



Exploring the Green FinTech Ecosystem in Asia: *Insights from Five Economies in APEC*

A study conducted by

WORKING PAPER



Corporate partner | ANT GROUP

FOREWORD

We are at a tipping point of changing climate in a changing world. Extreme weather with the ensuing natural disasters is happening at such a scale and frequency that there is a clear and present danger in the risks we will be facing if we fail to take adequate action urgently.

To keep global warming below 2°C above pre-industrial levels, the world will have to come together to slash global emissions by a quarter by 2030. This is the upper limit for warming set by the United Nations to avoid escalating climate risks and triggering climate ‘tipping’ points that have huge repercussions across the global economy and society. Are we on track to take the necessary actions that can turn net-zero pledges into measurable actions?

Faced with this new paradigm, it is clear that Capital and Technology are the twin engines to work in tandem to deliver tangible actions. Green FinTechs are at the forefront of a wave of innovations delivering rippling effects across the world. This Working Paper aims at offering a glimpse of trends and momentum for a selection of 5 locations among the APEC members with a particular focus on the:

- *overall state of the Green FinTech Ecosystem*
- *governmental & regulatory initiatives*
- *supporting institutions*



The 5 locations, **Hong Kong SAR (China)**, **Indonesia**, **the Republic of Korea**, **Singapore**, and **Thailand**, delineate a representative Asian spectrum of different stages of development in this space. The aim is to learn from each other and understand the best practices in different socio-economic contexts, with a forward-looking and collaborative lens.

FOREWORD

This study is an effort to bring together a snapshot of this fast-moving landscape based on available data and exchanges we had the privilege to be part of and bring together. We foresee that continuous efforts need to happen for us to better understand the rapid shifts in the agenda of Sustainability and Green FinTech, and look forward to continuing this exercise in the future.

It is no simple feat to gather input across regulators, government agencies, FinTech practitioners, and corporations in the ecosystem. While by no means exhaustive, we hope this study will bring together a credible set of information and perspectives that will inspire more sustainable actions from us all. We are humbled to have this opportunity to join forces on this important agenda.

Happy Reading!



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01

EXPLORING THE GREEN FINTECH ECOSYSTEM IN ASIA:
INSIGHTS FROM FIVE ECONOMIES IN APEC

PURPOSE

METHODOLOGY

PURPOSE & METHODOLOGY

The purpose of this study is to explore ways to facilitate Green FinTech development through insights obtained from 5 APEC economies, namely **Hong Kong SAR, China (Hong Kong), Indonesia, Singapore, the Republic of Korea (Korea), and Thailand**. Through the analysis of current developments, and responses from industry practitioners, this study aggregated data points and input across sectors to provide insights for policymakers, corporate decision makers, FinTech startups, and others in the ecosystem to collaboratively advance the Sustainability agenda in the APEC region. Green FinTech is defined as business activities that utilise technologies in financial activities that bring better environmental outcomes. Thus, Green FinTech should consist of the following 3 elements: environment, finance, and technology. Diagram 1 illustrates the relationship and difference between Green FinTech and related terms.

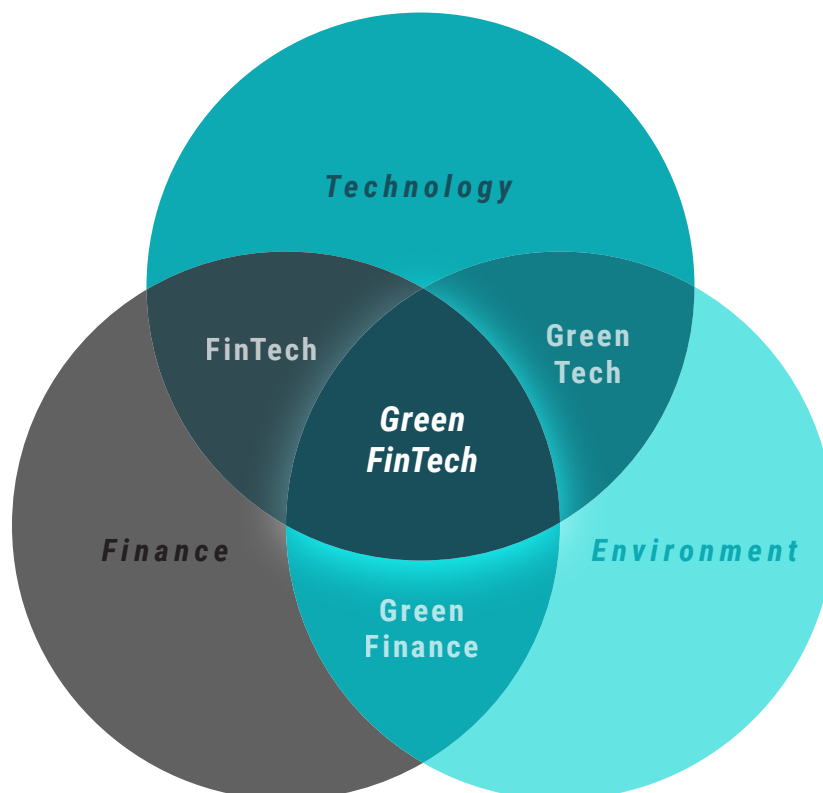


Diagram 1 | Venn Diagram - Green FinTech

This study employed a 6-step methodology to explore the Green FinTech ecosystem in Asia. A summary of the 6-step methodology is provided in Diagram 2. First, we conducted desk research to collect information about Green FinTech development in the 5 APEC economies. This study focused primarily on the 4 essential players in the ecosystem: Green FinTech startups; the government/quasi-government organisations; Green-FinTech-related associations; and financial institutions. Regarding financial institutions, this study focused on the top 3 largest banks by market capitalisation in each economy. Data collection was gathered from approximately 120 public sources, websites, media coverage, and industry reports in the period 1 April 2022 to 15 September 2022.



Diagram 2 | 6-Step Methodology

Second, to obtain a first-hand perspective on the Green FinTech developments of the 5 economies, we interviewed various industry experts, practitioners, and government and quasi-government bodies from 6 July 2022 to 26 August 2022. The industry experts ranged from startups and large corporations to financial institutions and industry associations. Each interview lasted between 60-90 minutes. A list of consultation questions (see *Table 1.1 and 1.2*) was sent to the interviewees before the interview.

The interviews followed a semi-structured procedure whereby the consultation questions as well as follow-up remarks were asked.



- 1 *How would you characterise the Green FinTech ecosystem in your market?*
- 2 *At what stage of maturity would you say most of the Green FinTech players are at?*
 - early startups
 - growth stage
 - mature stage
- 3 *Can you provide examples of how Green FinTech initiatives have led to new business opportunities?*
- 4 *What would you consider to be the top 3 criteria required by FinTechs to drive success for GreenTech initiatives in your market?*
- 5 *Would you say that Green FinTech initiatives influence the risk management of financial institutions?*
- 6 *How would you describe the underlying incentives that motivate FinTech firms to employ green or sustainable initiatives?*
- 7 *Have you noticed ways in which Green FinTech initiatives have accelerated the progression of sustainable finance in the region?*
- 8 *Would you say that public-private partnerships (PPPs) have played a significant role in accelerating sustainable financing in the region?*

Table 1.1 | Interview Questions (1-8)

9	Please group the following factors in order from the most important to the least important as the biggest barriers to the expansion of Green FinTech in your economy.
	<ul style="list-style-type: none"> • too much regulation • lack of skilled personnel • lack of government support • too little regulation • lack of financing • lack of education • lack of business demand
10	Based on your observations, which are the most important industry sectors in terms of advancing the adoption of Green FinTech development?
	<ul style="list-style-type: none"> • government / regulators • corporates • FinTech startups • academia
11	What would you describe as the most obvious impact of sustainable FinTech initiatives on financial institutions regarding the environment?

Table 1.2 | Interview Questions (9-11)

Third, to help the audience understand the current Green FinTech startup landscape, key Green FinTech initiatives in each economy have been listed. The Green Digital Finance Alliance and Swiss Green FinTech Network’s classification framework was used to determine if a startup qualified as Green FinTech.¹ Table 2 shows the 8 Green FinTech categories.

Green Digital Payment & Account Solutions
<p>Payment and account solutions integrating green features. Use cases:</p> <ul style="list-style-type: none"> • automated carbon / plastic / water footprint accounting (based on transaction data) • automated offsetting of green externalities
Green Digital Investment Solutions
<p>Digital platforms that provide automated solutions, algorithm-driven green financial planning & investment services with little to no human supervision. Use cases:</p> <ul style="list-style-type: none"> • retail algorithmic trading with a focus on green assets • automated green investment advice • automated green portfolio allocation • risk assessment according to environmental criteria
Digital ESG Data & Analytic Solutions
<p>Solutions for automated green data collection & analytics for finance, including automated green asset rating & indexing. Use cases:</p> <ul style="list-style-type: none"> • credit scoring algorithms that integrate green data in the credit decision • automated ESG rating of companies & funds • digital green indexing

Table 2.1 | Green FinTech Categories (1-3) - by Green Digital Finance Alliance & Swiss Green FinTech Network

Green Digital Crowdfunding & Syndication Platforms

Digital platforms for capital raising from a large number of individuals / from institutional investors to finance new green business ventures / projects. Use cases:

- green equity crowdfunding
- green loan crowdfunding
- green donation crowdfunding

Green Digital Risk Analysis & InsurTech

Solutions that help optimise green insurance products & services, as well as solutions to minimise physical climate & nature-related risks. Use cases:

- automated risk evaluation & monitoring tools
- digital green insurance
- dynamic pricing & underwriting of green assets
- smart contracts for green claims handling
- IoT for green asset insurance (e.g. real-estate, electric vehicles)

Green Digital Deposit & Lending Solutions

Digital savings solutions are used to finance environmentally beneficial projects. Digital loans to finance projects / loans linked to green behaviours. Use cases:

- green digital loans
- green linked / transitioned loans with automated monitoring
- green digital mortgages

Green Digital Asset Solutions

Tokens & cryptocurrencies with green properties & blockchain capital market infrastructure built for green use cases. Use cases:

- green utility tokens as a reward for lowering carbon emissions
- green asset tokens (e.g. a tokenised carbon credit / biodiversity offset)
- green cryptocurrencies designed to be spent on green products only
- green Security Token Offering (STO) issuance platforms; designed to enable green proof of impact reporting with a green STO framework for the issuance process

Green RegTech Solutions

Applications of technology-enabled innovation for regulatory, compliance & reporting requirements implemented by a regulated institution / a financial supervisory authority. Use cases:

- using digital technology to analyse disclosed green & financial data to automatically calculate a green taxonomy alignment % of a financial product (e.g. a fund)
- leveraging Natural Language Processing capabilities of AI to automatically monitor the quality of green banking disclosures

The 5 selected APEC economies were in different stages of FinTech and green development. Thus, the analysis of different economies' Green FinTech development provided a better understanding of how the build-up of a Green FinTech ecosystem is affected by current FinTech and green development. This study takes into consideration various metrics and indices in 6 areas that have an impact on the development of a Green FinTech ecosystem. Table 3 provides a brief introduction to those metrics and indices.

KEY DEVELOPMENT Population ² GDP per Capita ³ Human Development Index ⁴ World Competitiveness Ranking ⁵	FINTECH Global Index Rankings ⁹ Global Top 50 FinTech Hubs ¹⁰
GREEN FINANCE Global Green Finance Index ⁶ Indexes' Portfolio Sustainability Ranking ⁷	TECHNOLOGY Smart City Index ¹¹ Digital Competitiveness ¹² Global Innovation Index ¹³
TALENTS Talent Ranking ⁸	ENVIRONMENT Green Future Index ¹⁴ Global Sustainability Rankings ¹⁵

Table 3 | Metrics - Development of Green-FinTech-Related Areas

Fourth, this study analysed interviewees' responses using a cross-interview approach. The analysis focused on 5 areas:

- *current Green FinTech development*
- *top 3 barriers in developing Green FinTech*
- *suggestions for building up the Green FinTech ecosystem*
- *private-public partnership*
- *key players in the ecosystem*

Fifth, results from desk research and interviews were categorised into the following 5 dimensions:

- *Green FinTech startups*
- *financial institutions*
- *government support*
- *collaboration*
- *awareness*

Using a 5-point scale, a rating was given to each dimension to determine the dimension's development in the chosen economies. The scale was based on the analysis of desk research and interviewees' responses. A brief explanation of the assessment of the scale for each dimension is provided in Table 4A and 4B. Table 4A provides a brief explanation of the assessment metric for each dimension, while Table 4B provides a brief explanation of the criteria for scales in each dimension.

GREEN FINTECH STARTUPS

- no. of Green FinTech startups
- their operating history & media coverage
- their collaborations with other partners

GOVERNMENT SUPPORT

- support to Green FinTech startups
- help in facilitating Green FinTech collaboration
- initiatives in helping financial institutions to use technology to deliver green services

FINANCIAL INSTITUTIONS

- amount of technology adopted for delivering green financial services
- level of technology used in delivering green financial services

COLLABORATION

- between government & startup
- between government & financial institution
- between startups
- between startup & financial institution

AWARENESS

- Green FinTech activities by industry associations
- Green-FinTech-related incubators/accelerators
- public awareness towards Green FinTech

GREEN FINTECH STARTUPS

<p>No startups are working in the field of Green FinTech</p> <p>1</p>	<p>Started to develop in the field of Green FinTech</p> <p>2</p>	<p>Utilising technology to improve existing green financing services</p> <p>3</p>	<p>Utilising technology to analyse green data to provide green finance solutions for the market</p> <p>4</p>	<p>Able to provide a wide range of green solutions to users in both the local & international markets</p> <p>5</p>
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GOVERNMENT SUPPORT

<p>No initiative in pushing the Green FinTech agenda</p> <p>1</p>	<p>Initiatives in pushing the green agenda; but very limited in the Green FinTech agenda</p> <p>2</p>	<p>Some initiatives in pushing the Green FinTech agenda</p> <p>3</p>	<p>Some initiatives in pushing the Green FinTech agenda; especially in providing support to the use of technology in green finance services; encouraging collaboration among different stakeholders</p> <p>4</p>	<p>A wide range of initiatives in pushing the Green FinTech agenda & providing support to different stakeholders in the field</p> <p>5</p>
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FINANCIAL INSTITUTIONS

<p>No green financial services are provided</p> <p>1</p>	<p>Green financial services are provided; but very limited technology is used in delivering those services</p> <p>2</p>	<p>A few technologies are used in delivering a wide range of financial services for better green outcomes</p> <p>3</p>	<p>Some technology is used in delivering financial services for better green outcomes</p> <p>4</p>	<p>A wide range of technology is used in delivering financial services for better green outcomes</p> <p>5</p>
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Table 4B.1 | A Brief Breakdown - Scales for Each Dimension

COLLABORATION

<p>No collaboration is initiated in the field of Green FinTech</p> <p>1</p>	<p>Limited collaboration is initiated in the field of Green FinTech, but this is ancillary to another agenda e.g. FinTech</p> <p>2</p>	<p>Collaboration is initiated in the field of Green FinTech between different institutions</p> <p>3</p>	<p>Collaboration is initiated in the field of Green FinTech between different industry & business sectors; with some government involvement</p> <p>4</p>	<p>Collaboration is commonly found in the field of Green FinTech among different stakeholders</p> <p>5</p>
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AWARENESS

<p>Practitioners & the public are not aware of Green FinTech development</p> <p>1</p>	<p>Practitioners have started to be aware of Green FinTech development; but the public is not aware of it</p> <p>2</p>	<p>Practitioners are aware of Green FinTech development; the public has started to be aware of it, but has not yet recognised the business advantages</p> <p>3</p>	<p>Practitioners are well-aware of the Green FinTech development; the public is aware of it, has recognised the business advantages & is actively trying to do more of it</p> <p>4</p>	<p>Both practitioners & the public are well-aware of Green FinTech development; it has embedded itself into their normal business-as-usual activities</p> <p>5</p>
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Table 4B.2 | A Brief Breakdown - Scales for Each Dimension

Sixth, based on the analysis of Green FinTech development in each economy and practitioners' responses, this study provided key findings and insights that contribute to the development of Green FinTech ecosystems. In addition, this study suggested further recommendations based on the current literature and development of Green FinTech outside Asia.

The information for the whole report is for general information purposes only. The team has exercised reasonable due diligence in collecting data about Green FinTech development for each APEC economy.

However, some information provided in this report may be outdated, incomplete, incorrect, or subjective due to new developments after data collection, mistakes in data collection, different points of view, and limited population of interviewees.

In addition, different economies have their own structure and characteristics, so the 5-point scale should not be used for the comparison of different economies.

APEC MEMBERS

UP CLOSE

HONG KONG SAR, CHINA

SINGAPORE

THAILAND

THE REPUBLIC OF KOREA

INDONESIA



5 APEC MEMBERS UP CLOSE

HONG KONG SAR, CHINA

The Green FinTech ecosystem in Hong Kong is in the scaling-up stage with several startups working on using advanced technology to provide verifiable ESG data to meet companies' green reporting needs. Associations are promoting the use of technology in the financial sector to better align with the United Nations Sustainable Development Goals; and in 2017, Moment FinTech launched the first ESG FinTech accelerator for ESG-focused FinTech startups in Asia. Financial institutions have increased the use of technology to deliver green financial services and some institutions have partnered with other tech startups to develop green financial services. Similarly, the Hong Kong Government is increasing Green FinTech support and has initiatives to aid in the development of the ecosystem, such as a prototype for carbon credits attached to green bonds. The following examples are selected key Green FinTech initiatives:

GREEN FINTECH STARTUPS

- Allinfra
- Carbonbase
- CarbonX Global
- ESG Matters
- MioTech
- PortageBay

ASSOCIATIONS

- FinTech Association of Hong Kong
- Hong Kong Green Finance Association

FINANCIAL INSTITUTIONS

- Bank of China (Hong Kong) Digitalised mortgage services & e-Donate Platform
- Hang Seng Bank Digitalised charitable donation channel & green investment platform
- HSBC Hong Kong Broad-based biodiversity-screened equity indices

GOVERNMENT SUPPORT

- FinTech 2025 Strategy
- Project Genesis 1.0
- Project Genesis 2.0
- Green & Sustainable Finance Grant Scheme
- Green & Sustainable Finance Cross-Agency Steering Group

INCUBATORS & ACCELERATORS

- Cyberport
- Hong Kong Science & Technology Parks
- FinTech Proof-of-Concept Subsidy Scheme
- Moment FinTech ESG-focused FinTech accelerator

PARTNERSHIPS

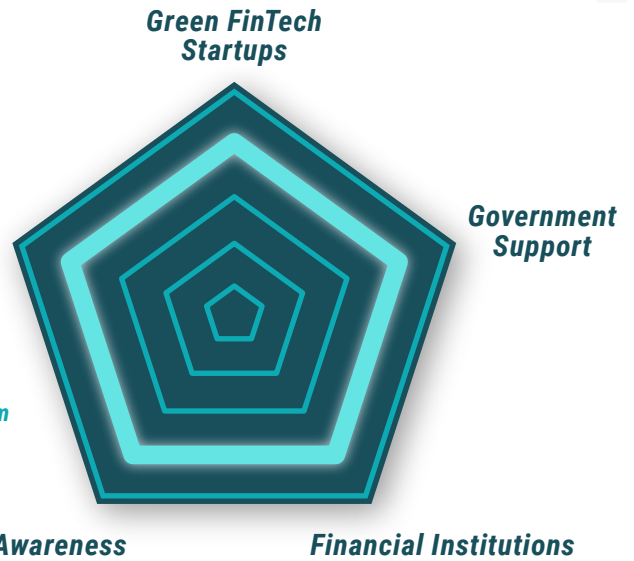
- Broad-based biodiversity-screened equity indices (HSBC, Euronext & Iceberg Data Lab)
- Cyberport
- Project Genesis 1.0
- Hong Kong Science & Technology Parks
- Project Genesis 2.0

KEY FACTS & FIGURES



Collaboration

Green FinTech Ecosystem



KEY DEVELOPMENT

Population 7,413,100

👤 = 1,000,000

GDP per Capita US\$ 49,660.6

💰 = US\$ 1,000

Human Development Index | 2019

Rank: 4 / 189

World Competitiveness Ranking | 2022

Rank: 5 / 63

GREEN FINANCE

Global Green Finance Index | 2022

Rank: 39 / 81

Indexes' Portfolio Sustainability Ranking | 2021

Rank: 4 / 48

TALENTS

Talent Ranking | 2021

Rank: 11 / 64

FINTECH

Global Index Rankings - City | 2021

Rank: 9 / 264

Global Top 50 FinTech Hubs | 2021

Rank: 14 / 50

TECHNOLOGY

Smart City Index | 2021

Rank: 41 / 118

Digital Competitiveness | 2021

Rank: 2 / 64

Global Innovation Index | 2021

Rank: 14 / 132

ENVIRONMENT

Green Future Index | 2021

Rank: 64 / 76

Global Sustainability Rankings | 2021

N / A



GREEN FINTECH STARTUPS

- Allinfra
- Carbonbase
- CarbonX Global
- ESG Matters
- MioTech
- PortageBay

Hong Kong has several startups working in the field of Green FinTech. Their focus is primarily on ESG data analytics and ESG reporting preparation. For example, Allinfra provides verifiable data for ESG reporting with blockchain technology. ESG Matters provides a report which fulfils the ESG disclosure requirement by the Hong Kong Stock Exchange. MioTech provides a dataset covering over 1,000 ESG data points for different financial purposes. Regulatory ESG disclosure for listed companies in Hong Kong is the key driving force behind the increasing demand for ESG reporting, which in turn helps to create the ecosystem for Green FinTech startups to develop.

Allinfra ¹⁶

Allinfra has developed an enterprise software - Allinfra Climate, to provide auditable and verifiable data for ESG reporting with blockchain technology. The company helps to provide digital environmental financial products, like digital RECS/emission reductions.

Carbonbase ¹⁷

Carbonbase provides ESG solutions for enterprises, including carbon management software, carbon offsetting, and green employee engagement plans. Carbonbase also provides a personal carbon footprint calculator service for individual users.

CarbonX Global ¹⁸

CarbonX Global provides a platform for investors to invest in green startups and for consumers to have access to the services and products provided by green startups.

ESG Matters ¹⁹

ESG Matters has created a data system - ESG Dashboard, which is used to collect environmental data, estimate carbon pricing, and provide ESG reports. The reports meet the ESG disclosure requirements set by the Hong Kong Stock Exchange.

MioTech ²⁰

MioTech provides a dataset covering over 1,000 ESG data points for investment, credit, and risk management purposes with a Southeast Asian market focus. With the use of artificial intelligence, MioTech can extract information from holding companies, subsidiaries, suppliers, and customers, for green data users.

PortageBay ²¹

PortageBay provides an AI ESG solution - ExpertAI ESG, that helps corporates and individuals make ESG assessments on a company and avoid greenwashing.



ASSOCIATIONS

- FinTech Association of Hong Kong
- Hong Kong Green Finance Association

Two associations in Hong Kong are advocating the development of FinTech and green finance.

FinTech Association of Hong Kong ²²

The FinTech Association of Hong Kong advocates the development of the FinTech industry, explores partnership opportunities for stakeholders, and provides training for practitioners. The association has set up a committee focusing on the use of FinTech in green and ESG, and has organised 'FinTech for ESG series' webinars to raise green and ESG awareness.

Hong Kong Green Finance Association ²³

Hong Kong Green Finance Association is a platform to facilitate the development of green and sustainable finance. It has 8 working groups to help organise activities in different areas, such as green and sustainable banking, green bonds, product innovation, and ESG disclosure and integration.



FINANCIAL INSTITUTIONS

- Bank of China (Hong Kong) Digitalised mortgage services & e-Donate Platform
- Hang Seng Bank Digitalised charitable donation channel & green investment platform
- HSBC Hong Kong Broad-based biodiversity-screened equity indices

Financial institutions have launched various initiatives to utilise technology to deliver green financial services. The following are examples of some of major banks' green finance initiatives.

Bank of China (Hong Kong) ²⁴

Bank of China (Hong Kong) is collaborating with Sino Group to provide digitalised mortgage services on residential projects certified with the BEAM Plus 'Platinum' or 'Gold' Rating. The bank has launched an 'e-Donate Platform' for charitable organisations to efficiently manage their donations.

Hang Seng Bank ²⁵

Hang Seng Bank has worked on digital transformation to deliver more eco-friendly financial services by reducing their paper usage, promoting the use of digital channels for transactions, using digital channels to collect charitable donations, and offering green investment instruments.

HSBC Hong Kong ²⁶

HSBC developed a new venture capital fund to provide a way for clients to invest in GreenTech startups. To promote green investment, the bank has partnered with Euronext and Iceberg Data Lab to provide broad-based biodiversity screening equity indices for investors.



GOVERNMENT SUPPORT

- FinTech 2025 Strategy
- Project Genesis 1.0
- Project Genesis 2.0
- Green & Sustainable Finance Grant Scheme
- Green & Sustainable Finance Cross-Agency Steering Group

The Hong Kong Monetary Authority (HKMA) plays a significant role in building green finance and FinTech in Hong Kong, and has launched several initiatives to do so. Some examples of the initiatives are providing a Green and Sustainable Finance Grant Scheme, setting up the Green and Sustainable Finance Cross-Agency Steering Group, launching FinTech Regulatory Sandbox, adopting 'FinTech 2025' strategy, and implementing 'Project Genesis'.

The Green and Sustainable Finance Grant Scheme provides subsidies to eligible bond issuers and borrowers to cover their expenses incurred from bond issuance and external review services.²⁷

In 2020, HKMA and the Securities and Futures Commission set up the Green and Sustainable Finance Cross-Agency Steering Group. The group was set up to coordinate the management of climate and environmental risks in the financial industry, accelerate the development of green finance in Hong Kong, and support the government's climate strategy. The Steering Group has established 2 workflows, '**to study and address cross-sectoral regulatory issues**' and '**to coordinate cross-agency market development efforts**'.²⁸ The Steering Group will explore the development of a green taxonomy framework for use in the local market. There is progress towards mandating sectoral mandates for climate-related disclosures that align with the Task Force on Climate-Related Financial Disclosures framework by 2025. Furthermore, the Steering Group has conducted an assessment of Hong Kong's carbon market opportunities²⁹ and is working with relevant authorities to explore the opportunities as part of the Guangdong-Hong Kong-Macao Greater Bay Area cooperation.³⁰

The HKMA FinTech Regulatory Sandbox, launched in 2016, allows banks and their partnered tech companies to conduct pilot trials of their FinTech programmes, involving a limited number of participating customers, without the need to fully comply with the HKMA's regulatory requirements. This arrangement enables banks and tech companies to collect data and user feedback to improve their new programmes, which can speed up the introduction of new technology products and reduce development costs.



In 2021, the HKMA announced 'FinTech 2025' - a new FinTech strategy that aims to encourage the full adoption of technology in the financial industry by 2025.

The 5 areas of focus proposed by the strategy are: ³¹

- *all banks to go FinTech*
- *nurturing the ecosystem with funding & policies*
- *expanding the FinTech-savvy workforce*
- *creating the next-generation data infrastructure*
- *future-proofing Hong Kong for Central Bank Digital Currencies*

To enhance FinTech talent development, the HKMA has collaborated with local universities to launch the Industry Project Masters Network scheme in 2022. The scheme provides postgraduate students in possession of FinTech disciplines with an opportunity to work on banks' FinTech or industry projects under the guidance of experts from academia, and the financial and technology industry. ³² The People's Bank of China and HKMA have signed a memorandum of understanding on the supervision of financial technology innovation in the Guangdong-Hong Kong-Macao Greater Bay Area. ³³

To encourage public investment in green bonds, HKMA has collaborated with BIS Innovation Hub and other industry partners on Project Genesis. The project aims at streamlining the process of green bond issuance and providing transparency on the environmental impact of the proceeds. Two prototypes - Daml and Liberty, were developed to improve the efficiency, transparency, and convenience of the current bond issuance process. The prototypes allow investors to invest any amount into a green bond with a mobile app and sell the bond transparently on the market. In addition, the investors can check not only their accrued interest but also the amount of clean energy generated and the reduction in CO₂ emissions resulting from their investment. ³⁴ The prototype provides insights into a sample process for green bond issuance, improvements from existing problems, and a proof-of-concept process for a platform that allows trading among retail investors.

Following Project Genesis 1.0, the BIS Innovation Hub partnered with the HKMA and other institutions to initiate Project Genesis 2.0. The project aims to develop a prototype for digitalised Mitigation Outcome Interests (MOI), which is an **'instrument of carbon unit indebtedness of the bond issuer to the holders of the MOI; future repayment of the MOI is made using mitigation outcome units that are at least partly generated by activities financed by the proceeds of the bond'**. The expected solution could be one that can track real-time mitigation outcome data and provide transparency throughout a bond lifecycle. The objective of Project Genesis 2.0 is to address investor concerns about the risk of greenwashing so that investors are more willing to invest in green bonds, thus facilitating the development of the green bond market. ³⁵



INCUBATORS & ACCELERATORS

- Cyberport
- Hong Kong Science & Technology Parks
- FinTech Proof-of-Concept Subsidy Scheme
- Moment FinTech ESG-focused FinTech accelerator

The Hong Kong government has set up 2 institutions to support the growth of startups in Hong Kong. Cyberport and Hong Kong Science & Technology Parks aim to better establish the technology ecosystem and offer a wide range of support for startups in different stages. To encourage financial institutions to collaborate with startups, the government has initiated the FinTech Proof-of-Concept Subsidy Scheme. The scheme provides incentives for financial institutions to explore the application of technology in traditional financial services. In the private sector, Moment FinTech has provided an ESG-focused FinTech accelerator to help FinTech and RegTech startups to grow and partner with financial institutions. Further information about these institutions and initiatives is provided below.

Cyberport ³⁶

Cyberport is a government initiative to create a hub to connect startups and technology companies. The objective of Cyberport is to develop a technology ecosystem through talent development, incubators and accelerators, collaboration facilitation, education, and promotion. FinTech is one of its key focuses.

FinTech Proof-of-Concept Subsidy Scheme ³⁷

The FinTech Proof-of-Concept Subsidy Scheme was launched by the Financial Services and the Treasury Bureau of the Hong Kong government to encourage financial institutions to collaborate with FinTech startups to explore Proof-of-Concept projects on innovative financial products.

Hong Kong Science & Technology Parks ³⁸

Hong Kong Science and Technology Parks Corporation is a public corporation that aims to develop the technology ecosystem by providing infrastructure, funding, network opportunities, incubation, and acceleration programmes.

Moment FinTech ³⁹

Moment FinTech is an ESG-focused FinTech accelerator aimed at connecting FinTech and RegTech startups with financial institutions to develop sustainable financial services in Asia.

TAKEAWAYS FROM INTERVIEWS & FOCUS GROUPS



Current Green FinTech Development

1

Compared to 2 years ago - the development of Green FinTech is in the **scaling-up & accelerating** stage

Some startups have **emerged to cater to the needs of ESG requirements**, such as helping in ESG reporting & carbon capture verification

Examples of Green FinTech startups include **Carbonbase & CarbonX Global**

The current Green FinTech ecosystem is developing well but **requires closer collaboration** among the government, players & individuals

The government has put **considerable support into the green & sustainable finance area**, from the grant scheme to the collective efforts of regulators

A key initiative adopted by the Hong Kong Monetary Authority has been the collaboration with the Bank for International Settlements Innovation Hub Centre in Project Genesis. The project concept has tested the **potential issuance of tokenised green bonds to retail investors**. Developed prototypes have demonstrated **efficiency gains** in terms of bond preparation & origination time as well as **cost savings** for stakeholders stemming from standardisation & automation; & **facilitated the tracking** of the environmental impact of the financed projects.

Hong Kong Monetary Authority has set an **'All banks Go FinTech' initiative** as its FinTech 2025 strategy

Private-Public Partnership

2

In general - the administration is **supportive** of the public-private partnerships that expedite the development of GreenTech & contribute to the green transformation of financial institutions

The government has set up Cyberport and Hong Kong Science & Technology Parks to encourage collaboration between the government & startups **by providing funding, resources & guidance**

The Top 3 Barriers to Developing Further Green FinTech Business

3

Lack of government support for Green FinTech activities, lack of business demand & lack of talent; although Green FinTech is developing well in Hong Kong, there is still a **general lack of understanding & product knowledge** that is impeding further development



Key Players in the Ecosystem

4

The 3 key players in the ecosystem are **the government, startups & corporations**

Suggestions for Building Up the Green FinTech Ecosystem

5

Utilise associations as a network to connect stakeholders

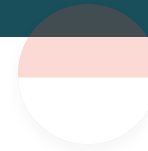
Provide support to Green FinTech startups

Help startups connect with overseas buyers

Implement talent development programmes

Provide degree programmes on Green FinTech

Educate the general public about the importance of ESG investment



5 APEC MEMBERS UP CLOSE

SINGAPORE

Singapore's Green FinTech ecosystem is in its scaling-up stage and close to the mature stage. Startups have provided a wide range of Green FinTech solutions for companies to address their sustainability concerns. Singapore FinTech Association takes the lead in promoting FinTech development and has a green and sustainable FinTech committee to encourage the use of FinTech to achieve sustainability goals. Financial institutions have actively applied technology in delivering green finance and collaborated with other companies to push the Green FinTech agenda. The government has played a significant role in implementing initiatives to build the ecosystem for Green FinTech. Overall, Singapore has a well-functioned Green FinTech ecosystem that encourages collaboration among various stakeholders in the field. The followings are selected key Green FinTech initiatives:

GREEN FINTECH STARTUPS

- CO2 Connect
- MetaVerse Green Exchange
- STACS

ASSOCIATIONS

- Singapore FinTech Association
- Singapore Green Finance Centre

FINANCIAL INSTITUTIONS

- DBS Bank Climate Impact X, LiveBetter, & green loan platform
- OCBC Bank RoboInvest platform & green loan to developers
- UOB Bank Carbon tracking platform

GOVERNMENT SUPPORT

- Project Greenprint
- Sustainable Bond Grant Scheme
- Green Finance Industry Taskforce
- Singapore Green Bond Framework
- ESGenome
- Singapore Green Plan 2030

INCUBATORS & ACCELERATORS

- FinLab accelerator
- F10 Climate FinTech incubator
- Mbanq LABS accelerator

PARTNERSHIPS

- Climate Impact X
- CO2 Connect
- Project Greenprint

KEY FACTS & FIGURES

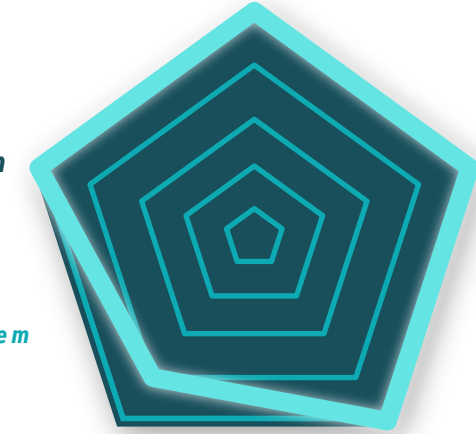


Collaboration

Green FinTech Ecosystem

Green FinTech Startups

Government Support



Awareness

Financial Institutions

KEY DEVELOPMENT

Population 5,453,570

1,000,000

GDP per Capita US\$ 72,794

1,000 US\$

Human Development Index | 2019

Rank: 11 / 189

World Competitiveness Ranking | 2022

Rank: 3 / 63

GREEN FINANCE

Global Green Finance Index | 2022

Rank: 16 / 81

Indexes' Portfolio Sustainability Ranking | 2021

Rank: 22 / 48

TALENTS

Talent Ranking | 2021

Rank: 12 / 64

FINTECH

Global Index Rankings - Country | 2021

Rank: 4 / 83

Global Index Rankings - City | 2021

Rank: 10 / 264

Global Top 50 FinTech Hubs | 2021

Rank: 8 / 50

TECHNOLOGY

Smart City Index | 2021

Rank: 1 / 118

Digital Competitiveness | 2021

Rank: 5 / 64

Global Innovation Index | 2021

Rank: 8 / 132

ENVIRONMENT

Green Future Index | 2021

Rank: 16 / 76

Global Sustainability Rankings | 2021

Rank: 48 / 180



GREEN FINTECH STARTUPS

- CO2 Connect
- MetaVerse Green Exchange
- STACS

Startups in Singapore have already provided a wide range of Green FinTech solutions for companies to address their sustainability concerns. The Green FinTech ecosystem is well established with players who are well connected. The following are examples of startups.

CO2 Connect (CO2X) ⁴⁰

CO2 Connect is a platform that provides a wide range of green finance services for companies to achieve their sustainability goals, such as tokenised carbon credit trading, green loan, and insurance, green certification, and green data analytics. CO2X is founded by 3 technology companies, namely Ascent, Evercomm, and STACS. CO2X has a strong relationship with the industry and associations. Partners include OCBC bank, UOB, EY, Bok Seng, and Singapore Transport Association.

MetaVerse Green Exchange ⁴¹

MetaVerse Green Exchange is a licensed digital asset trading platform by the Monetary Authority of Singapore for carbon credits with the use of metaverse technologies. These technologies can facilitate carbon trading without involving national ownership issues.

STACS ⁴²

STACS provides comprehensive ESG services to companies to help them meet their ESG needs. Its ESG Registry is partnered with the Monetary Authority of Singapore's Project Greenprint to provide ESG certifications and data collected from a wide range of verified sources. STACS Vetta is a smart contract platform for ESG Financial Products with automated monitoring and lifecycle management.



ASSOCIATIONS

- Singapore FinTech Association
- Singapore Green Finance Centre

The Singapore FinTech Association takes a lead role in facilitating collaboration in the field of Green FinTech.

Singapore FinTech Association ⁴³

The Singapore FinTech Association is a platform that facilitates collaboration among different stakeholders in the FinTech ecosystem through a wide range of activities, such as SFA's FinTech certification programme, Global FinTech Awards, and FinTech for Good initiative. Its Green and Sustainable FinTech Subcommittee focuses on developing FinTech solutions to achieve an inclusive, net-zero carbon and resilient economy through talent development and engagement with stakeholders. It has connected with more than 860 domestic companies and industry partners with a global network in more than 40 countries.

Singapore Green Finance Centre ⁴⁴

The Singapore Green Finance Centre aims at developing green finance markets by conducting research in the field and talent development activities. The centre is a collaboration between the Imperial College Business School and Singapore Management University, with the support of the Monetary Authority of Singapore and financial institutions.



FINANCIAL INSTITUTIONS

- DBS Bank Climate Impact X, LiveBetter, & green loan platform
- OCBC Bank RoboInvest platform & green loan to developers
- UOB Bank Carbon tracking platform

Financial institutions in Singapore have not only actively applied technology in delivering green finance services, but have also collaborated with other companies to promote the Green FinTech agenda. For example, DBS collaborated with Standard Chartered, Singapore Exchange, and Temasek to create Climate Impact X - a marketplace for carbon credits trading. OCBC collaborated with the Building and Construction Authority to provide loans and assessment tools to help developers predict the energy consumption of their projects. UOB partnered with CO2X with the help of the Monetary Authority of Singapore to develop a platform for carbon tracking solutions. The following are examples of some of the initiatives of a few major banks in Singapore.

DBS Bank ⁴⁵

DBS partnered with Standard Chartered, Singapore Exchange, and Temasek to set up Climate Impact X - a marketplace for tokenised carbon credits trading. The bank also partnered with Enterprise Singapore to provide funding for companies developing green technologies via the EFS-Green scheme. On the retail banking side, DBS launched LiveBetter - a platform to help clients invest in green funds and donate to ESG enterprises. Moreover, DBS provides a comprehensive green solutions package to their clients, including green car loans, green renovation loans, and rewards for green purchases.

OCBC Bank ⁴⁶

OCBC bank launched a range of different investment portfolios through its RoboInvest platform, some of which are ESG-centric in their investment objectives. OCBC has also collaborated with the Building and Construction Authority (BCA) in providing loans to owners, developers, and SMEs using BCA's Building Energy Efficiency Assessment tool to predict the energy performance of their buildings and assess whether their projects meet BCA standards. OCBC also provides a comprehensive green solutions package to their clients.

UOB Bank ⁴⁷

UOB has led a consortium of banks to work with SGTraDex in an initiative to enable effective, data-driven decision-making around ESG factors so that banks can better support their clients' green trade financing needs. UOB has also partnered with CO2X and OCBC to develop a platform that will provide local small and medium-sized enterprises with accessible carbon tracking solutions and green financial services through a data-driven approach.



GOVERNMENT SUPPORT

- Project Greenprint
- Sustainable Bond Grant Scheme
- Green Finance Industry Taskforce
- Singapore Green Bond Framework
- ESGenome
- Singapore Green Plan 2030

As one of the leading FinTech hubs in the world, Singapore was one of the earliest FinTech adopters in Asia and has focused on the development of technology and sustainability – the 2 main driving forces shaping financial services – with a particular emphasis on FinTech and Green Finance.

The Singapore Green Plan 2030 was proposed in the 2021 Budget Statement. This national plan, through a nationwide approach, aims to prioritise sustainable development, tackle climate change, and position Singapore to achieve net-zero emissions as soon as possible. The plan also envisaged additional schemes and funds for green finance and the harnessing of green technology to achieve the country's sustainable development goals.⁴⁸

To actively promote the use of Green FinTech, the Monetary Authority of Singapore (MAS) established Project Greenprint. The project involves a series of initiatives that strive to create a more accessible and transparent ESG ecosystem for sustainable finance via the assistance of modern technologies and data. Subsequently, MAS has announced the addition of 4 new platforms to alleviate the various data gaps that are commonly present when accessing high-quality, precise sustainability data:⁴⁹

- 1) **the Greenprint Common Disclosure Portal;**
- 2) **the Greenprint Data Orchestrator;**
- 3) **the Greenprint ESG Registry;** and
- 4) **the Greenprint Marketplace.**

MAS aims to cooperate with relevant industries to implement these 4 digital platforms and provide better-quality sustainability data for the financial industry.⁵⁰

Apart from Project Greenprint, MAS has also implemented several sustainability projects over the past few years. In 2017, the Sustainable Bond Grant Scheme was launched to support the issuance of social and sustainability bonds.⁵¹ Under the Green Investment Program, MAS issued an additional US\$2 billion in 2019 to support public market investment strategies with a strong sustainability focus.⁵²



In May 2022, The Green Finance Industry Taskforce (GFIT) published a second consultation paper on Green Taxonomy for Singapore-based financial institutions. MAS initiated the financial industry task force to increase climate-related disclosures, encourage green solutions, and advance green finance in Singapore.⁵³

This second paper aims to:

- 1) **devise a joint framework where economic activities for the building of financial products and services are classified;** and
 - 2) **establish precise goals for greenness to better combat the issues of greenwashing.**
- GFIT intends to develop the Singapore Taxonomy such that the flow of capital supports a low-carbon transition and achieves Singapore's stated environmental goals.⁵⁴

Furthermore, MAS and the Ministry of Finance introduced the Singapore Green Bond Framework in 2022, which sets out comprehensive guidelines for the public sector's green bond issuances.⁵⁵

To develop a sustainable finance research and talent ecosystem, MAS has also designated a working group comprising the 3 Centres of Excellence (*Singapore Green Finance Centre, Sustainable & Green Finance Institute, and Sustainable Finance Institute Asia*), Asia Pacific sustainability hubs established by financial institutions, and various training providers. Additionally, MAS has collaborated with the Institute of Banking and Finance Singapore to establish common standards of proficiency, knowledge, and abilities needed to perform various job roles in sustainable finance.⁵⁶

In 2022, MAS and Singapore Exchange jointly established ESGenome, an online disclosure portal that provides SGX-listed companies with a practical and well-organised means to report their ESG data to investors. As part of Project Greenprint, this initiative aims to harness technology to enhance the accuracy and precision of sustainability reporting in Singapore.⁵⁷

Climate Impact X (CIX)⁵⁸ is an exchange platform for carbon credits established by DBS Bank, Singapore Exchange, Standard Chartered, and Temasek. The platform helps users to compare, purchase, retire, and report their carbon credits, and the company verifies all credits traded on the platform.



INCUBATORS & ACCELERATORS

- FinLab accelerator
- F10 Climate FinTech incubator
- Mbanq LABS accelerator

Singapore has a well-established FinTech ecosystem. Many incubators and accelerators are tailored for FinTech/GreenTech startups, such as Mbanq LABS, FinLab, and F10.

FinLab ⁵⁹

FinLab is an accelerator programme offered by United Overseas Bank. Apart from the normal support from the bank, FinLab provides banking support to startups, such as payments, loans, and trade financing.

F10 ⁶⁰

F10 is a global technology ecosystem with an office in Singapore. F10 aims at creating collaboration among startups, incumbents, and investors. Since it was founded in 2015, F10 has incubated more than 200 startups with a total funding of US\$200 million. F10 has the world's first climate FinTech incubation programme for early-stage green startups. The 5-month programme helps startups arrive at a business-ready stage to meet the expectations of seed investors.

Mbanq LABS ⁶¹

Mbanq LABS is a FinTech startup accelerator initiated by Mbanq, which itself is also a FinTech startup. Mbanq has partnered with many Southeast Asian companies to offer comprehensive training and support to candidates.

TAKEAWAYS FROM INTERVIEWS & FOCUS GROUPS



Current Green FinTech Development

1

Overall - Singapore is now in the **scaling-up stage** & **close to the mature stage**; banks have been working in this direction for a few years already - led by the GFIT; Project Greenprint has helped connect different parties in the ecosystem

The various associations & public bodies **have collaborated very closely** to create a supportive ecosystem for further research, development & business development

Many startups **provide disclosure requirements' solutions** for companies, ranging from SMEs & large corporations to non-listed companies

The government is **very supportive of growing & internationalising the carbon markets** - from carbon calculators & carbon services to carbon exchanges; Singapore is striving to become **a carbon credit trading & services hub** for the region

Established companies / ESG-rating agencies / credit rating agencies are **trying to incorporate** tech-enabled solutions into their businesses

The key focus is now on **reporting** - such as **assisting in the construction of an ESG report** that fulfils the standards of different parties; another focus is on **how to use software** - like CRM and ERP, to track energy used & provide solutions to reduce carbon footprint; existing IoT companies are also **introducing additional ESG tools** to help track & monitor ESG data (e.g. Envision Digital has added a layer of decarbonisation insights to the data it has generated)

Startups are **working in different areas of Green FinTech** - such as carbon credit trading & the application of blockchain technology to deliver green finance solutions

There has been **close collaboration between established financial institutions** to achieve Green FinTech objectives (e.g. Climate Impact X, MetaVerse Green Exchange, STACS)

As large corporations are committed to meeting a carbon-neutral position as early as 2022, there will be **a growing demand for carbon credits**



2

Private-Public Partnership

Project Greenprint is a joint effort of the Monetary Authority of Singapore & the private sector to create a Green FinTech ecosystem

The Monetary Authority of Singapore has collaborated with Google Cloud on the **Point Carbon Zero Programme** - to drive the innovation & scaling of climate FinTech solutions in Asia

With these actions underway - the government aims to build an ecosystem of **collaboration between corporates, banks & startups**

3

The Top 3 Barriers to Developing Further Green FinTech Business

Lack of demand, lack of government support for Green FinTech activities & regulations on ESG disclosure; there is still a gap in understanding green innovation & its relevance to the financial sector, although this is **changing with more education & awareness**. In regards to ESG reporting, there is a general consensus that **more regulation**, rather than less, **is needed** to encourage further developments in Green FinTech.

4

Key Players in the Ecosystem

The top 3 key players in the ecosystem are **the government, startups & financial institutions**

5

Suggestions for Building Up the Green FinTech Ecosystem

Make green data more readily available & **standardise** the data gathering process, data quality

Standardise ESG reporting requirements

Promote the importance of going green to raise the awareness of both the public & practitioners

Implement more regulations in green disclosures & green consumption

Encourage more partnerships among different industry groups

Provide talent development schemes in the field of Green FinTech

Provide additional tax rebates / financial incentives for companies going green



5 APEC MEMBERS UP CLOSE

THAILAND

The Green FinTech ecosystem in Thailand is still at an early stage of development. There are a few startups that have started to incorporate green elements in delivering financial services. Associations are promoting FinTech but have not focused on Green FinTech yet. Financial institutions have employed ESG data to measure risk exposures. The government is pushing the green finance agenda and has a plan to encourage ESG disclosure. The followings are selected key Green FinTech initiatives:

GREEN FINTECH STARTUPS

- Gideon One
- GooGreens

ASSOCIATIONS

- Thai FinTech Association
- Thai Startup

FINANCIAL INSTITUTIONS

- Bangkok Bank Digital Banking Transformation & Environmental Management System
- Kasikorn Bank ESG risk analysis
- Siam Commercial Bank Climate Risk Management framework & SCB Abacus

GOVERNMENT SUPPORT

- Working Group on Sustainable Finance & Voluntary Global ESG Disclosure System

INCUBATORS & ACCELERATORS

- Bangkok Bank InnoHub

PARTNERSHIPS

- Bangkok Bank InnoHub
- Voluntary Global ESG Disclosure System

KEY FACTS & FIGURES



Collaboration

Green FinTech Ecosystem

Green FinTech Startups

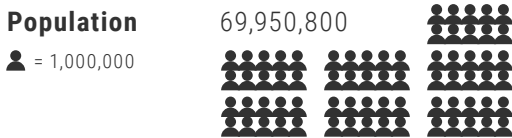
Government Support

Awareness

Financial Institutions



KEY DEVELOPMENT



GREEN FINANCE



TALENTS



FINTECH



TECHNOLOGY



ENVIRONMENT





GREEN FINTECH STARTUPS

- Gideon One
- GooGreens

In general, Green FinTech startups in Thailand are still in their preliminary stage of development. This is likely to develop further as greater awareness of the advantages of Green FinTech becomes apparent and the concepts around Green FinTech become better defined.

Gideon One ⁶²

Gideon One is a FinTech startup providing a wide range of services, including digital banking solutions, digital credentials through blockchain, and a digital market for energy trading.

GooGreens ⁶³

GooGreens is a waste management application that can help users to sell their garbage for points in the GooGreens application. The points can then convert back to cash as a reward.



ASSOCIATIONS

- Thai FinTech Association
- Thai Startup

Associations in Thailand are working on building up a network to connect different stakeholders in the technology industry. For example, the Thai FinTech Association's primary goal is to create an ecosystem for FinTech startups. However, they have yet to focus specifically on Green FinTech.

Thai FinTech Association ⁶⁴

Thai FinTech Association aims at developing the ecosystem for the FinTech industry. The association carries out FinTech seminars, networking events, API exchanges, cooperation with academia, and fundraising activities.

Thai Startup ⁶⁵

Thai Startup aims at creating a startup ecosystem by connecting startups with different parties through networking events and digital hackathons. In addition, the association provides help and mentoring programmes for startup members.



FINANCIAL INSTITUTIONS

- Bangkok Bank Digital banking transformation & environmental management system
- Kasikorn Bank ESG risk analysis
- Siam Commercial Bank Climate Risk Management framework & SCB Abacus

Financial institutions in Thailand are utilising digital transformation to reduce their carbon footprint when providing financial services. To enhance public awareness of sustainable investments, Bangkok Bank is actively promoting the importance of environmental preservation and how investors can influence positive environmental outcomes with their investments. Financial institutions are also currently focused on social values such as financial inclusion. For example, Siam Commercial Bank has launched SCB Abacus to allow more people in Thailand to access financial services conveniently and cheaply. The following are examples of the initiatives of a few major Thai banks.

Bangkok Bank ⁶⁶

Bangkok Bank has included ESG factors as a key consideration in operations and lending activities. The bank continues its digital banking transformation to help deliver financial services with lower GHG emissions. To enhance customer awareness of sustainable investment, the bank utilises its online platform to disseminate the importance of environmental challenges. Internally, the bank has implemented an Environmental Management System to measure its own impact on the environment.

Kasikorn Bank ⁶⁷

Kasikorn Bank employs technologies in data analysis to help assess the ESG risks for the financial products it offers. In consumer banking, the bank has adopted a green process design to deliver financial services with digital technology to reduce negative environmental impact. In the overall green ecosystem, Kasikorn bank is a member of the Carbon Markets Club that supports the development of carbon credit and renewable energy certificates. In addition, the bank has joined a working group together with the Bank of Thailand and the Thai Bankers' Association to conduct a feasibility study on a green taxonomy.

Siam Commercial Bank ⁶⁸

Siam Commercial Bank incorporates climate risk in its risk management framework and considers climate risk in its financing process. Apart from green financing activities, the bank is focused on financial inclusion and has initiated the SCB Abacus. The SCB Abacus is a digital financial platform with AI technology that promotes financial inclusion in the region.⁶⁹



GOVERNMENT SUPPORT

- Working Group on Sustainable Finance & Voluntary Global ESG Disclosure System

Like other Asian economies, Thailand has also begun developing and expanding its usage of FinTech and Green Finance in recent years.

Thailand aims to create a more sustainable future and economy by meeting the '17 Sustainable Development Goals' outlined in the UN's Agenda and reducing its greenhouse gas emissions by 20-25% from its business-as-usual level, as signed in the Paris Agreement.⁷⁰

In August 2021, the Working Group of Sustainable Finance, comprising Thailand's Ministry of Finance, Bank of Thailand, Securities and Exchange Commission, Thailand (SEC), and others, published the Sustainable Finance Initiatives for Thailand. The Sustainable Finance Initiatives outlined a list of critical actions and Key Strategic Initiatives required to transition the Thai financial sector into a more sustainable one by December 2025. The Initiatives also call for the financial sector to receive direct capital flows toward sustainable growth and adopt risk management frameworks to effectively monitor and reduce financial risks from environmental factors, including climate change, resource depletion, and environmental degradation.⁷¹

Likewise, the Bank of Thailand has also laid out new policies in its February 2022 publication on 'Repositioning Thailand's Financial Sector for a Sustainable Digital Economy'. The 3 main objectives set for the financial sector are:

- 1) **utilise technological advancements in the financial sector** to drive innovation and supply customers with inclusive financial services and protection;
- 2) **assist businesses and households in transitioning** to a digital economy while guiding and reducing adverse environmental impacts, and
- 3) **build resilience in the financial sector** to contain and mitigate systemic and transition risks in a rapidly shifting environment.

These objectives will help to enhance financial services and consumer protection, reduce risks of financial instability, and gradually lead to the sustainable transformation of the financial sector.⁷²



More recently, on June 14, 2022, The SEC announced its latest collaboration with Climate Disclosure Project (CDP) - a non-profit organisation. CDP runs a voluntary global ESG disclosure system and reports on the environmental impacts of various businesses, individual investors, and cities. Together, they aim to raise awareness of environmental disclosure by following the proposals of the Task Force on Climate-related Financial Disclosures (TCFD). Areas of focus include:

- 1) **enhancing** the quantity and quality of environmental disclosures from Thailand's financial institutions by developing necessary programmes;
- 2) **conducting** a series of workshops and reports for businesses and policymakers to have greater alignment with the TCFD disclosure framework; and
- 3) **sharing** related data between CDP, SEC, and associated policy actors to implement the list of critical actions outlined in Thailand's Sustainable Finance Initiatives.⁷³

Thailand's domestic green bond market has continued to gather pace. In particular, the government's sustainability bonds are favoured by both local and foreign investors. As mentioned in Thailand's Public Debt Management Office's (PDMO) Sustainability Bond Annual Report 2021, State Owned Enterprises (SOEs) have successfully issued green and social bonds, resulting in TH฿218.65 billion (US\$6.53 billion) worth of ESG bonds outstanding in the market. More than 10 Thai issuers have issued ESG bonds in local and foreign currencies. The PDMO has committed to the issuance of 15-year sustainability bonds in every quarter of the 2022 Fiscal year.⁷⁴



INCUBATORS & ACCELERATORS

- Bangkok Bank InnoHub

The following is an example of an incubator and accelerator programme that helps digital startups to grow.

Bangkok Bank InnoHub ⁷⁵

Bangkok Bank InnoHub is a FinTech accelerator programme provided by Bangkok Bank. It is a 12-week programme in which successful startups are given the opportunity to collaborate with Bangkok bank to expand into overseas markets.

TAKEAWAYS FROM INTERVIEWS & FOCUS GROUPS



Current Green FinTech Development

1

Overall - the development of Green FinTech is still **at an early stage**; current FinTech startups **have yet** to show a strong interest in Green FinTech

Instead - **traditional financial institutions & large corporations** have been seen to be the main drivers behind Green FinTech, with some large institutions **investing in research & development** to improve these offerings

The growth in green bonds has also been driven by large corporations & financial institutions

Green FinTech startups are **limited** right now but some specific areas (e.g. green financing) are seeing **upscaling**

Private-Public Partnership

2

At present - there are **few public-private partnerships** dedicated to Green FinTech; such partnerships are **more apparent in pure GreenTech activities** (particularly renewable energy, electric vehicles & solar farm projects)

3

The Top 3 Barriers to Developing Further Green FinTech Business

Lack of business demand, lack of funding & lack of regulation on ESG disclosure; there is still a knowledge gap in how Green FinTech can contribute to the growth of a sustainable economy

Key Players in the Ecosystem

4

The 3 key players in the ecosystem are **corporations, the government & the general public**

5

Suggestions for Building Up the Green FinTech Ecosystem

Provide additional incentives for investors & corporations to develop & enhance Green FinTech activities

Set Up compulsory, standardised green disclosure & reporting requirements for corporations

Create a centralised green reporting & disclosure database

Encourage partnerships between international tech companies & local startups



5 APEC MEMBERS UP CLOSE

THE REPUBLIC OF KOREA

The Green FinTech ecosystem in Korea is in the early stages and moving to the scaling-up stage. The current landscape of Green FinTech startups is focused on analysing company ESG information to provide ESG assessments to their clients.

However, FinTech associations have started to promote the application of Green FinTech to meet sustainability goals and financial institutions have begun to utilise technology for sustainable finance. Likewise, the Korean government launched the Green New Deal initiative to facilitate the country’s carbon-neutral strategy. The following are selected key Green FinTech initiatives:

GREEN FINTECH STARTUPS

- Energy X
- FAIR Labs
- QuantifiedESG
- Who’s Good
- XQuant

ASSOCIATIONS

- FinTech Center Korea
- Korea FinTech Industry Association

FINANCIAL INSTITUTIONS

- Hana Bank PROVER & market maker for GHG emissions trading
- KB Financial Group ESG-based assessment & Nephron
- Shinhan Financial Group Carbon Emissions Estimation System & Shinhan ESG-Rating System

GOVERNMENT SUPPORT

- Green New Deal
- Roadmap to mandatory ESG disclosure in 2030

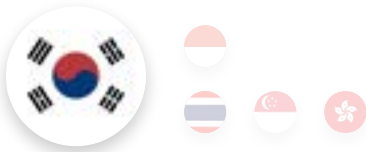
INCUBATORS & ACCELERATORS

- DreamPlus
- Samsung Mobile Advance
- Seoul FinTech Labs

PARTNERSHIPS

- Seoul FinTech Labs

KEY FACTS & FIGURES



Collaboration

Green FinTech Ecosystem

Green FinTech Startups

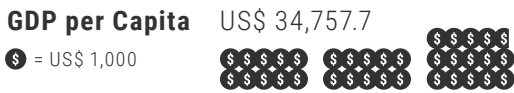
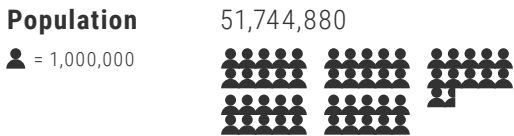
Government Support



Awareness

Financial Institutions

KEY DEVELOPMENT



GREEN FINANCE



TALENTS



FINTECH



TECHNOLOGY



ENVIRONMENT





GREEN FINTECH STARTUPS

- Energy X
- FAIR Labs
- QuantifiedESG
- Who's Good
- XQuant

There are several startups in Korea that are dedicated to Green FinTech. Their main focus is on analysing companies' ESG information to provide ESG assessments for their clients. For example, XQuant, Who's Good, FAIR Labs, and QuantifiedESG provide ESG data to meet the needs of different data users.

Energy X

Energy X provides an AI-driven crowdfunding platform to help renewable energy projects connect with corporate and individual investors.⁷⁶ In April 2022, Energy X signed a Memorandum of Understanding with Reynaers Aluminium to develop a carbon-neutral architecture model.⁷⁷

FAIR Labs ⁷⁸

FAIR Labs is an AI-based data platform that provides ESG information analysis. Its clients can access ESG information for all listed companies in South Korea and stay up to date with the latest news about a company's ESG performance.

QuantifiedESG ⁷⁹

QuantifiedESG is a platform that quantitatively assesses a company's ESG performance and risk factors. A specially-curated ESG evaluation report is then generated for that company.

Who's Good ⁸⁰

Who's good uses algorithms to evaluate more than 350 public data sources and 93 news data sources in South Korea to provide corporate ESG analysis. Its analysis covers both listed and non-listed companies in South Korea.

XQuant ⁸¹

XQuant utilises Optical Character Recognition and Natural Language Processing techniques to automatically extract ESG data for fund managers to assess ESG risks and opportunities.



ASSOCIATIONS

- FinTech Center Korea
- Korea FinTech Industry Association

There are 2 main FinTech associations in Korea: the **Korea FinTech Industry Association** and **FinTech Center Korea**. Both organisations actively promote the use of FinTech in society, and since 2021, ESG has become an area of increasing focus.

FinTech Center Korea ⁸²

FinTech Center Korea supports the development of innovation in delivering financial services, and the growth of the FinTech ecosystem. To promote the use of FinTech in the society, the association organises Korea FinTech Week. The theme in 2021 was 'FinTech and Sustainable Financial Innovation'. ⁸³

Korea FinTech Industry Association ⁸⁴

Korea FinTech Industry Association is the largest FinTech association in Korea with more than 300 member companies. Its key activities include promotions, policy recommendations, a member support system, foreign networking, and a bi-Weekly FinTech publication.



FINANCIAL INSTITUTIONS

- Hana Bank PROVER & market maker for GHG emissions trading
- KB Financial Group ESG-based assessment & Nephron
- Shinhan Financial Group Carbon Emissions Estimation System & Shinhan ESG-Rating System

Korean financial institutions are actively incorporating technology to deliver green financial services. KB and Shinhan Financial Group have developed a system to assess their clients' ESG performance and use it as one of the key considerations for lending and other business decisions. Hana Financial Investment Group is a market maker for GHG emissions trading in Korea. In consumer banking, KB Financial Group has an AI waste collection machine - Nephron, to provide rewards to their clients when they recycle bottles and cans. The following are examples of the initiatives of a few major banks based on market capitalisation.

Hana Bank ⁸⁵

Hana Bank has initiated an electronic contract service called 'PROVER' which significantly reduces paper usage. Hana Financial Investment was appointed by the Ministry of Environment to be a market maker for GHG emissions trading.

KB Financial Group ⁸⁶

KB Financial Group assesses the ESG performance of their corporate clients. The bank has set up guidelines for ESG practices that are used to adjust the credit-worthiness and borrowing capacities of their clients. ESG assessment is also used in overall risk management. In consumer banking, the bank has initiated a waste collection and recycling machine pilot programme called Nephron.

Shinhan Financial Group ⁸⁷

Shinhan Financial Group has developed a trial system to estimate the carbon emissions generated by certain loans and investments. In addition, the bank has developed a 'Shinhan ESG Rating' system that provides an internal ESG rating for the bank's corporate clients and helps them screen for ESG factors.



GOVERNMENT SUPPORT

- Green New Deal
- Roadmap to mandatory ESG disclosure in 2030

In 2020, the Ministry of Economy and Finance published the 'Korean New Deal: National Strategy for a Great Transformation'. The Korean New Deal introduced a nationwide development strategy and stimulus programmes to support the economy in recovering from the pandemic and guide the transition to a digital and greener society. The Korean New Deal initiative plans to invest KR₩160 trillion to create 1,901,000 job positions in the next 5 years with 2 main themes, the **Digital New Deal** and **Green New Deal**.⁸⁸ Out of the KR₩160 trillion, KR₩73.4 trillion has been allocated for green initiatives, KR₩58.2 trillion for digital projects, and the remainder will be used to provide a social safety net.⁸⁹

The Green New Deal facilitates the country's carbon-neutral strategy by focusing on the development of the following initiatives:

- 1) **enabling the shift to green infrastructure**, which will lead to innovations in the green industry and create 659,000 jobs;
- 2) **assisting the commercial development of technology** for carbon capture utilisation and storage; and
- 3) **lessening industrial dependence on coal** by substituting it with renewables.

The plan is intended to help the country achieve its 2030 target of reducing total GHG emissions by 24.4% compared to 2017 levels.⁹⁰ In 2021, the Global Green Growth Institute (GGGI) partnered with the South Korean Ministry of Economy and Finance to collaborate on achieving the environmental growth objectives set by the Green New Deal. To date, the GGGI community includes 43 member countries.⁹¹

In 2021, KR₩5.6 trillion was raised for the New Deal fund, of which KR₩500 billion has been invested in digital and Green New Deal sectors. In 2022, the New Deal fund prioritised investment in carbon net-zero initiatives and local new deal sectors.⁹²



To address the increasing focus on ESG investing, the South Korean Financial Services Commission (FSC) has established a plan to enhance the corporate disclosure process to include ESG factors. The objective is to make disclosure information easier for investors to understand and also reduce the burden of reporting for companies. The Korea Exchange had previously promoted voluntary ESG disclosures for listed companies, but starting from 2025, ESG disclosures will become mandatory for companies with total assets of at least KR₩2 trillion. ESG disclosures will eventually become mandatory for all listed companies in 2030.⁹³

In 2022, **the Korea Chamber of Commerce and Industry** and **Industrial Bank of Korea** launched the sustainability-linked loan cooperation project to provide a lower interest rate for small and medium-sized enterprises that can fulfil specific ESG goals and meet certain ESG evaluation targets.⁹⁴



INCUBATORS & ACCELERATORS

- DreamPlus
- Samsung Mobile Advance
- Seoul FinTech Labs

The Korean Government has a benchmark incubator programme - Seoul FinTech Lab, that incubates FinTech startups. The programme provides a set of comprehensive services ranging from training, mentoring, and networking to organising overseas promotions. However, large corporations also play an active role in supporting startups. For example, Hanwha Corporation's DreamPlus accelerator helps the growth of FinTech startups and Samsung's Mobile Advance programme invites startups to collaborate with Samsung. However, most of these incubator programmes do not appear to place a special emphasis on Green FinTech.

DreamPlus ⁹⁵

Initiated by Hanwha Corporation, DreamPlus is an ICT accelerator that provides office spaces, industry mentoring, networks with investors, and marketing services. DreamPlus's main focus is FinTech.

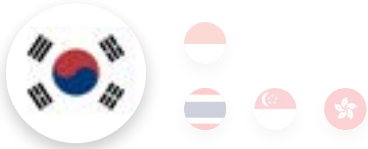
Samsung Mobile Advance ⁹⁶

Samsung Mobile Advance is an incubation programme that invites startups to collaborate with Samsung. The programme offers funding and support for startups to build a proof-of-concept and connects startups with potential partnerships. ESG is one of its areas of interest.

Seoul FinTech Labs ⁹⁷

Seoul FinTech Labs is an incubation programme funded by the Seoul Metropolitan Government with a focus on FinTech startups. The programme has incubated 70 startups and 30% are based overseas.

TAKEAWAYS FROM INTERVIEWS & FOCUS GROUPS



1

Current Green FinTech Development

Korea is still in the **early stage** & **moving to the scaling-up stage** of Green FinTech Development

There is a **language barrier** in introducing international FinTech services to the public; so the key players in the current FinTech ecosystem are **mainly local tech companies**

There are **some Green FinTech startups**; including XQuant, Who's Good & FAIR Labs

2

Private-Public Partnership

We **have yet** to observe any public-private partnerships that are specifically focused on Green FinTech; however - the Seoul Business Agency provides funding & guidance to startups

3

The Top 3 Barriers to Developing Further Green FinTech Business

Lack of business demand, lack of mandatory regulation on ESG disclosure & lack of talent; however - over time some of these barriers are expected to fall - particularly when **ESG disclosures become mandatory**

4

Key Players in the Ecosystem

The 3 key players in the ecosystem are **the government, financial institutions & startups**

5

Suggestions for Building Up the Green FinTech Ecosystem

Make green disclosure requirements mandatory; which is already taking place

Build a platform to store ESG data for different stakeholders to access

Educate the public to raise their green awareness

Provide more funding & incentives for companies to develop in this field



5 APEC MEMBERS UP CLOSE

INDONESIA

Indonesia is in the early stages of developing its Green FinTech ecosystem. Currently, startups are focused on 2 issues: **to provide carbon footprint offsetting services** and **to promote platforms for green project investment**. While some associations are promoting the use of FinTech, Green FinTech is not their current focus. Similarly, financial institutions are still in the early stages of adopting new technology to deliver green financial services. The government has made significant efforts to push the green finance agenda. The following are selected key Green FinTech initiatives:

GREEN FINTECH STARTUPS

- Gojek
- Investree
- Jejak.in
- LindungiHutan
- TaniHub Group

ASSOCIATIONS

- Indonesia FinTech Association
- Indonesian Joint Funding FinTech Association

FINANCIAL INSTITUTIONS

- Bank Central Asia
- Bank Mandiri
- Bank Rakyat Indonesia

GOVERNMENT SUPPORT

- Energy Transition Mechanism
- Sustainable Finance Roadmap Phase II
- Task Force on Sustainable Finance

INCUBATORS & ACCELERATORS

- Gojek Xcelerate
- IDX Incubator
- Synrgy Accelerator

PARTNERSHIPS

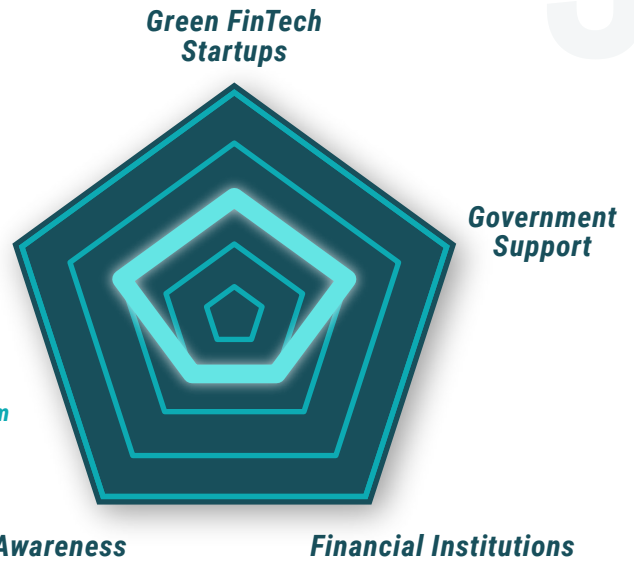
- IDX Incubator
- Collaboration between Gojek & Jejak.in

KEY FACTS & FIGURES

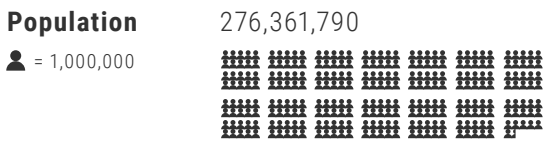


Collaboration

Green FinTech Ecosystem



KEY DEVELOPMENT



GREEN FINANCE



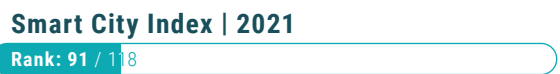
TALENTS



FINTECH



TECHNOLOGY



ENVIRONMENT





GREEN FINTECH STARTUPS

- Gojek
- Investree
- Jejak.in
- LindungiHutan
- TaniHub Group

Several tech startups provide green financial services to individuals and corporations. For example, Gojek's GoGreener Carbon Offset initiative allows users to offset their carbon footprint by planting trees through its app. Jejak.in utilises artificial intelligence to help individuals and corporations calculate their carbon footprint, and LindungiHutan provides an online fundraising platform to connect investors and philanthropists with projects that help forest conservation. The depletion of natural resources in Indonesia creates a strong demand for green financial services.

Gojek ⁹⁸

Gojek's GoGreener Carbon Offset Initiatives give users a way to offset their carbon footprint by planting trees.

Investree ⁹⁹

Investree provides a platform bringing lenders and borrowers together to help small and medium enterprises receive more affordable loans. The company also has an initiative called 'the Green Financing Partnership', which provides financing for certain green business activities.

Jejak.in ¹⁰⁰

Jejak.in is a tech startup that provides several services such as a carbon calculator, carbon offset marketplace, and the creation of a real carbon asset-backed digital currency. Jejak.in has worked with MRT Jakarta and Gojek to provide green financial services to their customers.

LindungiHutan ¹⁰¹

LindungiHutan is an online fundraising platform for forest conservation projects. The platform allows people to donate in support of various types of nature-based projects.

TaniHub Group ¹⁰²

TaniHub Group provides a combination of e-Commerce, logistics, and a P2P lending platform for farmers in Indonesia. The platform helps the farmers gain direct access to buyers, provides an efficient supply chain to make delivery shorter, and helps farmers to communicate directly with lenders. The platform incorporates a credit scoring system and a repayment system where the farmer's loan will be paid off when their product is sold in the market.



ASSOCIATIONS

- Indonesia FinTech Association
- Indonesian Joint Funding FinTech Association

The Indonesia FinTech Association and the Indonesian Joint Funding FinTech Association help promote FinTech in Indonesia, but there is no particular focus on Green FinTech. They conduct exhibitions, seminars, and training workshops to facilitate collaboration among different parties. The Green Building Council Indonesia promotes Green FinTech but does not provide financial services.

Indonesia FinTech Association ¹⁰³

The Indonesia FinTech Association collaborates with different stakeholders in the FinTech industry to encourage FinTech innovation. The association carries out 4 main activities: policy advocacy, community collaboration, education, and think tank.

Indonesian Joint Funding FinTech Association ¹⁰⁴

The Financial Services Authority appointed the Indonesian Joint Funding FinTech Association as the official association to promote peer-to-peer lending and as another online funding platform.



FINANCIAL INSTITUTIONS

- Bank Central Asia
- Bank Mandiri
- Bank Rakyat Indonesia

In recent years, financial institutions in Indonesia have increasingly turned their focus to sustainability and have reported a significant growth in sustainable loans in their portfolios. Since the first issuance of green and sustainable bonds in 2019, financial institutions have continuously issued green bonds to fund environmentally friendly projects. Indonesia is the global market leader in the issuance of Green Sukuk. While Green FinTech services ancillary to bond and Sukuk issuance are available, there is limited use of these services in the market. However, this is expected to change as sustainable finance continues to grow and develop. The following are examples of initiatives a few prominent banks, based on market capitalisation, have implemented.

Bank Central Asia ¹⁰⁵

Bank Central Asia is one of the largest banks in Indonesia. In 2021, the bank held IDR₹154.4 trillion of sustainable loans, an increase of 21% compared to 2020. The bank expects the continuous growth of sustainable finance in the future and has set a target of 7% growth for 2022.

Bank Mandiri ¹⁰⁶

In terms of assets, Bank Mandiri is the largest bank in Indonesia. In 2021, the bank had a sustainable portfolio of IDR₹205.4 trillion, contributing to 25% of the total bank loan portfolio. In 2021, the bank issued a US\$300 million sustainability bond that was oversubscribed 8.3 times.

Bank Rakyat Indonesia ¹⁰⁷

Bank Rakyat Indonesia specialises in the retail banking sector. As of 2021, 65.5% of the loans were categorised as sustainable loans, an increase of 12% from 2020. As of December 2021, 31% of the funding from sustainability bonds is used for green projects, while 69% is used for social projects.



GOVERNMENT SUPPORT

- Energy Transition Mechanism
- Sustainable Finance Roadmap Phase II
- Task Force on Sustainable Finance

The Indonesian Government has put considerable effort into accelerating the green finance agenda. In 2021, the government launched Indonesia's Energy Transition Mechanism (ETM). ETM consists of 2 schemes: the **Carbon Reduction Facility Scheme** is for retiring coal power plants in Indonesia, and the **Clean Energy Facility Scheme** is for re-investing in green energy facilities. The ETM country platform is open to investors from both the public and private sectors and serves as a funding framework for national energy transition projects. As ETM's settings accommodate the regulations and specifications of other countries, other countries can also utilise the platform.¹⁰⁸

Additionally, Indonesia's Financial Services Authority (OJK) is a governing body that supervises the financial industry. To move Indonesia towards a low-carbon economy and increase sustainable development awareness, OJK has initiated the Sustainable Finance Roadmap Phase I (2015 - 2019). Phase 1 of the roadmap includes the introduction of 8 principles of sustainable finance, requirements on financial institutions to develop ESG strategies and an implementation plan, and classification of sustainable business activities categories. To speed up the creation of a thriving ecosystem, OJK has initiated the Sustainable Finance Roadmap Phase II (2021 - 2025). Phase II contains 7 components: ¹⁰⁹

- 1) developing **supporting policies for sustainable finance**;
- 2) developing **sustainable finance products and services**;
- 3) developing **digital infrastructure for sustainable finance**;
- 4) enhancing the **collaboration among different stakeholders**;
- 5) raising **non-government support for sustainable finance development**;
- 6) developing **human resources for sustainable finance**, and
- 7) raising the **awareness of sustainable finance**.

OJK has also established a Task Force on Sustainable Finance in the Financial Services Sector to align with the Paris Agreement commitments in combating climate change. Another objective of the Task Force is to help develop a sustainable finance ecosystem in Indonesia. The Task Force consists of 47 financial institutions: 13 commercial banks, 15 capital market institutions, 11 insurance companies, 3 finance companies, and some governmental bodies.¹¹⁰



INCUBATORS & ACCELERATORS

- Gojek Xcelerate
- IDX Incubator
- Synrgy Accelerator

Many incubators and accelerator programmes help tech startups in Indonesia achieve support and funding, but there is no particular focus on Green FinTech. Even though most have a relatively short history, the various programmes have successfully helped several startups to either list on the Indonesia Stock Exchange or partner with large corporations like Gojek. Financial institutions provide acceleration programmes for startups looking for possible collaboration opportunities.

Gojek Xcelerate ¹¹¹

Gojek Xcelerate is an accelerator programme formed by Gojek and partnered with Digitalaya. Gojek is an Indonesian tech giant and Digitalaya is a local startup hub.

IDX Incubator ¹¹²

IDX incubator is an incubator programme provided by Indonesia Stock Exchange to help mature digital startups in the IPO stage. As of February 17, 2021, the programme had 114 foster companies.

Synrgy Accelerator ¹¹³

Synrgy Accelerator is a startup accelerator programme created by Bank Central Asia (BCA) in 2020 to encourage growth and innovation in the digital world. The programme has run 4 batches with 28 national startups having graduated.

TAKEAWAYS FROM INTERVIEWS & FOCUS GROUPS



Current Green FinTech Development

1

While there are signs of GreenTech development in Indonesia - **much of the development is centred around other industries** (such as the electric vehicle industry instead of the finance industry) Thus - Green FinTech development is still at **an early stage**

Startups in Indonesia are **working on a carbon platform** to validate carbon reduction

Many businesses are concentrated on financial inclusion & **neglect green targets**

In 2022 - Indonesia will **host the G20 summit**; with ESG issues likely to be the focus - the summit **may be a boost** for Green FinTech initiatives

Private-Public Partnership

2

The **majority of public-private partnerships** in Indonesia are **in the infrastructure sector**; many of the partnered projects are related to green infrastructures (e.g. a waste-to-power plant)

There **has yet** to be a Green FinTech partnership

3

The Top 3 Barriers to Developing Further Green FinTech Business

Lack of business demand, lack of talent & lack of regulation on ESG disclosure; there is still a **general lack of awareness & lack of prioritisation** on ESG matters

Key Players in the Ecosystem

4

The 3 key players in the ecosystem are **the government, corporations & startups**

5

Suggestions for Building Up the Green FinTech Ecosystem

Raise public awareness of Green FinTech opportunities

Set Up green disclosure requirements

Educate corporates on ESG values



THE CROSSROADS

WHERE ARE WE AT?

EXPLORING THE GREEN FINTECH ECOSYSTEM IN ASIA:

INSIGHTS FROM FIVE ECONOMIES IN APEC

THE CROSSROADS: WHERE ARE WE AT?

Looking at this sample landscape, we are addressing vastly diverse locations. The UN statistics in Table 5 showcase the wide variety of geographies, development stages, populations, and cultures of the 5 economies explored.

	Hong Kong	Singapore	Thailand	Korea	Indonesia
Total population <i>(in million)</i>	7.5	5.7	69.8	51.8	273.5
Superficies <i>(in km²)</i>	1104	710	513,120	100,210	1,904,569
% of electricity coming from low-carbon sources <i>(World in Data - 2021)</i>	0.23%	2%	15%	33.50%	18.17%
GDP /capita <i>(in US\$ of 2020)</i>	46.3k	59.8k	7.2k	31.5k	3.9k
Overall SDG Index score <i>(UN Sustainable Development Report)</i>	72.38	71.72	74.13	77.9	69.16
% population with access to Internet	93%	92%	77.84%	96.51%	53.73%
Expenditure on research & development <i>(in % of GDP)</i>	0.99%	1.93%	1%	4.53%	0.73%
Adults with an account at a bank / other financial institution OR with a mobile-money-service provider <i>(% of population over 15)</i>	95.28%	97.93%	81.59%	94.85%	48.86%
CO ₂ emission in tons of CO ₂ /person <i>(Our World in Data - Consumption base)</i>	14.55	19.11	4.04	13.61	2.49

Table 5 | The 5 APEC Economies' Landscape ⁱ

There is a correlation between jurisdictions with high GDP and larger investment capacity. Hence, their access to modern technologies, financing options, and education will be much easier and more direct. However, these are also the locations with higher CO₂ emissions per capita.

The range of the different populations and sizes for the locations in scope is also a factor to consider. With size comes more inertia to any initiative to deploy new technologies due to the large variety of sites and situations.

With this in mind, what is a bird's eye view of the current landscape for these jurisdictions in terms of GreenTech? What landscape do we get in terms of momentum for each location to promote sustainability in FinTech? The consolidated results from our study (see Table 6) reflect this diversity.

	Hong Kong	Singapore	Thailand	Korea	Indonesia
Green FinTech Startups	4	5	2	4	3
Financial Institutions	4	5	2	3	3
Government Support	4	5	3	4	2
Collaboration	4	4	2	3	2
Awareness	4	5	2	2	3
Average	4.0	4.8	2.2	3.2	2.6

Table 6 | The 5 APEC Economies' Ratings

Singapore is the most developed market in Green FinTech with an average score of 4.8, followed by Hong Kong with a 4.0 and then Korea with a 3.2. Indonesia and Thailand are still emerging in this space, and there appears to be less awareness overall regarding Green FinTech as a specific business opportunity.

KEY TAKEAWAYS – BUILDING A GREEN FINTECH ECOSYSTEM IN ASIA

The findings from the desk research and practitioners’ sharing have brought into focus 4 essential aspects of building a well-functioning Green FinTech ecosystem. The 4 interrelated aspects are **demand, supply, resources, and policies**.



Table 7 | Green FinTech Ecosystem

Demand for green services is the most crucial aspect of building a Green FinTech ecosystem. Businesses will not transition to green if there is a lack of demand for green products. Simply put, the value of Green FinTech services derives from how much people value green. The more the public prioritises sustainability, the more companies and investments are pressured to go green or adopt green technologies. As consumer behaviour and beliefs become more sustainability-oriented, businesses will inevitably need to reflect the sustainable orientation of consumers through the products and services offered. As such, it is imperative that consumers yielding the most power in accelerating the development of a Green FinTech ecosystem take the necessary steps to go green. For example, corporations may look for FinTech services to help them prepare for green disclosures or to enhance and measure sustainability impact. Likewise, investors may look for ratings that rely on self-reported and third-party data. This will allow investors to differentiate between companies that green-wash and those that do not. Thus, ESG education and public awareness of green issues play a crucial role in pushing the green agenda forward.

KEY TAKEAWAYS – BUILDING A GREEN FINTECH ECOSYSTEM IN ASIA

GREEN FINTECH STARTUPS

Startups have the talents, and knowledge of advanced technology required for the provision of green services and their simple and flexible company structure makes them more ready to cater to clients' needs. However, they lack a client base and resources to grow. On the other hand, financial institutions have an established client base and abundant resources but may not have enough knowledge and incentives to utilise advanced technology for green services. Therefore, a partnership between startups and financial institutions would create an optimum collaboration that serves the best interest of both parties. As some financial institutions may hesitate to share client data with a third party, an alternative partnership could be formed between governments and startups. The government could also provide public funding, grants, and networks to expedite the growth of startups.

Furthermore, governments can use incentives to encourage private and public partnerships, especially partnerships with Green FinTech startups. Financial institutions can partner with startups in Green FinTech to maintain their edge in the field. Startups can explore international opportunities to collaborate with international players to deliver local services.

Another barrier that Green FinTech startups face is capital. Unlike other FinTech startups where it may be easier for investors to see how the technology can contribute to the bottom line, Green FinTech startups bring benefits that may be seen as less direct and require a long-term horizon. Thus, it could be hard for Green FinTech startups to raise capital. In order for investors to see the potential in Green FinTech startups, demand for such products from consumers needs to increase. Here, industry associations play a crucial role in promoting Green FinTech, providing education to raise general awareness of the benefits of Green FinTech, and bridging the divide between the industry and the public. Such associations can serve as a platform for different parties in the ecosystem to connect. Through seminars, discussions, and events, associations can assist in paving the roadmap needed to guide green innovation.

GOVERNMENT SUPPORT

Through incentives, talent development and acquisition, education, and sustainable frameworks, governments have a primary role in developing a Green FinTech ecosystem. As policymakers, the government must establish a conducive environment for Green FinTech to flourish.

As Green FinTech is a business that is not easily monetised but is valuable to the sustainability of societies, governments can consider offering incentive schemes for startups to develop in this area. Governments can also help connect local Green FinTech startups with overseas buyers to improve the growth of this industry or provide grants or funding. Governments can provide tax rebates or benefits for companies to go green, investors to invest in green products, and consumers to use green products. Incentives such as tax benefits for investors investing in ESG assets or a direct subsidy for startups or financial institutions that provide Green FinTech services may help to encourage companies to shift their focus to ESG and ESG reporting. However, these incentives and subsidies alone are not sufficient in driving the green initiative forward. Despite the tax benefits and financial aid, the private sector will find itself struggling to hold the reins.

Therefore, governments must spearhead the change by setting sustainable regulatory frameworks and mandating disclosures, reporting, and thresholds. These implementations will allow organisations to better frame their transition to sustainability, providing organisations and investors the standards required to minimise greenwashing. Moreover, compulsory green disclosure requirements will simultaneously raise sustainability awareness while pressuring the private sector to prioritise sustainability. Only by standardising the reporting landscape and enforcing green policies can the private and public sectors efficiently work together to advance the sustainable agenda.

However, in order for governmental disclosures and frameworks to have the desired effect, data must be made readily available. Hence, governments can work with practitioners to create a centralised database that stores green or ESG data, such as ESG ratings and disclosures from third-party assessors. The platform could be made accessible to all stakeholders for investment, evaluation, and comparison purposes. Such a platform, however, would have to meet stringent data protection requirements and strike a fair balance between the information required to be stored and the risk of abuse resulting from monetising this information.

In this respect, a key characteristic that makes Green FinTech different from other fields of FinTech is that regulation is a critical factor affecting demand. Without regulations on ESG disclosures and sustainability reporting, companies will have less incentive to nurture their greenness. This is consistent with the phenomenon that FinTech is significantly more developed in economies where compulsory ESG disclosure is required.

KEY TAKEAWAYS – BUILDING A GREEN FINTECH ECOSYSTEM IN ASIA

AWARENESS THROUGH EDUCATION

Talent is essential in developing Green FinTech and the talent required is twofold. Not only does the ideal Green FinTech ecosystem have tech experts, but experts that are also well-versed in sustainability. Indeed, the majority of practitioners have raised concerns about the lack of talent in developing Green FinTech. In the short term, governments can initiate programmes that offer incentives to attract foreign talents and collaborate with local companies to develop local talent. In the medium to long term, universities should nurture more students with strong knowledge of ESG with an emphasis on the use of technology.

With respect to talent development and acquisition, governments can mandate sustainability in education curriculums for students to understand the importance and benefits of sustainability. The next generation will shape the new normal, and therefore it is crucial that the next generation is educated on sustainability to make it the new normal.

FINANCIAL INSTITUTIONS

Financial institutions are at the heart of the modern economy as they serve to finance economic growth and act as green and sustainability stewards to prevent excessive and irresponsible financial activities from occurring.

Financial institutions play a key role in developing the necessary technology required to develop Green FinTech. Driven by the demand of the general public to introduce innovative green financial services, financial institutions are best positioned to work with governments and regulators who can provide the necessary research and development support to further develop the Green FinTech ecosystem. Financial institutions can partner with startups to introduce green financial services to the public and overcome the common impediments faced by startups - insufficient funding and little-to-no track record. The greater outreach and customer base provided by established financial institutions will also serve to springboard the business viability and awareness of a startup's business activities.

As the public's awareness of Green FinTech services increases, it may create natural demand, thus allowing the Green FinTech business to become self-sustainable. Financial institutions are also in a strong position to develop their own in-house research and development on Green FinTech, and we have seen many large banks developing their own FinTech incubators and accelerators. Crucially, financial institutions are also able to serve as a bridge between startups and the government, and we have observed that most FinTech public-private partnerships involve financial institutions.

KEY TAKEAWAYS – BUILDING A GREEN FINTECH ECOSYSTEM IN ASIA

In addition to the various partnerships and collaborations set out in the preceding paragraph, financial institutions can make an impact on the green agenda by redirecting investment and financing flows to sustainable business activities, and conversely limiting such flows for brownfield or unsustainable business activities. This is in line with the Paris Agreement, but also serves the objective purpose of helping financial institutions to develop more advanced risk management techniques that will serve them more effectively in a fast-changing business environment. By considering green performance indicators like carbon emissions or eco-friendly management and adopting ESG risk assessment and management frameworks, financial institutions can react more quickly to different types of risk exposures, reduce exposure to stranded assets and invest more effectively in sustainable business development to promote the overall growth of green and sustainable economies.

As the next generation are distinctly focused on making the world more sustainable, financial institutions cannot maintain long-term growth without integrating sustainability into their structures and functions. Thus, financial institutions should wholly embrace the sustainable agenda to achieve the triple bottom line: profit, people, and the planet. Given the current competitive banking environment and the global shortage of green talent, financial institutions should utilise their unique positions in the business ecosystem to develop more in-house sustainability talent to promote the sustainability agenda. With trained sustainable finance professionals at the forefront of any business deal pushing for more sustainable business activities, the general business climate can change very quickly from the current linear model to a more sustainable circular model and Green FinTech can also be quickly adopted in line with such a sea-change in business thinking.

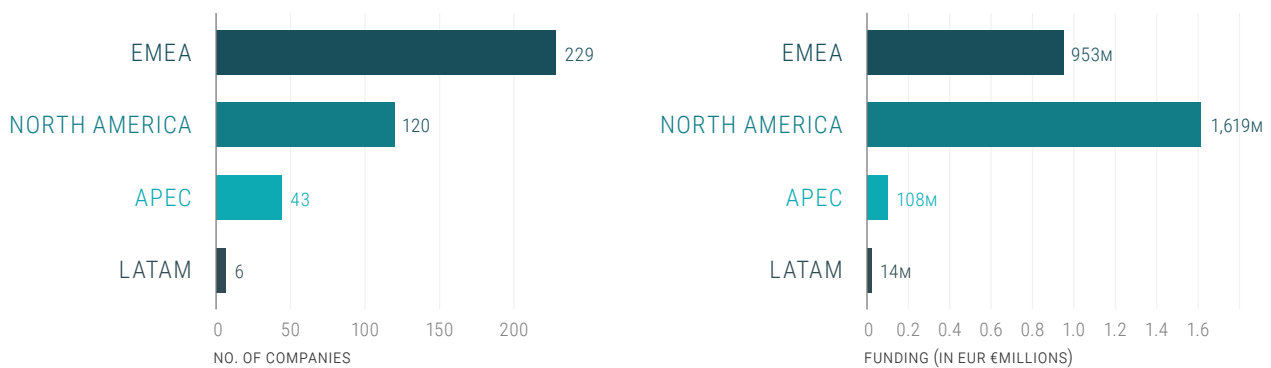
It is clear that achieving a thriving Green FinTech ecosystem will require efforts from all. The private sector alone will not be able to fully mobilise enough necessary resources required to make real changes to the current market, and it needs to be done together with the governments as well as the public at large. Above all else, a tripartite cooperation is paramount to effectuate a Green FinTech ecosystem.

BEYOND APEC - WHERE SHOULD WE LOOK?

Looking beyond APEC, we reviewed the literature at the crossroads of FinTech and sustainable finance, leveraging reports focused on other geographies for inspiration.

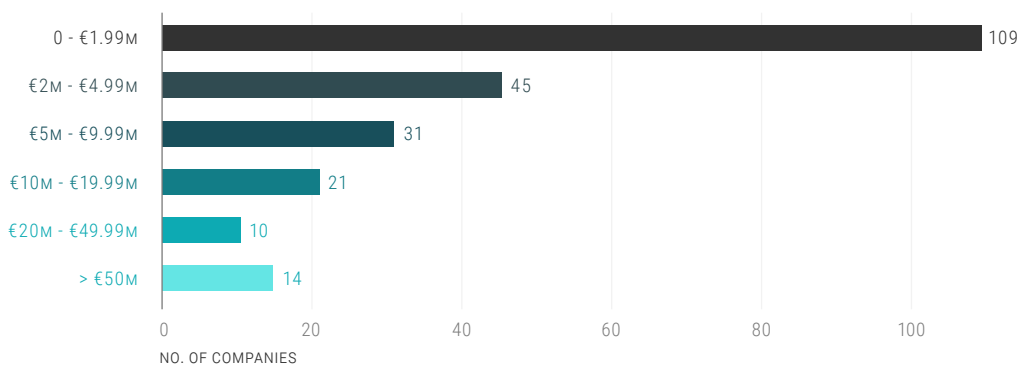
WHERE IS THE INVESTMENT HAPPENING?

Based on the estimation of F10, a global incubator and accelerator for FinTech and InsurTech, the total share of Green FinTech is estimated to be around 8% of all FinTech ventures. However, we are seeing a growing proportion in the area of Green FinTech, with a dominance in Europe and the U.S.:



Source | 'F10 - Climate FinTech, Beyond the Hype' Report ⁱⁱ

In the scope of the study, most of the FinTech startups in the survey are at a very early funding stage, with 80% below EUR€5 million in asset size:



Source | 'F10 - Climate FinTech, Beyond the Hype' Report ⁱⁱⁱ

THE CROSSROADS: WHERE ARE WE AT? BEYOND APEC - WHERE SHOULD WE LOOK?

70

WHAT IS THE TECHNOLOGY MOST LEVERAGED BY GREEN FINTECH ECOSYSTEMS?

Entrepreneurs in Asia will be inspired to ensure the application of the standard use cases (*carbon assessment, data aggregation, investment solutions etc.*) is tailored for each country with a particular focus '**to enable development, investment, financial inclusion, and sustainability**' as per the Asian Development Bank guidance.¹¹⁴

Key technology accelerators are enabling this development: ¹¹⁵

- 1 *Peer-to-peer (P2P) lending / crowdfunding broadens access to 'bite-sized investments'*
- 2 *Application Programming Interfaces (APIs) enhance financial platforms that now see strong consumer engagement*
- 3 *Blockchain with multiple access points for all parties*
- 4 *Self-service data analytics & the increasing investment in data tools allow financial institutions to improve their models in production environments*
- 5 *Operational efficiency gains through robotics & artificial intelligence*
- 6 *Reduction in costs of infrastructure with the commoditisation of cloud services*
- 7 *Commoditisation & standardisation of qualitative cyber-security*
- 8 *The emergence of full-stack & low-touch technologies allows rapid development & integration*
- 9 *The rise of FinTech clusters aggregating talents & innovation*
- 10 *A regulatory environment accommodates & encourages innovation through sandboxes & incentives for collaboration with financial institutions*

Green FinTech is also expected to be aligned with the overall trends of digital transformation seen in the financial services industry:

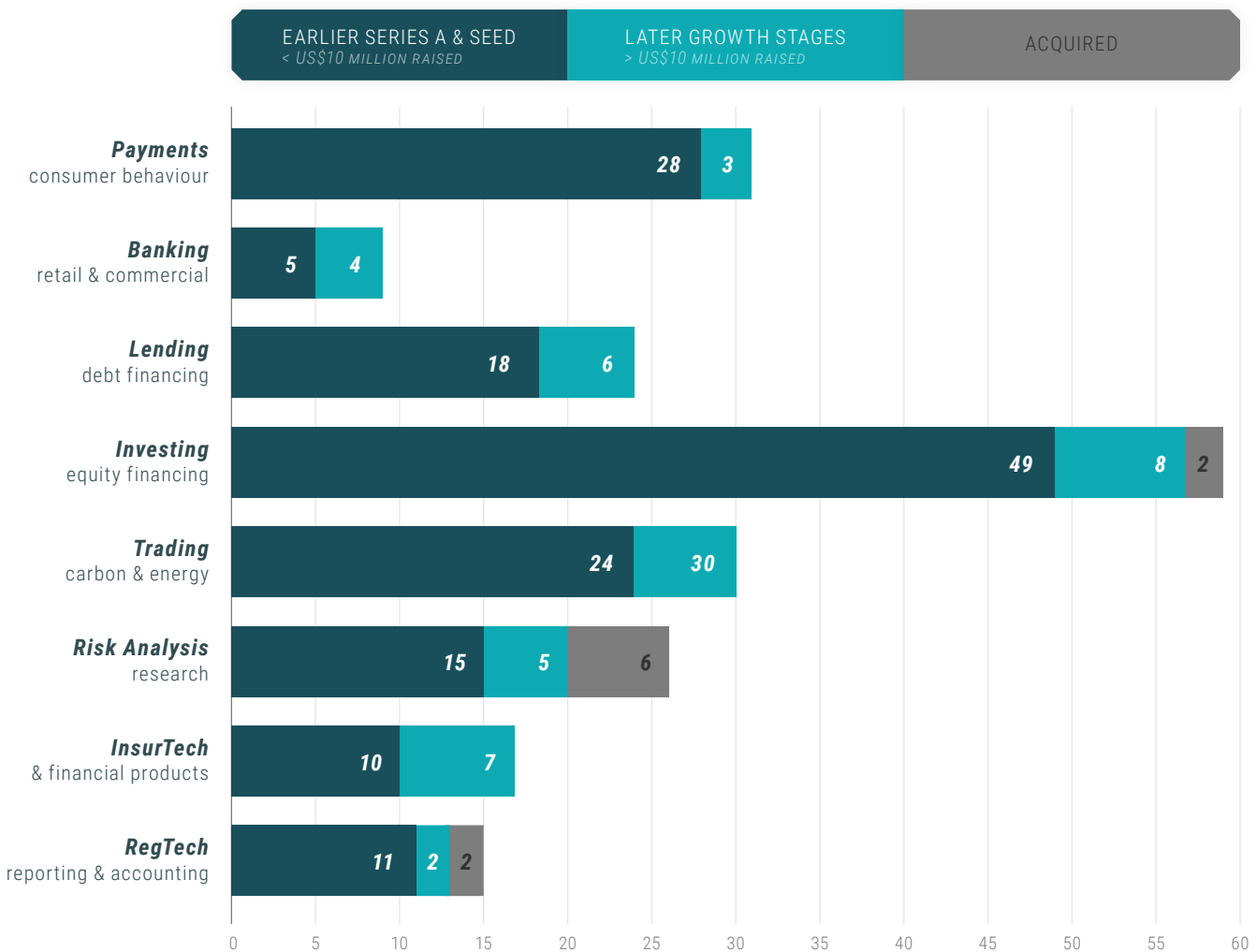
- **Hyper-Personalisation**
customised & tailored interface & experience
- **Collaborative Intelligence**
involving other members to add value
- **Continuous Intelligence**
dynamic learning mechanisms continuously updating behaviour with new insights
- **Modular Visualisation**
knowledge graph time-series visualisation visual clues for decision-making
- **Preemptive Security & Unbreakable Blockchain-Based Storage**
- **Robo-Advisory Support Interface**
- **Openness & Interoperability**

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WHICH USE CASES ARE THE MOST POPULAR GLOBALLY?

New Energy Nexus - a leading ecosystem of funds and accelerators supporting diverse clean energy entrepreneurs, published a report in 2021 titled 'Climate FinTech: Mapping an Emerging Ecosystem of Climate Capital Catalysts'. The report included key winning use cases of Green FinTech solutions enabling sustainable investment, carbon trading, and payments.



Source | New Energy Nexus - 'Climate FinTech: Mapping an Emerging Ecosystems of Climate Capital Catalysts' ^{iv}

WHAT ABOUT FINANCIAL INCLUSION?

One of the focuses of attention for emerging countries in the Asia-Pacific region is the financial inclusion effort, where governments have devised guidelines for the industry. The UNESCAP (*United Nations Economic and Social Commission for Asia and the Pacific*) released a policy guidebook in 2022 with illustrative cases from the region.

Marketing Facilitator (DEMAND-SIDE)

Government plans & strategies for digital financial inclusion that incorporate women & gender

- *Khyber Pakhtunkhwa Digital Policy in Pakistan*
- *Indonesia Strategi Nasional Keuangan Inklusif Perempuan: National Women's Financial Inclusion Strategy*

Financial literacy initiatives targeting women

- *Amader Kotha Helpline expansion facilitated by a2i & Better Than Cash Alliance in Bangladesh*

Women-led initiatives to provide access support at a localised level

- *Benazir Income Support Programme - beneficiary committees in Pakistan*

Marketing Participant (SUPPLY-SIDE)

Establishing digital payment systems, including government-to-person & person-to-person applications that benefits women

- *Wing Money in Cambodia*

Adjusting banking policies to enable non-traditional banks to provide technology-driven services & products for women

- *CARD Bank & konek2CARD in the Philippines*

Marketing Facilitator (DEMAND-SIDE)

Universal, secure & private digital identity using biometric technology to ensure payments reach women beneficiaries

- *Benazir Income Support Programme biometric verification in Pakistan*

Central Government targets for financial inclusion of women

- *increasing women's financial inclusion by 2025 in the Laos People's Democratic Republic through the Financial Inclusion Roadmap ⁽²⁰¹⁸⁻²⁰²⁵⁾*

Policy levers within bureaucracy to incentivise the use of digital technology to advance women's financial inclusion

- *Digital India*

Source | UNESCAP - Harnessing Digital Technology for Financial Inclusion in Asia & the Pacific [▼]

Countries can leverage these initiatives to integrate environmental considerations in their decision-making. For example, they can develop environmental literacy within communities or provide small businesses with carbon assessment guidance and tools.

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WHAT DOES 'GOOD' LOOK LIKE GLOBALLY?

The Global Green Finance Index, released in 2021, depicted an updated ranking of the top financial centres in the world and their relative positioning in green finance. London, San Francisco, and Amsterdam were the leaders in terms of the depth and quality of their green finance ecosystem.

	Green Finance Index 8 <i>GGFI 8 - Rank</i>	Green Finance Depth <i>GGFI 8 Depth - Rank</i>	Green Finance Quality <i>GGFI 8 Quality - Rank</i>	Financial Centre Competitiveness <i>GFCI 30 - Rank</i>
New York	13	11	13	1
London	1	2	1	2
Hong Kong	41	44	30	3
Singapore	16	25	9	4
San Francisco	3	3	5	5
Shanghai	14	8	17	6
Los Angeles	8	6	9	7
Beijing	11	15	7	8
Tokyo	22	17	30	9
Paris	10	6	12	10
Chicago	37	34	38	11
Boston	25	20	37	12
Seoul	16	13	21	13
Frankfurt	34	40	24	14
Washington DC	15	11	21	15
Shenzhen	28	25	30	16
Amsterdam	2	1	3	17
Dubai	40	42	30	18
Toronto	31	34	24	19
Geneva	6	8	6	20

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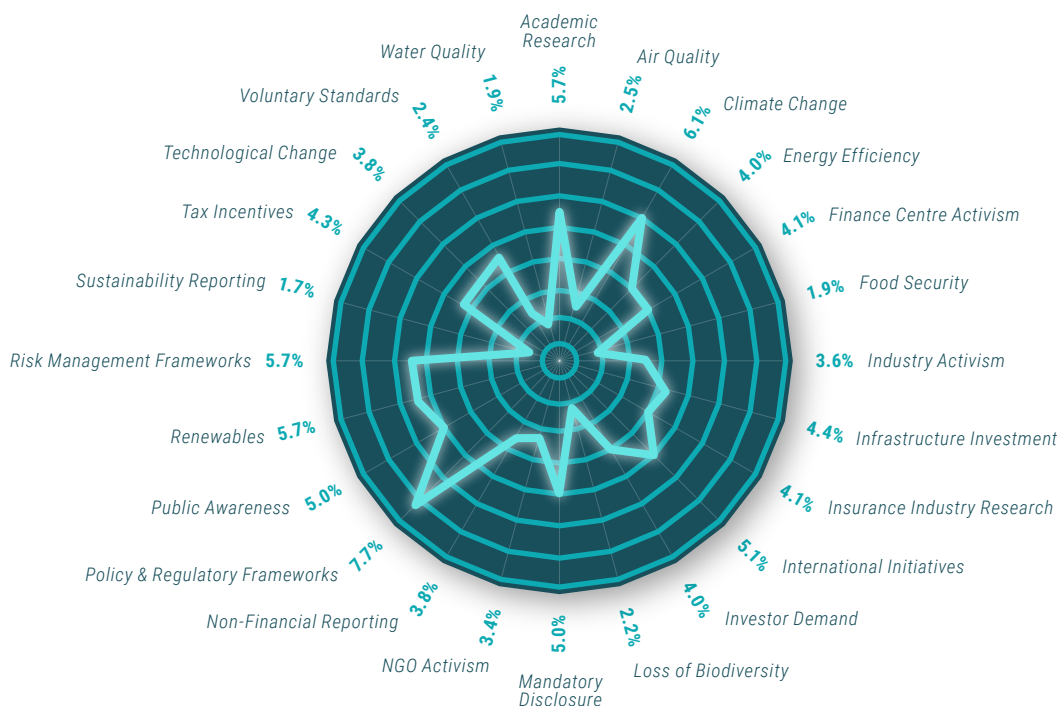
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The report identified several areas of competitiveness enabling the success of the promotion of green finance in specific regions:



Source | Sustainable Futures - The Global Green Finance Index 8 ^{vii}

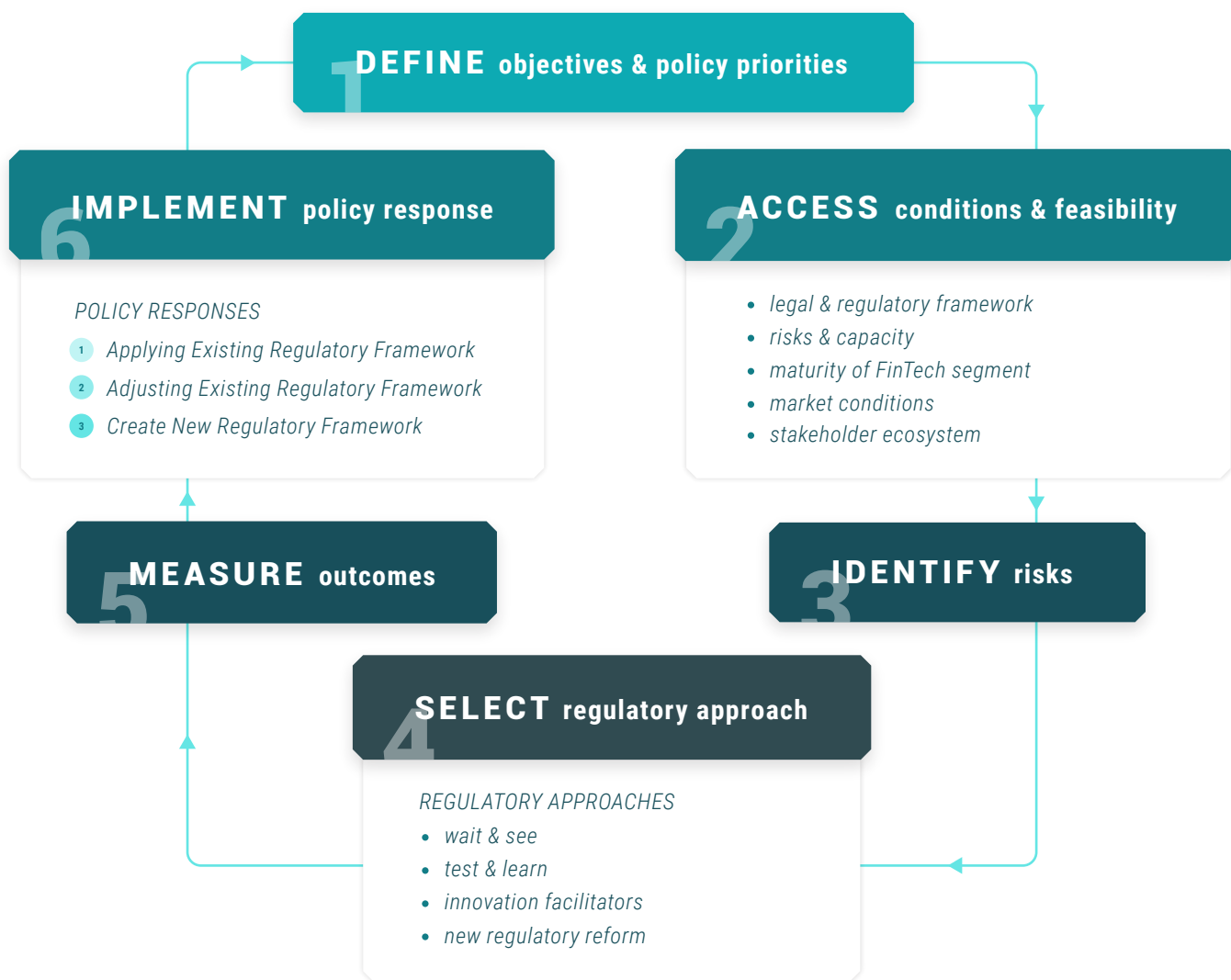
In the Global Green Finance Index (GGFI) study, the survey participants identified regulatory policies and the ongoing impact of extreme events due to climate change to be the salient drivers for the ecosystem performance:



Source | Sustainable Futures - The Global Green Finance Index 8 ^{viii}

INSPIRATION FOR REGULATORS

In a 2021 study titled 'FinTech for Good - Governance Mechanisms for Sustainable Development', the Centre for International Governance Innovation (CIGI) provided a high-level positive collaboration cycle for regulators on devising policies to encourage sustainable investment citing the group from the World Bank Group ⁽²⁰²⁰⁾:



TIPS FOR SUCCESS

- engage early & often with the market
- get executive-level sponsorship
- gauge preparedness to offer regulatory relief
- facilitate inter-agency coordination & collaboration
- identify key performance indicators
- focus on principles; not rules
- communication with the market

Finally, the study from TheCityUK and Clifford Chance titled 'Sustainable Finance: How Technology Can Accelerate the Transition to a Sustainable Economy' provides guidance that was intended for UK regulators but can be extrapolated to other regions: ¹¹⁶

- **ESG Thinking with Tech Regulation**

Policymakers should take a joined-up approach to ensure ESG issues are considered in all new FinTech legislative and regulatory initiatives.

- **Striking the Right Balance**

New legislative and regulatory initiatives should strike an appropriate balance between robust ESG standards while ensuring that FinTech innovation is not stifled.

- **International Alignment**

Encourage broad international alignment of standards while reflecting specific local needs – following the example of market leaders (Singapore quoted as a reference).

- **Achieving Data's Potential**

Encourage common data standard setting for big data and ESG disclosures.

- **Flexible Regulatory Framework**

Flexible regulation is key, so that regulators can respond quickly and effectively to new FinTech developments and accelerate the use of technology in sustainable finance.

LOOKING AHEAD

LOOKING AHEAD

We can expect increased attention from regulators in this space to develop their Green FinTech ecosystem. Although technology is not the silver bullet to solve the environmental crisis, it can help to:

- ***change behaviour***
by encouraging users towards more environmentally friendly practices & consumptions
- ***reduce the carbon footprint of key processes & activities***
by reducing material & energy footprints
- ***provide transparency in transactions***
to build trust & encourage sustainable investment
- ***progressively phase-out non-sustainable financing activities***
by making them obsolete & inefficient
- ***encourage traditional institutions***
to increase investment in sustainable financial services to stay competitive

Factors likely to encourage such investments in the region include:

Increased frequency & severity of extreme climate events that will bring even more challenges to respective governments; with negative effects on economies & societies

Broadening awareness from populations in the affected countries on the importance of addressing climate change & other environmental overshoots

Reduced cost & commoditisation of technologies
• *enabling affordable & responsible; green & sustainable innovation*

Leadership commitment to prioritise sustainability in the region for competitiveness; but also for resilience & adaptation

With time, several focus points will probably be on the radar to ensure these developments achieve their sustainability purpose, such as:

- *clear impact measurements will be paramount with multi-dimensional assessment (E, S and G) to ensure that positive outcomes are balanced*
- *scalability of green & sustainable solutions that will be crucial to ensure that the wins are not one-off events; but can be achieved for other locations*
- *ensuring that these developments remain within sustainable planetary boundaries & do not come with new negative externalities*

We believe Green FinTech is necessary to enable transparency in the financial industry and enhance existing measures to make finance consistent with climate goals in accordance with Article 2.1c of the UNFCCC Paris Agreement.

In the future, every FinTech will be a sustainable FinTech.

Sustainability will not be taxonomically perceived as a separate term but, instead, will be fully integrated as an essential part of how businesses and institutions operate.

APPENDIX

ACKNOWLEDGEMENT

CONTRIBUTORS

NOTES

DISCLAIMER

ACKNOWLEDGEMENT

We would like to thank the following organisations who have contributed to this study as well as other organisations and institutions who have participated in this study. We are grateful for the views and insights each organisation has provided.

We are also grateful to our colleagues at CUHK Business School, GoImpact, and Ant Group for facilitating this study.

*Organisations are listed in alphabetical order

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