Environmental Brief on Green Finance

Prepared by Environmental Division of the Hong Kong Institution of Engineers

April 2017

CONTENT

Green Finance Task Force Members

Chairman of the Task Force

Ir Elvis AU, Chairman of HKIE - Environmental Division (2016-17)

Members of the Task Force

Ir Antonio CHAN, Chairman of HKIE-Building Service Division

Ir Professor Irene LO, Past Chairlady of HKIE-Environmental Division

Ir Kenny WONG, Past Chairman of HKIE-Environmental Division

Ir Kelvin TANG, Vice Chairman of HKIE-Environmental Division

Jeanne NG, Chairlady, Hong Kong Institute of Qualified Environmental Professionals

Colman NG, KPMG

Ir Norman CHENG, Honorary Secretary of HKIE-Environmental Division

Ir CS LAM, Committee Member of HKIE-Environmental Division

Ir Andrew YUEN, Committee Member of HKIE-Environmental Division

Ir Dr Shelley ZHOU, Committee Member of HKIE-Environmental Division

Ir Thomas HK Chan, HKSTP

Amie Shuttleworth, Cundall

Jimmy Tong, Arup

Secretary of the Task Force

Ir Dr Alex GBAGUIDI, Committee Member of HKIE-Environmental Division

1- Introduction

Green finance represents a positive shift in the global economy's transition to sustainability through the financing of public and private green investments and policies that support sustainable development. The relevance of green finance has been steadily growing over the past few years, and has now emerged as a key topic underpinning the new international dynamic promoting environmental sustainability and financial market development. The green finance system, driven by Governments, banks, institutional investors, corporations, businesses, environmental professionals, international financial institutions, and regulators, is expected to internalise environmental externalities and reduce risk perceptions in order to boost investments that scale up economy from resource-intensive and pollution-intensive towards enhanced environmental and social benefits with real sustainability. In this respect, the People Republic of China has recently set up its green finance policy guidelines with the ultimate purpose to green the entire financial system, and mobilise private and public capital for green investments.

Hong Kong, as regional leader in financial services, is undoubtedly well placed to play a preponderant role in green finance development with potential benefits, as previously discussed in various forums and seminars organized by the HKIE-Environmental Division. However, mobilising capital for the development of green investments seems currently to be curbed by several obstacles and difficulties such as lack of information, inadequate measurement tools of green, lack of clarity in the definition of "green", insufficient coordination of financial and environmental policy approaches, and the lack of clear signal for the promotion of green transition.

By bringing together diverse professionals and experts into a Task Force, the HKIE-Environmental Division aspires to show regional environmental leadership; and provide environmental brief on green finance concept to inspire, empower, and inform professional bodies and all key stakeholders, in order to mobilise practical knowledge and know-how for dealing with challenging issues, and contributing to the promotion and development of green investment. In creating both an institutional framework and an integrating process involving various disciplines, the Task Force aims to make insights into, not only the pivotal role of environmental professionals in the development of green finance, but also, how to place green finance as a core aim and an organizing principle for financial dynamic and development of local and regional environmental industry.

The present environmental brief on green finance set under the leadership of HKIE-Environmental Division, is thus expected to provide stakeholders (Governments, lenders, investors, green bond issuers, regulators, corporations, professional bodies, businesses, environmental professionals, and general public) with an overview of a diagnostic, challenges, information, and perspectives on green investment and how to mobilize finance for sustainable development priorities and to mainstream sustainable development goals across financial decision-making. The main purpose is to come up with a comprehensive framework supported by all stakeholders that enables market forces to accelerate economy scaling up towards green, to stimulate further discussions and development, and to further develop the environmental industry for the benefit of Hong Kong, Mainland China and the region.

2- Green Finance Environmental Scope, Products and Services

2-1 Scope Definition

The United Nation Environmental Programme (UNEP) and environmental experts of G20 (2016) brought a precision on the scope of green finance comprising all forms of financial investment or lending

(including preparatory and capital costs) that take into account environmental impact in all aspects and enhance environmental sustainability (sustainable investment and banking where investment and lending decisions are taken on the basis of environmental screening and risk assessment to meet environmental sustainability standards). With such clarification, the climate finance (financial investment applied to climate change adaption and mitigation), previously considered as the unique scope of green investment appears only to be merely one aspect of green finance environmental scope (Fig.1).

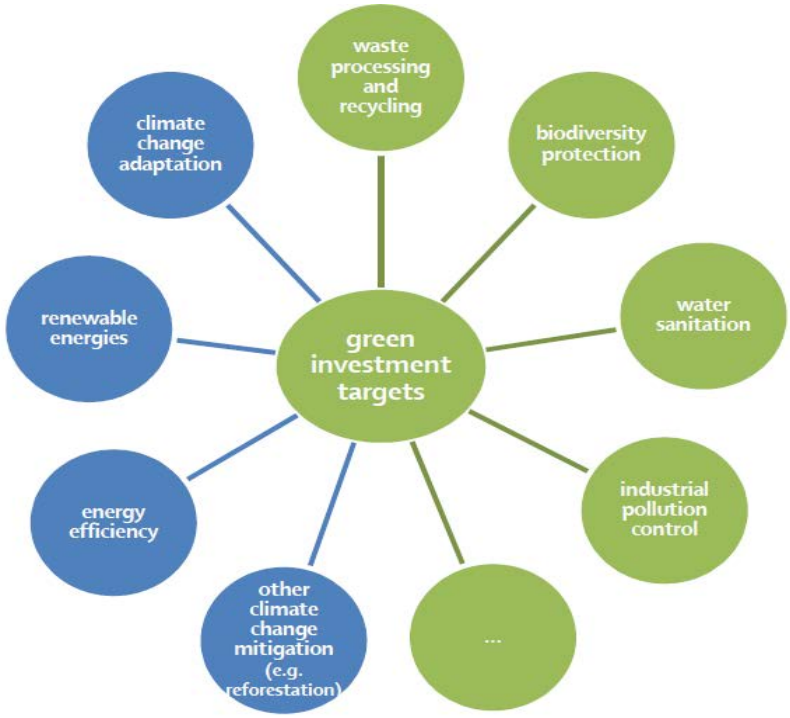

Fig.1 Environmental Scope of Green Finance (G20, 2016; UNEP)

2.2 The Concept of Green

As mentioned in the introduction section, a number of current market and institutional failures such as insufficient disclosure of environmental, social aspects and weak environmental risk assessment capacity may prevent full incorporation of material environmental factors into investment decision-making. Moreover, a lack of clear and consistent definition of the concept of green undermines confidence while uncertainty and high costs of assessment, qualification and verification of the green dimension of green finance projects could prevent a critical mass of issuance. On the other hand, insufficiency of credible expertise in green project performance measurement and evaluation also constitutes constraints for investors and banks. All these issues could result in inadequate risk management and potentially excess caution over allocations to green investments. Hence, mapping of definition and steps for evaluating the green dimension and performance of green projects appears to be an urgent imperative for the harmonious expansion of green finance.

In accordance with the new clarification of the environmental scope or green dimension of green finance jointly made by G20 (2016) and the United Nation Environmental Programme (UNEP), a green project is a business approach that creates long-term stakeholders' value (all tenants, associated stakeholders and the society) by integrating opportunities and managing risks deriving from resource, economic, environmental and social development.

The green concept therefore requires project designers and developers to consider in the design and implementation, the protection of the biosphere for present and future generations; conservation of water and resources; waste reduction, treatment, recycling, reuse and recovery; energy conservation; risk reduction and business durability; safety of products and services; environmental restoration, social responsibility and equity; public information and active participation. In clear, the concept of green is a holistic approach of project design that goes beyond climate change mitigation and adaptation to fully embed environmental and social sustainability into the whole life cycle of the business.

2.3 Key Steps for Project Greening

Based on precision above, project greening requires an exhaustive demarche as specified below.

-Setting Sustainability Vision

(1) Making sustainability as the project vision

(2) Complying to statutory and mandatory regulations in all aspects

(3) Going beyond statutory and mandatory requirements to print innovation and sustainability culture

-Design Greening

(4) Evaluation of the sustainability footprint: identification and collection of information in all aspects on how the project affects stakeholders, the environment, economy and public life (ISO, Index Guidelines)

(5) Assessment and evaluation of compliance status of legal and other environmental, eco-system and biodiversity impacts, life cycle, integrated assessment models for present and future scenario, benefit-cost-effectiveness, audits, risks analysis, health, quality, safety, investment and business requirements

(6) Building staff capacity (information, training, coaching for awareness, know-how)

(7) Stimulating stakeholders' engagement: bring on board shareholders, investors, authorities, lenders, employees, partners, suppliers, clients and local communities to set up a social responsibility scheme

(8) Determining the key indicators and measurements system for sustainability performance tracking

-Greening Implementation

(9) Establishing objectives and necessary processes to deliver results in accordance with the sustainability vision

(10) Setting-up a program around the sustainability footprint to meet the goals (objectives and targets)

(11) Establishing sustainability code of conduct, internal rules, monitoring, recording, verifiable database outcome evaluation, trade-off and synergy analysis, and internal promotion system

(12) Disclosing all sustainability aspects and embedding performance tracking in all project activities

(13) Reporting the performance periodically (ISO, GRI) based on key performance indicators and goals

(14) Processing verification and certification of the sustainability management system

-Continual Improvement and Innovation

(15) Comparing the performance against the baseline business condition, objectives, targets, legal and other requirements and taking actions for continual improvement of the sustainability management

(16) Learning from the efforts, challenges and going beyond the requirements by integrating strategy for greatly stable prosperity

(17) Driving innovation culture to take maximum economic, environmental and social benefits from the project sustainability management system for long-term stable prosperity and growth

2-2 Existing Green Finance Products and Services

Existing green finance products and services worldwide cover public and private financial sectors such as retail banking, corporate & investment banking, asset management and insurance as described below.

-Retail Banking

Green Mortgages / Green Home Equity Loans: considerably lower loans that help motivate households to purchase or install residential renewable energy, green residences with water and energy efficiency technologies or invest in retrofits. Green mortgages could also cover the cost of switching a house from conventional to green.

Green Commercial Building Loans: attractive loan for green commercial buildings, characterized by lower energy and resource consumption (15-25%), reduced waste, green construction materials, reduced operating expenses, improved performance and longer lifetimes associated with green functions / features, and less pollution than traditional buildings.

Green Car Loans: green car loans encourage the purchase of cars that demonstrate high fuel efficiency with enhanced pollution control.

Green Cards: debit and credit cards linked to environmental sustainability activities. Green credit cards from large credit card companies offer to make environmental NGO donations equal to approximately one-half percent of every purchase, balance transfer or cash advance made by the card owner.

-Corporate & Investment Banking

Green Project Finance / Green Bonds: financial investment in large-scale renewable energy and environmental sustainability projects (waste recycling, water and resource conservation, air pollution control, green infrastructure, biodiversity conservation etc.). In clear, green bonds are bonds or debt securities specifically issued to finance environmental protection, sustainability or specific climate mitigation and adaptation measures.

Green Securitization Bonds: financial investment in a variety of emerging innovative environmental securitization techniques, including forest bonds; ecosystem-securitization programs; terrestrial and aquatic fauna securitization bonds, etc.

Green Venture Capital & Private Equity: capital base and finance for environmental projects through specialized private equity units focusing on clean energy growth markets and investment opportunities in environmental sustainability (clean technologies, low carbon approaches, smart city etc.).

Green Indices: indices that fluctuate as emerging future environmental opportunities and challenges (series of indices based on individual industries, including carbon abatement technologies, water, waste, biodiversity, ecological footprint, solar, ethanol, renewable energy, resource and natural gas).

Carbon Commodities / Credits: a carbon constraint trading developed under the Clean Development Mechanism (CDM), focusing on low-carbon investment to address climate change and environmental risk.

Most invest banks acquire carbon credits in order to serve their corporate clients' compliance needs, or to supply an environmentally tradable product to the banks' trading desks.

-Asset Management

***Green Fiscal Funds**:* exemption from paying capital gains tax with a discount on income tax offered to citizens who purchase shares in a green fund, or invest money in a green bank. Investors can therefore accept a lower interest rate on their investment, while banks can offer green loans at a lower cost to finance environmental projects.

***Green Investment Funds**:* sustainable investment funds evolving three generations / steps. First generation funds solely employ exclusionary social and environmental criteria; second generation funds use positive criteria that concentrate on progressive social and environmental policies and practices; and third generation funds apply both exclusionary and positive criteria to assess and select potential environmentally friendly investments, with a focus on relative performance within a sector using a best-in-class approach.

***Carbon Funds**:* variety of carbon funds to help finance greenhouse gas emission reduction projects to curb climate change. Acting as a collective investment scheme, a carbon fund receives money from investors to purchase CO_2 emission reduction credits.

-Insurance

***Green Insurance**:* This type of insurance typically encompasses two product areas: 1) insurance products which differentiate insurance premiums on the basis of environmentally related characteristics (environmental risk assessment, environmental audit and management in all aspects); and 2) those specifically tailored for clean technology and emission reducing activities (green industry insurance, green nano-technology insurance, green auto insurance, energy efficiency building insurance, carbon offset schemes etc.).

Carbon Insurance: insurance products offered by financial institution to manage carbon credit price volatility.

3-Green Finance Policy Guidelines & Status in Mainland China and Hong Kong

3-1 Background and Salient Points of Green Finance Policy Guidelines in China

The People's Bank of China, along with six other government agencies, issued in August 2016 the "Guidelines for Establishing the Green Financial System" with the approval of the State Council. The Guidelines issued jointly by the People's Bank of China, the Ministry of Finance, the National Development and Reform Commission, the Ministry of Environmental Protection, China Banking Regulatory Commission, China Securities Regulatory Commission, and China Insurance Regulatory Commission, provide an essential next step for implementing the overall strategy of promoting ecological civilization, formulated by the Central Party Committee and the State Council. They advance the development concepts of innovation, harmony, greenness, openness and sharing, and promote the establishment of China's green financial system, as well as bringing more private capital into green economy and ecological civilization development, and sending a positive signal to the market.

The Guidelines stress that the primary purpose of establishing the green financial system is to mobilize and incentivize more social (or private) capital to invest in green sectors, while restricting investment in polluting sectors. The green financial system will help facilitate a green transformation for the Chinese economy, promote technological progress in environmental protection; energy saving and other fields, and will accelerate the development of new growth drivers and enhance the potential for economic growth. The Guidelines include a series of policy measures to support and incentivize green investment.

These incentives include, among others, re-lending operations by the People's Bank of China, specialized green guarantee programs, interest subsides for green loan-supported projects, and the launch of a national-level green development fund.

The Guidelines also spell out the important role of the securities market in financing green investment, require a unification of the domestic green bond standards, support qualified green companies to raise funds via IPOs and secondary placement, support the development of green bond indices, green equity indices and related products, and require a gradual establishment of the mandatory environmental information disclosure system for listed companies and bond issuers. The Guidelines call for the development of green insurance and trading of environmental rights, as well as the drafting of laws and regulations for introducing a mandatory pollution liability insurance system. They also support the development of various carbon finance products, and promote the development of the markets for emission rights, energy rights, water rights, and other environmental rights, as well as financing tools based on these rights. The Guidelines notably emphasize the role of local governments in supporting the development of green finance, and encourage local authorities to establish specialized green guarantee mechanisms and green development funds. The Guidelines require a further expansion in international cooperation on green finance, continued promotion of global consensus on green finance under the G20 framework, a progressive opening of the green securities market, and an enhancement of the level of "greenness" of China's outward investment.

3.2 Classification of Green Finance Environmental Scope in China

Targeted environmental scope and aspects covered by green finance in China in accordance with the policy guidelines are described on Fig.2.

1. Green Agriculture Development
2. Green Forestry Development
3. Industrial Energy Conservation, Water Conservation and Environmental Protection
4. Natural Preservation, Ecological Restoration and Disaster Prevention and Control
5. Resource Recycling
6. Waste Disposal, Pollution Prevention and Control
7. Renewable Energy and Clean Energy
   - 7.1. Solar Energy
   - 7.2. Wind Power
   - 7.3. Biomass Energy
   - 7.4. Hydropower
   - 7.5. Other Renewable Energy and Clean Energy
   - 7.6. Smart Grid
8. Rural and Urban Water Projects
   - 8.1. Rural Drinking Water Safety
   - 8.2. Small-Scale Farmland Water Conservancy Construction
   - 8.3. Urban Water Conservation
9. Building Energy Efficiency and Green Building
   - 9.1. Green Reconstruction Project for Existing Buildings
   - 9.2. Green Building Construction and Operational Maintenance
10. Green Transport
    - 10.1. Railway Transport
    - 10.2. Waterway Regulation and Ship Purchase
    - 10.3. Urban Public Transport
      - 10.3.1. Urban Bus or Trolleybus
      - 10.3.2. Urban Rail Transport
    - 10.4. Environmental Protection Projects in Transportation
11. Energy Conservation and Environmental Protection Services
    - 11.1. Energy Conservation
    - 11.2. Environmental Protection
    - 11.3. Water Conservation
    - 11.4. Circular Economy (Resource Recycling)
12. Overseas Projects Adopting International Practices and Standards

Fig.2 Classification of Green Finance Environmental Scope in China

2-3 Hong Kong Green Finance Context: Role and Benefits

-Financial Governance Infrastructure as Potential Asset

Financial service is a main pillar of Hong Kong's service-based economy. In 2014 it accounted for 16.6% of GDP and it provides business for other important sectors such as law and accountancy. The maintenance of Hong Kong's leading position in the financial industry and its continuing growth are key to Hong Kong's future. 6.5% of total working population was employed in the financing and insurance sector in 2015 (quarter of 1 million people) and the percentage has been rising over the past few years.

Hong Kong is uniquely placed to be the regional leader in green finance. As such, green finance presents a significant opportunity for Hong Kong to build its green bond markets, and provide benefits from increased employment to investment growth, derivative, insurance and private equity industries.

Building a vibrant green finance industry will enhance Hong Kong's reputation as a leading international financial and offshore RMB centres. Hong Kong's successful financial industry has the track record, reputation and scale, with a world-class business 9 infrastructure and sound regulatory environment. This provides the basis for innovation and leadership in green finance.

However, with regard to the strong financial governance infrastructure in place, and to fully play its role of regional green finance hub, Hong Kong must not restrict itself to China, but extend its influence to other countries and provide the due diligence and /or verification services needed to deliver green financial products widely in East Asia, in particular in South East Asia countries where environmental projects heavily depend on funding from World Bank, ADB, JICA, etc. Funding from these institutions often takes long time to materialize; thus, green financing would certainly help to expedite some of these projects with consistent regulatory framework that ensures pay-back to the green credit issuers.

-Benefits at Local and Regional Scale of Establishing Green Finance in Hong Kong

(1) Green finance presents a significant opportunity for Hong Kong. Potential benefits are commercial, reputational, infrastructural and environmental. A flourishing green finance business driven by Hong Kong would offer a number of advantages as specified below.

(2) Green Finance supports the growth of green industry and sustainable development; it can support the transformation of Hong Kong and regional economies into a diversified and innovative ones.

(3) Green Finance strongly supports hi-tech industry in Hong Kong; it would create employment opportunities. As investors, bankers, professional advisers and traders increasingly participate in the market, they are expected to recruit locally as well as relocate experts from other centres.

(4) It would attract capital and the concomitant new business and derivative products, with profits for Hong Kong taxpayers.

(5) It would provide support for local and regional projects and environment-related activities, providing a locally and regionally-based source of finance.

(6) It would provide local and regional impetus to the insurance / re-insurance sector as it seeks to meet the demand to de-risk new technologies and as regulation increasingly requires pollution risk to be transferred to the insurance sector.

(7) It would attract entrepreneurs in green industries, both established companies and new entrants, to raise capital and seek listings in Hong Kong.

(8) It would facilitate further growth of local and regional investment management industry, since demand for green investment products continues to grow.

-Green Finance Strategic Plan in Hong Kong

While a number of governmental, regulatory and market-driven initiatives have been taken in Hong Kong in this field, government leadership is required to stimulate and encourage the private sector. Government needs to adjust its own funding policies, and commit funds, to send a clear message to the financial industry locally and globally. In line with the green finance policy guidelines in China, targeted actions and achieved progress in green finance in Hong Kong are summarized on Fig.3 below.

Fig.3 Green Finance Strategic Plan and Current Achievement in Hong Kong

2.4 Green Bond Principles and Status of Green Finance in Mainland China and Hong Kong

-Principles

Following are general principles of green bond at international scale.

(1)***Use of Proceeds***: the environmental benefits are clearly assessed and even quantified (where feasible) by the green bond issuer of all designated green projects.

(2)***Process for Project Evaluation and Selection***: the issuer of a green bond basically outlines with a high level of transparency a process to determine how the projects fit within the eligible green projects categories; the related eligibility criteria; and the environmental sustainability objectives. In addition, green bond investors may also take into consideration the quality of the issuer's overall profile and performance regarding environmental sustainability.

(3)***Financial Account and Management of Proceeds***: the net proceeds of Green Bonds should be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer in an appropriate manner and attested by a formal internal process linked to the issuer's lending and investment operations for green projects. The issuer's management of proceeds could be supplemented by an auditor, or other third party, to verify the internal tracking method.

(4)***Disclosure and Reporting***: transparency is of particular value in communicating the expected impact of projects. The green bond principles recommend the use of qualitative and quantitative performance indicators of environmental and social aspects. An external review (consultant review, verification, certification and rating) is also recommended.

However, in Mainland China, determination of green project depends firstly on the types of bond, (including financial, business and corporate bonds) and nature of the projects rather than other technical considerations. Nevertheless, an assurance company is solicited by issuers to assure the compliance with above international standard of principles for the first issue of green bonds. In addition, a Green Finance Committee was formed under the PBOC to further develop the green bond mechanism of Mainland China, in order to prevent the risk of "green washing".

-Issued Green Bonds in Mainland China and Hong Kong

(1) A total of RMB 230 billion of green bonds was issued in 2016 in Mainland China.

(2) Xinjiang Goldwind Science & Technology Co. Ltd successfully issued green bond in Hong Kong Exchanges and Clearing, raising 300 million USD in July 2015, receiving orders of 1.4 billion USD

(3) CLP India raised 6 billion Rupee through a green bond offering to fund a wind project in India in September 2015

(4) LINK raised 500 million USD to refinance or fund eligible existing and future green projects in July 2016

(5) Financial Secretary John Tsang, in the Financial Budget of 2016-17, announced that the Airport Authority will explore the practicality of issuing green bonds.

Detailed description of green bond status in Hong Kong is given in Table.1

Table 1 Status of Green Bonds in Hong Kong

Issue Date	Issuer	Amount Issued (Mn)	Currency	Maturity
Jul-16	Huaneng Renewables Corporation Ltd	1,100	CNY	Jul-21
Jul-16	Link REIT	500	USD	Jul-26
Jul-16	BOC	1,500	CNY	Jul-18
Jul-16		500	EUR	Jul-21
Jul-16		750	USD	Jul-19
Jul-16		500	USD	Jul-19
Jul-16		1,000	USD	Jul-21
May-16	Xinjiang Goldwind	1,000	CNY	-
Apr-16	BAIC Motors	2,500	CNY	Apr-23
Apr-16	Century Concord Wind Power	200	CNY	Apr-19
Mar-16	Bank of Qingdao	500	CNY	Mar-21
Mar-16		3,500	CNY	Mar-19
Dec-15	HSBC	500	EUR	Dec-20
Oct-15	Agricultural Bank of China	600	CNY	Oct-17
Oct-15		400	USD	Oct-18
Oct-15		500	USD	Oct-20
Sep-15	CLP Wind Farms India	2,000	INR	Apr-18
Sep-15		2,000	INR	Apr-19
Sep-15		2,000	INR	Apr-20
May-14	CGN	1,000	CNY	May-19

4-Environmental Leadership as Potential Driver of Green Finance Development

4-1 Emerging Environmental Expertise for Supporting Green Investment

Supporting the development of green finance, in accordance with the policy guidelines and task force, requires strong environmental and engineering professional expertise in key flourishing fields including:

-Carbon Innovation: in line with existing practices in European and Japanese banks, carbon commodity products and services should be developed at an appreciable pace in Hong Kong and Mainland China where, setting up emissions trading desks, offering cutting-edge derivative products based on carbon assets, and investing and buying credits are all positioned to become mainstream over few years under the 13th Five-years Development Plan.

-Green Buildings (green construction material certification, energy, water and resource efficiency, ventilation comfort, indoor air quality performance etc.): the green finance task force is stimulating a growth of green building sector at an increasing rate, particularly in Hong Kong.

-Biodiversity & Ecosystem Conservation: strict requirements for qualitative and quantitative measurements of environmental benefits and sustainability performance tracking of green projects would undoubtedly enhance the demand of strong expertise in biodiversity, ecology and ecosystem conservation.

-Environmental & Health Risks Assessment and Due Diligence Audits

-Clean Technologies (applied to infrastructure projects; construction; waste, contaminations, chemicals & harmful substances management; mobility; urban & rural management systems): over the coming decades, tapping into clean energy and environmental technology opportunities will continue to require innovative financing packages, developed through a long-term lens at both local and international scale.

-Water Conservation & Resource Efficiency Technologies

-Circular Economy (requiring "zero waste" and full recovery design and management expertise)

-Development of Smart City Design and Technologies (strong need of green urban system expertise)

-Environmental Social Governance, Compliance and Corporate Sustainability (increasing need of diverse expertise in corporate risks assessment, audits, performance tracking and continual improvement)

4-2 Leading Role of Hong Kong Environmental Professionals

Taking advantage in the strong financial governance infrastructure in place, and in order to boost the green finance momentum at local, regional and international scale, Hong Kong environmental professionals, in close partnership with other key stakeholders, have to take leadership in:

-Consulting activities with Government, financial institutions, corporations, investors and project designers and developers in the areas of compliance to green bond principles, illegibility and evaluation of green projects at both regional and international scale.

-Assisting Governments and other key stakeholders in the establishment and disclosure sector-by-sector (energy, infrastructure, mobility, buildings, agriculture, industry, trading, communication, urban & rural systems, biodiversity, natural resource, land-use, bio-capacity, eco-system, water, etc.) of locally and regionally accurate permanent database system associated with climate, environmental & health risk and

sustainability for assessment, prediction, monitoring, reporting and verification.

This allows strengthening knowledge, evaluation and qualification of the green dimension of illegible green projects under the green finance guidelines with strong credible expertise at high level of transparency, in order to give assurance to investors, green bonds issuers and other key stakeholders and for maximizing the benefits to the society.

-**S**upporting businesses to identify, develop, and implement "bankable" green programmes and projects under the green finance guidelines and green bond principles.

-**A**ssisting investors, green bonds issuers and other stakeholders in setting up green rating and scoring systems, green stock index, corporate environmental cost accounting and recovering strategies to strength the transparency in green finance proceeds and performance tracking of green projects.

-**A**cting as catalyst for the adoption of strategic plan for carbon pricing, and exploring the possibility of an interjurisdictional emissions trading scheme with the Mainland and other countries under a consistent and regulatory partnerships, in order to promote expansion of sustainable green investment in the fields of clean technologies and low carbon alternatives at regional and international scale.

-**C**oordinating with Governments, investors, green bond issuers, project designers and developers, an exhaustive technical and economic evaluation of existing locally and regionally green projects (expansion of renewable energy, waste-to-energy, landfill gas, high efficiency fuel, biofuel, zero liquid discharge projects etc.) with the purpose to come up with cost-effective and profitable approaches which could raise the attractiveness of these projects and investors' interest for massive green investment.

-**C**oordinating public-private partnerships for research on emerging cost-effective sustainable green technologies in order to stimulate the diversification and growth of the regional green bonds market.

-**S**upporting and promoting Government sustainable green strategic plans to stimulate investors' interest and active investment in green finance projects.

-**P**romoting industry-academia partnerships for sustainable green solutions to business prosperity and corporate environmental & social responsibility to enhance attraction of sustainable green investment.

-**D**irecting and coordinating stakeholders' capacity building and information in project greening, responsible investment, cost-effectiveness, profitability and social dimension and benefits of illegible green projects.

5- Persistent Challenges

With regard to the vision, objectives and expected benefits from the green finance development, some persistent cross-cutting and challenging issues have to be overcome in both short and long terms.

5.1 Obstacles in Mobilising Private Investors

-**T**aking into account the wide range of estimates of the financing needs of green investments, locally and internationally public financial sources will be insufficient to finance the green transformation. Hence, a significant amount of private capital is strongly needed.

-**H**owever, private green finance is still scarce due to a range of microeconomic challenges, including difficulties in internalizing environmental externalities, information asymmetry (between investors, issuers, regulators and recipients) inadequate analytical capacity of issuers and investors, a lack of generally accepted green concept in some countries (despite the clarification made by UNEP during the G20 summit in 2016), leading to excess caution over green assets issuance. Greater harmonization and homogenization of the concepts at international scale are thereby required.

-**M**oreover, the short-term time horizon of savers and investors does not match the long-term nature of green investment projects, which often extend over more than a decade. Attracting green investment therefore requires the development of mechanisms that not only ensure that the green products meet the needs and expectations of the right lenders or investors, but also allow making green projects profitable in a short time frame.

-**A**nother immediate challenge in utilizing the bond markets for the green economy is meeting investor requirements in terms of deal size / liquidity and expected risk / return profiles. Even when sufficient deal size is achieved by green projects, achieving investment-grade credit ratings is another obstacle. It appears thus imperative to develop strategies to overcome liquidity and risk / return constraints.

5.2 High Risk of "Green-Washing" and Dispersion

-**I**n sight of efforts made by UNEP for precision and clarification on green finance**,** ensuring green finance market credibility still requires in some countries, open and consistent definitions in all aspects and transparent use of proceeds. This leads to the need for new tools that allow common understanding of the concepts of green and environmental assets linked to bonds, and transparent instruments for performance tracking, reporting and verification. Given the commoditized nature of bond markets, a standardized and commoditized approach is strongly required.

-**I**n addition, the dynamic of green finance worldwide could result in different definitions on some specific aspects, scopes and specificities for different countries, making the required verifications, competence and knowledge more localised, and curbing the harmonization of green finance promotion at international scale. Such situation might lead to cut expected benefits of some financial hubs like Hong Kong from the green finance. This imperatively calls for setting consistent mechanisms to internationally review and uniformize the concepts, rules, principles, requirements and procedures.

6- The Way Forward and Recommendations

6-1 Boosting the Environmental Expertise and Market in Hong Kong

-Need of Specific Policy Reforms

The development of the green finance in Hong Kong and its expansion at regional and international scale strongly lie in the environmental industry capability and market to act as solution provider to address critical issues in accordance with sound green policy guidelines, proceeds and rules. As such, there is an imperative to significantly scale-up economy to green alternatives through enhanced legislation, regulation and facilitation for green investment.

Environmental policy reforms are necessary in various areas including the way long-term low carbon investment and green consumption are regulated; climate risk and environmental sustainability are predicted, evaluated, managed and valued; corporate sustainability performance and outcomes are regulated and promoted; the way financial and environmental policies are integrated and coordinated; and the way public-private partnerships will be coordinated to enhance private capital mobilisation in the green finance market and for research on sustainable cost-effective emerging green technologies and projects. In this regard, establishment of a multi-dimensional environmental information and technical support centre for mitigating various potential challenges linked to the promotion of green finance is a key point.

The reforms should be also axed on enhanced specific support to environmental enterprises (in particular the SEMs) for introducing and promoting advanced green technologies through the provision of tax deductions / reductions, subsides, and exemptions as well as appropriate incentives, and facilitation for technology piloting and experimentation.

-Commitment of Environmental Professionals and Stakeholders as Imperative

With regard to the strong and credible environmental professional knowledge, capability, skills and know-how required for supporting the development of green finance, full commitment of environmental professionals in continuous competence-based professional development is a key.

Professional capacity building and innovation oriented expertise require multi-disciplinary research cutting across several disciplines. Therefore, new partnerships and closer links between Hong Kong environmental professional bodies with other professional institutions, academia (local and international), international technological quality regulation bodies and research institutions, appear to be crucial to meet highly increasing strong competence and know-how requirements associated with the green finance expansion.

Environmental professionals should also work closely with local educational institutions and vocational training bodies to contribute to develop young generation’s ability for designing green projects. In such vision, the promotion of specialization in emerging green technologies at universities and diversification of sustainability course subjects & innovative applied technological researches are necessary.

Concerted effort of all stakeholders for conceptualizing and commercializing green finance concept is crucial to fully enjoy the benefits of the model in Hong Kong and at regional scale. In addition, the development of green finance requires financial authorities and institutions to fully consider environmental professionals and businesses as stakeholders and green technologies as dynamic enablers.

Government and all key stakeholders (businesses, experts, Universities / R&D Institutions, NGOs, professional bodies, public, etc.) are recommended to closely work on all environmental flourishing lines to stimulate and sustain innovation, creativity and technological advancement in order to position Hong

Kong environmental industry as regional or world leader in driving green finance and sustainable economy development.

6-2 Enhancement of Financial Dynamism in Hong Kong and Mainland China

Attaining the ambitious climate and environmental sustainability goals, will depend significantly on the determination with which actors drive the development of green finance forward.

-In order to enhance private capital for green investment, it is necessary to design an enabling environmental facilitating green finance. Among other factors, green business, as well as rule of law, and investment regime, is an important aspect that supports the increase of green investment activities. Above all, a coordinated approach of all public and private actors of the financial system at all levels is needed.

-Several general measures could contribute to increase private capital for green investment. China Central and Hong Kong Governments should support green finance by backing the strategic framework for green finance, notably the sustainable development goals. By providing clear policy signals and consistent strategic plans, this could be an incentive for actors of the financial markets to pursue the sustainable development goals in line with the Paris Agreement.

-Financial and environmental policies, as well as regulatory policies, should be better coordinated, in Mainland China and Hong Kong. Government financial authorities should give bank regulators the mandate to supervise financial sector's environmental risks.

-Government authorities, together with the private sector, should enlarge capacity-building platforms (effects of the green transformation on credit risks with elaboration of adequate risk modelling and trainings). The sustainable banking network and the principles for responsible investment represent good examples of capacity-building platforms.

-Banks and other financial actors should accelerate their green finance instruments and capital adjustments. Banks, investors, corporations, financial institutions and other green bonds issuers should regularly report and disclose their systemic environmental risks.

-All institutional investors should state in their annual report in which way their investment policy considers environmental, social and governance factors and disclose their sustainability footprint.

-In order to ensure financial stability, financial regulatory authorities in Hong Kong and Mainland China should assess the potential effects of environmental degradation, climate change impacts and resource scarcities on price and financial stability. In addition, they should incorporate environmental effects in the central bank reporting. Moreover, central and main banks in Hong Kong and Mainland China could acknowledge high-rated (AAA) asset-backed securities as collateral loans to other banks or retail institutions.

5-3 Green Finance Promotion Strategies and Roadmap to the Market Growth

Stimulating the development of green bond supply in Mainland China and Hong Kong could be operated through number of instruments including:

-Creation of Local Sovereign Bond: given the emerging state of the green bond market globally, there are some fixed-income asset classes where Mainland China and Hong Kong have the opportunity to lead. Although multilateral development bank bonds such as those from the World Bank are often assigned to sovereign portfolio allocations, a local and national government sovereign green-labelled bond has yet to be issued. It would allow investors in government bonds to signal demand toward green bonds; provide a market example on increased transparency and use of proceeds on bonds; and quantify Hong Kong's leadership role in promoting green growth at local and international scale.

-Enhancement of Green City Investments: this could be implemented through an experimental field for exploring financial innovations, in particular in Hong Kong with targeted simulation of economic restructuring. Emerging smart city technologies and projects could be probably attractive to green city bonds.

-Diversification of Corporate Green Finance: diverse companies, large private corporations and SMEs are active in deploying green technologies and solutions that may be recognized and supported through green bonds. Corporate green bonds that are linked to investments and assets, could be issued from any enterprise (not just green enterprises) to open up the potential of green bonds, as long as the use of proceeds of the bond are linked to qualifying green projects with appropriate transparency and disclosure on performance. Moreover, incentives should be created for green bonds issuance, particularly by the SMEs. It appears also important to identify the boundary of green bond issuers and encourage individualized design.

-Enhancement of Securitization: in a more market-oriented financial system, securitization of assets will be essential for commercial banks and corporates which are looking to grow their lending and investments without over-stretching their own balance sheets. Areas of potential might include, credit enhancement by development banks, warehouse facilities, green asset-backed securities, green mortgage-backed securities and carbon bonds.

-Ensuring the Consistency of the Green Finance with the Development of Environmental Industry: it is crucial to make all green investment consistent with the needs to develop the environmental industry and sustainable development. A permanent follow-up evaluation system should be set to assess and quantify the environmental effects of green bonds with gradually streamline review and approval procedures in order to increase bond issuance efficiency.

-Promotion of the Social Benefits of Green Finance: with regard to the sustainable development purpose, going beyond the environmental performance, to promote the social benefits of the green bonds is a key. Associating green bonds (sustainable green bonds) with human development and quality life index could be innovative, and leading to the need to strength the proceeds and selection criteria with high transparency.

The growth and breakthroughs of green bonds market in Mainland and Hong Kong could be possibly achieved in medium and long term through:

-International Recognition: gaining international recognition for green growth and investment with stakeholders' commitment to a sustainable economy and development.

-Capital Cost Reduction: reducing capital costs to the economy of green growth by fast-tracking bond finance into green projects.

-Financial Transparency: promoting greater transparency in financial markets by providing incentives linked with green assets.

-Linking Household with Green Finance: channelling household savings into a strong retail bond market by tapping into public desire for a green and quality life environment.

-Mobilising Foreign Direct Investment as Asset: channelling international foreign direct investments into long-term debt in line with green growth goals.

7- Concluding Remark

The promotion of green finance for the development of local and regional environmental industry associated with economic diversification lies in having a solid foundation of laws, rules, sustainability standards, proceeds and regulations that not only establish rights, obligations and incentives, but also strengthen business greening and boost economical attractiveness of green investments. This would allow clarifying the environmental obligations of financial institutions, launching a local and national green development fund, greening the banking systems, and setting compulsory environmental liability insurance.

Enhanced environmental sustainability policy and credible expertise supported by strict enforcement on investment greening, appear to be the prerequisite for incorporating appropriate environmental liability into the financial system and stimulating real demand for green finance and growth opportunities for economy greening. This calls for adequate and strengthened coordination of financial and environmental regulations.

Environmental professionals in partnership with Government, investors, regulators and other key stakeholders, have to play a preponderant and pivotal role in printing the concept of green in business transactions, and implementing mandatory disclosure of sustainability information along the whole life cycle of projects. Sustainability standards and rules for disclosure would promote developing green finance assets. Therefore, boosting diversified and quality environmental expertise is crucial for supporting stakeholders to identify, understand and determine the risks and opportunities of green investments. The Task Force recommends the definition of green finance and green concept to be widely vulgarized as well.

Attracting capital and increase the flow of private capital for green investment on a sustained basis, requires green projects to deliver financial returns that meet investors' expectations and to meet international, national and local environmental goals. In this regard, rationalizing the pricing and charging rates incorporated into projects, together with a robust and professionally sound environmental framework, represents a more sustainable and effective approach to ensuring that projects generate attractive returns, attain sustained environmental outcomes and inspire confidence and trust. Voluntary issuance should be also complemented by financial and regulatory incentives. In addition, incentives should be created to support the diversification of issuers in the green finance market, in particular the SMEs.

Last but not the least, wide-ranging and in-depth collaborations among all related professional bodies, stakeholders and governments at all levels and upholding high professionalism in all aspects are the key to success in green finance.

8- Annexes

8.1 Content of Green Finance Policy Guidelines in China

-The Importance of Establishing the Green Financial System in China

(1) Green finance refers to financial services provided for economic activities that are supportive of environment improvement, climate change mitigation and more efficient resource utilization. These economic activities include the financing, operation and risk management for projects in areas such as environmental protection, energy savings, clean energy, green transportation, and green buildings.

(2) The green financial system refers to the institutional arrangement that utilizes financial instruments such as green credit, green bonds, green stock indices and related products, green development funds, green insurance, and carbon finance, as well as relevant policy incentives to support the green transformation of the economy.

(3) The main purpose of establishing the green financial system is to mobilize and incentivize more social (private) capital to invest in green industries, and to more effectively control investments in polluting projects. The green financial system is beneficial not only for the transition to a green economy and the development of an ecological civilization, but also for technological progress in environmental protection, new energy sources, energy savings and other fields. It will also help accelerate the development of new growth drivers and enhance the potential for economic growth.

(4) The establishment of the green financial system requires the internalization of environmental externalities by appropriate incentives and restraints with the support of policies, laws and regulations in the financial, fiscal and environmental areas. It also requires more innovations by financial institutions and financial markets in developing new financial instruments and services, to address the problems of maturity mismatch, asymmetric information and lack of analytical tools for green investment.

-Vigorously Develop Green Lending

(5) Establish a policy framework to support green lending. Further improve the green credit policy system. Improve the green credit statistics system and strengthen the monitoring and evaluation of the implementation of green loans. Support green credit by central bank re-lending operations, specialized guarantee mechanisms and other measures. Allow projects supported by green loans to apply for fiscal subsidies on interest payments. Explore ways to incorporate green credit into the central bank's macro-prudential assessment framework. Use key indicators of green credit performance and green banking evaluation results as important references to develop incentives for green finance business and disincentives for curbing loans to industries of high pollution, high energy intensity and overcapacity.

(6) Promote self-regulatory organizations in in banking industry to gradually establish a green banking evaluation mechanism. Clarify the evaluation indicators, the organization process of evaluation work, and utilization of the evaluation results, and guide financial institutions to actively carry out green finance business and better manage environmental risks. Apply green banking evaluations to major banks first, and based on experiences gained, gradually expand the scope of evaluation to small- and medium-sized commercial banks.

(7) Promote securitization of green loans. Based on the experience from pilot programs of loan securitization, expand the range of participating financial institutions, standardize the selection process of underlying assets, explore efficient and low-cost approaches to collateral registration, improve the market liquidity of securitized assets, enhance information disclosure, with a view to promoting normalized development of green loan securitization.

(8) Explore ways to introduce lenders' environmental legal liability. Based on China's legal framework and domestic conditions as well as lessons from relevant international experiences, explore ways to clarify the due diligence requirements, conditions for immunities from legal prosecution, and environmental legal liabilities for lenders, and to propose relevant legislative suggestions.

(9) Support and guide banks and other financial institutions to establish a credit management system that conforms to the characteristics of green enterprises and projects. Optimize the credit approval process, boost support for green enterprises and projects while controlling risks, and resolutely cancel unreasonable charges to reduce the cost of green loans.

(10) Support banks and other financial institutions to treat environmental and social risks as important drivers in their stress tests for credit risks, and incorporate these test results into asset allocation and internal pricing. Encourage banks and other financial institutions to evaluate their risk exposures to loans and assets in areas of high environmental risks. Quantify the potential credit and market risks to financial institutions due to such exposure under different scenarios.

(11) Incorporate the enterprise environmental information including environmental violations into the financial credit information database. Establish a mechanism to share enterprise environmental information, which should provide a basis for loan and investment decisions of the financial institutions.

-Enhance the Role of the Securities Market in Supporting Green Investment

(12) Improve the rules and regulations for green bonds and unify the green bond definitions. Research and improve the relevant regulations and self-discipline rules for issuance of green bonds. Clarify that funds raised by the issuance of green bonds must be fully (or mainly) used for green projects. Strengthen inter-departmental coordination and unify the definitions of green bonds. Clarify the requirements of information disclosure and other regulatory arrangements or green bond issuance. Support qualified institutions to issue green bonds and related products, and enhance the efficiency for approval or registration for green bond issuance.

(13) Take measures to reduce the financing cost of green bonds. Local governments can support green bond issuance through specialized guarantees and credit enhancement mechanisms. Study and formulate other measures to reduce the financing costs of green bonds.

(14) Explore ways to formulate standards for third party verification of green bonds and green credit rating. Standardize the quality requirements for third party verification of green bonds. Encourage institutional investors to make use of green verification reports in investment decision-making. Encourage rating agencies to evaluate, in their rating exercises, the green performance of the issuers, the "greenness" of the projects, as well as the impact of environmental costs on creditworthiness, and to disclose such information separately in credit rating reports.

(15) Actively support the qualified green enterprises to obtain financing via initial public offerings and secondary offerings. Actively assist qualified green enterprises in their efforts for IPOs, and help listed green enterprises to issue additional shares via secondary offerings according to legal procedures.

(16) Support the development of green bond indices, green equity indices and related products. Encourage financial institutions to develop green index based financial products, such as mutual fund products or private equity fund products, to meet the diverse needs of investors.

(17) Gradually establish and improve the mandatory environmental information disclosure system for listed enterprises and bond issuers. For listed companies that are on the black list of major polluters compiled by the Ministry of Environmental Protection, formulate and strictly implement the disclosure requirements for information on emission of major pollutants, construction and operation of environmental protection facilities, and major environmental incidents. Increase the penalties on listed enterprises and bond issuers that forge environmental information. Cultivate the ability of third party professional organizations to provide environmental information disclosure services for listed enterprises and bond issuers. Encourage third party professional organizations to participate in the collection, research and release of corporate environmental information and analytical reports.

(18) Guide institutional investors to invest in green assets. Encourage long-term funds such as pension funds and insurance funds to carry out green investment and encourage investors to release green investment responsibility reports. Enhance the analytical capacities of institutional investors on

environmental risks and carbon intensity of their investments, and conduct stress tests of the impact of environmental and climate factors on institutional investors (especially insurance companies) and Private Partnerships (PPP).

-Launch Green Development Funds and Mobilize Social Capital through Public

(19) Support the establishment of all kinds of green development funds and their market-based operations. The central fiscal authorities will set up a national-level green development fund by integrating existing special funds, such as energy saving and environment protection funds, and invest in green industries to demonstrate the government's strategic guidance and policy signals for green investment. Encourage local governments and social (private) capital to launch regional green development funds to support the development of local green industries. Encourage social (private) capital and foreign capital to set up all kinds of private green investment funds. Ensure that the investment and management of governmental green development funds are in accordance with the market approach, under the premise of executing national strategies and policies.

(20) Local governments could support the projects invested by green development funds through measures such as relaxing market access restrictions, improving pricing of public services, granting franchises, implementing favourable fiscal and land policies, and improving benefit- and risk-sharing mechanisms.

(21) Support the introduction of the PPP model in the green industry, encourage the bundling of energy saving and emission reduction projects, environment protection projects and other green projects with related higher-return projects, and establish a green service charge mechanism for projects with a "public goods" nature. Improve relevant rules and regulations on green PPP projects, and encourage local governments to release operational rules based on experience of past PPP projects. Encourage all kinds of green development funds to support green PPP projects.

-Develop Green Insurance

(22) Establish a compulsory environmental pollution liability insurance system in areas of high environmental risks. Formulate and revise relevant laws and regulations of compulsory environmental pollution liability insurance according to procedure. The environmental protection agency, in collaboration with the insurance regulatory agency, should publish implementation rules. Include enterprises under the coverage of compulsory environmental pollution liability insurance in areas in which there are higher environmental risks and concentrated environmental pollution incidents. Encourage insurance institutions to play an active role in prevention of environmental risks, to carry out "environmental examination" for enterprises, to inform the environmental protection departments of the environmental risks discovered, and to support environmental risk supervision. Improve the environmental damage evaluation procedure and technical standards, guide insurance companies to expedite damage assessment and settlement of claims, compensate pollution victims on a timely basis, and control damages to the environment.

(23) Encourage and support insurance institutions to innovate green insurance products and services. Establish and improve the catastrophe insurance system related to climate changes. Encourage insurance institutions to develop insurance products for environmental protection technologies and equipment, liability insurance for product quality and safety for low-carbon and environmental friendly products, liability insurance for vessel pollution damage, forest insurance and insurance for agriculture and husbandry disasters. Actively encourage insurance institutions to participate in the environmental pollution risk management of the breeding industry. Establish the coordination mechanism between agriculture insurance compensation and safe disposal of ill livestock.

(24) Encourage and support insurance institutions to participate in the development of the environmental risk control system. Encourage insurance institutions to perform the function of disaster prevention. Actively make use of Internet technologies and other advanced tools to establish monitoring and early warning mechanisms for applicants of pollution liability insurance policies. Conduct real-time risk

monitoring and regular risk evaluation, alert hidden dangers in time, and efficiently process insurance claims. Encourage insurance institutions to make full use of their specialties on risk management, and provide education on environmental risk management to enterprises and the public.

-Improve Environmental Rights Trading Market and Develop Related Financing Instruments

(25) Develop different kinds of carbon finance products. Promote the development of a unified national carbon trading market and carbon pricing center with global impact. Progressively develop carbon forwards, carbon swaps, carbon options, carbon leases, carbon bonds, carbon asset backed securities, carbon funds and other carbon finance products and derivatives. Explore and develop a trading system for carbon futures.

(26) Promote the establishment of markets for pollutant emission rights, energy use rights, water rights and other environmental rights. In key basins and key areas of air pollution, jointly promote inter-regional trading of pollutant emission rights and expand pilot projects on compensated use and trading of pollutant emission rights. Improve and innovate the systems for pollution emission rights trading. Establish and improve the certification process for pollutant emission rights and the market-based price formation system. Establish regional and national trading markets of pollutant emission rights. Establish and improve trading markets of energy use rights and water rights.

(27) Develop financing instruments based on carbon emission rights, pollutant emission rights, energy use rights, water rights and other environmental rights, with a view to expanding the green financing channels for enterprises. Based on the pilot experience of banks that provided financing with environmental rights as collaterals, develop methodologies for evaluating collateral values and their reference ranges. Improve the market-based pricing for environmental rights. Establish an efficient registration and disclosure system for collaterals. Explore methods for re-purchasing environmental rights and other approaches to the disposal of collaterals. Explore ways to include environmental rights and their future cash flows as qualified collaterals, and reduce compliance risk of transactions involving pledges by environmental rights as collaterals. Develop financial products such as repos, factoring, and custodian services for environmental rights.

-Support Local Government Initiatives to Develop Green Finance

(28) Explore supportive measures, such as central bank re-lending, macro- prudential assessment, and capital market instruments to promote green finance at the local level. Encourage and support local governments to crowd-in social (private) capital to invest in green industries, by measures such as setting up specialized green guarantee programs and establishing green development funds. Support local governments to make full use of the green bond market to finance medium- and long-term green projects with stable cash flows. Encourage local governments to include projects with significant environmental benefits into the green project database, and expand the financing channels for these projects by listing them on national financial asset trading centers. Encourage international financial institutions and foreign corporations to cooperate with local governments to make green investments.

-Promote International Cooperation in Green Finance

(29) Expand the scope of international cooperation in green finance. Continue to promote the global consensus on developing green finance under the framework of the G20, promote the application of voluntary principles for green banking and green investment, as well as other best practices on green finance, and improve related capacity building. Promote regional cooperation on green finance and support green investment of relevant countries through implementing ‘the One Belt One Road' strategy and regional cooperation mechanisms such as Shanghai Cooperation Organization, China-ASEAN Cooperation, and South-South Cooperation, and the role of the Asian Infrastructure Investment Bank and BRICs New Development Bank in leveraging private green investment.

(30) Promote the progressive, two-way opening of the green securities market. Support domestic financial institutions and enterprises to issue green bonds overseas. Make full use of bilateral and multilateral

cooperation mechanisms and guide foreign capital to invest in China's domestic green bonds, green equities and other green financial products. Encourage the establishment of joint venture green development funds. Support international financial organizations and multinational corporations to issue green bonds in the Chinese market and make green investments in China.

(31) Enhance the "greenness" of China's outward investment. Support and encourage domestic financial institutions, non-financial enterprises and multilateral development banks with China's active participation to strengthen environmental risk management, improve environmental information disclosure, adopt green financing instruments such as green bonds, develop green supply chain management, and explore the use of instruments such as environment pollution liability insurance to manage environmental risks, in implementing "One Belt One Road' and other overseas investment projects.

-Prevent Financial Risks and Strengthen Implementation

(32) Improve the supervision mechanism to prevent risks related to green finance. Improve coordination among supervisory agencies on green finance businesses and products, make comprehensive use of macro-prudential and micro-prudential management tools, unify and improve relevant supervision rules and standards, enhance information disclosure, effectively control the default risks of green loans and green bonds, and fully develop equity finance, with a view to preventing excessive leverage by green projects, unhealthy financial arbitrage, "green washing" and other problems, and preventing systematic financial risks.

(33) Government agencies should coordinate and join force in promoting the development of green finance. The People's Bank of China, the Ministry of Finance, National Development and Reform Commission, the Ministry of Environment Protection, China Banking Regulatory Commission, China Securities Regulatory Commission, China Insurance Regulatory Commission and other relative departments should pay close attention to the business development of, and the risks associated with, green finance, monitor and evaluate policy incentives and supervisory rules, and make appropriate policy adjustments in time. Strengthen the development of financial information infrastructure, and promote the sharing of information and statistics. Establish and improve the early warning systems, and intensify the supervision and evaluation of use of funds for green projects.

(34) Each region should, taking into account local circumstances and priorities, actively promote the development of green finance. Local governments should develop their plans for promoting green finance, clarify the division of labour, and incorporate the development of green finance into their annual performance targets. Strengthen the capacity building of green finance, and accelerate talent development and acquisition.

(35) Intensify public communications on green finance. Actively promote best practices of green finance and financial institutions and enterprises with outstanding green performance, and seek to build a greater public consensus of green finance development. Further increase environmental awareness, promote green consumption, and develop a better social atmosphere for ecological civilization and green finance.

8.2 Green Bond Principles

INTRODUCTION

Green Bonds raise funds for new and existing projects with environmentally sustainable benefits. The Green Bond Principles (GBP) are voluntary process guidelines that recommend transparency and disclosure, and promote integrity in the development of the Green Bond market. They are intended for broad use by the variety of actors participating in the market and are designed to provide the information needed to increase capital allocation to environmentally sustainable purposes without any single arbiter. This edition of the GBP benefits from the input of the 2015 summer consultation of GBP Members and Observers, as well as of the subsequent working groups created by the GBP Executive Committee to reflect on the key themes that surfaced from the consultation. It also aims to reflect ongoing feedback from the wider Green Bond stakeholder community and to take into account recent market developments.

The 2016 update continues to be framed by the same four core components (Use of Proceeds, Process for Project Evaluation and Selection, Management of Proceeds and Reporting). A particular effort has been made this year to recommend best practice on information sharing and external reviews including through proposed templates. This is designed to help investors, and the market generally, to establish the alignment of issuances with the GBP. Project eligibility is discussed in the Green Project categories under the Use of Proceeds section and has been expanded to include more details and reference to other external resources. Additional detail has also been included on reporting guidelines. Finally, this update of the GBP acknowledges the application of the "use of proceeds" bond concept to themes beyond the environment, such as bonds financing projects with social objectives, or with a combination of social and environmental objectives. A number of such Social or Sustainability Bond transactions share common key features with Green Bonds. Guidance for Issuers of Social Bonds has therefore been developed to confirm the relevance of the GBP in this context and facilitate their application to provide transparency and disclosure to this emerging segment. A copy of this document is available at www.icmagroup.org/socialbonds.org.

GREEN BOND DEFINITION

Green Bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance in part or in full new and/or existing eligible Green Projects (see section 1 Use of Proceeds) and which are aligned with the four core components of the GBP. Different types of Green Bonds exist in the market. These are described in Appendix I. It is important to note that Green Bonds should not be considered fungible with bonds that are not aligned with the four core components of the GBP.

GREEN BOND PRINCIPLES

The Green Bond Principles (GBP) are voluntary process guidelines that recommend transparency and disclosure and promote integrity in the development of the Green Bond market by clarifying the approach for issuance of a Green Bond. The GBP are intended for broad use by the market: they provide issuers with guidance on the key components involved in launching a credible Green Bond; they aid investors by promoting availability of information necessary to evaluate the environmental impact of their Green Bond investments; and they assist underwriters by moving the market towards expected disclosures which will facilitate transactions.

The GBP recommend a clear process and disclosure for issuers, which investors, banks, investment banks, underwriters, placement agents and others may use to understand the characteristics of any given Green Bond. The GBP emphasize the required transparency, accuracy and integrity of information that will be disclosed and reported by issuers to stakeholders. The GBP have four core components:

(1). Use of Proceeds

(2). Process for Project Evaluation and Selection

(3). Management of Proceeds

(4). Reporting

(1). Use of Proceeds The cornerstone of a Green Bond is the utilization of the proceeds of the bond for Green Projects which should be appropriately described in the legal documentation for the security. All designated Green Project categories should provide clear environmental benefits, which will be assessed and, where feasible, quantified by the issuer.

In the event that all or a proportion of the proceeds are or may be used for refinancing, it is recommended that issuers provide an estimate of the share of financing vs. re-financing, and where appropriate, also clarify which investments or project portfolios may be refinanced. The GBP explicitly recognize several broad categories of eligibility for Green Projects aiming to address key areas of concern such as climate change, natural resources depletion, loss of biodiversity and/or pollution control. The list is intended to be indicative and capture the most commonly used types of projects supported or expected to be supported by the Green Bond market. These categories, listed in no specific order, include, but are not limited to:

-Renewable energy (including production, transmission, appliances and products);

-Energy efficiency (such as in new and refurbished buildings, energy storage, district heating, smart grids, appliances and products); - pollution prevention and control (including waste water treatment, greenhouse gas control, soil remediation, recycling and waste to energy, value added products from waste and remanufacturing, and associated environmental monitoring analysis);

-Sustainable management of living natural resources (including sustainable agriculture, fishery, aquaculture, forestry and climate smart farm inputs such as biological crop protection or drip-irrigation);

-Terrestrial and aquatic biodiversity conservation, (including the protection of coastal, marine and watershed environments);

-Clean transportation (such as electric, hybrid, public, rail, non-motorized, multi-modal transportation, infrastructure for clean energy vehicles and reduction of harmful emissions);

-Sustainable water management (including sustainable infrastructure for clean and/or drinking water, sustainable urban drainage systems and river training and other forms of flooding mitigation);

-Climate change adaptation (including information support systems, such as climate observation and early warning systems);

-Eco-efficient products, production technologies and processes (such as development and introduction of environmentally friendlier, eco labelled or certified products, resource efficient packaging and distribution).

While the GBP's purpose is not to take a position on which green technologies, standards, claims and declarations are optimal for environmentally sustainable benefits, issuers and other stakeholders can refer to examples through links listed on the GBP webpages at www.icmagroup.org/greenbonds. Furthermore, there are many institutions that provide independent analysis, advice and guidance on the quality of different green solutions and environmental practices. Definitions of green and green projects may also vary depending on sector and geography.

(2). Process for Project Evaluation and Selection

The issuer of a Green Bond should outline: • a process to determine how the projects fit within the eligible Green Projects categories identified above; • the related eligibility criteria; and • the environmental sustainability objectives. The GBP encourage a high level of transparency and recommend that an issuer's process for project evaluation and selection be supplemented by an external review (see External Review section). In addition to information disclosed by an issuer on its Green Bond process, criteria and external reviews, Green Bond investors may also take into consideration the quality of the issuer's overall profile and performance regarding environmental sustainability.

(3). Management of Proceeds

The net proceeds of Green Bonds should be credited to a sub-account, moved to a sub- portfolio or otherwise tracked by the issuer in an appropriate manner and attested to by a formal internal process linked to the issuer's lending and investment operations for Green Projects. So long as the Green Bonds are outstanding, the balance of the tracked proceeds should be periodically adjusted to match allocations to eligible Green Projects made during that period. The issuer should make known to investors the intended types of temporary placement for the balance of unallocated proceeds. The GBP encourage a high level of transparency and recommend that an issuer's management of proceeds be supplemented by the use of an auditor, or other third party, to verify the internal tracking method and the allocation of funds from the Green Bond proceeds (see External Review section).

(4). Reporting

Issuers should make, and keep, readily available up to date information on the use of proceeds to be renewed annually until full allocation, and as necessary thereafter in the event of new developments. This should include a list of the projects to which Green Bond proceeds have been allocated, as well as a brief description of the projects and the amounts allocated, and their expected impact. Where confidentiality agreements, competitive considerations, or a large number of underlying projects limit the amount of detail that can be made available, the GBP recommend that information is presented in generic terms or on an aggregated portfolio basis (e.g. percentage allocated to certain project categories).

Transparency is of particular value in communicating the expected impact of projects. The GBP recommend the use of qualitative performance indicators and, where feasible, quantitative performance measures (e.g. energy capacity, electricity generation, greenhouse gas emissions reduced / avoided, number of people provided with access to clean power, reduction in the number of cars required, etc.) with the key underlying methodology and / or assumptions used in the quantitative determination. Issuers with the ability to monitor achieved impacts are encouraged to include those in their regular reporting.

Leading International Financial Institutions have developed a reference framework for impact reporting ("Working towards a harmonized framework for Green Bond impact reporting" available at www.icmagroup.org/greenbonds) that outlines core principles and recommendations and puts forward core indicators for two sectors: energy efficiency and renewable energy. The framework includes templates for impact reporting at a project and portfolio level that other issuers can adapt to their own circumstances. The GBP welcome this initiative, and encourage further initiatives, to help establish additional references for impact reporting that others can adopt and/or adapt to their needs.

The use of a summary reflecting the main characteristics of a Green Bond or a Green Bond programme, and illustrating its key features in alignment with the four core components of the GBP may help inform market participants. To that end, a template can be found on www.icmagroup.org/greenbonds which once completed can be made available online for market information (see section on GBP Resource Centre below).

EXTERNAL REVIEW

It is recommended that issuers use an external review to confirm the alignment of their Green Bonds with the key features of the GBP as defined above. There are a variety of ways for issuers to obtain outside input to the formulation of their Green Bond process and there are several levels and types of review that can be provided to the market. Such guidance and external reviews might include:

1) Consultant Review: An issuer can seek advice from consultants and/or institutions with recognized expertise in environmental sustainability or other aspects of the issuance of a Green Bond, such as the establishment/review of an issuer's Green Bond framework. "Second opinions" may fall into this category.

2) Verification: An issuer can have its Green Bond, associated Green Bond framework, or underlying assets independently verified by qualified parties, such as auditors. In contrast to certification, verification may focus on alignment with internal standards or claims made by the issuer. Evaluation of the

environmentally sustainable features of underlying assets may be termed verification and may reference external criteria.

3) Certification: An issuer can have its Green Bond or associated Green Bond framework or Use of Proceeds certified against an external green assessment standard. An assessment standard defines criteria, and alignment with such criteria is tested by qualified third parties / certifiers.

4) Rating: An issuer can have its Green Bond or associated Green Bond framework rated by qualified third parties, such as specialised research providers or rating agencies. Green Bond ratings are separate from an issuer's ESG rating as they typically apply to individual securities or Green Bond frameworks / programmes.

An external review may be partial, covering only certain aspects of an issuer's green bond or associated Green Bond framework or full, assessing alignment with all four core components of the GBP.

The GBP recommend public disclosure of external reviews, or at least an executive summary, for example by using the template available at www.icmagroup.org/greenbonds which once completed can be made available online for market information (see section on GBP Resource Centre below). The GBP encourage external review providers in any case to disclose their credentials and relevant expertise, and communicate clearly the scope of the review conducted.

The GBP take into account that the timing of an external review may depend on the nature of assets financed (new projects or refinancing of existing assets) and publication of reviews can be constrained by business confidentiality requirements.

GBP Resource Centre Recommended templates and other GBP resources are available at the GBP Resource Centre at www.icmagroup.org/greenbonds. Completed templates can be made available online for market information at the GBP Resource Centre by following the instructions at www.icmagroup.org/greenbonds.

TYPES OF GREEN BONDS

There are currently four types of Green Bonds (additional types may emerge as the market develops and these will be incorporated in annual GBP updates):

• Green Use of Proceeds Bond: a standard recourse-to-the-issuer debt obligation for which the proceeds shall be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer and attested to by a formal internal process that will be linked to the issuer's lending and investment operations for eligible Green Projects. It is recommended that the issuer make known to investors the intended types of temporary placement for the balance of unallocated proceeds.

• Green Use of Proceeds Revenue Bond: a non-recourse-to-the-issuer debt obligation in which the credit exposure in the bond is to the pledged cash flows of the revenue streams, fees, taxes etc., and the use of proceeds of the bond goes to related or unrelated Green Project(s). The proceeds shall be credited to a sub-account, moved to a sub-portfolio or otherwise tracked by the issuer and attested to by a formal internal process that will be linked to the issuer's lending and investment operations for eligible Green Projects. Pending such investment or allocation, it is recommended that the issuer make known to investors the intended types of temporary placement for the balance of unallocated proceeds.

• Green Use of Proceeds Project Bond: a project bond for a single or multiple Green Project(s) for which the investor has direct exposure to the risk of the project(s) with or without potential recourse to the issuer.

• Green Use of Proceeds Securitized Bond: a bond collateralized by one or more specific Green Project(s), including but not limited to covered bonds, ABS, MBS, and other structures. The first source of repayment is generally the cash flows of the assets. This type of bond covers, for example, asset-backed securitizations of rooftop solar PV and/or energy efficiency assets.

Note: It is also recognized that there is a market of environmental, climate or otherwise themed bonds, in some cases referred to as "pure play", issued by organisations that are mainly or entirely involved in environmentally sustainable activities, but that do not follow the four core components of the GBP. In such cases, investors will need to be informed accordingly and care should be taken to not imply GBP features by a Green Bond reference. These organisations are encouraged to adopt where possible the relevant best practice of the GBP (e.g. for reporting) for such existing environmental, climate or otherwise themed bonds, and to align future issues with the GBP.

8.3 Methods and Analytical Tools for Green Project Evaluation (References)

-Sara et al., (2015), A systemic framework for project sustainability assessment, *Ecological Economics*, *Volume 119, Pages 314–325*

-BSR | Measuring and Managing Corporate Performance, (2013), Review of Emerging Tools

-Daniel C. Esty and Todd Cort , (2017), Project Sustainability Metrics: What Investors Need and Don't Get, Yale university

-Helene Spitzer & André Martinuzzi, (2013), Methods and Tools for Corporate Sustainability Assessment and Management

---

8.4 Examples of Green Projects

1. **Organic Recycling in Wilmington, DE**—The Wilmington Organic Recycling Center is the largest composting facility in North America, sitting on 27 acres and accepting 160,000 tons of organic waste per year. The plant reduces greenhouse gas emissions by an amount equivalent to removing 8,800 cars from area roads, per year. The center also lowers the cost of organic waste disposal by 20-50 percent, which makes it possible for more residents and businesses to participate in the program

2. **Landfill Rehabilitation in New York, NY**—Freshkills, formerly known as the world's largest landfill at 2,200 acres, is being turned into a park with advanced landfill engineering techniques. Freshkills Public Park is three-times the size of Central Park. It once accepted more than 29,000 tons of trash per day, but now landfill mounds have been capped through a special process that will alleviate toxic fumes and the soil has been treated to promote proper drainage and ensure public health and safety regulations are not only met, but surpassed.

3. Zero-liquid discharge (ZLD) Systems: ZLD is a water treatment process in which all wastewater is purified and recycled; therefore, leaving zero discharge at the end of the treatment cycle. ZLD is an advanced green wastewater treatment method that includes ultrafiltration, reverse osmosis, evaporation/crystallization, and fractional electrodeionization.

4. **Wind Energy in Corpus Christi, TX**—Known as America's Wind Power Port, Corpus Christi houses the continent's first on-port wind farm. The Port serves as a shipping hub for wind turbines and also wants to harness Texas winds to generate more clean energy in what is already the nation's top state for wind power. Additionally, Texas A&M University-Corpus Christi houses 11 vertical-axis wind turbines that produce 92 kilowatts, which makes it the largest installation of its kind in the nation.
.

5. Augustenborg is one of the largest investments in Europe in the ecological conversion of an existing residential area. In 2010, it was awarded the United Nations (UN) World Habitat Award for its 10,000 green roofs which slow down flooding by absorbing rainwater. The district has also implemented a large solar energy project where photovoltaic solar panels have been installed on both public and private buildings to harness energy. Also, over 70 per cent of waste collected is recycled in Augustenborg. The district of **Hyllie** is developed as the Öresund Region's climate-smartest district. The goal is to have this emerging neighbourhood 100 per cent fuelled by renewable and recycled energy by 2020. Among other things, Hyllie is developing a sustainable energy system that will integrate electricity, heating and cooling while building a smart consumption monitoring solution where residents will be able to track and measure their environmental impact.

6. Innovative green concrete technology for enhancing greenhouse gas reduction in construction
In order to obtain sustainable green concrete, intensive researches have been recently conducted, not only on the geo-polymerization of the concrete, but also, and more importantly, on the reduction of the ratio of calcium-to-silicate, which is crucial in reducing carbon emissions in concrete manufacturing. The geo-polymerization process consists of inorganic polymer concrete utilizing fly ash, one of the most abundant industrial byproducts on earth, as a substitute for Portland cement. With regard to the ratio of the calcium-to-silica, the new finding reported the ratio of 1.5 to be the optimal one that makes the concrete highly green and two times more resistant than existing standard ones, in terms of mechanical resistance to fracture, since the cement would be glassier and less crystalline with no residual stress. In conventional cements, the ratio ranges anywhere from about 1.2 to 2.2, with 1.7 accepted as the standard. Such double innovation has the benefits, not only to substantially curb CO_2 emissions and to produce a more durable infrastructure capable of la sting hundreds of years, but also, conserve hundreds of thousands of acres currently used for disposal of coal combustion products, and protect our water ways from fly ash contamination as well. Because of its improved resistance to mechanical stress, the new technology could be of particular interest to the oil and gas industries, where cement around well casings is crucial to preventing leakage and blowouts. In comparison with ordinary Portland cement-based concrete, the life cycle greenhouse gas of the geo-polymer concrete with a ratio of 1.5 for calcium-to-silica could be reduced by 90% according to the Technology Transfer Center in Shreveport (Louisiana, USA).

7. High Efficiency and Low-Cost New Solar Energy Technology: Based on recent research results, scientists and engineers reported the performance of a mineral called perovskite which could hold the key to cheaper photovoltaic energy generation. A perovskite solar cell is a type of solar cell which includes a perovskite absorber, most commonly a hybrid organic-inorganic lead or tin halide-based material, as the light-harvesting active layer. Crucially, studies conducted worldwide with perovskite confirmed its efficiency and high cost-effectiveness in converting light to power in a range of atmospheric conditions, rather than just under direct sunlight. Perovskite solar cells hold an advantage over traditional silicon solar cells in the simplicity of their processing. Traditional silicon cells require expensive multistep processes with high temperatures and vacuums. These techniques are harder to scale up, while the organic-inorganic perovskite material can be manufactured with simpler wet chemistry and processing techniques in a traditional laboratory environment. Thereby, the mass-manufacturing of perovskite solar cells is found to be much cheaper than the silicon cells. The results demonstrated the ability of perovskite material to produce stable solar cells under versatile climatic conditions. One of most attractive assets of the perovskite solar cells is its ability to absorb only the visible part of the light spectrum to assure the biggest bang per photon of visible light much more efficient than existing silicon solar cells so far. Moreover, combining two perovskite cells with approximately the same efficiency resulted in a very large efficiency boost. In particular, testing of the formamidinium and methylammonium perovskites mixture showed much more stable solar cells with an efficiency of 50% higher than silicon cells in terms of absolute efficiency. This offers the potential for significant progress in finding low-cost ways to generate photovoltaic energy for wider consumers. Such a drastic improvement in efficiency and cost-effectiveness has the potential to definitely redefine the commercial viability of existing low-quality silicon. The development of perovskite solar cells technology at industrial-scale production process (Starting from 2018 according to the US National Renewable Energy Laboratory) will undoubtedly lead to significant reduction of photovoltaic energy generation costs and widely enhance carbon emission control.

9- References

1. China Council for International Cooperation on Environment and Development, (2015), Green Finance Reform and Green Transformation, Annual Conference of CCICED

2. Financial Service Development Council, FSDC, Hong Kong (2016), Hong Kong as a Regional Green Finance Hub, Paper No.23

3. Financial Service Development Council, FSDC, Hong Kong (2016), Promoting Green Finance to Drive Green Economy

4. Green Budget Coalition, Canada, (2016), Vision for Environmental Leadership

5. German Development Institute, Green Finance: Actors, Challenges and Policy Recommendations, (2016), Briefing Paper

6. International Capital Market Association, ICMA, (2016), Green Bond Principles, Voluntary Process Guidelines for Issuing Green Bonds

7. International Finance Corporation, IFC, and Sustainable Banking Network, (2015), Greening the Banking System - Experiences from the Sustainable Banking Network (SBN), Background Paper for the G20 Green Finance Study Group

8. UNEP, (2007), Green Financial Products & Services: Current State of Play and Future Opportunities, CEO Briefing