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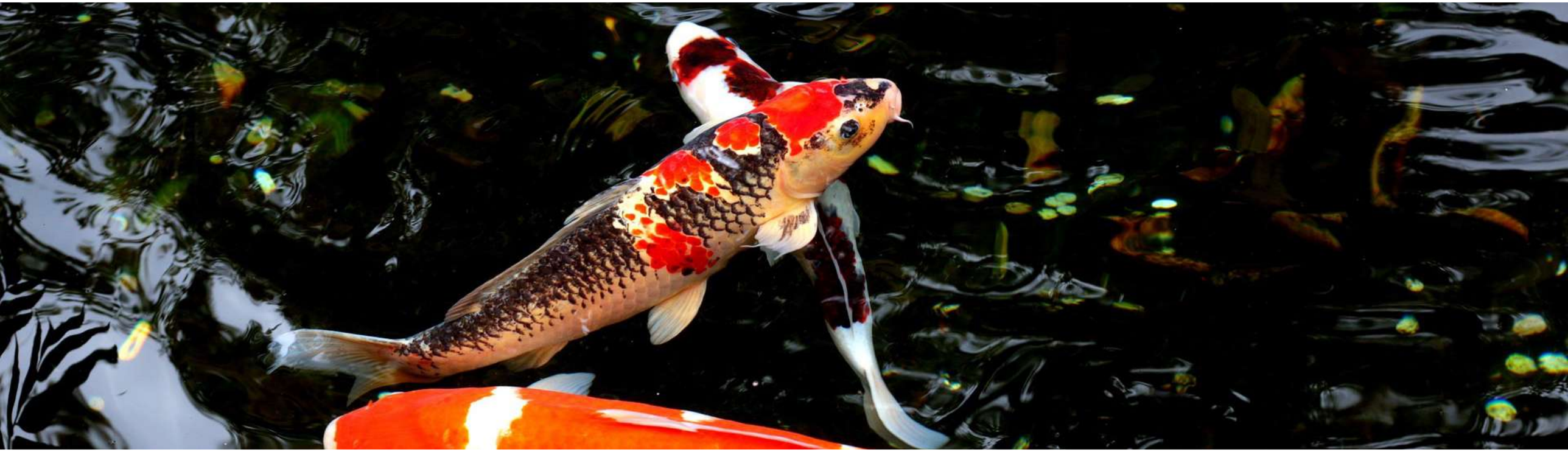
Tokyo Institute of Technology

SCHOOL OF GEOGRAPHY AND THE ENVIRONMENT

UNIVERSITY OF OXFORD



TUJ Discussion Series

25 November 2019 — Tokyo, Japan

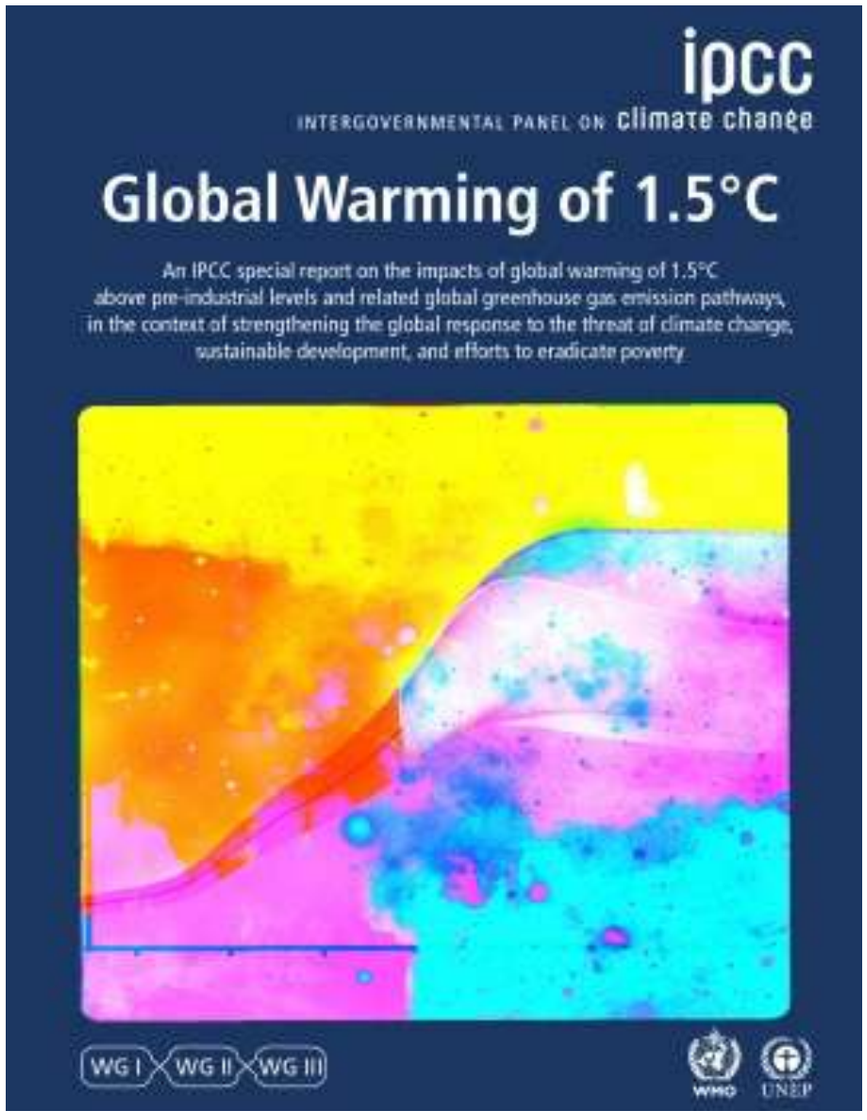
Sustainable Finance and ESG Principles in Japan

by Dr. Kim Schumacher (Tokyo Tech.)

Presentation Outline

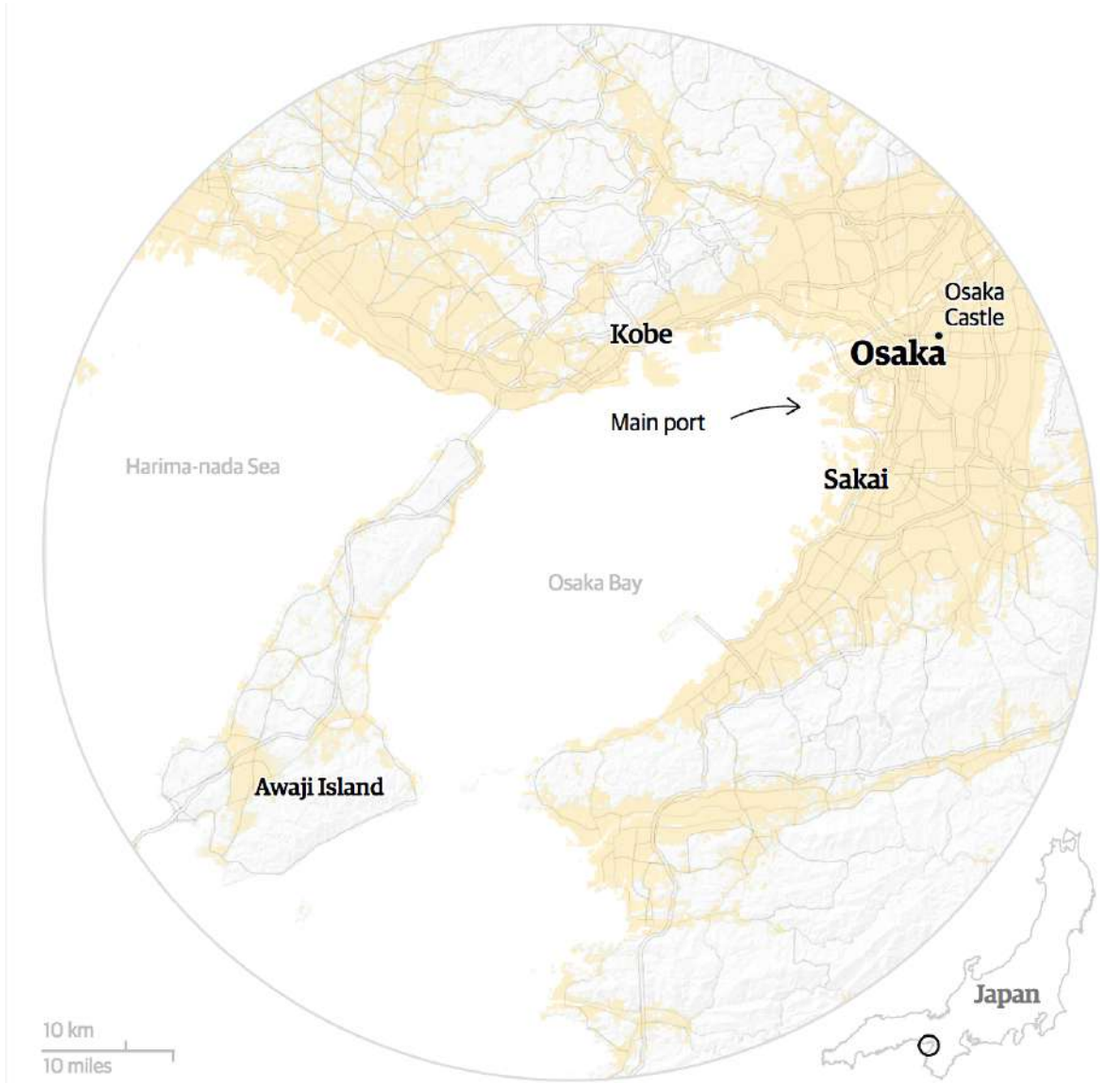
- **I. Japan and Physical Climate Risks**
- **II. Transition Risks: Regulatory Stranded Assets**
- **III. ESG Investment Globally and in Japan**
- **IV. Timeline of Sustainable Finance and ESG Initiatives**
- **V. Impact of Climate-related Risks on Banks**
- **VI. Corporate Green Finance Alignment - TOPIX**
- **VII. Conclusion**

I. Japan and Physical Climate Risks

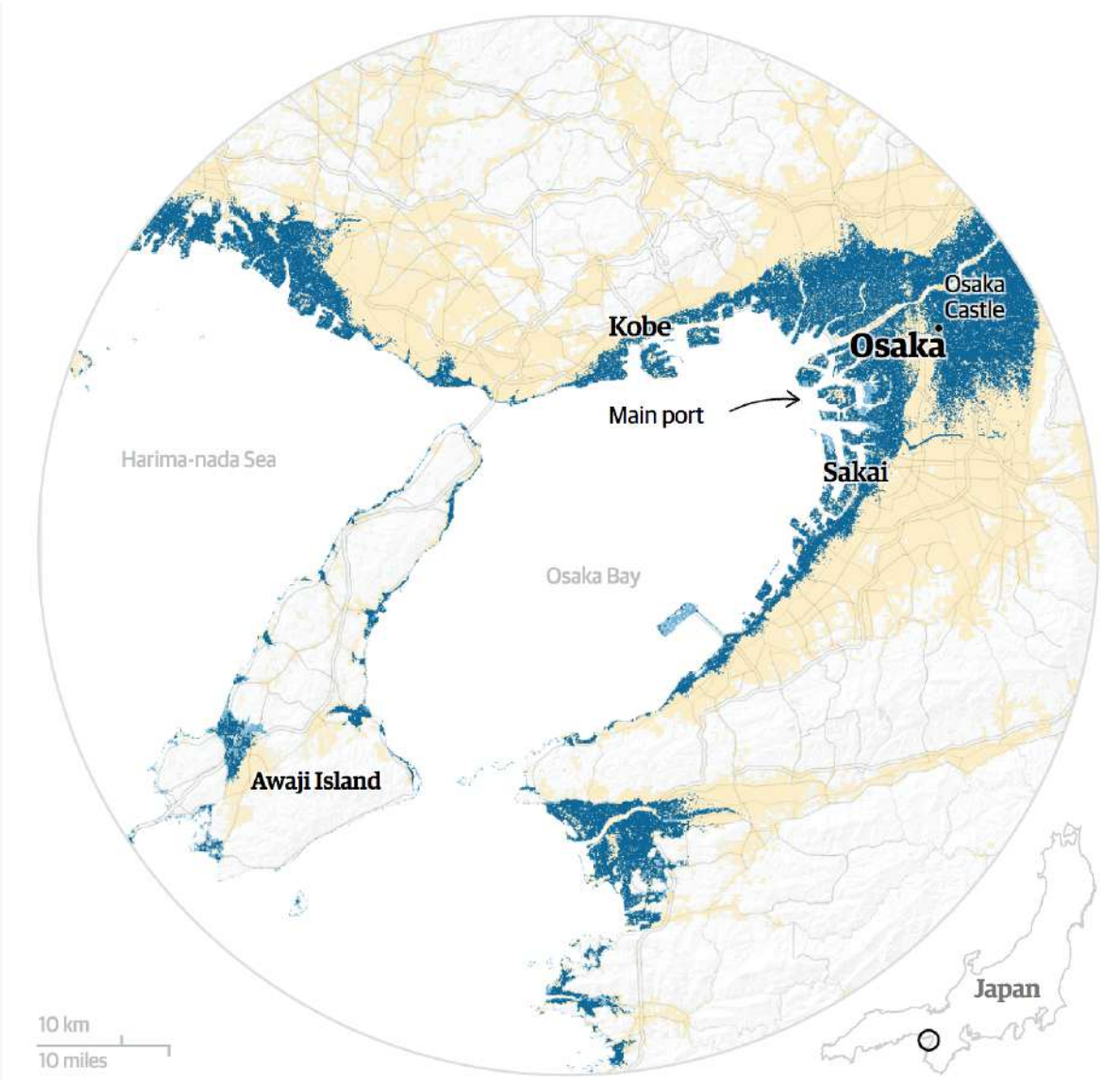


Source: IPCC, UN

I. Japan and Physical Climate Risks



Kansai Region +1ºC (2017)



Kansai Region +3ºC (2070)

Source: Guardian, Climate Central

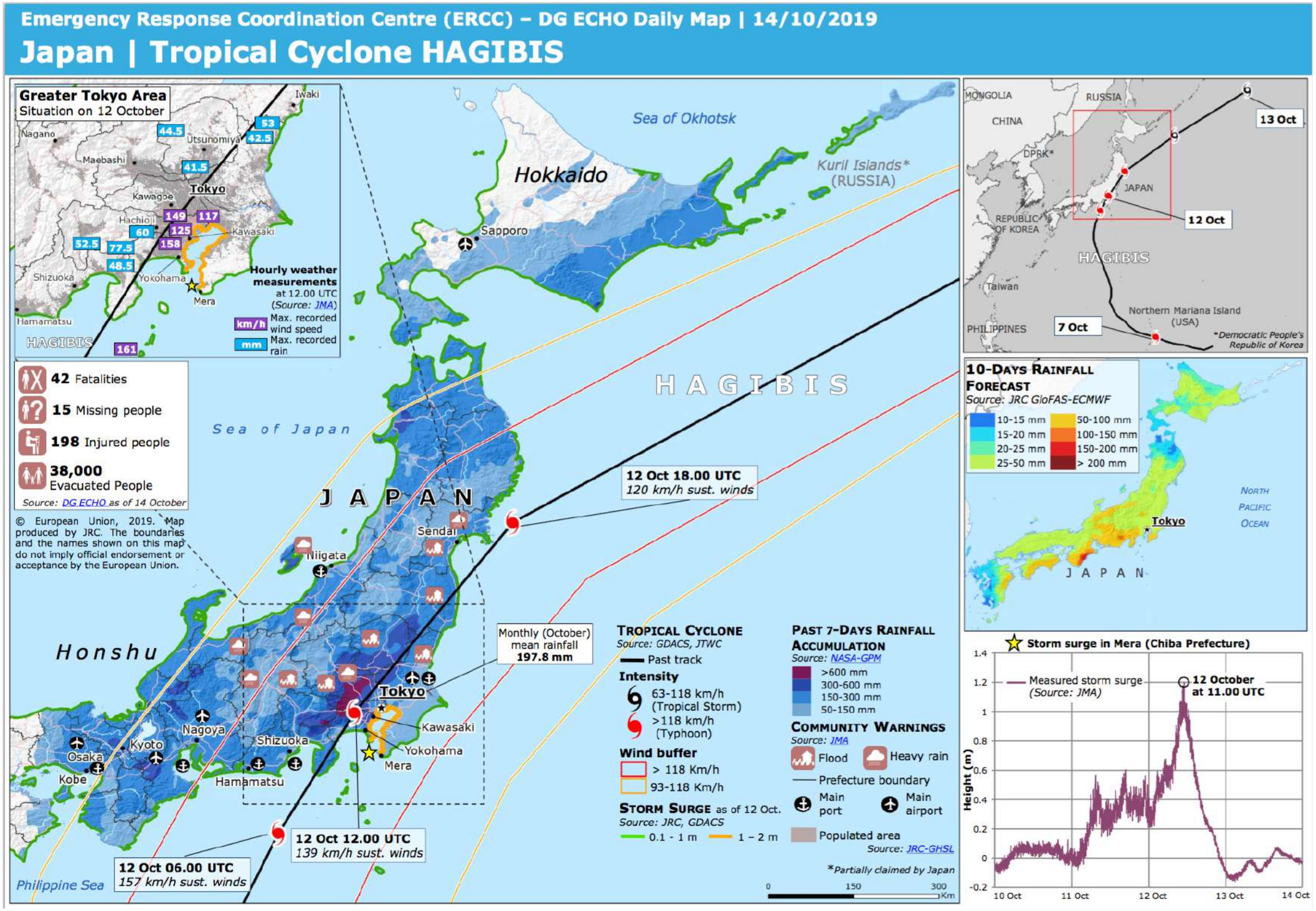
I. Japan and Physical Climate Risks

- In Japan, **sea-level rise of 3.3 feet (1 meter)** could put another **4.1 million people at risk of flooding**, and inundate more than 900 square miles of land (2,339 square kilometers) in major cities. Such a rise is well within the range of scientists' projections, if today's trends in global warming pollution continue.

- Economists project that Osaka **could suffer the loss or damage of nearly U.S.$1 trillion in assets** owing to coastal flooding by the 2070s—more than four times its current economic risk of U.S.$216 billion.

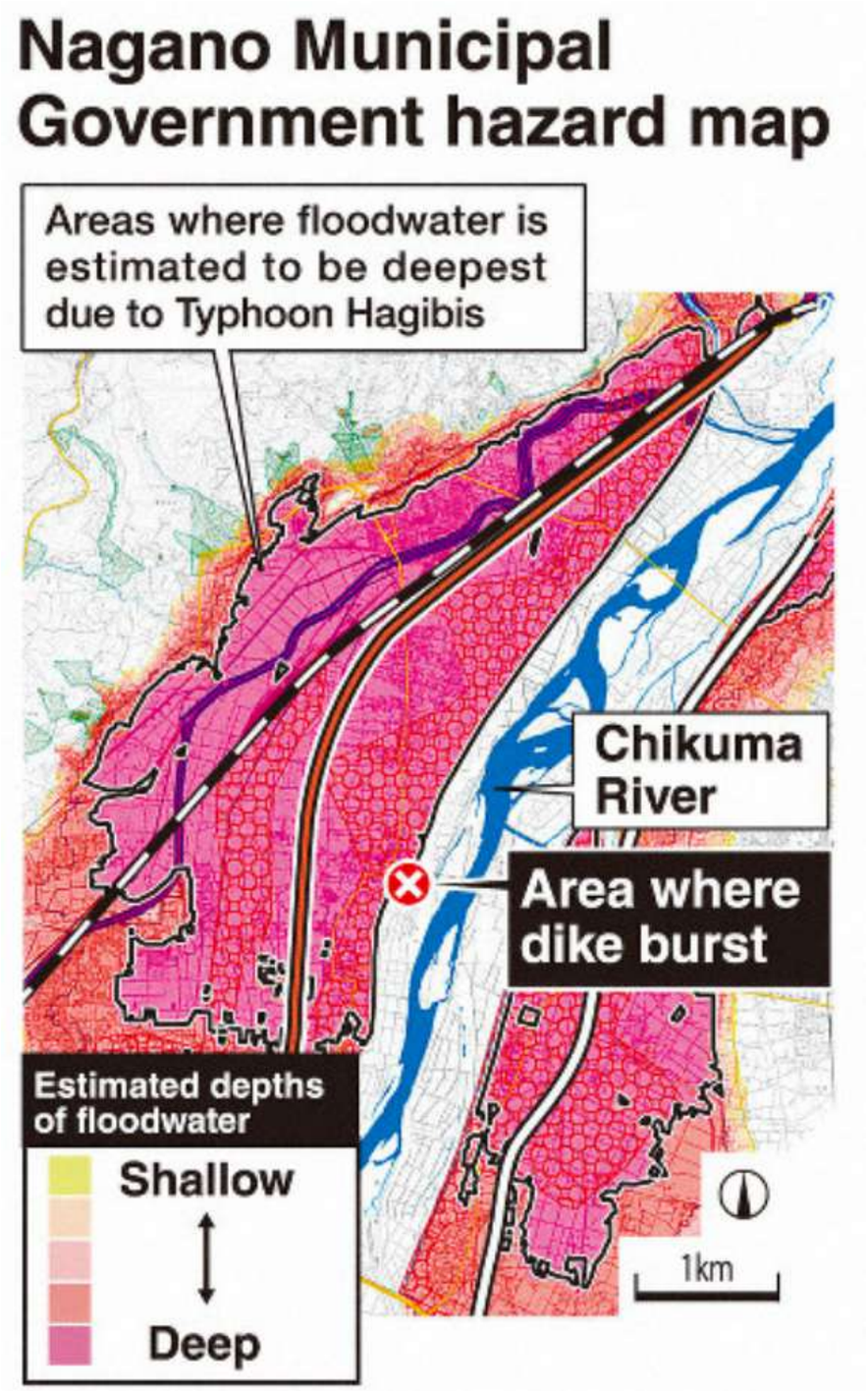
Source: Union of Concerned Scientists

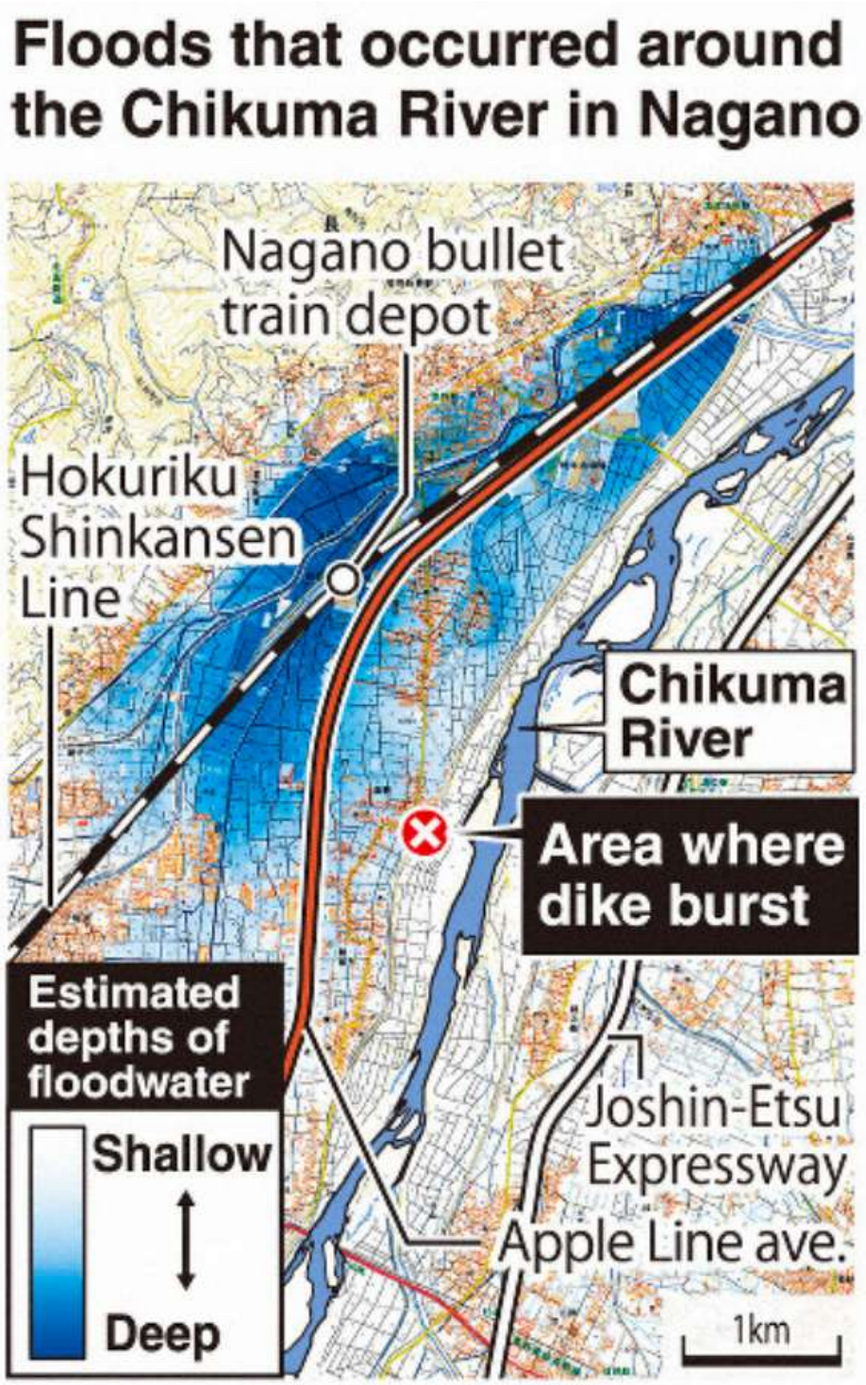
I. Japan and Physical Climate Risks



Source: European Commission

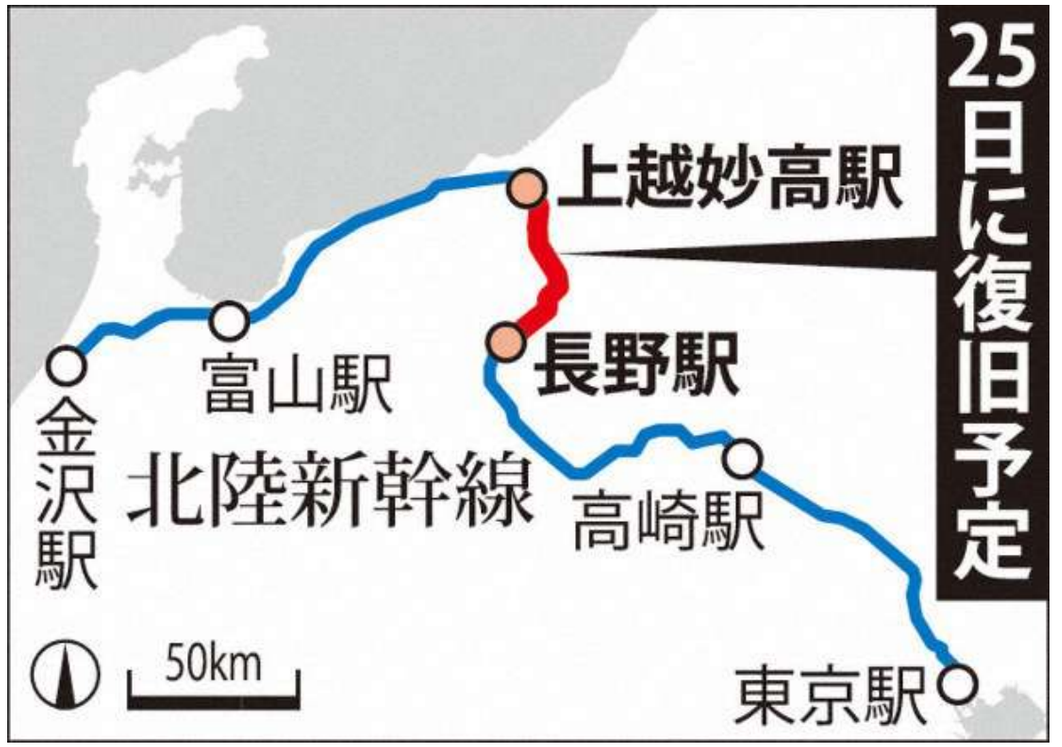
I. Japan and Physical Climate Risks





Source: Mainichi Shimbun

I. Japan and Physical Climate Risks



JR East may be forced to scrap 120 shinkansen cars flooded by Typhoon Hagibis

If all the affected cars are scrapped, the damage bill is projected to top ¥30 billion.

➡ Hagibis insured losses could exceed $9bn-rated Faxai.

Source: Japan Times

I. Japan and Physical Climate Risks

Before

After

Source: PlanetLabs

I. Japan and Physical Climate Risks

Before

After

Source: PlanetLabs

I. Japan and Physical Climate Risks

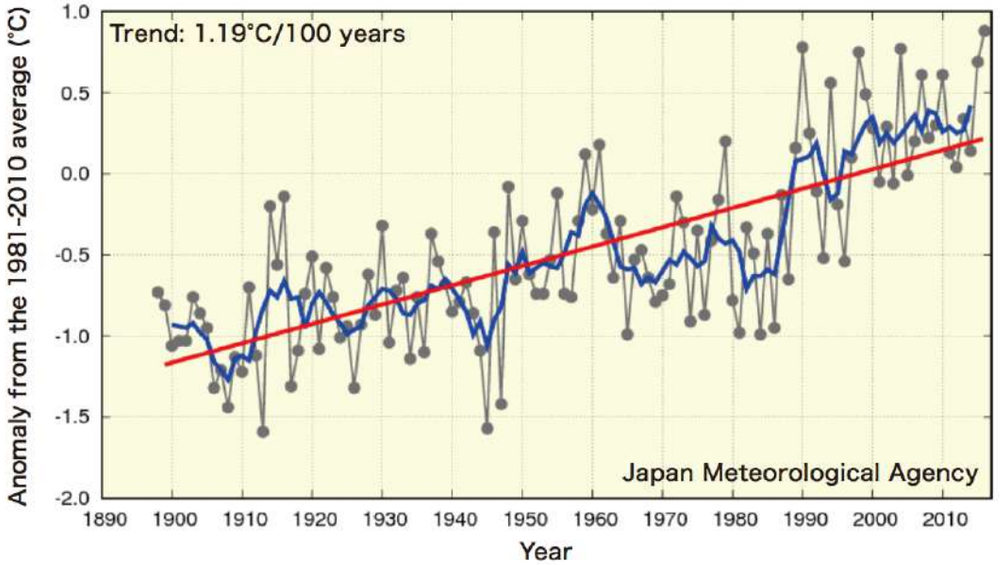
Before

After

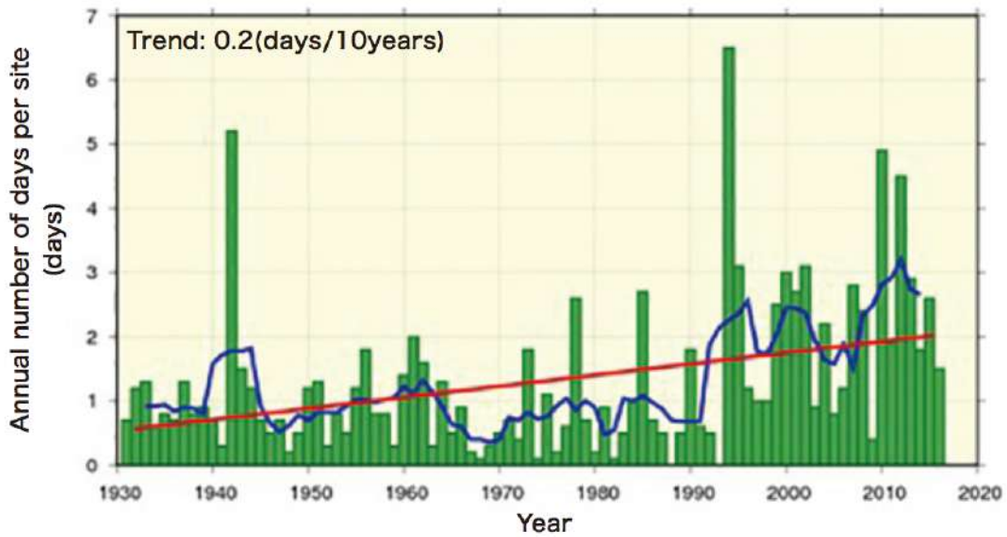
Source: PlanetLabs

I. Japan and Physical Climate Risks

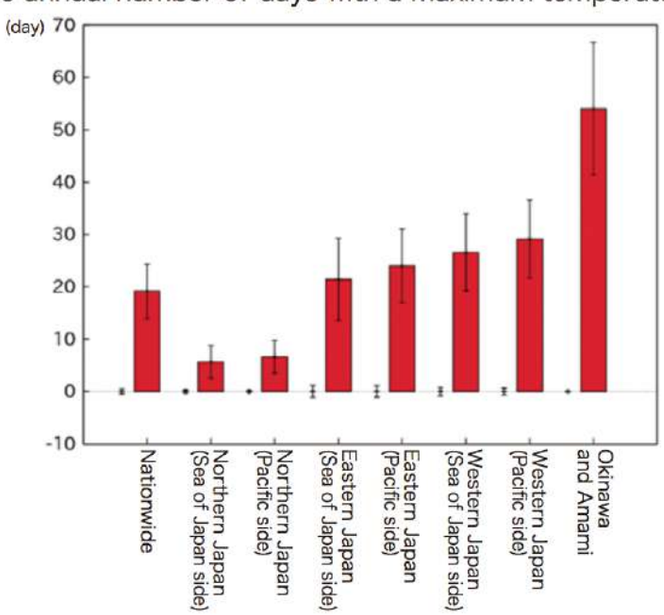
Annual surface temperature anomalies in Japan

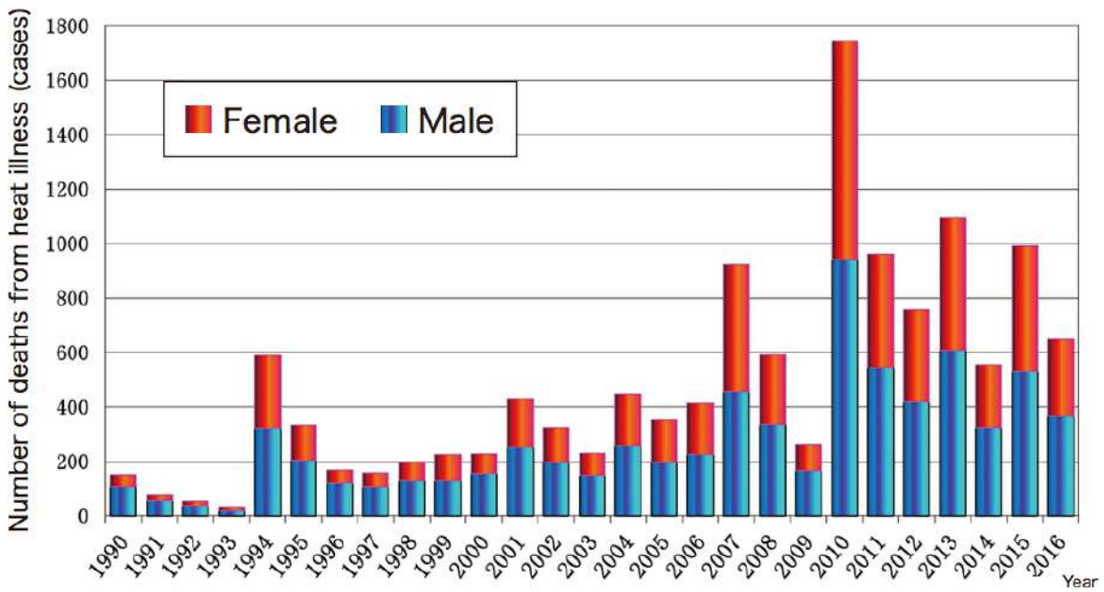


Annual number of days with maximum temperatures of 35°C or above (mean of 13 sites)



Future change in the annual number of days with a maximum temperature of 35°C or above





Source: MOE

I. Japan and Physical Climate Risks

Children play in the water as the mercury rose above 39 degrees Celsius in Tajimi, Gifu Prefecture, on July 24. | KYODO

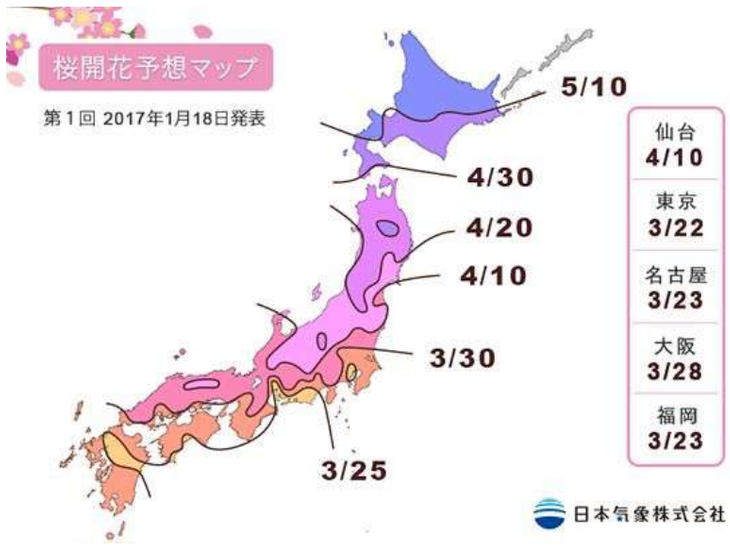
BUSINESS

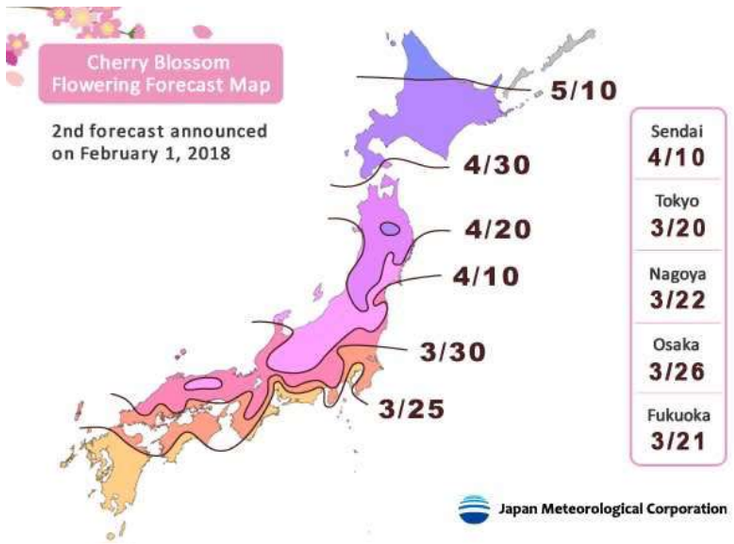
Japan's utilities crank up oil-fired power in face of heat wave

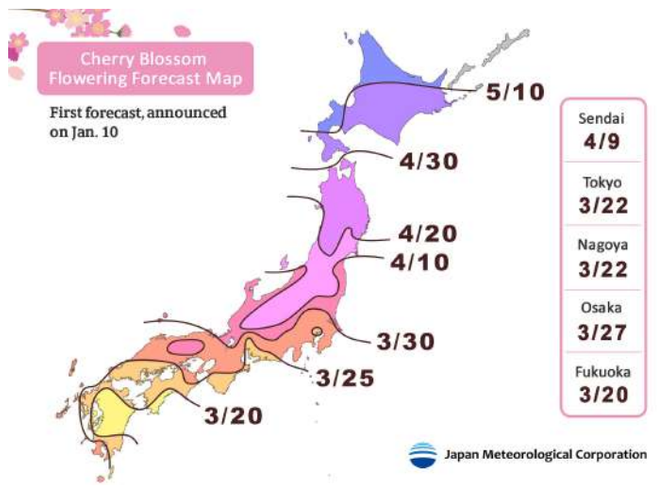
Sources: JapanTimes, Reuters

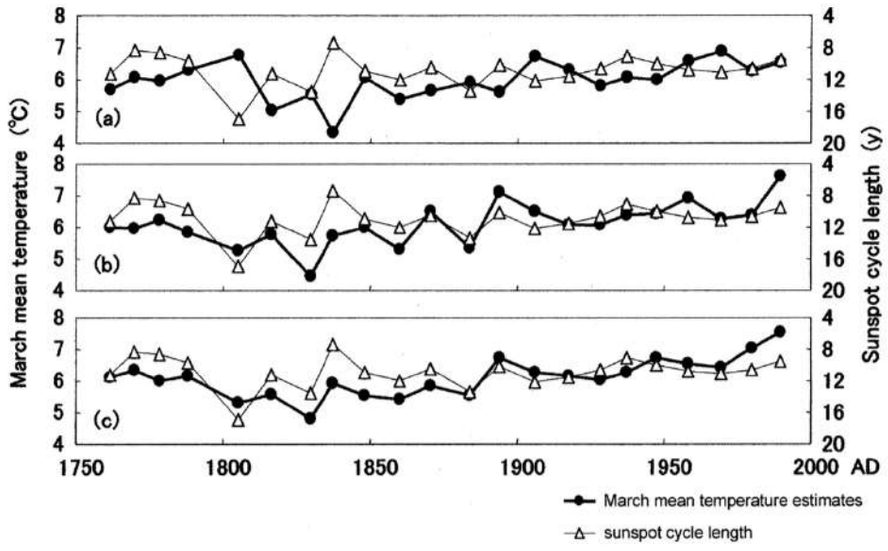
I. Japan and Physical Climate Risks

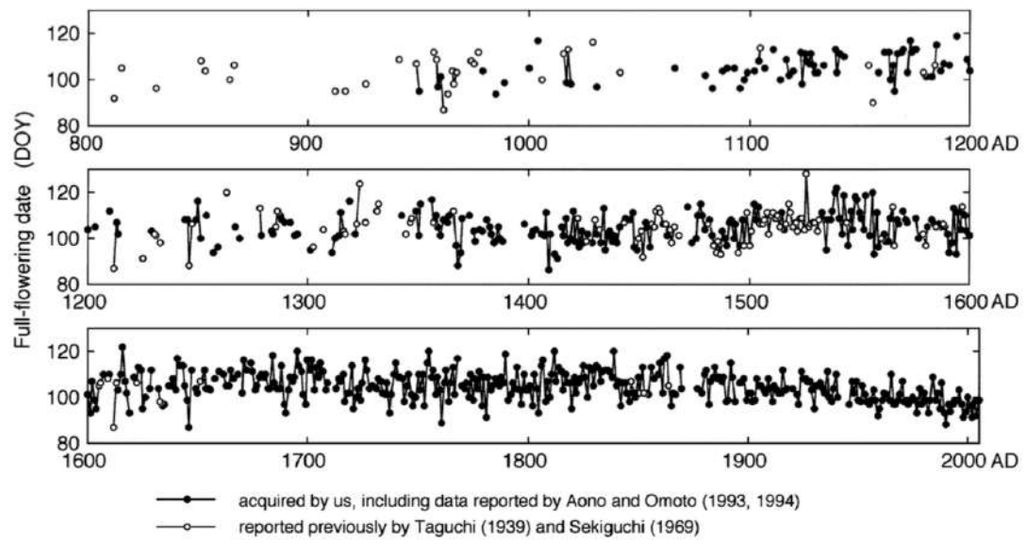
2017 → **2018** → **2019**







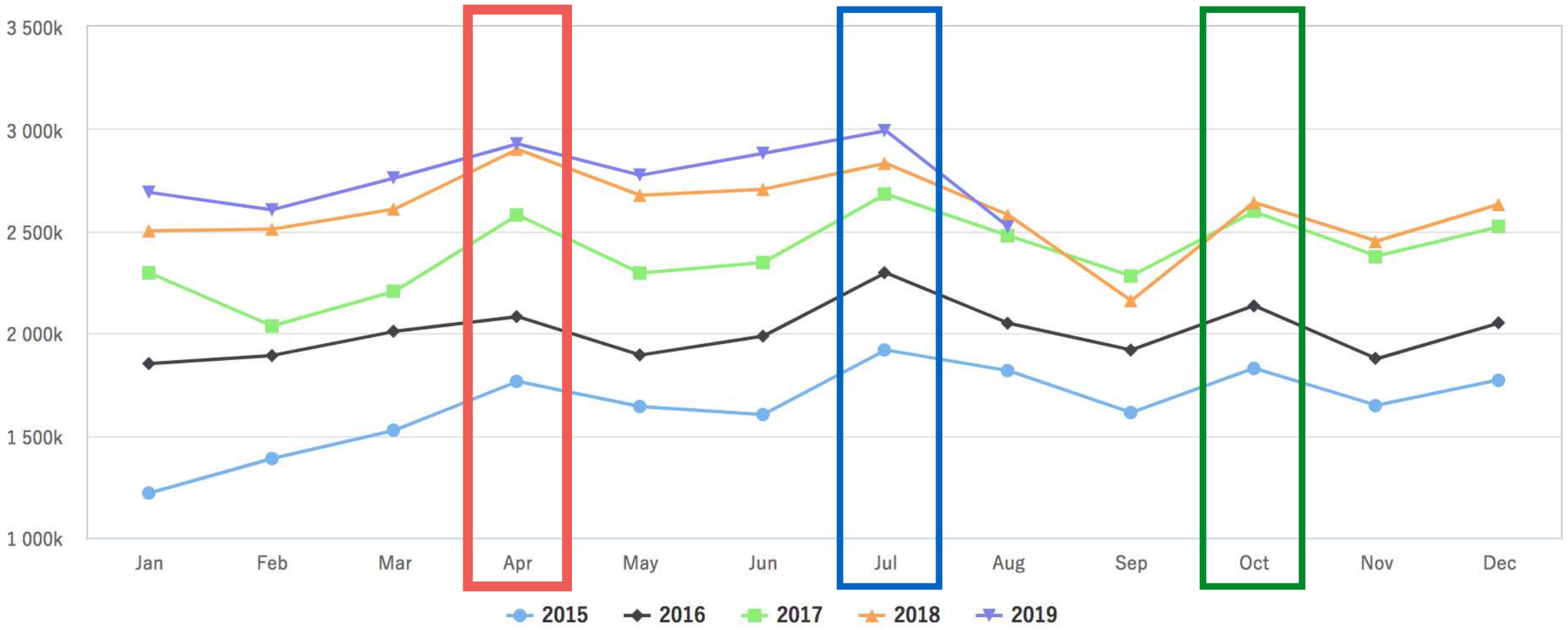




Sources: JNTO, Aono and Kazui (2008)

I. Japan and Physical Climate Risks

Overseas Residents' Visits to Japan (by month)



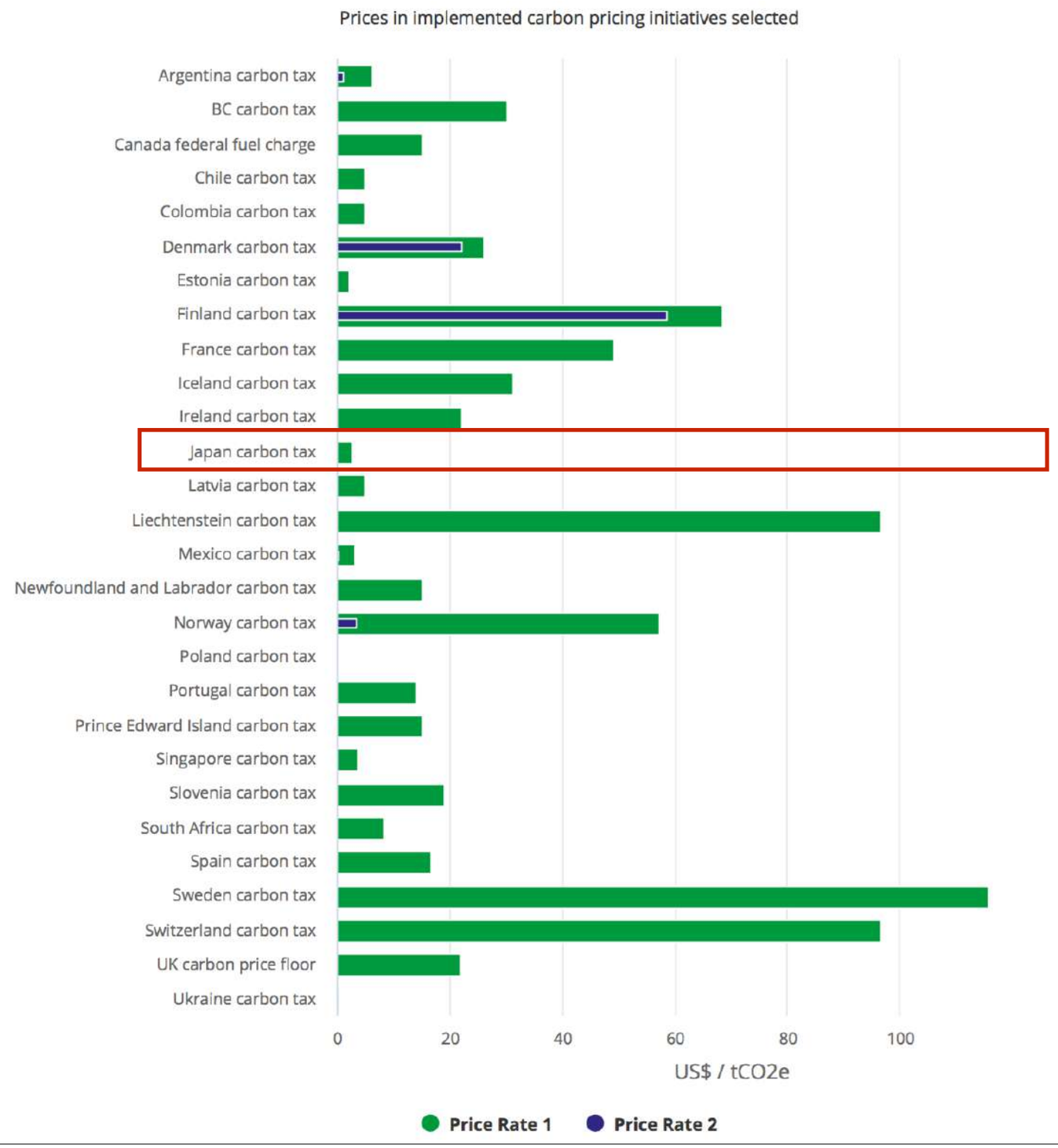
Sources: JNTO

II. Transition Risks: Regulatory Stranded Assets

- **Regulatory Stranding** - Due to a change in policy of legislation
- **Economic Stranding** - Due to a change in relative costs / prices
- **Physical Stranding** - Due to distance / flood / drought

Source: Carbon Tracker

II. Transition Risks: Regulatory Stranded Assets



Source: OECD/IEA

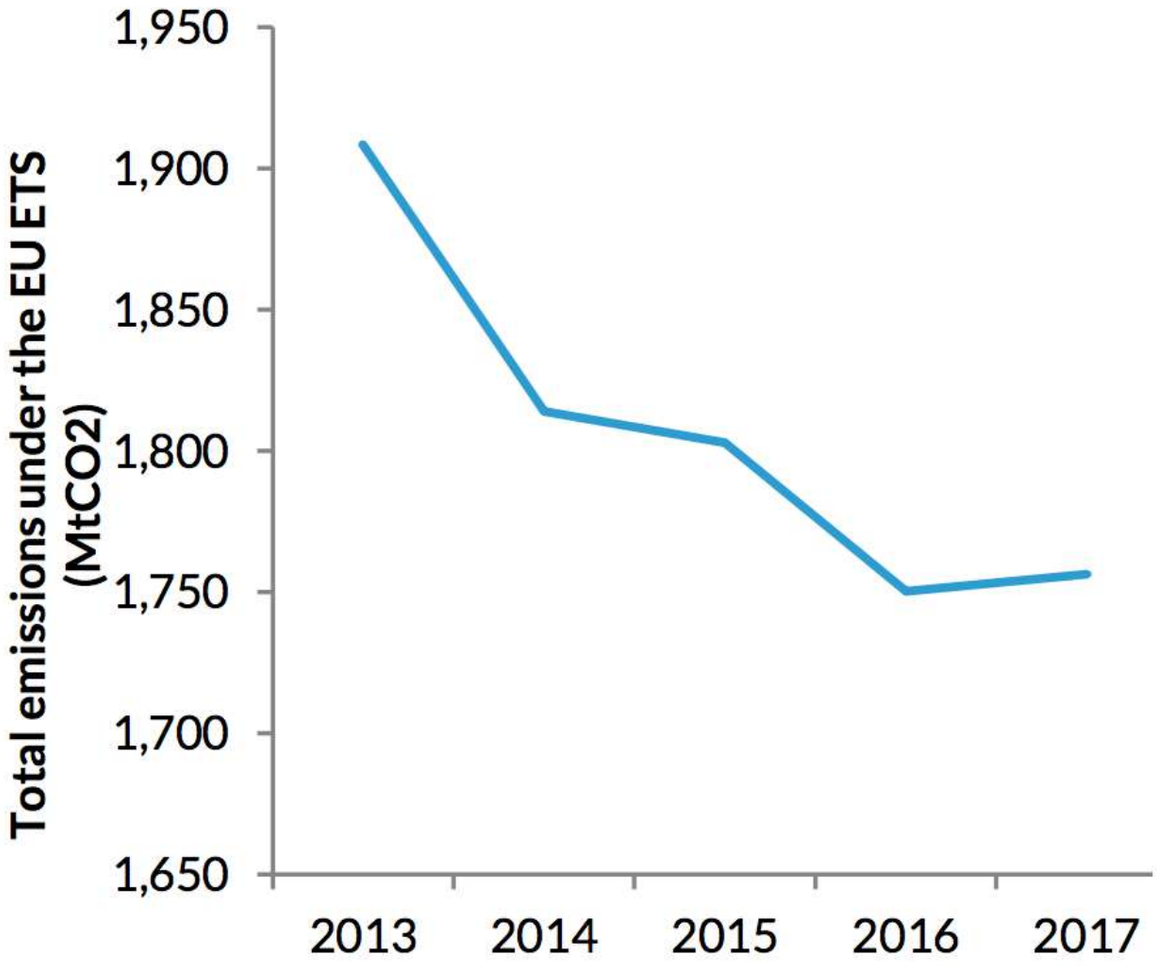
II. Transition Risks: Regulatory Stranded Assets

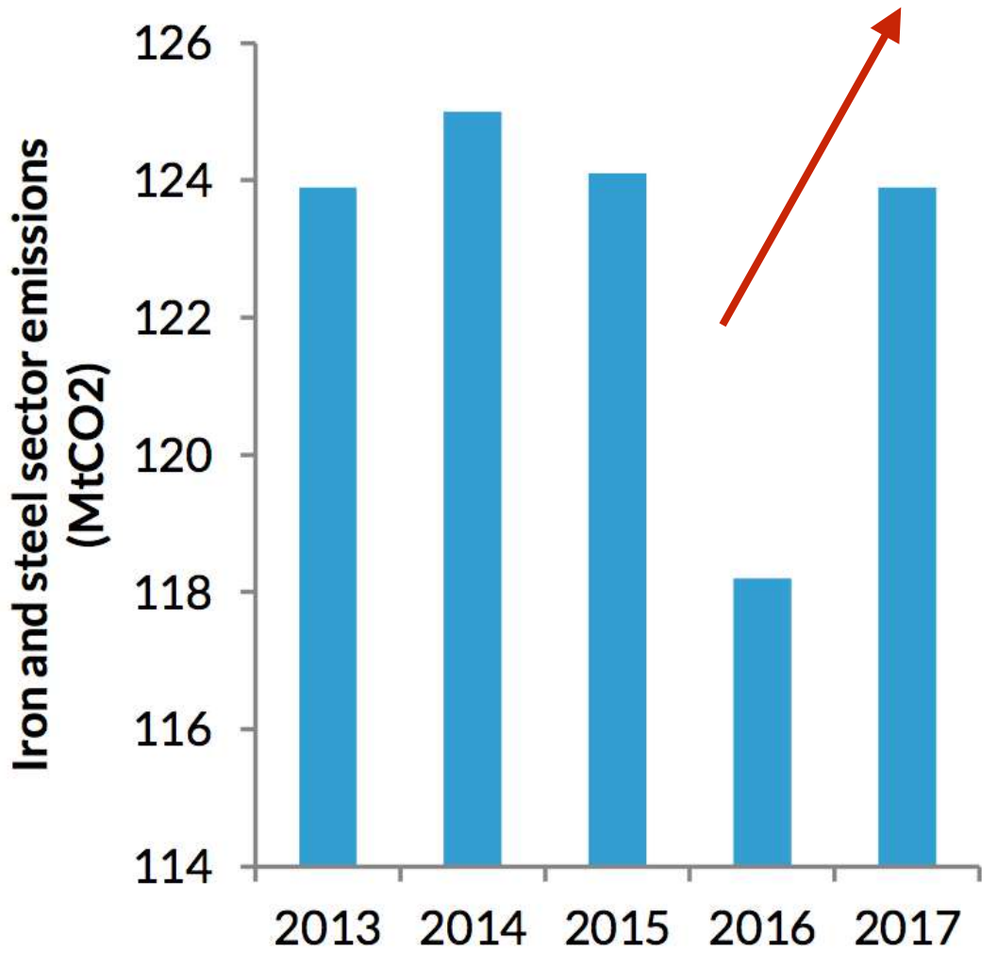
EU ETS Carbon Credit Price 2008-2019

Source: EC, 2019

II. Transition Risks: Regulatory Stranded Assets

Iron and steel contributions to EU ETS emissions rise in 2017



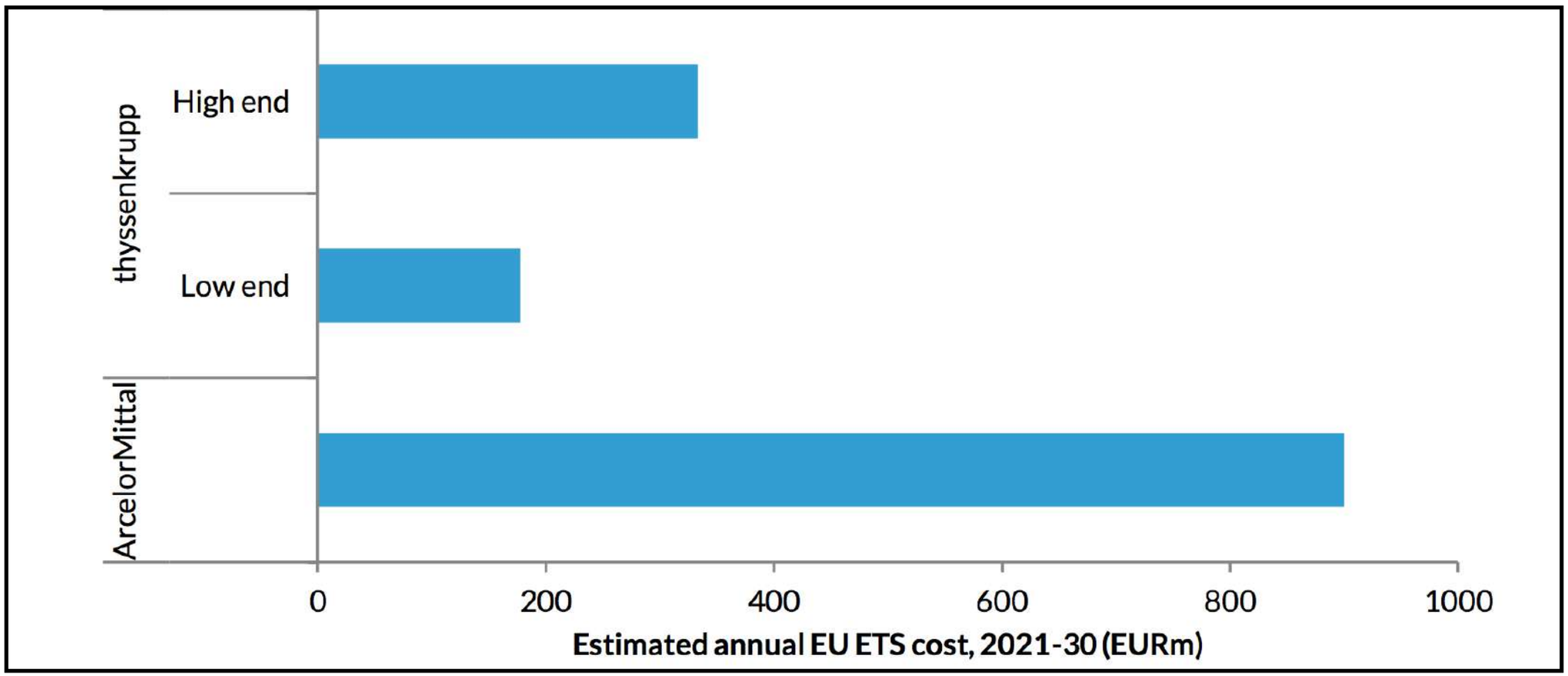


Source: CDP, Kepler Chevreux

II. Transition Risks: Regulatory Stranded Assets

EU ETS-related Cost Increases

thyssenkrupp			ArcelorMittal	
Allowances allocated (m)	Allowances purchased (m)	% purchased	Allowances allocated (m)	Allowances purchased (m)
17.9	2.8	16%	59.9	0



Source: CDP, Kepler Chevreux

II. Transition Risks: Regulatory Stranded Assets

A UNIFIED EU GREEN CLASSIFICATION SYSTEM – 'TAXONOMY'

to determine if an economic activity is environmentally sustainable based on harmonised EU criteria. It will identify areas where sustainable investment can make the biggest impact.

To qualify as green, an investment would need to contribute to at least one of these **six objectives**:

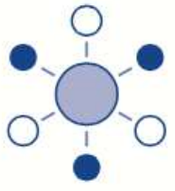
CLIMATE CHANGE MITIGATION

CLIMATE CHANGE ADAPTATION

SUSTAINABLE USE OF WATER AND MARINE RESOURCES

CIRCULAR ECONOMY

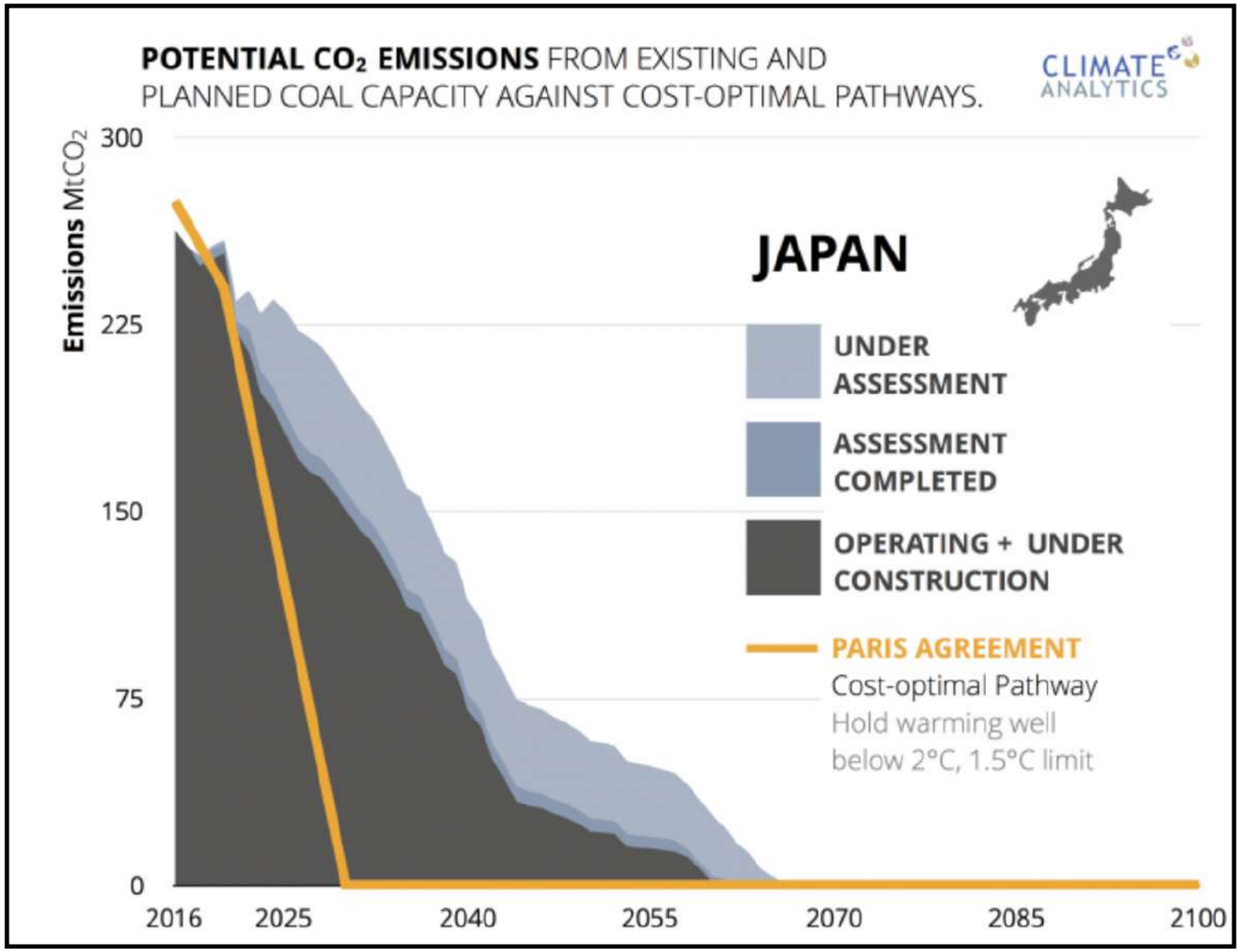
POLLUTION PREVENTION



HEALTHY ECOSYSTEM

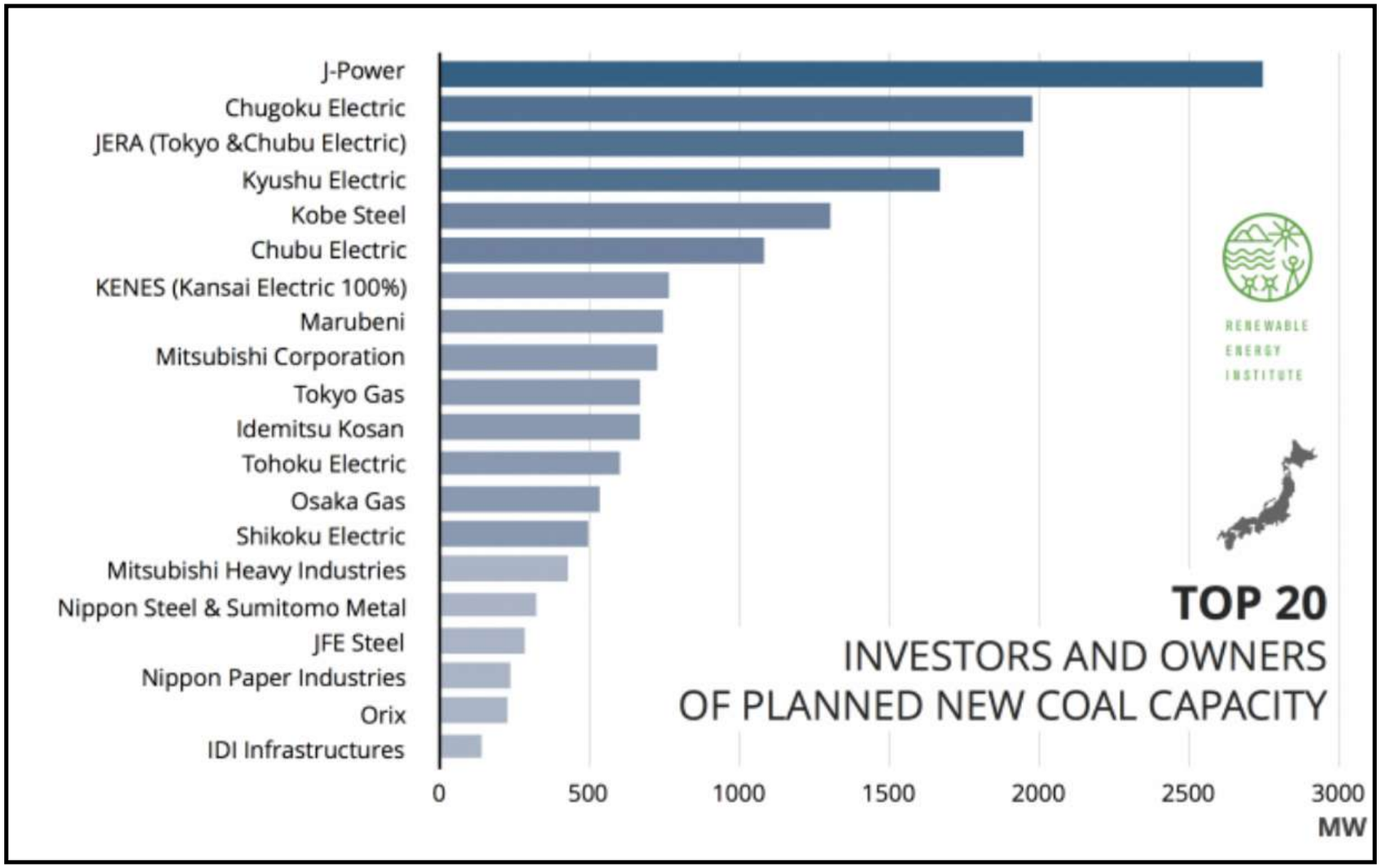
Source: European Commission

II. Transition Risks: Regulatory Stranded Assets



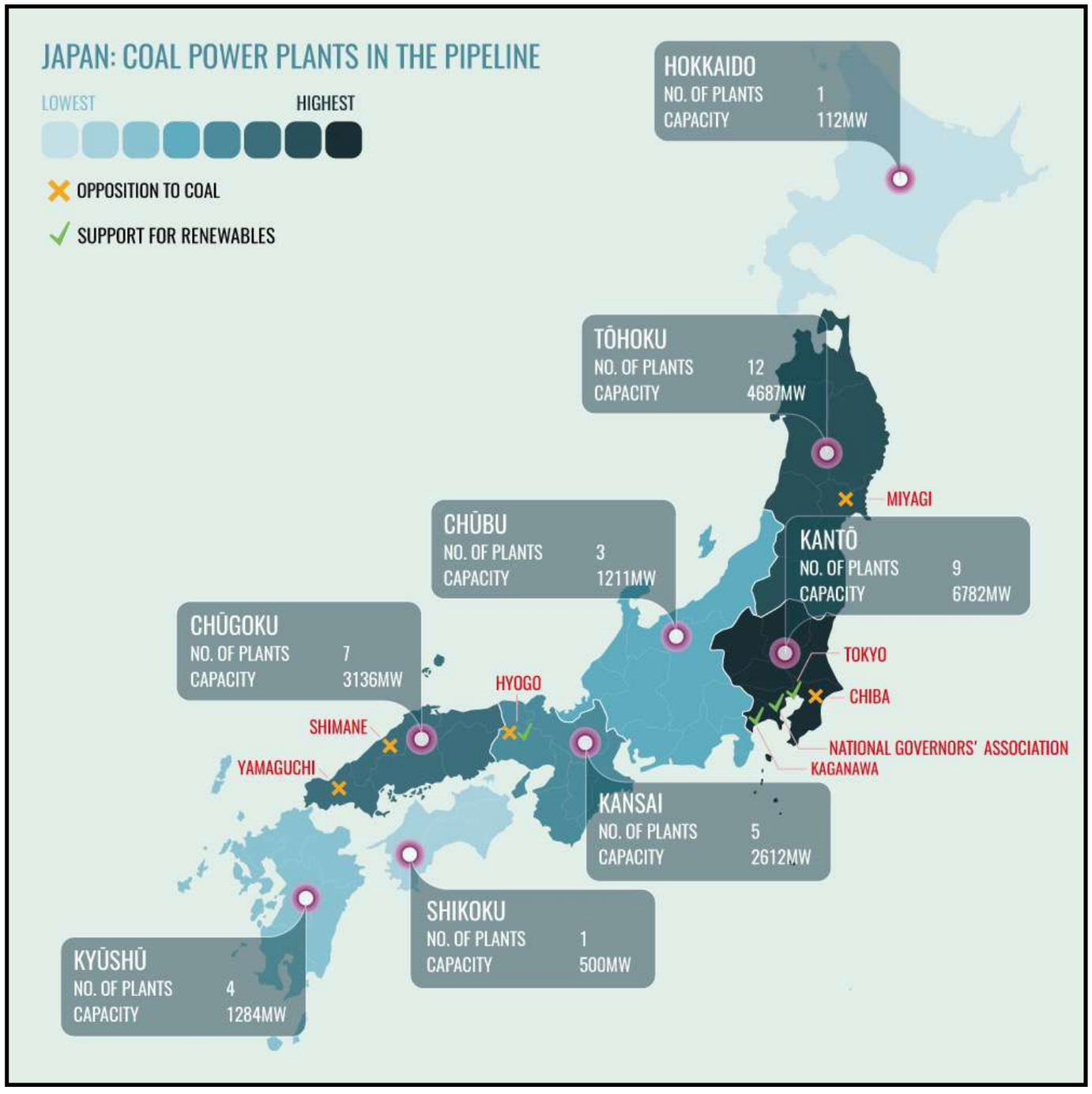
Source: Climate Analytics

II. Transition Risks: Regulatory Stranded Assets



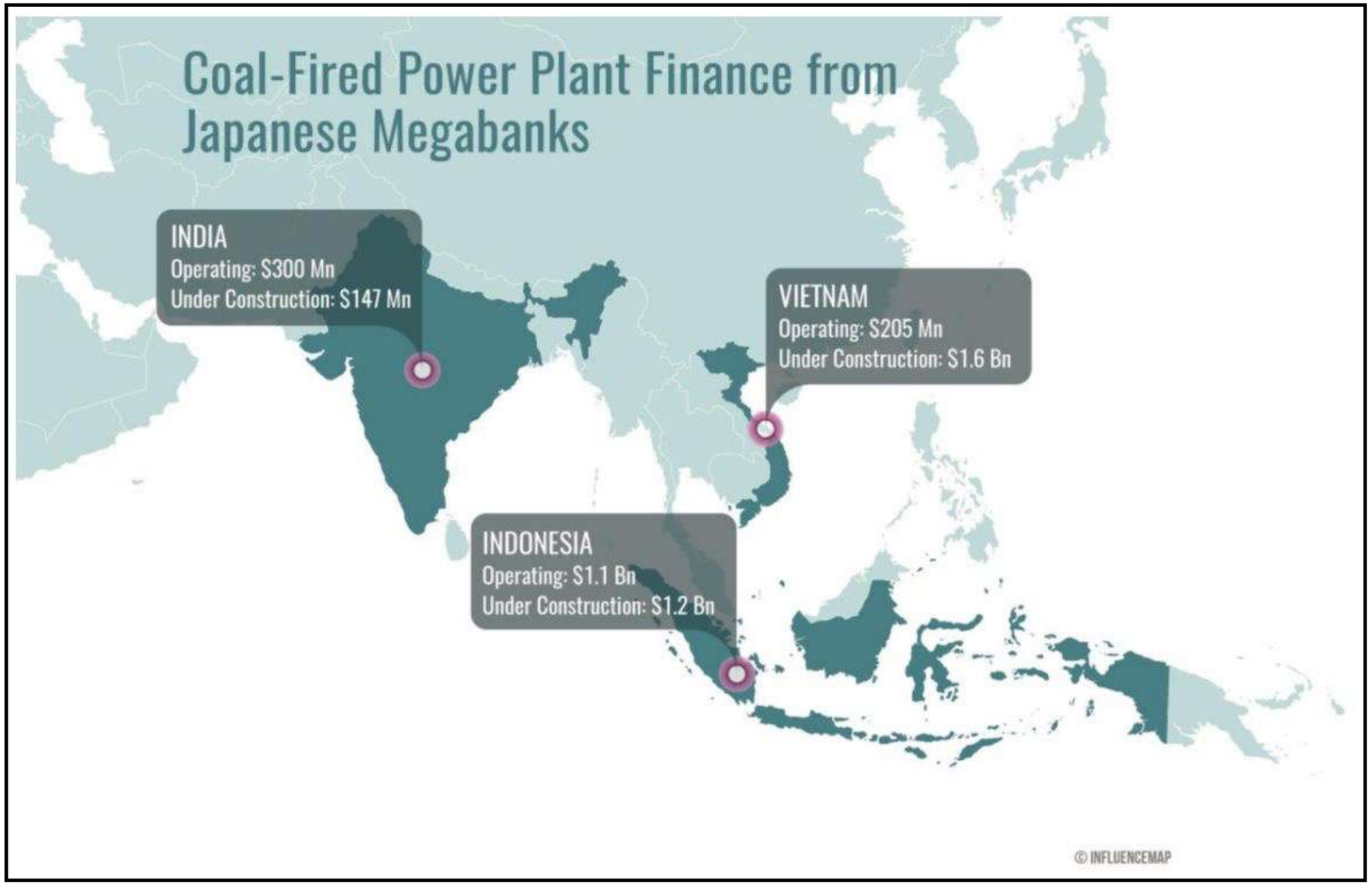
Source: Japan Renewable Energy Institute

II. Transition Risks: Regulatory Stranded Assets



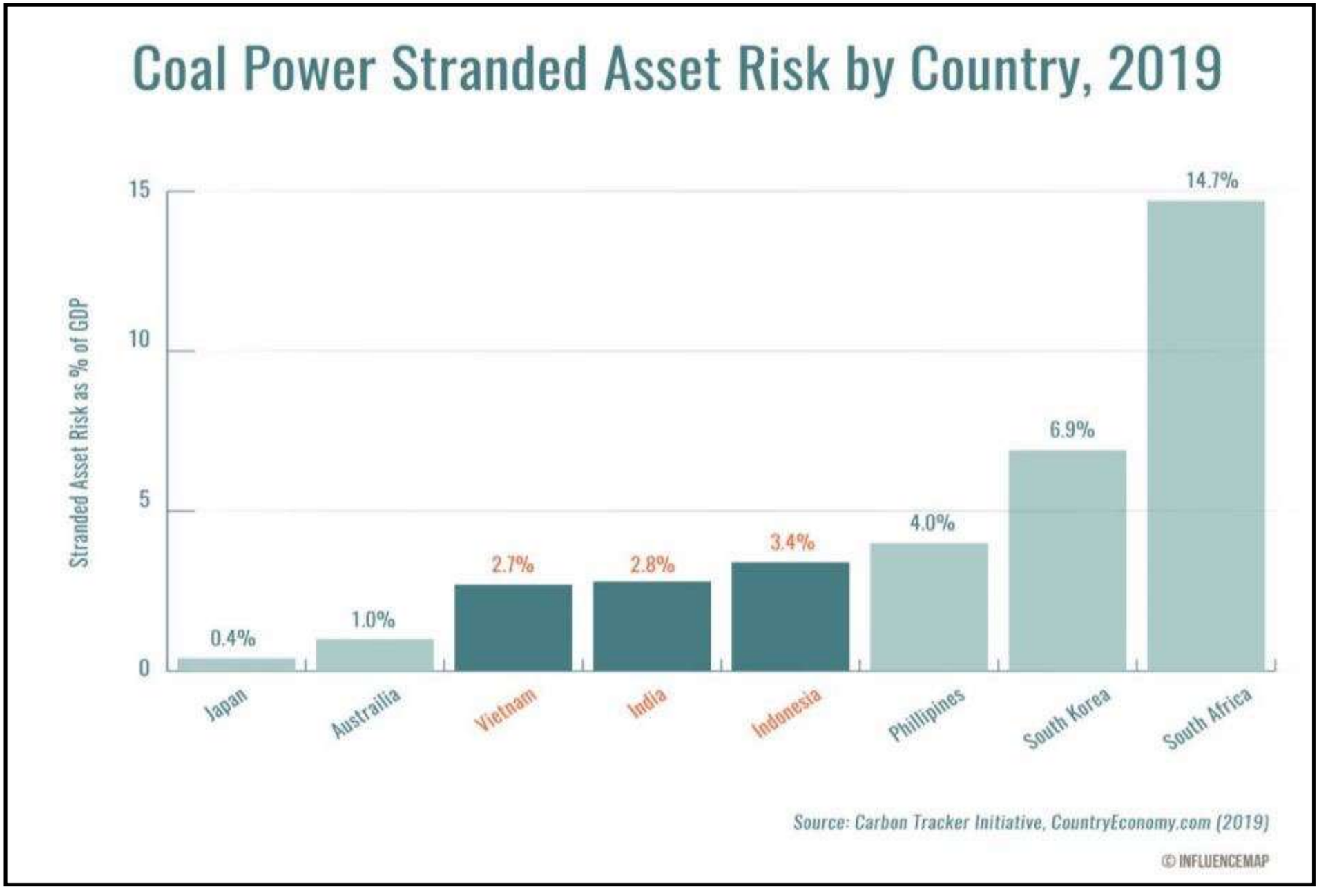
Source: InfluenceMap

II. Transition Risks: Regulatory Stranded Assets



Source: InfluenceMap

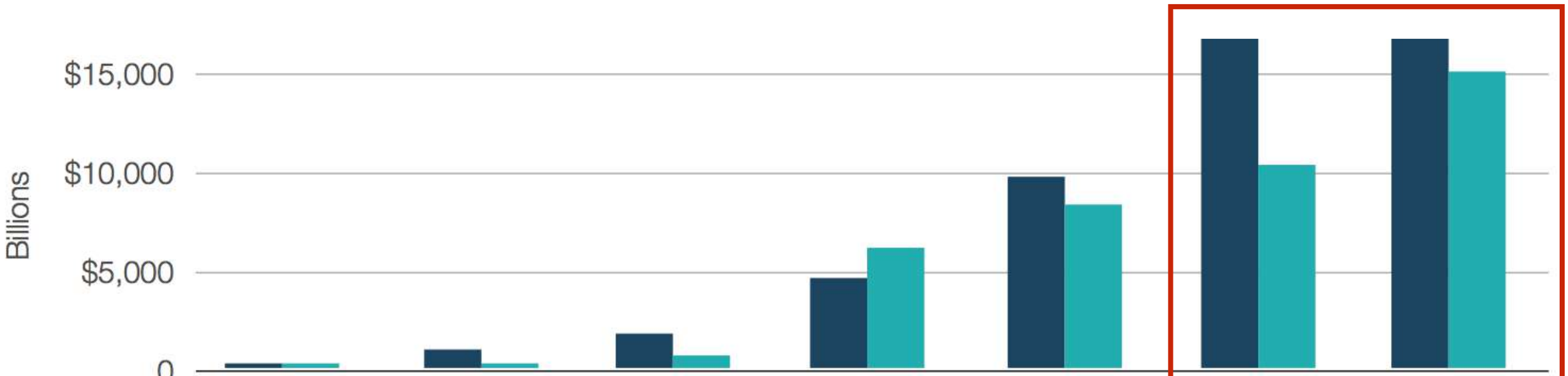
II. Transition Risks: Regulatory Stranded Assets



Source: InfluenceMap

III. ESG Investment Globally and in Japan

Global Sustainable Investments from 2016 to 2018

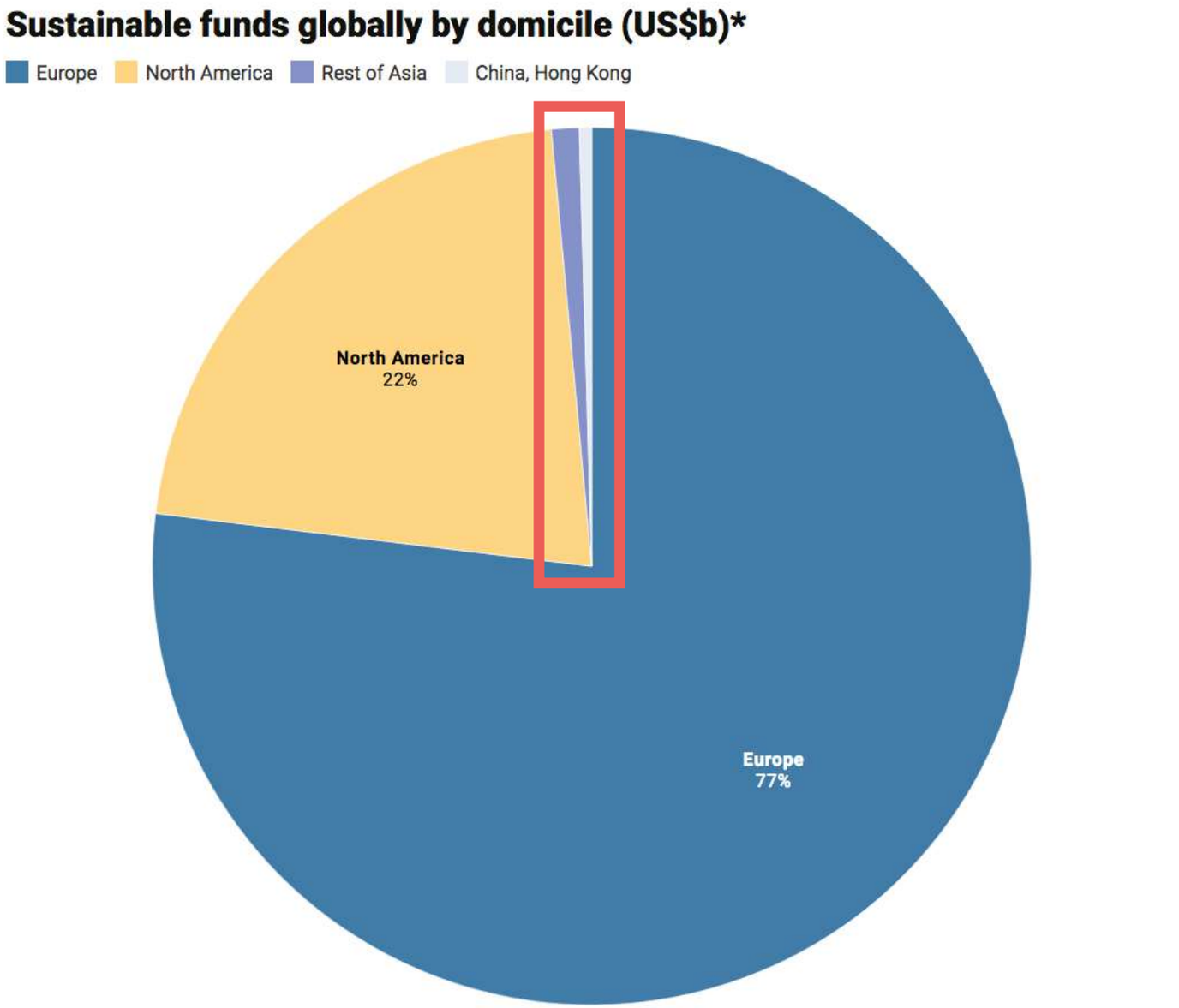


	Impact/ community investing	Sustainability themed investing	Positive/ best-in-class-screening	Norms-based screening	Corporate engagement and shareholder action	ESG integration	Negative/ exclusionary screening
2018	$444.26	$1,017.66	$1,841.87	$4,679.44	$9,834.59	$17,543.81	$19,770.96
2016	$248.47	$276.16	$818.01	$6,195.40	$8,385.17	$10,353.20	$15,063.57
Growth 2016–18	79%	269%	125%	-24%	17%	69%	31%
CAGR	33.7%	92.0%	50.1%	-13.1%	8.3%	30.2%	14.6%

Source: Global Sustainable Investment Review 2018

III. ESG Investment Globally and in Japan

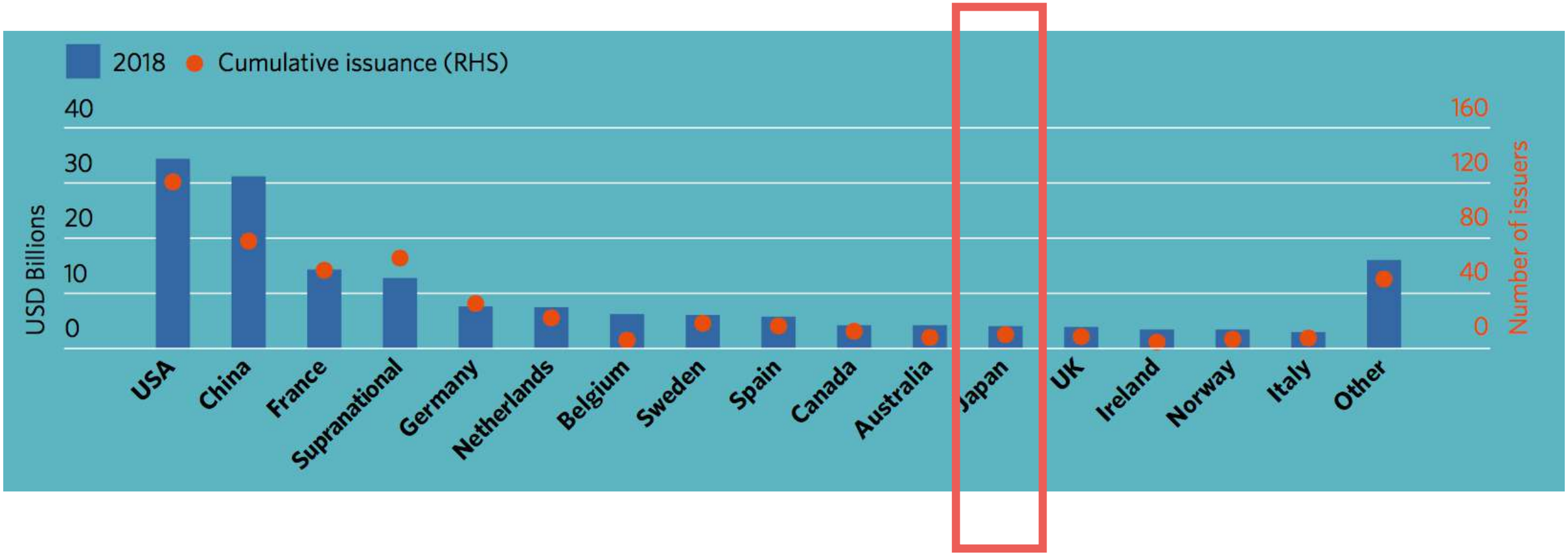
Domiciliation of ESG-aligned Funds in June 2019



Source: Global Sustainable Investment Review 2018

III. ESG Investment Globally and in Japan

Global green bond issuance in 2018

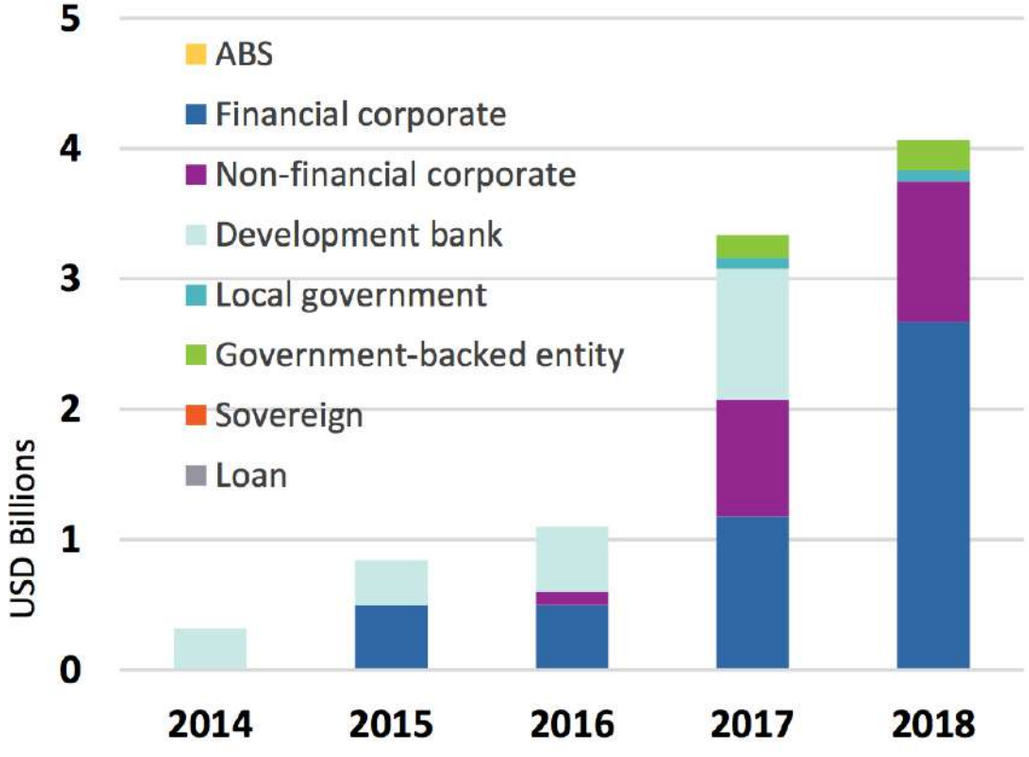


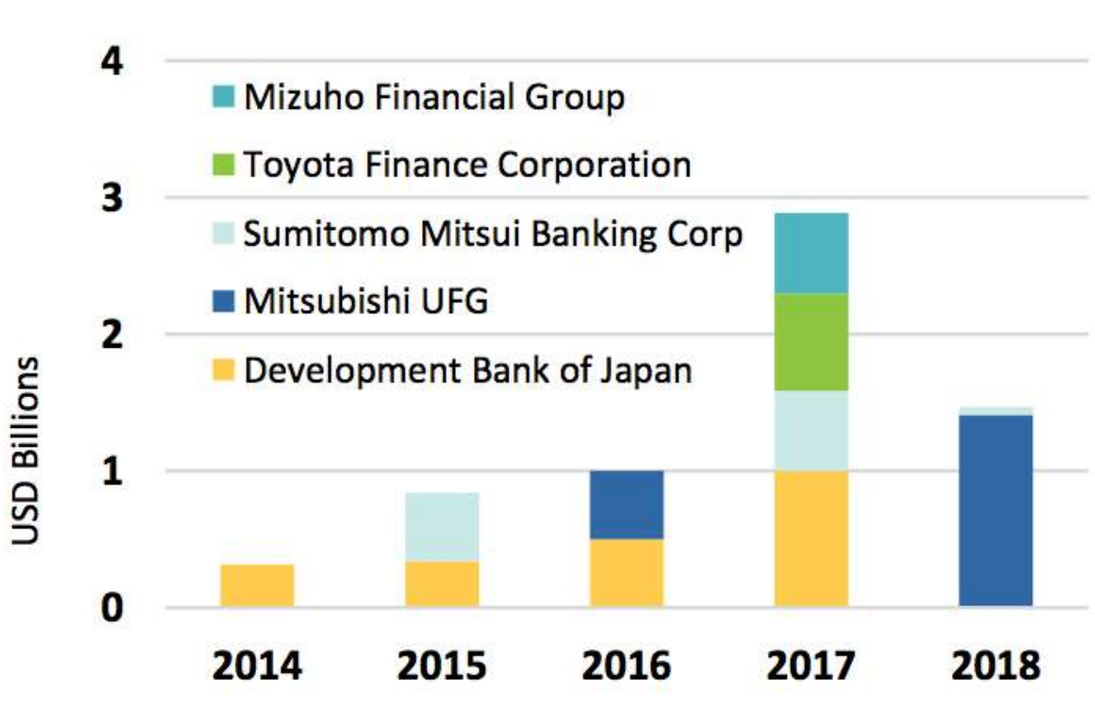
Source: Climate Bonds Initiative

III. ESG Investment Globally and in Japan

Japanese green bond issuance in 2018

- **Cumulative green bond issuance: US$ 9.7bn (10th in global country rankings)**
- **<u>2018 issuance</u>: US$ 4.1bn, up 22% from 2017, 42% of total issuance to date, 12th in 2018 country rankings**





Source: Climate Bonds Initiative

IV. Timeline of Sustainable Finance and ESG Initiatives

2014

- Publication of Japan's Stewardship Code (FSA, February 2014)

2017

- Publication of ESG Working Group Report (MOE, January 2017)
- Publication of Green Bond Guidelines (MOE, March 2017)

2018

- Launch of Green Bond Issuance Platform (MOE, June 2018)
- Creation of Green Finance Network Japan (November 2018)
- Launch of ESG Investment Study Group (METI, November 2018)
- Public Support for TCFD by GPIF (GPIF, December 2018)
- Publication of TCFD Guidance (METI, December 2018)
- Launch of TCFD Consortium (May 2019)

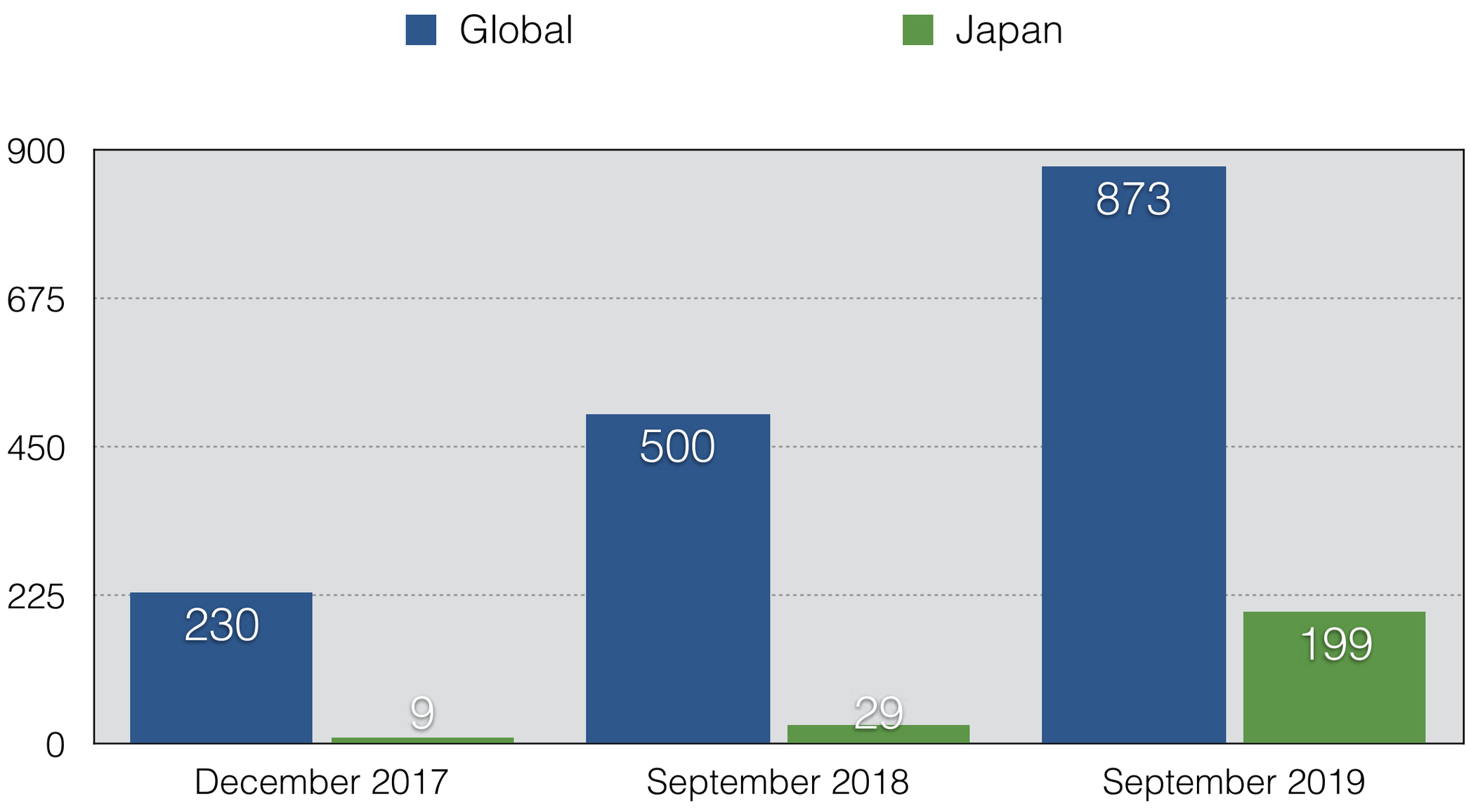
2019

- Guide for SDG Business Management (METI, May 2019)
- Holding of Green Innovation and TCFD Summits (October 2019)
- Announcement of ESG Finance Awards (MOE, October 2019)

Sources: Various

IV. Timeline of Sustainable Finance and ESG Initiatives

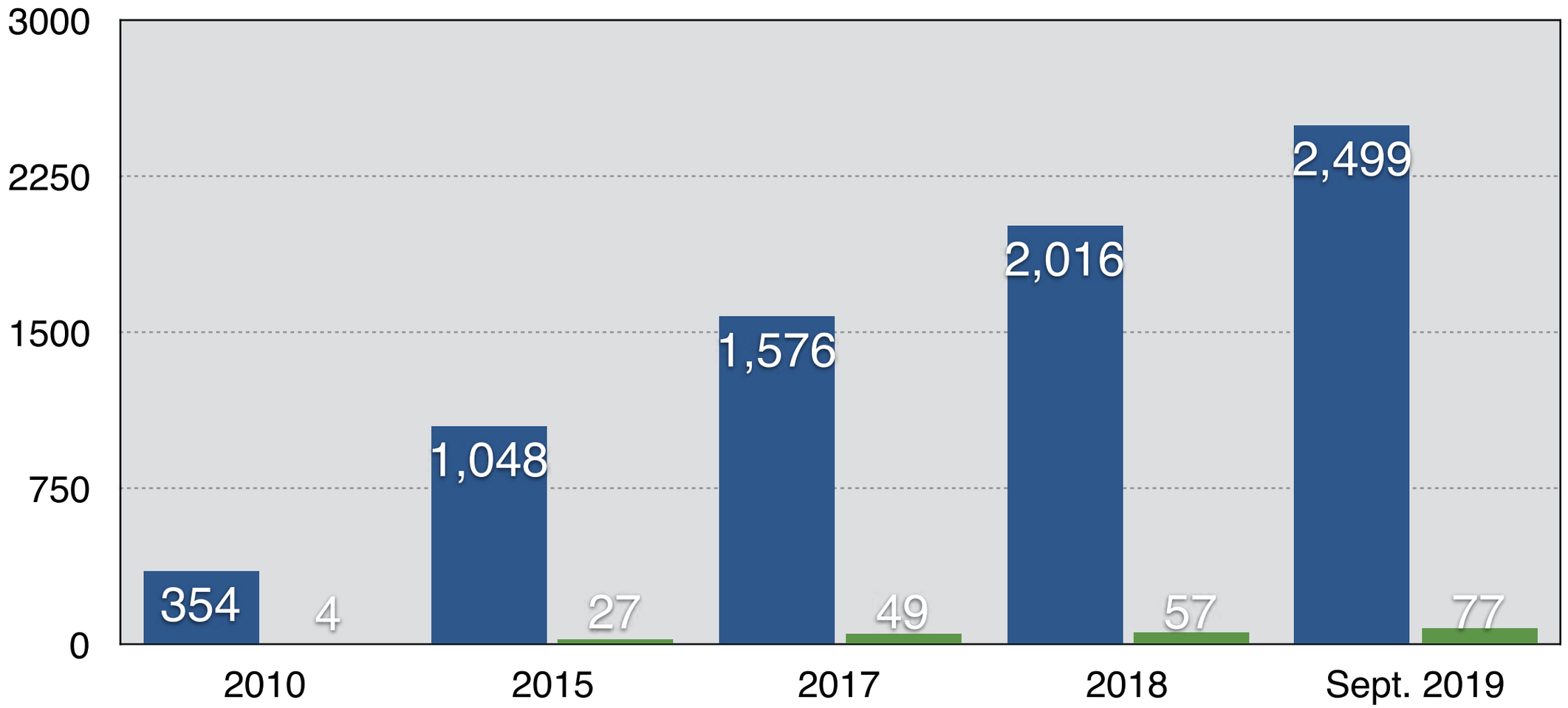
TCFD Supporters from Japan



Source: FSB-TCFD

IV. Timeline of Sustainable Finance and ESG Initiatives

PRI Signatories from Japan



Source: UN PRI

IV. Timeline of Sustainable Finance and ESG Initiatives

The organization's governance around climate-related risks and opportunities

The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning

The processes used by the organization to identify, assess, and manage climate-related risks

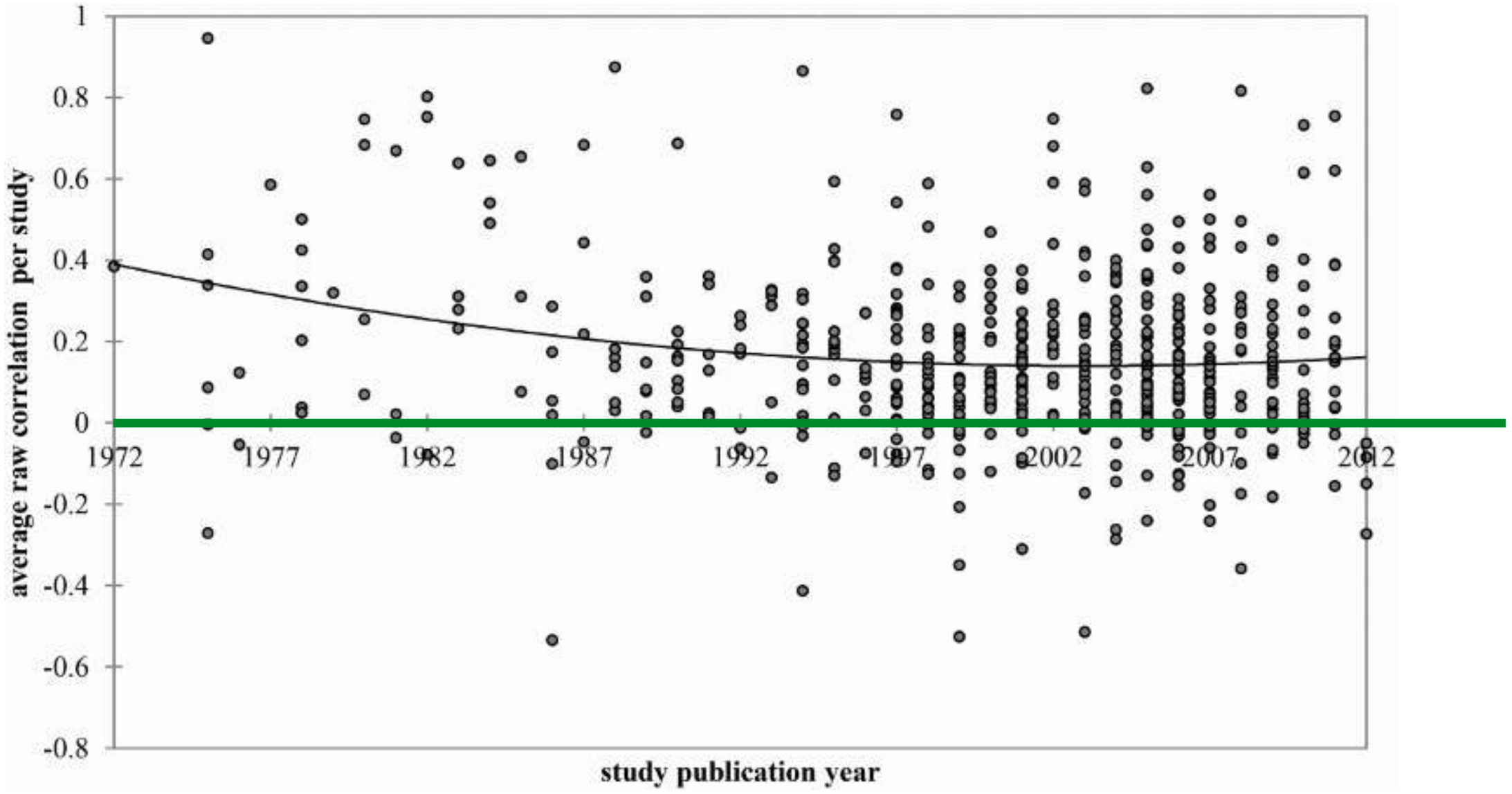
The metrics and targets used to assess and manage relevant climate-related risks and opportunities

TCFD | TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

Source: FSB-TCFD

V. Impact of Climate-related Risks on Banks

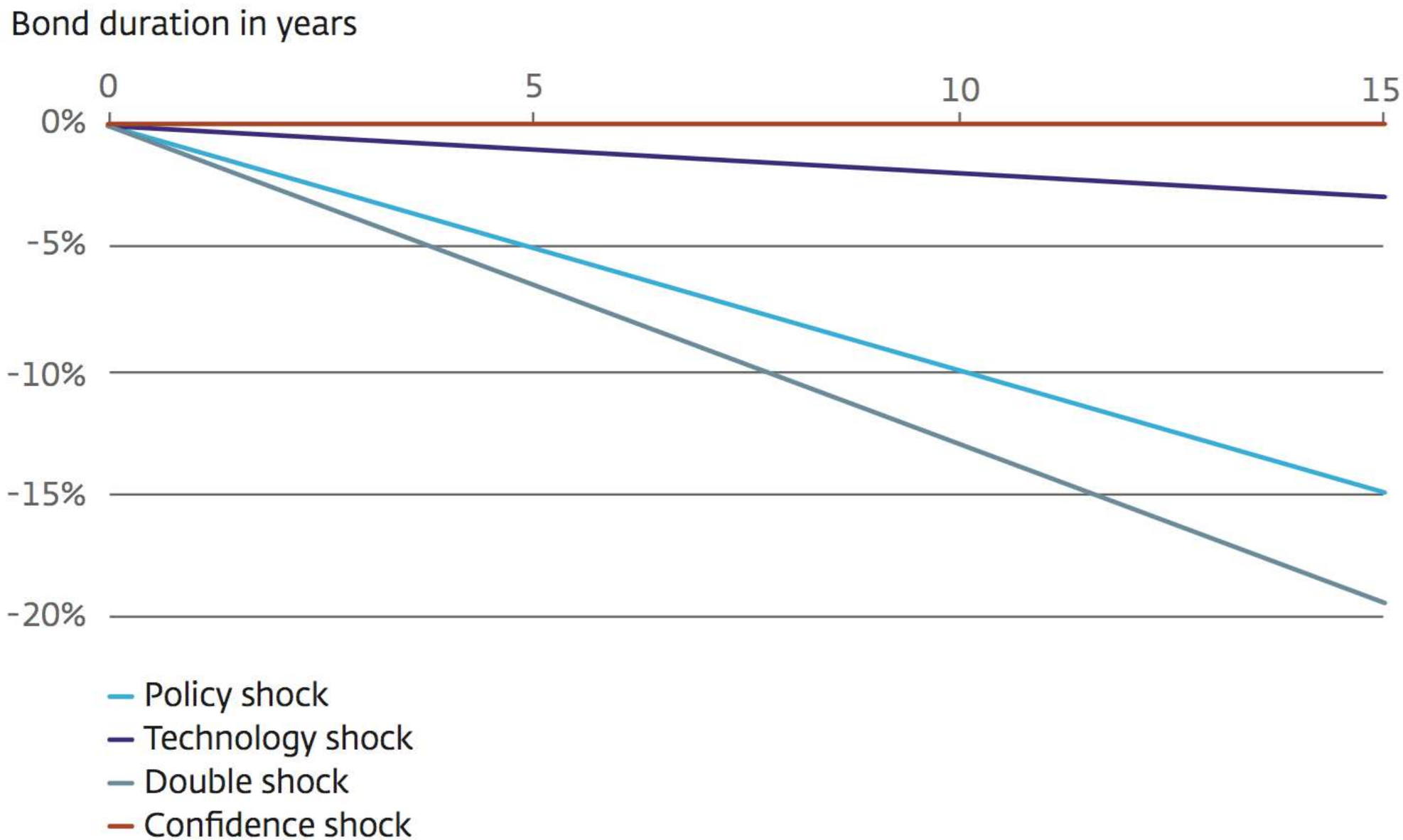
Firm-level ESG integration and corporate financial performance



Source: Friede, Busch and Bassen (2015)

V. Impact of Climate-related Risks on Banks

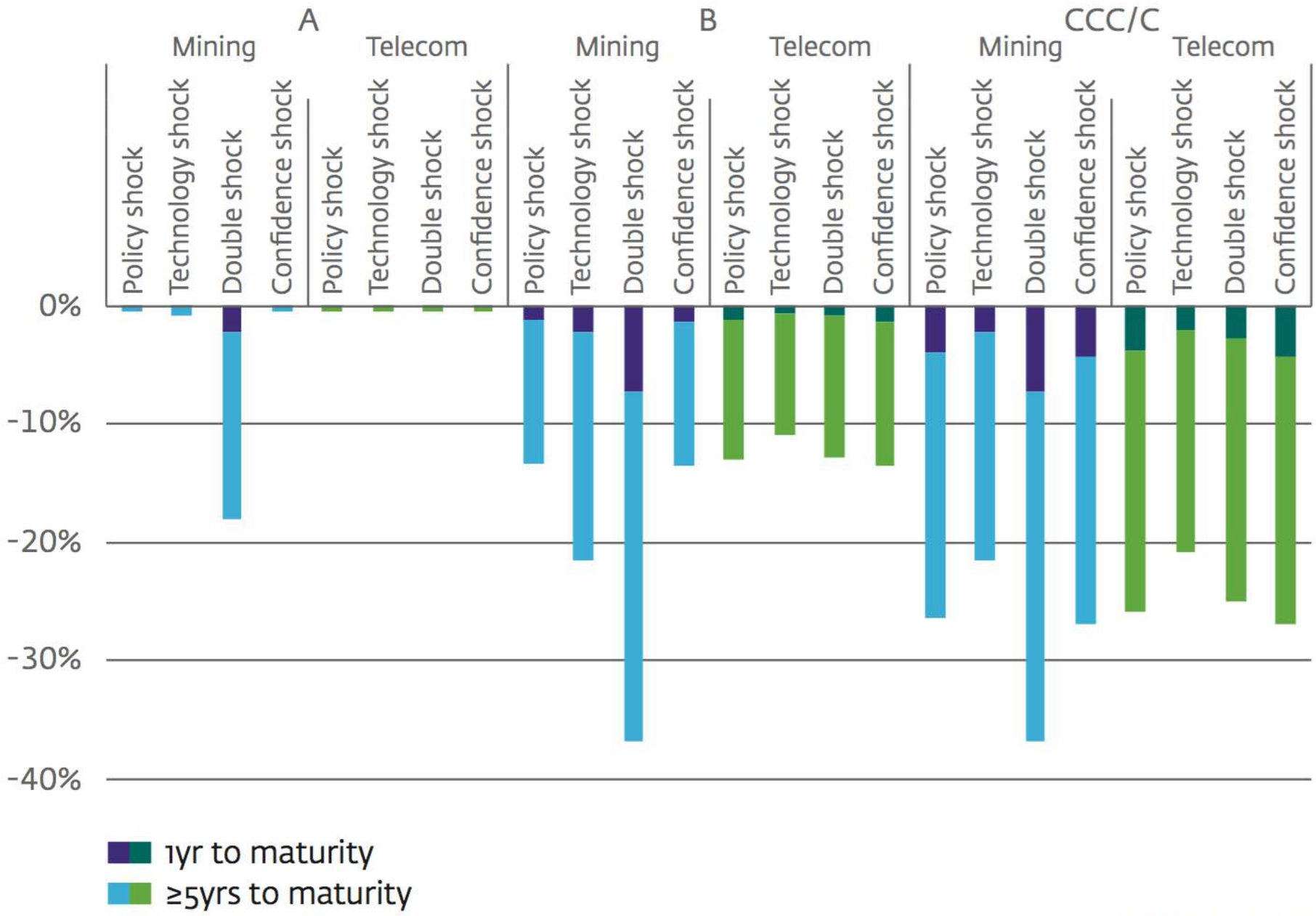
Bond price changes due to a shift in the risk free rate



Source: DNB, 2018

V. Impact of Climate-related Risks on Banks

Bond price changes due to changes in credit risk spread (by credit rating and industry



Source: DNB, 2018

V. Impact of Climate-related Risks on Banks

Asset category	Growth portfolio weight %	Sustainable growth portfolio weight %
Developed market equity	17.5	7.5
Emerging market equity	10.0	10.0
Low-volatility equity	7.5	7.5
Small-cap equity	2.5	2.5
Sustainable equity		10.0
Private equity	5.0	4.0
Sustainable private equity		1.0
Real estate	10.0	10.0
Infrastructure	5.0	4.0
Sustainable infrastructure		1.0
Timberland	2.5	2.5
Agriculture	2.5	2.5
Hedge funds	5.0	5.0
Private debt	5.0	5.0
Developed market debt (sovereign)	10.0	10.0
Emerging market debt (sovereign)	2.5	2.5
Multi-asset credit	10.0	10.0
Investment-grade credit	5.0	5.0
Total	**100.0%**	**100.0%**

Source: Mercer, 2019

V. Impact of Climate-related Risks on Banks

Example industry sectors and asset classes	% p.a. to 2030 in 2°C scenario	% p.a. to 2050 in 2°C scenario	% cumulative impact to 2030 in 2°C scenario	% cumulative impact to 2050 in 2°C scenario
Coal	-7.1	-8.9	-58.9	-100.0*
Oil and gas	-4.5	-8.9	-42.1	-95.1
Renewables	+6.2	+3.3	+105.9	+177.9
Electric utilities	-4.1	-3.3	-39.2	-65.7
Developed market equities	0.0	-0.2	-0.5	-5.6
Emerging market equities	+0.2	-0.1	+1.8	-4.0
All world equities — sustainability themed	+1.6	+0.9	+21.2	+32.0
Infrastructure	+2.0	+1.0	+26.4	+39.4
Infrastructure — sustainability themed	+3.0	+1.6	+42.3	+67.1
All world real estate	0.0	-0.2	-0.1	-4.7

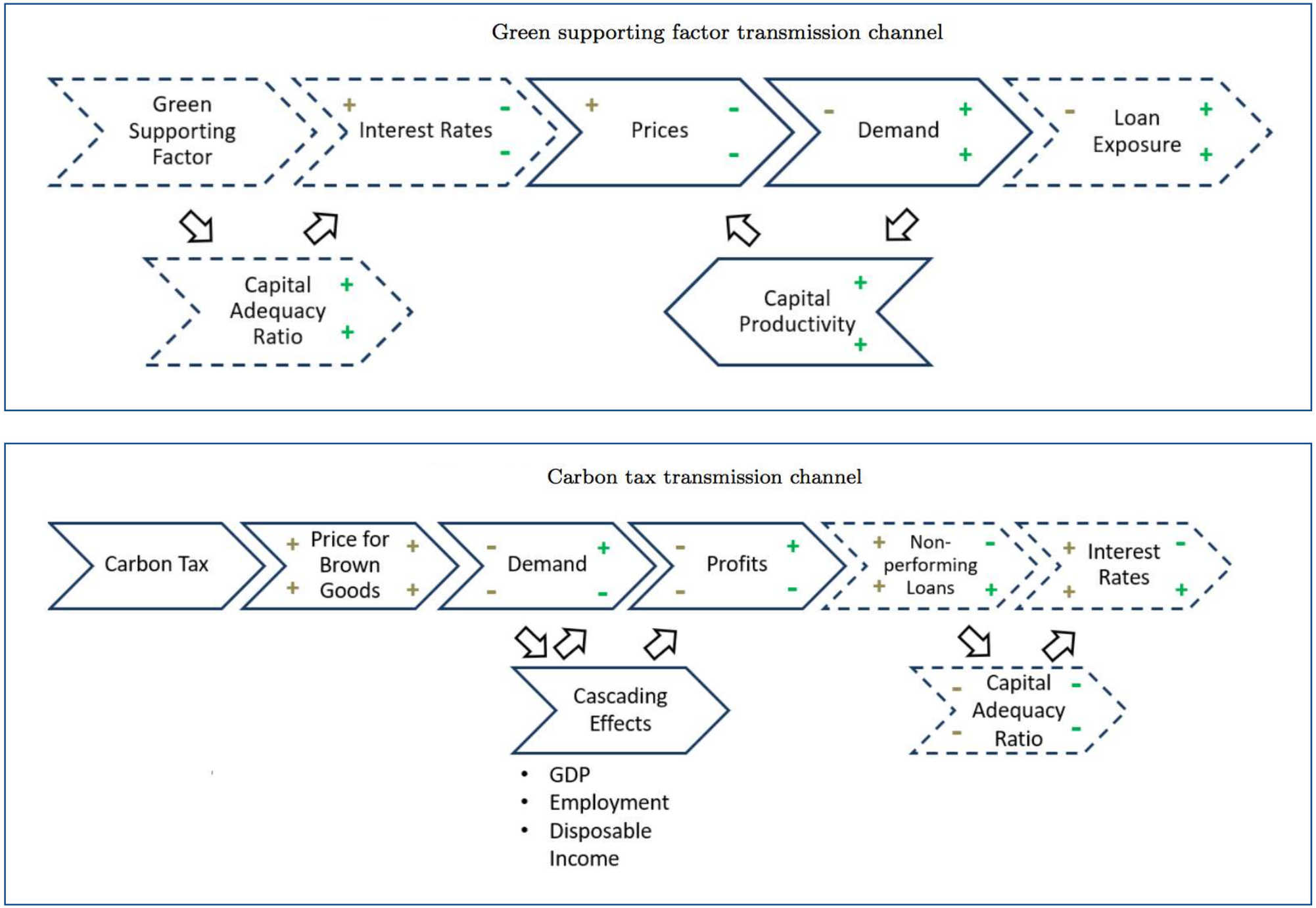
* Effective absolute loss of value is expected to occur in 2041 under a scenario in which global warming is limited to 2°C by 2100.

Source: Mercer, 2019

V. Impact of Climate-related Risks on Banks

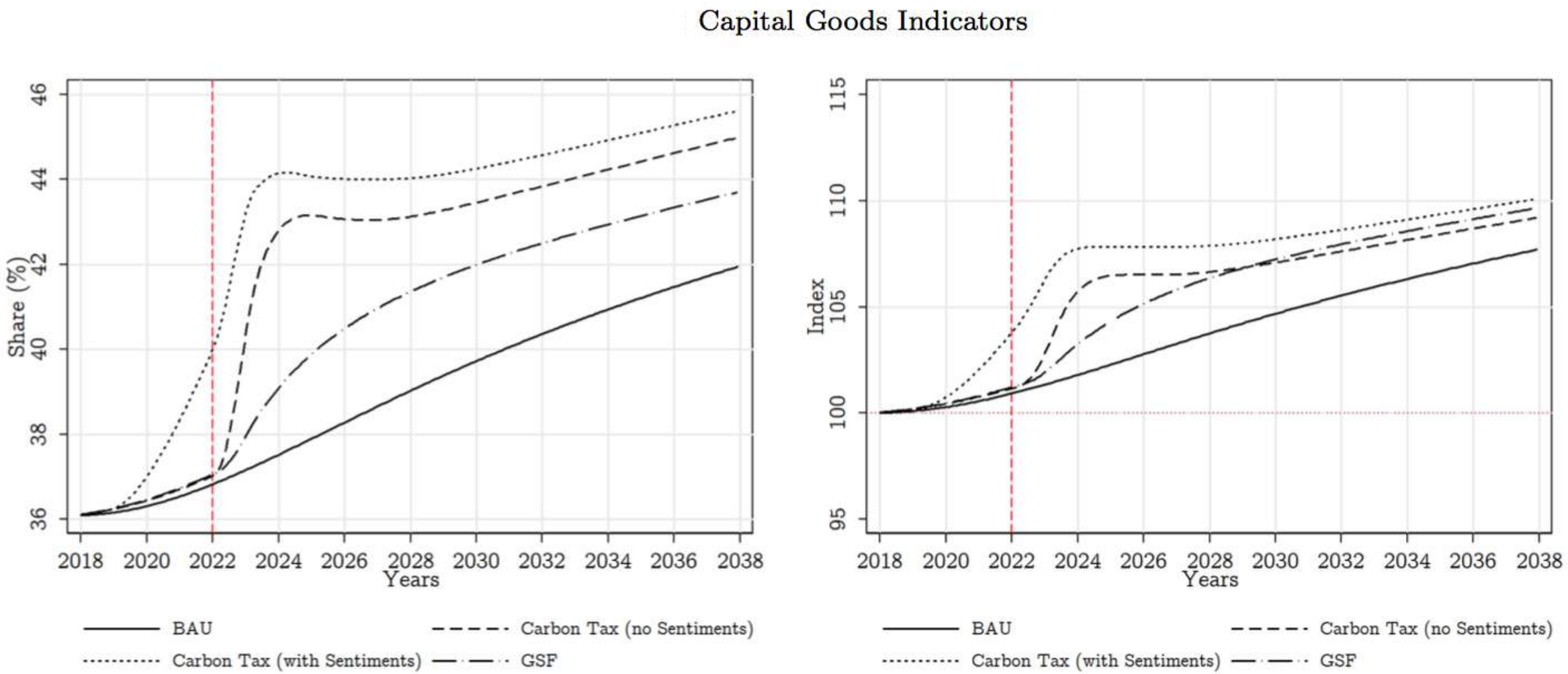
Source: Mercer, 2019

V. Impact of Climate-related Risks on Banks



Source: Dunz et al. (2015)

V. Impact of Climate-related Risks on Banks

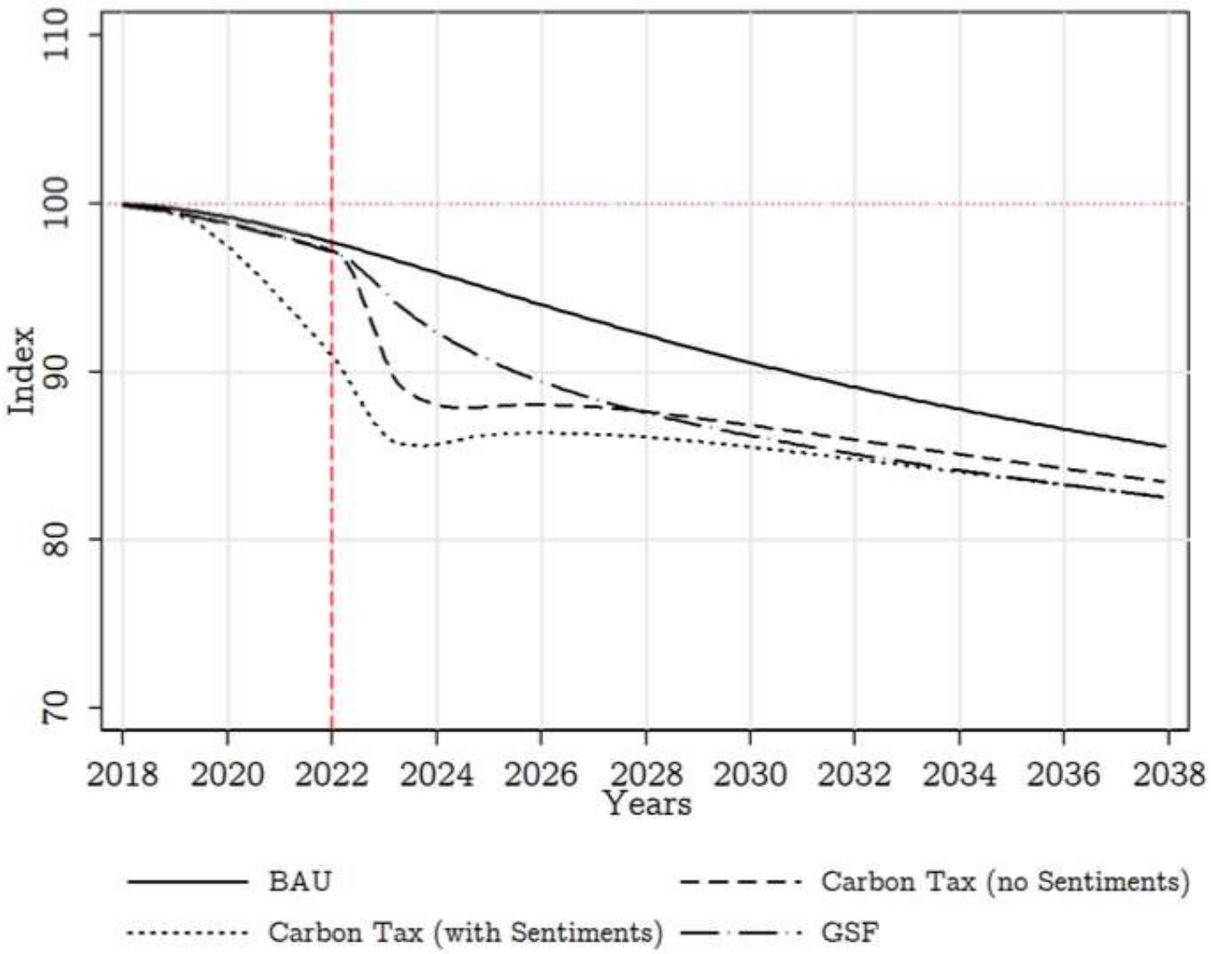


(a) Share of green capital (ϕ^G)

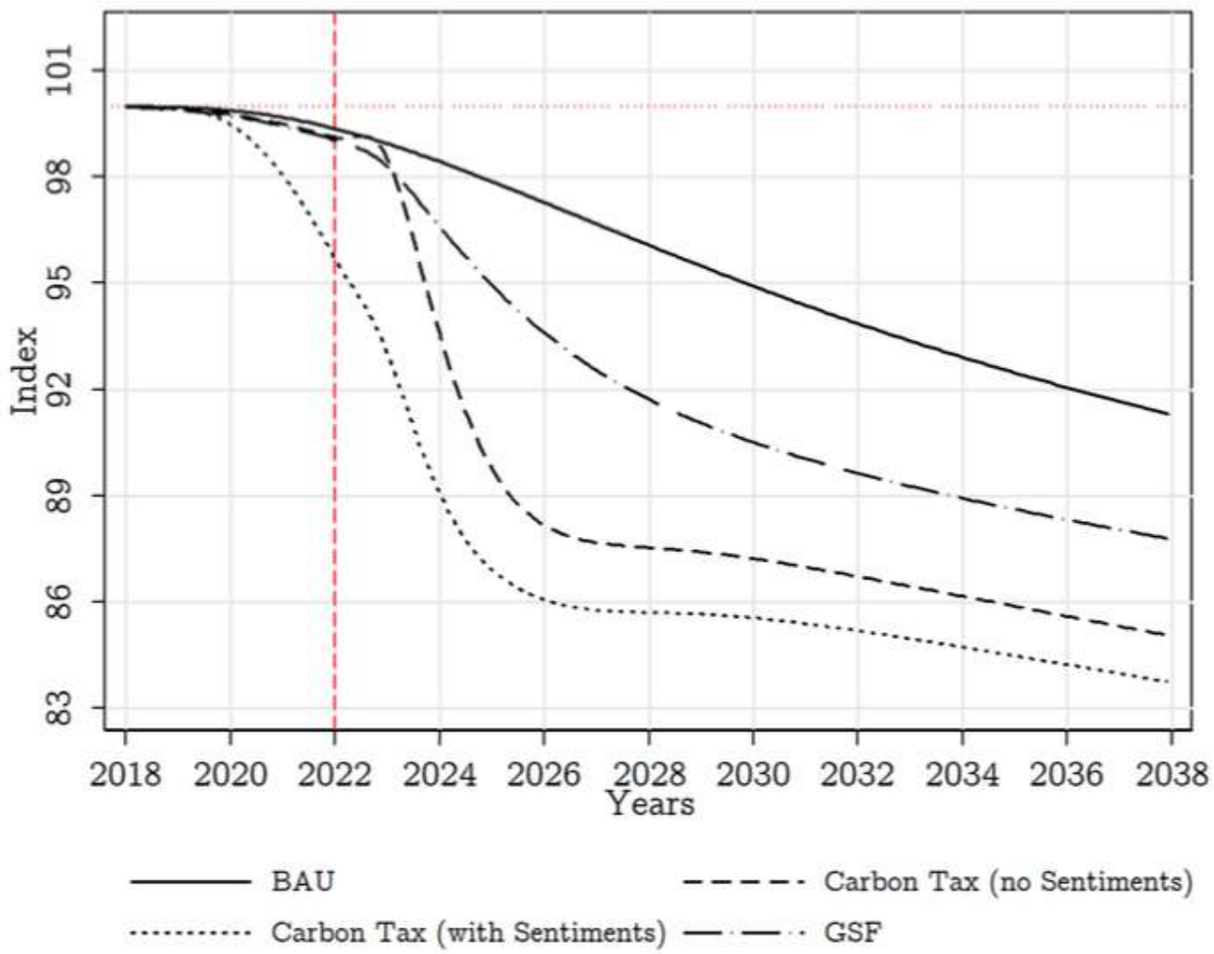
(b) Green vs. Brown Productivity (ϵ^G/ϵ^B)

Source: Dunz et al. (2015)

V. Impact of Climate-related Risks on Banks



(c) Nonperforming Loans ratio (ξ^G) G



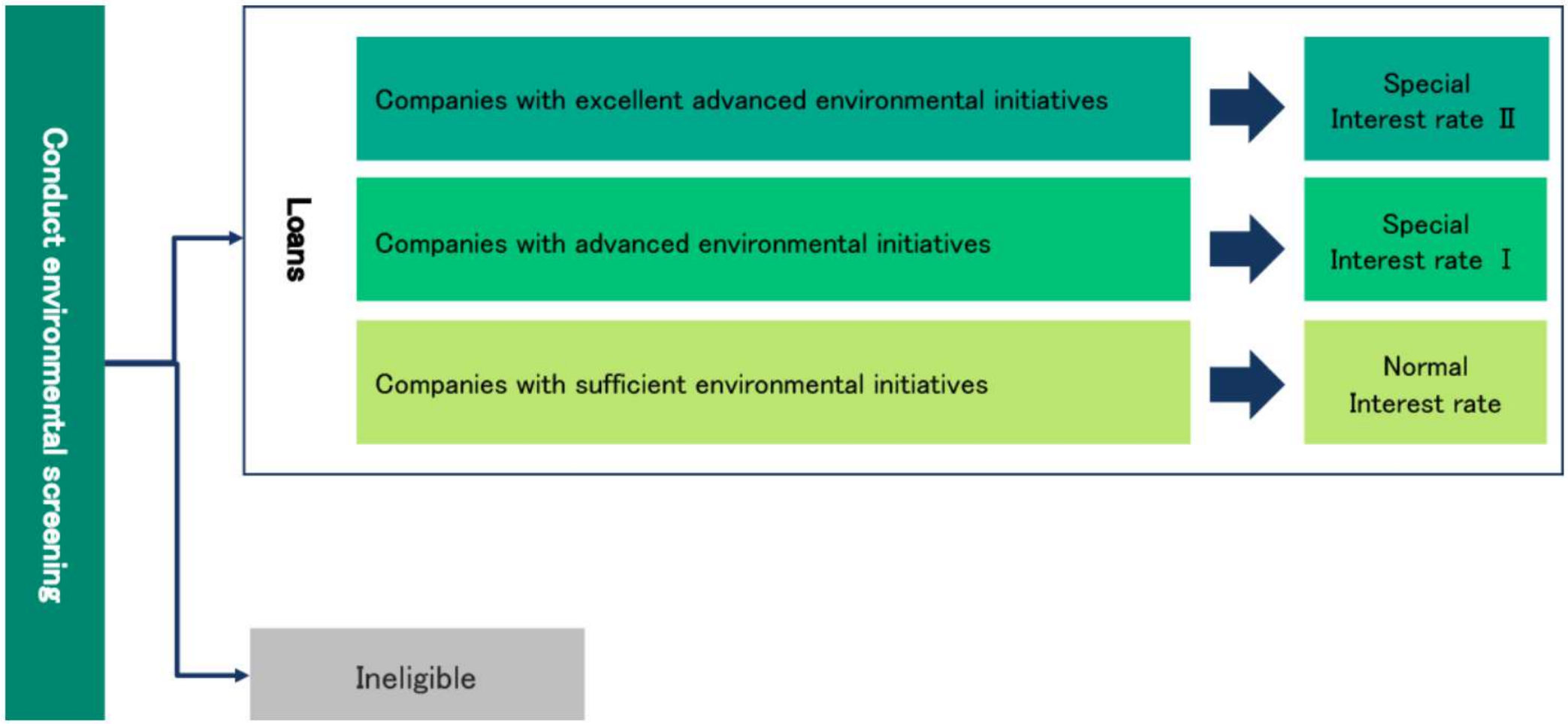
(d) Loan Exposure (L^B) B

Source: Dunz et al. (2015)

V. Impact of Climate-related Risks on Banks

DBJ
Development Bank of Japan Inc.

DBJ 環境格付



Source: DBJ, 2019

VI. Corporate Green Finance Alignment - TOPIX

- **We analysed the TOPIX to determine whether the activities of listed companies are aligned with the Paris Agreement and the 2ºC warming scenario.**
- **The analysis focuses on asset ownership, and not on the entire activity catalogue of the company.**
- **This analysis enables investors to identify whether equity in their portfolios may be exposed to climate-related risks, such as stranded assets.**
- **We selected data among the 53 TCFD-committed companies in the TOPIX, limiting the analysis to the carbon- and energy-intensive automotive, power, fossil fuel (primarily oil&gas) sectors.**
- **In the end the data covered 11 companies in total: 3 automotive, 1 oil & gas, and 7 power companies**

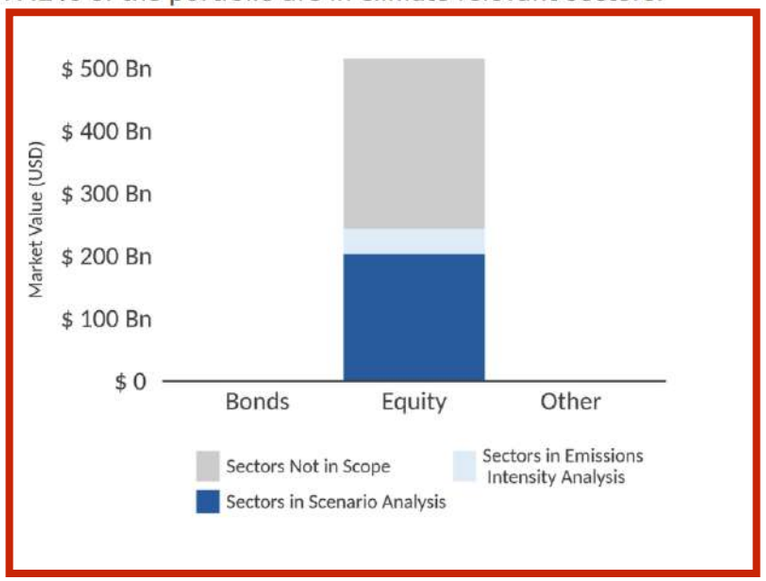
PACTA
Paris Agreement Capital Transition Assessment

Disclaimer:
This presentation and the information therein do not constitute investment advice and may not be used or cited as such.

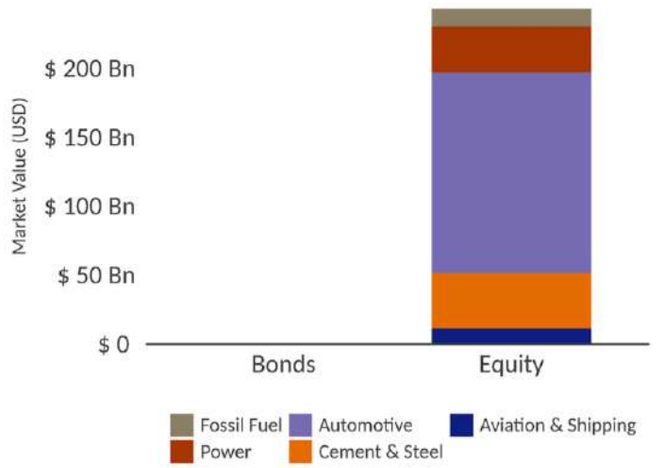
VI. Corporate Green Finance Alignment - TOPIX

TCFDincl Equity Portfolios

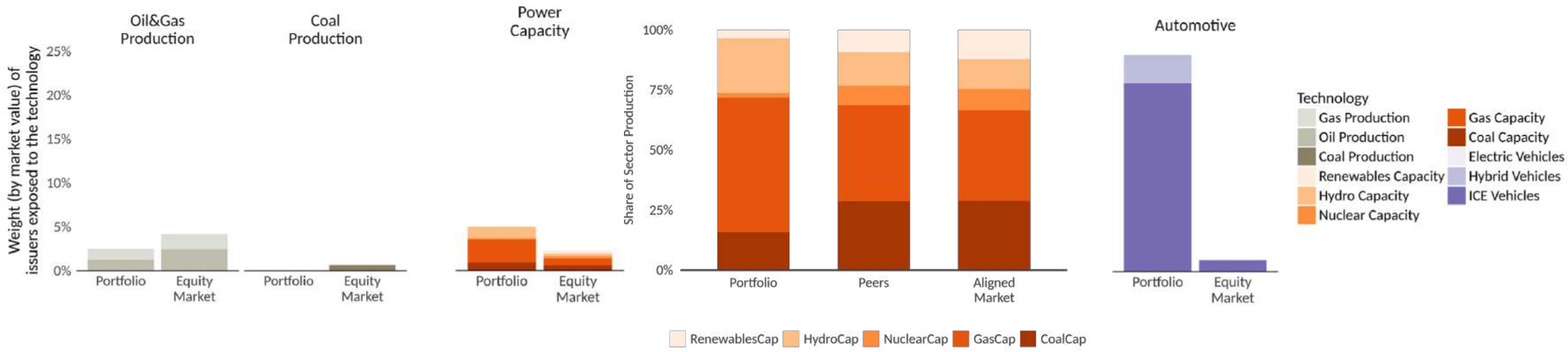
The figure below shows the share of the total corporate bond and equity investments included in the analysis. 47.2% of the portfolio are in climate relevant sectors.



The figure below shows the breakdown by climate relevant sectors in the portfolio.



Current exposure of the equity portfolio to high-carbon and low-carbon activities, as a % of the portfolio, compared to the equity market



Source: Schumacher , K., Chenet, H., Volz, U., 2019

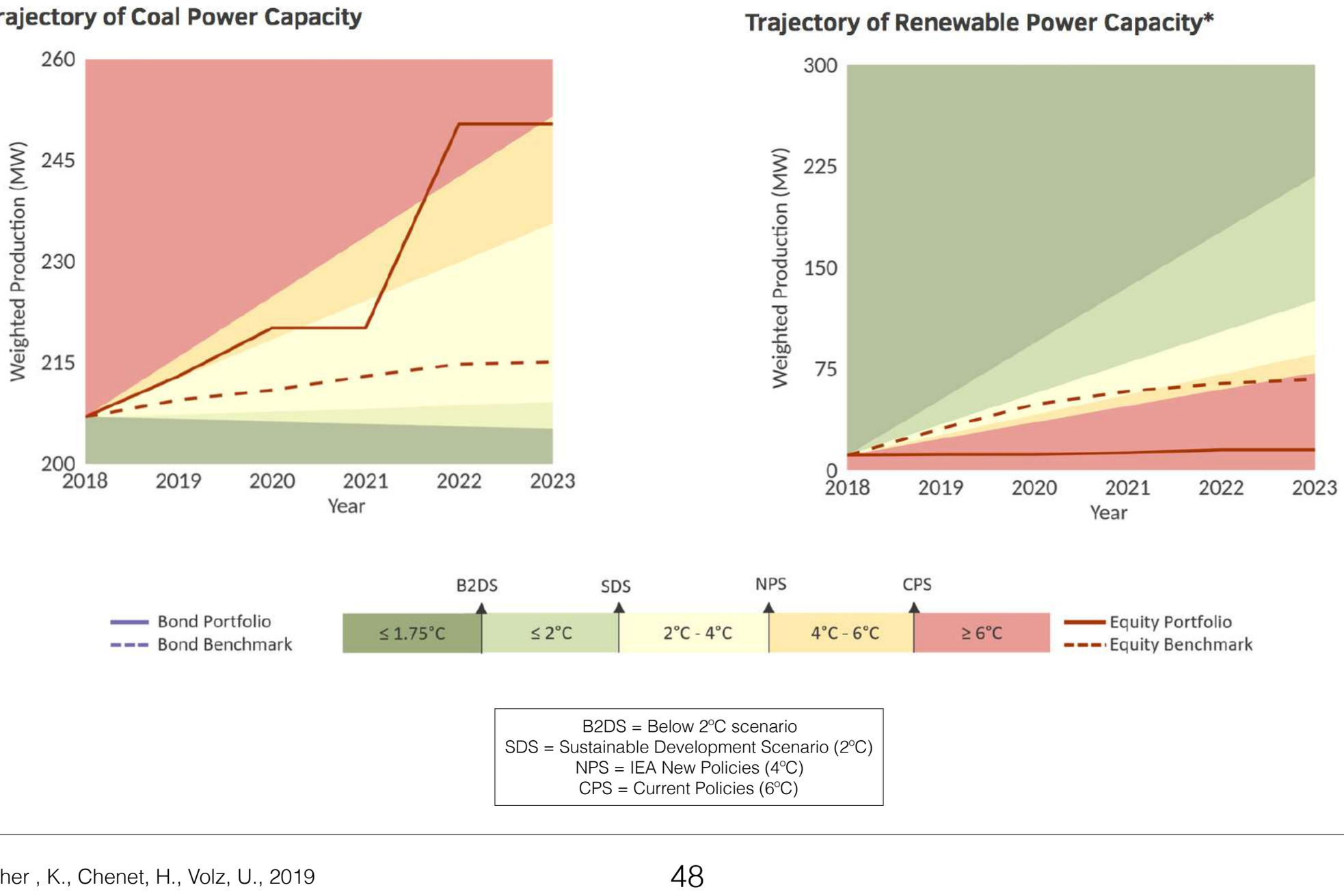
VI. Corporate Green Finance Alignment - TOPIX

TCFDincl Equity Portfolios

Source: Schumacher , K., Chenet, H., Volz, U., 2019

VI. Corporate Green Finance Alignment - TOPIX

TCFDincl Equity Portfolios

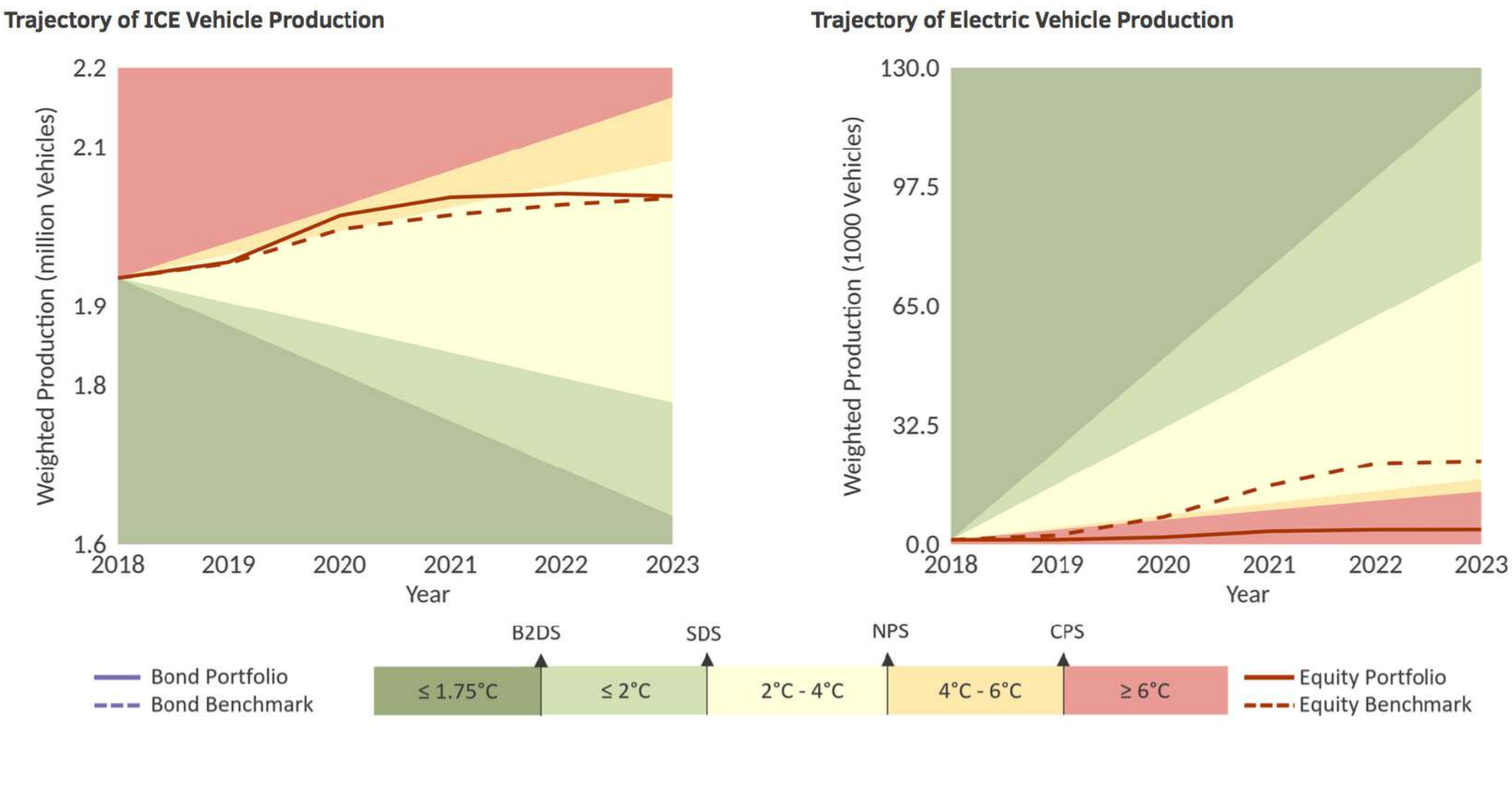


B2DS = Below 2°C scenario
SDS = Sustainable Development Scenario (2°C)
NPS = IEA New Policies (4°C)
CPS = Current Policies (6°C)

Source: Schumacher , K., Chenet, H., Volz, U., 2019

VI. Corporate Green Finance Alignment - TOPIX

TCFDincl Equity Portfolios

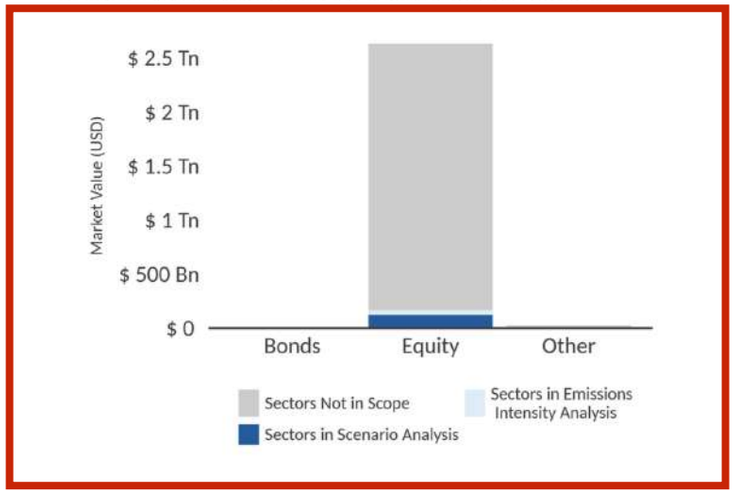


Source: Schumacher , K., Chenet, H., Volz, U., 2019

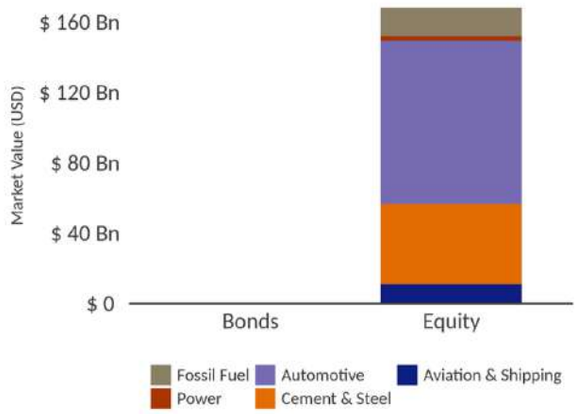
VI. Corporate Green Finance Alignment - TOPIX

TCFDexcl Equity Portfolios

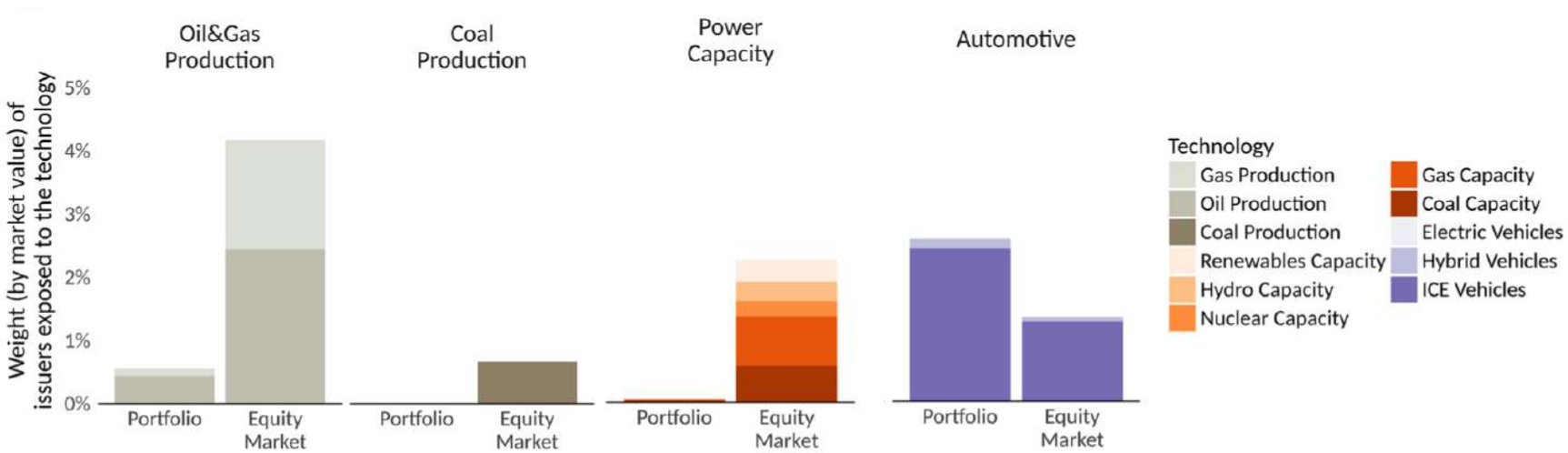
The figure below shows the share of the total corporate bond and equity investments included in the analysis. 6.3% of the portfolio are in climate relevant sectors.



The figure below shows the breakdown by climate relevant sectors in the portfolio.



Current exposure of the equity portfolio to high-carbon and low-carbon activities, as a % of the portfolio, compared to the equity market

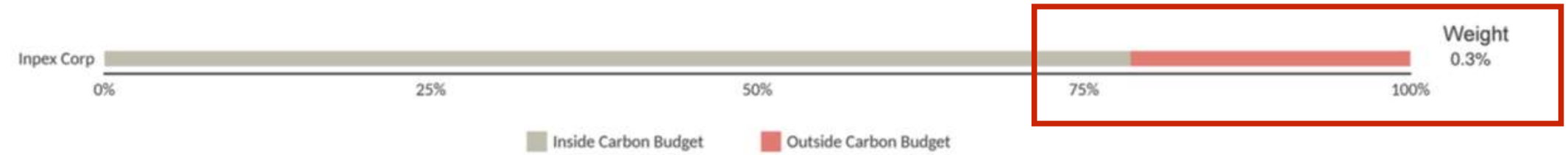


Source: Schumacher , K., Chenet, H., Volz, U., 2019

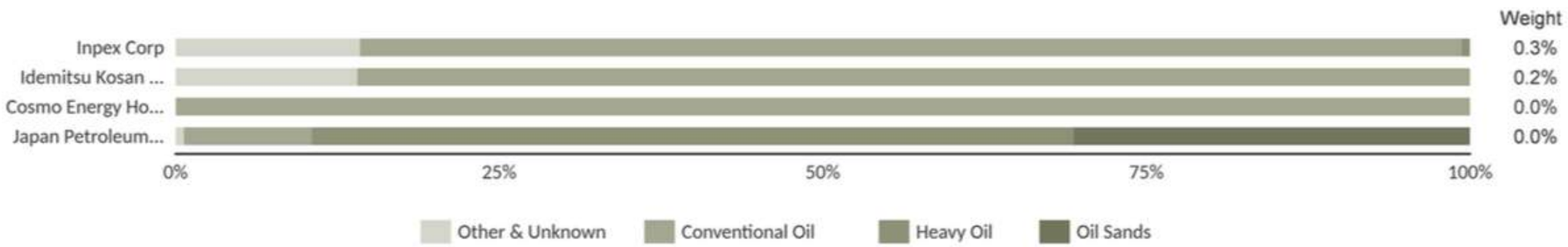
VI. Corporate Green Finance Alignment - TOPIX

TCFDexcl Equity Portfolios

Carbon budget alignment of the largest oil companies in the equity portfolio in 2023. This graph is based on the work of the Carbon Tracker Initiative and UNPRI and shows the carbon budget alignment, and by extension the level of potential exposure to unneeded capex, of the largest oil and gas producers (by market value).



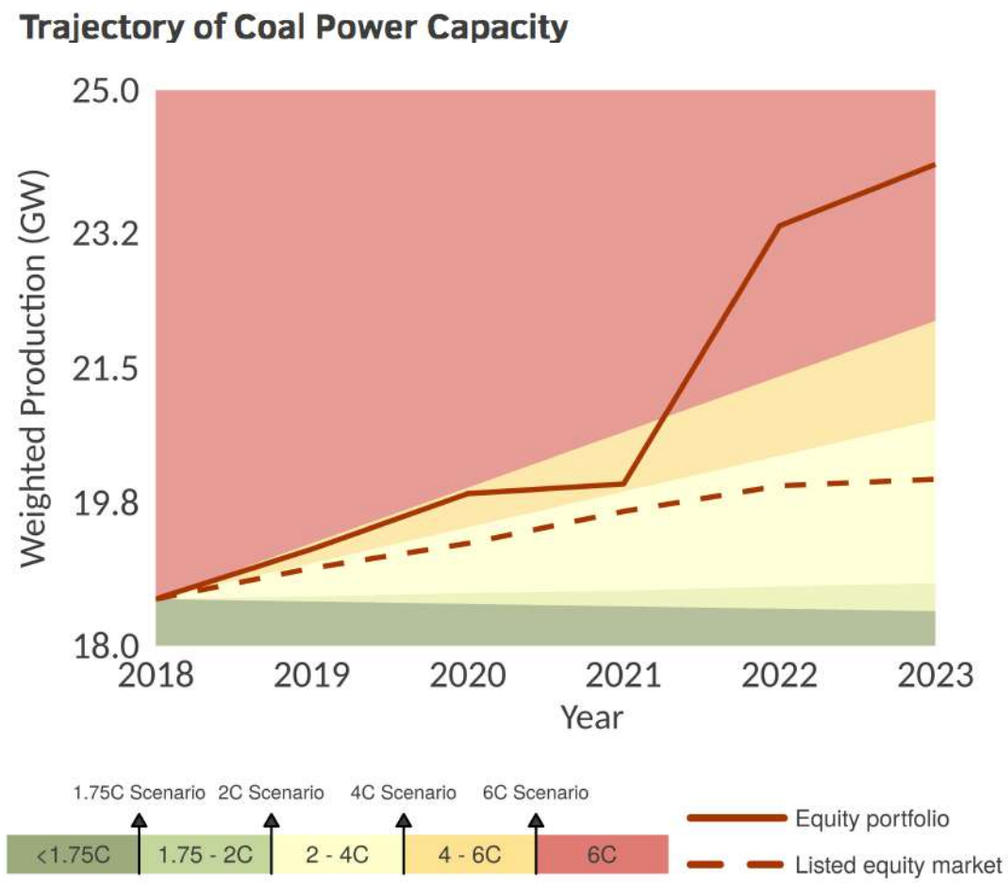
Resource breakdown of oil production of the largest holdings in the equity portfolio in 2023. This graph shows oil production by type of oil for the largest holdings (by market value) of oil producers in the equity portfolio.

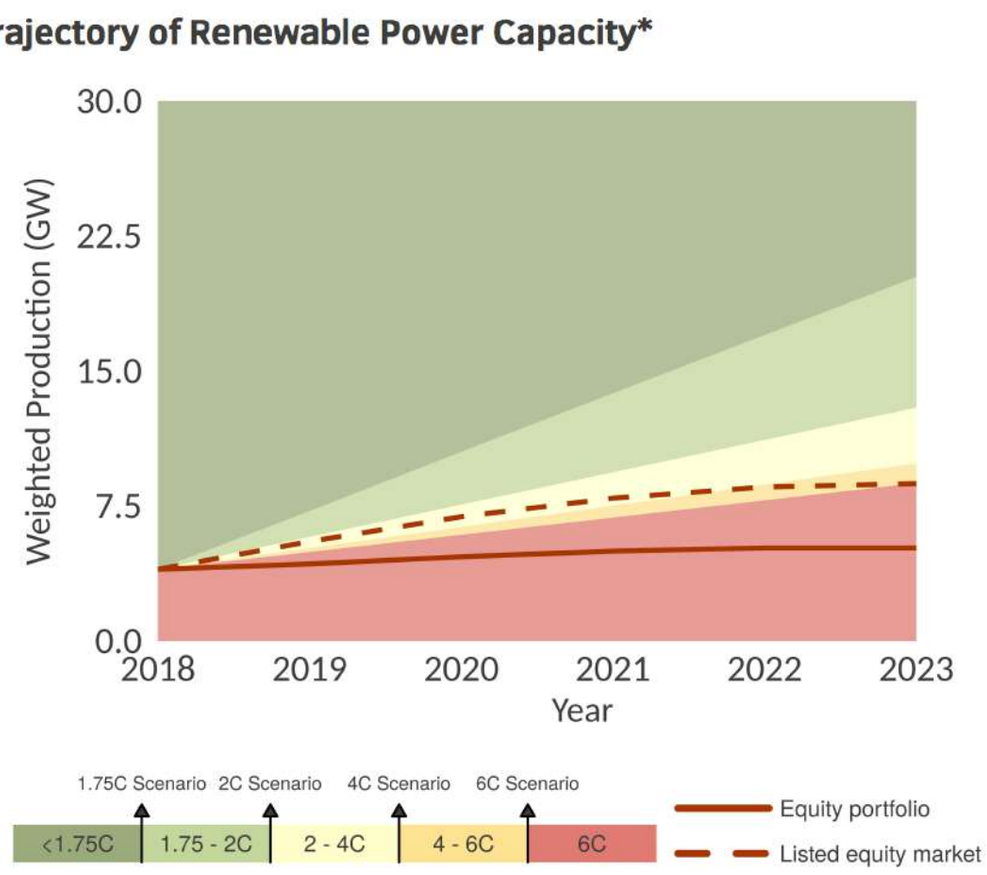


Source: Schumacher , K., Chenet, H., Volz, U., 2019

VI. Corporate Green Finance Alignment - TOPIX

TCFDexcl Equity Portfolios

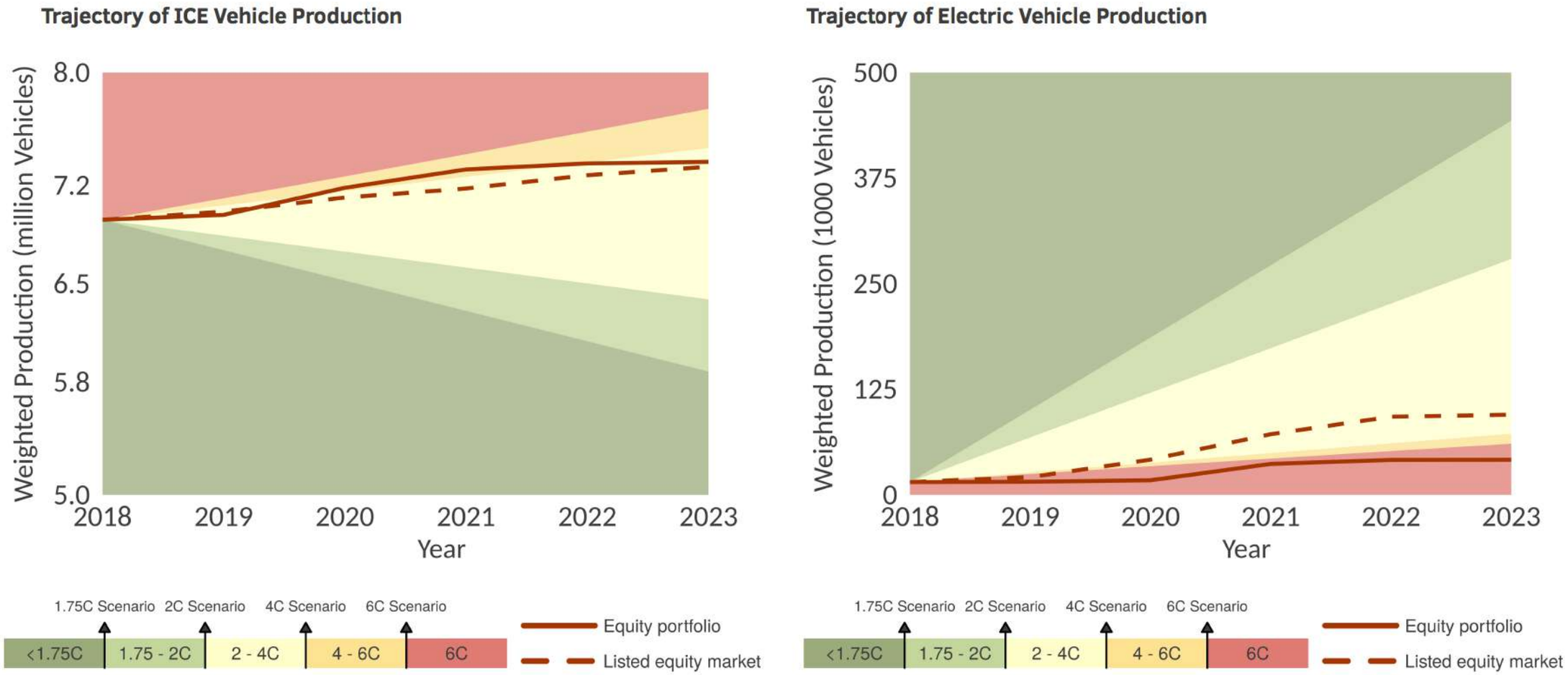




Source: Schumacher , K., Chenet, H., Volz, U., 2019

VI. Corporate Green Finance Alignment - TOPIX

TCFDexcl Equity Portfolios



Source: Schumacher , K., Chenet, H., Volz, U., 2019

VII. Conclusion

- There remains a significant climate misalignment of observed Japanese companies across the TOPIX, with little tangible differences between TCFD supporting and non-supporting ones. The share of renewables and EVs remains too low, whereas the shares of coal, oil, gas, and ICEs remain too high.

- TCFDexcl equity portfolios do indeed perform a little bit worse than TFCDincl equity portfolios although variances remain overall too limited to provide certitude in terms of significance.

- With a larger dataset and additional observations, the trend could be proved in a more reliable manner and beyond 2023. These limitations notwithstanding, the preliminary results do indicate that TCFD-supporting companies do display (slightly) more Paris Agreement aligned trajectories versus the complete TOPIX.

➡ This research is preliminary in its scope insofar that limited availability of recent corporate sustainability data renders the current analysis indicative. Through the gathering of additional data both in terms of quantity and quality, the final analysis will provide more robust results. We expect these preliminary results to solidify in further analyses.

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Thank you very much!

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