
Friend or foe?
… risen from a man-made catastrophe


… driven off several times, but never defeated
AP


… re-surfacing frequently, even as guardian

Carbon Market Trends in Japan and the Prospects for Northeast Asian Carbon Market Linking

Assoc. Prof. Dr. Sven Rudolph,
Kyoto University Graduate School of Economics

REFORM Meeting
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Carbon market work in progress

Regional carbon pricing in North America and Lessons for Japan (with Takeshi Kawakatsu, Japan)

Towards a new carbon market in Australia (with Elena Aydos, Australia)

Social justice in carbon pricing (with Achim Lerch, Germany)

NEW: Toward a Transpacific Carbon Market – Politically Feasible and Sustainable (ToPCaPS)

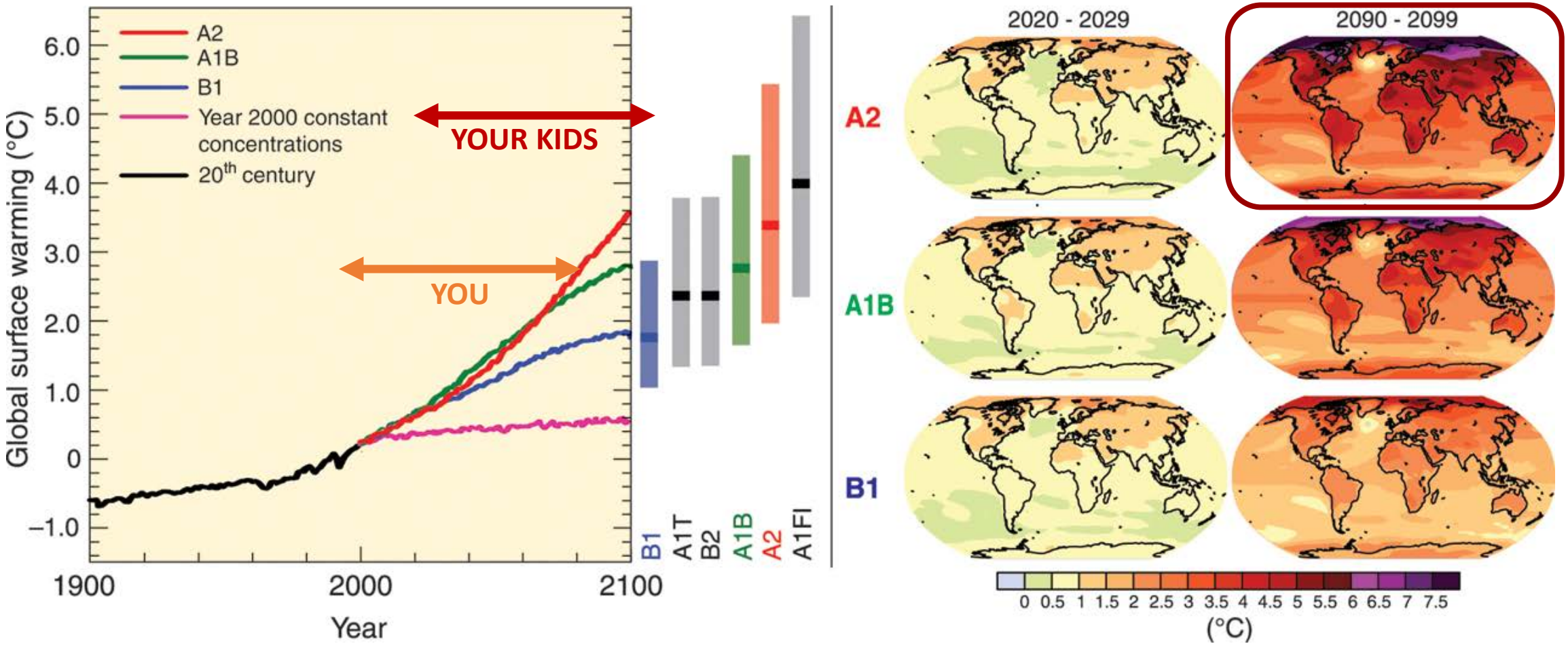
Hessische Berufsakademie
University of Cooperative Education

Kyoto Prefectural University
京都府立大学

THE UNIVERSITY OF NEWCASTLE AUSTRALIA


Friend or foe?
… risen from a man-made catastrophe

Our climate past, present, and future



Japan floods: Heat wave adds to misery in devastated areas

By **Jessie Yeung**, CNN
Updated 1001 GMT (1801 HKT) July 16, 2018

More than 200 dead as heavy rain pounds Japan

Catastrophic rainfall kills dozens in Japan

Dozens dead in flooding in Japan

Rescue operations ongoing in flood-stricken Japan

Family reur dog after fl destroys hc

(CNN) — A heat wave in southern Japan has killed at least eight people, dealing another blow to a country still recovering from the worst flooding in decades.

WORLD NEWS JULY 17, 2018 / 1:11 PM / 2 DAYS AGO

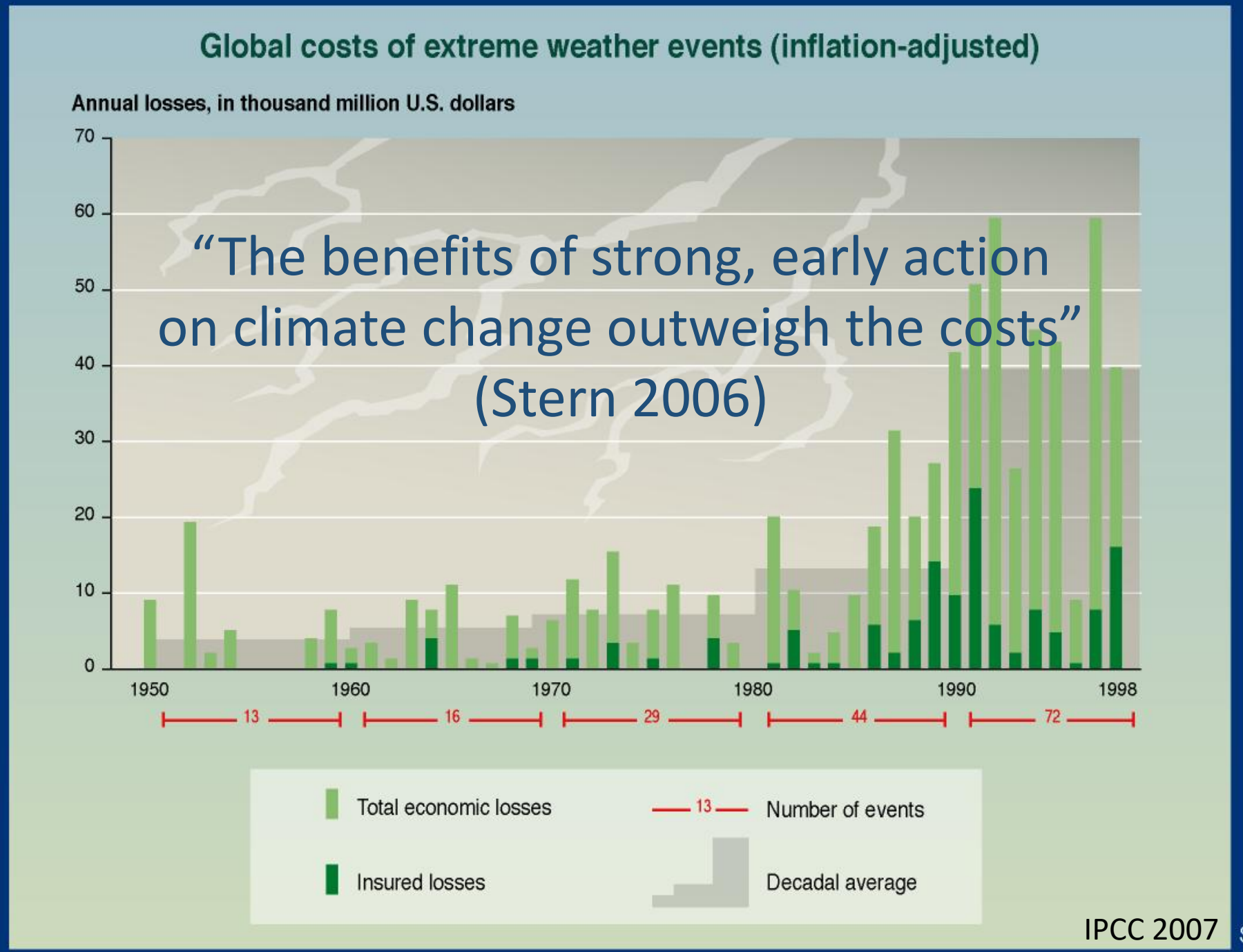
Heatwave blankets Japan, kills 14 people over long weekend

Reuters Staff

2 MIN READ

TOKYO (Reuters) - An intense heatwave killed at least 14 people over a three-day long weekend in Japan, media reported on Tuesday, and high temperatures hampered the recovery in flood-hit areas where more than 200 people died last week.

FILE PHOTO: A volunteer, for recovery work, wipes his sweat as he takes a break in a heat wave at a flood affected area in Kurashiki, Okayama Prefecture, Japan, July 14, 2018. REUTERS/Issei Kato/File Photo



"The benefits of strong, early action on climate change outweigh the costs" (Stern 2006)

IPCC 2007 SYR - FIGURE 2-7

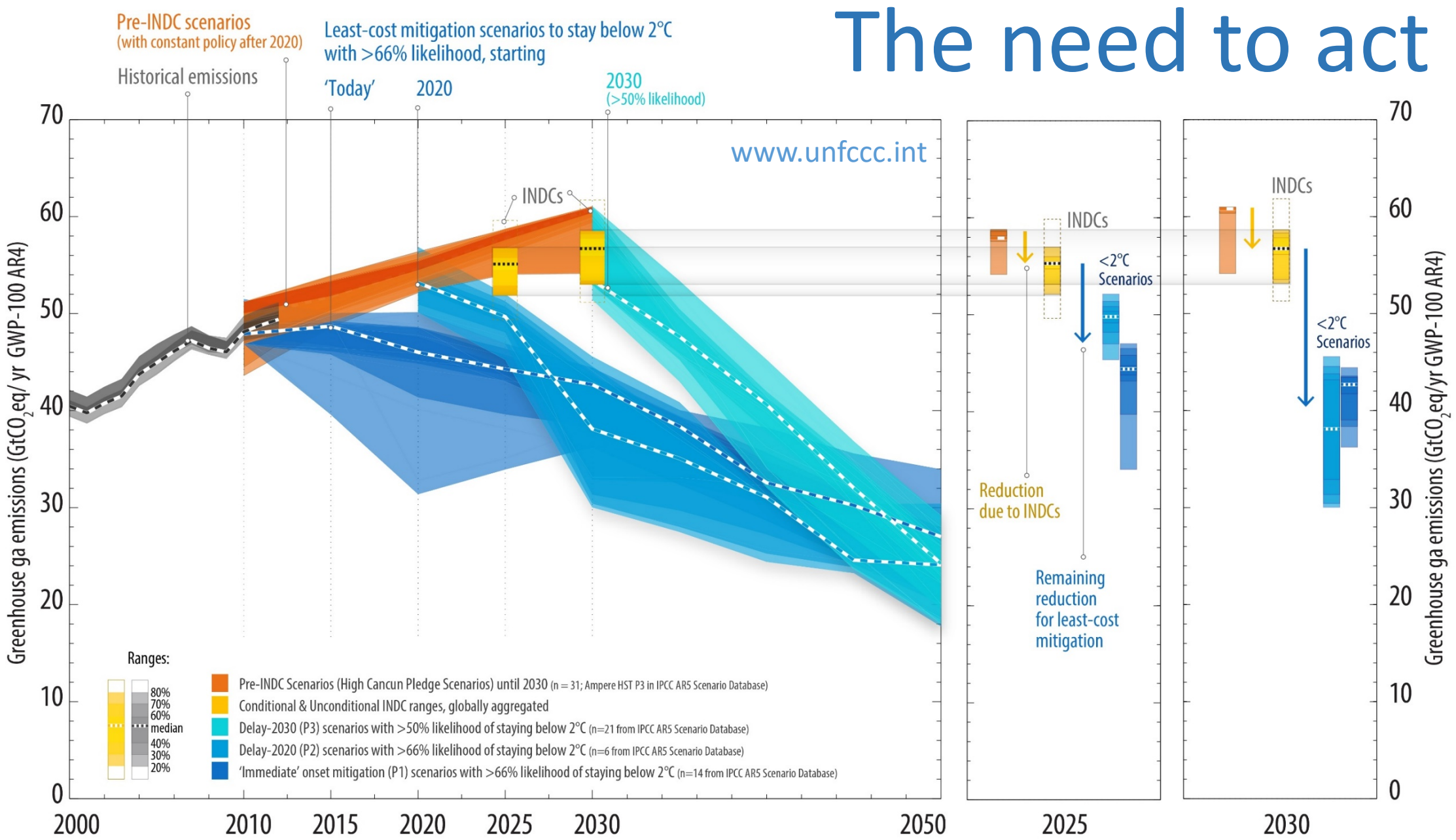
Policy and damage costs Japan

	Climate measures begin	
	2005	**2025**
Climate policy costs (bn US$/a)		
2050	59.54	66.09
2100	415.70	463.01
Climate change damages (bn US$/a)		
2050	182.80	522.97
2100	467.83	2124.31

- participation of 195 UN countries
- target “well below 2°C”
- gradual improvements of (I)NDC

- “use of internationally transferred mitigation outcomes to achieve nationally determined contributions” (Art. 6)

The need to act



Economists' paradigm

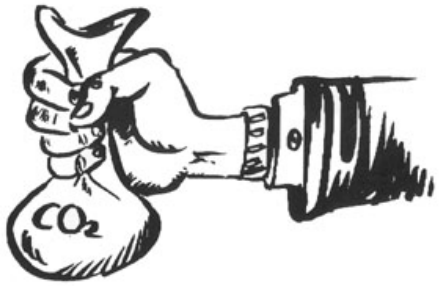
Markets (Price)

"If it is feasible to establish a market to implement a policy,
no policy-maker can afford to do without one. …
Unless I am very much mistaken, markets can be used to implement any anti-pollution policy that you or I can dream up".

John H. Dales 1968

Cost Efficiency Strategy / Tax

Baumol/Oates (1971):
Use of Standards and Prices for Protection of the Environment.
In: SJE 73, 42-54



Cap-and-Trade

Dales (1968): Land, Water, and Ownership.
In: CJE I(4), 791-804

Carbon market design

Flexibility
(banking, borrowing, offsets)

Status quo emissions
(e.g. 10,000,000 t CO_2 per year)

Cap
(e.g. 5,000,000 t CO_2 per year)

Distribute

Distribute
(e.g. 5,000,000 x 1t CO_2 allowances)

Trade
(e.g. 100 allowances)

Revenues
(e.g. mitigation/adaptation measures, cost compensation, tax reductions)

Price
(e.g. 10 US$/permit)

Coverage
(e.g. mandatory vs. voluntary, sources, gases

Cap-and-trade (Dales 1968)

Carbon market design

Coverage
- voluntary vs. mandatory participation
- pollutants and polluters

Cap
- target and total amount of emissions
- absolute volume cap vs. specific intensity targets
- dynamic cap reduction

Initial allocation and flexibility
- free of charge distribution (grandfathering, benchmarking) vs. for purchase (auction, price)
- secondary market (bilateral trading, stock exchanges etc.)

Revenue use
- revenue neutrality vs. budget increase
- e.g. dividend, climate action, tax reduction, budget reconciliation, re-distribution

Flexibility mechanisms
- banking and borrowing
- offsets (domestic, international)

Price management
- price collar (price floor, price ceiling)

Compliance
- compliance periods
- monitoring, reporting, verification (MRV); registries (allowances, emissions)
- fines and compensation

Supporting measures
- border adjustment
- linking

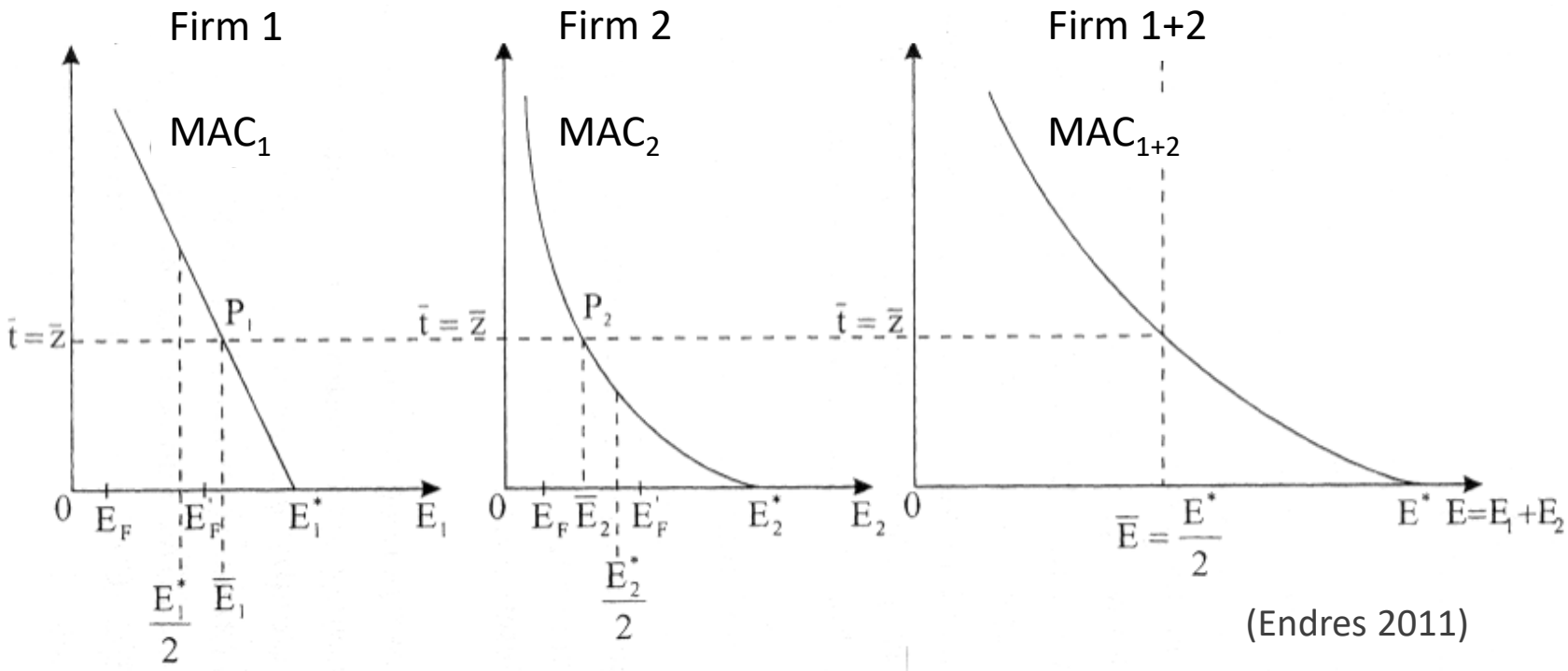
Carbon market evaluation

… an “**apparent failure**” (Spash 2009);
EU ETS “**clinically dead**” (Kemfert 2015)!

But …
“If it is feasible to establish a market to implement a policy,
no policy-maker can afford to do without one.
Unless I am very much mistaken, markets can be used
to implement any anti-pollution policy that you or I can dream up.”
(Dales 1968: 100)

And …

… efficient and effective!



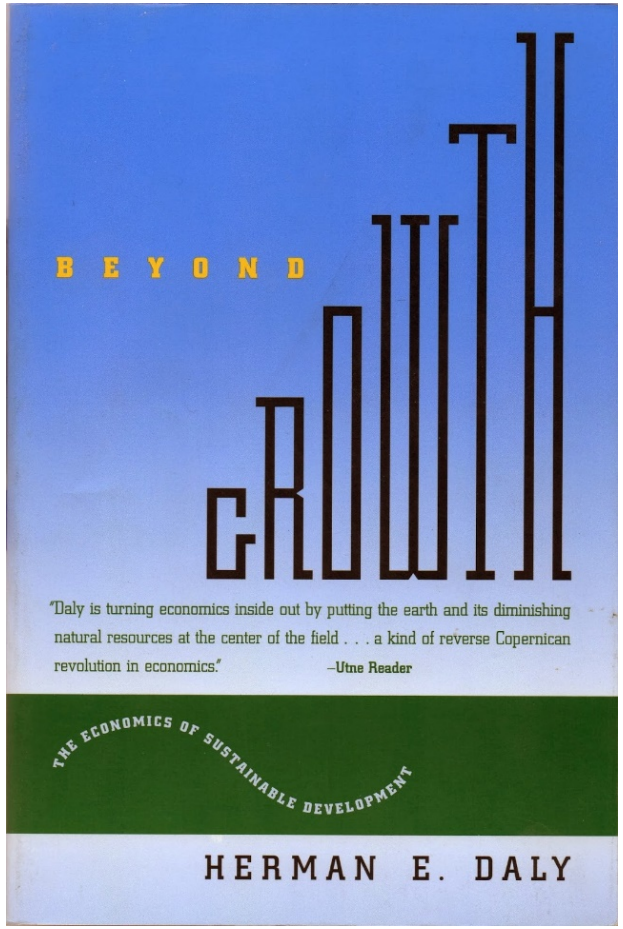
(Endres 2011)

… can be made sustainable!

Sustainable Design	
Coverage	mandatory participation all GHG (based on CO_2e) all polluters
Cap	target 25-40% reduction by 2020, base 1990) absolute volume cap gradual cap reduction
Allocation	unit of 1 t of CO_2e/a 100% auctioning frequent, non-discriminatory auctions equally accessible market
Revenue Use	100% revenue recycling (earmarked) for mitigation, adaptation, cost compensation
Flexibility Mechanisms	unlimited banking no borrowing offsets limited to sustainable projects
Price Management	price floor (≥ 30 US$/t), inflation adjustment price ceiling (≥ 200 US$/t), inflation adjustment
Compliance	control periods not longer than 3 years continuous emission monitoring or verified reporting emission and allowance tracking and registration fines (>p) for non-compliance over-compensation of excess emissions (at least 2x)
Supporting Measures	border adjustment linking

(Rudolph et al. 2012)

… can prioritize economic decisions!



Scale, …
total volume of the resource flow, matter-energy throughput taken from the environment as low-entropy resources and returned to the environment as high-entropy wastes.
Scale is relative to environmental carrying capacity
⇒ cap setting

Distribution, and …
division of the resource flow, embodied in products, among different people
⇒ initial distribution

Allocation …
division of the resource flow among alternative uses
⇒ allowance trading

… to be separated and prioritized!

… can be applied at sub-national level!

political **failure** at the **national** level (e.g. US 2010, JP 2010, AU 2014)

efficient "**voting by feet**" (Tiebout 1956) vs. "**race to the bottom**" (Stewart 1977);

now "**policy laboratories**" allowing "**tailor-made solutions"**
(Adler 2004; Revesz 1992, 1996)!

… can be improved by linking!

Reduction of …

target achievement, administrative, transaction **costs** (efficiency, justice),

competitive distortions (efficiency, justice), and

carbon leakage (effectiveness, justice).

… are spreading globally!

… are allowed under the Paris Agreement

Article 6

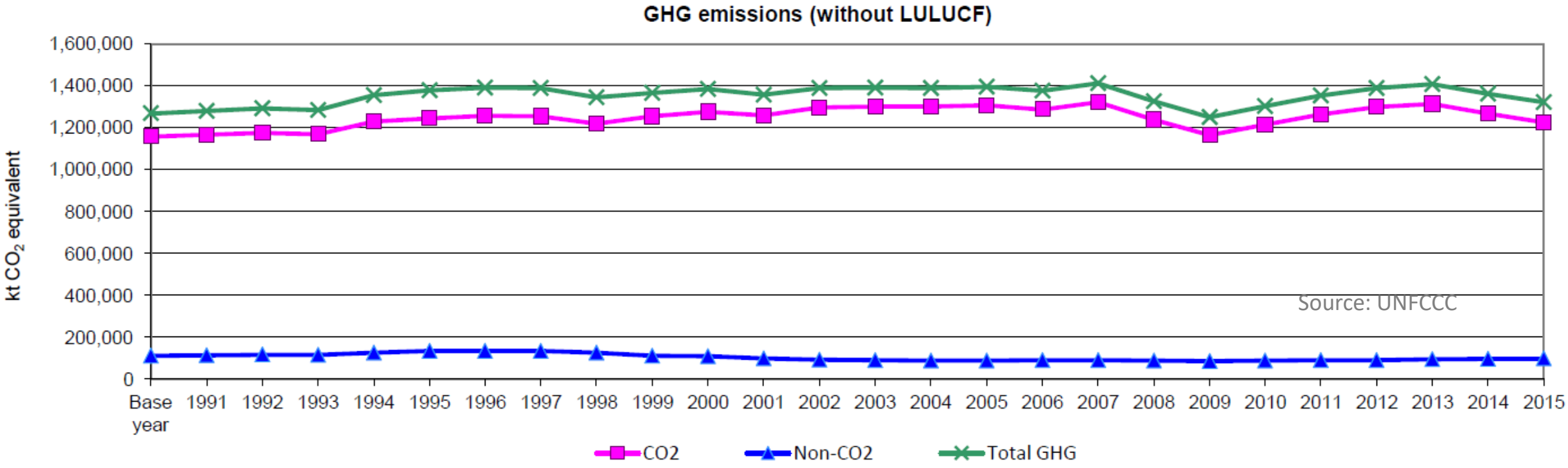
1. Parties recognize that some Parties choose to pursue voluntary **cooperation in the implementation of their nationally determined contributions** to allow for higher ambition in their mitigation and adaptation actions and to promote sustainable development and environmental integrity.

2. Parties shall, where engaging on a voluntary basis in **cooperative approaches that involve the use of internationally transferred mitigation outcomes** towards nationally determined contributions, **promote sustainable development** and ensure environmental integrity and transparency, including in governance, and shall apply robust accounting to ensure, inter alia, the avoidance of double counting, consistent with guidance adopted by the Conference of the Parties serving as the meeting of the Parties to this Agreement.

3. The use of internationally transferred mitigation outcomes to achieve nationally determined contributions under this Agreement shall be **voluntary and authorized by participating Parties**.

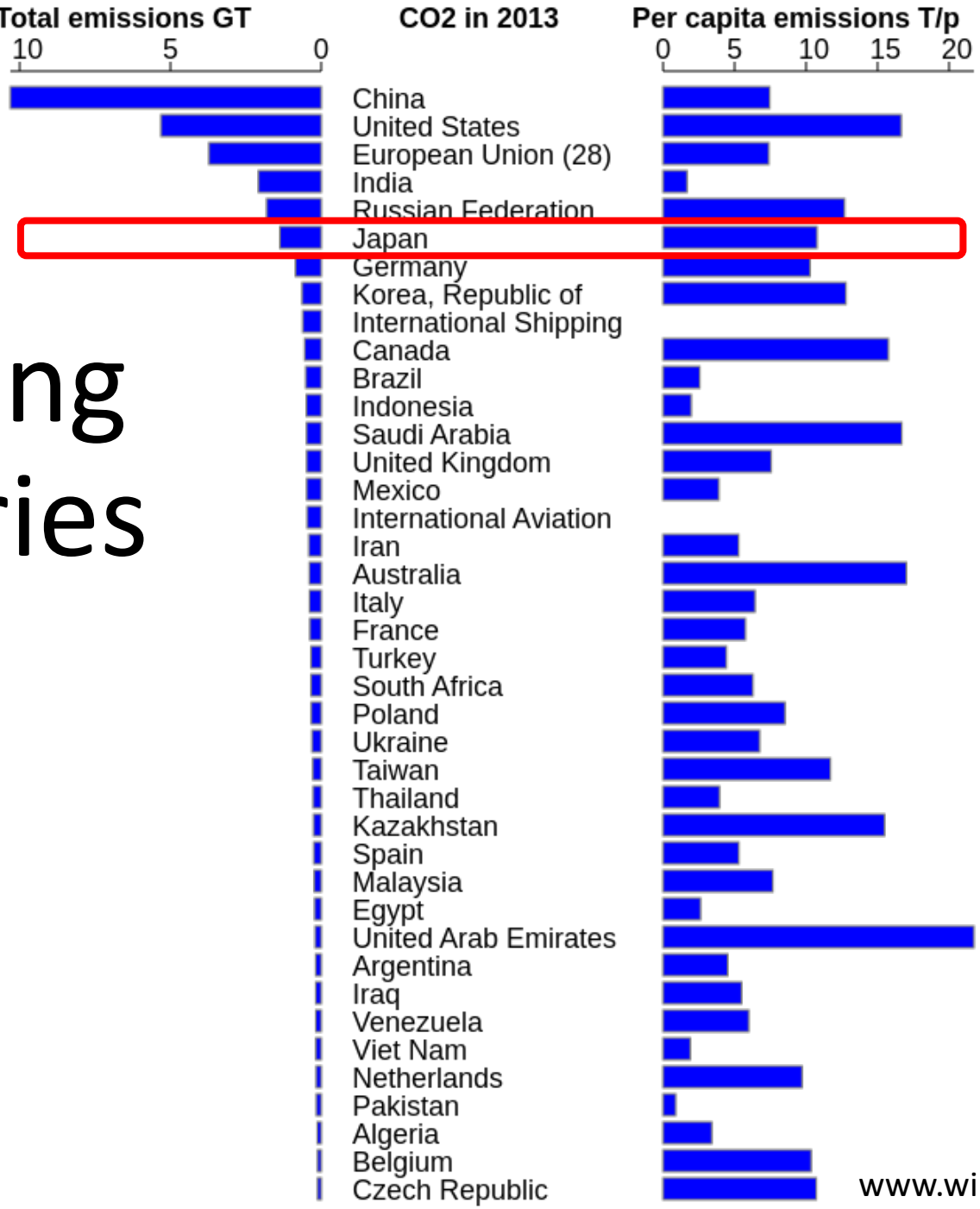

… driven off several times but never defeated
AP

GHG emissions Japan



1990-2015: +4.28%

Polluting Countries



www.wikipedia.org (data EU Edgar Data Base 2013)

Climate policy history (international)

	Japan
United Nations Framework Convention on Climate Change (1992)	signed and ratified
Kyoto Protocol I (1997) 1st commitment period (2008-12)	signed and ratified
Kyoto I target	–6% by 2008-12 (1990) (achieved)
Kyoto Protocol II/Doha Amendment (2012) 2nd commitment period (2013-20)	not signed
Paris Agreement (2015)	signed and ratified
INDC commitment	–26% by 2030 (2013) (= –8-12% (1990))

Japan carbon pricing history

2000s
2004-11 annual proposals for carbon tax by Ministry of the Environment (MoE) failed **2005-12** Japan Voluntary Emissions Trading Scheme (JVETS) operational 2005-2012 **2010** proposal for Integrated Domestic Market of Emissions Trading (IDMET) failed
2010s
2012 Japan Global Warming Tax (JGWT) implemented 2012 **2013** Joint Crediting Mechanism (JCM) implemented 2013

The Public Choice explanation

“**Where Did All the Markets Go**?”
(Hahn/Hester 1989)

“[T]here is **a market tendency for the political process**
to resist market mechanisms for rationing scarce environmental resources”
(Hahn 1987)

„[W]ith some minor revisions, **the results** of the Public Choice approach **still hold**“.
(Kirchgässner/Schneider 2003)

The tragedy of cap-and-trade (in theory)

Political Stakeholders	Interests CaT	Political influence
Voters	😐	–
Environmental groups	☺	–
Industry groups	☹	+
Environmental bureaucrats	😐	+
Politicians	😐	±

The tragedy of IDMET

Political Stakeholders	Interests CaT	Political Influence
Voters	😐	–
Environmental groups	☺	–
financial, green / Keidanren	😐 / ☹	– / +
MoE / METI	☺ / ☹	– / +
DPJ / LDP	😐 / ☹	– / +

Keidanren's alternatives

2005-12 Voluntary Action Plan

- Participation: voluntary
- Coverage: CO_2 from big industry
- Target: mixture of mainly relative intensity targets

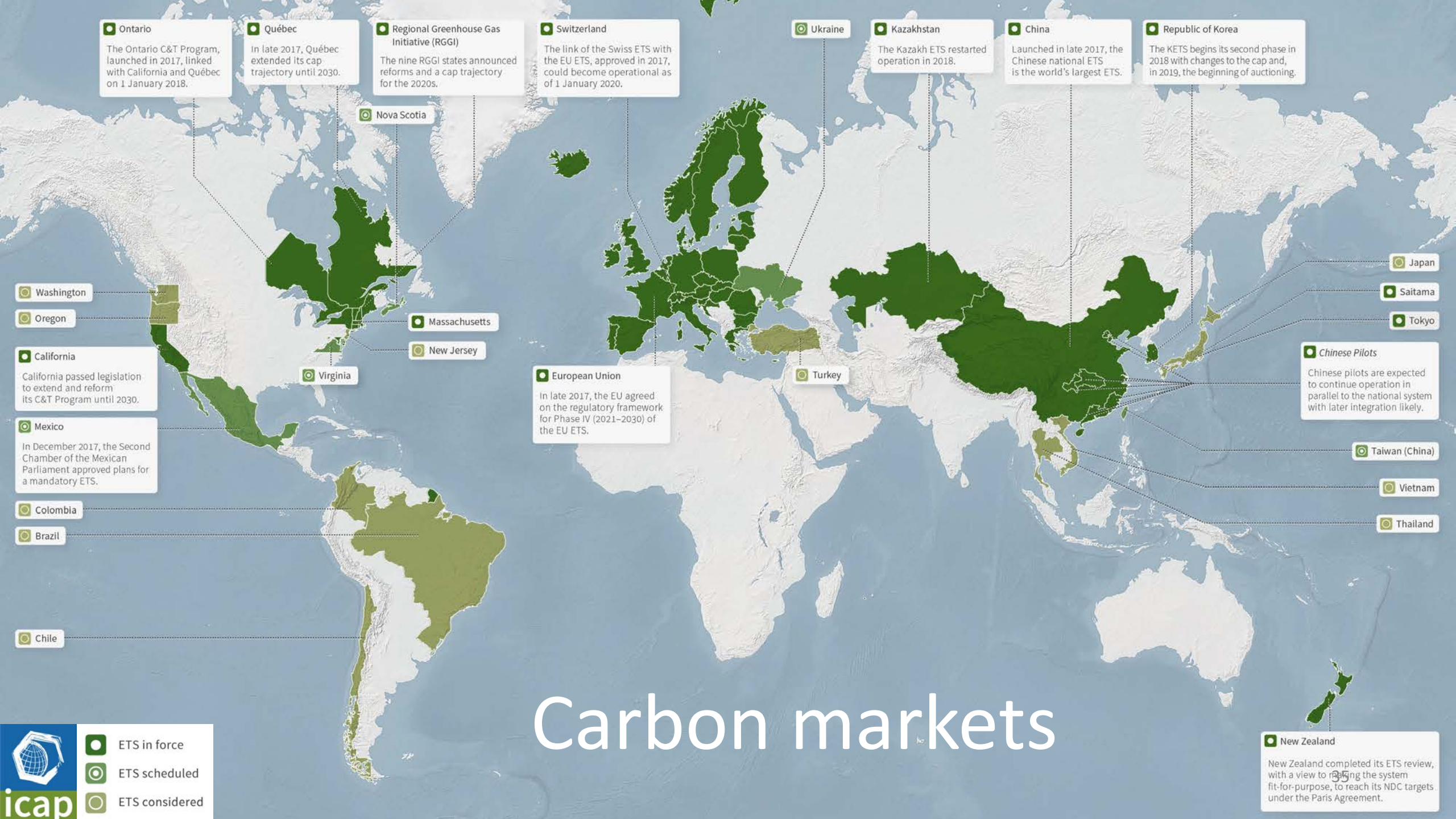
$\Rightarrow$ Results: only few absolute volume reductions

2012 Global Warming Tax (+ FIT)

- Participation: mandatory
- Coverage: CO_2 from fossil fuel consumption
- Target: gradually increasing national carbon tax of 289¥/t CO_2 (2016)
- Revenue: 100% revenue neutral, proceeds fro climate policy measures in industry

$\Rightarrow$ Results: estimated –0.5-2.2% CO_2 (mainly by use of revenues)


… re-surfacing frequently, even as guardian



Carbon markets

The political triumph of the TMG ETS

Political Stakeholders	Interests CaT	Political Influence
Voters	☺	+
Environmental groups	☺	+
financial, green / Keidanren	😐 / ☹	+ / –
Environ. / Econ. Bureau	☺ / 😐	+ / –
Politicians	☺	+

Tokyo

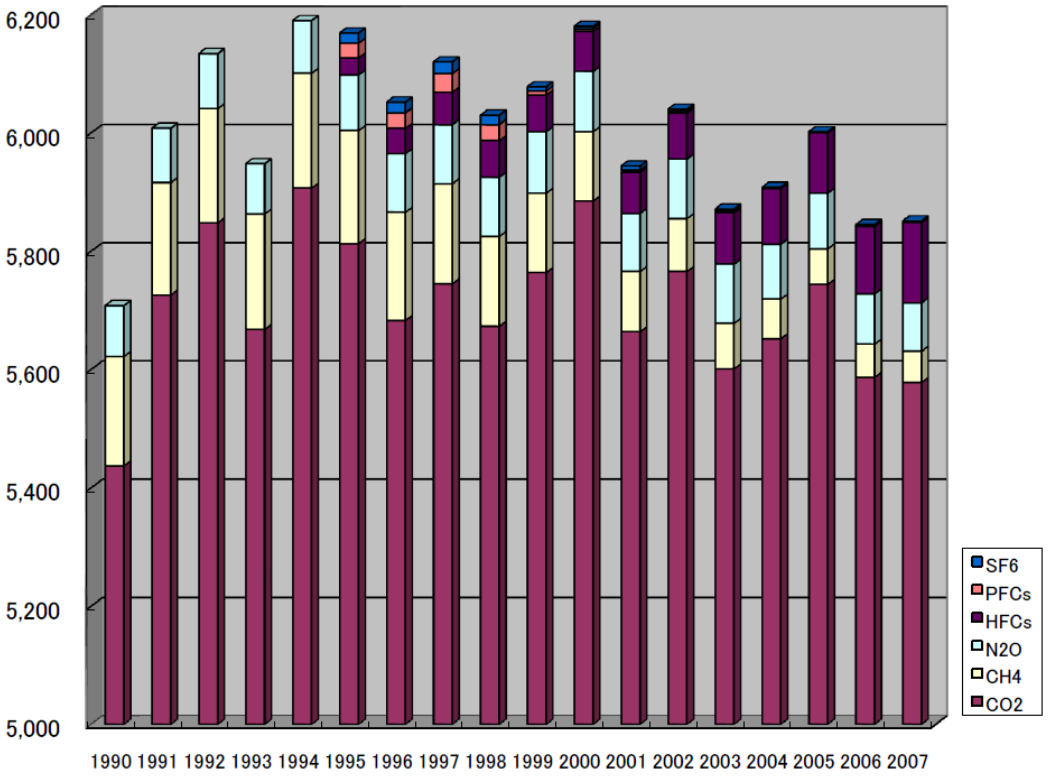
The city …

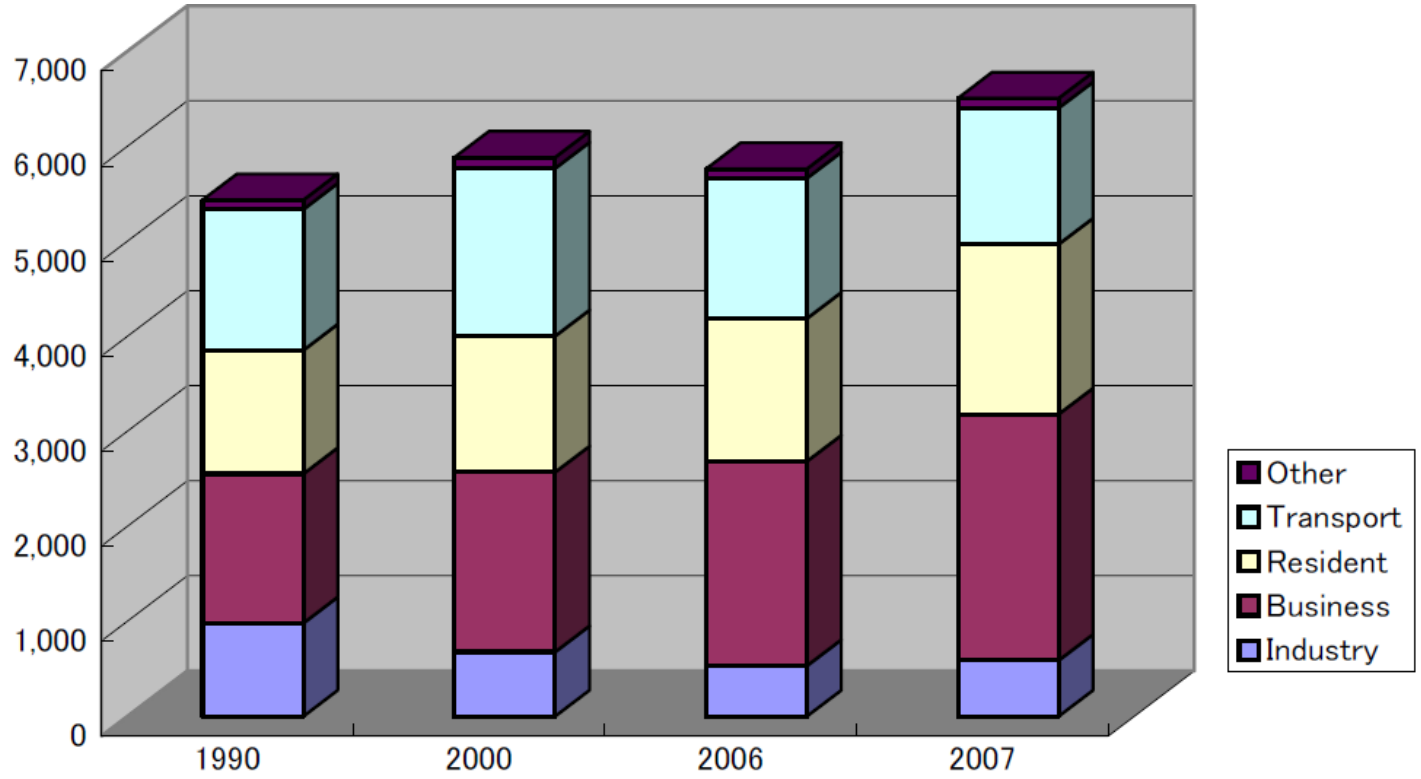
- biggest metropolis and 15th largest economy
- significant GHG emission level of 65 m t (95% CO_2)
- low per capita CO_2 emissions and energy intensity

and its climate policy

- national leader in environmental policy
- GHG targets of –25% by 2020, –50% by 2050 (2000)
- policy mix, but until 2005 rather ineffective
- Tokyo Metropolitan Government Emissions Trading Scheme (TMG ETS) major policy instrument

Tokyo GHG emissions





TMG ETS design

Flexibility
(banking, no borrowing, limited JP offsets)

Status quo emissions

Cap
(decreasing, bottom-up, absolute volume, –6/8% 2014, –15/17% 2019 (2006-08))

Distribute

Revenues
(no revenues)

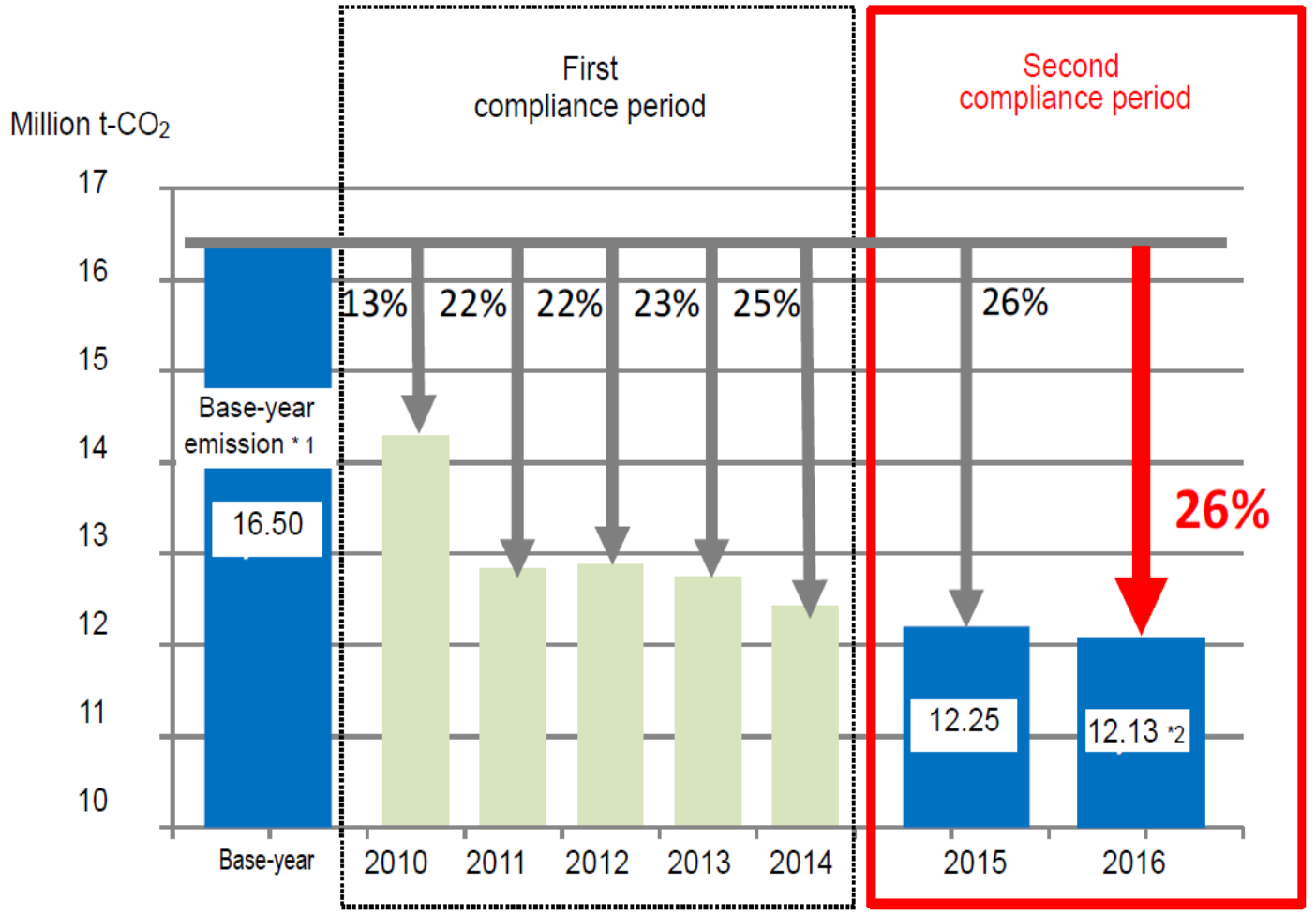
Trade
(ERC, bilateral only)

Price
(no price managment)

Distribute
(Excess Redcution Credits (ERC) only)

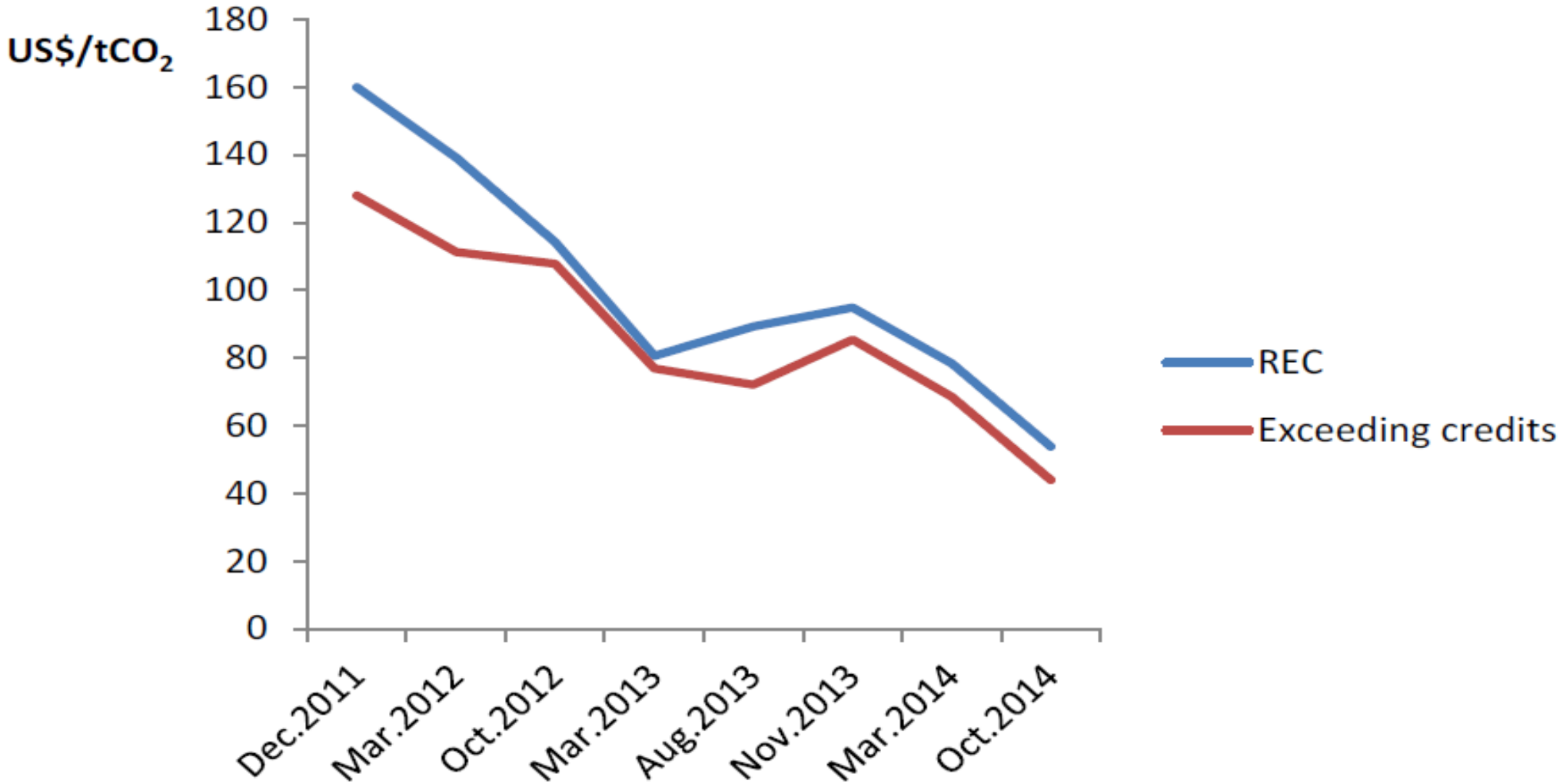
Coverage
(mandatory participation of office buildings, big factories; CO_2 only, 20% of all GHG)

TMG ETS emission reductions



*1 Base-year emissions are the average emissions of three consecutive fiscal years selected by facilities between FY2002-FY2007.
*2 Aggregated value as of January 18, 2018 resulting from emission factors for electricity, etc. in the second compliance period

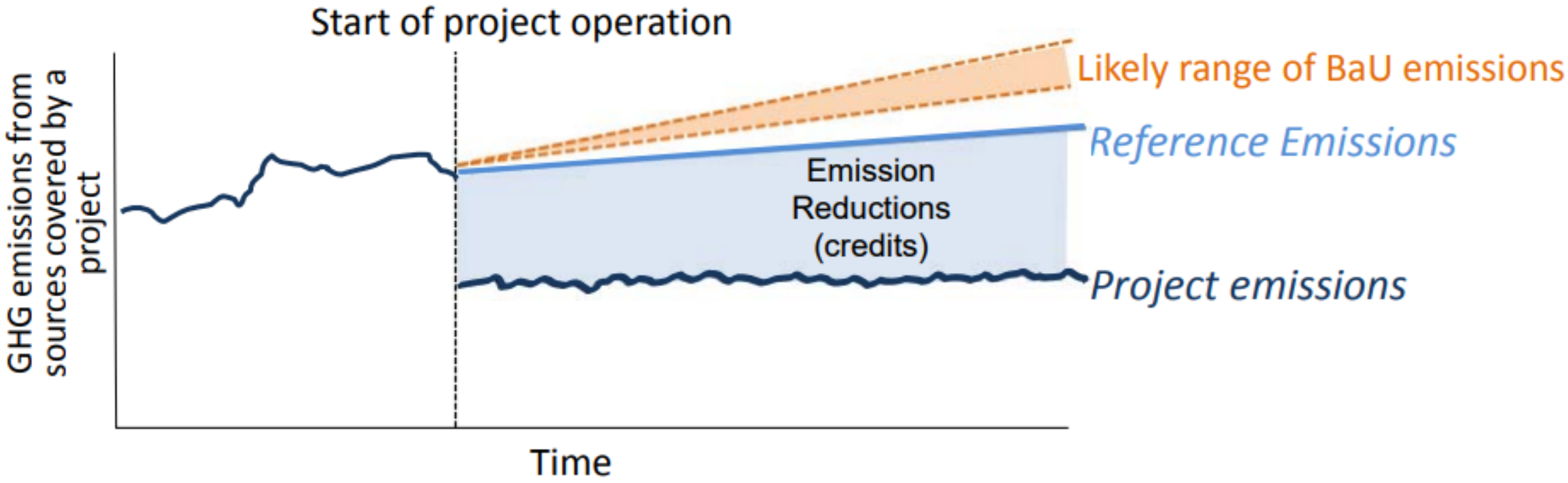
TMG ETS decreasing allowance prices

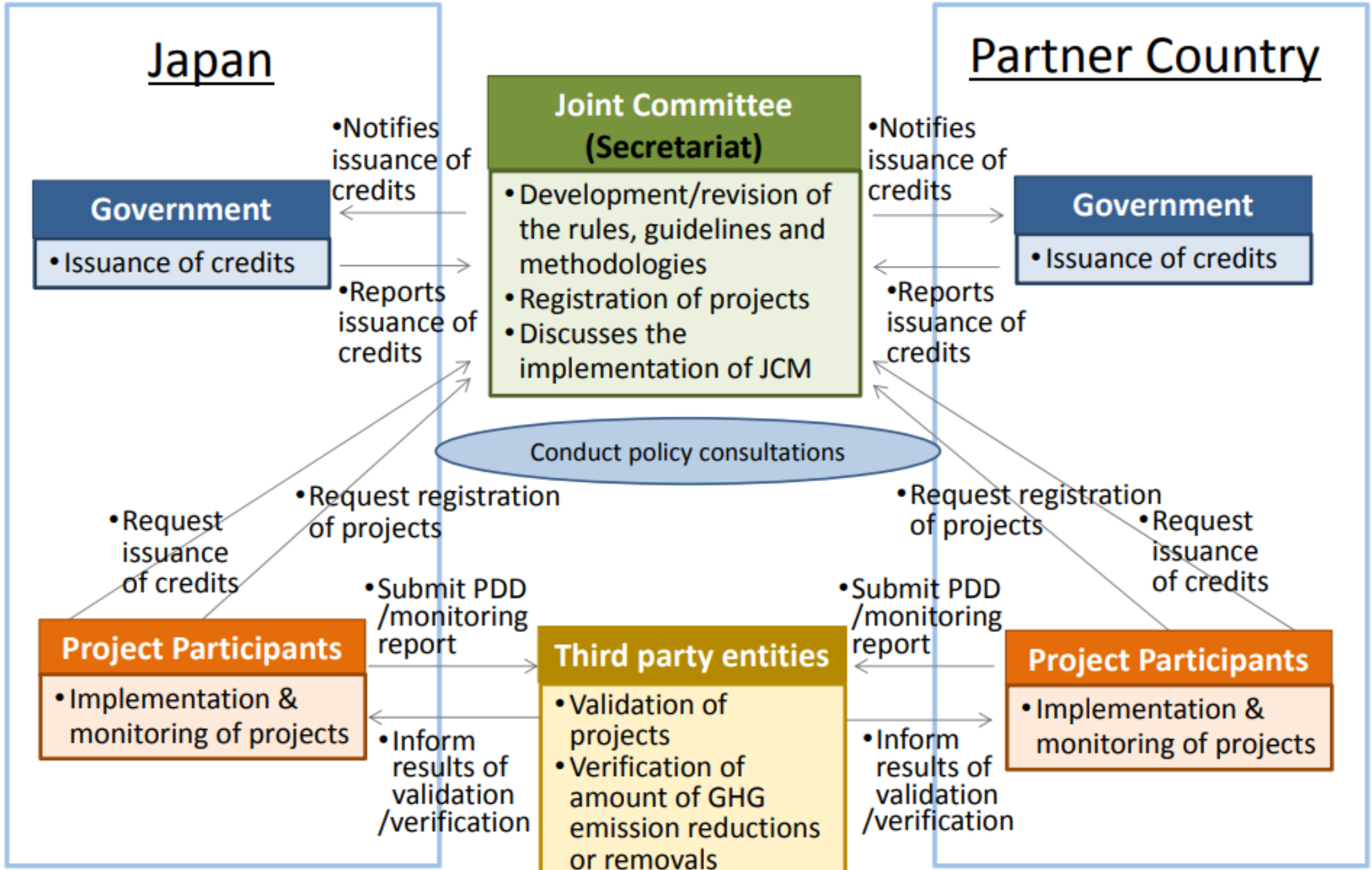


Joint Crediting Mechanism (JCM) aim

- “To facilitate diffusion of leading low carbon technologies …
- implementation of mitigation actions, …
  contributes to sustainable development of developing countries. ...
- uses (credits] to achieve Japan’s emission reduction target.
- … contribute to the ultimate objective of the UNFCCC by facilitating global actions …
- complementing the CDM.”

JCM credit creation




Japan
Partner Country
Joint Committee (Secretariat)
• Development/revision of the rules, guidelines and methodologies
• Registration of projects
• Discusses the implementation of JCM
Government
• Issuance of credits
Government
• Issuance of credits
•Notifies issuance of credits
•Reports issuance of credits
•Notifies issuance of credits
•Reports issuance of credits
Conduct policy consultations
•Request issuance of credits
•Request registration of projects
•Request registration of projects
•Request issuance of credits
Project Participants
• Implementation & monitoring of projects
•Submit PDD /monitoring report
•Inform results of validation /verification
Third party entities
• Validation of projects
• Verification of amount of GHG emission reductions or removals
•Submit PDD /monitoring report
•Inform results of validation /verification
Project Participants
• Implementation & monitoring of projects

JCM partner countries

Mongolia
Jan. 8, 2013
（Ulaanbaatar）

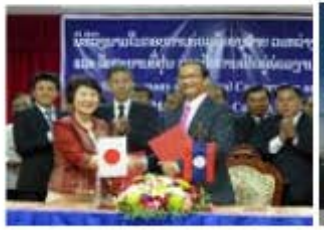
Bangladesh
Mar. 19, 2013
(Dhaka)

Ethiopia
May 27, 2013
(Addis Ababa)

Kenya
Jun. 12,2013
(Nairobi)

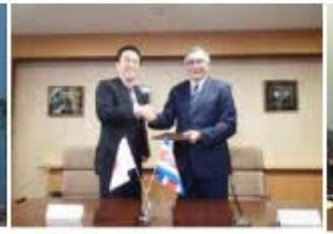
Maldives
Jun. 29, 2013
(Okinawa)

Viet Nam
Jul. 2, 2013
(Hanoi)



Lao PDR
Aug. 7, 2013
(Vientiane)

Indonesia
Aug. 26, 2013
(Jakarta)



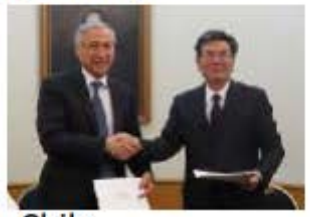
Costa Rica
Dec. 9, 2013
(Tokyo)

Palau
Jan. 13, 2014
(Ngerulmud)

Cambodia
Apr. 11, 2014
(Phnom Penh)

Mexico
Jul. 25, 2014
(Mexico City)

Saudi Arabia
May 13, 2015



Chile
May 26, 2015
(Santiago)

Myanmar
Sep. 16, 2015
(Nay Pyi Taw)

Thailand
Nov. 19, 2015
(Tokyo)

the Philippines
Jan. 12, 2017
(Manila)

Case Study:
10MW Solar Power Project in Darkhan City

- Mongolia
- Darkhan-Uul Province
- Estimated emission reductions in each year: 11,221 each year from 2017 to 2030.
- The electricity produced by the project is supplied to the Central Energy System of Mongolia displacing electricity generation by fossil-fuel based power plants, contributing to greenhouse gas emissions reduction in Mongolia.
- Mongolia: 1,789 / Japan: 7,158

Image Source: https://media.istockphoto.com/vectors/solar-energy-vector-id492096808?k=6&m=492096808&s=612x612&w=0&h=edL8PZNUZmn0M_NqR0EEJ7AcBXVIk5vKrgZHHhCoT4U=

Source: https://www.jcm.go.jp/projects/22/pdd_file

Case Study:

Introducing High Efficiency Refrigerator to a Frozen Food Processing Plant in Indonesia

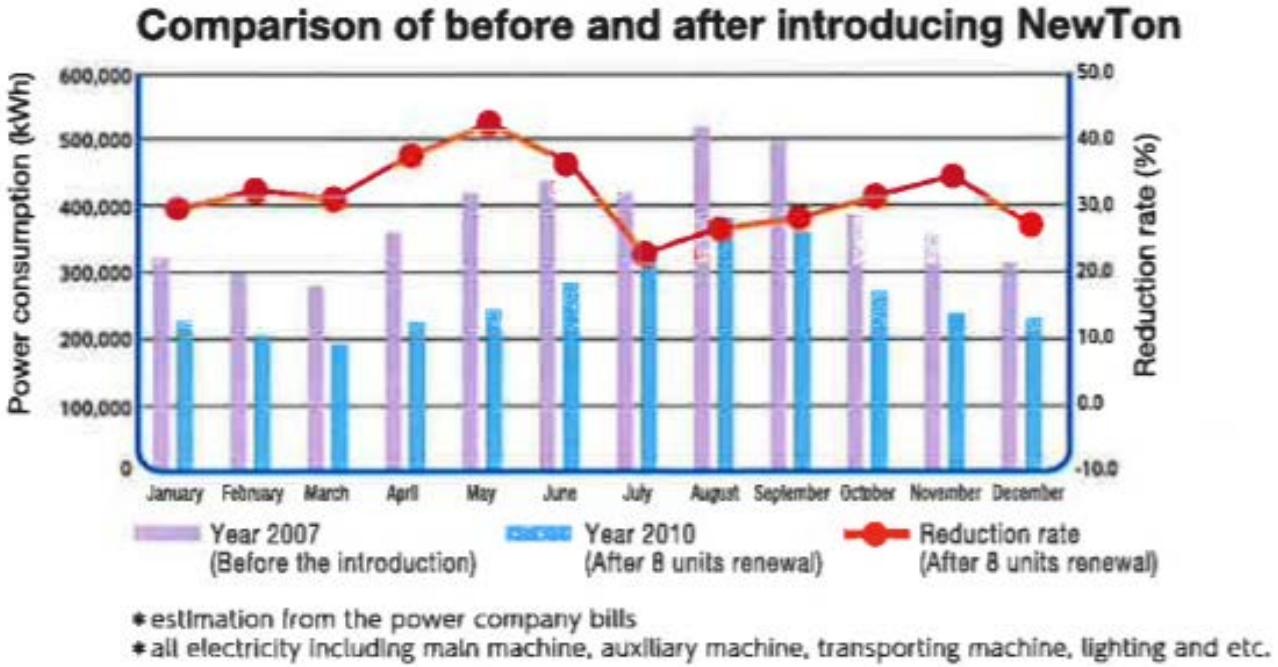
- Republic of Indonesia, West Java Province, Kecamatan Cilebar, Kabupaten Karawang
- Estimated emission reductions in each year:

- 2014: 1
- 2015 to 2020: 25/year

Over 30% energy-saving

Tokyo Toyomi Cold Storage Funabashi Logistic center

capacity (ton)	after construction (year)	previous equipment		the number of NewTon units (unit)	Reducing rate of consumption electricity (%)
		refrigerant	compressor		
18,000	29	HCFC-22	Screw	8	31.1



- Indonesia: 3 / Japan: 8

Image source: https://images.fineartamerica.com/images-medium-large/factory-building-power-plant-retro-aloysius-patrimonio.jpg

Source: https://www.jcm.go.jp/projects/3/pdd_appendix_file1

JCM achievements and flaws

Achievements

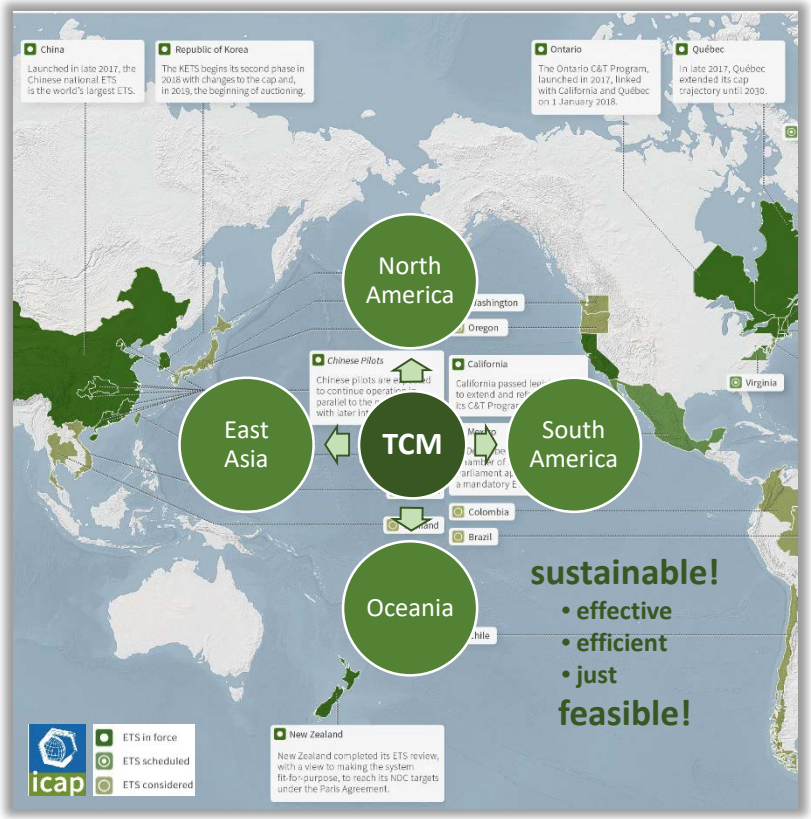
- 53 methodologies and 29 projects have been approved and implemented (19 await validation, including a heat recovery project estimated to average 90,864 tons of CO_2 reduction over its lifespan).
- Japan has earned over 8,000 insured credits, partner countries approx. 2,000.
- Spread of technology is expected to lead to diffusion and a greater impact than initially projected.

Flaws

- Additionally remains the major issue (environmental credibility).
- Process is lengthy and time consuming (transaction costs).
- Credits are maintained by the Paris Agreement and are formless without.
- Potential to create foreign investment dependence.

(i)
Dr. Sven RUDOLPH, Assoc. Prof., Kyoto University Graduate School of Economics

(ii)
Title: **ToPCaPS – Toward a Trans-Pacific Carbon Market (TCM): Politically Feasible and Sustainable!**



First steps in the Hakubi Project:
- Empirical: status quo CN, JP, KR carbon markets and stakeholder interviews
- Theoretical: refining sustainability criteria for carbon market design
- Organizational: research trips to CN, JP, KR for stock-taking and networking

⇒ Output: Climate Policy article "Prospects of AU Carbon Market" (Oct. 2018), Ecological Economics article "Social Justice in Carbon Markets" (Dec. 2018), conference presentations on CN-JP-KR linking at IAEE and ESEE (Jun. 2019)

Creative points in my research:
- Aim: develops an innovative sustainable and politically feasible policy model for substantiating the Paris Agreement and limiting global warming
- Methodology: combines Sustainability Economics, Law, and Political Science approaches trans-disciplinarily and applies theoretical and empirical methods

⇒ Output: advances politico-economic theory on carbon market linking as well as case study research methodology; provides immediately applicable advice for local, national, and international policy-makers and practitioners

Strong individuality as a researcher:
- team-minded and internationally well-connected
- dedicated to trans- and interdisciplinary collaboration
- determined to serve society by advancing and communicating science

(iii)
Reasons for applying at the Kyoto University Hakubi Project:
- offers generous resources, inspiration, and intellectual freedom
- provides the reputation for fostering my career as a renowned global climate policy expert
- is home to the epoch-making Kyoto Protocol and perfectly located in the center of the Pacific region

Carbon markets in Asia

A misconceived friend!

Japan’s current climate policy target lacks ambition and is not in line with the 2°C Paris target requirements.

On the national level,
carbon pricing is only used to a very limited extent and without much positive environmental effect.

While JP is not linking-ready on the national level, Tokyo might be a contender for a transpacific carbon market;
KR is linking ready, while CN lacks transparency

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Civil society Japan

NGOs and the Greens

The German green network