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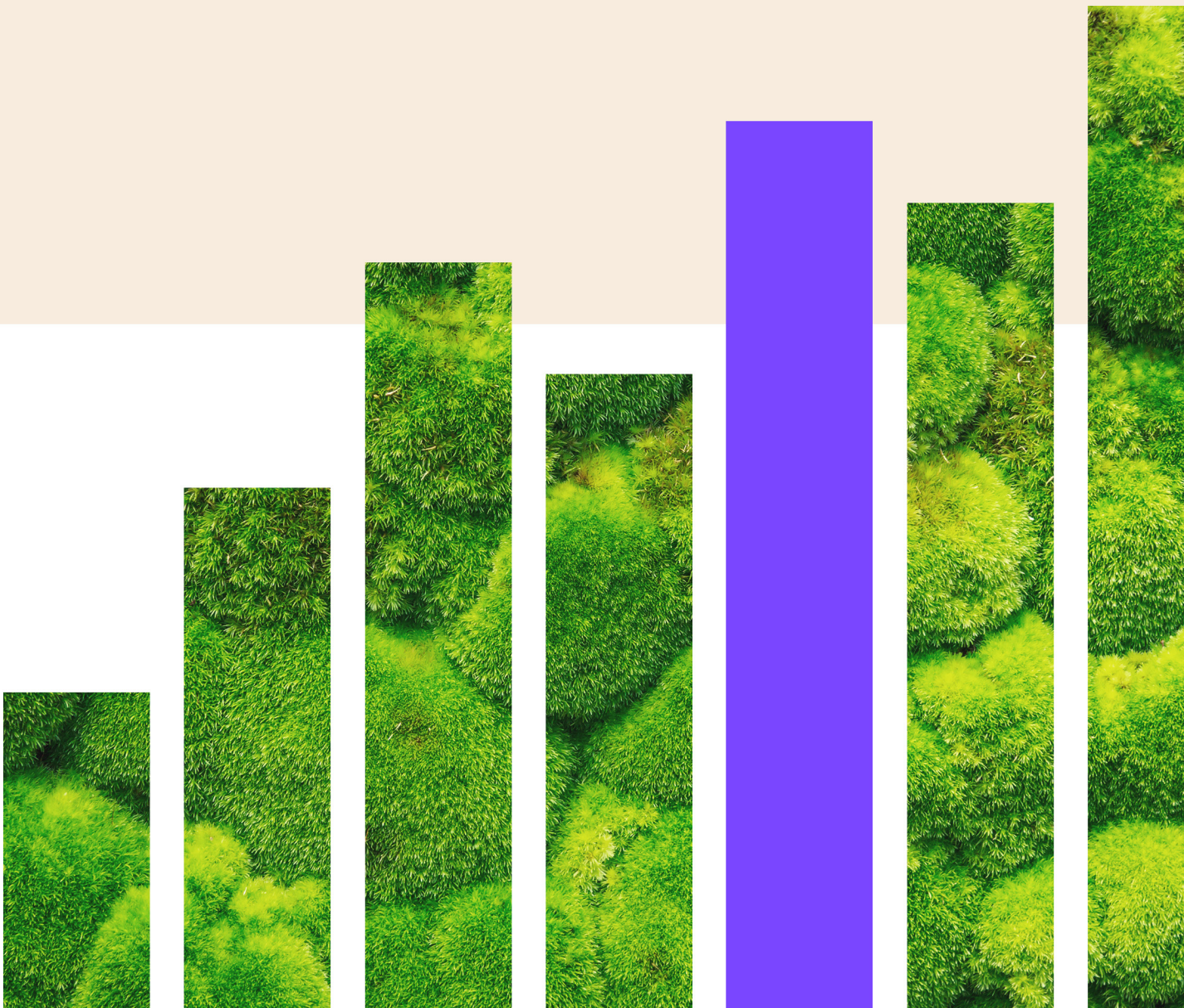

GREEN AND TRANSITION FINANCE ON THE MUNICIPAL LEVEL: CASE OF HUZHOU CITY

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Since becoming one of China's inaugural "green finance pilot zones" in 2017, Huzhou has seen its green loan balance grow eightfold to CNY338.8 billion by the end of 2023, which represents 32% of its total loan balance and is 20 percentage points higher than the national average. This success is driven by an enabling environment shaped by the local government, including clear regulatory frameworks and policy incentives that essentially reduce transaction costs. Digital platforms that integrate environmental, social, and governance assessments and green certifications have further supported the market players.

Huzhou has also pioneered transition finance, introducing a comprehensive taxonomy covering nine carbon-intensive sectors as well as guidelines for carbon accounting and just transition. By integrating digital solutions for emissions data and offering standardized templates for transition plans, Huzhou helps financial institutions, particularly small and medium-sized enterprises, initiate climate actions while allowing space for future refinements. This approach may also serve as a reference for the thousands of cities across emerging markets and developing economies to help green and transition corporations tap into local liquidity.

Introduction

Achieving net-zero emissions has become a critical global priority because of the escalating impacts of climate change. At its core, net zero relies on two essential pillars: the advancement of green industries and the systematic decarbonization of carbon-intensive sectors. Green industries show that economic growth can be maintained while providing essential goods and services in an environmentally friendly way. By accelerating investments and innovation in these sectors, countries can not only reduce emissions but also develop new economic models and create employment opportunities, thus supporting and compensating for the phaseout of traditional carbon-intensive industries.

Although all green growth requires structural changes, green finance typically supports the growth of new industries. In contrast, transition finance affects existing infrastructure and presents different risks, opportunities, and challenges to current development patterns and pathways. This process

entails setting ambitious emissions reduction targets, implementing stringent regulatory frameworks, deploying advanced technologies, and fostering collaboration among governments, businesses, and civil society.

Green and transition finance can be mutually reinforcing. Although the fine details may differ, transition finance benefits from many of the same governance structures as green finance, including taxonomy, disclosure requirements, and policy incentives.

This chapter presents the case of Huzhou, a medium-sized city in coastal China. Huzhou has found a new development pathway through piloting green finance and is now paving the way for transition finance by building on its previous experiences. In analyzing this case, we illustrate the lessons for how municipalities can develop green finance and how the existing architecture of green finance can also become a lever for transition finance.

Becoming the Green Finance Pilot Zone

A city in Zhejiang province, Huzhou sits at the heart of the Yangtze River Delta, one of China's most affluent regions. In 2023, the city's total GDP reached CNY401.51 billion, a 5.8% increase from the previous year. This growth highlights the city's economic resilience and its ongoing development. Its GDP per capita in 2023 (CNY117,195) is equivalent to USD16,396 and is roughly 20% higher than that of both the national and world averages. Its economic growth relies heavily on both the secondary (49.3%) and tertiary (46.7%) sectors (People's Government of Huzhou 2024a). Like many of its Chinese peers, Huzhou's rapid expansion of heavy industry in past decades led to significant economic growth.

This growth, however, came at the cost of environmental degradation. As environmental impacts became more pronounced, public awareness for environmental protection increased. This awareness has increased demand for a greener economic development pathway. On the one hand, economic development is still the top priority, which means shutting down polluting enterprises without finding the proper alternative is not a viable option. On the other hand, such a polluting and carbon-intensive pathway has reached the point where it is no longer economically and environmentally sustainable. Economically, the added value compared with the use of resources for these industries is relatively small, reducing resource efficiency. Environmentally, the negative externalities will ultimately burden public spending.

The political momentum for green development in Huzhou can be traced back to the early 2000s, with the ideology of "Clear Waters and Green Mountains" from President Xi Jinping when he was the governor and party secretary of Zhejiang province; this momentum continued to build in the 2010s. Initially, the focus was on reducing and remediating environmental pollution and degradation in line with national environmental governance efforts. Local government actions in Huzhou included improvements to urban infrastructure,

such as waste management systems, a tightened review process for projects with potential environmental impacts, and the establishment of emissions trading for pollutants (*National Business Daily of China* 2023). The trading system marked the initial steps in using market-based mechanisms to address environmental externalities at the local level, setting the stage for more advanced initiatives.

In 2015, when the concept of green finance started emerging in China, Huzhou was among the first to propose the establishment of regional green finance pilot zones. In 2016, the People's Bank of China (PBOC), alongside six other ministries, issued what is considered the founding document of China's green finance system, "Guidelines for Establishing the Green Financial System." This document (PBOC 2016) prompted local governments to develop their own plans for promoting green finance.

In 2017, Huzhou was selected as one of the first pilot zones for green finance reform and innovation. In its action plan, it aimed to build an ecosystem of green finance with regional traits, rapid growth of green financing, steady decline of financing for carbon-intensive and polluting sectors, and a relatively low nonperforming ratio for green loans. Notably, as a medium-sized city, Huzhou also emphasized how green finance should be tailored to the development needs in a small or medium-sized city context (PBOC et al. 2017).

Financing for an Eco-City

In recent years, Huzhou's overall progress in green development has been accelerating, particularly since the announcement of China's dual carbon goals in 2020. Even a year before this announcement, it had already become the first city in Zhejiang province to fully transition its public transport system to electric vehicles, with more than 2,000 electric buses in operation in 2019.

The development strategy used by the local government to transition its industry structure can be described in the metaphor of "emptying the cage and letting the right birds in"—in this case, meaning to clear out traditionally polluting industries and make room for green and advanced ones. Statistics show that from 2005 to 2022, the total GDP of Huzhou increased from CNY64 billion to CNY385 billion, with an average annual growth rate of 11.1% (Caixin News 2023). Meanwhile, the industry structure shifted toward higher technology and lower emissions. In 2022, the proportion of the traditional textile and building materials industries declined to 20%, compared with 50% in 2005. The number of companies in the lead battery industry decreased from 225 to 16. Overall, the value-added share of high-tech industries, strategic emerging industries, and the equipment manufacturing industry in Huzhou reached 65.7%, 38.9%, and 35.2%, respectively (Caixin News 2023).[1]

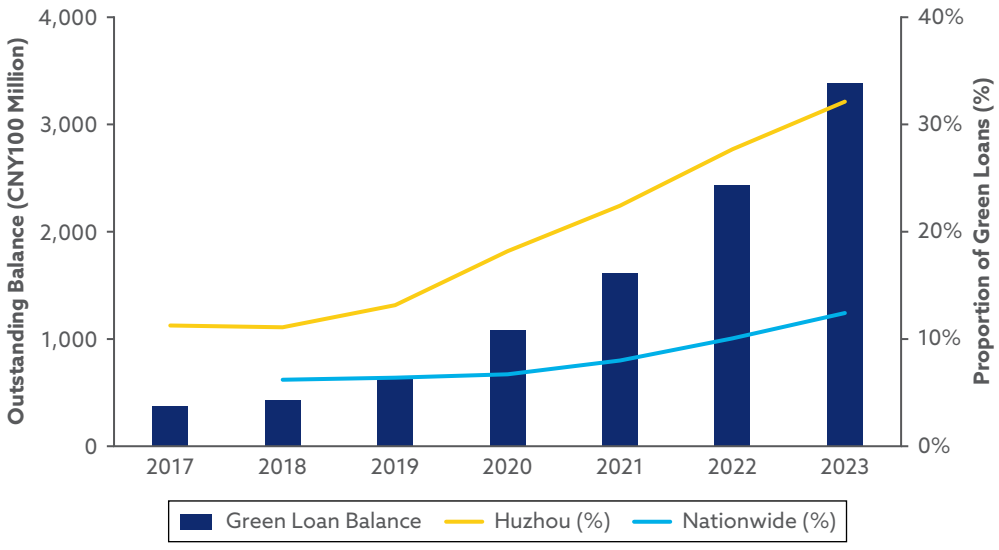
[1]These data are from the People's Government of Huzhou. These emerging industries include the manufacturing of electronic vehicles and semiconductors, smart logistics and biomed technologies, special-use materials, components for renewable energy and robotics, and geographic information system technology.

The implementation of a "carbon efficiency code" for industrial entities, in which carbon emissions and efficiency compared with their per-acre output can be traced, drove actual carbon emissions per unit of added value down by 12% in 2022, just one year after its launch.

Green finance in Huzhou has developed rapidly as the facilitator of green and transition activities. Since Huzhou became a pilot zone in 2017, its outstanding balance of green loans has increased by 45.8% annually, contributing to more than 50% of the overall loan increase. As shown in **Exhibit 1**, green loans now account for 31.3% of the total loans, 21 percentage points higher than China's average and higher than these statistics from other developing countries. As of the end of March 2023, the outstanding volume of green loans reached CNY298.4 billion (USD41 billion), 7 times higher than that of 2018 (Exhibit 1). Meanwhile, green loans are performing significantly better, with an overall nonperforming loan ratio of only 0.002%—substantially lower than the financial sector average of 0.32%.[2]

Financial institutions (FIs) have taken initiatives in innovating green financial products. There are now more than 180 varieties, ranging from loans and bonds to insurances and guarantees. These products also cover a wide range of themes, such as carbon efficiency, carbon price, electric vehicles, and green buildings, to name a few. FIs and corporations have collectively issued

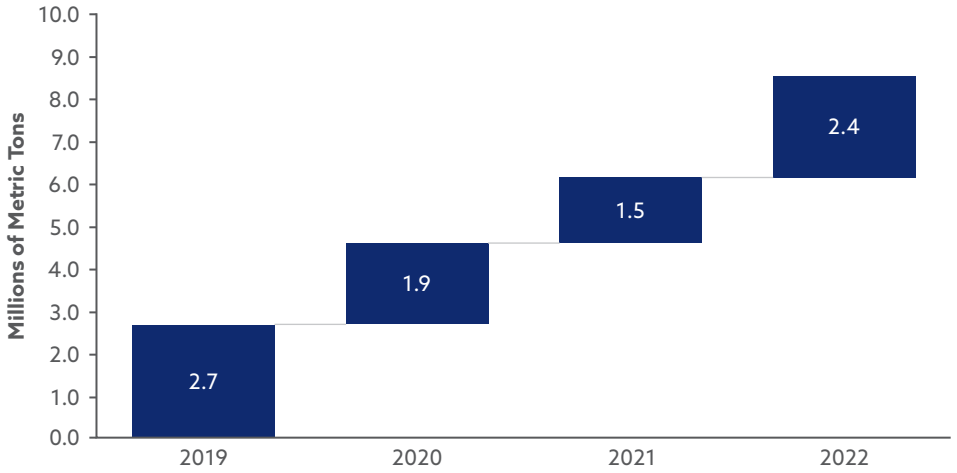
Exhibit 1. Green Loan Growth and Proportion of Green Loans, Huzhou vs. China Nationwide, 2017–2023



Source: PBOC Huzhou Branch, Institute of Finance and Sustainability (IFS).

[2]Provided by the local Huzhou government office.

Exhibit 2. CO_2 Emission Reduction Related to New Green Loans in Huzhou City, 2019–2022



Sources: Consolidated from public sources by the authors.

59 labeled green bonds, amounting to CNY39.41 billion (USD5.4 billion; Financial Regulatory Bureau of Zhejiang Province 2023). A digital platform, Green Loan Express, has been created and cumulatively has served more than 43,000 enterprises and facilitated more than CNY510 billion in credit, accelerating the matchmaking process and improving access for micro and small-sized enterprises.[3] The fast-growing green loans have also significantly contributed to avoiding millions of metric tons in carbon emissions (see **Exhibit 2**).

Creating an Enabling Environment for Green Finance

To understand Huzhou's journey in green and transition finance, it is important to understand the key components for green and transition finance as identified by the G20 Sustainable Finance Working Group (SFWG), such as in the G20 Sustainable Finance Roadmap and the G20 Transition Finance Framework. These components include an identification approach (such as a taxonomy), policy incentives, products, and information disclosure, all of which were later expanded to accommodate transition finance. In the case of Huzhou, it is therefore important to review how such a green financial ecosystem developed and how it has become an enabler for transition finance. Lessons learned from the previous years of pilots continue to inform policymaking from municipal to national levels, even contributing global dialogues and business decisions by market players.

[3]Provided by the local government.

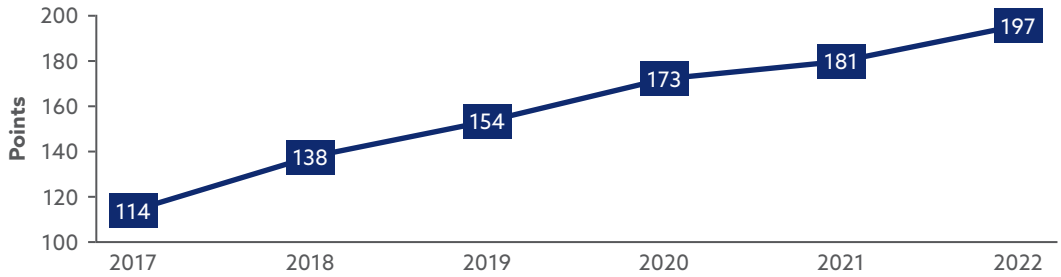
Policy and Legislative Framework

When green finance first emerged, how to define "green" activities was among the primary challenges. On top of national green taxonomies, starting in 2017, Huzhou has developed its first batch of local green finance standards to evaluate green projects, green financing enterprises, and green banks. Furthermore, Huzhou developed standards for a special set of FIs that conduct business only in green finance, named "green finance specialized institutions"; the creation of such FIs is unique to China, compared with other countries. Huzhou also created a "Green Finance Development Index" for the municipality itself, with a set of 45 quantitative indicators and corresponding methodologies to evaluate the municipal-level performance of green finance. The key indicators were grouped into three main categories: governance and policy foundation; market performance; and contribution of green finance to green, technological, and economic advancements (Huzhou Market Supervising Administration 2019). **Exhibit 3** demonstrates how the overall development environment for green finance has improved, as measured by the index.

The system of standards continues to evolve and expand, covering green building loans, green agriculture loans, green inclusive loans, and carbon-neutral banks. Huzhou's experience in standard setting also contributes to the formulation of seven national standards as well as provincial ones. In a city with a small presence of large third-party service providers and a high proportion of small and medium-sized enterprises (SMEs), government-led standard setting leads to the clarification of market expectations and reduces the costs of green certification for FIs and enterprises, which may be replicable in other developing economies.

Policy incentive is another government-led approach that has had clear impacts in shaping market expectations and giving prompts to first movers in the market. In the case of Huzhou, policy incentives usually fall into three categories: fiscal, monetary, and regulatory. At the very beginning, incentives for green policies started with "shades of green": Based on how "green" the firms are, the government would provide interest subsidies of 12%, 9%, and 6%, respectively. The policy gradually expanded to a wider range of incentives

Exhibit 3. Green Finance Development Index, 2017–2022



Source: PBOC Huzhou Branch, IFS.

targeting different objectives. Despite the recognition of pilot zones from the national level, such subsidies are provided in the local government's own fiscal and monetary capacity. **Exhibit 4** presents a non-exhaustive list of current policy incentives in Huzhou. The maximum amount of subsidy to each enterprise ranges from CNY30,000 to CNY300,000 (roughly USD4,200 to USD42,000).

To ensure consistency across different administrations over time, green finance has been written into the local legislation, incorporating key topics such as carbon finance, environmental, social, and governance (ESG) rating, and green finance performance evaluation. Local legislation of green finance has codified both incentive and punitive measures. Supportive measures for innovation in green finance fall into the fiscal mandate. There are also administrative penalties for "greenwashing" behavior, such as false disclosure of carbon emissions,

Exhibit 4. List of Current Policy Incentives in Huzhou (non-exhaustive)

Green Inclusive Loan	For green inclusive loans in the current year, interest subsidies of up to 12% of the China loan prime rate will be provided to FIs based on their green finance performance, with a maximum interest subsidy of CNY150,000 per enterprise.
Green Bank	Banks that are approved as the first batch of green finance demonstration banks within the pilot zone and achieve significant results in such areas as "carbon-neutral" banks, green loans, and transition finance will receive a one-time reward of up to CNY300,000.
Green Bonds (e.g., carbon-neutral bonds, transition bonds, sustainability-linked bonds)	Eligible enterprises and FIs issuing green bonds, carbon-neutral bonds, transition bonds, sustainability-linked bonds, and other debt financing instruments and asset securitization products (collectively referred to as "green bonds") can receive a subsidy of CNY100,000 for each successful issuance. For green bonds issued in alignment with the China–EU Common Ground Taxonomy, the subsidy per bond issuance will be increased to CNY150,000.
Green, ESG, and Transition Insurance	For enterprises that purchase environmental pollution liability insurance, a subsidy of 30% of the insurance premium will be provided, with the cap of CNY30,000 per enterprise. For enterprises that purchase ESG insurance, a subsidy of 50% of the insurance premium will be provided, with the cap of CNY50,000 per enterprise.
Government Procurement	In government procurement of services related to banking or insurance, the performance of FIs in green finance will be used as one of the criteria in the bidding process.
Standard Setting	For FIs, research institutions, and local financial organizations, participation in the formulation of national or industry-level green financial standards will be rewarded with CNY250,000 at maximum for each set of standards. Participation at the provincial level will be rewarded with CNY150,000 at maximum. Lead drafting entity (entities) in the formulation of standards at the municipal level will be rewarded CNY100,000 for each set.

Sources: Sorted by the author from publicly disclosed policy documents (People's Government of Huzhou 2023b).

fraudulent application to government subsidies, or false advertisements about green financial products.

Digitalization in Green Finance

Similar to many cities in other developing economies, Huzhou is home to numerous SMEs. According to estimates, there are 40,000–50,000 SMEs in Huzhou, ranging from manufacturing to services and making up about 99% of the business entities in the city (Paulson Institute Green Finance Center and Research Center for Green Finance Development of Tsinghua University 2020). The significant proportion of SMEs made developing SME-specific green and sustainable finance one of the municipality's top priorities.

Compared with large enterprises and FIs, SMEs tend to have more constraints on capacity and resource mobilization, such as limited knowledge about green finance and industries, difficulty finding bankable green projects, relatively high costs for green certification from professional service providers, and so on. These constraints can act as hurdles to SMEs' development of green finance. Digitalization can help address information asymmetry and lower transaction costs.

In Huzhou, a Green Finance One-Stop Service Platform (One-Stop Service Platform)[4] was built to tackle this specific issue for SMEs. Through big data, cloud computing, and other technologies, the platform focused on green lending, green financing, and green credit ratings for SMEs. As of year-end 2023, the platform has provided ESG ratings for more than 22,000 enterprises. Cumulatively, it has assisted 51,000 enterprises in accessing bank financing, with a total of CNY590 billion (USD81 billion). **Exhibit 5** presents a screenshot of the user interface on mobile phones, with buttons that direct users to loan applications, equity investments, and guarantees.

The One-Stop Service Platform main characteristics can be explained in the following three aspects:

- **Consolidation of mandated data from multiple government agencies:** Recognizing that collecting useful data remains a common challenge for the green finance market, the One-Stop Service Platform consolidates information from 31 government agencies, including the Huzhou Municipal Administration for Industry and Commerce, Huzhou Tax Bureau, and Huzhou Environmental Protection Bureau—information that is "green" and will be used in due diligence. This consolidation reduces search costs: Financiers can save efforts in profiling clients and verifying their information, while enterprises can avoid duplicating efforts of submitting the same information to multiple FIs on top of their regulatory requirements.

[4]The platform consists of subplatforms, such as Green Loan Express (mentioned previously), Green Financing Express, green regulatory data, and personal carbon accounts.

Exhibit 5. Mobile Interface of Green Loan Express

Note: *Governance loan is actually based on the performance of the Chinese Communist Party government branches within corporations.

- **Automation of standards and ratings:** The application of standards will still demand a certain level of knowledge and capacity from financiers and enterprises. But incorporating them into the online system and automating the evaluation process, such as alignment with green standards and the rating of overall ESG performances, will not only alleviate the burdens for FIs and enterprises but also enhance credibility in the process because results are backed by regulators. Results of evaluation will feed into the due diligence process and update regularly for risk management.
- **Dynamic matchmaking:** The platform is similar to e-commerce websites, where enterprises can browse the various financial products offered (both loans and equity financing) and financiers can browse the various projects seeking financing. It is estimated that the average time for matchmaking between banks and enterprises has been reduced to 1.4 days, compared with 2.7 days originally (People's Government of Huzhou 2022b). Moreover, the platform is constantly upgrading with more "smart" elements, including the evaluation of future financing demands, a recommendation algorithm, and risk monitoring.

According to the local government, the One-Stop Service Platform will be upgraded to enable automatic regulatory review based on all the data readily available (*China Economic Observer* 2022), which also alleviates the workload for regulators.

Lessons Learned

Among numerous reasons why Huzhou has stood out among green finance pilot zones, those associated with the context of developing economies—where the financial market is generally less developed and government regulation has great potential to shape the market landscape for green finance—can serve as useful reference.

One core concern for green finance from market players is the additional cost associated with "green," whether it is identification of green projects, certification of instruments, or sustainability-related disclosure. Huzhou has taken various measures to offset this cost, or even reduce it to levels below normal financing—ranging from standards to incentives to digitalization. As illustrated earlier, ESG ratings and labeling of green loans through automated platforms have saved FIs from hiring external service providers that usually charge rather high prices, particularly compared with the small volume of transactions in the city. Based on market logic, FIs were then able to supply green financial products with lower costs, contributing to the boom of green loans and bonds in recent years.

Huzhou's ability to build up such an enabling system can be attributed to a few factors:

- **Strong political will and consensus:** Local government leaders have not only demonstrated a robust commitment to prioritizing green finance but also coordinated among different agencies, laying the foundation for the digital infrastructure as well as policy alignment. Meanwhile, there is also a broad consensus among public and private players on the necessity of developing green finance.
- **The mindset of "create first, improve later":** Huzhou has adopted a pragmatic approach to green finance by focusing on solutions best available within the local capacity and development contexts, with the understanding that there will certainly be gaps between local and global best practices, because improvements in quality need to be achieved progressively. Instead of waiting for very detailed instructions or standards from the national level, Huzhou has started with what is feasible and refined it over time, in terms of both policymaking and financial product innovation. This approach allows for the testing of new ideas and models, which can then be adjusted based on feedback and results. Notably, because local governments tend to have competing development priorities, some of these priorities—such as creating rural employment opportunities, alleviating poverty, and increasing access to affordable energy—can be achieved all together through localized policy design and financial solutions.

- **Capacity building and international cooperation:** Huzhou has focused on developing the skills and capabilities of local professionals in green finance while learning from and cooperating with international entities. By partnering with global organizations such as CFA Institute and by participating in international initiatives such as the G20 SFWG, Huzhou has tapped into the abundance of best practices and innovative solutions worldwide, which can benefit local stakeholders around major and emerging topics of green finance. Notably, these international collaborations have facilitated a two-way exchange of knowledge. Huzhou not only learns from global experiences but also shares its insights and successes, thus contributing to the broader discourse on green finance in developing economies.

A Local Approach to Transition Finance

Despite its leading performance in green development, Huzhou still has a higher carbon intensity compared with the provincial average, with a relatively heavy industrial structure. The city's eight major high-energy-consuming industries account for 70.8% of the energy consumption in regulated industries, yet they represent only 37.7% of the total added value of large enterprises. The need for transitioning the carbon-intensive sectors becomes more pressing than ever with the national dual-carbon goals as well as the limited overall carbon budget, leaving insufficient room for new industries to settle in Huzhou. Meanwhile, Zhejiang is one of China's fastest-developing provinces, and there is fierce competition for new industries from other cities. Huzhou needs to act fast enough to grasp the opportunity window for green development.

However, the development of transition finance is far more difficult than that of green finance in nature, both temporally and spatially. Climate transition is inherently a long-term, dynamic process and thus requires ongoing evaluation, as opposed to green economic activities that can maintain their green status once certified. Market participants need to keep track of the transition pathways because of their evolving nature, which raises both the costs and requirements for capacity. Meanwhile, climate transition is highly constrained by local contexts and conditions, such as political systems and economic growth models. Developing countries such as China are still in the process of industrialization, with newer infrastructure and growing market demand. Therefore, delicacy is needed in designing transition pathways, policies, and financial products to ensure a credible and smooth transition while minimizing the risks of "transition washing."

In the case of Huzhou, exploration into transition finance is built on its previous experiences, policy setup, and market infrastructures. Because transition finance is considered an extension of green finance, it has shared similar pillars of development—such as taxonomies, disclosure, incentives, and products—with some unique elements, such as transition planning. In January 2022, Huzhou introduced China's first municipal-level roadmap for transition finance,

Exhibit 6. Huzhou's Approach to Transition Finance

Source: People's Government of Huzhou (2022a).

which identified seven primary tasks that include developing taxonomies, incentives, transition finance services, and digital platforms (see **Exhibit 6**).

Taxonomy

Huzhou first launched its own Transition Finance Taxonomy in 2022 and updated it in 2023 (People's Government of Huzhou 2023a). The taxonomy outlines 106 transition technology pathways for "8+1" carbon-intensive sectors locally in the form of a "whitelist," with the rationale of technological neutrality. The "8+1" refers to eight traditional key sectors: textiles, paper, chemicals, chemical fibers, nonmetal minerals, steel, nonferrous metals, and power generation. The "plus-one" is wire and cable, which is classified as a subsector in the national industry catalog. The wire and cable industry is included because of its high energy consumption and thus urgent need for transition.

The transition pathways in the taxonomy can be generalized into four categories: clustering of industries, decarbonization of production process (including reduction in source and process as well as carbon sequestration at the end), infrastructure upgrade, and purchase of third-party consultation services:

- Clustering of industries: focusing on systemic changes in the geographical layout of industries, to cut down long-distance transportation of materials and intermediate products.

- Decarbonization of production process: reduction in source materials, technical upgrade of the production process, and potential application of carbon capture, utilization, and storage technologies at the end of the process.
- Infrastructure upgrade: focusing on improving the efficiency of infrastructure related to production, such as factory buildings, charging sites, and green data centers.
- Purchase of third-party consultation services: consultation, certification, and advisory services that contribute to the low-carbon transition of the operations.

The taxonomy establishes baseline and targets of "carbon intensity" instead of energy consumption intensity, reflecting unit CO_2 emissions per CNY10,000 of industrial added value. Compared with the energy consumption intensity approach, this design is more straightforward and can avoid being impacted by the increasing proportion of renewable energy in the grid. The baseline values are provided by the local Statistics and Economic Information Bureau, based on industry data and the overall energy efficiency of production facilities. The target values are determined in line with the Paris Agreement and Huzhou's 14th Five-Year Plan for carbon reduction. Leveraging carbon targets that are readily available from government agencies supervising respective industries, the accuracy and credibility of benchmarks are assured, as is consistency across government agencies.

The taxonomy also includes instructions for four primary kinds of users: enterprises applying for transition financing, FIs, third-party agencies, and local governments. Essentially, users can benchmark the performance of transition entities against the values to determine if the entities are on track to meet the targets, which helps to mitigate the risks of transition washing. Advantages of municipal-level standards include accuracy of values (given the same statistical system), homogeneity of regulated entities, and flexibility to renew in time.

Transition Planning

Transition planning is an essential element of transition finance, which differentiates it from green finance. Transition finance is heavily reliant on the transition pathways of the financed entities. The process of developing a climate transition plan at the corporate level helps enterprises better understand climate-related risks and opportunities, clarify their business goals and strategies, and enhance their climate resilience. Lack of data and capacity remain key challenges for FIs and enterprises in this regard, however, particularly in developing countries.

Huzhou continues to follow the rationale of "create first, improve later" and emphasizes the practicality of transition planning from the perspectives of both policymakers and practitioners. The municipal government has formulated several other guidance documents in addition to the taxonomy,

including guidelines on carbon accounting for banks, transition target setting for enterprises in the key sectors, assessment for just transition, developing "carbon-neutral" banks, and outlines/templates for formulating transition plans.

Carbon accounting: Carbon accounting is a common challenge for FIs in both disclosure and transition planning, particularly with financed emissions. Therefore, Huzhou issued the General Carbon Accounting Guidelines for Bank Loans, which provides formulas and emission coefficients for the use of fossil fuels and purchased electricity, as well as emissions in the production of cement, lime, steel, and desulfurization of coal power generation (Huzhou Market Supervising Administration 2022a). The financed emissions are the proportion of loans to the total assets of the enterprise, multiplied by its total emissions. This calculation is in line with the methodology from the Partnership for Carbon Accounting Financials. The emission intensity of enterprises is emissions divided by unit added value (CNY10,000). Although the coefficients may be subject to update from time to time, and may not necessarily reflect the performance of specific enterprises if they outrun or fall behind their peers, banks in Huzhou can still apply the formulas to their portfolios, generating results ready to be disclosed and compared with those of other FIs. Starting from here, FIs can determine whether they need to calculate on a more granular scale to create advantages in the market or answer investors' demands for more information.

"Carbon-neutral" banks: The guidelines for carbon-neutral banks were built on the previous guidance for green finance-specialized institutions and covered both operational and financed emissions in Scopes 1–3 (Huzhou Market Supervising Administration 2022b). Banks are encouraged to calculate their greenhouse gas (GHG) emissions based on established methodologies, such as the GHG Protocol and local guidelines. They are also encouraged to have standalone/separate credit quotas, approval channels, pricing, risk appetite, performance appraisal, products, and disclosures. In Huzhou's medium- to long-term planning for the banking sector, it provides differentiated timelines for pilot banks and others, while expecting overall neutrality by 2058 for all banks within its jurisdiction (People's Government of Huzhou 2021). **Exhibit 7** illustrates the milestones for carbon-neutral banks in Huzhou.

Target setting: For enterprises in the key sectors in the taxonomy, Huzhou developed guidelines to help them set short-, medium-, and long-term

Exhibit 7. Milestones for Carbon-Neutral Banks in Huzhou

Progress Milestone	Pilot Banks	Other Banks
Carbon peaking of operations	By 2025	By 2028
Carbon neutrality of operations	By 2030	By 2035
Overall neutrality	By 2055	By 2058

Source: People's Government of Huzhou (2021).

transition targets that are more ambitious than the targets in the taxonomy to prevent the risk of "transition washing."[5]

Transition planning: The formulation of transition plans is a complicated process. So far, net-zero transition plans published by leading FIs and enterprises globally are mostly lengthy documents of hundreds of pages, which is hard for smaller FIs to replicate. To address the capacity constraint, Huzhou prescribed outlines as well as a template of transition planning for enterprises, in the format of filling in blanks and checkboxes (Huzhou Financial Office 2023). In terms of themes, it is structurally in line with global frameworks—such as requirements from the International Sustainability Standards Board or the Task Force on Climate-Related Financial Disclosures—starting from strategic targets and descending to actions, financing plans, supporting measures, just transition/social responsibility, and disclosure. The content of each section is as follows:

- Introduction: organizational background and baseline of emissions.
- Strategy and targets: Transition entities are encouraged to provide short-term (2025), mid-term (2030), and long-term goals (year of carbon neutrality by 2045/2050/2055/2060).
- Actions: Transition entities are encouraged to provide relevant technologies and pathways, indicating whether they fall into the taxonomy.
- Financing plans: Transition entities are encouraged to provide an estimate of the overall expenditure by 2025 and how much of it is expected from external financing.
- Supporting measures: This part covers all supporting measures, including governance mechanisms, monitoring, internal incentivization, and risk management.
- Just transition/social responsibility: Transition entities are encouraged to estimate the potential impact on employment, supply chain, and commodity prices.
- Disclosure: format and content of disclosure.

Despite its simplicity in format, this template covers most elements put forward in international frameworks, such as those published by Climate Bonds Initiative, Glasgow Financial Alliance for Net Zero, and Transition Plan Taskforce. It serves as a skeleton and leaves entities the flexibility to fill in as much "flesh" (i.e., detailed reasoning or measures, as well as advanced modeling) as they see fit. For most of the enterprises seeking financing from only domestic FIs, filling in the template should give them sufficient backing to apply for transition finance. For enterprises seeking financing from international investors, they can elaborate the plan with more granularity to compete with international peers.

[5]Wanli Bian, "There Are Five Major Challenges in the Implementation of Financial Transformation. How Can We Solve Them?" *21st Century Business Herald* (30 June 2024). www.21jingji.com/article/20240630/herald/e888ae5f604165c674230aee56b21f26.html.

Right after the publication of the template, enterprises in the chemical fiber sector were selected as the first batch of transition entities. According to their commitments, their average carbon intensity will decline by 39.8% as of year-end 2025, compared with the baseline at year-end 2020 (*National Business Daily of China* 2023).

Just Transition

Just transition has received increasing attention in recent years and was included in the G20 Transition Finance Framework. Its definition or implications may vary across countries, however, as may the approaches that FIs need to take to address it. In the Chinese context, just transition is mostly associated with social stability, such as employment, income distribution, and commodity prices.

To ensure a just and equitable transition, Huzhou has also issued an assessment methodology with multiple quantitative and qualitative indicators to help firms evaluate, disclose, and mitigate the potential social impact of their transition planning. **Exhibit 8** presents a list of indicators used in the methodology.

Exhibit 8. Indicators in the Just Transition Assessment Methodology

Dimension	Indicator	Indicator Specification
Impact on Employee	Employee stability	Changes in the number of employees
	Equitable distribution of income	Changes in the income level of frontline manufacturing workers
	Employee growth plan	Status of staff training, including plans to provide training for new or upgraded skills and to support workers affected by corporate-level transition to access career opportunities and decent jobs
Impact on Supply Chain	Supply chain resilience	Impact on (the number of) small and micro firms in the upstream and downstream of the supply chain
	Price effect	Provision of affordable energy
		Provision of affordable raw materials
Sustainable Development Impact	ESG performance	A firms' own ESG score compared with that of the same period last year
		ESG score ranking compared with those of enterprises in the same industry in the city

Source: Huzhou municipal government.[6]

[6]The full table was provided by the Huzhou government in a research interview. Numeric thresholds were omitted by the author as they were not publicized. The public version can be accessed at https://custom.huzhou.gov.cn/DFS/file/2023/07/28/20230728164430854xcmln3.pdf?iid=570150.

Evaluation indicators are both quantitative and qualitative, depending on the status quo of sectors and regions. For dimensions where quantitative indicators are available, thresholds are provided as hard cutoffs. Meanwhile, some questions may not be applicable to certain enterprises and thus will be omitted. Data are extracted from the One-Stop Service Platform, other governmental agencies, and disclosure by the enterprises.

Such evaluation takes place as a component of ESG risk management before the approval of loans. It has also been included in post-loan monitoring: In the case of any deteriorating performance that triggers a risk alert, contingency plans will be activated. Banks are encouraged to actively engage with clients on the importance of just transition.

So far, in small-scale pilot tests, negative scores are mainly concentrated in small enterprises—partially because of the absence of clear employee growth plans or the presence of declining ESG scores—which may be explained by small enterprises' limited capacity for corporate governance.[7] Even though it is considered the social responsibility of enterprises to help employees grow, smaller enterprises may find doing so burdensome, particularly when they already face downward pressure from climate transition, such as income decline. Further capacity building is still needed from government agencies that oversee social welfare and employment, as well as research institutions and civil society organizations. SMEs in other economies may find this challenge relatable to their own corporate transition planning.

Incentives

In addition to the incentives for green finance, the Huzhou government has mobilized fiscal resources for transition entities. For transition entities that meet the committed progress of their transition targets, the government will provide subsidies of up to 0.5% of the entity's total loan amount in that year, with a maximum of CNY300,000 per entity. For entities that disclose transition information and achieve a just transition, the subsidy can increase by 10% (People's Government of Huzhou 2023b).

Meanwhile, banks in Huzhou have designed specialized financial products, such as "transition loans" and "carbon efficiency loans," whose lending terms are linked to transition targets and carbon efficiency performance. As of May 2024, a cumulative total of CNY56.552 billion in carbon efficiency loans has been issued (People's Government of Huzhou 2024b).

Bridging the Data Gaps

To enhance transparency and ensure measurability, reportability, and verifiability of performances, Huzhou developed a municipal-wide "carbon account" platform. Using digital technologies, the platform aggregates data from government

[7]Huzhou City Government, "Just Transition Practices in Huzhou," Presentation made by Huzhou government officials to the German Agency For International Cooperation, Huzhou, China (May 2024).

agencies, FIs, and third-party service providers to create a unified and consolidated emissions database. Through built-in algorithms, the platform can automatically draw data on the usage of electricity, oil, gas, coal, and heating and then calculate the carbon emissions, intensity, carbon efficiency ratings, and loan-associated carbon footprints, while matching the emissions within the time frame of loans, with just a few clicks. The platform not only helps enterprises keep track of their own progress but also helps FIs develop transition finance products.

To date, the carbon account platform has covered 31,000 enterprises, taking up more than 70% of the corporate clients of Huzhou's banks and accounting for 80% of the city's energy consumption and carbon emissions from the production sector (Huang 2022). It significantly reduces the costs of carbon accounting for enterprises and verification for FIs while enhancing the credibility of transition actions and financial products.

Conclusion

Reasons for Achievements

The most important reason for Huzhou's achievements is the reduction of costs for green and transition finance, given that these costs are a core challenge faced by FIs and firms worldwide. Particularly with the rise of transition finance, even more costs will be associated with data verification and labeling. In the case of Huzhou, however, a huge proportion of such costs is borne by the government through digital measures. With integrated and automated digital platforms, costs are saved in many aspects—such as data tracking, carbon accounting, and verification and certification—and market players are more incentivized to act in a green or transition-enabling manner. Whether Huzhou's achievements can be replicated in other municipalities is a hard question to answer.

Some additional reasons for Huzhou's success cannot be neglected:

- **Decent fiscal space and governance capacity:** Huzhou is located in one of the most affluent provinces in China, and its steady economic growth allows room for policy incentives, particularly fiscal subsidies. Meanwhile, the governance capacity of the local government is relatively high compared with that of average Chinese municipalities in terms of policy research, formulation, implementation, and cross-agency coordination. Plus, the Huzhou government has a high commitment to green development. In particular, cross-agency coordination has facilitated the provision of data infrastructure, while the fiscal space bears the costs of such public goods.
- **Lighter industrial structure:** Huzhou's industrial landscape, characterized by a predominance of light industries such as textiles and wooden furniture, has also made its climate transition easier. Its emission intensity may be high compared with that of its peers in the same province, but the intensity is not among the highest emissions in China. These light industry sectors face relatively lower pressures compared with heavy industries—the latter may already be challenged in terms of business sustainability and thus have

a more dire need to transition. For example, the market demand for textiles is still growing, and transition is somehow perceived as something "good to have." In other cities with higher reliance on heavy industries—such as steel, which has seen a sharp drop in demand—transitioning these industries in an orderly and just manner will be much more difficult.

- **"Learning by doing" mindset:** Notably, Huzhou's capacity to learn from global best practices and adapt them to its local context has been a cornerstone of its achievements. The city has embraced innovative approaches, especially technologies, to improve efficiency and reduce search and verification costs. It has also adopted a pragmatic rationale that prompts FIs to get started first and improve later, with the realistic expectation that it is impossible for smaller FIs to directly copy the pattern or efforts of the "big names" (i.e., global FIs) given capacity constraints and the actual demands. Starting with a small quantity, however, does not necessarily mean a compromise in quality.

Taking the example of transition planning, the brief template has covered all major aspects in global frameworks and can be further expanded when conditions allow. In such dynamic processes, FIs will be able to cultivate their unique understanding of green and transition finance in alignment with the local context and enhance their capacity gradually. The lessons learned through pilots will also feed into the provincial and national-level policymaking.

Future Challenges

Huzhou's experience with fiscal incentives illustrates its effectiveness in jump-starting green finance activities. However, fiscal incentives cannot last forever. There is an urgent need to create a self-sustaining green finance ecosystem that reduces reliance on continuous fiscal support.

Meanwhile, FIs in Huzhou have also mentioned that profitability lies at the heart of green and transition finance. In some cases, their green or transition finance products can meet the profitability criteria only with the subsidies; in other cases, FIs are willingly giving up some profitability in these products to demonstrate their responsibility. But with the downward trend in interest rates, there may be more pressure on the business sustainability of these actions. Banks interviewed during the writing of this chapter expressed their expectation that what Huzhou has accomplished will foster a culture of green preference among consumers and investors, with the hope of ensuring that financial products remain commercially viable. How soon this expectation can be achieved, however, remains a question.

Another challenge lies in the diversification of financial products. Loans have been the dominant product in Huzhou's green financial market. From an enterprise perspective, loans typically have a lower risk appetite compared with equity, making them less suitable for high-risk, high-reward ventures such as early-stage decarbonization technologies. Relying heavily on loans may increase the debt burden on businesses, limiting their financial flexibility

and performance. The time frame is also an issue: Loans often come with shorter repayment periods relative to "patient capital" (e.g., pension fund or sovereign wealth funds), and these shorter time frames may not align with the long development cycles and uncertain payoffs associated with many decarbonization technologies. As the whole society continues to decarbonize, there is a growing need for more risk-tolerant and patient capital, as well as more structured financial products to cater to market demands.

Last but not least, the constant evolution of regulatory requirements, taxonomies, and standards is both a challenge and an opportunity for Huzhou and other municipalities striving to lead in green and transition finance. Although these updates can be demanding and resource intensive, they are essential for aligning financial practices with climate and sustainability goals in a rapidly evolving global landscape of regulatory requirements.

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