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The Evolution of Sustainable Finance Paradigms in Banking: Transitioning from Green Banking to Climate Risk Governance

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abstract

Background: The global banking sector is at an inflection point, moving from a voluntary, operationally framed commitment to environmental stewardship toward a mandatory architecture of climate risk governance embedded in prudential supervision, yet the literature has said little about what this shift means for the smallholders and micro-enterprises who depend on bank credit.
Aims: This paper traces that evolution across theoretical, institutional, and empirical dimensions, and asks how the move from green banking to climate risk governance affects not only financial stability but also the resilience of climate-vulnerable communities and micro-enterprises.
Methods: A narrative literature review (Snyder, 2019) synthesised theoretical typologies (Jeucken, 2001; Elkington, 1997), international regulatory frameworks (TCFD, NGFS, PCAF, Equator Principles), and case-study evidence from global banks and Indonesia's three largest state-owned banks, triangulated against the author's earlier monographs on Indonesian sustainable banking (Panjaitan, 2015, 2026).
Results: The shift from green banking to climate risk governance is best read as a qualitative rupture rather than a linear refinement, and Indonesia's regulatory trajectory mirrors that global current; even so, implementation still lags leading international practice, and inclusive outcomes for micro-enterprise borrowers, visible in Bank Rakyat Indonesia's own portfolio, remain a work in progress.
Conclusions: Shifting to climate risk governance matters for financial stability, but it matters just as much for social equity and the resilience of communities that depend on climate-vulnerable sectors such as agriculture and micro-enterprise; the paper closes with five strategic imperatives for Indonesian banks ahead of OJK's Sustainable Finance Roadmap Phase III (2026-2030).

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1. Introduction

The question of how banks ought to relate to the natural environment is not new. What is new is the speed at which it has moved from the margins of corporate responsibility to the centre of prudential supervision. A handful of European banks began adopting voluntary environmental policies in the 1990s; by the mid-2020s, that voluntary posture had hardened into a global regulatory imperative woven directly into how banking systems are supervised

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(Jeucken, 2001; Bouma, Jeucken, & Klinkers, 2001). 'Green banking' entered the professional vocabulary in the early 2000s, meaning something fairly modest: less paper, lower branch energy use, and steering clear of financing the most ecologically destructive industries. That is not what the term means today. Climate risk is embedded in prudential banking regulation across the European Union, the United Kingdom, Australia, Singapore, and Indonesia. The Taskforce on Climate-related Financial Disclosures (TCFD) has become the de facto global disclosure standard (TCFD, 2017), and the Network for Greening the Financial System (NGFS), 144 central banks and supervisors strong by 2025, has built the climate scenarios that now feed directly into bank stress-testing worldwide (NGFS, 2024, 2025). Indonesia's OJK launched its Climate Risk Management and Scenario Analysis (CRMS) Guidelines in 2024, putting domestic banks on notice that physical and transition climate risks belong in capital planning, not just in sustainability reports (OJK, 2024).

Mark Carney's (2015) address on the 'Tragedy of the Horizon' is usually credited with turning this reframing into policy: climate change stopped being an externality regulator could leave to CSR departments, and became a systemic threat to financial stability in its own right. Battiston et al. (2017) gave that claim empirical teeth with the first quantitative climate stress-test of the financial system, and Campiglio et al. (2018) mapped out how difficult it is for central banks to operationalise climate supervision in practice. What this body of work has not done, at least not with much conviction, is follow the argument down to the borrower level. Jeucken (2001), Weber (2012), and most of the prudential-regulation literature treat climate risk governance as a question of bank solvency and portfolio resilience, full stop, with little attention to how governance quality at an individual bank plays out for the smallholder farmer, the fisher, or the micro-enterprise owner whose credit access depends on that same institution's risk decisions (Aizawa & Yang, 2010; Cogan, 2008), even though separate household-level research already shows that financial inclusion measurably reduces climate vulnerability: Chhatre, Deuskar, Mohib, and Bhardwaj (2023) find that formal financial access lets rural households facing high climate risk hold less of their wealth in unproductive liquid form, and Mhlanga (2022) reaches a similar conclusion more broadly. Neither literature talks much to the other. When a bank's climate risk governance is weak, that weakness does not stay contained on the balance sheet; it gets passed to borrowers through sudden credit tightening or withdrawal from exposed sectors, usually at the moment those borrowers can least absorb the shock.

1.1 Theoretical Foundations: Sustainable Banking Typologies and the Triple Bottom Line

The theoretical starting point for this paper is Jeucken's (2001) four-stage typology of bank environmental strategy, defensive, preventive, offensive, and sustainable banking, which remains the most widely cited framework for classifying how far a bank has moved from treating environmental regulation as a cost to treating it as a source of competitive advantage. Bouma, Jeucken, and Klinkers (2001) locate the same tension, between defensive compliance and proactive value creation, at the centre of bank environmental strategy more broadly, and Elkington's (1997) Triple Bottom Line, economic, environmental, and social performance judged together, supplies the normative floor beneath all four stages. Applied specifically to banking, Scholtens (2009) makes a distinction this paper leans on throughout: a bank's own operational footprint, its paper use, its energy bills, is almost trivial next to the footprint embedded in its loan portfolio, the sectors and borrowers it chooses to finance. Weber, Scholz,

and Michalik (2010) add that folding sustainability criteria into credit risk management reshapes a bank's internal architecture only gradually, through how credit is actually underwritten rather than through what appears in annual reports. Read together, this literature explains why environmental banking policy took as long as it did to reach the loan book: the theoretical vocabulary for talking about portfolio-embedded risk existed by the early 2000s, but the practical machinery for pricing and monitoring it did not.

By 2015, when I published Bank Ramah Lingkungan, the first systematic Indonesian treatment of sustainable banking, this link between governance quality and borrower-level resilience had not yet been articulated, in my own work or in the wider literature (Panjaitan, 2015). A decade of regulatory build-up since then, from the 2014 OJK Roadmap through POJK 51/2017 to the 2024 CRMS Guidelines, has closed a great deal of ground on the supervisory side. It has not closed this particular gap. The field still leans heavily on Jeucken's (2001) four-stage typology; this paper proposes a fifth stage, Climate Risk Governance Banking, to capture what banks are now being asked to do that Jeucken's original stages did not anticipate: scenario analysis, stress-testing, portfolio decarbonisation, and Board-level ownership of climate risk (Dikau & Volz, 2021; Nieto, 2019; Weber, Scholz, & Michalik, 2010). That typology, together with Elkington's (1997) Triple Bottom Line and Scholtens' (2009) account of a bank's direct versus portfolio-embedded footprint, is developed further, with supporting evidence, in the Results section. Institutionally, UNEP-FI, the Equator Principles, TCFD, NGFS, and PCAF supply the scaffolding through which all of this gets operationalised (Equator Principles Association, 2020; PCAF, 2022; Rojas, 2010; UNEP-FI, 2019). My interest here is less in that scaffolding's systemic-stability rationale, well covered elsewhere, than in what it means for the communities on the other side of the loan book.

1.2 International Regulatory Architecture and Institutional Frameworks

Institutionally, the scaffolding behind that machinery has been built up in stages since the early 1990s. UNEP-FI, founded in 1992, evolved from a soft-law signatory network into a genuine standard-setter through its Principles for Responsible Banking (UNEP-FI, 2019); its practical contribution to credit analysis, the Environmental and Social Risk Analysis (ESRA) methodology developed through the Ecobanking Project, structures due diligence around project categorisation, detailed assessment against IFC Performance Standards, and ongoing covenant monitoring (Rojas, 2010; IFC, 2012). The Equator Principles, adopted in 2003 and now in their fourth iteration, require signatory banks to categorise project-finance transactions by environmental and social risk before a loan is approved (Equator Principles Association, 2020), and Scholtens and Dam (2007) show that adoption is associated with measurably different lending behaviour rather than symbolic compliance alone. Climate-specific reporting sits on top of this older architecture: the Taskforce on Climate-related Financial Disclosures (TCFD, 2017) supplies the four-pillar disclosure structure now mandatory across several major jurisdictions, and the Network for Greening the Financial System (NGFS), founded in 2017 and 144 members strong by 2025, has built the climate scenarios that translate disclosure into actual stress-testing practice (NGFS, 2024, 2025). The Partnership for Carbon Accounting Financials (PCAF, 2022) closes the loop by standardising how financed emissions, the emissions a bank enables through its lending rather than emits directly, are measured in the first place. None of

these initiatives were designed with Indonesian smallholder lending in mind, which is precisely the gap Section 1.3 turns to.

1.3 Financial Inclusion and Climate Vulnerability: A Missing Link

Bank Rakyat Indonesia (BRI) makes that question concrete. It is simultaneously the world's largest microfinance institution by loan count and a bank now required, like its state-owned peers, to run climate scenario analysis on its corporate risk framework (BRI, 2024). Few institutions anywhere sit so squarely at the intersection of prudential climate regulation and financial inclusion, and yet the literature on sustainable banking has mostly treated these as separate conversations: Jeucken (2001) and Weber (2012) trace the evolution of environmental frameworks largely in isolation from prudential regulation, while Park and Kim (2020) examine OJK's domestic policy architecture on its own terms, without asking what any of it means for financial inclusion. Tumewang, Ntim, and Haque's (2025) recent systematic review of the TCFD literature, covering 230 papers published between 2016 and January 2025, finds no country-specific study of TCFD-related climate governance anywhere in Southeast Asia, which gives some sense of how underexplored this setting still is. Neither strand connects the transition from green banking ethics to climate risk governance with community resilience in any sustained way.

The financial-inclusion side of this literature is thinner but no less relevant. Chhatre, Deuskar, Mohib, and Bhardwaj (2023) find that formal financial access lets rural households facing high climate risk hold less of their wealth in unproductive liquid form, cash, livestock, stored grain, that would otherwise sit idle as an informal insurance buffer, and Mhlanga (2022) reaches a similar conclusion when he links FinTech-enabled financial inclusion to household climate resilience more broadly. Neither study, however, asks what happens when the bank supplying that access is itself exposed to climate risk through its portfolio. Indonesia is a useful setting for that question because so much of its bank lending sits directly against climate-exposed land use: roughly 90 per cent of Sumatra was forested a century ago, a figure that has fallen sharply as plantation agriculture, oil palm prominent among it, expanded across the island (Forest Watch Indonesia, 2014). My own fieldwork applying ESRA to a Category A palm oil financing proposal in North Sumatra in the mid-2010s showed just how much judgement, and how much room for inconsistency, sits inside a single environmental risk screen for a smallholder-adjacent plantation loan (Panjaitan, 2015). Multiply that judgement across millions of microfinance decisions, BRI's scale, and the stakes of getting bank-level climate risk governance right for financial inclusion become considerably clearer.

1.4 Research Gap, Novelty, and Objectives

This paper tries to close that gap in three ways, and this is where its novelty lies. First, it draws together theoretical, institutional, and empirical strands of the literature usually kept apart, linking the Jeucken typology and the Triple Bottom Line to the regulatory architecture of TCFD, NGFS, and PCAF, and to firm-level evidence from global and Indonesian banks. Second, it extends Jeucken's (2001) typology with a fifth stage capturing the shift from voluntary stewardship to mandatory, balance-sheet-relevant risk management, an extension that, as far as I am aware, has not previously been made for the Indonesian banking context specifically. Third, drawing on a decade of my own published work on Indonesian sustainable banking (Panjaitan, 2015, 2026), the paper offers a practitioner's longitudinal view tying climate

risk governance maturity to financial-inclusion outcomes for micro-enterprise and agricultural borrowers, a connection largely missing from the predominantly Anglo-European literature on climate-related financial risk. With that in mind, the study sets out to (1) trace the theoretical and institutional evolution of sustainable banking into climate risk governance, (2) assess where Indonesian bank practice sits against that evolution, and (3) work out what governance maturity means for financial inclusion and community resilience, proposing an inclusive climate risk governance agenda ahead of OJK's Sustainable Finance Roadmap Phase III (2026-2030). The remainder of the paper proceeds accordingly: Section 2 sets out the review's methodology, Section 3 reports the results across the theoretical, institutional, and Indonesian bank-level dimensions just outlined, Section 4 discusses what those results mean, and Section 5 concludes with the paper's central argument and its practical stakes for Indonesian banks and the climate-vulnerable borrowers who depend on them.

2. Methods

2.1 Research design

This is a narrative literature review, sometimes called a conceptual or critical review, rather than a systematic review with a pre-registered protocol (Snyder, 2019). That choice fits the aim of the paper: not to quantify treatment effects or aggregate findings across a fixed set of primary studies, but to synthesise a genuinely heterogeneous body of theoretical, regulatory, and case-study literature spanning three decades, and to push an established typology (Jeucken, 2001) somewhere it has not yet been pushed. Narrative reviews of this kind are well established in management and finance research precisely where the goal is theory development rather than statistical meta-analysis (Snyder, 2019; Torraco, 2005).

2.2 Research procedures

The review moved through four stages. First, I mapped the theoretical foundations of sustainable banking, chiefly Jeucken's typology and the Triple Bottom Line, through the foundational literature. Second, I reconstructed the international institutional and regulatory architecture, UNEP-FI, the Equator Principles, TCFD, NGFS, and PCAF, from primary regulatory and institutional sources. Third, I assembled empirical case evidence for six purposively selected banks, HSBC, ING, ABN AMRO, DBS, Standard Chartered, and Citigroup, alongside Indonesia's three largest state-owned banks, Bank Mandiri, BNI, and BRI. These cases were chosen for their prominence in the existing literature and for the public availability of detailed sustainability and climate-risk disclosures, not through random or exhaustive sampling. Fourth, I read the Indonesian regulatory trajectory and bank-level evidence specifically for what it implies about financial inclusion and community resilience, following the framework set out in the Introduction. This is consistent with the illustrative, rather than statistically representative, role that purposively selected cases play in a narrative review (Snyder, 2019).

2.3 Participants

A literature-based study has no human participants in the conventional sense; its informants are documents. These fall into three groups: primary regulatory and institutional sources, including OJK's Sustainable Finance Roadmaps, POJK 51/2017, POJK 60/2017, the

Indonesia Taxonomy for Sustainable Finance (TKBI), and the CRMS Guidelines, alongside NGFS, TCFD, and PCAF technical publications; bank-published sustainability and climate disclosures from Bank Mandiri, BNI, BRI, and the six international comparator banks; and my own earlier monographs on Indonesian sustainable banking (Panjaitan, 2015, 2026), used as primary practitioner sources documenting the sector's evolution over a decade and checked against independent academic and regulatory literature rather than taken at face value.

In place of physical materials, equipment, or measurement instruments, which do not apply to a literature-based methodology, the material record here consists of primary-source documents identified by publisher, issuing authority, and publication or revision date, so that each source can be independently verified and, where later versions superseded earlier ones (as with OJK's Green Taxonomy giving way to TKBI, or TKBI Version 1.0 giving way to Version 2.0), the specific version relied upon is stated explicitly in the text and tables. Quantitative figures reported from bank disclosures and regulatory documents, portfolio volumes, disclosure percentages, financial ratios, are reproduced in the units and currency (Indonesian Rupiah, IDR) used in the original source rather than converted, to avoid introducing conversion error, and are cross-referenced against independent commentary (Climate Policy Initiative, 2025; InfluenceMap, 2024) wherever an independent check was available. International standard (SI) units do not apply to a documents-based methodology of this kind; the recurring unit of measurement across sources, Indonesian Rupiah (IDR) for portfolio and financial figures, is retained in its original form for the reason given above, and all dates are reported consistently in day-month-year form throughout the text and tables.

2.4 Data collection

Literature was identified through targeted searches of Scopus, Web of Science, and Google Scholar using the keywords 'green banking', 'sustainable finance', 'climate risk governance', 'TCFD', 'NGFS', 'Equator Principles', and 'Environmental and Social Risk Analysis (ESRA)', cross-referenced with 'Indonesia', 'OJK', and 'financial inclusion', and supplemented by a snowball search of references cited in key foundational works (Jeucken, 2001; Weber, 2012; Carney, 2015). Priority went to sources from 2020 to 2025 so the analysis reflects the current state of the field, though a portion of the theoretical backbone, Jeucken (2001), Elkington (1997), Rojas (2010), predates that window; these were kept because no more recent source supersedes their conceptual contribution, and building the extended typology proposed here without them would not have made much sense. Bank-level financial and portfolio data came directly from each institution's most recent audited sustainability report or bond framework document, cross-checked where possible against independent commentary from Climate Policy Initiative (2025) and InfluenceMap (2024) so the analysis was not resting on a single self-reported source.

2.5 Data analysis

Analysis followed a thematic synthesis procedure common to narrative reviews (Snyder, 2019; Torraco, 2005). Sources were first organised chronologically to trace the theoretical and regulatory evolution set out in the Introduction. Bank-level case evidence was then coded against the extended Jeucken typology to assess each institution's climate risk governance maturity stage, and cross-checked against the TCFD four-pillar framework for disclosure

completeness. Indonesian bank data, financed portfolio volumes, disclosure scores, and climate risk integration milestones, were compiled into comparative tables and triangulated across each bank's own disclosures, OJK regulatory documents, and independent commentary to reduce reliance on self-reported figures. Finally, the financial-inclusion implications of governance maturity were worked out by linking each bank's governance stage to its microfinance and MSME portfolio characteristics, most directly in BRI's case, to see where governance gaps translate into inclusion risk for climate-vulnerable borrowers.

3. Results

The review turns up converging evidence across four levels: the theoretical typology of sustainable banking, the regulatory architecture built around it, how global banks apply it, and where Indonesia's own trajectory sits against that backdrop, read for what it means for financial inclusion.

3.1 The Jeucken Typology, Extended to a Fifth Stage

Marcel Jeucken's taxonomy remains the most widely cited framework for mapping a bank's sustainability orientation (Jeucken, 2001). Jeucken identified four sequential stages: 'defensive banking', where environmental regulation is treated as a threat to be minimised; 'preventive banking', where cost-saving opportunities and credit-risk screening start to appear; 'offensive banking', where environmental and social costs, risks, and opportunities get folded into daily operations through formal ESRA; and 'sustainable banking', where the institution is creative and proactive and actively finances green projects, the territory occupied by ABN AMRO, HSBC, and BNI. This resonates with Bouma, Jeucken, and Klinkers' (2001) earlier account of the tension between defensive compliance and proactive value creation as the organising axis of bank environmental strategy.

Table 1. Jeucken's (2001) Typology of Sustainable Banking, Extended with a Fifth Stage

Stage	Label	Characteristic Behaviour
Stage 1	Defensive Banking	Environmental regulation treated as a cost to be minimised; no proactive engagement.
Stage 2	Preventive Banking	Bank identifies cost-saving opportunities and begins screening environmental risk in credit analysis.
Stage 3	Offensive Banking	Environmental and social costs, risks, and opportunities integrated into daily operations; formal ESRA conducted.
Stage 4	Sustainable Banking	Bank is creative and proactive; adopts UNEP-FI and Equator Principles; actively finances green projects.
Stage 5 (proposed)	Climate Risk Governance Banking	Climate change treated as material financial risk requiring scenario analysis, stress-testing, portfolio decarbonisation, and Board oversight.

This typology, which I applied to the Indonesian context in Bank Ramah Lingkungan, was a reasonably good fit for its era, with Stage 4 as the aspirational ceiling (Panjaitan, 2015). Table 1 sets out a fifth stage identified in this review, Climate Risk Governance Banking, in which climate change is treated as a material financial risk requiring scenario analysis, stress-testing, portfolio decarbonisation, and Board-level oversight, distinct from Stage 4's environmental responsibility framing (Dikau & Volz, 2021; Nieto, 2019). Weber, Scholz, and Michalik (2010) show that folding sustainability criteria into credit risk management reshapes a bank's internal risk architecture gradually, mostly through how credit is actually underwritten rather than what gets said in annual reports. Elkington's (1997) Triple Bottom Line, economic, environmental, and social performance assessed together, is the theoretical floor underneath this, and Scholtens (2009) applies it to banking specifically: a bank's own operational footprint is almost trivial next to the footprint embedded in its lending portfolio, exactly what determines which sectors and borrowers keep access to credit as the wider economy decarbonises.

3.2 International Architecture and Global Practice

The institutional scaffolding behind Stages 4 and 5 has grown up since the early 2000s. UNEP-FI, founded in 1992, moved from a soft-law network into a genuine standard-setter through the Principles for Responsible Banking (UNEP-FI, 2019); BNI became the first Southeast Asian signatory in 2005 (Panjaitan, 2015). Its practical contribution is the ESRA methodology built through the Eco-banking Project (Rojas, 2010), structuring due diligence around categorisation, detailed assessment against IFC Performance Standards, and covenant monitoring (IFC, 2012). The Equator Principles, adopted in 2003, require signatories to categorise project-finance deals by risk (Equator Principles Association, 2020); Scholtens and Dam (2007) found adoption associated with measurably different lending behaviour. TCFD's four-pillar structure (Table 2) is now the template against which bank disclosure gets judged, mandatory across the United Kingdom, the European Union, Singapore, Hong Kong, and New Zealand (TCFD, 2017); by 2024 it covered 79 per cent of global financial institution assets by value, though how comparable those disclosures are is another question (Climate Policy Initiative, 2025; InfluenceMap, 2024).

Table 2. TCFD Four-Pillar Disclosure Framework for Banks

TCFD Pillar	Core Disclosure Requirement for Banks
Governance	Board and management-level oversight of climate-related risks and opportunities; committee structures and accountability.
Strategy	Actual and potential impacts of climate risks on business strategy, financial planning, and portfolio resilience under climate scenarios.
Risk Management	Processes for identifying, assessing, and managing climate-related risks; integration into enterprise risk management.
Metrics & Targets	Climate-related metrics (financed emissions, green lending ratio, climate VaR); specific targets and performance against them.

Among the global comparators, HSBC pairs sector-based exclusion policies with a transaction-level ESG scoring tool that quantifies climate-adjusted probability of default

(HSBC, 2024). ING's 'Terra' approach tracks portfolio carbon trajectories against science-based pathways, and ABN AMRO has built out a dedicated Sustainability Department with embedded sustainability experts (KPMG Netherlands, 2024). DBS Bank is the most relevant Southeast Asian comparator, with a Responsible Financing Policy covering energy, agribusiness, mining, and forestry, and early nature-related risk disclosure relevant to Indonesia's own exposures (Forest Watch Indonesia, 2014). Standard Chartered and Citigroup show how Equator Principles membership becomes mandatory Category A review in practice (Equator Principles Association, 2020). NGFS has built the scenarios underpinning OJK's CRMS Guidelines (OJK, 2024), and PCAF (2022) supplies the standard for measuring financed emissions any credible net-zero target has to rest on. Taken together, these institutions sit at Jeucken's Stage 4 to 5 in the extended typology set out in Table 1.

3.3 Indonesia's Regulatory Trajectory

Indonesia's own path toward sustainable finance has been gradual but has clearly picked up speed (Table 3), moving from a voluntary roadmap in 2014 to a binding, taxonomy-anchored, scenario-driven supervisory framework a decade later (OJK, 2014, 2017a, 2017b, 2021, 2024, 2025).

Table 3. Milestones in Indonesia's Sustainable Finance Regulatory Architecture

Year	Milestone	Significance
2014	OJK Sustainable Finance Roadmap Phase I	First systematic regulatory framework for sustainable finance in Indonesia.
2017	POJK 51/2017 on Sustainable Finance	Mandatory sustainability action plans and reporting for financial institutions, issuers, and public companies.
2017	POJK 60/2017 on Green Bonds	Regulatory basis for green bond issuance; minimum 70% allocation to environmentally-friendly activities.
2021	OJK Roadmap Phase II	Accelerated ESG integration; portfolio ratio targets; climate risk framework development.
2022	Indonesian Green Taxonomy 1.0	First national green taxonomy classifying activities by environmental impact.
2024	TKBI launched	Replaced Green Taxonomy; shift to green/transition classification aligned with ASEAN Taxonomy.
2024	CRMS Guidelines launched	Large banks required to conduct climate scenario analysis and submit results.
2025	TKBI Version 2.0	Expanded to 192 additional KBLI codes across agriculture, forestry, FOLU, and industry.
2026	TKBI Version 3.0 (planned)	Planned expansion to agriculture, IPPU, and waste sectors; approximately 537 additional KBLI codes.

Year	Milestone	Significance
2027-2028	Binding sustainable finance regulations	Full mandatory implementation across all financial institutions.

This has not been a clean story. The 2024 move from the red/yellow/green classification of the 2022 Green Taxonomy to the green/transition binary of TKBI drew criticism from INFID for quietly widening the door for greenwashing, especially compared with Singapore's MAS taxonomy, which kept its traffic-light system intact (OJK, 2024, 2025). Measured against Table 1, this regulatory push has shifted the system's floor from around Stage 2 toward Stage 3, with the CRMS Guidelines aimed at pulling the largest, systemically important banks toward Stage 5.

3.4 State-Owned Bank Performance and the Inclusion Question

Bank Mandiri, Indonesia's largest bank by assets, leads the state-owned banks on green portfolio volume: an IDR 293 trillion green portfolio in 2024, 47 per cent of sustainability bond proceeds allocated to renewable energy, sustainable water management, green buildings, and clean transportation, and a Transition Finance Framework in development (Bank Mandiri, 2024, 2025). BNI, the first Southeast Asian UNEP-FI signatory back in 2005, reached a sustainable finance portfolio of IDR 190.5 trillion by end-2024 and fully allocated its IDR 5 trillion Green Bond proceeds by December of that year, with a GRI-based disclosure score around 73 to 77 per cent (BNI, 2025).

BRI is where this paper's central argument gets its clearest test. As the world's largest microfinance institution by loan count, BRI's 2024 Sustainability Report describes a two-phase climate risk integration process: Phase 1, completed in 2024, assessed baseline exposure across half its portfolio, and Phase 2, reported in 2025, extended coverage to the full portfolio, backed by a Negative List Policy, sub-sector financing policies, and sustainability-linked loans (BRI, 2024). BRI reported a return on assets of 3.06 per cent, a return on equity of 19.01 per cent, and net profit of IDR 60.64 trillion in 2024, alongside completion of climate risk assessment across its full, microfinance-heavy portfolio (BRI, 2024).

Table 4. Comparative Climate Risk Governance and Inclusion Indicators, Indonesian State-Owned Banks (2024-2025)

Dimension	Bank Mandiri	Bank BNI	Bank BRI
Disclosure score	77% (highest)	75%	70%
Distinctive strength	Green financing volume; Transition Finance Framework	UNEP-FI pioneer; governance architecture	Financial inclusion; microfinance scale
Climate risk tool	Sustainability Bond Framework; CRMS alignment	CRMS reporting	Phase 1/2 portfolio climate risk assessment
Inclusion-relevant portfolio	IDR 293 trillion green portfolio	IDR 190.5 trillion sustainable portfolio	Nationwide micro-enterprise and smallholder loan book

Dimension	Bank Mandiri	Bank BNI	Bank BRI
Jeucken stage (Table 1)	Stage 3, moving toward Stage 4	Stage 3-4	Stage 3, with Stage 5 elements in risk assessment
Common gap	Impact measurement depth and data verifiability	Financed-emissions measurement incomplete	Portfolio-level PCAF measurement incomplete

So all three banks are formally compliant with POJK 51/2017, but none has reached Stage 4 system-wide, and Stage 5 is still aspirational everywhere. ESRA itself has been available since 2010 (Rojas, 2010), and I worked through a full Category A palm oil example in North Sumatra using it back in 2015 (Panjaitan, 2015), yet it remains underused in routine credit processes today; current practice leans instead on PROPER classification, with BNI reportedly downgrading a debtor's internal risk rating by one category the moment that debtor lands in PROPER's red or black bracket (OJK, 2017a). Recent Indonesia-specific quantitative work corroborates this case-level picture. Using a difference-in-differences design on 22 banks, Sutanto, Ermawati, and Anggraeni (2025) find that POJK 51/2017 initially raised bank risk, concentrated in smaller and state-owned banks and transmitted through the green credit ratio, fitting the uneven governance maturity in Table 4. Furqan and Sutrisno (2024) find green credit positively associated with profitability once capital adequacy and size are controlled for, helping explain why Mandiri and BNI keep expanding green portfolios without full financed-emissions measurement, while Ahmar, Rahmah, and Darminto (2024) and Andaiyani, Muthia, and Novriansa (2023) both find that disclosure quality tracks corporate governance structure more closely than regulatory mandate, one reason disclosure scores in Table 4 do not track governance depth closely. Table 4 summarises disclosure scores, distinctive strengths, climate risk tools, inclusion-relevant portfolio figures, Jeucken stage, and common gaps side by side for the three banks.

3.5 The 2024–2025 Net-Zero Banking Alliance Backlash

Bank participation in the Net Zero Banking Alliance (NZBA) fell sharply between December 2024 and 2025. Six major United States banks, JPMorgan, Citigroup, Bank of America, Morgan Stanley, Wells Fargo, and Goldman Sachs, withdrew from the NZBA, which had counted over 140 member banks holding an estimated USD 74 trillion in assets at its peak. Over the same period, lending to oil and gas companies across major banks rose to a three-year high of USD 869 billion in 2024 (Climate Policy Initiative, 2025).

4. Discussion

4.1 Statement of main results and comparison with the literature

The headline result is that Indonesian state-owned banks, despite being formally compliant with POJK 51/2017 and actively engaged with OJK's CRMS Guidelines, have not reached Stage 4 of the extended Jeucken typology system-wide, let alone Stage 5. That is broadly what the wider comparative literature on environmental credit risk management would predict: even well-resourced banks in emerging markets tend to lag European and leading Asian peers in turning voluntary commitments into systematic, balance-sheet-integrated risk practice

(Weber, 2012; Weber et al., 2010; Aizawa & Yang, 2010). It also lines up with Park and Kim's (2020) reading of green banking transitions across Asia, which points to regulatory mandate, investor pressure, and reputational competition as the three drivers that push banks toward substantive integration. In Indonesia, all three drivers are present individually. None of them is yet strong enough, on its own or together, to push the sector past Stage 3.

There is a second layer to this result that the disclosure literature tends to gloss over. TCFD-aligned disclosure reached 79 per cent of global financial institution assets by 2024, a number that could easily be read as evidence that disclosure maturity is more or less achieved (Climate Policy Initiative, 2025; InfluenceMap, 2024). The Indonesian evidence in Table 4 tells a more complicated story: disclosure scores of 70 to 77 per cent sit alongside financed-emissions measurement that is still incomplete and Board oversight that is inconsistent from one bank to the next. Disclosure breadth and governance depth, in other words, are not the same thing, and they can diverge quite a lot within a single banking system. This is close to what Krueger, Sautner, and Starks (2020) warn about when they note that investor-facing disclosure metrics do not necessarily track the internal risk-management substance that actually determines a bank's resilience to climate shocks. It is that substance, not the volume of disclosure, that ultimately decides whether a climate-vulnerable borrower keeps stable access to credit. Monasterolo's (2020) review of the wider climate-finance literature makes much the same point at the macro level: the metrics that satisfy investors and the metrics that actually track systemic resilience are not always the same metrics, and Indonesia's case suggests the gap between them widens further once the analysis moves down to individual borrower segments.

4.2 An unexpected result: the net-zero backlash

One finding I did not anticipate at the outset was the speed of the 2024-2025 backlash against voluntary net-zero banking coalitions, reported in Section 3.5. Coming as it did around the 2024 US presidential election, this exodus has mostly been read as political accommodation to the incoming administration's climate scepticism. The evidence gathered here points somewhere else: the drivers look primarily economic. European banks that had cut fossil fuel financing sharply saw that business move to competitors, consistent with the surge in oil and gas lending reported in Section 3.5 (Climate Policy Initiative, 2025). This supports Zadek and Robins' (2015) older argument that voluntary sustainability frameworks work only while broadly adopted across a competitive peer group, and stop working once a critical mass of competitors walks away, which D'Orazio and Popoyan (2019) and Dikau and Volz (2021) both read as evidence that only mandatory, consistently supervised regulation resolves this tension. Indonesia's own regulatory trajectory is set domestically and does not depend on what US banks decide, so the backlash does not directly threaten it; it may even open space for Indonesian and Asian banks with credible frameworks to become preferred counterparties for ESG-oriented global investors.

4.3 Explaining the results: why the gap persists

Why has ESRA, available since 2010, still not become routine in Indonesian credit processes, and why does financed-emissions measurement remain incomplete across all three state banks? Part of the answer is straightforwardly about data. PCAF-consistent measurement and systematic ESRA screening need documentation that large corporate borrowers

increasingly provide as a matter of course, but that Indonesia's millions of micro and small borrowers rarely have on hand. That forces banks such as BRI to lean on proxy indicators and phased rollouts rather than loan-level measurement, which is consistent with Weber, Scholz, and Michalik's (2010) observation that sustainability criteria reshape internal risk architecture only gradually, well behind the pace of the policy commitments that announce them. The other part of the answer is competitive, and it is the same dynamic discussed in Section 4.2: even where OJK's mandate removes the free-rider problem that Zadek and Robins (2015) describe at the international level, Indonesian banks still face a genuine operational constraint in pushing granular climate risk governance down to the borrower segments that matter most for financial inclusion. These two explanations are not competing with each other. They reinforce each other, which is arguably the more troubling part.

My own experience applying ESRA to smallholder-adjacent plantation financing in North Sumatra a decade ago illustrates why this data gap is so persistent (Panjaitan, 2015). Even for a single, well-documented Category A project, assembling a defensible environmental and social risk profile required site visits, cross-checking land-use permits against province-level deforestation data, and judgement calls that a standardised checklist could not fully resolve. That was one loan. BRI's microfinance book runs to tens of millions of accounts, the overwhelming majority far smaller and far less documented than a Category A plantation project, and Bank Mandiri and BNI face a version of the same problem across their own SME and agricultural portfolios. Under those conditions, phased rollout and proxy indicators of the kind BRI reports (BRI, 2024) are not simply a governance shortcut; they may be the only operationally feasible path to system-wide coverage, at least until agricultural land registries, cooperative-level reporting, and satellite-based land-use monitoring mature enough to substitute for loan-level documentation. Ahmar, Rahmah, and Darminto (2024) and Andaiyani, Muthia, and Novriansa (2023) both find that disclosure quality tracks internal governance structure more closely than regulatory mandate does, which is consistent with a data-and-capacity explanation rather than a simple unwillingness to comply: OJK's mandate is in place, but building the underlying measurement infrastructure for a smallholder-heavy portfolio takes longer than issuing the regulation that requires it. This has a direct bearing on the sequencing argument in Section 4.4: expecting Stage 5 governance sophistication, scenario analysis and portfolio decarbonisation, ahead of the loan-level data that makes those tools meaningful risks producing governance structures that look complete on paper but rest on foundations the smallholder segment of the portfolio cannot yet support.

4.4 Generalisation: Five Imperatives, in Sequence

Generalising from these results, five imperatives stand out for banks moving from formal OJK compliance to genuine climate risk leadership, and I think they work best in sequence rather than as an unordered checklist. Financed-emissions measurement using the PCAF Standard, across SME and agricultural lending as well as large corporate exposures, is the data precondition for everything that follows (PCAF, 2022). NGFS-aligned scenario analysis, embedded into Contingency Funding Plans and credit risk appetite frameworks rather than treated as a compliance exercise, depends on that data existing in the first place (NGFS, 2025). Sector-specific policies, along the lines HSBC and Standard Chartered use for palm oil, coal, and timber, only work once scenario analysis can tell a genuine transition pathway apart from

an activity that should simply be excluded (Forest Watch Indonesia, 2014). Systematic ESRA screening, with independent review for Category A deals, gives that distinction teeth at the point credit actually gets extended or withheld. None of it holds without Board-level ownership: a dedicated Climate Risk Committee, annual TCFD-aligned disclosure, and remuneration tied to measurable sustainability performance (TCFD, 2017; Cogan, 2008).

Read as a sequence, this suggests something uncomfortable about where Indonesian banks are currently putting their effort. Governance structures and disclosure, the fifth imperative, are relatively easy to stand up and photograph well in an annual report. Financed-emissions measurement and scenario analysis, the first two, are harder, slower, and far less visible, which is exactly why they tend to lag. A bank that invests in governance architecture without the underlying data risks building oversight that looks convincing on paper but cannot actually tell a genuine transition borrower from an exposed one. This extends Park and Kim's (2020) observation that regulatory mandate alone does not guarantee substantive integration: the mandate creates the incentive to build the structure, but only sustained investment in data and analysis turns that structure into risk management that actually protects the borrowers this paper is concerned with. OJK's own direction of travel points the same way, with TKBI Version 3.0 planned for 2026 and binding regulations targeted for 2028 (OJK, 2025), and Indonesian banks are well placed to feed their Phase II experience into the design of that Phase III framework.

5. Limitations

This study has several limitations worth stating plainly. As a narrative rather than systematic review, the selection and synthesis of literature, while guided by explicit criteria (Section 2.4), inevitably reflects my own judgement about which sources and cases best illustrate the shift under discussion. The bank case studies, including the comparative rankings in Table 4, rest substantially on publicly disclosed sustainability reports and regulatory filings that this review did not independently audit; they carry the well-known limitations of self-reported ESG disclosure, including selective reporting and greenwashing risk (InfluenceMap, 2024), and should be read as indicative of relative governance maturity rather than precise, verified measurements. The paper's empirical grounding in the Indonesian context draws heavily on my own prior publications (Panjaitan, 2015, 2026) and professional experience in the sector; that affords practitioner insight not easily available to outside researchers, but it also raises the possibility of interpretive bias, which I have tried to manage by triangulating these sources against independent regulatory documents and the international literature. Finally, the discussion of the 2024-2025 net-zero backlash reflects a fast-moving, still-unfolding policy environment, and the conclusions here should be treated as provisional. Future research should test the relationship proposed in Section 4.1 between climate risk governance maturity and financial-inclusion outcomes more rigorously and across a wider set of Indonesian banks, including regional and smaller institutions beyond the three examined here.

6. Conclusion

This review has traced the evolution of sustainable banking from a voluntary, reputationally motivated form of environmental stewardship into a mandatory architecture of climate risk governance embedded in prudential supervision, and has extended Jeucken's (2001) four-stage typology with a proposed fifth stage, Climate Risk Governance Banking, to capture that qualitative shift. Applied to Indonesia, the evidence shows genuine institutional progress: Bank Mandiri's IDR 293 trillion green portfolio, BNI's full allocation of its Green Bond proceeds, and BRI's completion of climate risk assessment across its entire, microfinance-heavy portfolio are not small achievements. Even so, the sector as a whole has not reached Jeucken's fourth stage, and financed-emissions measurement, systematic ESRA integration, and Board-level climate oversight all remain unfinished business. The paper's central contribution is to show that this governance gap is not just a matter of systemic financial stability; it bears directly on the resilience of climate-vulnerable communities. Shifting to climate risk governance is essential not only for financial stability but also for social equity and resilience in communities that depend heavily on vulnerable sectors such as agriculture and micro-enterprise, because it is the quality of a bank's physical-risk assessment that decides whether these borrowers keep predictable, adapted access to credit or face abrupt withdrawal once climate losses start to bite. As OJK moves toward its Sustainable Finance Roadmap Phase III (2026-2030) and TKBI Version 3.0, Indonesian banks and regulators have a real opportunity to build inclusion-oriented safeguards directly into the emerging climate risk governance architecture, so that the push toward genuine climate risk leadership strengthens, rather than erodes, financial access for the country's most climate-exposed communities.

Author Contribution

Leonard Tiopan Panjaitan conceived the study, conducted the literature review and analysis, developed the proposed extension to the Jeucken typology, and wrote and revised the manuscript in its entirety.

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