2) L’objectif est la neutralité carbone en 2050

3. La transition énergétique au Vietnam

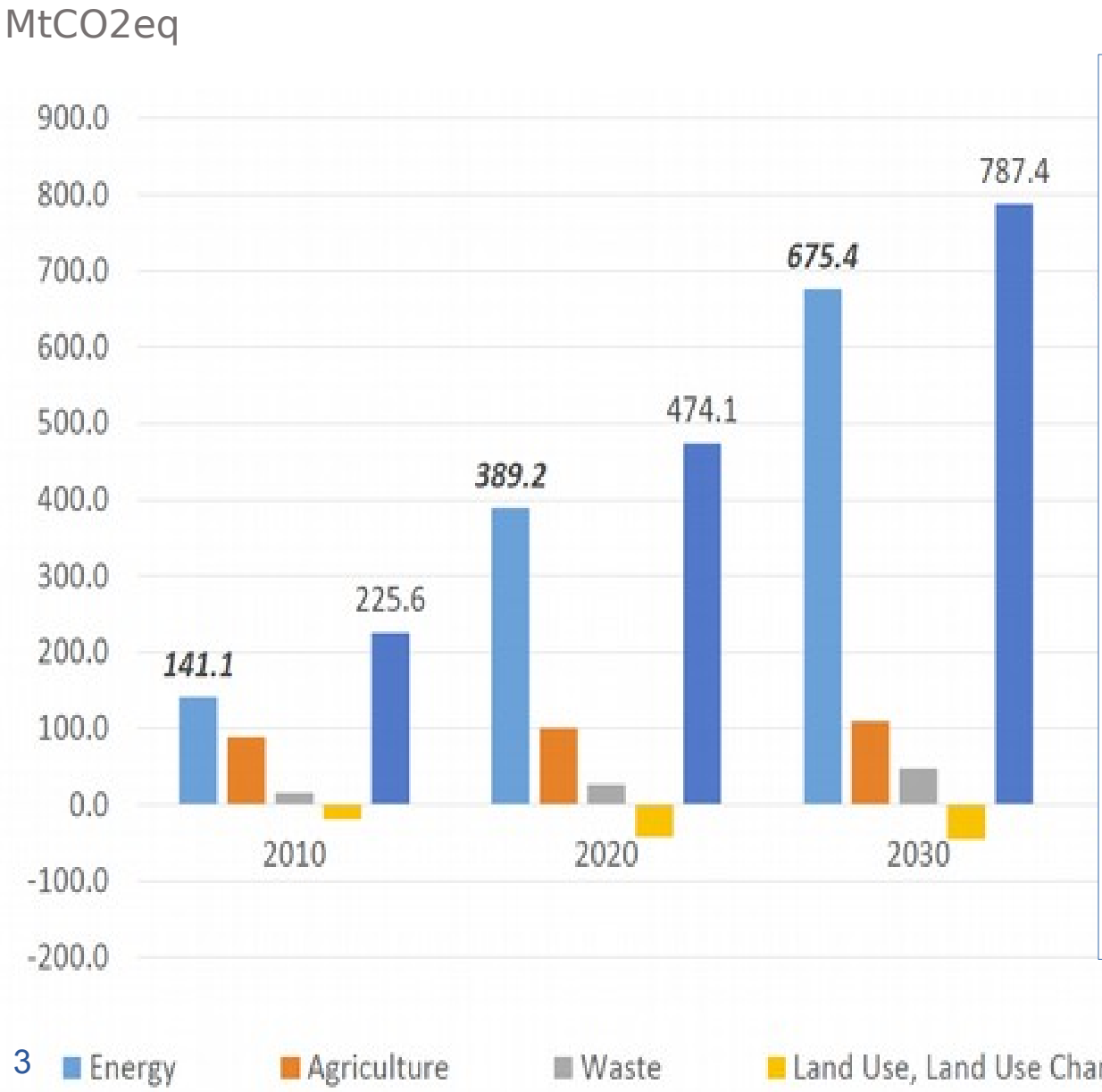
Dr. Minh Ha-Duong

2018-12-02

VN 3e pays qui construit le plus de centrales à charbon



+350 % d'émissions de CO_2 sur 2010-2030



Le Vietnam s'engage à réduire ses émissions de CO_2 de 8.8 % en 2030

3

Peut faire mieux !

7 raisons pourquoi

1. Le système énergétique du Vietnam sait changer vite

Chaque transition énergétique mondiale:

Biomasse → Charbon → Pétrole

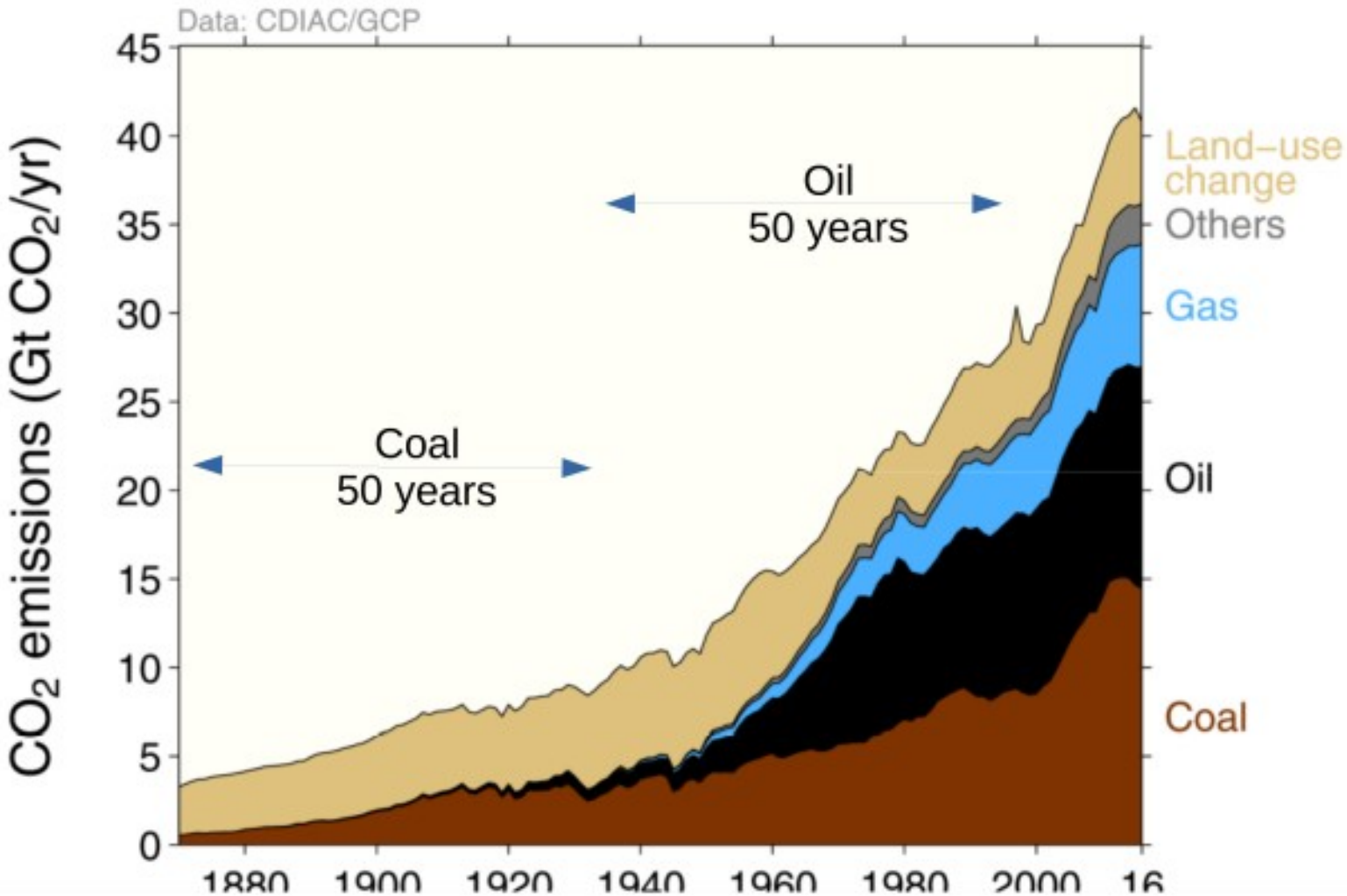
a duré un demi siècle

Le Vietnam en a connu deux depuis 1975

Biomasse → Hydro → Gaz

Total global emissions by source

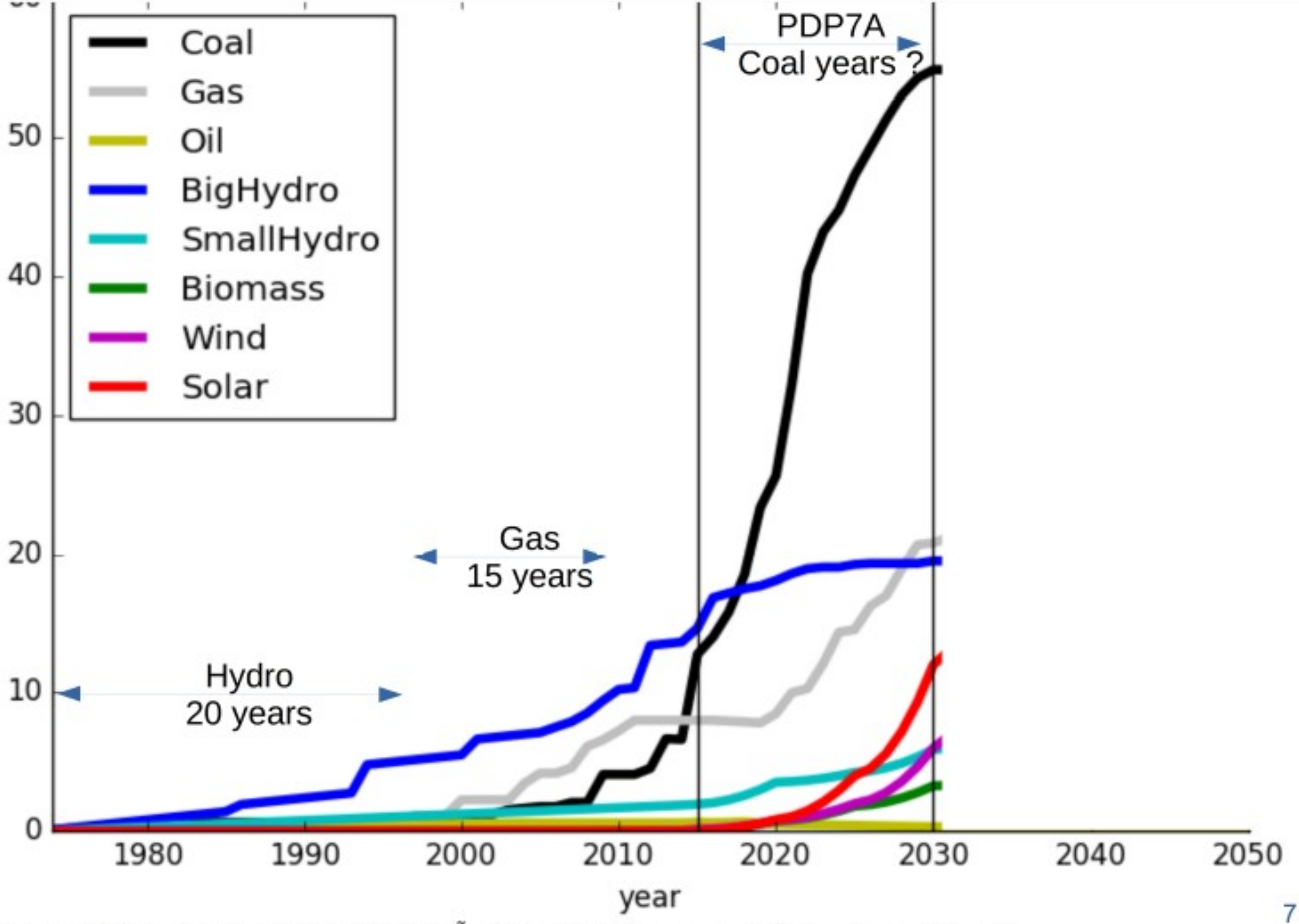
Histoire de l'utilisation de l'énergie par l'humanité à travers les émissions de CO2 :
Il faut un demi siècle pour qu'une source d'énergie devienne dominante



Others: Emissions from cement production and gas flaring

Comment le Vietnam produit-il son électricité ?

1975 – 2015 et vision à 2030



Ha-Duong, Minh and Hoang Anh Trinh Nguyễn (Nov. 2017a). Energy Policy 110, pp. 559–569.

2. Les économies d'énergie favorisent croissance et compétitivité

Utilisation d'électricité efficace

- Équipements des ménages
- Connaissance des pratiques dans les secteurs industriels
- Sociétés spécialisées dans les économies d'énergie
- Formation

Production d'électricité efficace

- Technologies des centrales à charbon
- Dispatching : à chaque instant, quelles centrales utiliser
- Transmission/distribution

3. Les énergies renouvellables sont plus économiques que les énergies fossiles, si on considère tous les coûts et bénéfices

Falling wind and solar costs

- Already below coal cost if including external pollution costs.
- In a few years, competitive on financial costs for new capacity.
- Later, building new PV / wind cheaper than operating existing coal → stranded assets risk

Green energy technologies benefits

- Create local jobs
- Compete in a dynamic global market
- Help energy security
  - Expand power capacity
  - Reduce energy import dependency

4. Les projets solaires et éoliens viennent vite quand bien incités

Objectifs nationaux	PV (0,7 km² = 50 MW)	Wind (1 éolienne = 2 à 5 MW)
2020	850 MW	800 MW
2025	4 000 MW	2 000 MW
2030	12 000 MW	6 000 MW

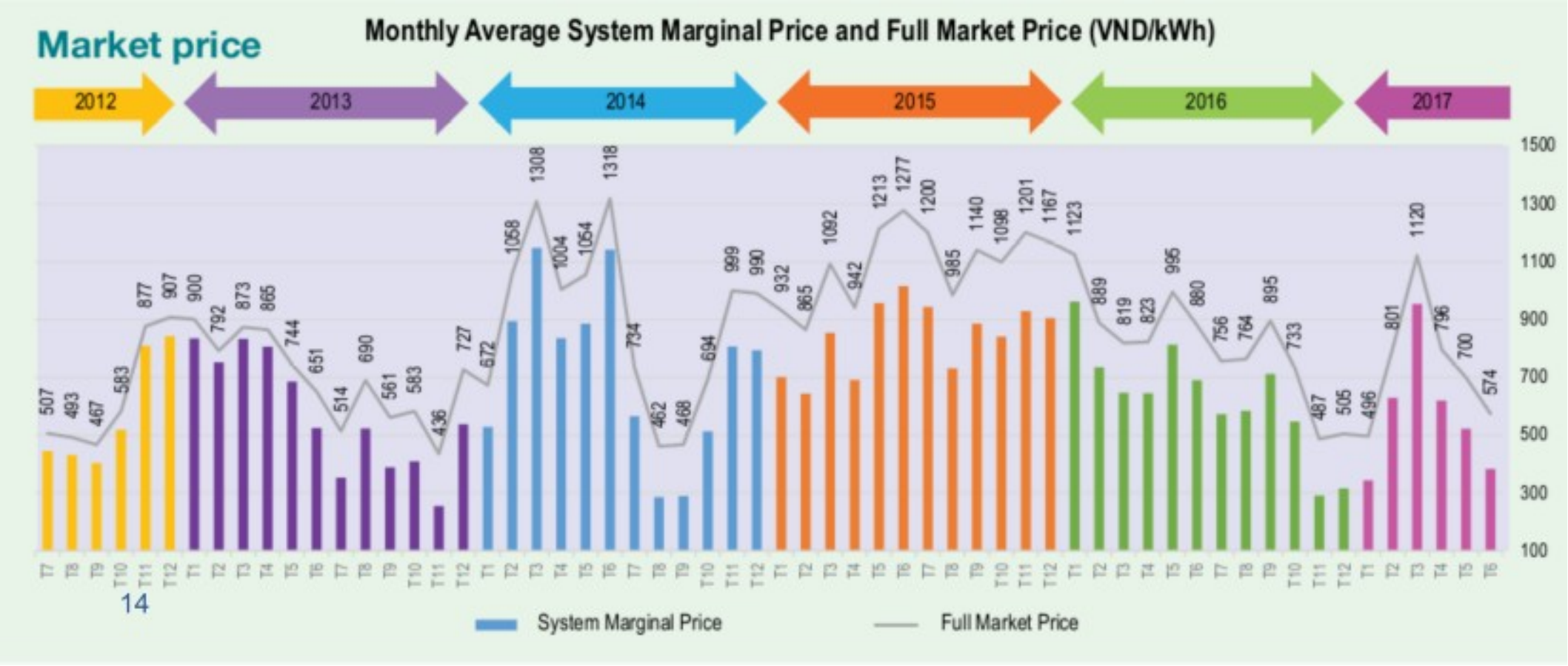
Feed In Tariff for solar PV

Feed In Tariff = un prix d’achat spécial par EVN

- 9.35 UScent/kWh pour un projet connecté avant fin juin 2019 (fin 2020 pour Ninh Thuan)
- Après : ça va baisser
- Encore après : enchères

Un FIT généreux mais cher

Market price	**1 200 VND / kWh at most**
Solar energy FIT	**2 086 VND /kWh**



Résultat des incitations (PV)
Rappel objectif: 850MW en 2020, 4GW en 2025

- 100 centrales photovoltaïques (PV) ajoutées au Plan de développement électrique (10/6) (a)
- Soit 4 700 MW autorisés à construire pour 2020, et 1 800 MW après 2020 (a)
- 2 300 MW de contrat d'achat de l'électricité signés (35 projets) fin Septembre (b)

Sources : (a) Mr. Nguyen Ninh Hai, Director of RE, MOIT, Sep. 2018 « Renewable energy development in Vietnam » communication. (b) EVN quoted by Vietnam Energy Online, 9.10.18

5. Les nouvelles technologies de stockage permettent de limiter coûts et coupures

EVN n’avait pas prévu les lignes : risque de coupures

Location	Approved	Grid capability	Curtailment
Khanh Hoa	306	306	0
Phu Yen	442	245	197
Gia Lai	82	72	10
Binh Thuan	1941	750	1191
Ninh Thuan	2021	650	1371

Solar and Wind farms are usually located in low demand area, They require a grid infrastructure which takes longer to build.

Source : Comment for solar extension plan – EVN report (Elia consultant)

Les réponses à l’intermittence

- Grid extension → grid reinforcement → smartgrid
- Interconnects
- One more role for hydro
- Flexible and efficient thermal power (gas)
- Battery storage

Stocker l’électricité : où, qui paye ?

Decentralized at projects ?

e.g. 25 % of RE power plant capacity for 10mn

e.g. 2MWh battery for a 48 MW plant

Larger systems under grid operator responsibility ?

All of the above.

6. Réformer le marché de l’électricité peut attirer des investisseurs dans les énergies renouvellables

- Introduire en bourse les compagnies de production d’électricité. Mais acheter des parts dans des centrales à charbon est il rentable ?

- Autoriser les producteurs indépendants à vendre en direct aux usines qui veulent de l’électricité verte

Les grands toit solaires

- 11.55 MW de capacité en cours d'installation soit 748 projets fin Juillet 2018[a]

- 3.2MW chez EVN (sur un potentiel de 56MW)[b]

Sources : (a) Mr. Nguyen Ninh Hai, Director of RE, MOIT, Sep. 2018 « Renewable energy development in Vietnam » communication. (b) EVN press release 28.9.2018

La finance, principal levier pour la transition énergétique

- Finance publique
  - Échec du Clean Development Mechanism
  - Accord des pays riches de principe seulement ?
  - Aide et commerce séparables ?

- Finance privée
  - PV : les banques Vietnamiennes investissent
  - Pression sur les banques pour sortir du charbon

7. Les forces technologiques vers le réseau intelligent et décentralisé sont irrésistibles

Ready or not, smart grid is coming

« Renewable energy is for remote areas. »

vs.

« The fourth industrial revolution will disrupt almost every industry, everywhere. »

Maison et quartiers à énergie positive

- En Europe : objectif sur la feuille de route
- Au Vietnam : mise en place du cadre légal et fiscal pour les particuliers et entreprises.
- L’énergie solaire est disponible au moment où on en a le plus besoin, pour la climatisation

Conclusion partie 3

La ruée vers le solaire de cette année n’est que le début de la transition énergétique au Vietnam.