北京绿色金融与可持续发展研究院
INSTITUTE OF FINANCE AND SUSTAINABILITY

On behalf of:
Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

INTERNATIONAL CLIMATE INITIATIVE

Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Unlocking Transition Finance for Small and Medium-sized Enterprises:

A Lookback Transition Instrument

Cheng Lin[1], Zhang Ninghui[2], Su Yuqiao, Zeng Yuqi, Wong Chi Xiang, Malte Hessenius[3], Moritz Driescher[4]

[1] Cheng Lin, Director, Center for International Collaborations, Institute of Finance and Sustainability (IFS), chengl@ifs.net.cn
[2] Zhang Ninghui, Su Yuqiao, Zeng Yuqi, and Wong Chi Xiang are researchers at IFS.
[3] Malte Hessenius, Data and Transition Finance Lead, Climate & Company
[4] Moritz Driescher, SME Expert, Climate & Company

Acknowledgement

This report is a knowledge product developed under the Sino-German Cooperation on Climate Change – Climate Partnership project, which is a bilateral initiative by the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN) in partnership with the Ministry of Ecology and Environment of the People's Republic of China (MEE), carried out by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

The project is implemented on behalf of the International Climate Initiative (IKI) of the Federal Government of Germany. Within the Federal Government, the IKI is anchored in the BMUKN. Selected individual projects are also the responsibility of the Federal Foreign Office (AA).

The findings, interpretations and conclusions contained in this report are those of the authors and do not purport to reflect the views and opinions of GIZ or BMUKN.

Table of Contents

Executive Summary 1

1. Introduction: Transition Finance and the Role of SMEs 3

2. Research Methodology 6

3. Global Context and SME Transition Challenges 8

3.1 The Role of SMEs in the Global Economy and Low-Carbon Transition 8

3.2 Key Challenges for SMEs to Finance the Low-Carbon Transition 12

4. Lookback Transition Instrument: Definition and Operationalization 16

4.1 Sustainability-linked Loans – State of Play and Challenges for SMEs 16

4.2 Lookback Transition Instrument – Definition and Operationalization 17

5. Case Studies: SLLs can be adapted into LTIs for SMEs 23

Case 1 Changxing Rural Commercial Bank's Textile Transition Instrument in Huzhou: Alignment with and Implications for the LTI Mechanism 23

Case 2 Denmark – sustainability-linked loans for SME dairy producers 26

Case 3 Germany - KfW Credit 295 and ex-post repayment grants 27

6. Implementation Guidelines and Other Recommendations 28

6.1 A Quadrant-Based Framework for Banks to Implement the LTI Mechanism 28

6.2 A Public Sector-led Data Framework to Address SMEs' Climate Data Gaps 30

6.3 Policy and Market Recommendations 33

Executive Summary

SMEs are pivotal to the global economy, accounting for up to 90% of enterprises worldwide[5], contributing roughly 50-70% of global employment and GDP[6], and are responsible for 40%-60% of business-sector greenhouse gas (GHG) emissions[7]. Their active participation is essential to achieving global climate goals; however, many SMEs face structural barriers to accessing affordable transition finance.

This paper examines the Lookback Transition Instrument (LTI)—a mechanism of innovative financial tools tailored to address small and medium-sized enterprises (SMEs)' low-carbon transition financing needs by adapting existing sustainability-linked loan (SLL) structures. "Lookback" refers to awarding the transition label and the main pricing benefits only after performance has been achieved and verified.

Key challenges for SMEs include limited capacity to develop long-term transition plans, high transaction and verification costs of existing financial instruments, and insufficient access to affordable capital—constraints that traditional SLLs, often structured for larger enterprises with robust ESG governance, do not fully address. In practice, SLLs often require comprehensive ex-ante transition plans and stringent disclosure, creating prohibitive barriers for SMEs with constrained resources.

The LTI mechanism addresses these gaps through a "phased label and incentive" design: SMEs only need to submit simplified short-to-medium-term transition plans when they apply. The formal transition labels and main financial benefits are awarded ex-post, based on verified performance. This structure lowers entry barriers, mitigates transition-washing risks, and aligns financial benefits with tangible emission reductions. The LTI complements existing transition finance tools by extending performance-linked lending to SMEs.

Drawing on case studies from China (Textile Transition Instrument by Changxing Rural Commercial Bank from Huzhou, Zhejiang Province), Denmark (SME dairy loans by the Export and Investment Fund), and Germany (KfW Credit 295), the paper shows that the core elements of the LTI—such as simplified entry requirements, standardized assessment tools, or ex-post performance incentives – are already being applied across different schemes in practice. These cases demonstrate that existing SLLs or lending structures can be adapted incrementally. Additional recommendations include a quadrant-based framework for banks to target SMEs, a public-sector-led data system to address climate data gaps, and multi-stakeholder

[5] World Bank. (n.d.). *Small and medium enterprises (SMEs) finance*. The World Bank. https://www.worldbank.org/en/topic/smefinancehttps://www.worldbank.org/en/topic/smefinance

[6] International Finance Corporation. (2024). *Small business, big impact*. World Bank Group. https://www.ifc.org/en/stories/2024/small-business-big-impact

[7] COP28. (2023, December 5). *No net-zero without SMEs: Accelerating the green transition of SMEs* [Webinar]. COP28 Virtual Pavilion. https://www.oecd.org/en/events/2023/12/cop28---no-net-zero-without-smes-accelerating-the-green-transition-of-smes.htmlhttps://www.oecd.org/en/events/2023/12/cop28---no-net-zero-without-smes-accelerating-the-green-transition-of-smes.html

collaboration to enhance implementation.

By enabling the accessibility and practicality of transition finance for SMEs, the LTI mechanism unlocks their decarbonization potential. It complements existing tools, accelerating the global low-carbon transition while supporting economic stability and inclusive growth.

1. Introduction: Transition Finance and the Role of SMEs

Since the emergence of transition finance—and the work of the G20 Sustainable Finance Working Group (G20 SFWG), including their *Transition Finance Framework*[8], the Organisation for Economic Cooperation and Development (OECD), the European Commission and others—substantial progress has been made regarding the conceptual understanding of transition finance and its translation into financial products. More recently, in October 2025, the Loan Market Association (LMA), the Asia Pacific Loan Market Association (APLMA), and the Loan Syndications and Trading Association (LSTA) further advanced market practice by introducing the Transition Loan Principles (TLP), providing a clearer framework for defining and structuring transition loan products[9].There has also been an increase in the mobilization of capital to drive decarbonization in hard-to-abate sectors. However, despite this progress, most transition- or sustainability-labelled financial instruments remain concentrated among large corporates. While SMEs represent a significant share of both economic activity and emissions, they often lack access to suitably designed transition finance, as many existing frameworks are structured around credible transition plans and related disclosures that are more readily developed by larger corporates.

This paper introduces the Lookback Transition Instrument (LTIs) mechanism as a novel approach that adapts existing sustainability-linked loan (SLL) structures to SMEs, highlights the importance of SMEs to the global economy and their critical role in achieving our shared climate and sustainability goals, and outlines the transition-related challenges they face. While global in its relevance, this paper particularly draws on insights derived from China, Germany and Europe, more broadly.

Looking at general market dynamics, research indicates that transition-specific instruments remain a small niche relative to mainstream green finance. To foster the growth of the transition finance market, multiple stakeholders, including government agencies, financial institutions, international organizations, and research bodies, have made respective efforts to support enterprises in accessing transition finance resources.

Among these enterprises, SMEs play a pivotal role in national economies and global supply chains, yet they are increasingly under pressure to align with global low-carbon transition goals. Concurrently, SMEs account for 40% -60% of GHG emissions in the business sector[10]. As such, while SMEs are key drivers of growth and employment, they also contribute a substantial share of global emissions. Amid

[8] G20 SFWG (2023). G20 Transition Finance Framework. https://g20sfwg.org/wp-content/uploads/2023/12/TFF-2-pager-digital.pdf

[9] Transition Loan Principles (2025). https://www.lma.eu.com/application/files/8017/6121/0645/Guide_to_Transition_Loans_-_16_October_2025.pdf

[10] COP28. (2023, December 5). *No net-zero without SMEs: Accelerating the green transition of SMEs* [Webinar]. COP28 Virtual Pavilion. https://www.oecd.org/en/events/2023/12/cop28---no-net-zero-without-smes-accelerating-the-green-transition-of-smes.html

tightening climate regulations and rising sectoral transition expectations, SMEs face significant constraints in both financial and technical capacity to decarbonize. For instance, many SMEs lack the capability to formulate long-term transition targets or strategies, as well as the resources and capacities to implement such initiatives.

Existing transition finance policy frameworks predominantly support large enterprises, leaving SMEs with limited access to relevant financial and non-financial resources to support their transition journeys. Additionally, while current policy frameworks and financial instruments continue to focus on addressing the transition needs of large firms, these support measures are often accompanied by specific restrictions or covenants. For example, industrial and financial regulators in China have imposed lending restrictions on enterprises operating in high-energy-consumption, high-carbon-emission, and overcapacity sectors—affecting precisely those high-emitting sectors with the greatest transition financing needs. Another critical challenge pertains to the "too-large-to-fail" phenomenon: large enterprises typically hold substantial investments and occupy core positions in industrial value chains. Redirecting investments toward low-carbon projects or retrofitting existing operations may face strategic and profitability constraints. This suggests that a transition finance mechanism anchored on large firms is unlikely, on its own, to unlock the full decarbonization potential of the real economy.

In contrast, SMEs' inherent resilience provides them with unique advantages in navigating the low-carbon transition. Their smaller size, greater operational flexibility, fewer regulatory constraints, and more manageable emission profiles—primarily characterized by non-process emissions (e.g., from energy, electricity, and heat consumption)—facilitate the adoption of carbon abatement technologies and measures. With appropriate policies and incentives, SMEs are well-positioned to achieve emission reductions more rapidly and at lower cost. However, unlocking this potential requires targeted policies and financing tools that transform SMEs from passive compliance actors within supply chains into active drivers of system-wide decarbonization.

Despite these advantages, SMEs face significant hurdles in accessing transition finance, particularly in setting long-term climate targets and developing credible transition plans. Even among SMEs that have formulated transition plans, concerns regarding their credibility persist, underscoring the urgent need to enhance capacity-building efforts for SMEs to advance the goals laid out by the Paris Agreement. These intertwined challenges have motivated this research to address SMEs' financing constraints from a financial product design perspective.

Against this backdrop, this research introduces the LTI mechanism as a complementary instrument to existing transition finance products such as SLLs. LTIs are designed to facilitate easier access to financing for SMEs with credible transition targets, while assisting financial institutions in managing transition-washing risks.

Drawing on policy experiences and emerging pilot cases from China and Europe, including Germany, this study highlights the conditions that enable LTIs, the operational considerations involved, and the preliminary evidence demonstrating the growing feasibility of LTIs in advancing SME-oriented transition finance.

The remainder of this paper is structured as follows. Section 2 outlines the research methodology. Section 3 provides the global context by examining the role of SMEs in the low-carbon transition and the key challenges they face in accessing transition finance. Section 4 introduces the LTI mechanism and compares it with existing instruments such as SLLs. Section 5 presents case studies from China and Europe that illustrate how elements of the LTI logic are already being applied in practice. Finally, Section 6 provides implementation guidelines and policy recommendations.

2. Research Methodology

This study employed a multi-method research design methodology, integrating desktop research, case study analysis, policy evaluation, market assessment, and feasibility study to ensure the analytical rigor, credibility, and practical relevance of the findings and recommendations. By synthesizing qualitative and quantitative evidence, the research aims to draw on established good practices from both Chinese and global contexts, thereby enhancing the generalizability and contextual adaptability of the conclusions.

a) Desktop Research: This component involves a systematic review of academic literature, policy documents, and industry market reports to construct a comprehensive understanding of the research domain. Specifically, it focuses on three core objectives: mapping the key financing barriers faced by SMEs in their low-carbon transition; synthesizing global transition finance practices and regulatory frameworks; and identifying the accessibility and affordability challenges of existing transition finance tools. Additionally, this phase entails examining the limitations of conventional transition financing instruments and introducing the conceptual framework and typological characteristics of LTI.

b) Case Study Analysis: To derive practical operational insights, this paper selects and analyzes pilot cases from China (e.g., the Huzhou pilot) and Europe (e.g., Denmark and Germany), prioritizing examples that feature SME-oriented lending comparable to the proposed LTI design. The case analysis focuses on dissecting the operational mechanisms, incentive structures, and observed outcomes of existing transition finance initiatives targeting SMEs. Cross-jurisdictional comparative analysis of these cases is conducted to extract transferable lessons, which in turn inform the design of scalable and context-sensitive elements for LTI implementation.

c) Policy and Market Analysis: This section systematically maps national and sub-national transition finance policy frameworks, identifies gaps in current policy support for SMEs, and pinpoints key enabling factors for SME-oriented transition finance. It also assesses the alignment of domestic policies with international transition finance standards to enhance the global compatibility of the proposed LTI mechanism. Furthermore, this analysis explores opportunities to integrate fiscal and monetary incentive policies, aiming to strengthen SMEs' access to transition finance resources and improve their risk management capabilities.

d) Feasibility Analysis: This component evaluates the potential impact and operational viability of LTI structures under different policy incentive scenarios, including phased implementation approaches, differentiated loan pricing mechanisms, and integrated policy instrument packages. Quantitative and qualitative assessments are conducted to estimate the effects of LTIs on three critical

dimensions: SMEs' financing costs, financial institutions' risk exposure, and the overall operational feasibility of the LTI-based transition finance mechanism.

Collectively, these complementary research methods enable a structured synthesis of empirical evidence and theoretical insights. This integrated approach ensures that the research outputs, which include actionable policy implications and practical implementation guidance for LTI mechanisms, ultimately advance the goal of developing SME-focused transition finance that is both accessible and aligned with transition performance.

3. Global Context and SME Transition Challenges

3.1 The Role of SMEs in the Global Economy and Low-Carbon Transition

SMEs[11] play a key role in the global economy, with significant contributions to economic output, employment, and innovation, and therefore represent a critical leverage point for achieving economy-wide decarbonization. Globally, SMEs represent around 90% of all businesses and employ more than 50% of the workforce[12]. In China, SMEs are equally indispensable: The number of micro, small, and medium-sized enterprises exceeded 52 million by the end of 2022, representing 51% increase since 2018[13].

SMEs are the backbones of both global markets and national economies. Globally, SMEs in OECD countries contribute between 50% and 60% of business-sector value added and play a key role in national economic stability[14].

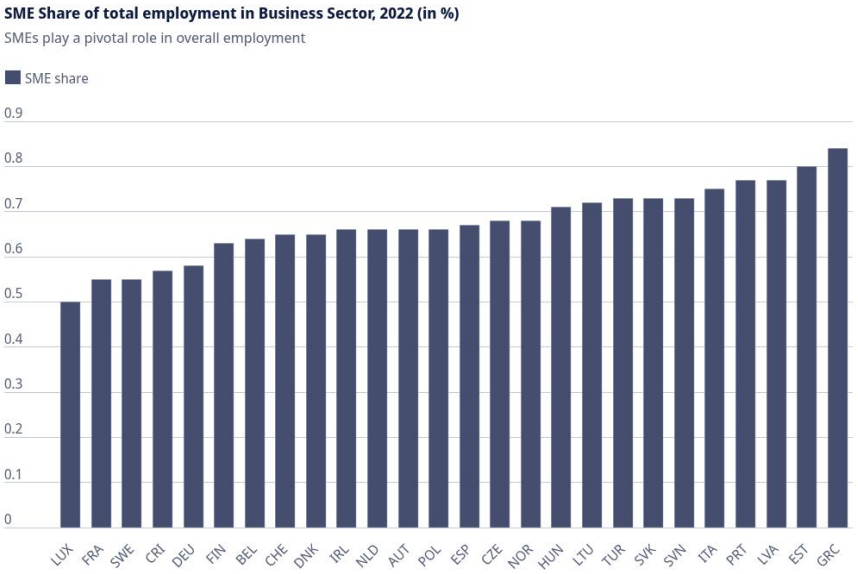

Figure 1- SME Share of total employment[15]

In some advanced economies, such as Germany, SMEs (*Mittelstand*) play a central role in the economy, accounting for 99.2% of all enterprises, generating about 28% of

[11] In this report, "SMEs" are defined using the applicable official standards in each jurisdiction, and the t erm should be read as a policy-defined segment rather than a fully harmonized size class. In China, SM Es comprise micro, small and medium-sized enterprises under the 2011 Provisions on the Classification St andards for Small and Medium-sized Enterprises issued by the Ministry of Industry and Information Tech nology and relevant agencies. The classification varies by sector: such as Industrial enterprises: fewer than 1,000 employees or operating revenue below RMB 400 million are considered micro, small, or medium-sized; medium-sized firms have at least 300 employees and at least RMB 20 million in revenue. In Ger many, SMEs follow the EU definition in Recommendation 2003/361/EC: fewer than 250 employees and e ither turnover not exceeding EUR 50 million or a balance sheet total not exceeding EUR 43 million.

[12] World Bank. (n.d.). *Small and medium enterprises (SMEs) finance*. The World Bank. https://www.worldbank.org/en/topic/smefinance

[13] China National Intellectual Property Administration. (2023, July 5). IPR boosts innovative development of SMEs. English CNIPA. https://english.cnipa.gov.cn/art/2023/7/5/art_2975_186116.html

[14] Gurría, A. (2018). *SMEs are key for more inclusive growth*. OECD. https://doi.org/10.1787/25aa3d56-en

[15] OECD (year unknown). *SMEs and entrepreneurship.* https://www.oecd.org/en/topics/smes-and-entrepreneurship.html

national turnover, contributing approximately 55.7% of net value added, and employing over 50% of the workforce (around 19 million people)[16].

In China, SMEs contribute over 50% of tax revenue, over 60% of GDP, over 70% of technological innovations, over 80% of urban employment, and account for 90% of all enterprises[17]. Furthermore, SMEs are indispensable within industrial value chains, where they provide supporting services to larger firms, produce key components or parts to the value chain, and play an important role in maintaining a robust industrial ecosystem. In particular, within manufacturing processes, services, and foreign trade, SMEs extend to the far ends of the industrial chain like "capillaries", injecting flexibility and resilience into the overall economy.

Beyond economic output, SMEs play a pivotal role in social stability and inclusive development. Globally, SMEs create numerous employment opportunities for the youth, women, and vulnerable groups, reflecting their structural importance in inclusive labour markets[18]. Their hiring patterns demonstrate greater flexibility and openness to first-time job seekers and individuals with limited formal work experience, making SMEs a critical entry point into the workforce[19].

In China, SMEs serve as a "reservoir" for employment and livelihoods, absorbing more than 80% of the working force[20]. Meanwhile, in suburban and rural areas, SMEs are key employers of the local economy. By offering diversified employment opportunities, they help alleviate the pressures of regional labor transfer and enhance overall employment flexibility.

SMEs hold substantial potential in driving the green and low-carbon transition. While large enterprises currently receive more attention in the low-carbon transition, the collective emission reduction potential of SMEs is significant and requires greater attention. Globally, SMEs are estimated to account for 40%–60% of business-sector emissions, underscoring their critical role in achieving climate targets[21].

In the EU, SMEs collectively produce approximately 63% of the carbon emissions of all corporate entities combined. While individual SMEs produce relatively low

[16] IfM Bonn. 2023. *Overview of the German Mittelstand – Macro-Economic Significance of SMEs*. https://www.ifm-bonn.org/en/statistics/overview-mittelstand/macro-economic-significance-of-smes/deutschland;. IfM Bonn. 2023. *The Economic Significance of Small and Medium-Sized Enterprises Remains High Despite Crises*. https://idw-online.de/de/news838234

[17] State Council Information Office. (2018, December 25). *State Council unveils policy support for SME growth*. The State Council of the People's Republic of China. https://english.scio.gov.cn/topnews/2018-12/25/content_74310167.htm

[18] International Labour Organization. (2023). *Women and men in the informal economy: A statistical picture* (English edition). International Labour Office. https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40ed_protect/%40protrav/%40travail/documents/publication/wcms_869188.pd

[19] United Nations Department of Economic and Social Affairs. (2024). *Global MSMEs report 2024: Global micro-, small and medium-sized enterprises report* (7th ed.). United Nations. https://www.un.org/sites/un2.un.org/files/globalmsmesreport2024.pdf

[20] State Council of the People's Republic of China. (2020). *Giving SMEs the "wings" of policy*.

[21] World Economic Forum. (2025, June 23). *Fast-tracking SME sustainability could accelerate global climate targets and unlock economic value*. World Economic Forum. https://www.weforum.org/press/2025/06/fast-tracking-sme-sustainability-could-accelerate-global-climate-targets-and-unlock-economic-value-says-new-report/

emissions, their large numbers result in a significant aggregate impact[22]. Absolute emissions are particularly substantial in the manufacturing sector, where SMEs contribute roughly 30% of GHG emissions in European OECD countries[23].

While the vast majority of SMEs in the EU (93%) have adopted at least one resource-efficiency measure (e.g., energy saving, waste minimization), the development of carbon-reduction strategies is less widespread, with around a quarter having developed concrete strategies for carbon reduction[24].

According to the *China SME Green and Low-Carbon Development Pathway Report* (2023), SMEs account for 46% of carbon emissions in the national industrial sector[25]. This implies that the success of SMEs' green and low-carbon transition will directly affect the achievement of whole-of-economy-and-society emission reduction targets. Without a broad participation of SMEs, relying solely on large enterprises would leave much of the industrial emission reduction potential untapped.

SMEs are important drivers of green and low-carbon innovation, and are able to catalyze transformation across the value chain, particularly through their role as suppliers and technology adopters within the broader industrial ecosystem. At the national level, multiple European countries have developed strong demonstration effects in SME-driven green innovation. For example, in Germany and several other EU member states, SMEs participate actively in EU-funded clean-technology demonstration projects covering hydrogen applications, industrial electrification, circular-economy solutions, and CCUS; these initiatives collectively mobilize more than EUR 3 billion in public and private investment, underscoring the central role of SMEs in advancing breakthrough technologies[26]. In addition, the European Innovation Council (EIC) has strengthened SME-led clean-tech research, development and commercialization through dedicated funding instruments and innovation programs, as highlighted in its 2024 Annual Activity Report[27]. Lastly, the Sustainability Guarantee by the European Investment Fund (EIF) offers advantageous debt financing to SMEs via financial intermediaries. Over EUR 6 billion has been handed out to support SMEs whose economic activities contribute to reaching the EU's

[22] Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, European Commission. (2024). *SMEs, resource efficiency and green markets*. Publications Office of the European Union https://op.europa.eu/publication/manifestation_identifier/

[23] Organisation for Economic Co-operation and Development. (2024). *Fostering convergence in SME sustainability reporting: A background study*

[24] European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. (2024). *Flash Eurobarometer 549: SMEs, resource efficiency and green markets* (Flash Eurobarometer survey). Publications Office of the European Union

[25] iResearch Consulting. (2023). *2023 China SME green and low-carbon development pathway report* [Research report]. iResearch Consulting

[26] European Commission, Directorate-General for Research and Innovation. (2023). *Scaling up innovative technologies for climate neutrality: Innovative clean technologies for climate-neutral energy-intensive industries*. Publications Office of the European Union. https://op.europa.eu/en/publication-detail/-/publication/2f1ec1d2-1173-11ee-b12e-01aa75ed71a1

[27] European Innovation Council and SMEs Executive Agency. (2025). *Annual activity report 2024*. Publications Office of the European Union. https://commission.europa.eu/publications/annual-activity-report-2024-european-innovation-council-and-smes-executive-agency_en.htm

environmental targets[28]. The eligible activities and criteria are largely based on the EU Taxonomy, and a digital platform helps SMEs understand whether they qualify for the instrument[29].

While SMEs are exempt from mandatory reporting under the EU Corporate Sustainability Reporting Directive (CSRD), a proportionate framework was adopted with the Voluntary Sustainability Reporting Standard for SMEs (VSME) in 2025[30]. The objective is to enable comparable ESG reporting and sustainability management by SMEs, standardize fragmented information requests from business partners and financiers, and facilitate better access to sustainable finance for SMEs[31]. Existing sustainability reporting initiatives and platforms for SMEs, such as the German Sustainability Code, are adjusting their reporting templates and formats to support the uptake of the new EU-wide standard[32], whose advanced module (officially the Comprehensive Module) includes a specific disclosure requirement on emission reduction targets and transition plans.[33] Since SMEs' ability to set science-based and achievable GHG reduction targets and develop transition plans still lags behind, capacity-building workshops and pilot studies are conducted with increased frequency[34].

In China, SMEs are widely distributed across sectors, acting as foundational linkages within value chains and maintaining upstream/downstream partnerships with large enterprises. In recent years, SMEs have increasingly emerged in strategic green industries such as renewable energy, electric vehicles, green manufacturing, and the circular economy, becoming key drivers of industrial restructuring and green upgrading. Promoting SMEs' green transition can directly reduce their own emissions while generating synergistic decarbonization effects across entire supply chains. Due to their relatively flexible structures, greater agility, and lower risk to path dependence, SMEs often demonstrate higher adaptability and innovative capacity when exploring green business models and applying low-carbon technologies.

[28] European Investment Fund. (2026). *InvestEU guarantee products*. European Investment Fund. https://www.eif.org/flagship-initiatives/investeu/guarantees

[29] European Investment Bank. (2025). *EIB Group Green Checker: Green eligibility and climate assessment tool*. European Investment Bank. https://greenchecker.eib-group.org/eib-green

[30] European Commission. (2025). *Recommendation on a voluntary sustainability reporting standard for small and medium-sized undertakings (VSME)* (C(2025) 4984 final). Publications Office of the European Union. https://ec.europa.eu/finance/docs/law/250730-recommendation-vsme_en.pdf

[31] European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union. (2025, July 30). *Commission presents voluntary sustainability reporting standard to ease burden on SMEs* [Press release]. European Commission. https://finance.ec.europa.eu/publications/commission-presents-voluntary-sustainability-reporting-standard-ease-burden-smes_en

[32] German Sustainability Code. (2025). *Voluntary sustainability standards for SMEs (VSME)*. Deutscher Nachhaltigkeitskodex. https://www.deutscher-nachhaltigkeitskodex.de/en/reporting-obligations/voluntary-sustainability-standards-for-smes-vsme/

[33] European Financial Reporting Advisory Group. (2025). *VSME supporting guide on disclosure C3: Comprehensive module (GHG reduction targets and climate transition)*. EFRAG. https://www.efrag.org/en/vsme-supporting-guide-on-disclosure-c3-comprehensive-module-ghg-reduction-targets-and-climate

[34] Unternehmensnetzwerk Klimaschutz, Deutsche Industrie- und Handelskammer, & Bundesverband Öffentlicher Banken Deutschlands. (2025). *Vom Transitions- zum Finanzierungsplan: Leitfaden zur Transitions- und Finanzierungsplanung für KMU*. Unternehmensnetzwerk Klimaschutz. https://www.klima-plattform.de/klimaguide/guideinhalte/artikel/vom-transitions-zum-finanzierungsplan

In summary, SMEs are central to global economic stability, social inclusion, emission reduction, and green and low-carbon innovation. They are a core pillar of the national economy and employment, while also representing a significant source of GHG emissions; at the same time, they possess substantial potential for green innovation and value chain-driven impacts. Only with sufficient financial and technological support can these SMEs fully unleash their emission reduction potential, drive the green upgrading of industrial chains, and enhance the resilience and sustainability of sectors, regions, and the global economy as a whole.

3.2 Key Challenges for SMEs to Finance the Low-Carbon Transition

Since the G20 SFWG launched the *Transition Finance Framework* (TFF) in 2022, a global consensus has gradually taken shape, with a core tenet spanning all framework pillars: credible transition finance relies on clear, actionable, and verifiable transition plans[35]. This point serves as the guiding axis of the TFF, shaping the identification of transition activities, disclosure of relevant information, design of financial instruments, and formulation of supportive policies. The IMF (2023), for example, has emphasized that "international climate disclosure initiatives should target the standardization of transition plans", and several jurisdictions have begun introducing either mandatory transition plan requirements or voluntary guidance[36]. A critical criterion for assessing credibility lies in an enterprise's capacity to define medium- to long-term transition targets and pathways—a standard that has been increasingly endorsed internationally[37] and is exerting a subtle yet profound influence on market expectations and financial practices.

Despite these developments, the full potential of transition finance remains largely untapped. While the need for transition investment is widely recognized and enterprises require substantial capital to upgrade their equipment, improve energy efficiency and transform production processes, transition-labelled financial products have not yet been scaled to the same level as traditional green finance instruments.

Globally, green finance has evolved into a mainstream segment of sustainable investment. In 2024, global green bond issuance reached USD 671.7 billion, making it the largest single category of sustainable debt worldwide - with the United States (USD 84.7 billion), Germany (USD 73.3 billion) and China (USD 68.9 billion) as the three largest national sources of green bond volume worldwide[38].

In 2025, global green bond issuance remained high and relatively stable at USD 653.5 billion, reflecting sustained momentum in the global green finance market.[39] Wind

[35] International Monetary Fund. (2023). Global financial stability report: *Safeguarding financial stability a mid high inflation and geopolitical risks*. International Monetary Fund. https://www.imf.org/en/Publications/GFSR

[36] Data based on https://itpn.global/interactive/

[37] G20 Sustainable Finance Working Group. (2022). *G20 transition finance framework*. G20. https://g20.org/wp-content/uploads/2022/11/G20-Transition-Finance-Framework.pdf

[38] Climate Bonds Initiative. (2025). *Sustainable Debt Global State of the Market 2024.* p. 3 & p. 5.

[39] Climate Bonds Initiative. (2026). *Pick for 2026.*

data shows that China's green bond issuance volume exhibits a clear overall upward trend. In 2025, total issuance exceeded RMB 1 trillion, which is equivalent to approximately USD 151 billion[40].

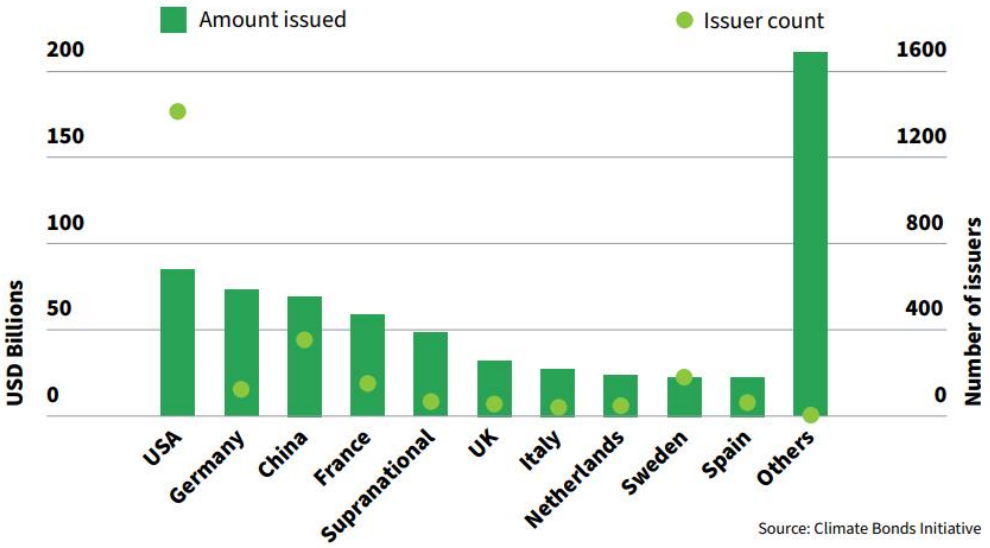

Figure 2 - Global Green Bond Issuance in 2024

In contrast, the global market for labeled transition instruments remains relatively modest. This disparity – namely, the gap between the scale of mainstream green finance and the much smaller transition finance specific instruments - is particularly stark when comparing green and transition finance volumes in both China and Europe. In China, by the end of the third quarter of 2025, the total volume of China's transition finance market, including SLLs and SLBs, remained below RMB 100 billion (around USD 14 billion),[41] while China's green loan market alone exceeded RMB 43 trillion (around USD 6.1 trillion) over the same period[42].

In Europe, a similar pattern emerges: based on the latest available full-year data, green bond issuance reached EUR 300 billion (around USD 330 billion) in 2024, whereas the issuance of transition-type bonds (SLLs and SLBs combined) amounted to only about EUR 23 billion (around USD 25.3 billion)[43]. Taken together, these figures reflect that, despite substantial transition investment needs, transition-labeled instruments remain a small niche relative to green finance in both China and the EU. Consequently, the majority of enterprises, particularly SMEs, lack access to affordable capital to support their low-carbon transition.

[40] WIND data.
[41] Statement from the People's Bank of China.
[42] People's Bank of China Monetary Policy Analysis Group. (2025, November 11). 2025 third quarter China monetary policy implementation report [PDF]. Ministry of Commerce China CIF.
[43] Association for Financial Markets in Europe. (2024). *ESG finance report: 4th quarter 2024*. Since full-year figures for 2025 are not yet available, 2024 remains the most recent comparable annual dataset. https://www.afme.eu/media/gqmpgt3t/esgfinancereport4q24.pdf.

In the current transition finance landscape, large enterprises hold a dominant position. They possess the capacity to formulate medium- to long-term transition targets and plans, coupled with superior access to data and resources required for plan implementation, monitoring, and verification, enabling them to better engage with transition finance mechanisms (see also figures in Chapter 4). Nevertheless, the transition finance market's expansion potential is constrained by several inherent challenges. For instance, in China, financial regulators have imposed lending limits on enterprises operating in high-energy-consumption, high-emission, and overcapacity sectors—precisely the sectors with the most urgent demand for financial support. n the EU, challenges relate to a combination of insufficient economic incentives, fragmented policy signals[44], and persistent data gaps—particularly for SMEs[45], which complicate the identification and monitoring of credible transition activities by financial institutions.

Furthermore, large enterprises typically hold substantial investments and occupy key nodes in industrial chains. Redirecting capital toward low-carbon projects or retrofitting existing operations requires rigorous consideration, as missteps could exacerbate risks of carbon lock-in and undermine long-term climate goals. Compounded by uncertainties surrounding the returns and economic feasibility of such investments, the high stakes and ambiguous outcomes slow large enterprises' engagement with transition finance, preventing the market from realizing its full potential.

In contrast, SMEs hold significant potential to unlock the latent value of the transition finance market, albeit facing persistent challenges. Their unique characteristics endow them with inherent advantages in navigating the low-carbon transition. First, SMEs exhibit high operational agility due to their smaller team sizes and simplified organizational structures. When governments introduce clear policy requirements or financial incentives, SMEs can adjust investment plans and operational practices rapidly, avoiding the internal decision-making delays common in large enterprises. Second, their emission profiles face lower transition barriers: for most SMEs, carbon emissions are concentrated in energy, electricity, and heat consumption rather than complex production processes, making emission sources easier to identify, measure, and mitigate. Third, measurement and verification (M&V) are more manageable—SMEs' emissions and carbon footprints are relatively straightforward to track, reducing verification costs and enhancing the feasibility and reliability of monitoring. Finally, SMEs often play influential roles in supply chains; their emission

[44] OECD (2022). Guidance on Transition Finance. "Lack of fiscal incentives" and "Lack of fragmentation of applicable policy frameworks for the real economy" ranked first and second in this industry survey a sking "What are the main drawbacks and gaps in the enabling environment that should be addressed to f ully support a low-emission transition?". https://www.oecd.org/content/dam/oecd/en/publications/reports/2022/10/oecd-guidance-on-transition-finance_ac701a44/7c68a1ee-en.pdf

[45] See for example European Banking Authority (2025). Report on data availability and feasibility of com mon methodology for ESG exposures Report on data availability and feasibility of common methodology for ESG exposures.pdf

reduction improvements can propagate upstream and downstream, driving broader system-level decarbonization across value chains.

Despite these advantages, SMEs face two core challenges in accessing transition finance: accessibility and affordability. Many SMEs struggle to secure funding for low-carbon investments altogether, while those that can obtain financing often face higher capital costs, rendering transition projects economically unviable. These challenges are intrinsically linked to inherent capacity constraints within SMEs. A key structural limitation is their short business horizon and heightened survival risk. OECD data indicates that only about half of new SMEs survive beyond their first five years (OECD, 2019)[46]. This reality drives many to prioritize short-term operational stability over long-term strategic planning, including climate and sustainability goals. In the context of low-carbon transition, many lack the professional expertise and reliable methodologies required for data collection and analysis, hindering their ability to set long-term transition targets or develop comprehensive transition plans.

Even among SMEs that have formulated transition plans, credibility concerns persist. Such plans are often criticized for relying on incomplete data, ambiguous assumptions, or unverified technologies. Additionally, SMEs typically have shorter business lifecycles and occupy passive positions in supply chains, with their operations and investment decisions heavily influenced by large buyers and volatile market conditions. Even when long-term transition plans are developed, their feasibility and relevance over time are difficult to assess. Cost pressures further exacerbate these challenges: expenses related to emissions measurement, third-party verification, and ongoing reporting are disproportionately burdensome relative to SMEs' scale, further constraining their ability to develop credible transition plans and bankable low-carbon projects.

Despite these obstacles, SMEs remain critical to unlocking the vast potential of the global transition finance market. To facilitate SMEs' access to transition finance, it is imperative to bridge the gap between the traditional TFF's requirements and SMEs' practical capabilities—primarily by reducing the emphasis on long-term transition plans and extensive data requirements. For instance, long-term transition goals and plans could be replaced with short- to medium-term targets, which are more feasible for SMEs to design and implement. Concurrently, to mitigate transition-washing risks and incentivize tangible low-carbon actions, it is essential to link financial incentives to verifiable performance outcomes—and crucially, to award transition labels only after pre-agreed targets have been achieved and verified.

This approach constitutes a "lookback transition mechanism", with the corresponding financial product termed as LTI, which is introduced in detail in the following chapter.

[46] OECD. (2019). OECD SME and Entrepreneurship Outlook 2019 (p. 104). OECD Publishing, Paris. https://doi.org/10.1787/34907e9c-en

4. Lookback Transition Instrument: Definition and Operationalization

4.1 Sustainability-linked Loans – State of Play and Challenges for SMEs

SLLs represent one of the most prominent market-based financial instruments to support corporate low-carbon transition activities.

In Europe, SLLs have emerged as an important component of the broader sustainable finance ecosystem, yet adoption remains concentrated among large, investment-grade corporates. The Association for Financial Markets in Europe (AFME, 2025) observes[47] that in Q3 2025, 84% of European "sustainability-linked and green loans" were taken out by investment-grade companies. Also, recent empirical work found that SLL borrowers tend to be larger entities and are more likely to have investment-grade ratings than conventional-loan borrowers[48]. Whilst the instrument may be conceptually appealing, SLLs have yet to become a scalable financing channel for SMEs. A similar pattern can be observed in China's transition finance market—despite rapid overall growth in green finance[49], in the Chinese market, SLLs remain at an early stage of development compared with other sustainable finance instruments, especially green loans. Individual cases indicate that such products are beginning to be deployed domestically, with syndicated SLLs of moderate scale illustrating emerging adoption among larger corporate borrowers.

The general effectiveness of SLLs has also been subject to critical review. A large-sample study by Auzepy[50] (2023) found that "hurdles remain for companies with lower ESG profiles and for SMEs," and that the quality and materiality of sustainable performance targets were often uneven. These findings suggest that even for larger corporates, SLL structures do not automatically translate into robust or measurable transition outcomes. For smaller firms with limited resources and reporting capacity, these requirements may be a challenge to attain.

From an operational perspective, SLLs require borrowers to link financing costs to the achievement of pre-committed sustainability performance targets—primarily carbon reduction objectives, with or without restrictions on the specific use of loan proceeds. Simultaneously, borrowers are required to meet rigorous disclosure obligations, relying on post-loan evaluation and reporting to ensure transparency

[47] AFME (2025). ESG Finance Report Q3 2025 https://www.afme.eu/media/mhgayv3c/esg-finance-report-3q25.pdf

[48] Luo, Y. (2025). Sustainability-linked Loans and Financial Benefits. *Available at SSRN 5485707*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5485707

[49] The broader sustainability debt market—comprising green, social, and sustainability-linked bonds—provi descontextual insight, with total CBI-aligned issuance from China reaching USD 555.5 billion by end-202 4, underscoring the growth potential of sustainability-related credit instruments in the Chinese financial ec osystem. Source: Climate Bonds Initiative. (2025). *China Sustainable Debt State of the Market Report 20 24*. https://www.climatebonds.net/data-insights/publications/china-sustainable-debt-state-market-report-2024

[50] Auzepy, A., Bannier, C. E., & Martin, F. (2023). Are sustainability-linked loans designed to effectively incentivize corporate sustainability? A framework for review. https://www.econstor.eu/bitstream/10419/268891/1/1837832250.pdf

and credibility. This design generally requires the development of complex transition plans and detailed KPIs. The transaction and verification costs associated with SLLs are also high, and the required data disclosure can be demanding for SMEs, which often lack the management and technical capacity to comply. In addition, the fixed structuring and verification costs associated with sustainability-linked facilities tend to make such loans more economical for larger ticket sizes and syndicated transactions, further limiting their practicality for smaller SME borrowers.

Taken together, these features help explain why current SLL markets are predominantly accessed by larger borrowers and why uptake among SMEs remains limited. This creates a gap in the transition finance landscape: instruments that simplify the application process, reduce reporting and verification burdens, and enhance accessibility to low-carbon financing. This gap led to the conceptualization of the LTI, which will be presented in the following section.

4.2 Lookback Transition Instrument – Definition and Operationalization

The LTI is a targeted transition finance instrument, designed to address the low-carbon transition financing needs of SMEs. Conceptualized vis-à-vis the novel application of transition finance principles by IFS,, the key feature of the instrument lies in a “phased label and incentive” design logic: (i) SMEs are only required to submit a simplified transition plan with short-term targets when applying for the loan; while (ii) the transition label is awarded in phases and financial incentives are disbursed progressively—both contingent on the achievement and verification of pre-agreed transition targets.

To clarify the positioning of LTIs in the existing transition finance toolbox, it is necessary to compare them with the mainstream SLLs, which are currently the most representative transition finance instruments.

With regards to the key design dimensions, the differences between LTI and SLL are encapsulated in Figure 3.

Firstly, in terms of the application threshold, SLLs require borrowers to formulate formal and comprehensive long-term transition plans and have the ability to conduct regular performance disclosure and third-party verification, which is difficult for most SMEs with limited management and technical capabilities. In contrast, LTIs lower the threshold by accepting simplified short-to-medium-term transition plans and targets, which are more in line with SMEs' operational characteristics.

Second, in terms of incentive and label granting logic: SLLs link financing costs to performance at the contract signing stage, and the "sustainability-linked" attribute is determined ex ante; while LTIs adopt a phased label and incentive approach, where the formal transition label and financial incentives are granted progressively after targets are achieved, which better mitigates the transition-washing risk caused by the mismatch between ex ante commitments and ex post performance.

These comparative advantages enable LTIs to make up for the deficiency of SLLs in serving SMEs, forming a complementary relationship with existing transition finance instruments rather than a substitute, thereby expanding the coverage of transition finance services.

This mechanism generates multi-dimensional value across SMEs, financial institutions, and policymakers. For SMEs, the simplified transition plan requirement lowers the threshold for accessing transition finance, while phased financial incentives enhance the affordability of low-carbon transition investments. For financial institutions, the LTI opens up a viable pathway to align the vast majority of their SME clients with internal low-carbon transition strategies. Prior to the LTI mechanism, banks could already provide financing for SMEs' specific low-carbon transition activities; however, the lack of standardized data and official validation frameworks prevented them from claiming corresponding carbon reduction credits. LTI's phased incentive structure balances risks and benefits between SMEs and banks, with incentives linked to SMEs' measurable low-carbon performance—effectively mitigating transition-washing risks for financial institutions. For policymakers, LTI facilitates the practical implementation of the G20 Transition Finance Framework and enables more precise and efficient allocation of policy-backed funds, thereby advancing the overall goals of sectoral decarbonization.

In practice, the operationalization of the LTI mechanism can be structured into three sequential phases, with clear decision nodes and performance review loops to ensure the credibility of the transition process and the effectiveness of financial incentives (see Figure 3).

Phase 1: Application and Feasibility Assessment.

This phase initiates the LTI application process, where SMEs are required to submit three core documents: (1) Standard Loan Documentation, (2) a Simplified Transition Plan, and (3) a Statement on Use of Proceeds. The Standard Loan Documentation, which may vary by project, typically includes financial statements, collateral details, and other materials necessary for banks to conduct credit risk assessments. The Simplified Transition Plan is a streamlined version of formal long-term transition plans, outlining SMEs' short- to medium-term transition objectives and corresponding implementation actions. The Statement on Use of Proceeds requires SMEs to explicitly commit that the loan funds will be used for the transition activities specified in the plan, which must be aligned with existing national or regional transition finance taxonomies or frameworks.

Subsequently, banks conduct an integrated assessment covering two dimensions: (i) SMEs' financial viability (creditworthiness); and (ii) the feasibility of the proposed transition plan (including the achievability of targets and the rationality of implementation actions). If an SME meets both credit and transition criteria, the LTI application is approved, and the process proceeds to Phase 2. Otherwise, the SME

may be considered for conventional loans instead of transition finance. This design improves SMEs' access to transition finance by reducing the barrier of formal transition plan preparation, while ensuring that only SMEs with credible and feasible transition intentions enter the performance-linked financing pathway, enabling banks to manage credit risk while supporting low-carbon transitions.

Phase 2: Quasi-Transition Instrument and Initial Performance Implementation.

This phase commences after the SME passes the Phase 1 feasibility assessment, at which point the loan is designated as a Quasi-Transition Instrument, marking the SME's official entry into the LTI mechanism (classified as a "One-Star LTI"). The bank disburses the loan and provides initial financial incentives—such as preferential interest rates—to reduce SMEs' financing costs and support the implementation of transition plans.

During this phase, the SME utilizes the loan funds for the agreed transition activities, implements predefined carbon reduction measures, and monitors KPIs (e.g., absolute/relative emission reductions, energy efficiency improvements). Banks conduct periodic reviews (e.g., semi-annual) to assess the SME's financial status and progress toward transition targets. A positive performance review (i.e., achievement of agreed KPIs) allows the SME to advance to Phase 3. If performance falls short of targets, banks may adjust or withdraw initial incentives, and the SME's eligibility for continued participation in the LTI mechanism must be re-evaluated (returning to the Phase 1 assessment process).

Phase 3: Performance Review Loop and Formal Label Award.

This phase is triggered when the SME progresses through the first performance review in Phase 2. Having achieved initial KPIs, the SME is awarded a "Two-Star LTI" label and proceeds to the next stage of the transition plan. During Phase 3, the SME continues to utilize loan funds for agreed activities, implement low-carbon measures, and track performance indicators. A periodic performance review loop is established at this stage, with reviews typically conducted annually (adjustable based on loan maturity).

Each successful performance review triggers the phased release of additional financial incentives, motivating SMEs to sustain their transition efforts. The "Two-Star LTI" label remains unchanged throughout this loop, providing stability while ensuring consistent performance monitoring. If the SME fails to meet targets in any review, incentives may be reduced or withdrawn, and eligibility for continued participation is re-assessed (returning to Phase 1). The review loop continues until all transition targets specified in the Simplified Transition Plan are fully achieved.

Upon the full achievement of all agreed transition targets, the SME is awarded the formal "Transition Instrument" label. At this stage, the bank reports the SME's transition performance to relevant regulatory authorities and applies for

government-level transition finance incentives (if applicable). This final step ensures that SMEs receive full recognition for their successful short- to medium-term transition efforts and gain access to additional policy support, while verifying the credibility of the LTI mechanism for policymakers and the market.

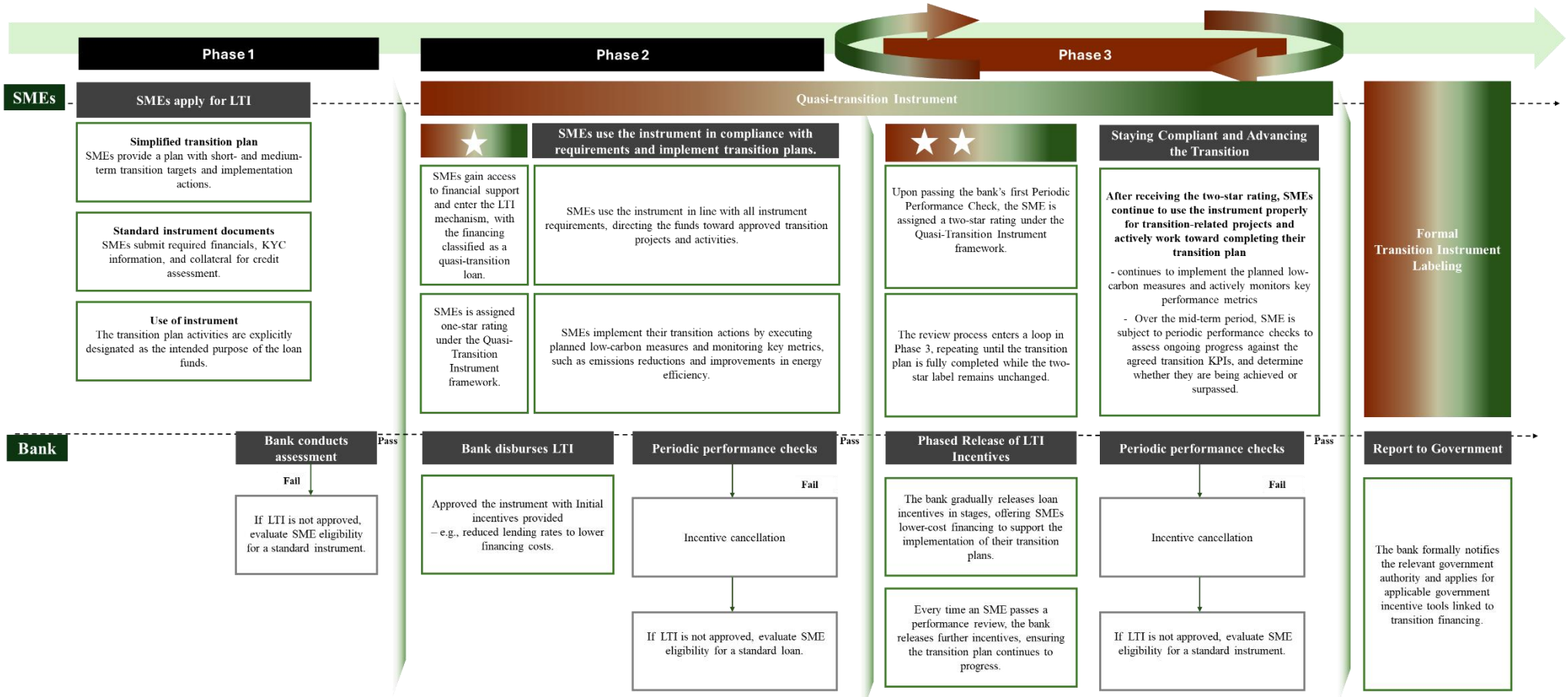

Figure 3: OperationalizAation of the LTI Mechanism in Three Phases

It is worth noting that currently the financial market offers a range of transition finance products, such as SLL. At the structural level, these loans closely resemble the LTI, as both share a common framework for sustainability-linked performance review. However, several differences exist, including the timing of incentives and the labeling, the scope of transition plans, and the performance review approach. This suggests that most SLLs in the market could be slightly adapted into LTIs for SMEs, allowing them to build on existing market practices while becoming more suitable for SMEs and linking benefits directly to verified performance.

To clarify these differences, the table below compares SLLs and LTIs across multiple dimensions, including transition labels, requirements for transition plans, level of transition-washing risks and MRV.

Table 1: Comparison between SLL and the LTI mechanism

Dimension	Traditional SLL	LTI Mechanism
Transition Label	Loan is granted *and* labelled as transition at origination, based on ex-ante KPIs/SPTs.	Loan is granted first as ordinary credit; transition label and full benefits are only granted ex post, based on realised performance.
Transition Plan	Requires a detailed long-term transition plan (often to 2050/2060), with clear pathway, and milestones.	Requires simplified transition plan focused on short- to medium-term targets and key measures.
Incentives	Interest step-downs (or step-ups) are agreed upfront, conditional on KPI reviews but priced into the structure from day one.	Only a small entry discount is given upfront; meaningful rate reductions are activated *after* performance is verified.
Level of transition-washing risks	Higher risk: targets set on the basis of plans and policies that are hard to verify or may not be implemented.	Lower risk: classification and main benefits depend on achieved outcomes rather than targets.
Data and capacity burden	High at origination: requires baselines, scenarios, detailed KPIs and external verification.	Lower and more phased: start with basic data and short-term target; MRV increase gradually.
MRV	Regular KPI review against SPTs; if missed, margin step-ups may apply, but loans generally remain transition-labelled.	Periodic review against KPIs; if targets are missed, incentives can be reduced and transition label may not be granted.

5. Case Studies: SLLs can be adapted into LTIs for SMEs

Case 1 Changxing Rural Commercial Bank's Textile Transition Instrument in Huzhou: Alignment with and Implications for the LTI Mechanism

5.1.1 Transaction Background and Core Context

To address the decarbonization financing needs of the textile sector—an archetypal hard-to-abate industry with a high concentration of SMEs—Changxing Rural Commercial Bank (CRCB), a regional financial institution in Huzhou, Zhejiang Province, launched a targeted Textile Transition Instrument product. The design of this product leverages enterprise-level carbon emission data from the Huzhou Public Carbon Accounting Platform, integrating environmental performance indicators into the credit decision-making and post-lending management processes. Zhejiang Xintao Technology Co., Ltd. (hereinafter referred to as "Xintao Technology"), a medium-sized textile manufacturer with total assets exceeding RMB 380 million, was among the first batch of enterprises to obtain this loan.

Xintao Technology is a local enterprise in Changxing County, Huzhou, established in 2003, with a registered capital of RMB 35.18 million and approximately 150 employees. The enterprise focuses on the research and development, manufacturing, and sales of industrial textile products and holds multiple patented technologies related to fabric production. As a standing council member of the China Filament Weaving Association, the enterprise has participated in Huzhou's pilot program for transformational finance reform and innovation, exploring green and low-carbon development pathways with policy support.

Xintao Technology's financing demand was driven by the expansion and upgrading of its production facilities to reduce carbon emissions—a common transition scenario for SMEs in energy-intensive sectors. However, under traditional credit models, the enterprise faced significant financing constraints due to insufficient collateral. This reflects a typical pain point in transition finance: itientities' financing needs peak during equipment renovation and process upgrading, yet the stringent pre-disbursement compliance requirements (e.g., submission of comprehensive transition plans, third-party verification reports) under conventional transition finance instruments often lead to funding delays or erode the economic viability of transition projects. CRCB's Textile Transition Instrument was designed to address this mismatch, and its operational logic exhibits substantial alignment with the LTI mechanism proposed in this study.

5.1.2 Core Characteristics of the Transaction and Alignment with LTI Mechanism

Although CRCB formally labeled this product as a SLL, its operational design deviates from traditional SLLs and closely approximates the core logic of the LTI mechanism. Specifically, the transaction embodies two key LTI elements:

First, the integration of simplified transition planning and carbon performance into the full loan lifecycle. Unlike traditional SLLs that require borrowers to submit formal, long-term, and audit-grade transition plans at the loan origination stage—an unattainable requirement for most SMEs—CRCB's product only required Xintao Technology to provide a simplified transition plan focusing on short-to-medium-term production upgrade objectives and corresponding carbon reduction targets. More importantly, the bank did not rely solely on ex ante commitments to determine the "transition" attribute of the loan; instead, it embedded carbon performance monitoring into post-lending management. This includes real-time tracking of carbon emission data through the Huzhou Public Carbon Accounting Platform, with clear intervention measures (e.g., requiring corrective actions) if the enterprise's carbon performance deteriorates. The "ex ante commitment + ex post verification" model is consistent with the LTI mechanism's core design of "phased label awarding and progressive incentive disbursement based on verified results."

Second, the adoption of a "verify later" logic that weakens ex ante compliance constraints. Traditional SLLs tend to overemphasize origination-stage compliance (e.g., completeness of transition plans, formality of verification materials), which creates high entry barriers for SMEs with limited technical and management capabilities. In contrast, CRCB's practice shifts the focus of transition performance verification from the origination stage to the post-lending period. The bank approved a RMB 53 million loan for Xintao Technology and offered preferential interest rates linked to carbon performance—with the preferential terms maintained or adjusted based on the enterprise's actual carbon reduction progress during the loan tenor. This means that the final confirmation of the loan's "transition value" and the full release of incentives depend on the enterprise's post-lending performance, rather than being determined entirely at the contract signing stage. This is highly consistent with the LTI mechanism's core concept of "delaying transition label awarding until pre-agreed targets are achieved," which effectively lowers the threshold for SMEs to access transition finance.

5.1.3 LTI Mechanism's Mitigation Effect on Structural Risks in the Case

The CRCB case also highlights the structural risks that the LTI mechanism is explicitly designed to address, particularly the upfront collateral constraints and timing

mismatch between financing needs and compliance capabilities faced by SMEs.

On the one hand, the LTI mechanism's "lookback" structure resolves the timing mismatch problem. By allowing SMEs to obtain financing via standard underwriting procedures (with simplified ex ante requirements) and delaying the transition label awarding decision until the achievement of pre-agreed targets, the LTI mechanism enables firms to secure timely funding for transition projects. For Xintao Technology, this meant accessing the RMB 53 million loan when it was most needed for production upgrades, rather than waiting for the completion of complex transition plan audits—a delay that would have jeopardized the project's progress.

On the other hand, the LTI mechanism reduces the need of traditional collateral by taking carbon performance as an important reference for credit approval and incentive adjustment. In the CRCB case, the bank used data from the Huzhou Public Carbon Accounting Platform to assess Xintao Technology's carbon reduction potential, which supplemented the lack of physical collateral and expanded the credit basis for SMEs. This practice aligns with the LTI mechanism's design concept of "performance-based risk control," which shifts the focus of risk assessment from traditional collateral to measurable transition performance—effectively mitigating the collateral constraints faced by SMEs in transition finance.

5.1.4 Case Implications for LTI Mechanism Implementation

The CRCB case provides valuable practical insights vis-à-vis the formal implementation of the LTI mechanism. First, the integration of public carbon accounting platforms is critical to the operability of the LTI mechanism. Reliable third-party carbon data not only reduces the bank's post-lending monitoring costs but also enhances the credibility of performance verification, which is a key foundation for the "lookback" logic. Second, regional financial institutions have natural advantages in promoting the LTI mechanism. As a local bank, CRCB had a deeper understanding of the operational characteristics and transition needs of SMEs in the textile sector, enabling it to design simplified and practical transition plan requirements. Third, the LTI mechanism does not need to completely replace existing transition finance instruments such as SLLs; instead, it can be developed by optimizing and adjusting the design of existing products, as demonstrated by CRCB's transformation of traditional SLLs into a more SME-friendly model.

In Europe, (public) financial institutions are increasingly experimenting with lending structures that link financial benefits to verified sustainability performance. While these instruments are not explicitly framed as “lookback transition instruments”,

they provide practical analogues to the LTI logic proposed in this paper, such as their emphasis on accessibility for SMEs or simplified reporting and verification.

These developments align with a growing emphasis on SME financing, as identified by a recent OECD report[51], addressing the dual objectives of SMEs' persistent difficulties in accessing affordable finance while simultaneously advocating for climate objectives – while at the same time ensuring that public support delivers on environmental outcomes. Against this background, recent instruments increasingly combine risk-sharing mechanisms, sustainability performance criteria, and technical support.

Two European cases illustrate how elements of the LTI concept are already being applied in practice.

Case 2 Denmark – sustainability-linked loans for SME dairy producers

A recent OECD report[52] features an example of Denmark's Export and Investment Fund (EIFO). EIFO provides sustainability-linked loans to SME dairy producers using a widely applied industry assessment tool[53], the Dairy Farming Climate Check (Farm Ahead) . The tool assesses the environmental impact of farming practices across a set of predefined indicators, including feed efficiency, land use, and protein efficiency. Financing conditions are directly linked to these performance scores: farmers whose results exceed the national average qualify for interest-rate reductions of between 10% and 30%. EIFO's Annual Report further documents the scale and design of this pilot[54]. In 2024, the program covered 85 dairy farmers, with total EIFO commitments of DKK 325 million (approximately USD 52 million), and an average interest-rate margin reduction of 15%.

Relevance for LTI design: In this scheme, entry barriers for SMEs are kept low by using a sector-wide assessment tool instead of complex, firm-specific transition plans. Verification is also scalable, as performance is assessed against standardized benchmarks, reducing monitoring, reporting and verification (MRV) costs for both SMEs and lenders.

[51] OECD (2025). Scaling Up Public Financial and Non-Financial Support for SME Sustainability – Innovations and Good Practices. https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/11/scaling-up-public-financial-and-non-financial-support-for-sme-sustainability_c69f770d/bf835159-en.pdf

[52] OECD (2025). Scaling Up Public Financial and Non-Financial Support for SME Sustainability – Innovations and Good Practices. https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/11/scaling-up-public-financial-and-non-financial-support-for-sme-sustainability_c69f770d/bf835159-en.pdf

[53] The Danish Dairy Board. (n.d.). *Climate measurement tool implemented across all Danish dairy farmers*. Food Nation Denmark. https://foodnationdenmark.com/cases/climate-measurement-tool-implemented-across-all-danish-dairy-farmers/

[54] EIFO. *Annual Report 2024.* https://eifo.dk/media/3t4jsier/eifo-annual-report-2024.pdf

Case 3 Germany - KfW Credit 295 and ex-post repayment grants

A complementary example can be found in Germany through a credit program administered by Germany's largest public bank, KfW Credit 295,[55]Funding for Energy and Resource Efficiency in the Economy (EEW)[56], supports corporate investments that reduce energy and/or resource consumption and associated GHG emissions, and is accessible to SMEs across a broad range of sectors. Financing is provided via a concessional KfW loan, combined with a repayment grant that reduces the outstanding loan amount. KfW's program documentation specifies that the repayment grant is credited only after the investment has been implemented and confirmation of completion has been submitted. Hence, while financing is provided upfront, the full financial benefit materializes ex-post, conditional on verified implementation of the eligible measures.

Relevance for LTI design: While KfW Credit 295 is not formally labelled as a transition finance instrument, its structure picks up various elements proposed in this paper:

(1) Standard Loan Documentation: remains the core entry requirement;

(2) Simplified Transition Plan: In the case of this KfW grant, a transition plan is not required. However, a statement on use of proceeds is required, see next point;

(3) Statement on Use of Proceeds: embedded in the program design, as the funding line is explicitly limited to measures that reduce energy and/or resource consumption.

In procedural terms, SMEs are not obliged to submit long-term transition plans, and the repayment grant is awarded only upon completion and verification of the supported measures (with monitoring conducted through sampling-based checks). This approach reduces ex-ante compliance burdens for SMEs while ensuring that public support is ultimately linked to delivered environmental outcomes.

[56] KfW. (n.d.). Bundesförderung für Energieeffizienz in der Wirtschaft (295). Retrieved June 14, 2026, from https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/F%C3%B6rderprodukte/Energieeffizienz-und-Prozessw%C3%A4rme-aus-Erneuerbaren-Energien-(295)/

6. Implementation Guidelines and Other Recommendations

The previous sections introduce the LTI mechanism in detail and analyze relevant case studies. The success of the LTI mechanism depends on the coordinated interaction among enterprises, banks, and public authorities, including financial and sectoral supervisors, standard setters, and government agencies.

Banks and financial institutions would face various challenges when implementing the LTI mechanism, which could limit or hinder SMEs' access to financial support, such as credit ratings, financing track records, collaterals, and governance considerations. Meanwhile, other specific challenges directly attributed to the low-carbon transition of SMEs, include identification SME clients, availability of data for determining and verifying transition targets and plans, as well as the costs associated with these processes. This study performs an in-depth examination of these challenges, and proposes a set of targeted recommendations, including potential actions that could be undertaken by banks and financial institutions, alongside how financial market stakeholders can adopt to create an enabling environment for the LTI mechanism.

From a broader perspective, SMEs will need to undertake a transition toward greener and lower-carbon economic models. Should the LTI mechanisms be scaled and promoted globally, it has the potential to support a wide range of SMEs in their transition journey.

6.1 A Quadrant-Based Framework for Banks to Implement the LTI Mechanism

The scale of SME client bases is a challenge for banks in identifying and prioritizing target clients for tailored financial support. To address this challenge, this study proposes a two-dimensional framework anchored upon "the willingness to transition" and "availability of transition-related resources", which offers a pragmatic and data-driven approach to support the transition efforts by SMEs. This framework enables banks to move beyond a one-size-fits-all approach, and instead implement differentiated strategies tailored to the specific characteristics of each client segment.

The proposed classification system lies in a four-quadrant coordinate system, where the horizontal axis represents the "quantity of transition-related resources" (e.g., technological capabilities, financial reserves, human capital, and access to green supply chains) and the vertical axis denotes the "level of willingness to pursue green and low-carbon transition" (reflected in corporate strategy, investment plans, and compliance with environmental regulations). Each quadrant corresponds to a distinct type of SME, with clear differences in their transition potential and needs. **Quadrant I** (upper right) includes SMEs with both high transition willingness and abundant resources, positioning them as the most viable candidates for immediate support. **Quadrant II** (upper left) comprises enterprises with strong willingness but limited resources, while **Quadrant III** (bottom left) represents those with low willingness and

scarce resources. **Quadrant IV** (bottom right), by contrast, includes SMEs with ample resources but weak transition willingness.

Figure 5- A Quadrant-Based Framework for Banks to Implement LTI Mechanism

A differentiated policy approach is critical to maximizing the efficiency and impact of banks' green financial support for SMEs. **Priority should be given to Quadrant I (upper right) enterprises**, as their high willingness and resource endowment minimize transition risks and ensure a high probability of successful decarbonization. For these group of SMEs, banks can offer a comprehensive suite of financial products, such as green credit lines with preferential interest rates, green trade finance, and structured financing solutions for renewable energy projects. **The second priority goes to Quadrant II (upper left) enterprises**, whose strong willingness is offset by resource constraints. For this segment, banks can adopt a more collaborative approach, combining financial support with non-financial services such as technical consulting, access to green industry networks, and linkage with government

subsidies or green guarantee schemes. This integrated support helps address resource gaps and unlock their transition potential.

For enterprises in **Quadrant III (bottom left, with low willingness and limited resources),** the short-term outlook for green transition is highly challenging. These SMEs often lack both the strategic vision to embrace decarbonization and the basic resources to implement even incremental changes, leading to a high risk of transition failure. From a risk management and resource allocation perspective, financial institutions can adopt a wait-and-see approach in the short term, focusing their limited resources on more viable segments. However, it is important for banks to monitor these enterprises closely, as shifts in regulatory policies, market demand for green products, or industry-wide decarbonization trends – may alter SMEs' willingness and resource availability over time.

Finally, **Quadrant IV enterprises (bottom right, with abundant resources but low willingness)** represent a unique segment with untapped transition potential. Their resource endowment provides a solid foundation for decarbonization, but their low willingness often stems from a lack of awareness of transition benefits, concerns about short-term costs, or misalignment between green strategies and corporate objectives. For these group of SMEs, banks should prioritize awareness-raising and capacity-building efforts, over depployment of financial support. This can include organizing workshops on the economic and environmental benefits of green transition, sharing case studies of successful decarbonization in the same industry, and conducting customized feasibility studies to demonstrate the long-term value of low-carbon investments. Once their willingness is enhanced, these enterprises can quickly transition into high-priority clients for financial support.

6.2 A Public Sector-led Data Framework to Address SMEs' Climate Data Gaps

As outlined in previous chapters, a key barrier to scaling transition finance for SMEs is the lack of credible and standardized climate data, as many SMEs lack the capacity and resources to measure, verify, and report emissions in a way that financial institutions can reliably use for credit assessment and monitoring.

To address this market failure, the public sector—particularly government agencies—shall play a central and catalytic role in enhancing the availability and quality of SMEs' climate data. A promising policy instrument is the establishment of a centralized **corporate carbon account system**, which streamlines the collection, verification, and standardization of core operational data from SMEs. Such a system can aggregate real-time or periodic data on key inputs including electricity consumption, fossil fuel usage (e.g., natural gas, gasoline, and diesel), water intake, and heat supply, leveraging existing public infrastructure such as smart meters, energy regulatory databases, and tax filing systems. By applying nationally or regionally recognized emission factors, the public sector can convert these data into standardized carbon emission metrics, ensuring consistency and comparability across

enterprises. Crucially, the processed data can be made available to qualified financial institutions (primarily banks) through a secure, permission-based mechanism, striking a balance between data accessibility and the protection of SMEs' commercial privacy.

The practical utility of this public-sector data governance approach is significantly amplified by the unique emission profile of most SMEs. Unlike heavy industries where direct process emissions constitute a major portion of total GHG emissions, SMEs' operational activities are predominantly characterized by **indirect emissions from energy and electricity consumption**, with minimal direct process emissions. This emission structure aligns perfectly with the data categories captured by the corporate carbon account system—electricity, fuel, water, and heat—making the standardized carbon emission data highly relevant and reliable for financial institutions' credit assessment and risk management processes. By focusing on these high-impact, indirect emission sources, the public sector can ensure that the data it provides delivers maximum value for both SMEs and banks, without imposing unnecessary data collection burdens on enterprises with limited resources.

A case study of this framework in action is the public ESG service platform in Huzhou, Zhejiang Province. This platform serves as a centralized hub for collecting, processing, and disseminating SMEs' climate and ESG data to over 30 local financial institutions. Beyond providing emission data, the platform further generates standardized ESG ratings for enterprises, enabling banks to quickly evaluate SMEs' sustainability performance and transition potential. Having evolved to its current fifth edition, the platform has integrated nearly 300 million data records and processed over 900 million query requests to date. This initiative has resolved the data credibility gap for local SMEs, and thereby empowered financial institutions to design and scale targeted green and transition finance products, demonstrating the transformative potential of public-sector-led data platform in unlocking sustainable finance for the SME sector – something in which the LTI mechanism can potentially benefit from.

For cases where a public data platform has yet to be established, financial institutions may adopt a practical approach based on the emission characteristics of SMEs. Most SMEs are dominated by energy-related emissions from electricity, natural gas, gasoline, and diesel, with limited process emissions. Financial institutions could request SMEs to submit quarterly or semi-annual invoices and payment receipts for energy consumption, including electricity, gas, and fuel. Using the appropriate emission factors, this method can result in the computation of fairly accurate corporate emission data. Such information enables financial institutions to monitor real-time emission levels and the progress of low-carbon transition targets. This operational mechanism supports the implementation of LTI.

In addition, simplified data collection and verification are worth considering, such as sector-wide assessment tools or platforms, which can reduce the burden for both SMEs and lenders, as illustrated by the Denmark case study. The advantage of this

model is twofold: (i) it lowers entry barriers for SMEs by eliminating the need for complex, firm-specific transition plans; and (ii) performance verification is based on standardized indicators that can be scaled to a larger sample, thereby substantially reducing monitoring, reporting, and verification (MRV) costs.

This experience demonstrates that public sector-led data platforms and standardized sectoral tools can be mutually reinforcing: the former provides a centralized, credible data foundation that enables financial institutions to conduct credit assessment and risk management based on reliable information, while the latter further reduces compliance burdens through standardized, scalable performance evaluation methods, enhancing the operational feasibility of policies and financial instruments.

For LTI design, this implies that performance-linked mechanisms can leverage both public sector data infrastructure and sectoral tools to achieve a more efficient and scalable approach, offering SMEs practical and accessible financing pathways.

Integrating a Supply Chain Perspective into the LTI Implementation Framework

Building on the quadrant-based LTI framework, banks can enhance their transition financing strategies by leveraging supply chain relationships to reach a broader set of SMEs. This approach involves three key actors: **banks**, **supply chain anchor enterprises**, and **SMEs**.

There are two pathways through which supply chain dynamics can be used to extend LTI support to SMEs:

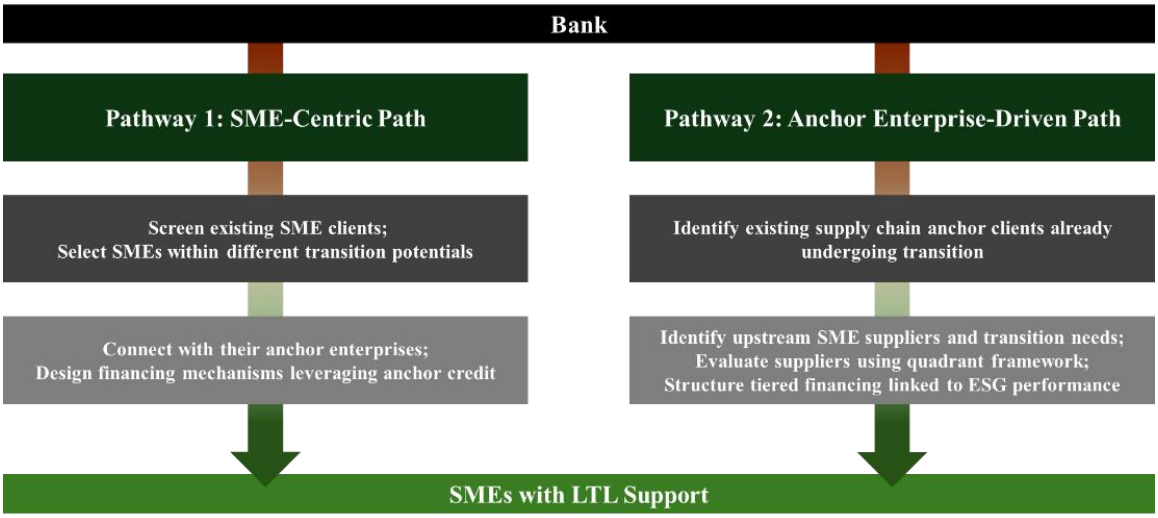

Figure 6 - Two Pathways to Extend LTI Support to SMEs

Pathway 1: SME-Centric Path: Banks identify SMEs and leverage their connections with anchor enterprises to enable LTI support

Banks may begin by screening their existing SME clients to identify those with strong transition willingness and credit profiles (**Quadrant I**). For SMEs in **Quadrants II**—those with high willingness but limited resources or moderate capabilities—banks can examine their connections to supply chain anchor enterprises. By collaborating with creditworthy anchor firms, banks can design mechanisms such as reverse factoring, supplier financing programs, or transition-specific financing pools that leverage the anchor entities' credit and operational support. This arrangement enhances the SME's credit profile and enables access to LTI facilities for transition investments, such as energy efficiency upgrades or low-carbon production adjustments.

Pathway 2: Anchor Enterprise–Driven Path: Banks target transitioning anchor enterprises, then identify and extend LTI facilities to upstream SMEs within their supply chain

Banks can also start from the anchor enterprise (i.e., systemically important supply chain actors) side, identifying supply chain anchors that are currently undergoing transition. These anchor firms naturally influence their upstream SMEs, many of which may face the need or opportunity to transition in parallel. Banks can then assess these upstream SMEs and provide LTI financing directly to those meeting **Quadrant I criteria**, while SMEs in **Quadrants II** can benefit from linked financing structures supported by the anchor enterprise's credit strength and transition commitments.

Through these supply chain-oriented approaches, banks can extend LTI support beyond resource-rich SMEs, reaching those with strong willingness but limited standalone capacity. By embedding anchor enterprises into the financing design, the framework enables more SMEs to engage in low-carbon transition efforts while aligning with anchor firms' broader transition objectives. Performance indicators can be tracked both at the anchor and SME level, ensuring measurable impact along the value chain.

6.3 Policy and Market Recommendations

The following recommendations summarize the key findings of this paper, with practical steps outlined for various stakeholders vis-à-vis creating an enabling environment for the LTI mechanism to be applied across SMEs, banks, public authorities, etc., to support a credible, SME-led low-carbon transition.

SMEs are encouraged to focus on strengthening transparency on the most material issues and transition execution capacity.

Improving market transparency is a critical first step. SMEs are encouraged to enhance their data collection capabilities, actively disclose relevant transition-related data to financial institutions, and clearly document data sources to support verification. At the same time, SMEs should strengthen their transition planning

capacity by working closely with banks on target setting. Transition targets should be clearly linked to transition-related investments and aligned with loan requirements or taxonomies, ensuring that financing directly supports measurable transition actions. While the LTI permits simplified transition plans at entry, SMEs are encouraged to develop medium- to long-term perspectives to provide strategic direction and improve the credibility and continuity of implementation.

Banks shall emphasize on engagement and product innovation.

Banks should proactively support data collection and verification by SMEs, as well as provide technical guidance and operational support to their cleints, where necessary. Existing SLL products can be progressively adapted into LTI structures, allowing banks to build on existing established credit products while introducing staged incentives, lookback verification, and ex-post labeling.

Public authorities shall focus on cost reduction and policy coordination. Governments can play a catalytic role in supporting SME transitions through direct financial benefits and by creating an enabling environment via regulatory measures.

- **Direct financial benefits:** Governments can provide fiscal support, subsidies, grants, or catalytic capital to lower financing costs for both banks and SMEs, including expenses related to data collection, reporting, and verification. Such targeted support helps de-risk investments and crowd in private lending, thereby reducing downside risks. This policy orientation is also reflected in recent macro-level practice. In January 2026, the People's Bank of China announced an expansion of the scope of its carbon emission reduction lending facility, to include projects such as energy efficiency retrofits, green upgrading, and low-carbon energy transition. By providing lower-cost funds to financial institutions, it lowers banks' funding costs and broadens the range of eligible transition projects, thereby improving financing conditions for SMEs undertaking energy-saving and low-carbon investments through indirect but tangible policy transmission channels[57].
- **Creating an enabling environment:** Policy coordination, via the alignment of incentives and regulatory signals, to support the transition of large, systemically important enterprises – governments can generate positive spillover effects along supply chains, and strengthen transition demand among SMEs. Moreover, governments can support LTI-related data reporting and verification through financial and technical assistance, ensuring that performance outcomes are credible and scalable. This can be further complemented by broader measures, such as public data infrastructure, taxonomies, disclosure requirements, and carbon pricing, which positions LTIs not only as a product innovation, but also as part of a broader transition finance policy mix. In the meantime, government agencies and public

[57] People's Bank of China. (2025). Carbon Emission Reduction Support Tool for Green Low-carbon Trans formation Projects. https://www.pbc.gov.cn/goutongjiaoliu/113456/113469/2026011515253112924/index.html

authorities can encourage the use of AI in identifying and managing transition related risks, alongside supporting business cases, such as by the use of IoT, block chain, smart contract and so on.

Other stakeholders shall facilitate a coordinated and supportive ecosystem to enhance the effectiveness of the LTI mechanism.

Think tanks, research institutions, and international organizations can contribute by delivering capacity building programs, and developing technical tools to support SMEs in transition planning and implementation. Consulting firms and service providers can offer professional services in data collection, monitoring, and verification, thereby helping SMEs and banks meet credibility requirements.

Furthermore, international organizations and multilateral institutions can help to further enhance and catalyze the development of LTI mechanism as an effective tool in supporting the transition of SMEs, thus encouraging broader participation and facilitating cross-border knowledge sharing and product innovation. They can also consider supporting the piloting of LTI structures across multiple countries, providing technical assistance and catalytic funding to test and refine the mechanism in different regulatory and market contexts. Such pilot programs would help generate practical implementation experience, support cross-border knowledge sharing, and facilitate the broader adoption of SME-oriented transition finance instruments.