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2024 European Energy Policy Conference

The EU CBAM: Averting Emissions Leakage or Promoting the Diffusion of Carbon Pricing?

M.A. Mehling, G. Dolphin and R.A. Ritz

September 2024



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Presentation Structure

- Growing Interest in Spillover Effects
- EU CBAM and the Prevention of Carbon Leakage
 - Carbon Leakage under the EU ETS: Evidence to Date
 - CBAM: Contested Solution to a Contested Problem?
- EU CBAM and the Diffusion of Carbon Pricing
 - Is the EU CBAM Accelerating Carbon Pricing?
 - Harnessing the ‘Brussels Effect’

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Growing Interest in Spillover Effects (1)

Source: [Schmidt-Traub et al., 2019](#)

nature sustainability

Analysis

Global spillover effects of the European Green Deal and plausible mitigation options

Received: 19 December 2023

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Check for updates

Honglin Zhong¹, Yanxian Li², Jiaying Ding¹, Benedikt Bruckner^{1,3}, Kuishuang Feng^{4,5}, Laixiang Sun^{6,7}, Christina Prell⁸, Yuli Shan⁹ & Klaus Hubacek¹⁰

Achieving European Green Deal (EGD) targets for carbon removal and ecological restoration would reduce agricultural and forestry production within the European Union yet simultaneously extend ecosystem impacts elsewhere. Here we quantify such spillover impacts by coupling an extended multi-regional input–output analysis with an agro-ecological zones model. We find that EGD's agricultural and forestry targets set for 2030 could result in a 23.9 Mha increase in demand for agricultural land outside the European Union, which in turn would lead to an increase in land-use-related carbon emissions by 758.9 MtCO₂ equivalent (244.8% of EGD's carbon removal target in the land, land-use-change and forestry sectors) and a biodiversity loss of 3.86 million mean species abundance loss. Such spillover impacts far exceed the ecological benefits from EGD conservation-based import policies, such as promoting deforestation-free products and phasing out food-based biofuel. We then propose three options beyond the primary targets of the EGD with the aim to mitigate such spillover impacts. The assessment of these options reveals the critical role of reducing meat and dairy consumption, highlighting the impact of consumer behaviour on environmental outcomes. This raises questions about public awareness, willingness to change diets and the role of policy in influencing consumer behaviours.

To address climate change, sustainable development and biodiversity conservation, the European Green Deal (EGD) was introduced in 2019. While EGD targets may benefit the European Union ecologically, they could cause environmental impacts beyond the EU borders, particularly through imports of land-intensive goods¹. Without understanding these spillover impacts, EGD goals might unintentionally shift environmental degradation to other countries². This study quantifies the unintentional outsourcing impacts of the EGD on land use, land-related

carbon emissions and biodiversity using the latest available data, enabling a more comprehensive understanding of the EGD's global environmental implications.

Research on environmental impacts of EU consumption has grown, focusing on trade flow analyses^{3,4} and consumption-based environmental footprints^{5,6}. These studies show that EU consumption patterns lead to larger land footprints than the world average, thus triggering increased biodiversity loss^{7,8} and greenhouse gas (GHG)

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Nature Sustainability

Source: [Zhong et al., 2024](#)



Brussels, 23.2.2022
COM(2022) 71 final
2022/0051 (COD)

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on Corporate Sustainability Due Diligence and amending Directive (EU) 2019/1937

(Text with EEA relevance)

{SEC(2022) 95 final} - {SWD(2022) 38 final} - {SWD(2022) 39 final} -
{SWD(2022) 42 final} - {SWD(2022) 43 final}

“up to 80-90% of the environmental harm of EU production may occur ... outside the Union”

Source: [European Commission](#), COM(2022)71

SDG 2024

Spillover score

Click on a country to see its performance.

CHECK OUT BILATERAL SPILLOVERS

Legend

- > 80
- 70 - 80
- 60 - 70
- 50 - 60
- < 50
- Information unavailable

Description

Each country's actions can have positive or negative effects on other countries' abilities to achieve the SDGs. The Spillover Index assesses such spillovers along three dimensions: environmental & social aspects embodied into trade, economy & finance, and security. A higher score means that a country causes more positive and fewer negative spillover effects.

Environmental and social impacts embodied into trade

Exports of hazardous pesticides

Exports of hazardous pesticides

Scarce water consumption embodied in imports

Fatal work-related accidents embodied in imports

Volume of modern slavery embodied in imports

Air pollution associated with imports

Nitrogen emissions associated with imports

Exports of plastic waste



International spillovers and the Sustainable Development Goals (SDGs)

Measuring how a country's progress towards the SDGs is affected by actions in other countries



Spillover Rankings

The spillover performance of all 193 UN Member States

OVERALL SPILLOVERS

Countries are ranked by their spillover score. Each country's actions can have positive or negative effects on other countries' abilities to achieve the SDGs. The Spillover Index assesses such spillovers along three dimensions: environmental & social impacts embodied into trade, economy & finance, and security. A higher score means that a country causes more positive and fewer negative spillover effects.

Rank	Country	Score
1	Sierra Leone	98.71
2	Madagascar	98.67
3	Zambia	98.33
4	Maldives	97.67
5	Malawi	97.44
6	Togo	
7		



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Growing Interest in Spillover Effects (2)

- **Climate policies** in an increasingly integrated world in which goods, services, capital, labor and ideas flow across borders lead to **spillover effects**
 - No universally accepted ‘spillover’ concept: consequences of activities in one geographic or temporal context that have impacts in another
 - Rise due to increased **stringency** of climate policies, but also growth in **industrial policies** with multiple goals and explicit trade impacts
 - Spillover effects can be **positive** or **negative**, **intended** or **unintended**; they also affect the **political economy** of climate action
 - Spillover effects are **contested** in scale and impact, with causal links highly debated
 - Hypothesis: spillover effects frequently **exceed the direct effects** of climate policies

Policies that Increase the Cost of Emissions		
Demand Side	Examples	(Downstream) carbon pricing, performance standards
	Spillover Channels	Emissions leakage through relocation of fossil fuel consumption, process emissions; ‘Green Paradox’ ; climate policy diffusion
Supply Side	Examples	Fuel or technology phase-out mandates, (upstream) carbon pricing, extraction taxes
	Spillover Channels	Emissions leakage through relocation of fossil fuel production
Policies that Decrease the Cost of Mitigation		
Demand Side	Examples	Tax rebates, grants, public procurement
	Spillover Channels	Low-carbon technology innovation and diffusion ; network effects
Supply Side	Examples	Innovation subsidies, industrial policy, e.g. production and investment tax credits
	Spillover Channels	Low-carbon technology innovation and diffusion ; network effects

Example: Technology Innovation Spillover Benefits (1)

Decomposition of Solar Adoption Because of German-Induced Innovation



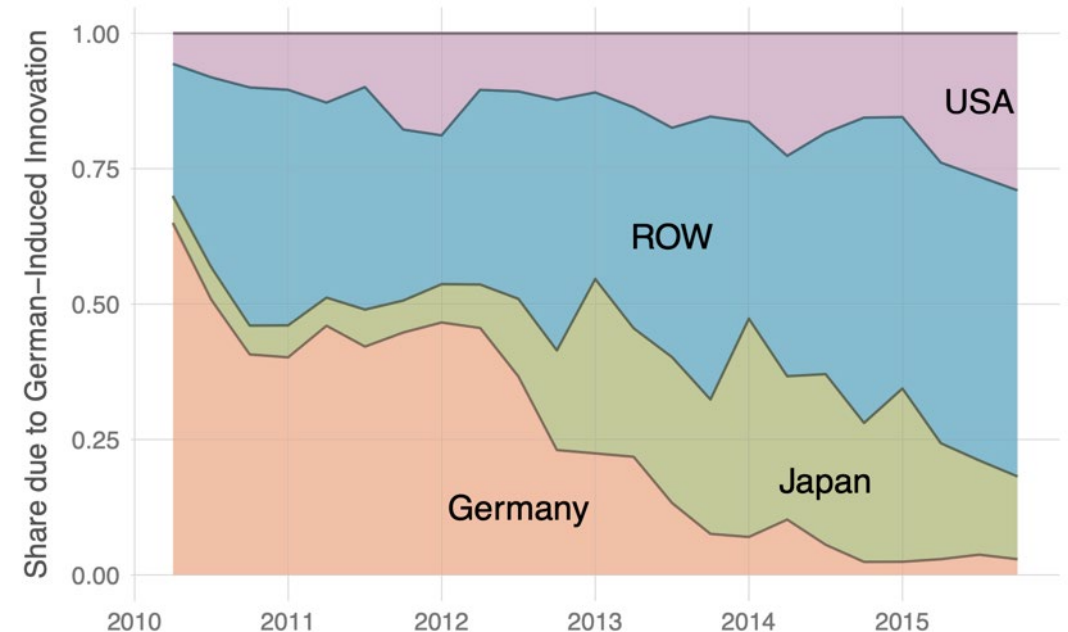
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**The Cost of Abating CO₂ Emissions
by Renewable Energy Incentives in
Germany**

Claudio Marcantonini
and A. Denny Ellerman

February 2013 CEEPR WP 2013-005

A Joint Center of the Department of Economics, MIT Energy Initiative and MIT Sloan School of Management.



“86% of the marginal solar adoption attributable to innovation induced by German subsidies occurs outside Germany”

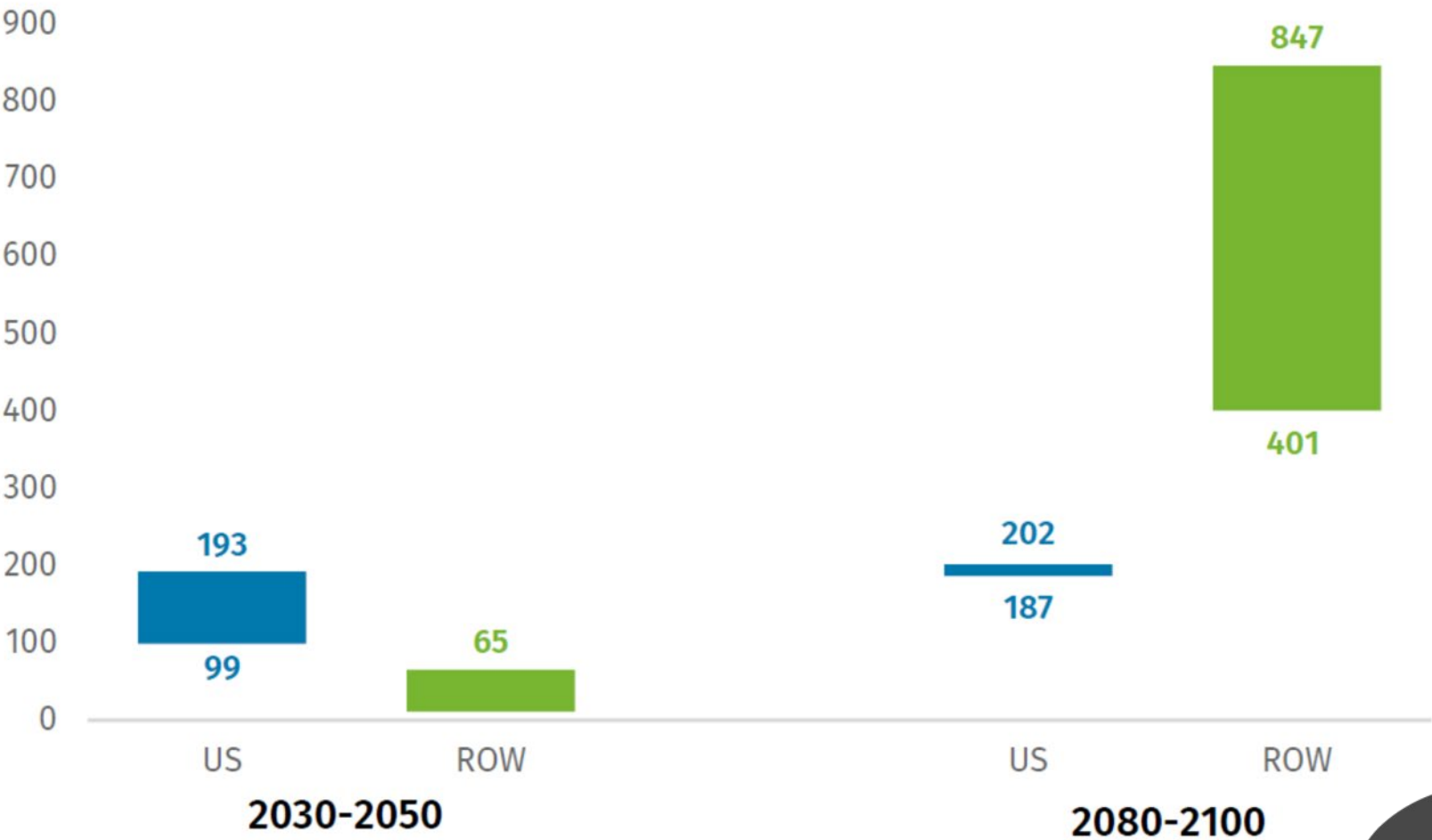
Source: [Gerarden](#), 2023

“a very expensive way of reducing CO₂ emissions”

Source: [Marcantonini](#) et al., 2013

Example: Technology Innovation Spillover Benefits (2)

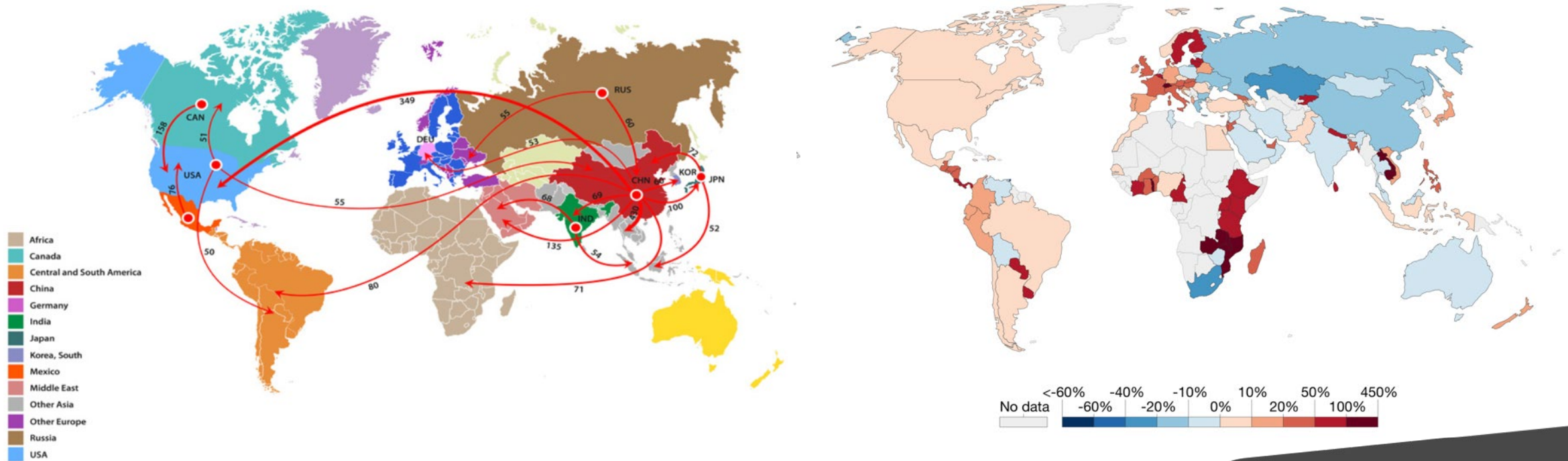
Catalyzed Emission Reductions from ECT Provisions in the IRA



Source: [Rhodium Group](#), 2024

Example: International Emission Transfers

Between 20-25% of global greenhouse gas emissions are embedded in goods traded across national borders, creating a “carbon loophole.”



Source: [Hasanbeigi et al., 2022](#); [Peters et al., 2012](#) (upd.); [Global Carbon Project](#)

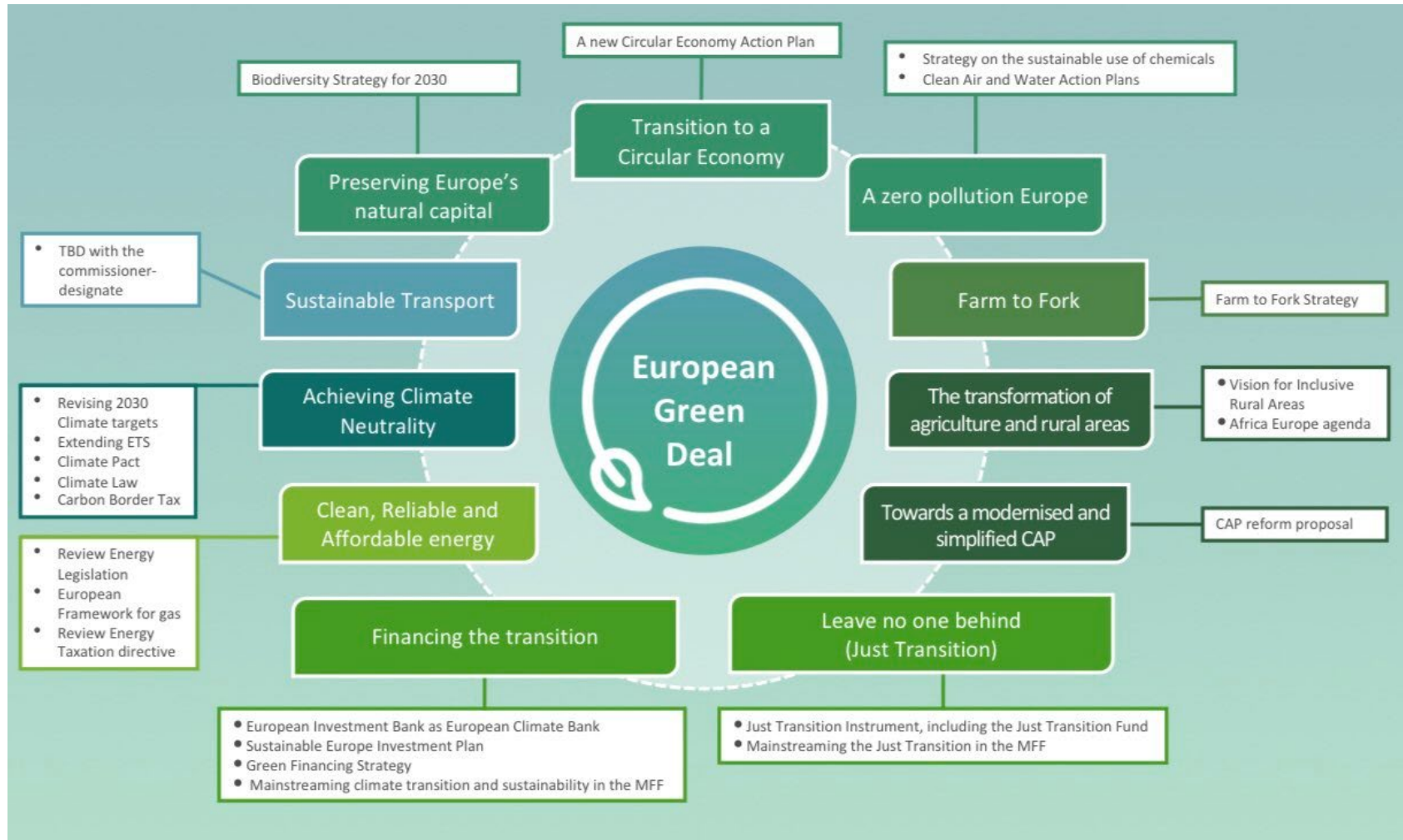
Uneven Distribution of Spillover Effects and Political Economy Constraints

Point of Regulation Type of Policy	Demand-Side			Supply-Side		
	Spillover Effects	Political Economy	Spillover Effects	Political Economy	Spillover Effects	Political Economy
Constraining	Positive	Negative		Positive	Negative	
	Weak	Strong	Unfavorable	Moderate	Moderate	Unfavorable
Supportive	Positive	Negative		Positive	Negative	
	Moderate	Weak	Favorable	Strong	Weak	Favorable

Presentation Structure

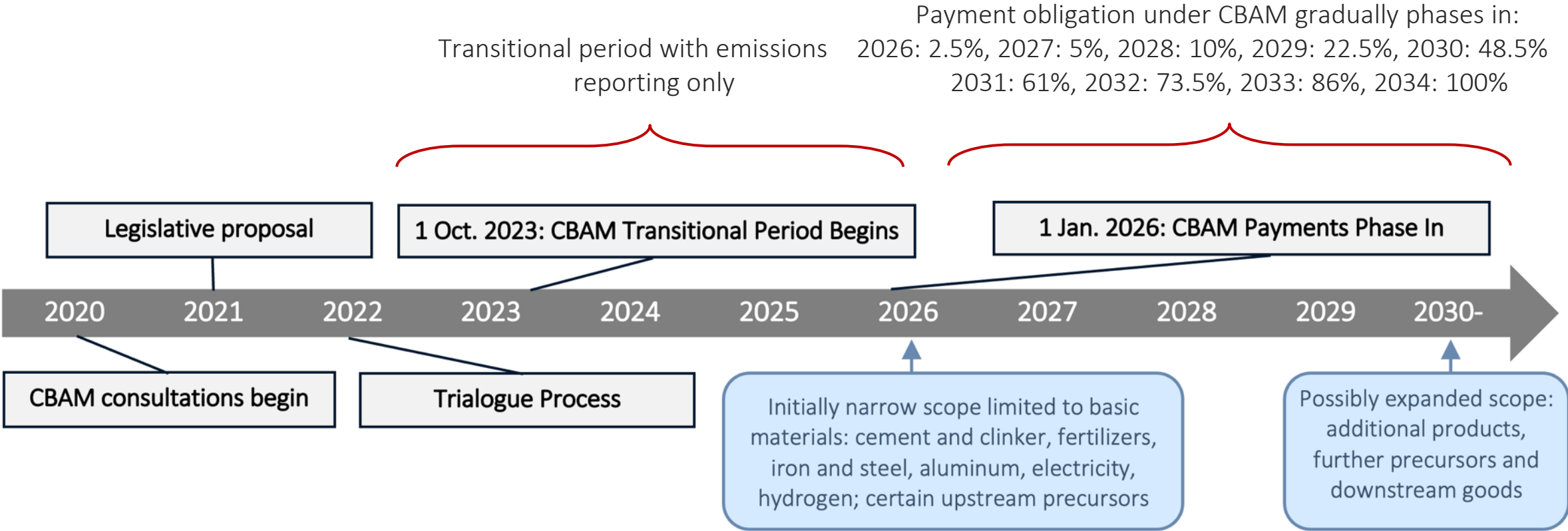
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Policy Context: European Green Deal



(Source: [European Commission](#), 2019)

CBAM Regulation (EU) 2023/956: Timeline



(Source: Mehling, based on [CBAM Regulation \(EU\) 2023/956](#), 16 May 2023)

CBAM Regulation (EU) 2023/956: Design Elements

Design Element		Selected Option
Timeline		1 Oct. 2023-31 Dec. 2025: reporting only (“Transitional Period”) 1 Jan. 2026 onwards: full implementation
Free Allocation		Decreases annually by: 2.5% in 2026 and 2027; 5% in 2028; 12.5% in 2029; 26% in 2030; 12.5% in 2031, 2032 and 2033; and 14% in 2034, reaching zero
Adjustment Level		Obligation to buy certificates tracking price of EU ETS allowances (avg. weekly closing price); not fungible
Scope	Countries	All, except countries with linked ETS and certain EU territories
	Sectors	Cement, Fertilizer, Steel, Aluminum, Electricity, <i>Hydrogen</i> (Annex I)
	Emissions	Direct emissions (including from heating and cooling) <i>For cement and fertilizers also indirect emissions from electricity (cf. Annex IA)</i>
Trade Flows		Imports only, with review of export leakage
Determination of Embedded Emissions		Direct emissions – standard approach: declared emissions data 1 st fallback: default value (average carbon intensity in country of origin) plus mark-up 2 nd fallback: x% worst-performing EU producers (tbd) <i>Indirect emissions – default value, unless PPA or captive generation</i>
Crediting of Foreign Policies		Explicit carbon pricing only, as documented by declarant
Revenue Use		EU budget, but financial support for decarbonization of least developed countries
Institutional Aspects		Competent authorities (CAs) in Member States; centralized EU CBAM registry

(Source: Mehling, based on [CBAM Regulation \(EU\) 2023/956](#), 16 May 2023)

Stated Objective: Preventing Carbon Leakage

- Article 1(1) CBAM Regulation (EU) 2023/956: “This Regulation establishes a carbon border adjustment mechanism ... to prevent **the risk of carbon leakage.**”
- Recital 9 of the Preamble: “**Carbon leakage** occurs if, for reasons of costs **related to climate policies**, businesses in certain industry sectors or subsectors transfer production to other countries or imports from those countries replace equivalent products that are less intensive in terms of greenhouse gas emissions.”
- **Limited evidence** of meaningful carbon leakage from climate policies generally ([Aldy and Pizer](#), 2015; [Caron](#), 2022; [Dechezleprêtre and Sato](#), 2017; [IPCC](#), 2022) and the EU ETS specifically ([Branger, Quirion, and Chevallier](#), 2016; [Dechezleprêtre, Nachtigall, and Venmans](#), 2023; [Verde](#), 2020); ascribed to low policy stringency and carbon prices. Observed emission transfers due to other factors ([Grubb et al.](#), 2022) plateauing.
- Future impact of carbon leakage *may* increase, but *ex ante* projections intrinsically **uncertain** ([Babiker](#), 2005; [Branger and Quirion](#), 2014; [Carbone and Rivers](#), 2017)

EU CBAM: Is it Fit for Purpose? (1)

- **Political risks:** perceived inequity and protectionist goals have already incited diplomatic censure and may undermine climate cooperation
- **Legal risks:** legal viability depends on political balancing tests with uncertain outcomes; some design options widely considered illegal
- **Complexities and tradeoffs:** e.g. determination of embedded emissions, including for indirect emissions; coverage of exports
- **Value chain substitution effects and cost increases** of raw material inputs for downstream manufacturing
- **Initial compliance record** not encouraging
- **Circumvention opportunities:** s. next slides

EU CBAM: Is it Fit for Purpose? (2)

- **Circumvention opportunities** under BCAs include (but not limited to):
 - **Resource shuffling:** low-carbon production substitutes for high-carbon exports
 - **Transshipment:** covered goods enter indirectly via exempted countries through onward export, or displace goods produced in exempted country that are then sold onward
 - **Political evasion:** trade partners assist exporters, e.g. with symbolic climate policies that are not enforced, relabeled, only applied to exports, compensated through other measures, etc.
 - **Producer reorganization:** high-carbon production capacities spun off to separate legal entity
 - **Product modification:** goods are processed just enough to fall outside coverage threshold
 - **Split shipments:** goods shipments are split to fall under de minimis thresholds
- **Aggregation** can preempt resource shuffling, but reduces benefits and exacerbates political and legal risks ([Mehling & Ritz](#), 2023)
- Article 27 of CBAM Regulation defers solutions

EU CBAM: Is it Fit for Purpose? (3)

Californian experience with **resource shuffling** in electricity imports serves as a cautionary tale:

- California covers approximately 1/3rd of electricity demand **with imports** via the Western grid (WECC)
- First jurisdictional deliverers of electricity **including importers** are covered by a carbon price
- Initial program design included a **prohibition** of resource shuffling, requiring annual written attestations to CARB confirming that they did not engage in resource shuffling, under penalty of perjury
- Pressured by FERC, CARB replaced this prohibition with a **whitelist** of 13 so-called **safe harbors**
- Research has suggested that these safe harbors “are so broad as to **completely swallow** the prohibition on resource shuffling”, enabling “facility swapping”, “cherry picking” and “laundering/relabeling” practices to avoid between **74 and 319 Mt CO₂e** from being priced until 2020
- [Bushnell, Chen, and Zaragoza-Watkins](#) (2014) and [Caron, Rausch, and Winchester](#) (2015) estimated that, without effective provisions to prevent resource shuffling, the BCA on imports would lead to **no further emission reductions** than a program design that only covers domestic electricity

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Unstated Objective: Incentivizing Carbon Pricing

- Article 1(1) CBAM Regulation (EU) 2023/956: “... supporting the goals of the Paris Agreement, also by **creating incentives** for the reduction of emissions by operators in third countries”
- Recital 10 of the Preamble: “The CBAM is expected to also contribute to **promoting decarbonisation in third countries**”
- Article 9: “... may claim in the CBAM declaration a reduction in the number of CBAM certificates to be surrendered in order to **take into account** the carbon price paid in the country of origin for the declared embedded emissions”
- Consistent with long history of the European Union advocating for expanded use of carbon pricing (European Commission, 2008) and promoting adoption through targeted capacity building and outreach activities

A 'Brussels Effect'? Anecdotal Evidence Suggests So (1)

UPDATE – Albania responds to EU CBAM by raising carbon tax on coal from 2024

Published 18:35 on November 13, 2023 / Last updated at 12:09 on November 17, 2023 / Emanuela



EU's looming carbon tax nudged Turkey toward Paris climate accord, envoy says

Turkey is currently working on introducing a climate law, which Birpınar expects to be ready in three to four months. It will address "Green Deal issues," he said, and will introduce a carbon price to avoid getting hit by CBAM.



Russia Aims to Make Carbon-Tax System That EU Will Recognize

- Finance Ministry sees carbon-emission quotas as best option
- Russia cost per unit to be lower than Europe, official says

Mr Ekniti said the department is working on jointly drafting a carbon tax structure with the Commerce Ministry and the Thailand Greenhouse Gas Management Organization to ensure export products to the US and Europe can be tax-deductible.



Excise Department mulls carbon tax

Proposal to apply carbon tax to mitigate CBAM for exported goods



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India weighs local tax options to avoid EU carbon levy - minister

By Reuters

November 2, 2023 3:50 PM GMT+1 · Updated a year ago



NEW DELHI, Nov 2 (Reuters) - India is looking at potentially taxing high-carbon goods locally, and then using the proceeds to support its green energy transition, to avoid the European Union's carbon tax on imports, the country's trade minister said on Thursday.



Indonesian govt still maturing carbon tax regulation: Minister

Jakarta (ANTARA) - The Indonesian government is still working on finalizing its carbon tax regulation, which aims to anticipate the Carbon Border Adjustment Mechanism (CBAM) that will be fully implemented by the European Union in 2026.



Morocco carbon tax plans gain new momentum after EU CBAM

Published 15:49 on February 5, 2024 / Last updated at 15:49 on February 5, 2024 / Alejandra Padin-Dujon / Africa, Carbon Taxes, CBAM, EMEA, International, Middle East

The Moroccan government reaffirmed its commitment to implement carbon tax plans within a few years after initially proposing it in a tax reform law and partially exempting certain goods from carbon tariffs.



A 'Brussels Effect'? Anecdotal Evidences Suggests So (2)

- Türkiye's [Medium Term Programme for 2024 to 2026](#) (2023):

'the National Emission Trading System (ETS) ... will be developed in a structure compatible with the EU Carbon Border Adjustment Mechanism (CBAM)'

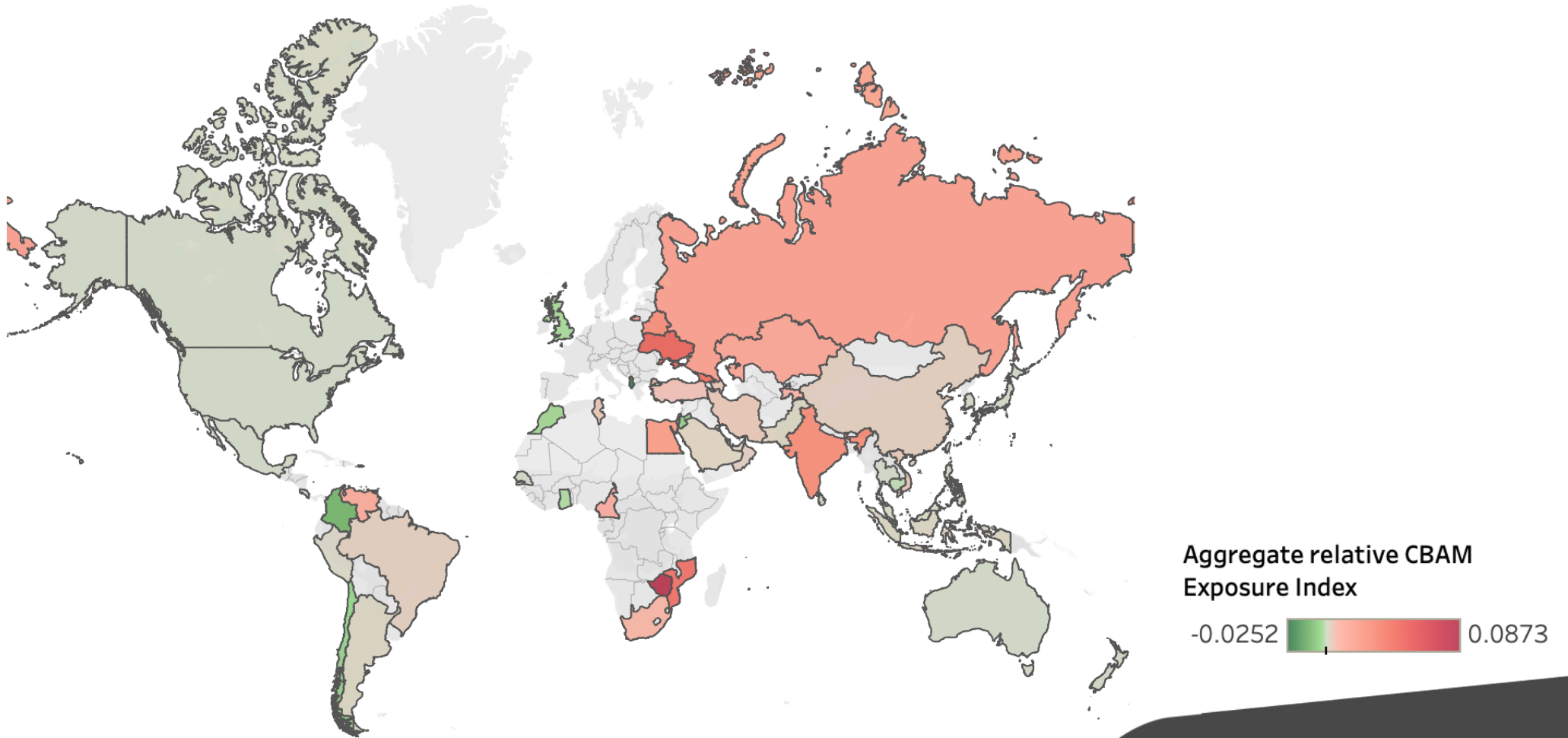
- China's [Draft Work Plan for the National Carbon Emission Trading Market Covering the Cement, Steel and Electrolytic Aluminum Industries](#) (2024)

'there are still deficiencies in the construction of the national carbon emission trading market ... which is far behind the mature carbon markets covering multiple industries such as the European Union.'



Causal Relationship: Is it Supported by Data?

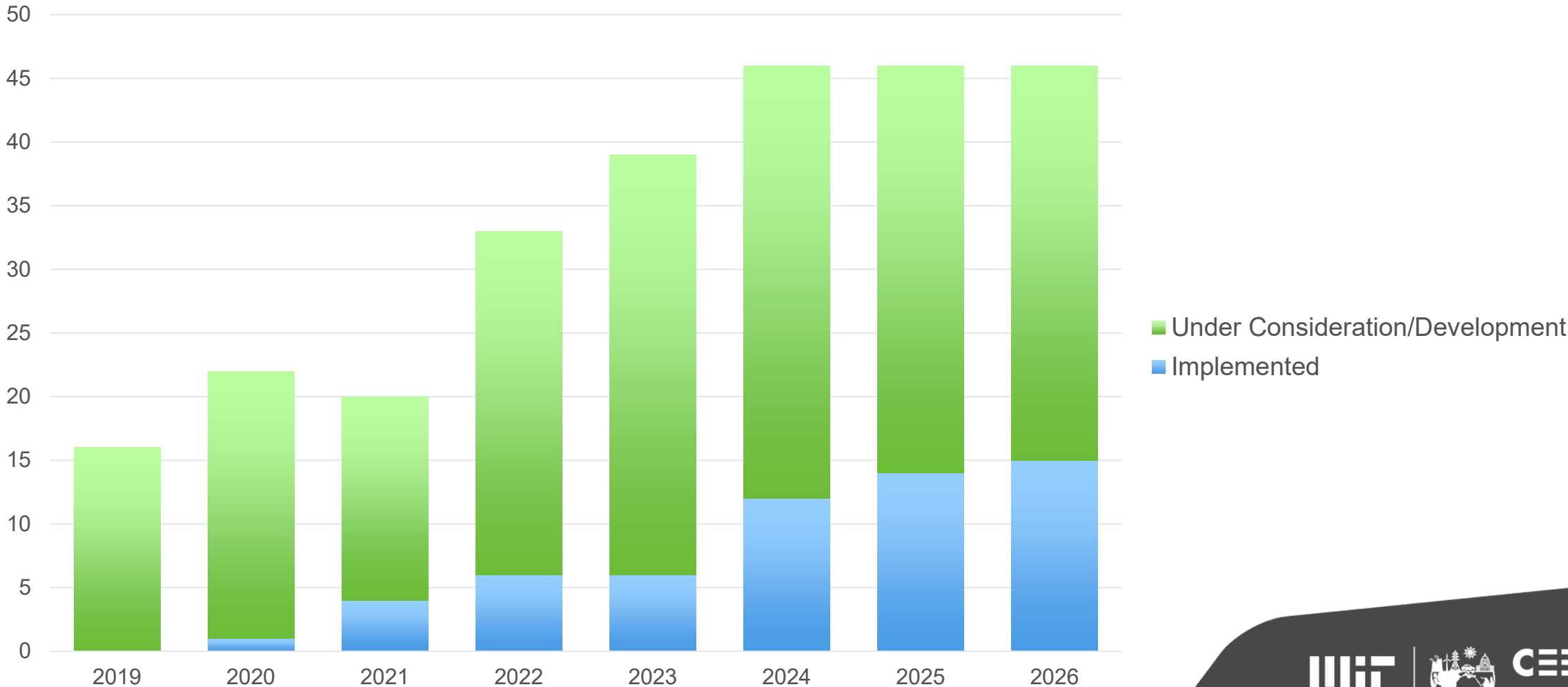
Aggregate Relative CBAM Exposure Index



Aggregate relative CBAM Exposure Index
-0.0252 0.0873

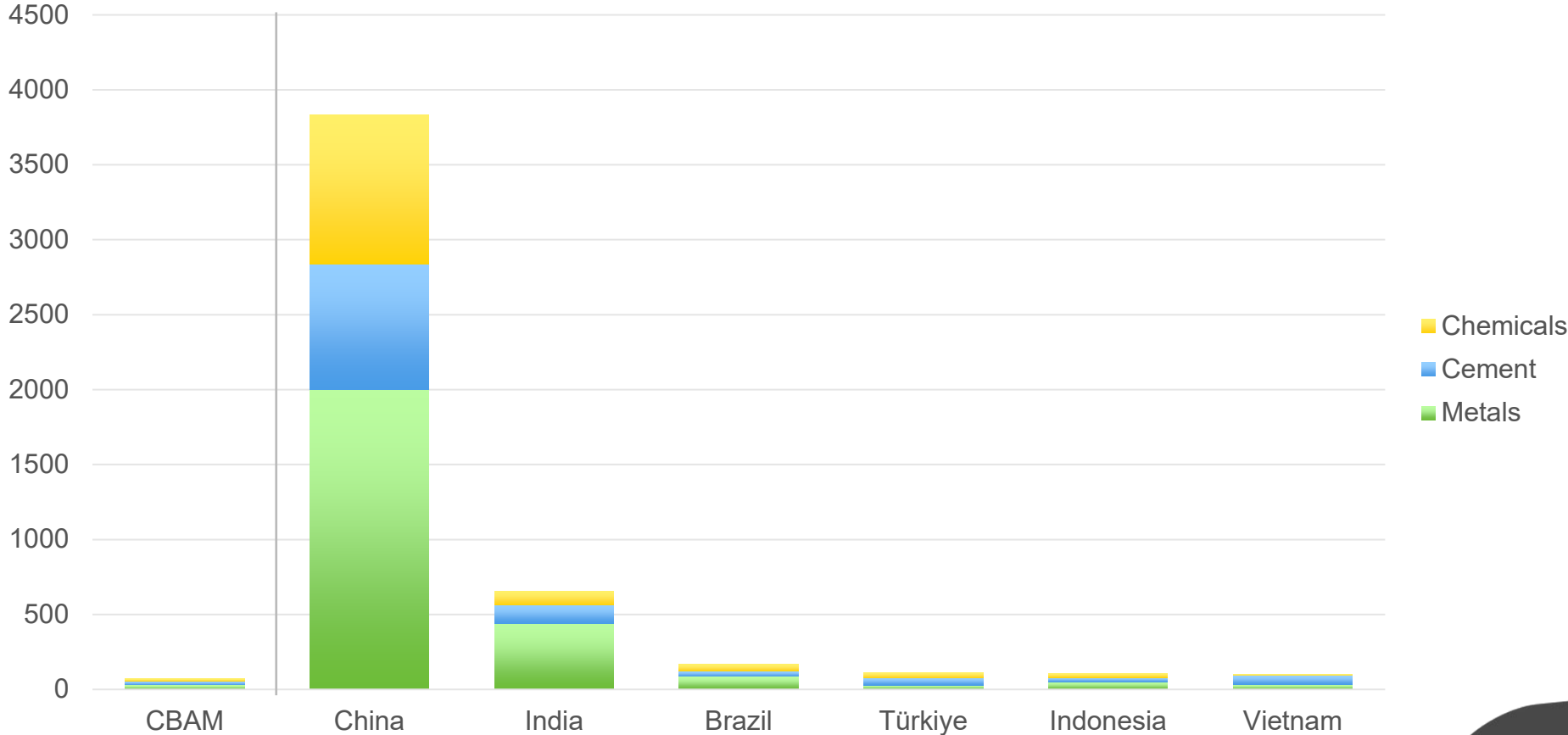
(Source: [World Bank](#), 2024)

Carbon Pricing Systems under Consideration, Development or Implemented, ex-EU, 2019-2024



(Source: Data from [Carbon Pricing Dashboard](#); [ICAP Status Report](#))

Emissions Coverage, CBAM vs. CBAM Sectors in Major Trade Partner Economies (1:50)



(Source: Data from [World Data Lab](#); [Beaufils et al.](#), 2023)

Harnessing the 'Brussels Effect'

- Intended direct effect of the CBAM is at best modest, and entails use of a **contested instrument** to solve a **contested problem**
- Spillover effects can **exceed the direct effect** of a climate policy, and the CBAM's potential to spur carbon pricing diffusion would be no exception
- If the spillover effect is real, it seems less related to the **CBAM exposure** of trade partner countries, and more to **political economy** factors
 - CBAM recalibrates the political preferences of domestic stakeholders
 - Capacity matters: low-income countries have limited carbon pricing readiness
- Spillover effect enabled by **conscious policy design**
 - Provision recognizing foreign policy effort (e.g. carbon price)
 - Example: Clean Competition Act 2023 vs. 2022



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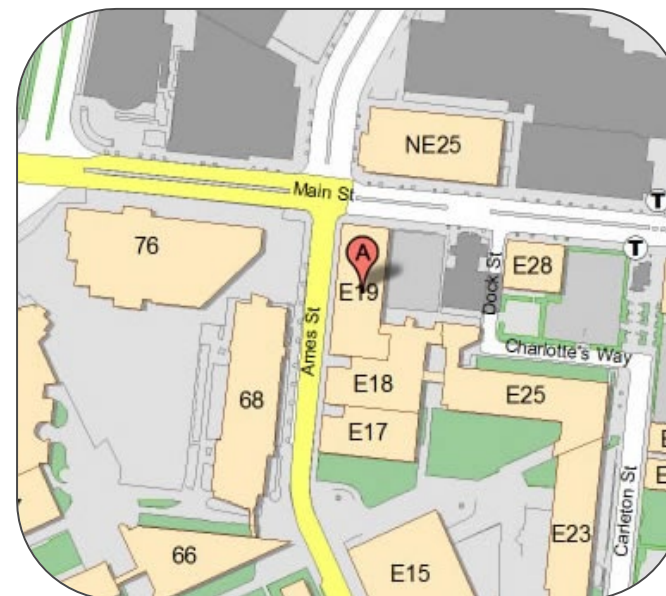
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