



Green Infrastructure Investment Opportunities

VIETNAM

2019 REPORT



Climate Bonds INITIATIVE



Supported by European Climate Foundation

This report highlights green infrastructure investment opportunities in Vietnam

This report has been prepared to help meet the growing demand for green investment opportunities and to support the country's transition to a low carbon economy.

It aims to facilitate greater engagement on this topic between project owners and developers, and institutional investors. Green infrastructure and corresponding green finance instruments are explored in the report, with sector-by-sector investment options presented.

The report is intended for a wide range of stakeholders, including domestic superannuation funds and asset managers and their global counterparts, potential issuers, infrastructure owners and developers, as well as relevant government ministries.

Green Infrastructure Investment Opportunities (GIIO) Report Series

Green infrastructure presents a huge investment opportunity globally, with an estimated USD100tn worth of climate compatible infrastructure required between now and 2030, in order to meet Paris Agreement emissions reduction targets. However, there remains a lack of identifiable, investment-ready and bankable projects. There is also a lack of understanding of what types of assets and projects qualify for green financing.

In response to this challenge, CBI is developing a series of reports that aim to identify and demonstrate green infrastructure investment opportunities around the world. By so doing, it aims to raise awareness of what is green and where to invest, as well as to promote green bond issuance as a tool to finance green infrastructure.

The report series commenced with the GIIO Indonesia report, launched in May 2018, followed by four other reports - the latest being the GIIO Brazil report, launched in November 2019. The pipeline of GIIO reports being developed includes further exploration of opportunities in Asia-Pacific as well as in Latin America.



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Climate Bonds Initiative

The Climate Bonds Initiative (CBI) is an international investor-focused not-for-profit organisation working to mobilise the USD100tn bond market for climate change solutions.

It promotes investment in projects and assets needed for a rapid transition to a low carbon and climate resilient economy.

The mission focus is to help drive down the cost of capital for large-scale climate and infrastructure projects and to support governments seeking increased capital markets investment to meet climate and greenhouse gas (GHG) emission reduction goals.

The CBI carries out market analysis, policy research, market development; advises governments and regulators; and administers a global green bond standard and certification scheme.

CBI screens green finance instruments against its Climate Bonds Taxonomy to determine alignment and uses sector specific criteria for certification.

The Climate Bonds Taxonomy is on the back cover. Please see p.11 for information on the Climate Bonds Standard and Certification Scheme.

Green infrastructure: an opportunity for growth

Vietnam is one of the most vulnerable countries to climate change. It is also a fast-growing emerging economy. Significant scaling-up of investment in green infrastructure is critical for Vietnam to meet its climate commitments and build resilience to the impacts of climate change as well as to achieve rapid economic development.

Vietnam will need roughly USD31bn by 2020 to move its current carbon-dependent development onto a more sustainable path, and towards its Nationally Determined Contribution (NDC) commitments.¹ In 2017, the Minister of Planning and Investment of Vietnam calculated that it will need a USD21.13bn of total expenditure – from national and foreign financing – to meet its adaptation and mitigation NDC targets.²

Most infrastructure investment in Vietnam is currently financed by the central government budget and Official Development Assistance (ODA).³ However, relying on public funding could create a fiscal challenge in the long term.⁴ So, the Government has already begun turning towards private-sector led growth.

Under the Vietnam Green Growth Strategy, approved by the Government for the 2011-2020 period, the capital market has been identified as being key to achieving the country's targets. Green bonds, for example, will be vital in raising funds specifically for green projects and assets, including green infrastructure, as well as tapping into private sector investment for sustainable development.⁵

So far, private investors have been limited by complicated legal and regulatory requirements and challenging risk sharing arrangements between the public and private sector.⁶ Fortunately, the Vietnamese government has begun implementing policies that improve the ease-of-doing business and are developing private public partnerships to attract private foreign investment. These efforts are already showing positive results.⁷

Improving the general investment environment as well as promoting more green finance will help to fund the infrastructure necessary to meet climate targets. Globally, there is significant demand for green investments. Vietnam can take advantage of this demand and attract capital by developing and promoting green infrastructure pipelines.

Green infrastructure has positive environmental and economic benefits. It can create prosperity by increasing competitiveness, productivity and employment opportunities; extending the reach, reliability and efficiency of the national electricity grid, without creating air pollution; broadening the economic base; creating new markets; and providing inclusion and connectivity across Vietnam.

Adaptive and resilient infrastructure provision is also important, and it should become a core part of the national response to the coming climate emergency. Delayed action in transitioning to a low carbon economy increases the cost of change as well as the volatility and structural risks to the finance sector and underlying asset values. In this environment, major stakeholders in banking, finance and superannuation have a responsibility to act.

Country facts^{8,9,10}

Population: **96.4 million** (mid-2019)¹¹

Population growth rate: **0.96%** (2019)

Urban population: **37%** of the population is urban (2019)

GDP: **USD244.95bn** (2018)

GDP growth rate: **7.31%** (Q3, 2019)

Interest rate (cash rate): **6.00%** (Oct, 2019)

Inflation: **1.98%** (Sept, 2019)

Net inflow FDI: **USD14.2bn** (Sept, 2019)

Government 10Y Yield: **3.65%** (Daily, Oct, 2019)

Balance of trade: **USD0.5bn** (as at Sept, 2019)

Government debt to GDP: **57.3%** (2018)

Rating:

BB, stable (S&P)

Ba3 (Moody's)

BB, positive (Fitch)

Snapshot: Vietnam's macroeconomic outlook

Green finance presents an opportunity in promising macroeconomic conditions

Amid a slowing global economic outlook and international trade tensions, Vietnam has been able to maintain rapid economic growth compared to its ASEAN (Association of Southeast Asian Nation) counterparts. Vietnam's GDP growth rate accelerated to 7.31% in Q3 2019, surpassing the Government's GDP growth target of 6.8%.¹²

This growth has been sustained by Vietnam's market-oriented and outward-looking economic policies, and its strong service and industrial sectors.¹³ Annual headline inflation has been stable for seven consecutive years, at single digits and moving towards 4%, consistent with national government inflation targets.¹⁴ The external balance also remains under

control and should continue to be financed by strong foreign direct investment inflows, which reached almost USD18bn in 2018, accounting for almost 24% of the total investment in the economy.¹⁵

Vietnam's economic outlook remains promising and is growth projected to expand by 6.5% in 2020.¹⁶ President Nguyen Phu Trong assured that, "in 2020, [Vietnam] will continue to consolidate its macroeconomic stability, keep inflation under control and enhance the productivity, quality and competitiveness of the economy."¹⁷ This positive growth prediction will position Vietnam as one of ASEAN's most dynamic and promising economies. Increased investment in infrastructure is central to achieving this position.¹⁸ Green finance is one of the tools for doing so.

Snapshot: Infrastructure spending in Vietnam

Infrastructure pipelines are growing, with more opportunities emerging for outside investment

Infrastructure has been central in Vietnam's impressive growth over the past two decades. According to the Global Competitiveness Report 2016-2017, Vietnam ranked 79th out of 138 countries in terms of overall infrastructure quality.¹⁹ Regionally, Vietnam is leading the way with electrification – 99% of the population has access to electricity.²⁰ At the present rate of national infrastructure development, Vietnam remains on-track for continued growth.²¹

However, rapid economic development and accelerating urbanization are putting increasing pressure on Vietnam's infrastructure. With 50% of Vietnam's population expected to reside in cities by 2040,²² the existing transport networks and utilities could become overloaded.²³ Furthermore, demand for energy is estimated to increase by around 10% annually and freight volumes (and their infrastructure needs) are also expanding quickly.²⁴ With these added pressures and the threat of climate change, Vietnam will need to increase as well as improve infrastructure developments.

The Vietnamese government has already invested heavily in infrastructure, almost double the global average.²⁵ With more than 6% of GDP being allocated to infrastructure, Vietnam is among the countries spending the highest.²⁶ Currently, about two-thirds of Vietnam's expenditure

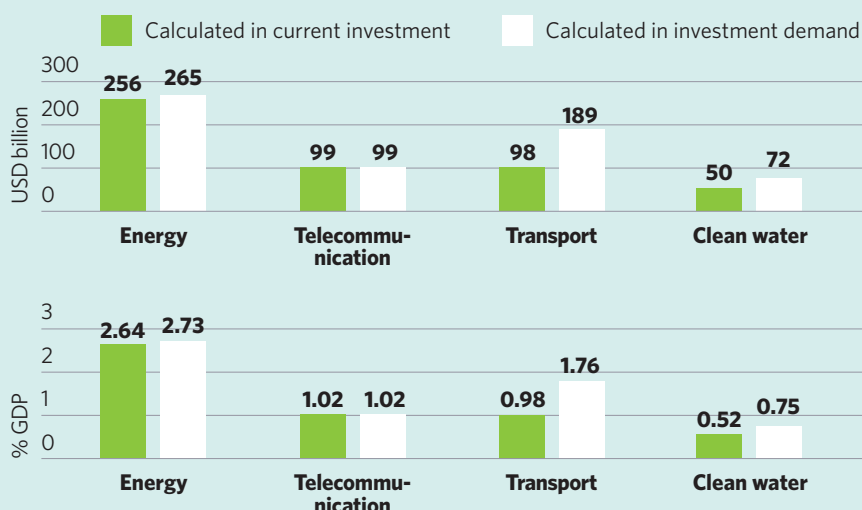
for infrastructure investment is financed by public resources.²⁷ In 2015 alone, total public investment in infrastructure was USD10bn out of a total of USD15.5bn of public and private invested in infrastructure that year.²⁸

As estimated in Global Infrastructure Outlook report 2017, if Vietnam continues on this impressive stride of infrastructure spending, the country will be able to meet 83% of its infrastructure needs by 2040.²⁹ To reach 100%, Vietnam will need a future investment of USD605bn via both public and private sector intervention.³⁰ According to current trends of government spending on infrastructure, this will leave an investment gap of USD102bn by 2040.³¹

To fill this gap, the Government has been developing policies and undergoing reform

in order to attract foreign investment and introduce private participation. In 2015, Decree 15/2005/NĐ-CP³² on investment in the form of Public-Private Partnership (PPP) came into effect, providing clear guidance for PPP projects – including BOT (Build-Operate-Transfer), BTO (Build-Transfer-Operate) and BT (Build-Transfer) – to promote foreign investment in infrastructure development. In 2016, the Government released a list of projects open for private and foreign investment with a special focus on transport and energy.³³ Despite these changes, the current legal and regulatory framework is still considered complicated by private investors.³⁴ More needs to be done to ensure an open and clear investment environment and that there continues to be a strong pipeline of projects.

Infrastructure investment forecast 2016-2040, sector breakdown in terms of GDP



Snapshot: Vietnam's climate policy

Vietnam is striving to increase and reach its climate goals

Vietnam ratified the Paris Agreement in November 2016. In its NDC, Vietnam pledged to reduce 8% of carbon emissions by 2030, compared to business-as-usual, or 25% with international support.³⁵ Prior to the Paris Agreement ratification, the Government aspired for low carbon growth. This was demonstrated by national climate policy frameworks introduced in 2011 and 2012: the National Climate Strategy, outlining climate objectives, and the National Green Growth Strategy, including mitigation targets and measures, respectively.³⁶

Vietnam is currently reviewing its NDC to increase its level of emissions reductions.

This revision coincides with the development of a monitoring framework to track progress on Vietnam's Plan for Implementation of the Paris Agreement (PIPA).³⁷ Another recent climate policy decision aims to better promote renewable energy through the upcoming 8th Power Development Master Plan, to be finalized in June 2020.³⁸

This is important as the nation's increasingly carbon-intensive energy mix is projected to significantly contribute to Vietnam's GHG emissions in the future. The Asian Development Bank (ADB) projected that energy associated emissions may have a tenfold increase between 2010 and 2050.³⁹ The energy sector will also make up an 86% total net-emission in 2030, according to the business-as-usual scenario.⁴⁰ Other contributing sectors are agriculture, land-use change, and waste management.⁴¹

As Vietnam pursues economic development, energy demands will rise, urban areas will grow and GHG emissions will shoot up, unless measures are taken in the near future to mitigate these emissions. Increased green infrastructure will be necessary for more sustainable development.

Vietnam's climate goals

As part of its NDCs under the Paris Agreement, Vietnam has defined the following mitigation targets/GHG reduction targets:

- **8% reduction by 2030**, compared to business-as-usual
- **25% reduction** with international support, by 2030, compared to business-as-usual

Green finance trends and opportunities

Global demand for green is growing

There is a strong green finance momentum globally and substantial further growth potential. Green labelled fixed income instruments have become globally recognised as an effective means of directing investment capital towards climate change mitigation and climate change resilience and adaptation projects, including green infrastructure. The growing level of interest from investors in green projects has resulted in the development and growth of innovative financial products including green, social, ESG and sustainability bonds and loans; and green index products.

Green bonds are currently the most developed segment of thematic instruments, carrying greater recognition from the investor base. To combat the effects of climate change, it is estimated that green bond issuance needs to reach USD1tn per annum by the early 2020s. A substantial amount is expected to finance green infrastructure and assets in emerging markets.

“In recent years there has been significantly more engagement from institutional investors for integrating ESG in their investment process [in ASEAN] and the wealth management industry is now following.”

Valentin Laiseca, MSCI’s Head of ASEAN Index Sales⁴³

“We have some very long-term horizons. If you’re a long-term investor, you can focus on specific areas, like Southeast Asia funds... [where] there is a source of growth.”

Ted Lee, Senior Portfolio Manager of Canadian Pension Plan Investment Board⁴⁴

ASEAN is increasingly appealing to investors

Several foreign entities, including development banks as well as foreign commercial banks, have issued green bonds in local ASEAN currency bonds demonstrating interest in these domestic markets. Other green bond issuers such as BNP Paribas, Société Générale, Bank of America and NAB have issued vanilla bonds in at least one of the local ASEAN currencies. Issuance in local currency allows foreign issuers to tap domestic investors for capital. Interest in ASEAN markets continues to grow.

“European industry still overwhelmingly sees ASEAN as an attractive region for growth and investment, as our 2017 Business Sentiment Survey showed. But that survey also showed a strong call for more progress on government initiatives to reach trade agreements, reduce barriers to trade, and realise the vision of the ASEAN Economic Community.”

Donald Kanak, Chairman, EU-ASEAN Business Council⁴⁵

“As ASEAN grows and steadily fulfils its economic potential, opportunities exist across a wide range of industries. For example, ASEAN has over USD2tn worth of infrastructure investment opportunities – not just traditional ports, roads, and bridges, but support in ICT, education, agriculture, and healthcare.”

Alexander Feldman, President and CEO, US-ASEAN Business Council⁴²

CBI’s Green Bond European Investor Survey shows interest in investment in emerging markets

Outstanding emerging markets (EM) green bonds, as of 30 April 2019, amounted to USD114bn, or around 20% of the green bond market. Meanwhile, EM currently contribute 63% to global GHG emissions.⁴⁶ It is thus critical to determine how investors can support the expansion of EM green bonds.

Respondents of CBI’s *Green Bond European Investor Survey* were asked to describe their appetite for EM green bonds and to outline what they could be receptive to buying. Most respondents (82%) can buy EM debt. With exposure limits at country and issuer level tending to apply more

to respondents that have a greater degree of integration of green bonds. However, the most common restrictions are credit rating (69%), currency (65%) and deal size (58%).

As most respondents can and would like to buy EM green bonds, EM issuers must consider how these requirements can be reconciled. Respondents expressed that they would like to increase their holdings in EM sovereigns. Countries such as

Indonesia (2 bonds in USD), Seychelles (USD) and Lithuania (EUR) have issued green bonds and were met with a positive reception from investors.

Three quarters of respondents able to buy EM green bonds treat EM differently from developed market, stating that they require more evidence of integrity to invest in green

bonds from EM. So, respondents were also asked to rank factors that could make investing in EM green bonds more attractive and bring scale to the market. Credit enhancements available from multilaterals and/or public sector entities was the most frequently selected option, with more than half considering it important or very important.

When respondents were then asked which features would give them more confidence to invest in EM green bonds, they listed the following:

- 1. Transparency:** e.g. adherence to GBP, reporting Use of Proceeds (65%),
- 2. Reliability:** e.g. external reviews (SPO, audit, certification, etc) (48%),
- 3. Risk:** e.g. insurance/CDS/guarantees, size of issue, currency (25%).

More information on this topic can be found in the *Green Bond European Investor Survey*, on the CBI website.



Green finance is growing in Vietnam

Green finance is growing in Vietnam, boosted by strong economic performance, and there is continued growth potential that could support the country in meeting its climate goals. So far Vietnam has been exploring green debt – including green bonds – as well as equity instruments, supported by credit enhancement mechanisms and other risk sharing approaches. This includes partial credit guarantees for green projects, concessional loans for solar energy projects and risk sharing facilities for energy efficiency projects (see Annex I through IV for more information on green financial instruments and mechanisms in Vietnam.) There has also been some ‘greening’ of the stock exchange and domestic banking.

In the future, scaling up sustainable investment will mainly depend on the Vietnam Government’s commitment to greening the economy. Any policies encouraging public investment in green infrastructure have the power to set Vietnam on a sustainable course for the long run – sending an important signal to the market and providing an opportunity for the country to access new capital.

In 2012, the Vietnamese government approved the extension of its *National Green Growth Strategy 2011-2020* vision to 2050, with the aim of building an efficient and sustainable economy that supports the implementation of the national climate change strategy.⁴⁷ In 2020, the Government and corresponding ministries could leverage this vision to set up a green financial

framework and develop green financial instruments to finance green projects.⁴⁸

Nearly 30 provinces (cities) in Vietnam have already developed and implemented their Green Growth Action Plan.⁴⁹ This is important, as decentralized climate policy implementation could position provincial government as key actors in enabling green investment. Provincial government could enable green investment in green infrastructure, public transport, renewable energy and energy efficiency through tax incentives and effective regulations and institutional arrangement. This could take the form of public-private partnerships, which could potentially remove the burden from local and state finances.⁵⁰ It could also occur through the issuance of sub-sovereign or local government green bonds.

Green bonds in Vietnam

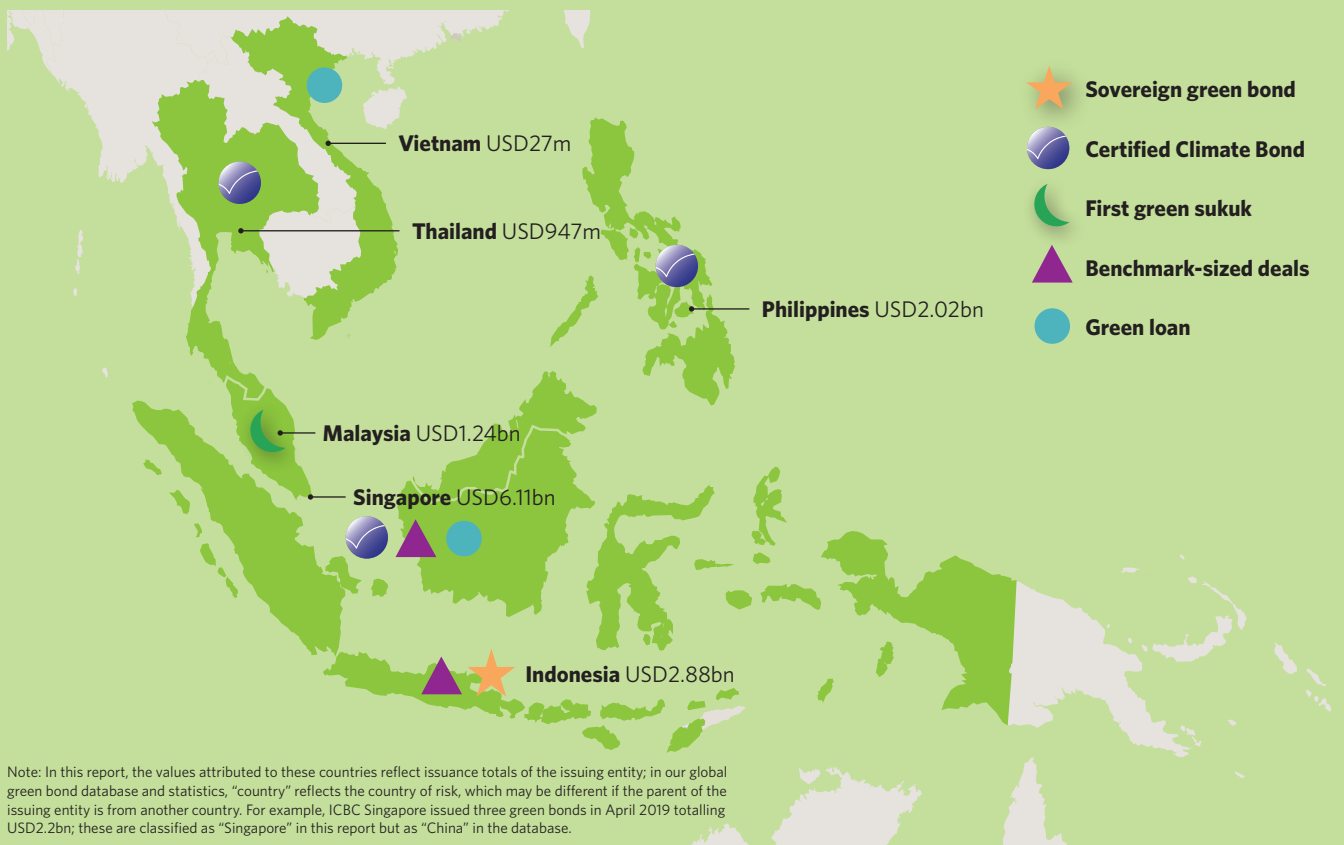
Asia-Pacific green bond issuance is rising, and the ten ASEAN countries have considerable growth potential. After the first green bond was issued in the Philippines, in February 2016, the next green bond issuances in ASEAN were two Vietnamese local government entities – Ho Chi Minh City and People’s Committee of Ba Ria Vung Tau Province – issuing the

first VND-denominated green bonds and listing them on Hanoi Stock Exchange.^{51,52} These issuances came out of a pilot program between the Ministry of Finance and the German International Cooperation Agency (GIZ), aiming to prepare the market for future issuance.

USD27m worth of green bonds have been issued to date and there is further potential.

Local government issuers started the green bond market in Vietnam and remain until today the only local government entities to have raised a green bond in the ASEAN market. Potential future public sector issuers, like Vietnam Development Bank, Vietnam Bank for Social Policies and VietinBank, could support the Vietnam Green Growth Strategy and boost the nation’s sustainable

ASEAN Green Bonds market (as at December 2019)



development by further encouraging green investments. This could be an avenue for green bond issuance.

As one of the most vulnerable cities to coastal flooding, Hai Phong and Da Nang could also enter the green bond market to increase their adaptation and resilience to climate change. Other avenues for green growth lie in addressing water and waste management.⁵³

Vietnamese green bond issuance

So far, official corporate green bond issuance has not occurred in Vietnam due to the absence of an appropriate legal framework to support the issuance. However, with the introduction of Decree 163 and the growing financial market in Vietnam, corporate green bonds are expected to be present in the Vietnamese bond market soon.

Decree 163, issued by the Government on December 4 2018, relates specifically to corporate bond issuance.⁵⁴ The Decree is considered the first-ever legal framework for corporate green bonds in Vietnam. It provides a leverage tool to encourage further investment in green projects in the private sector.

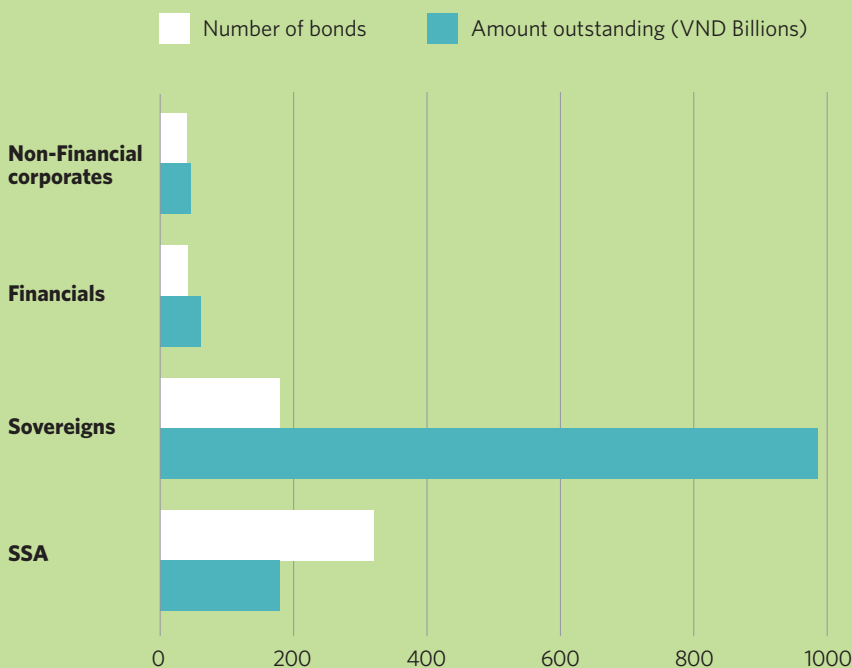
The decree aims to support the Vietnamese road map for bond market development for 2017-2020,⁵⁵ which sets out mechanisms and policies for the distribution of the green bond market with the aim to enable issuers to raise capital for implementing green projects through the issuance of bonds. Some notation points under Decree 163 include^{56,57}: (i) the definition and overview of corporate green bonds, (ii) principles for issuance of corporate green bonds, (iii) disclosing and reporting regimes for corporate green bonds, (iv) issuance method, redemption and swap of corporate green bonds, (v) restrictions on the transfer of green bonds, and (vi) a potential channel and platform to mobilise capital for green projects.

The existence of a dynamic bond market in Vietnam can facilitate the integration of green bonds into the capital structure. The overall Vietnamese Dong (VND) bond market still remains relatively small, with VND177tn (USD58.9bn) outstanding at the end of January 2020; however, it is growing.⁵⁸ Altogether, there are 50 separate issuers and the market is dominated by 176 Vietnamese sovereign bonds, totalling VND979bn (USD43.5bn), and the second largest issuer, the Vietnam

Issuer name	Issued USD	Issue date	Issuer type	Use of proceeds
People's Committee of Ba Ria Vung Tau Province	4m	Sep 2016	Local government	Water
Ho Chi Minh and Investment State-Owned Company	23m	Oct 2016	Local government	Water, Adaptation

Note: Issued amount is converted to USD regardless of currency issue.

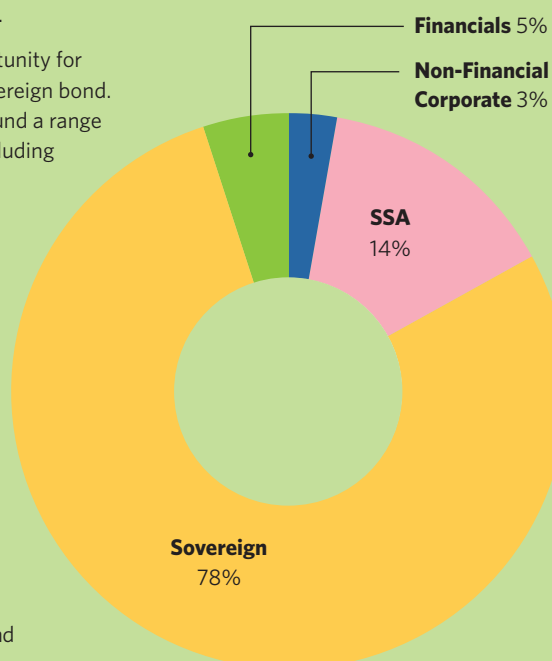
Number and total amount outstanding VND bonds



development bank, is a tenth of the size at VND100bn (USD4.7bn), which is spread over 316 bonds. Corporate asset classes are small but nevertheless active.

There is a momentous opportunity for Vietnam to issue a green sovereign bond. Green sovereign bonds can fund a range of infrastructure projects, including the types of projects already being funded by existing (vanilla) Vietnamese sovereign bonds. Use of proceeds can be dominated by a single type of infrastructure or multiple sectors. For example, Belgium's initial sovereign bond was dedicated mostly (85%) to low-carbon transport, whereas Indonesia split the proceeds of its green bonds between five sectors: Energy, Buildings, Transport, Waste, and Land Use.

The VND Bond market is dominated by Vietnamese Sovereigns



Green indexing

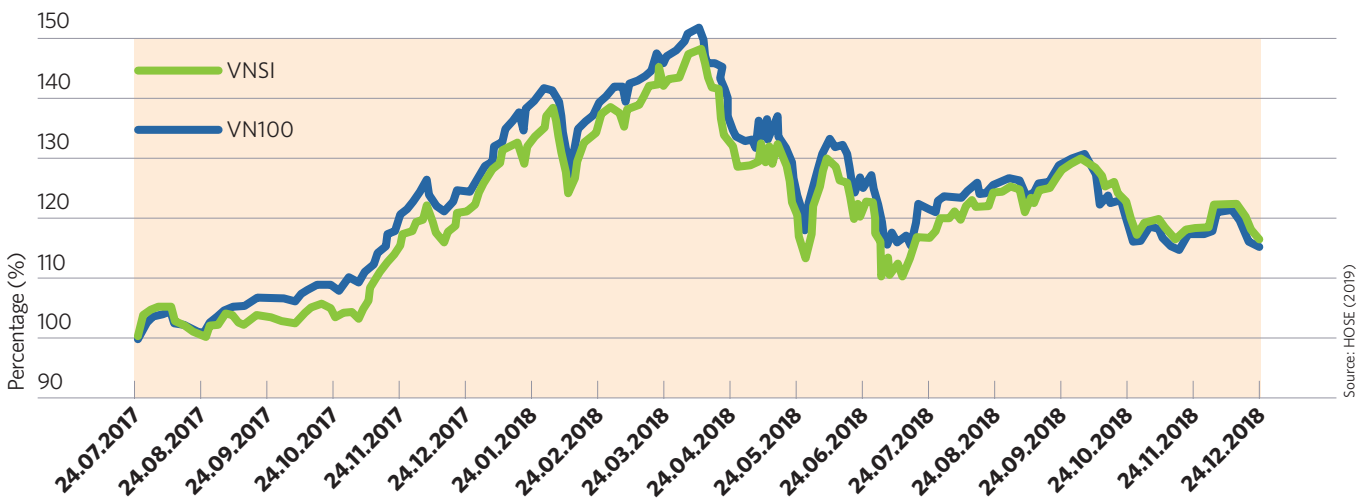
In 2015, the Ministry of Finance released its Circular No.155 on "Disclosure on information on the securities market".⁶² The Circular provides guidance to enterprises to disclose information on green finance activities and encourage businesses listings on the stock market to publish financial reports and annual reports towards sustainable and green development. The circular is an important legal cornerstone of building green indexing as an indicator of the green economy in Vietnam.

Hanoi Stock Exchange (HNX) and Ho Chi Minh Stock Exchange (HOSE), the two prominent exchanges in Vietnam, have also actively been working on measures to realise investment attraction for the domestic green bond market.⁶³ Currently, HNX and HOSE have completed the design of green stock index concepts.⁶⁴

In the first half of 2017, HOSE piloted the Green and Sustainable Index (VNSI), a green index combined with sustainability

index. and July 2017 This would be in parallel to the Green and Sustainable Index (VNSI). On 24 July 2017, the index became official.⁶⁵ VNSI measures the performance of top 20 sustainable stocks from VN100 (100 largest companies listed on HOSE), which undergoes an ESG evaluation process and is reassessed annually in July.⁶⁶ After the launch, VNSI has performed well. At its height, VNSI witnessed an increase of approximately 50% compared with the basis (1000 basis on 24 July 2017).

The VNSI has performed relatively well

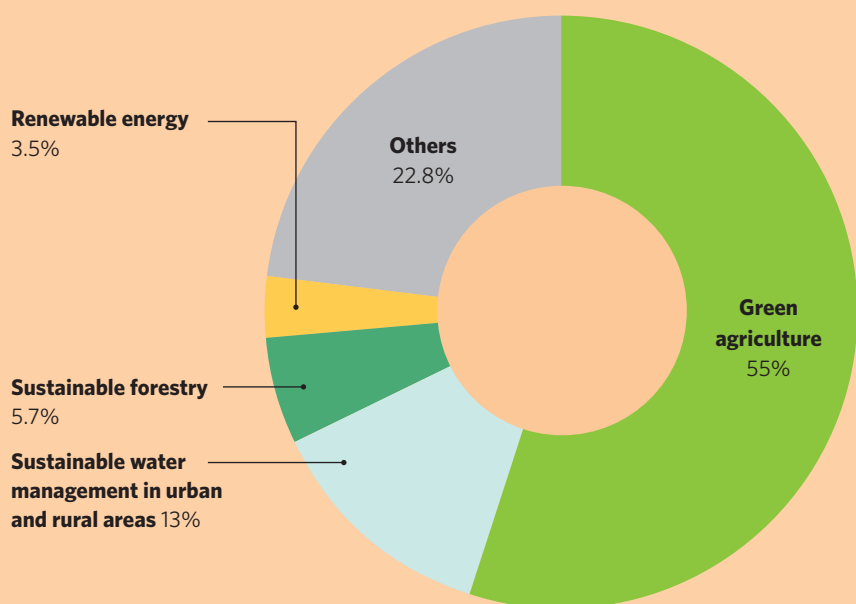


Banks and green credits

Vietnam is a bank-centred economy with around 70% of capital need in the economy being financed by the banking system.⁵⁹ Therefore, the local banking system will need to play an important role in the growth of the country's green financial market. So far, the State Bank of Vietnam (SBV) has actively participated in the campaigns of green economy.

In 2015, SBV issued Directive No.03/CT-NHNN on promoting green credit growth and environmental/social risk management in credit granting activities.⁶⁰ In response to this Directive, a number of green credit campaigns have been started. According to SBV, as of the first quarter of 2019, there were 20 credit institutions providing green credit loans with a lending balance of VND242,000bn, an increase of 2% compared to 2018.⁶¹

Green credit balance by sector (March 2019)



Examples of green credit programmes in Vietnam

Proponents	Amount	Intended customers	Participants	Results
SBV ⁷²	Approximately USD100m	SMEs with green projects	Vietcombank, BIDV, Agribank and Sacombank	<ul style="list-style-type: none"> 26 projects: renewable energy, waste management and organic agriculture. The interest rates applicable to SMEs is 1-3% lower than the market interest rates. Banks participating in the programme are refinanced from SBV at interest rates 1% lower than usual.
Agribank and Vietnam Development Bank ⁷³	60% of the required capital (about USD18m)	Solar Power Plant TTC Phong Dien in Hue province	Agribank and Vietnam Development Bank	<ul style="list-style-type: none"> Construction was from 2017 to 2018. Agribank Thua Thien-Hue and Agribank Gia Lai branches will finance 30% of the total investment, while VDB Thua Thien-Hue and VDB Quang Tri will cover the rest.
Vietcombank and Japan International Cooperation Bank ⁷⁴	USD200m	Solar and Wind power projects in Vietnam	Vietcombank and Japan International Cooperation Bank	Limited results so far, as the cooperation agreement between VCB and JICB was signed in May 2019.
Agribank and Central Power Corporation (EVNCP) ⁷⁵	VND735bn	Central Power Solar Project in Khanh Hoa province	Agribank	The power plant was completed and put into operation in late May 2019.
TPBank and the Global Climate Partnership Fund (GCPF) ⁷⁶	USD20m	Green projects in Vietnam	TPBank and the Global Climate Partnership Fund (GCPF)	Limited results so far, as the cooperation agreement between VCB and JICB was signed in May 2019.

Looking forward

In the future, any policies encouraging public investment in green infrastructure has the power to set Vietnam on a sustainable course for the long run - sending an important signal to the market and providing an opportunity for the country to access new capital.

In 2012, the Government of Vietnam approved the extension of its National Green Growth Strategy 2011-2020 vision to 2050, with the aim of building an efficient and sustainable economy that supports the implementation of the national climate change strategy.⁶⁸ In 2020, the Government and corresponding ministries could leverage this vision to set up a green financial framework and develop green financial instruments to finance green projects.⁶⁹

Nearly 30 provinces in Vietnam have developed and implemented their Green Growth Action Plan.⁷⁰ Decentralized climate policy implementation could position provincial government as key actors in enabling green investment. Provincial government could enable green investment in green infrastructure, through tax incentives and effective regulations and institutional arrangement.

This could take the form of public-private partnerships, which could potentially remove the burden from local and state finances.⁷¹ It could also occur through the issuance of sub-sovereign or local government green bonds. Development banks and international organisations could also support the local governments.

Development Finance Institutions (DFIs) have a unique role to play

DFIs have a mandate to support developing countries and can achieve this through blended finance and credit enhancement mechanisms, reducing risk exposure and enhancing market incentives for investors to mobilize private capital. This is particularly relevant for large-scale projects such as infrastructure development, where the blended finance approach can generate more bankable project pipelines by providing technical support and facilitating access to funding.

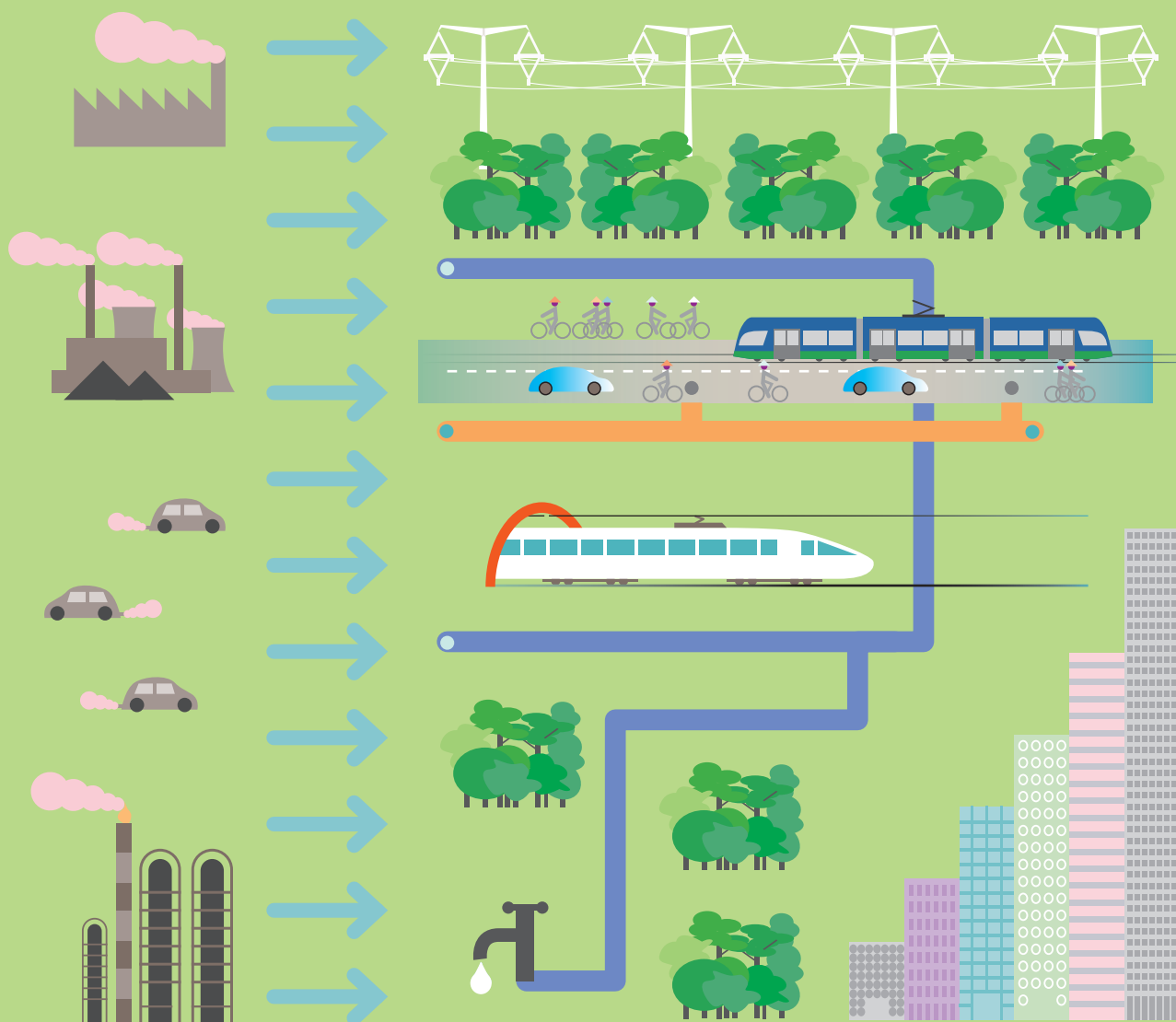
DFIs can act as market facilitators, which is beneficial to increasing liquidity and issuance in local economies. For example, the IFC issued a green bond in June 2018 in Philippine peso (a Mabuhay bond) and one in Indonesian rupiah (a Komodo bond) in October 2018. Through deals like these, DFIs can support "market creation" by participating in first-time issuances and helping new issuers get their names out to investors. Effectively, this establishes pricing points, the idea being that issuers return to market publicly. So, the deals also act as demonstration issuance to spur market growth and can showcase how climate solutions can be funded with green bonds.

DFIs in ASEAN, such as the International Finance Corporation (IFC), Asian Development Bank (ADB), Asian Infrastructure Investment Bank (AIIB) and the World Bank, can also subscribe to private placements or be anchor investors in debt issuance and IPOs to help the company seeking funding to build investor confidence and catalyse investments from a wider pool of private actors. So, they provide direct green financing, as anchor investors in debt issuance or in IPOs, DFIs can leverage their support to attract other investors.

They can help a company seeking funding to build investor confidence and catalyse investments from a wider pool of private actors (both international and domestic). For example, in early 2019, the ADB and other development financiers launched the "ASEAN Catalytic Green Finance Facility", an initiative to mobilize USD1bn for green infrastructure in Southeast Asia.⁷⁷ The facility will provide loans and technical assistance for sovereign green infrastructure projects such as sustainable transport, clean energy, and resilient water systems, which aims to catalyse private capital by mitigating risks through innovative finance structures.⁷⁸

Through these modes of support, DFI's could be key partners in Vietnam issuing a sovereign green bond.

Brown to green transition in Vietnam



The Climate Bonds Initiative has been active in promoting a brown-to-green (BtG) transition strategy in GHG-emissions intensive industries around the world. BtG reflects the fact that, in the short- to medium-term, large companies in many sectors will inevitably straddle both brown and green assets, progressively reducing exposure to brown assets and practices as they increase capex towards, and adoption of, greener modes of operation.

It also embodies a recognition that, both globally and locally, the expectation of institutional investors is that progress towards low or zero-carbon business models, is increasingly indicative of corporate performance, hedging of climate risks and long-term value accretion.

Global green investment opportunities are growing and yet there remains a scarcity of offerings, pointing to a lack of supply of green bond issuance particularly from non-financial corporates, i.e. the real economy. Furthermore, segments of the real economy, that offer meaningful emissions reductions potential – such as cement and concrete, mining and metals, oil and gas transport and manufacturing – are yet to be activated towards a BtG transition.

When such industry sectors start to align with a 2-degree emissions trajectory, new green financing opportunities could be created.

Particularly for assets and projects with ambitious climate targets and an increased focus on low carbon production modes.

A national BtG strategy should require 'brown' organisations to commit to strategic change, undertaking tangible and verifiably climate relevant measures that relate to companies' core business activities. They will need to progress from broad statements of strategy or intent to disclosure of climate risk as envisioned by compliance with the Task Force on Climate-related Financial Disclosures (TCFD) and, ultimately, to a visible reflection of green investment on balance sheets, in capex plans and borrowing programs.

Credible green bonds are a highly visible means to support this transition from brown into green. Even a small initial share of green capital expenditure could be a credible indicator of more to come, if it is combined with a re-orientation and acknowledgment to investors that achieving low carbon targets and then zero carbon operating models are inevitable business destinations between now and 2050.

Transitioning to a green, climate resilient economy is paramount to ensure that the region can reduce its GHG emissions, better hedge against climate change risks and thrive in the long-run.

Green infrastructure investment opportunities

The Vietnamese government aims to develop billions of dollars of new public-works projects. Most major infrastructure projects in Vietnam are listed on central government and embassy websites or are listed by individual proponents.

There are already green infrastructure projects and assets of many different sizes and technologies spread across the nation. These range from the USD10bn national railway project through to a USD30m water infrastructure project. A list of 40 projects has been compiled into a sample pipeline (see Annex VI).

This report uses the globally recognised Climate Bonds Taxonomy and Sector Criteria to determine which projects and assets are green. However, there are many other standards and schemes that can be used to measure the 'greenness' of projects in Vietnam, internationally, in Southeast Asia and in Vietnam. Most of these apply to either the development and retrofitting of buildings or a broad set of infrastructure projects and assets (see Annex V for more details).

Investors currently have insufficient tools to ensure that their investments are making a positive impact. Having common definitions of 'green' across global markets, allows investors, potential issuers and policy makers to identify green assets and attract investment more easily.

Ideally, Vietnam's Government could adopt a best practice standard to identify green projects during infrastructure planning and collating these in a single list. Then it can prioritise projects that are in line with international definitions for 'green'

and provide clear 'green' labelling, when preparing future infrastructure pipelines.

Providing this level of visibility for green infrastructure investment opportunities could facilitate increased access to private sector capital for Vietnam's economic development, the acceleration of Vietnam's transition to a low carbon economy and help meet global institutional investor demand for green assets.

Methodology

The following section explores green infrastructure investment opportunities across Vietnam in four key sectors: renewable energy, low carbon transport, sustainable water management and sustainable waste management. Although not included here, Vietnam has some green projects across other sectors like green buildings, agriculture/forestry, and tourism.

There are various ways for an investor to gain exposure to a specific project, asset or portfolio. The possible investment pathways will vary depending on the asset ownership structure, the stage in the asset's financing lifecycle, and the investor's mandate. This can vary between projects with public and private funding.

Accordingly, metrics were used to classify the green infrastructure investment opportunities, by status:

- Completed projects: high profile, recently completed projects;
- Projects under construction: major projects that are under construction; and

- Planned projects: major projects that have not yet begun construction but have been announced and/or have undergone business case planning and/or have been allocated budget.

Case studies and a sample pipeline have been developed for this report to show the different types of opportunities available in the short- and medium-term future in Vietnam. The case studies include both greenfield and brownfield projects and assets that could have been or could potentially be financed/refinanced via green bonds.

Climate Bonds Taxonomy and the Climate Bonds Standard and Certification Scheme

The Climate Bonds Taxonomy features eight climate-aligned sectors (see back cover). The purpose of the Taxonomy is to encourage common broad 'green' definitions across global markets in a way that supports the growth of a cohesive green bond market. The Climate Bonds Standard and Certification Scheme is used to provide a labelling scheme for bonds and other debt instruments.

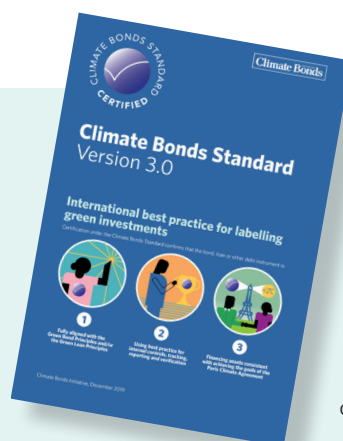
The Sector Criteria for the Climate Bonds Standard and Certification Scheme provide eligibility conditions or thresholds which must be met for assets to be in line with a rapid trajectory towards a 2050 zero-carbon future. The criteria are developed based on climate science by technical expert groups with input from industry.

At the end of 2019, Climate Bonds released Version 3.0 of the international Climate Bonds Standard; a significant development for green finance. Standard V3.0 incorporates major upgrades to the existing umbrella guidance for Climate Bonds Certification to meet market growth and demand for enhanced reporting, transparency and harmonisation around green definitions.

Standard V3.0 is a major upgrade to the Climate Bonds Standard, designed to ensure compatibility with the new EU Green Bond Standard (EU GBS), the latest version of the Green Bond Principles (GBP), Green Loan Principles and recent market developments including guidelines adopted by India, ASEAN and Japan.

The new Standard V3.0 provides guidance for:

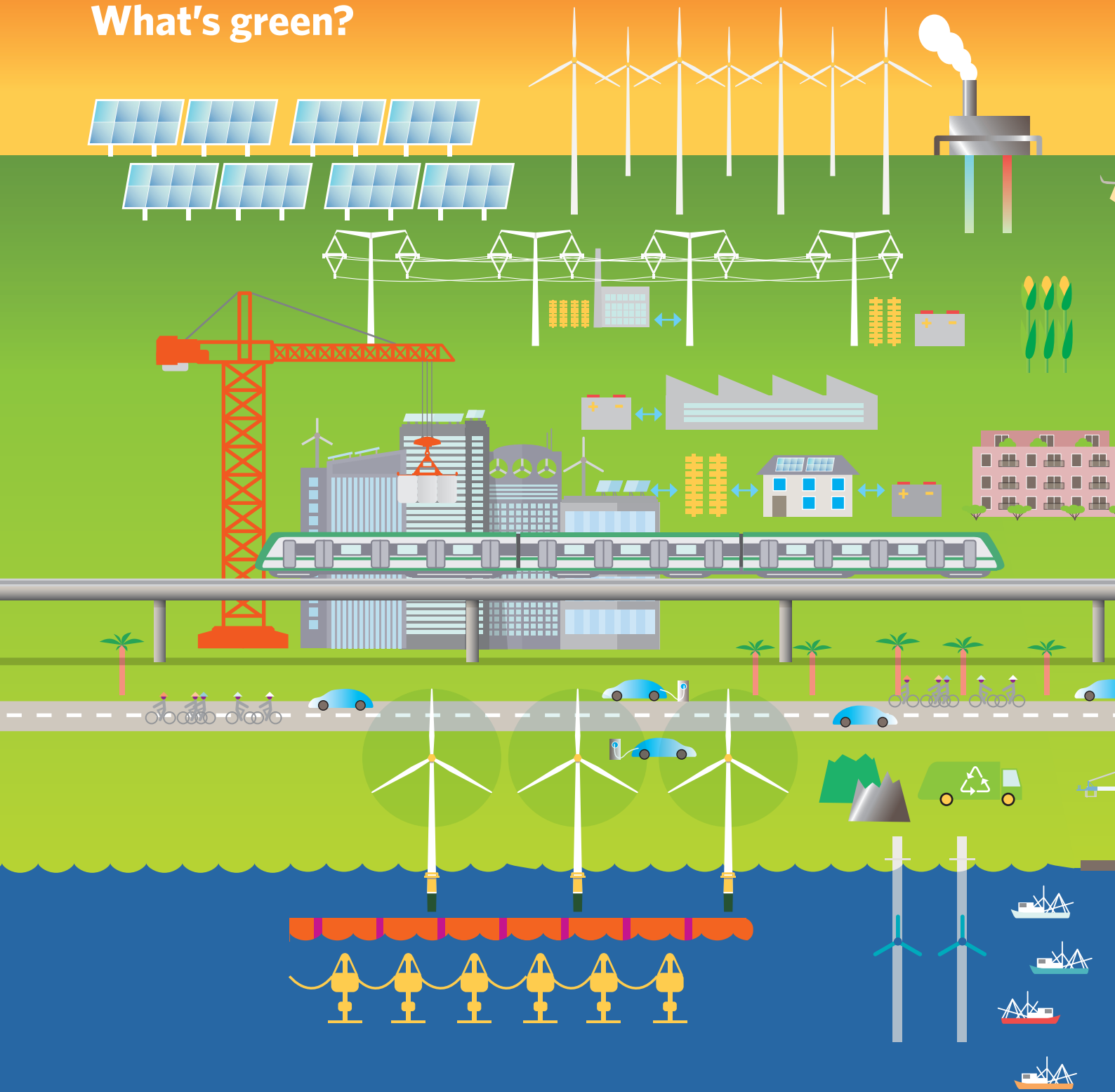
- Robust Green Bond Frameworks: Standard V3.0 provides issuers with detailed requirements for what their Green Bond Framework document must contain.
- Ongoing Reporting: Standard V3.0 reporting requirements are more clearly defined via a formal annual Update Report which covers Allocation, Eligibility and Impact Reporting.
- Expenditures & Debt Instruments Definitions: Standard V3.0 provides



detailed definitions on which type of expenditures are eligible and an expansion in the list of debt instruments which can be Certified, including loans, sukuk, deposit products and other investments

Overall, Standard V3.0 aims to support the expansion of the green investment market - forecast to reach up to USD250bn of green debt issuance in 2019, USD350-400bn in 2020 and accelerate the mainstreaming of green bonds, green loans and other products via a simple label which investors can trust.

What's green?



Geothermal:



According to the Geothermal Energy Association, 39 countries could supply 100% of their electricity needs from geothermal energy, yet only 6% to 7% of the world's potential geothermal power has been tapped.⁷⁹

Drawdown Agenda

Solar:



The world installed a record number of new solar power projects in 2017, more than net additions of coal, gas and nuclear plants put together.⁸¹

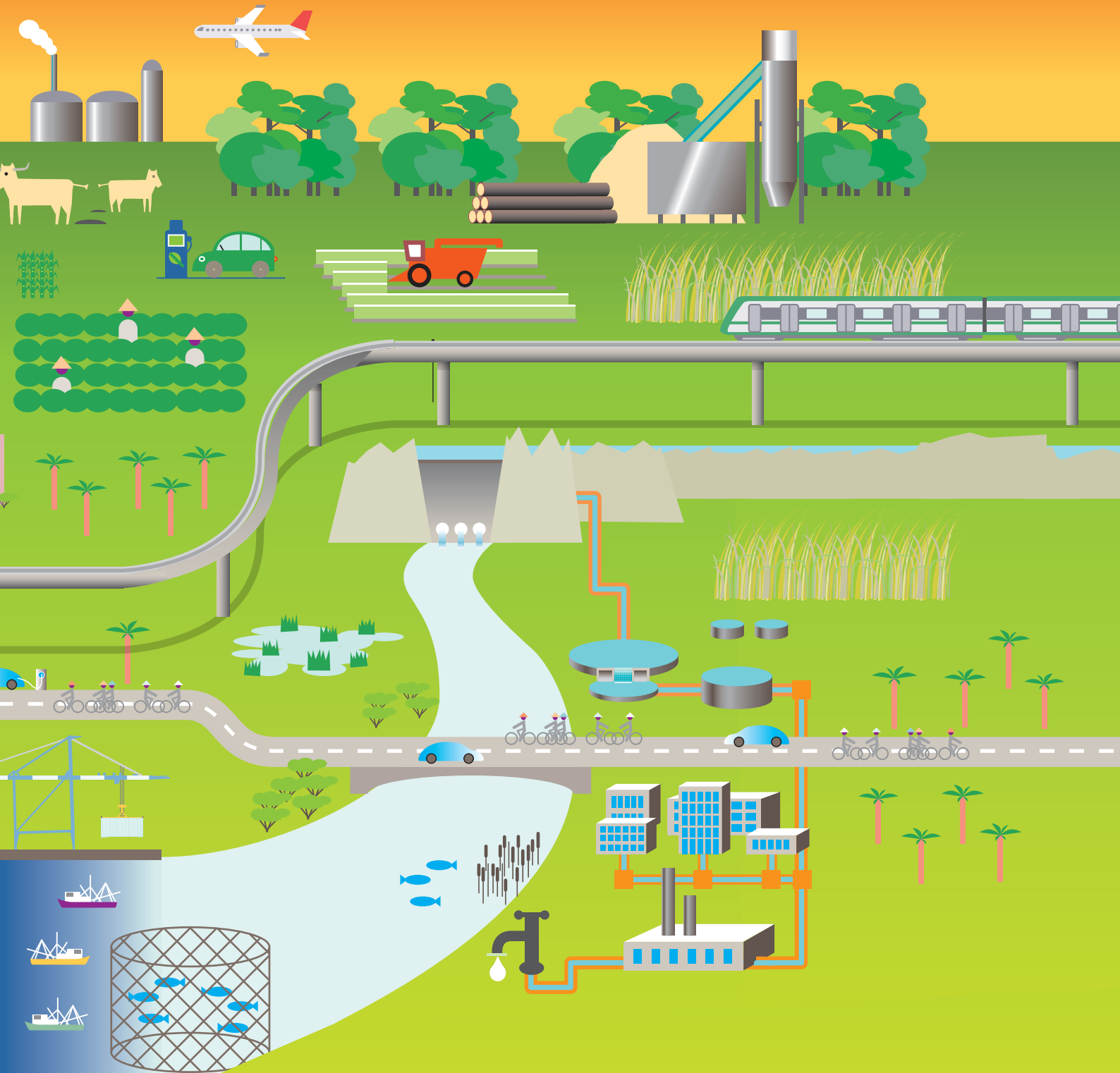
UNFCCC

Hydropower:



Hydropower is the largest source of renewable electricity in the world, producing around 17% of the world's electricity from over 1 200 GW of installed capacity, and is expected to remain the world's largest source of renewable electricity generation by 2022.⁸⁰

International Energy Agency



Transport (rail):



75% of the world's countries have established strategies and targets to improve the environmental performance of their transport sector within their Intended Nationally Determined Contributions (INDCs). One-fifth of the transport-related (I)NDCs include measures in the railway sector.⁸²

UNFCCC

Water:



The UN says the planet is facing a 40% shortfall in water supply by 2030, unless the world dramatically improves the management of this precious resource.⁸³

UNFCCC

Buildings:



Building-related emissions account for about one-third of global GHG emissions and could double by 2050, making building efficiency a critical part of the COP21 agenda.⁸⁴

GreenBiz

Renewable energy

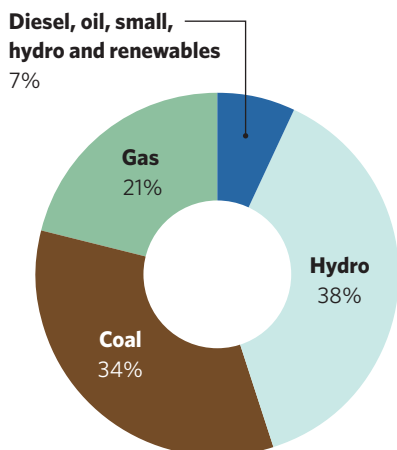
Energy generation, transmission or storage technology that has low or zero carbon emissions. This can include solar energy, wind energy, bioenergy, hydropower, geothermal energy, marine energy or any other renewable energy source.

Sector overview

With its rapid industrialisation and economic modernisation, energy demand in Vietnam is growing at 9.1% annually⁸⁵ and is predicted to increase by 8% per annum during the 2021-2030 period.⁸⁶ In absolute terms, the power demand would rise from 86 TWh in 2010 to 265-278 TWh in 2020 and to 572-632 TWh in 2030.⁸⁷ In order to meet this growing demand, Vietnam needs to raise its annual installed capacity by 6,000-7,000 MW, which will require a significant increase in the share of renewable energy generation.⁸⁸

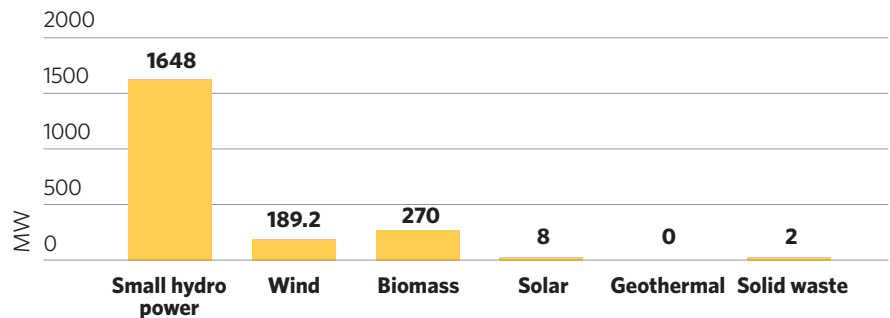
The traditional source of power supply in Vietnam has been large hydropower plants, accounting for about 38% of total national power generation capacity.⁸⁹ Recently, there has been increased growth in fired coal energy supply, which is responsible for around 34% of total installed capacity. At present, power generation from renewable energy plants, together with diesel, oil and small hydro, is relatively limited with only 7% of total energy supply. Given the fact that large hydro and fired coal power plants have raised environmental concerns and that the Government has decided to suspend nuclear power development,⁹⁰ renewable energy is considered a feasible substitute to accommodate Vietnam's future power needs.

Vietnam energy mix, May 2019



Source: Norton Rose Fulbright (2019)¹¹⁷

Renewable energy installed capacity by type in Vietnam, 2018



Source: Vietnam Renewable energy report (2018)

Vietnam's renewable energy sources include solar, wind, small hydro and biomass, accounting for only 2.1% of the total power generated in the last year.^{91,92} Small hydropower makes up the largest share of renewable energy investment in Vietnam, followed by biomass and wind.⁹³ Solar and wind are expected to dominate future investment, overshadowing geothermal energy and tidal energy, which are at a very early stage in Vietnam.^{94,95}

In 2016, the Vietnamese government approved the revised National Power Development Plan for 2011 to 2020, with a vision for 2030 that emphasises renewable energy development and power market liberalisation.⁹⁶ The Government aims to increase the share of renewable energy production to 7% by 2020 and 10% by 2030, whilst reducing the use of imported coal-fired electricity to ensure energy security, environmental protection and sustainable socio-economic development. The targets that were set for individual renewable energy type are as follows:

Hydro energy

Hydropower has been the largest contributor to Vietnam's national power capacity, with significant capacity yet to be harnessed. 818

hydropower projects have been approved with a total registered capacity of about 23,182 MW.⁹⁷ Currently, the country has 385 operational hydropower plants with total electricity output of about 18.5 GW.⁹⁸ Additionally, 143 projects with a capacity of 18,564 MW are under construction.⁹⁹ Another 290 projects of 2,770 MW are in the feasibility study stage.¹⁰⁰

Solar energy

Vietnam is reported to have enormous potential in developing solar power due to an average natural solar energy intensity of 5kWh per square metre.¹⁰¹ Dak Lak, Ninh Thuan, Binh Thuan, Quang Tri and Quang Ngai are five provinces with the highest planned solar energy capacity.¹⁰² Despite the potential, until 2015, there was only one solar power plant in operation in Vietnam, together with a number of small-scale rooftop projects, while many others were stuck at the pre-investment or pre-construction stages mainly due to the fact that no feed-in tariff was put in place for solar projects.^{103,104,105}

The growth of solar began after the Government's Decree No.11/2017/QĐ-TTg¹⁰⁶ on mechanisms for encouraging the development of solar power in Vietnam was released.

Renewable Energy Targets

Renewable energy	Targets	2020	2025	2030
Wind	Total capacity (MW)	800	2,000	6,000
	Electricity production (%)	0.8	1%	2.1
Hydro power	Total capacity (MW)	21,600	24,600	27,800
	Electricity production (%)	29.5	20.5	15.5
Biomass	Total capacity (MW)	-	-	-
	Electricity production (%)	1	1.2	2.1
Solar	Total capacity (MW)	850	4,000	12,000
	Electricity production (%)	0.5	1.6	3.3

As of June 2019, the number of solar PV projects soared to 82 as the validity of attractive feed-in-tariff (FiT) rates ended on 30 June 2019.¹⁰⁷ Thus, annual electricity output from grid-connected solar power projects rocketed from 8 MW in 2018 to 870 MW in the first half of 2019.^{108,109}

Wind energy

Vietnam's potential for wind energy is promising – with a long coastal line experiencing an average wind speed of six metres per second.¹¹⁰ Wind energy plants could potentially generate 500-1000 kWh per metre squared per year.¹¹¹ The top five provinces with the highest planned wind energy capacity are Bac Lieu, Soc Trang, Binh Thuan, Ninh Thuan and Ben Tre.¹¹² Similar to solar projects, the number of operational wind energy projects is limited – only six plants with a combined capacity of 189.2 MW, although there are an increasing number of projects beginning construction.¹¹³

Biomass energy

As an agricultural country, Vietnam has abundant biomass energy potential. Biomass projects are expected to generate about 900 MW.¹¹⁴ Currently, there are 38 bagasse-based biomass power plants in Vietnam with a total registered capacity of around 352 MW.¹¹⁵ However, biomass has generally been treated as a non-commercial energy source, as it has been being collected and consumed locally. Only eight plants with a combined capacity of 82.51 MW are connected to the national grid, selling only 15% of electricity produced from biomass.¹¹⁶

Financing options

In order to reach targets set out in the National Power Development Plan for 2011 to 2020, Vietnam would require around USD23.7bn in investment by 2030. However, the country's domestic resources are not strong enough to keep pace with this capital demand.¹¹⁸ The Government has taken steps to unlock the private investment and call for foreign technical expertise and investment, by allowing 100% foreign ownership of Vietnamese companies in the energy sector.¹¹⁹ Accordingly, foreign investors can choose among permitted investment forms; 100% foreign-invested company, joint venture or public-private partnership (PPP) in the form of build-operate-transfer (BOT) contract.

Other incentives are also applicable,¹²⁰ including:

- **Feed-in-tariffs:** One of the lowest in the world, tariffs are currently set for solar (9.35 US cents/kWh), wind (8.5 US cents/kWh for onshore and 9.8 USD cents/kWh for offshore wind),

biomass (5.8 US cents/kWh); waste-to-energy (5.8 US cents/kWh) and landfill gas (7.28 US cents/kWh),

- **Tax incentives,** i.e. low corporate income tax (10% for the first 15 years) or tax exemptions for 4 years,¹²¹
- **Land-related incentives,** and
- **Other financial preferences,** i.e. preferred rate loans.

Furthermore, to ensure consistent returns for investors, EVN, the sole buyer of electricity in Vietnam, also has the obligation to prioritize renewable energy in grid connect, and purchase all on-grid electricity at approved tariffs.¹²² Bolstered by these incentives, renewable energy project developers and asset owners generally could have access to a variety of funding options from banks, specialised project financiers, debt clubs, investment funds, direct investors and the capital markets.

Green bonds are very well suited to large renewable energy projects or asset portfolios and can be structured in a number of ways, including project bonds, corporate bonds, covered bonds or ABS. Aggregation of smaller projects can be done through securitisation or by banks originating green loans and refinancing in the green bond market. Renewable energy funds are being used to support greenfield projects and stimulate innovation.

Although no green bonds have been issued for renewable energy in Vietnam, there are examples in ASEAN. A regional example is the green bond issued by the Thai power company, B.Grimm Power PCL, issued in late 2018 and certified under the Climate Bonds Standard – with proceeds earmarked for nine operational solar power plants with a total capacity of 67.7 MW and seven solar plants currently under construction with a combined capacity of 30.8 MW.

Future focus

Energy generation by tidal range technology

It is imperative that Vietnam increases the share of renewal energy if it is to meet its NDC targets and transition to a low carbon economy. Adding tidal power to the total energy mix can help to do this.

Tidal range technology adopts the same principles as hydropower in producing power: requiring a dam or barrier to impound a large body of water and harvesting the potential energy from the difference in level between the height inside and outside of the impounded, reservoir water area.¹²³ The water is forced through turbines inside the structure, creating energy.

A potential advantage of tidal range technology is that it is predictable and sustainable since tidal energy production is not influenced by weather conditions but only by cycles of the moon, sun and earth.¹²⁴ Furthermore, tidal power, while drawing energy from water currents in much the same way as wind turbines from

air currents, has greater power generation than that of similarly rated wind energy turbines.¹²⁵ However, environmental impact of this technology should also be taken into consideration.¹²⁶

Tidal range technology could be suitable and workable in Vietnam. The country owns a long coastal line of more than 3200 km with a lot of islands. There are many favourable terrain locations to build a tidal power plant, such as the islands of Bach Long Vy, Co To, Cat Ba, Hon Dau, Phu Quoc, Hoang Sa, Truong Sa. Measurements on the speed of tidal waves around these areas show that the largest tides are from 0.74m/s and 0.84 m/s.¹²⁷

The tidal regime of the Mekong Delta is particularly favourable since its semi-diurnal tide regime is relatively common to tidal power plants in Europe.¹²⁸ However, the construction of a tidal power plant using tidal range technology in the Mekong Delta River requires careful considerations and feasibility tests since Mekong River is important for its water supply and biological environments.



Source:¹²⁹

Lai Hoa wind farm^{130,131}

Proponent: Super Wind Energy Cong Ly Soc Trang Joint Stock Company

Location: Soc Trang, Mekong Delta, Vietnam

Status: Under construction. The construction of the first phase was started in 2018 and is expected to be finished within 36 months.¹³²

Classification: Wind generation facilities, Renewable Energy

Description: The project is located in Lai Hoa Ward, Vinh Chau Town, and covers an area of 2,489ha. It is named as the first wind farm in Soc Trang Province.

The wind farm has a total capacity of 98 MW, and it will be implemented in three phases. Specifically, the first phase will have 30 MW in capacity, the second phase 30 MW, and the third phase 38 MW. The first phase has a size of 15 wind turbine masts, covering 370ha. The total investment of the phase is over VND1.68tn.¹³³

The construction of wind farm is expected to contribute to the balance of power sources as well as regional development of Mekong Delta.



Source: ¹³⁵

Output: The wind farm is expected to generate 257 million kWh per year to connect with the national power grid.

The development of this project will bring about mutual benefits for the local economy, namely: contributing to the economic restructuring of the region, boosting tourism development, creating jobs for local people and reducing the impact of climate change.

Cost: Approx. VND5.39tn (USD237.4m)¹³⁴

Financial structure: Private funding from Cong Ly Joint Stock Company

Dau Tieng solar power complex^{136,137}

Proponent: Dau Tieng Energy Joint Stock Company (a joint venture between Xuan Cau holdings and B. Grimm Power Public Company limited)

Location: Tay Ninh, southern Vietnam

Status: Completed. The construction of Dau Tieng solar power complex was initiated in late June, 2018. It was completed and officially connected to the national electricity grid in June, 2019.¹³⁸

Classification: Solar power energy

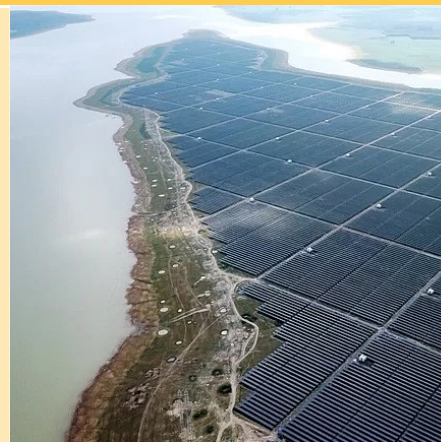
Description: Dau Tieng solar power complex has been developed on 504ha of the semi-flooded region of Dau Tieng Reservoir. The complex comprises Dau Tieng 1 and Dau Tieng 2 solar power plants with a designed capacity of 420 MW. They are among 10 solar power projects developed in Tay Ninh province with total capacity of 808 MW and a registered investment of VND21,460m (equivalent

to USD922m). Upon completion, it was the largest solar power project in Vietnam and Southeast ASEAN.¹³⁹

The complex was designed with solar photovoltaic technology with the main component being photovoltaic (PV) panels. It was implemented by POWERCHINA corporation under an EPC (Engineering, Procurement and Construction) contract.¹⁴⁰

The completion and operation of Dau Tieng 1 and Dau Tieng 2 solar power plants have turned Tay Ninh to be one of solar power hubs in Vietnam. It is estimated that electricity generated by the complex could meet power demand of Tay Ninh province and the Southern region as a whole.

Output: Dau Tieng solar power project is able to generate about 688 million kWh per year to the local area, meeting the annual power consumption of approximately 320,000 households.



Source: ¹⁴⁴

Cost: The project has a total investment of more than VND9,100bn (equivalent to about USD391m)^{141,142}

Financial structure: The project was co-funded by Xuan Cau holdings of Vietnam and Thai's B. Grimm Power Public Company limited¹⁴³

Phu Yen Biomass Power Plant¹⁴⁵

Proponent: KCP Vietnam Industries Limited

Location: Phu Yen province, in the south central of Vietnam

Status: Under construction. The construction of the factory commenced in 2015, including two phases. The first phase was finalized and integrated into the national power system in April 2017. The second phase is under construction.

Classification: Biomass power energy

Description: Phu Yen Biomass Power Plant is located in the Hoa Son Sugar Factory land area. It was constructed to utilise bagasse generated from the sugar production process when the sugar plant reached a capacity of 8,000 tonnes of sugarcane per hour.

The biomass factory has two units. The first unit of 1x30 MW started construction at the end of 2015 and was put into operation in April 2017. The main input for the first phase is residues from Hoa Son sugar factory. Therefore, it is set to operate in parallel with the sugar plant.

The second unit (2x30 MW), which is still under construction, will also operate in line with the operation of the sugar factory. It will use 10,000 tonnes of sugar biomass per hour in addition to other biomass fuel such as rice husk, coconut and cashew as its inputs.

Phu Yen biomass Power Plant utilises stoker fired boiler technology with high-performance electrostatic filter system to ascertain its output dust meets environmental standards. The biomass electricity from this project is considered environmentally-friendly as well as bringing permanent income to local sugar growers and contributing to socio-economic development of Phu Yen province.



Source: ¹⁴⁷

Output: Unit 1 of the factory is co-generating electricity and steam for industrial use at Hoa Son sugar factory with an output of over 70 million kWh annually. Unit 2 will generate electricity only and is expected to double the output of Unit 1.

Cost: The total investment of the project was USD58.4m, of which, the investment for the first phase is USD29.2m and the other half corresponds to the second stage.¹⁴⁶

Financial structure: The project is 100% funded by KCP Vietnam Industries Limited

Hoa Binh Hydro power plant expansion¹⁴⁸

Proponent: Vietnam Electricity Corporation (EVN)

Location: Hoa Binh, Vietnam

Status: Under construction. The plant will be put into operation in 2022 - 2023.

Classification: Hydro Power, Renewable energy

Description: The project is part of the Hoa Binh hydro power plant, the second largest hydropower plant in Vietnam with an annual electricity output of over 10 billion kWh.¹⁴⁹

The project consists of 2 units with total capacity of 480 MW, the water intake is in Thai Thinh commune, the water tunnel and the expansion plans are in Phuong Lam Ward, Hoa Binh city, Hoa Binh province.

The plant does not change the existing catchment area and volume of reservoir. The normal rising water level and dead water level is still 117m and 80m respectively, but the minimum operation water level increases from 80m to 87m. The designed water flow of the expanded plant is 600 m³/s, increasing the total water flow to 3000 m³/s.

Output: On average, the plant is expected to produce 479 million kWh per year, while its electricity mobilisation during peak hours will increase to 264.4 million kWh per year.¹⁵⁰



Source: ¹⁵³

Cost: The total investment of Hoa Binh Expansion is expected to be about USD360m (including administration, consultancy, project management, site preparation cost, the taxes and interest during construction)¹⁵¹

Financial structure: Funding from EVN's own capital (about 30% of total investment); preferential credit loans (used for compensation, support and resettlement costs) and commercial loans (about 70% of the total investment).¹⁵²



Low carbon transport

Transportation modes and ancillary infrastructure that produce low or zero direct carbon emissions. This can include national and urban passenger rail and freight rail networks; Bus Rapid Transit (BRT) systems; electric vehicles; and, bicycle transport systems.

Sector overview

The transport sector is becoming a large and growing contributor of GHG emissions in Vietnam, accounting for 18% of the total CO₂ emissions in 2014.¹⁵⁴ The transport CO₂ emissions per capita are on the rise, estimated to almost double from 0.343 tons in 2014 to 0.621 tons in 2025.¹⁵⁵ Therefore, in order to reduce GHG emissions by up to 25% in 2030 and 45% in 2050, as targeted in the country's Renewable Energy Development Strategy,¹⁵⁶ a structural change in the transport sector is essential - with a focus on improving energy efficiency, increased use of public transport and clean transport fuels.¹⁵⁷

Existing transport in Vietnam comprises of road, railway, air and waterway (both inland and coastal line) modalities. Among them, the largest share of emissions, of around 68%, corresponds to road transport.¹⁵⁸ With a population of around 96 million people, Vietnam is home to nearly 40 million vehicles - most running on oil and petroleum.¹⁵⁹ Nevertheless, electric bicycles and scooters, which are considered much greener, have attracted growing attention from Vietnamese consumers.¹⁶⁰

In 2017, Vietnamese people obtained 400,000 electric vehicles. In the near future, given the country's existing policies on low carbon growth, this new mode of transport can be expected to fill up to 20% of the market demand.¹⁶¹ Recently, Vinfast, a local automobile manufacturer, successfully launched its first e-scooter, boosting the country's immature e-vehicle manufacturing market.¹⁶²

Other green transport in Vietnam include rail, metro, light rail and Bus Rapid Transit (BRT) - mostly concentrated in Hanoi and Ho Chi Minh City. Even though these modes are available, the share of public transport remains relatively low, accommodating less than 10% of commuters' need.¹⁶³ This is due to its low level of network development, limiting accessibility and the convenience of private vehicles.

Whilst the Hanoi BRT system (financed by the World Bank's ODA, at a cost of

USD53.6m)¹⁶⁴ has been in operation since 2016, the BRT system in Ho Chi Minh City was suspended in 2017 after one year of operation due to insufficient passengers.¹⁶⁵ In line with its plan to make Ho Chi Minh City a green and environmentally-friendly city, the Ho Chi Minh City government recently approved the development of a new, smart BRT system with electric buses in the city.¹⁶⁶

Despite the poor patronage of some networks in the past, public transport infrastructure development has become a priority for the major cities. Accordingly, public transport investment has considerably increased in recent years, with the largest investments seen for the five metro lines developed in Hanoi and Ho Chi Minh City. These multi-billion-dollar projects are either complete or under construction.¹⁶⁷ They are expected to ease the congestion problems in these two cities, provide a more comprehensive network - increasing accessibility for more people - and shift commuters from private vehicles to public means.

Beyond urban transport systems, freight and passenger rail networks exist throughout the country. The nation's principle route is connecting Hanoi with Ho Chi Minh City, with four other main lines going through 35 remote provinces, with international links to China.¹⁶⁸ Generally, the railway system in Vietnam is old-fashioned and the rollingstock relies on fossil fuels.¹⁶⁹ Although, this might soon change.

Vietnam Railway is undergoing a comprehensive revamp with plans to attract foreign investment into the industry.¹⁷⁰ There are also plans to build a North-South high-speed railway system, running from Hanoi capital to Ho Chi Minh City, which may be worth USD58bn.¹⁷¹ The project is based on Japan's Shinkansen bullet train technology and is expected to improve transport quality for nearly half of the country's population. It is anticipated that, in the future, the share of green transport in Vietnam will increase.

Financing options

Most funding for transport comes from government budget, ODA (i.e. from ADB, China, etc.), PPP arrangements, Build-Operate-Transfer or Build-Transfer contracts.

There are also potential funding structures available to encourage private sector involvement in the long-term financing required for low-carbon transport projects including green bonds, outright asset acquisitions and the securitisation of

green assets. Green bonds provide indirect exposure for investors to specific projects and assets and provides attractive credit and liquidity credentials for institutional investors. Although, green bonds for funding low carbon transport have not yet been issued in Vietnam.

Government-backed concessional loans are a new structure that exists in ASEAN, which provides greater leverage against the revenue streams of transport (i.e. fares). Another innovative mechanism is 'value capture', which refers to the value that is generated for private landowners from infrastructure and surrounding business operations. As private sector appetite increases, funding sources will continue to diversify, and investment will accelerate.

Future focus

Electrification of garbage collection and postage delivery vehicles

Over the past two decades, the rapid urbanization process has put intensive pressure on cities in Vietnam. Hanoi and Ho Chi Minh City are becoming more and more polluted with exhausts and municipal garbages. A transition of public vehicles, like buses, postal vans and garbage trucks from petrol-run to electronic-run is necessary to release environmental pressure on those cities. Indeed, a new electric bus company is coming to Vietnam with up to 3000 e-buses being expected to run on road in five major cities from March 2020.¹⁷²

The switch to electronic vehicles for waste collection may also help to ease the environmental pressure. Also, the noise-free electric vehicles can move at any time of the day or night, which makes them more productive and can save on operating costs. The use of electronic trucks is being implemented in countries like New Zealand¹⁷³ and USA.¹⁷⁴

There are similar benefits for switching to electric postage vehicles. DHL have rolled out electronic vehicles in Vietnam as a part of DHL Group's commitment to Zero Emissions by 2050.¹⁷⁵ However, the Vietnam Post Corporation, the most prominent postal service provider in Vietnam with more than 2000 postal trucks and 3500 motorbikes,¹⁷⁶ is yet to make the change. Countries that have already begun the switch include Canada, Germany, USA and Taiwan.

Hanoi Metro x 2 lines

Line 2A: Cat Linh-Ha Dong

Line 3: Nhon- Hanoi Railway Station^{177,178}

Proponent: Vietnam railways Corporation as the owner. Hanoi Metro Company as the operator.

Location: Hanoi, Northern Vietnam

Status: Under construction. Line 2A: Cat Linh-Ha Dong: It was started on late October, 2011, and initially targeted to begin operations in 2016. However, this construction was delayed because of a shortage in funds. It was finally completed, and has been in operation since the beginning of 2019.

Line 3: Nhon- Hanoi Railway Station: This line is under construction and is scheduled to be put into operation in 2022.¹⁷⁹

Classification: Metro, Infrastructure

Description: These two lines are part of the four priority lines within a larger urban transportation system planned by the Ha Noi Urban Transport Master Plan (HUTMP), with the aim of easing traffic congestion and reducing emissions.

The Line 2A connects the district Dong Da, Thanh Xuan, Ha Dong through 12 stations with total length of 13.1km. This project was expected to be the first rapid transit line in Vietnam.

Line 3 connects Nhon to Hanoi Railway Station with total length of 12.5km of dual track rail metro line. The Metro line 3 will greatly enhance accessibility in six districts of Ha Noi and be an important integral part of an improved public transport system, which aims to achieve increased public modal share through low carbon transport that reduces GHG emissions.



Source:¹⁸²

Output: Competitive metro rail services along the project corridor that supports public transport connectivity.

Cost:

- Line 2A: USD868m (estimated)¹⁸⁰
- Line 3: USD1.3bn (total current cost estimated)¹⁸¹

Financial structure: Line 2A, Cat Linh-Ha Dong, was funded by ODA from China (about USD669m) combined with Vietnamese government budget (about USD199m).

Line 3, Nhon-Hanoi Station, is financed through loans backed by the ADB, Agence Francaise de Development, European Investment Bank, Direction Generale du Tresor, Clean Technology Fund, and the remainder comes from the municipal government's reciprocal capital.

Light Rail in Ho Chi Minh City

Ground tram line no 1 - Sai Gon - Cho Lon - West Station^{183,184}

Proponent: The Management Authority for Urban Railways (MAUR)

Location: Ho Chi Minh City, Southern Vietnam

Status: Planned. The project is calling for foreign investment.

Classification: Public Passenger Transport, Tram, Infrastructure

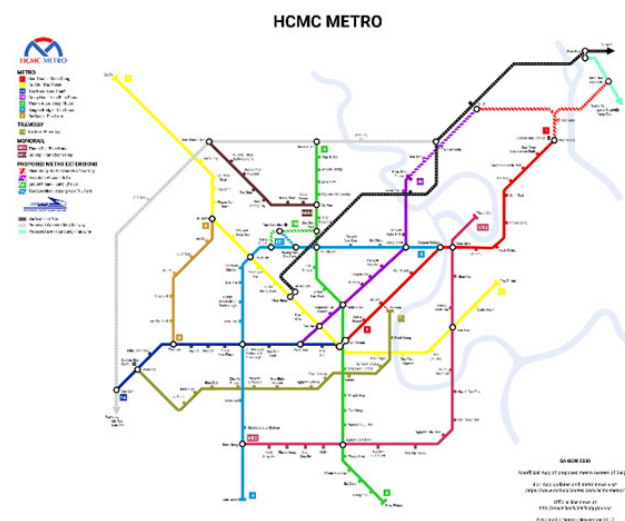
Description: There will be a light rail line beginning in Saigon (in the area of Ben Bach Dang park) and ending at the Western Bus Station, with the total length of about 12.5 km, connecting key venues in Ho Chi Minh City.

The route includes the 01 Depot located at Western Bus Station with an area of 5 ha, 6 main stations and 17 passenger terminals.¹⁸⁵

Output: Build public passenger transport services with relatively large capacity in order to reduce environmental pollution and personal vehicle usage.

Cost: Approx. USD250m¹⁸⁶

Financial structure: PPP arrangements, ODA, BOT or BT contracts



Source:¹⁸⁷

Upgrading the Hanoi - Ho Chi Minh City railway route¹⁸⁸

Proponent: Vietnam Railway Department, Ministry of Transport

Location: From the Northern Central to the Southern Central of Vietnam

Status: Under construction. The project is divided into three phases. Currently it is in phase 2, and still continues to call for investment.

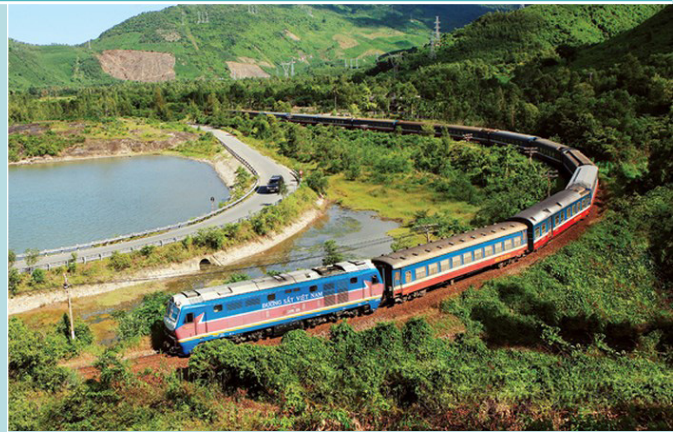
Classification: Public passenger transport, Rail, Infrastructure

Description: The main objective of the plan is upgrading and modernising the North - South railway with the starting point from Hanoi Station to Hoa Hung Station (Ho Chi Minh City) from grade 1 to grade 2 railway standards.

Phase I, from 2014 to 2015, included implementing existing projects, with capital of USD580.56m.

Phase II, concentrates on a number of projects to remove bottlenecks to ensure safety for trains such as: constructing Khe Net and Hai Van tunnels, prioritizing two railway projects in the Hanoi - Ngoc Hoi and Trang Bom - Hoa Hung sections to reduce urban congestion, and investing in projects for two high-volume sections: Hanoi - Vinh and Nha Trang - Saigon.¹⁸⁹ The total cost of this phase is approximately USD5.7bn.

In Phase III, the Vietnam Railway Department proposes to build a series of branch routes connecting seaports, industrial parks and tourist areas, for instance: Vung Ang, Chan May, Nhon Hoi, Van Phong and rail lines such as Bien Hoa - Vung Tau, Saigon - Loc Ninh.



Source:¹⁹⁶

Output: Operation with an average speed of 80 - 90 km/h for passenger trains, with the capacity of 16 million passengers each year.

An average speed of 50 - 60 km/h for freight trains with capacity of 6 million tons of goods, with 25 pairs of trains operating each day and night.

Cost: Approx. USD10bn¹⁹⁰

Financial structure: Funding from government budget and government bonds combining with ODA, BOT

Manufacture of Electric Buses^{191,192}

Proponent: VinFast

Location: Haiphong, Vietnam

Status: Under construction. The buses are scheduled to be put into operation by March 2020.

Classification: Public Passenger Transport, Low Carbon Vehicle

Description: The project is developed by VinFast in partnership with Siemens Vietnam, as a technology and components supplier.¹⁹³ Currently, VinFast electric bus factory is in the process of building and installing the factory system.

The first electric bus is expected to finish by the end of 2019. The aim of the project is developing environmentally friendly electric cars in general and electric buses in particular. It will help to alleviate the pollution problems in major urban cities and meet with increasing public transport needs in Vietnam.

Output: From March 2020, electric bus services will be provided in five major cities, namely: Hanoi, Haiphong, Danang, Ho Chi Minh City and Cantho, with the operation of 3000 electric buses.

Cost: VND1tn (USD43m)¹⁹⁴

Financial structure: Funding from Vingroup. The project follows non-profit model, 100% of the profit will be fully re-invested



Source:¹⁹⁵



Sustainable water management

Assets that do not increase greenhouse gas emissions or that aim at emission reductions over the operational lifetime of the asset, address adaptation, and increase the resilience of surrounding environments. This covers built as well as nature based water infrastructure.

Water management projects could include water capture and collection, water storage, water treatment (with methane emissions treatment), flood defence, drought defence, stormwater management, and ecological restoration/management.

Sector overview

Climate change, rapid urbanization and strong population growth mean that Vietnam needs to prioritise more resilient and sustainable water management. The three areas most in need, and which currently pose a challenge to the Vietnamese government and municipal authorities, include clean water supply, adequate wastewater treatment and flood control infrastructure.

Inadequate and ageing water infrastructure has meant that water supply for residential and industrial purposes has not yet met the demand.¹⁹⁷ In 2015, piped water only reached 10% of rural households and 61% of urban households.¹⁹⁸ In general, with an estimated urban population of 44 million, demand for water is expected to be 9.4-9.6 million cubic metres per day by 2020.¹⁹⁹ Large urban cities also see high demand for clean water. For instance, Hanoi is estimated to need two million cubic metres per day of clean water by 2020, about three million and 3.5 million cubic metres per day by 2030 and 2050, respectively.²⁰⁰

Vietnam's government has set high targets for future water supply. By 2030, 100% of the population should have access to safe drinking water.²⁰¹ By 2020, urban water supply should reach 85% and rural water supply should achieve 75% of the demand.²⁰² The Government's 'National Strategy on Climate Change' also states that improving water security is an important response to climate change.²⁰³ Furthermore, in the 'National Strategy on Green Growth' the Government highlight the need for water and irrigation infrastructure to be sustainable.²⁰⁴

The financing needs for these ambitious water supply sector targets is estimated to about USD600m annually, up to 2020.²⁰⁵

As the ODA sources are highly likely to diminish as Vietnam becomes a middle-income country, the Government will have to look for other sources of funding, e.g. from foreign direct investment, private investment or PPP frameworks and other blended finance models.

Investment will also be required for Vietnam's ambitious plans to upgrade wastewater treatment facilities. Vietnam suffers from increasing wastewater problems, whereby discharging of domestic and industrial wastewater directly into the water sources without treatment is affecting the quality of water supply. The amount of domestic wastewater generated daily is around 1.75 million cubic metres,²⁰⁶ with only 10% of city households' wastewater being treated. This is due to a significant deficit in wastewater treatment facilities.²⁰⁷

In response to these issues, the Government is working to increase the current treatment capacity of about 900,000 cubic metres per day by another 1.6 million cubic metres per day by 2020.²⁰⁸ The Government has also set the target of having centralized municipal wastewater treatment and collection systems in most urban cities, by 2025; 70-80% of municipal wastewater will be collected and treated properly. By 2050, all urban cities, with an urban population of more than 50,000 people²⁰⁹ and above, should also receive stormwater discharge and wastewater treatment systems.^{210,211}

Major urban centres like Ho Chi Minh City and Hanoi are pushing to upgrade and expand their existing wastewater infrastructure. For example, the Ho Chi Minh's Urban Flood Control Program (2016-2020) is expected to build and upgrade 6,000km of drains, 12 wastewater treatment plants and over 5,000km of canals, all of which should cost approximately USD4bn. Hanoi plans to spend USD2bn to renovate its drainage and effluent treatment capacity in the coming years.²¹²

Vietnam is highly vulnerable to flooding, with flash flooding being particularly common during the rainy season due to insufficient flood prevention planning and infrastructure. Urban water drainage facilities are out of date and inefficient as a consequence of rapid urbanisation. As a result, new storm water channels and canals are needed to cope and build resilience. In the Government's NDC, Vietnam acknowledges the important role of water infrastructure in combating rising sea levels and urban flooding.²¹³ The Government has set the target that by 2025, 100% of urban areas should experience less frequent floods

during rainy season.²¹⁴ Ho Chi Minh City's Department of Transport aims to protect to over 900 storm drains, channels and canals.²¹⁵ This means Vietnam needs to allocate considerable funding to flood infrastructure in the near future.

Financing options

Currently, the sector is mostly supported by public finance, as the majority of water infrastructure in Vietnam is publicly owned. Sovereign and sub-sovereign green bonds could complement the funding of public water infrastructure issued by the local governments (provinces, cities, or utility companies owned by them). The use of proceeds for both of the green bonds issued in Vietnam are intended to support sustainable water infrastructure. Both green bonds were issued in 2016 by local government issuers, with a total value of USD27m.

Green bonds present an investment pathway for sustainable water infrastructure. Further investment pathways exist in the construction, ownership and refinancing of new types of infrastructure such as water desalination assets and commercial and industrial water infrastructure.

Future focus

Desalination in response to water scarcity

With a growing population, demand for fresh drinking water in Vietnam is increasing fast. Finding an alternative source of safe drinking water is crucial. The desalination of sea water is one solution for this problem in the future.

Desalination is a technique where the excess salts are removed from sea water or brackish water converting it into safe potable or usable water. Good examples of this technique, in the region, can be found in Australia²¹⁷ and Singapore.²¹⁸ Specifically, the Tuas Desalination Plant in Singapore was launched in 2018²¹⁹ and it can produce 30m gallons of fresh water daily.



Source:²¹⁶

Wastewater treatment plant Song Hau 1 water treatment plant, phase 1^{224,225}

Proponent: AQUA ONE Hau Giang Water One-member Co., Ltd

Location: Hau Giang province, Southern Vietnam

Status: Completed. The plant was constructed in October 2015 and started commercial operation in June 2017²²⁰

Classification: Water treatment and distribution

Description: Song Hau 1 water treatment plant was built in a 15ha construction area within Nam Song Hau Industrial Zone, in response to the problem of unclean water and poor water security in the Mekong Delta. The treatment plant depends on the nearby Hau River for its input water.

The plant has among the most advanced wastewater treatment facilities in Vietnam. In addition to office buildings, the complex includes tanks, modern pumping station and pumping construction together with a subsidiary section. As a result, Song Hau 1 Water Treatment Plant has received the final EDGE certificate by SGS Vietnam. It has a capacity of 100,000 m³/day

Song Hau 1 water treatment plant is currently the main supplier of clean and purified water for residents and organisations in five provinces, including Can Tho, Hau Giang, Soc Trang, Bac Lieu, Ca Mau.



Source:²²⁶

Output: Song Hau 1 water treatment plant phase 1 has a capacity of 100,000 m³ per day.²²¹ It aims to improve the living standards of local residents by supplying them with reliable water.

Cost: VND1.9tn (approximately USD85m)²²²

Financial structure: The project is 100% funded by AQUA ONE Hau Giang Water One-member Co., Ltd²²³

Water treatment plant Song Da water treatment plant, phase 2

Proponent: Vinaconex Water Supply Joint stock company

Location: Hanoi, Hoa Binh

Status: Under construction. The construction was started in May 2018 and expected to be finalised by the end of 2019 or early 2020.²²⁷

Classification: Water treatment and distribution

Description: Song Da water treatment project phase 2 is the second phase of the Song Da treatment project. Upon completion, this plant will be able to supply 300,000 m³ of water per day and raise the aggregate capacity of the Song Da Water treatment plant to 600,000 m³/day.²²⁸ (The first phase with a capacity of 300,000 m³ per day was completed and put into commercial operation in 2009).

The project is among many water projects in the master plan to develop the water supply system for Hanoi capital and suburban areas by 2030, which will cost VND72tn (approx. USD3.5bn).²²⁹

Output: The designed capacity of this project is 300,000 m³ per day.²³⁰ This project will contribute to meeting the needs for sustainable supply of clean water of the capital and the neighbouring localities.



Source:²³²

Cost: The total investment of the project is approximately VND5tn (approximately USD200m)²³¹

Financial structure: The project is 100% funded by Vietnam Construction and Import – Export Joint stock corporation



Sustainable waste management

The efficient use of resources to cut down on waste production, coupled with collection and disposal systems that promote reuse and recycle, thereby minimising residual waste going into energy from waste facilities. Where waste must go to landfill, there are gas capture systems installed to minimise emissions as well as measures to minimise run-off and other negative impacts on surrounding environments.

Sector overview

Vietnam generates over 28 million tons of waste annually.²³³ Due to population growth and rapid urbanisation, the volume of waste is anticipated to significantly increase in coming years, especially in large urban areas. The emissions produced by this waste are also expected to increase. It is projected that GHG emissions from waste in Vietnam will reach 26.6m MtCO₂e in 2020, and almost double to 48m MtCO₂e by 2030.²³⁴

Vietnamese cities already dump about 38,000 tons of solid waste per day and only 85% of this waste is collected, while rural areas discharge 32,000 tons, of which only 40-55% are collected.²³⁵ The common practice of solid waste management in Vietnam is by incineration or landfilling.²³⁶ These methods result in low economic and environmental values, and cause severe environmental and health issues, including land pollution, toxic emissions, air contamination and communicable diseases. Vietnam ranks 17th in the world for ocean plastic waste pollution and has been named as one of Asia's five worst countries for discharging the most plastic waste into the ocean.²³⁷

Acknowledging these challenges, the Government is looking for other ways to treat or recycle solid waste. The Government's policy response includes Decree No. 59/2007/ND-CP, on solid waste management, which provides the national framework for waste management activities and outlines the roles and responsibilities of governments, businesses, communities and individuals involved in waste-related activities.²³⁸ Vietnam also acknowledges the importance of waste management to mitigate GHG emissions and has included specific commitments in its Intended NDC to address this.²³⁹

There is also the National Strategy on solid waste management, which highlights the key tasks and targets for waste reduction. For example, by 2025, 100% of regular solid waste in urban cities and 90% of solid waste

from rural areas should be collected and treated up to Vietnamese environmental standards; 90% of the urban waste should be recycled and reused.²⁴⁰

Currently, recycling in Vietnam is mainly done by informal private waste pickers or collectors who deliver their loot to one of the approximately 15 plastic recycling plants in Vietnam.²⁴¹ To meet the waste management targets, the Government plans to support the development of further recycling facilities as well as increase the demand for recycled materials. For example, encouraging the building of roads from recycled plastic,²⁴² to create market expansion for the recycling industry.

Investment in advanced technologies for waste management, including waste-to-energy (WtE) technology, is also being promoted by the Government. WtE technology was introduced to Vietnam in 2012 and has the potential to generate 320 MW; however, the current energy generated by WtE is only 2.4 MW.²⁴³ To increase the development of WtE facilities in Vietnam, the Government is calling for private investment as well as developing favourable policies and incentives for the investors.

One of these incentives includes the lowering of the corporate income tax rate

to 10% for a period of 15 years for newly-established companies investing in WtE power plant projects that are using new or advanced technology.²⁴⁴ The Government is also supporting the development small-scale WtE projects located in less urban districts or communes, as this approach could help to address the local waste problems and reduce the transportation of waste from the downtown areas to remote landfills.²⁴⁵

Financing options

Most of the major waste management assets and projects in Vietnam are publicly owned, with public financing used primarily for waste treatment facilities, waste-to-energy processing and sanitary refill infrastructure. Waste treatment facilities usually demand substantial capital. Development via PPPs or through the issuance of green bonds could offer options for municipalities to fund projects.

Privately owned asset and projects, which could include recycling facilities and some WtE facilities, offer other means of debt and equity investment. Accordingly, investment pathways could include participation in green bonds and consortium debt arrangements and/or equity stakes in individual projects via PPPs or other public-private or private ownership and financing structures.

Future focus

Facilities for the production of biogas from green waste

Anaerobic digestion facilities present an opportunity for Vietnam to reduce its landfill and GHG emissions as well as cut fossil fuel use by generating renewable energy. Anaerobic Digestion is a natural process where biomass (plant and animal materials) is broken down by micro-organisms inside a tank or digester that is free of oxygen.²⁴⁶ This process releases a methane-rich gas (biogas) that can be used to generate renewable heat and power, and the remaining material (digestate) can then be used as a fertiliser.

This is not a new approach to waste management, but anaerobic digestion technology continues to improve. There is also an increase in biomass, as the agriculture industry grows in many economies.

This is particularly true in Vietnam, with an agriculturally productive land area of 10.2million ha. In 2019, agriculture, forestry and fisheries accounted for about 15% of GDP.²⁴⁷ The types of biomass with



Source:²⁵⁰

the greatest potential in Vietnam include cassava, jatropha, rice (straw and husks) and sugarcane waste.²⁴⁸ Some anaerobic digestion facilities already exist in Vietnam and the potential for growth is significant.

Not all anaerobic digestion is green. The best practice is to use the technology whilst producing methane emissions below 1285g CH₄/tonne of waste input (this is approximately equivalent to 100g CO₂e/kWh).²⁴⁹ Also, woody waste must be segregated before or after processing and sent to an eligible composting plant, rather than sent to land fill. It is also important that any biomass be waste, rather than raw food product, to avoid food insecurity.

High Tech Waste Treatment Factory a Waste-to-energy Complex in Bac Son, Soc Son

Proponent: Hanoi Department of Construction²⁵¹

Location: Hanoi, Northern Vietnam

Status: Planned. The plant was expected to be built between 2017 and 2020, however it has been delayed.²⁵²

Classification: Waste, Energy from Waste

Description: The plant will cover 17 ha and is a part of Soc Son waste treatment complex. It is designed to apply the most advanced waste-to-energy technology in the world for waste treatment.

The aim of the project is to construct a solid waste treatment plant based on combustion - power generation technology. The factory is expected to save space (less land use), meeting Vietnam's current environmental standards and regulations, and minimize the amount of waste to be buried after treatment (< 15%). The energy from waste incineration could then be reused to generate electricity for plant operation as well as connecting to the national grid.

It will be invested in two phases: phase one with a capacity of 2,000 tons per day, phase two with an increase of capacity of 2,000 tons per day.²⁵³ Inputs are daily-life solid wastes, ordinary industrial wastes and other non-hazardous wastes suitable to the selected technology.



Source:²⁵⁷

Output: The plant is designed to operate with a capacity of about 4000 tons each day to cope with the increasing municipal solid waste from Hanoi.²⁵⁴

Cost: About VND3.5-4.8tn (approximately USD200m)²⁵⁵

Financial structure: PPP arrangements under Build-Lease-Transfer Contract²⁵⁶

Recycling Production Facility Minh Hung Recycling Facility²⁶²

Proponent: Minh Hung Group of Vietnam, MH Group with technology transfer from GFSI-MHE Manufacturing of Texas LLC

Location: Tien Giang, Mekong Delta, Vietnam

Status: Under construction. The plant is due for completion and operation in late 2019/early 2020.

Classification: Waste, Recycling

Description: The project includes a manufacturing facility for plywood made from recycled composite with technology transferred from GFSI-MHE Manufacturing of Texas LLC. This technology will help to recycle composite waste and used fibre glass from recycled planes, wind turbine blades, ships and others to produce eco-friendly materials. In addition to plywood, the factory will produce pallets, door frames, tiles, manhole covers, culverts and other iron and aluminium materials in the future. It is named as Southeast Asia's largest recycling production facility.²⁵⁸

Output: The facility is expected to operate 20 hours a day and be capable of producing two tons of plywood an hour.²⁵⁹

Cost: USD50m (estimated)²⁶⁰

Financial structure: Private funding from Minh Hung Group plus MH Group²⁶¹

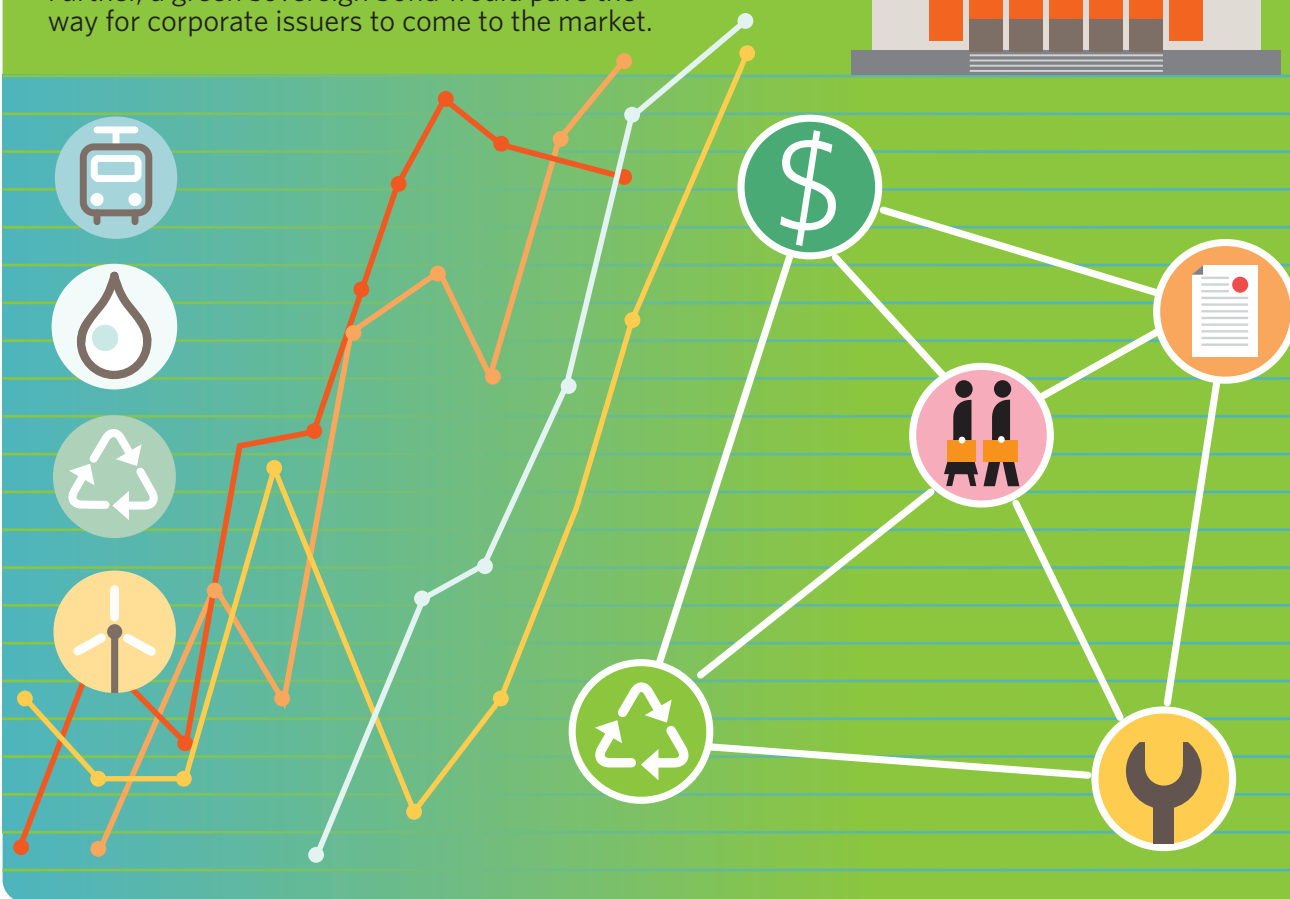
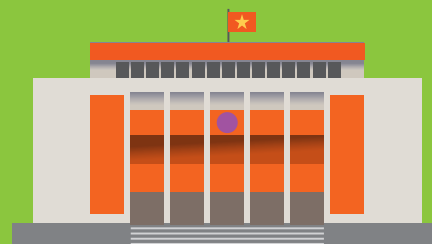


Source:²⁶³

Actions for growing green infrastructure

The growth of green infrastructure pipelines and associated green finance (including the green bond market) in Vietnam can be aided by key policy and institutional changes. Such measures act to raise the profile of green infrastructure, support critical finance channels for infrastructure development stakeholders, diversify risks and create more options for investors. Key measures for doing so are as follows:

- **Incorporate climate risk exposure to new infrastructure plans**, accounting for future depreciation of assets due to change in precipitation patterns, temperature increases and extreme weather events.
- **Improve the visibility of green investment opportunities** to help investors understand that there is a sufficiently large pool of financially attractive investments that are also green.
- **Adjust regulatory requirements**, including the promotion of a standardized Green Tagging approach for project finance and integration of climate criteria.
- **Issue a green sovereign bond** to fund some of the project types mentioned above. This would demonstrate commitment, support, and offer a sizeable liquid asset to encourage investors to allocate money to a green investment strategy. Further, a green sovereign bond would pave the way for corporate issuers to come to the market.
- **Offer incentives**, such as government-backed grants, to cover green bond issuance costs (often including the cost of obtaining an external review); subsidy schemes for interest rates or third-party engagement; and/or launch incentives for issuers or investors, such as a tax-exemption to increase investor engagement.
- **Partner with development entities**, moving beyond loans, to leverage and reduce the risk the infrastructure projects and attract a wider range of investors, for example, through the development of foreign exchange products, political coverage and credit enhancement products or offering credit guarantees and adopting a blended-finance approach in order to channel capital flows – possibly in combination with credit support to improve the bankability of projects.
- **Promote climate-related financial risks disclosure** – e.g. supporting the implementation of recommendations of the Task Force for Climate-related Financial Disclosure (TCFD) – to boost investor confidence in the market.



Annex I: Green debt instruments

Debt Instrument	Definition	Example
Supranational and sovereign green bonds	Proceeds are allocated to nominated projects and assets. Debt securities carry the credit rating of the issuing nation.	The Republic of Indonesia issued a USD1.25bn 5-year green sovereign sukuk in 2018 to finance eligible projects under a range of categories: renewable energy, energy efficiency, adaptation, transport, green buildings, sustainable agriculture, sustainable management of natural resources and green tourism. This instrument has not yet been used in Vietnam.
Sub-sovereign green bonds	Proceeds are allocated to nominated projects and assets within the sponsoring region. Credit rating is based on that of the issuing municipality and the credit quality of the underlying assets.	In 2016, the Vietnam Ministry of Finance approved a pilot project for municipal green bonds. In September 2016, the People's Committee of Ba Ria Vung Tau Province came to market with a VND80bn (USD4m) 5-year green bond to finance a water resource management project. Shortly after, Ho Chi Minh City Finance and Investment State-Owned Company issued a VND523.5bn (USD23m) 15-year green bond with proceeds allocated to 11 projects related to water and adaptation infrastructure.
General obligation green bond	Proceeds are allocated to nominated projects and assets within the sponsoring region. As the green bonds are backed by balance sheet assets, the bond will carry the credit rating of the issuing entity.	Singapore state development bank, DBS Group, issued a USD500m 5-year green bond in July 2017. Proceeds will be allocated to green buildings, transport, renewable energy, energy efficiency, waste and adaptation. This instrument has not yet been used in Vietnam.
Green revenue bond	Proceeds are allocated on nominated projects and assets. As the green bonds are backed at least partially by the issuer's revenue stream, bonds carry the credit rating of the issuing entity.	In 2014, the State of Hawaii issued GEMS 2014-1, an ABS deal secured on the green infrastructure fee collected by three state utility companies via electricity bills. The bond raised funds for the Hawaii Green Infrastructure Loan Program, which aims at providing loans to finance the installation of renewable energy power systems and for energy efficiency projects. This instrument has not yet been used in Vietnam.
Green structured finance	Debt securities backed by a pool of underlying assets. Proceeds are allocated only to nominated projects and assets. The credit risk is dependent on the asset risks.	National Australia Bank placed AUD200m of secured notes for the refinancing of wind and solar assets in June 2018. The structure is backed by loans to Australian renewable energy developers. This instrument has not yet been used in Vietnam.
Green securitisation Green tranches in ABS and MBS deals	Debt securities backed by a pool of underlying assets. Proceeds are allocated only to nominated projects and assets. The credit risk is dependent on the asset risks.	FlexiGroup (Australia) has closed three ABS deals with green tranches, mostly senior (Class A), for the refinancing of solar rooftops. Its 2018 deal contained a B note too. Harvest Capital (China) has issued Green CMBS secured on a LEED Gold Certified office building owned by China Energy Conservation and Environmental Protection Group (CECEP). This instrument has not yet been used in Vietnam.
Green convertible bond	Proceeds are allocated on nominated projects and assets. The security can be converted into a predetermined amount of the company's common stock. The bond will carry the credit rating of the issuing entity.	Japan-based Sumitomo Forestry Co., Ltd issued the first green convertible in September 2018 to refinance the acquisition of 30,000 hectares of FSC certified timberlands and plantation forests in Nelson, New Zealand. The Stock Acquisition Rights give bondholders the option to acquire the company's common stock. This instrument has not yet been used in Vietnam.
Green project bond	Proceeds are allocated on nominated projects and assets. Credit rating is based on the quality of the backing green assets and the returns stream of the underlying project.	In February 2016, AP Renewables became the first green bond issuer of the region with a PHP10.7bn (USD226m) green bond, certified under the Geothermal Criteria of the Climate Bonds Standard. The project bond financed the rehabilitation the Tiwi-MakBan (Makiling-Banahaw) Geothermal Energy Project. The Asian Development Bank provided credit enhancement by guaranteeing 75% of the bond. This instrument has not yet been used in Vietnam.

Debt Instrument	Definition	Example
Environmental impact bonds / pay-for-results green bonds	Proceeds allocated to nominated green projects/assets. Part of the project's risk is transferred from the issuer to investors. The payments to investors are conditional to the project achieving an expected outcome after a third-party evaluation has been conducted.	<p>DC Water and Sewer Authority issued a USD25m private placement in 2016 to finance the construction of green infrastructure designed to mimic natural processes to absorb and slow surges of stormwater during periods of heavy rainfall. If the outcome of the project meets expectations, no contingent payment will be due to investors. If it exceeds expectation, investors will make a Risk Payment Share of USD3.3m to DC Water. If it does not meet expectations, DC Water will make an outcome payment to investors.</p> <p>30 US cities of Atlanta and Baltimore recently announced plans to issue environmental impact bonds in the course of 2019.</p> <p>This instrument has not yet been used in Vietnam.</p>
Private Placement	Green bond placed directly with the investor/s. Details of the deal such as pricing and maturity may remain confidential, but the issuer is expected to disclose details on the nominated projects and assets to be financed.	<p>Thailand-based TMB Bank issued a USD60m 7-year green private placement in June 2018 to finance solar, biomass and waste to energy projects. The IFC was the sole investor in the deal.</p> <p>This instrument has not yet been used for green projects in Vietnam.</p>
Green loans, syndicated loans and credit lines	Provide lending to encourage market development in climate-aligned sectors in line with the Climate Bonds Taxonomy and in compliance with the Green Loan Principles. Interest rates are based on borrower credit scores or an ESG score assigned by an ESG rating agency.	<p>Fraser Property Limited (Singapore) issued a SGD1.2bn (USD876m) 5-year green loan to refinance existing loans relating to the development of the Fraser Tower.</p> <p>This instrument has not yet been used for green projects in Vietnam.</p>
Mezzanine and subordinated debt	Proceeds are allocated on nominated projects and assets. Hybrid capital investments, from development banks seeking to support private investment in the senior debt or from investors with a higher risk appetite.	<p>Global investment manager AMP Capital provided a EUR245m mezzanine finance facility of EUR245m to Neoen, a French renewable-energy provider. In May 2018, Canadian insurance company Manulife Financial issued a CAD600m (USD464m) 10-year green subordinated secured bond.</p> <p>This instrument has not yet been used for green projects in Vietnam.</p>

Annex II: Green equity instruments

Equity Instrument	Definition	Example
Public- Private Partnership	A long-term contract between a public entity and a private party aimed at developing and supporting a public asset or service. The private party takes on considerable risk and management responsibility, and remuneration is linked to performance.	The Duong River Surface water treatment plant was a large project run through a public-private partnership since 2006. ²⁶⁴ The project was a cooperation between AquaOne Water JSC and Hanoi municipal authorities. ²⁶⁵ The first phase of the project has a total cost of VND5tn (USD217.39m) ²⁶⁶ and was expected to finish in late 2019. It should be able to supply about one-third of water demand of Hanoi and surrounding province. (This was not specifically labelled as a green deal; however, it was certificated as a green project by EDGE.)
Joint venture, partnership	Business agreement between two or more parties that pool their capital, skills and resources to achieve a specific project or business activity.	Xuan Cau holdings of Vietnam and Thai's B. Grimm Power Public Company Ltd., in a joint venture, invested USD391m in Dau Tieng solar power complex since 2018. ²⁶⁷ (This was not specifically labelled as a green deal; however, it was financing for a green project.)
Private equity, venture capital and unlisted equity funds	Fund allocations to innovative pilot-scale green projects including for qualified green infrastructure. This assist project developers and entrepreneurs to secure a funding stream for green projects.	The Vinfast electric bus was the first pilot electric bus project in Vietnam. It was 100% funded by the Vingroup through its venture capital. The estimated cost of the project is USD43m. ²⁶⁸ (This was not specifically labelled as a green deal; however, it was financing for a green project.)
Mezzanine/ subordinated debt and preferred stock (B-shares)	Hybrid financing typically from development banks and international finance institutions supported by subordination of equity tranches. Often, lenders are allowed to convert the loan into subordinate equity shares according to pre-specified conditions. Alternatively, shares may be used as loan collateral.	AMP Capital's GBP37m mezzanine investment stake in a GBP247m refinancing of UK solar parks. This instrument has not yet been used for green projects in Vietnam.
Subsidiary / project financing vehicles / YieldCos	Use of proceeds to fund a portfolio of (off-balance sheet) green projects. Private or publicly traded vehicle consisting of pools of long-term cash-generating green assets, may have tax advantages.	City Developments Limited (CDL) issued an SG100m (USD71m) senior secured Certified Climate Bond in April 2017 through its wholly owned subsidiary CDL Properties Ltd to refinance an intercompany loan extended by CDL to CDLP for Republic Plaza, one of Singapore's tallest skyscrapers and a premium Grade A office building in the heart of Singapore's Central Business District. US YieldCos Terraform Global and Terraform Power were established by SunEdison in 2015 and issued green bonds to finance solar, hydro and wind assets. This instrument has not yet been used for green projects in Vietnam.
Investment Trusts	Use of proceeds to fund a portfolio of green projects. Publicly traded vehicle consisting of pools of long-term cash generating green assets, may have tax advantages.	US REIT Hannon Armstrong issued a debut USD100m ABS in 2013. The deal was secured on ground lease receivables from 78 solar and wind farms. Leasing land to renewable energy operators carries lower risk than owning and operating the solar and wind farms. Pooling the leases creates diversity of income streams, a prized feature of securitisations, which further lowers deal risk. This instrument has not yet been used for green projects in Vietnam.
Infrastructure/ property funds	Fund directly investing in nominated infrastructure projects. Funds can have a mixed financing structure by both investing directly in assets, and through debt subscription.	Glennmont Partners is a European-based fund manager focusing on clean energy infrastructure investments. In October 2017, the fund completed a EUR190m refinancing of a portfolio of operating wind turbines located in Sicily and Puglia, Italy. This instrument has not yet been used for green projects in Vietnam.

Annex III: Credit enhancement mechanisms

Credit enhancement mechanisms	Definition	Example
Full or partial credit guarantee (PCG)	A credit guarantee or PCG is created to absorb part or all the debt service default risk of an infrastructure project, irrespective of the cause of default. PCGs can be used for any commercial debt instrument (loans, bonds) from a private lender. The existence or proposed implementation of a PCG is indicative of confidence in the product being floated by the guaranteeing entity and can even assist in bringing new lenders to the table.	<p>The Government of Vietnam provides partial credit guarantees (maximum coverage level at 70% of the project's total investment capital) for green projects (e.g. the renewable energy sector) through the Vietnam Development Bank.^{269,270}</p> <p>The Vietnam Scaling Up Energy Efficiency Project adds to the existing Vietnam Energy Efficiency for Industrial Enterprises Project (VEEIE) - funded by the World Bank and the Green Climate Fund - by supporting energy efficiency investments. One of the components of the project is a Risk Sharing Facility (RSF), which provides partial credit guarantees (RSF guarantees) to participating financial institutions (PFIs) to cover potential defaults on loans (PFI Loans) provided by PFIs to industrial enterprises and energy service companies to finance eligible energy efficiency sub-projects.²⁷¹</p>
Partial risk guarantee / Political risk guarantee	PRGs cover private lenders and investors for certain risks of lending to sovereign or sub-sovereign borrowers. A PRG needs to include private participation in the project. A PRG can cover a number of sovereign or sub-sovereign risks such as currency inconvertibility, repatriation, expropriation, political force majeure such as war, regulatory risk and government payment obligations (such as tariffs).	On December 31, 2015, the Multilateral Investment Guarantee Agency (MIGA) issued a USD39.7m guarantee to a number of lenders, led by Goldman Sachs and Bank of Tokyo Mitsubishi. ²⁷² The loan was guaranteed by the Ministry of Finance - acting for and on behalf of the Government of Vietnam - to support the construction of the Hoi Xuan Hydropower Plant in Thanh Hoa, Vietnam. The plant was to produce and sell electricity to the national utility company, Vietnam Electricity (EVN), under a power purchase agreement. The guarantee covered the risk of non-honouring of sovereign financial obligations with regards to the Government's repayment guarantee to the lenders with tenor of 15 years. ²⁷³
Partial risk swap guarantees	Partial Swap Guarantees cover investors against the risks arising from currency swaps in cross-border transactions or where the debt service cash flow is in a different currency from the deal cash flows, which would require the issuer to hedge the currency mismatch to provide comfort to investors that payments can be made in the debt currency.	<p>Brazil-based private sector bank Unibanco issued JPY25bn 10-year amortising notes backed by the banks' USD denominated offshore remittance flows. The deal was placed with Japanese institutional investors, who required a hedging on the currency mismatch. To reduce the credit exposure for the institution providing the currency swap, the issue obtained a PSG from the IFC.</p> <p>This instrument has not yet been used for green projects in Vietnam.</p>
First-loss provisions	First-loss provisions refer to any device designed to protect investors from the loss of capital that is exposed first if there is a financial loss of security. These could be debt, equity or derivatives instruments including mezzanine finance, cash facilities or guarantees. They could also take the form of insurance that insures debt security providers who are liable to pay compensation to the investors, irrespective of the cause of the loss.	<p>The Green Cornerstone Bond Fund, created by the IFC and Amundi and launched in March 2018, is the world's largest targeted green bond fund focused on investing in emerging markets. To lower risk and attract private sector investments, the IFC will provide a first-loss coverage through a junior tranche. The Credit Guarantee Investment Facility provides credit guarantees for local currency denominated bonds issued by investment grade companies in ASEAN+3 countries.</p> <p>This instrument has not yet been used for green projects in Vietnam.</p>

Credit enhancement mechanisms	Definition	Example
Contingent loans	Contingent loans are often used in project finance to backstop the main debt by providing a payment option for specific case scenarios. For instance, if the Government fails to obtain quality cash flows, the contingent loan is triggered, and investors are paid.	There have been no green projects using contingent loans to date. This instrument has not yet been used for green projects in Vietnam.
Concessional loan	Concessional loans are loans that are granted on substantially more generous terms compared to market loans, which is achieved through below-the-market interest rates, longer grant periods or a combination of both.	The HDBank solar power programme, which amounted to VND7,000bn, ²⁷⁴ was established to exclusively finance solar power projects. The solar power loans aim to provide up to 70% of the project's total investment capital with a duration of no more than 12 years. ²⁷⁵
ESCOs (Energy Service Companies)	ESCOs provide technical and financial services for the implementation of energy efficiency solutions. Under a Guaranteed Saving Schemes, the ESCO guarantees a certain level of energy savings, thus assuming the performance risk. With a Shared Savings Model, higher energy savings determine a lower cost of the energy service. In both schemes, financing can come either from the ESCO or a third party.	SolarBK is an example of an ESCO in Vietnam. The company provides two main services through the ESCO model, namely: Solar Power and Solar Water Heating. Finance is generated based on energy savings efficiency brought about by ESCO. ²⁷⁶
Viability gap funding (VGF)	VGF is used specifically in infrastructure to cover for the heavy upfront funding that is required to kick start projects. An analysis of the viability of a proposed project points out the weak areas that prevent large-scale funding from being obtained. A VGF scheme can be implemented through capital grants, subordinated loans or even interest subsidies to target specific issues that are affecting the viability of the project. A blended finance approach could also be used to reduce project risk.	The Coc San Hydropower project in Vietnam was successfully implemented through Viability Gap Funding in the form of a USD5m grant from the Technical Assistance Facility by The Private Infrastructure Development Group (PIDG), in 2013. ²⁷⁷ The finance helped to offset part of the up-front preparation costs of pro-poor infrastructure investments in Coc San, Lao Cai province - the most mountainous area in Vietnam. (This was not specifically labelled as a green deal; however, it was financing for a green project.)
A/B loans or grants	A/B loans or grants are where a Multilateral Development Bank (MDB) offers the "A" portion of the loan while attracting other lenders to join in a second (or "B") tranche. The MDB will be the lender-of-record, lead lender and administrative agent in the transaction. This reduces part of the risks of the operations, by also being covered by the "umbrella" of the MDBs that include a preferred creditor status and <i>de jure</i> (legally recognised) immunity from taxation.	Italian transmissions system operator Terna issued a USD81m green loan in project finance format in July 2017. The Inter-American Development Bank offered the USD56m A loan and BBVA subscribed a B loan for USD25m. The deal will finance the design and construction of a 213km transmission line of 500kv in the north-east of Uruguay This instrument has not yet been used for green projects in Vietnam.

Annex IV: Risk transfer/risk sharing mechanisms

Risk transfer instruments	Definition	Example
First-loss capital	May provide a risk-buffer for green structures and thereby encourage institutional investors. First loss capital incorporated into the capital structure usually as a junior equity tranche or as subordinated debt.	The Clean Energy Finance Corporation's (CEFC) AUD100m equity investment in Australian Prime Property Fund Commercial. This instrument has not yet been used for green projects in Vietnam.
Synthetic green capital notes or securitisation	Risk management (de-risking) to release loss reserves, with the use of freed capital to fund green projects. This can reduce risk weighting of assets, while keeping the assets tied to the banks' balance-sheet and the current operations.	A global example is Credit Agricole's USD3bn synthetic ABS used to free up risk capital for green loan origination. This instrument has not yet been used in Vietnam.
Loan loss reserves	Pooled public funds set aside by a financial institution to partially recover loss in their loan portfolio in the event of borrower defaults. If the institution issues green bonds, loan loss reserves can improve the risk profile of the deal by providing additional assurance on the issuer's cash flows.	This instrument has not yet been used for green projects in Vietnam.
Risk sharing facility (RSF)/Default swap	These structures support a transaction involving a loss-sharing agreement, where the originator will be reimbursed in the case of a loss of principal on a portfolio of eligible assets (mortgages, consumer or student debt, energy efficiency loans, SME loans, receivables). Originators are mainly banking and corporations.	<i>The Scaling Up Energy Efficiency for Industrial Enterprises in Vietnam</i> , group Vietnam projects together, funded by the World Bank and the Green Climate Fund, and will offer a Risk Sharing Facility amounted to USD78m ²⁷⁸ for energy efficiency investment. The project will facilitate more than 100 industrial enterprises to reduce energy consumption and mitigate GHG emission of 120 MtCO ₂ over the lifetime of the investment. ²⁷⁹

Annex V: Green standards applicable in Vietnam

Green Standard	Description	Sector(s)	Applicability in Vietnam
LOTUS²⁸³	<p>LOTUS is a set of market-based green building rating tools developed by the Vietnam Green Building Council (VGBC) specifically for the Vietnamese built environment. LOTUS rating tools are based on various international green building rating systems (LEED, Green Star, BREEAM, GBI, and Green Mark). It provides a separate set of standards for Vietnam, gearing the domestic construction sector towards the economical use of natural resources, presenting and promoting environmentally friendly construction activities. The LOTUS standards aim to fit Vietnam's construction practices, state regulations, and the country's climate conditions.</p> <p>LOTUS consists of 10 components: energy, water, materials, ecology, waste and pollution, health and comfort, adaption and mitigation, community, management, and innovation.</p>	Buildings, Construction, Infrastructure	As of 2018, 50 buildings in Vietnam were certified as LOTUS green buildings. ²⁸⁰
ASEAN Green Bond Standards (AGBS)²⁸⁴	The standards were developed and launched in November 2017 by the ASEAN Capital Markets Forum. The standards also provide guidance on the classification of green projects in the region that are qualified for the AGBS label in the region. These projects specifically exclude fossil fuel-related projects. Companies in Malaysia, Singapore and Indonesia have already issued bonds labelled as ASEAN Green Bonds.	Energy, Transport, Water, Buildings, ICT, Waste, Nature Based Assets, Industry and Commercial activities.	This framework can be applied in Vietnam.
ASEAN Sustainability Bond Standards (ASEAN SUS)²⁸⁵	The standards provide the framework to finance or re-finance a combination of both Green and Social Projects that respectively offer environmental and social benefits. It also provides guidance on classification of sustainable projects.	Energy, Transport, Water, Buildings, ICT, Waste, Nature Based Assets, Industry and Commercial activities.	This framework can be applied in Vietnam.
National Standards for Environmental Management Systems (ISO 14001)²⁸⁶	The ISO 14001 standard specifies requirements for an effective environmental management system (EMS). It provides a framework that an organization can follow to better control its environmental impacts.	Waste treatment	According to Decree No.38/2015/ND-CP, all the waste treaters have to apply the ISO 14001 to fully operate. ²⁸¹
Effective energy management systems (EnMS)/ ISO 50001²⁸⁷	The ISO 50001 standard establishes an international framework for the supply, use and consumption of energy in industrial, commercial and institutional organizations. It aims to continuously improving energy performance, leading to economic benefits and reduced greenhouse gas emissions.	Renewable energy, Energy efficiency Energy, Transport, Water, Buildings, ICT, Waste Treatment	Some companies in Vietnam have been awarded with this certification, i.e. Clover Imaging Vietnam. ²⁸²


Green Standard	Description	Sector(s)	Applicability in Vietnam
Certified emission reductions (CERs) ²⁹¹	<p>Issued by QUACERT Vietnam²⁸⁸ to certify a project that qualifies as having greenhouse gas emission reduction.</p> <p>The certification has been established as a requirement for BOCM (Bilateral Offset Credit Mechanism) or JCM (Joint Crediting Mechanism) projects, which are of bilateral cooperation between Japan and Vietnam.</p> <p>These projects aim to reduce greenhouse gas emissions in host countries.</p>	Energy, Transport, Water, Buildings, ICT, Waste Treatment	<p>Some initiatives certified in Vietnam include:</p> <ul style="list-style-type: none"> Energy Savings and Air Quality in Vietnamese Hospitals and Energy Management System in hotels (V-BEMS);²⁸⁹ Energy efficiency equipment in water supply system in Ho Chi Minh City in 2018;²⁹⁰ Energy Efficient NH3 Heat Pumps to Marine Products Processing Industry in Ho Chi Minh City.
Climate Bonds Taxonomy ²⁹²	Climate Bonds Taxonomy is used to identify green projects and assets which are aligned with achieving the goals of the Paris Agreement. This excludes fossil fuel power generation, internal combustion engine personal vehicles and new roads and infrastructure that facilitate their movement, and freight rail that is primarily used for fossil fuel transportation.	Energy, Transport, Water, Buildings, ICT, Waste, Nature Based Assets, Industry and Commercial activities.	This taxonomy can be applied in Vietnam.
SOURCE	SOURCE is a global standard created by Sustainable Infrastructure Foundation (SIF). It offers governments a project preparation software to maximize public financing options, including PPPs, by providing well-prepared projects in a consistent and transparent way. This aids in attracting the international community of contractors, investors, and lenders.	Infrastructure	The SOURCE website indicates that contacts have been made for the integration of projects in Vietnam. ¹²⁰
The Standard for Sustainable and Resilient Infrastructure (SuRe)	SuRe is a global voluntary standard which integrates key criteria of sustainability and resilience into infrastructure development and upgrade, through 14 themes covering 61 criteria across governance, social and environmental factors.	Infrastructure	This framework could be applied in Vietnam.
Envision	Envision is a framework that includes 64 sustainability and resilience indicators, called 'credits', organized around five categories: Quality of Life, Leadership, Resource Allocation, Natural World, and Climate and Resilience. These collectively address areas of human wellbeing, mobility, community development, collaboration, planning, economy, materials, energy, water, sitting, conservation, ecology, emissions, and resilience.	Infrastructure	This framework could be applied in Vietnam.

Annex VI: Sample Green Pipeline

This sample pipeline includes a list of 'green' and 'potentially green' projects taken from various publicly available sources. Four sectors are covered in the list, including: low carbon transport, renewable energy, sustainable water management and sustainable waste management. The assessment of the green credentials or 'greenness' of each project was based on the Climate Bonds Taxonomy (see back cover).

Green projects				
Sector	Project name	Location	Status	Greenness
Low carbon transport 	Hanoi Metro, Line 2A: Cat Linh-Ha Dong + Line 3: Nhon- Hanoi Railway Station	Hanoi	Under construction	Green
	Hanoi urban railway route 6 (from the centre of Hanoi to Noi Bai Airport)	Hanoi	Planned	Green
	Ground tram line no 1 - Sai Gon - Cho Lon - West Station	Ho Chi Minh City	Planned	Green
	Fly over Lines 1, 2 and 3	Ho Chi Minh City	Planned	Green
	Monorail No. 2	Ho Chi Minh City	Planned	Green
	Monorail No. 3	Ho Chi Minh City	Planned	Green
	Ground tram line 1	Ho Chi Minh City	Planned	Green
	Urban Metro No.6	Ho Chi Minh City	Planned	Green
	Upgrading the Hanoi - Ho Chi Minh City railway route	Hanoi - Ho Chi Minh City	Under construction	Green
	Bien Hoa - Vung Tau railway	Đông Nai - Bà Rịa Vung Tau Provinces	Planned	Green
	Railway into Hai Phong Int'l port	Hai Phong	Planned	Potentially green
Manufacture of Electric Buses	Haiphong, Vietnam	Under construction	Green	
Renewable energy 	Dau Tieng solar power complex	Tay Ninh, southern Vietnam	Completed	Green
	TTC No.01 + TTC No.02 solar power plants in Thanh Thanh Cong Industrial Zone	Trang Bang district, Tay Ninh province	Completed	Green
	Tri An floating solar power plant	Dinh Quan district, Dong Nai province	Planned	Green
	Gelex Ninh Thuan Solar farm project	Thuan Nam district, Ninh Thuan province	Completed	Green
	Hoa Hoi solar power plant	Phu Hoa district, Phu Yen province	Completed	Green
	Se San 4 Hydropower Plant PV solar project	Gia Lai Province	Under construction	Green
	Lai Hoa wind farm	Soc Trang, Mekong Delta	Under construction	Green

Green projects

Sector	Project name	Location	Status	Greenness
Renewable energy cont. 	Huong Linh 1 Wind Farm	Huong Hoa town in Quang Tri province	Under construction	Green
	Bac Lieu Offshore Wind Farm	East Dam region of Bac Lieu province	Completed	Green
	Sóc Trăng wind farm	Sóc Trăng Province	Completed	Green
	Lam Dong wind power project	Da Lat, Lam Dong province	Under construction	Green
	Thuong Kon Tum hydro power plant	Kom Tum Province	Completed	Potentially green
	Hoa Binh Hydro power plant expansion	Hoa Binh, Vietnam	Under construction	Potentially green
	Ialy MR hydro power plant	Gia Lai province	Under construction	Potentially green
	Tri An MR hydro power plant	Dong Nai province	Planned	Potentially green
	My Ly hydro power plant	Nghe An province	Under construction	Potentially green
	Nam Mo hydro power plant	Nghe An province	Under construction	Potentially green
	Phu Yen Biomass Power Plant	Phu Yen province, south central Vietnam	Under construction	Green
	Thien Phu biomass fuel briquetting plant	Huong Tra town, Thua Thien Hue province	Completed	Potentially green
Sustainable water management 	Song Hau 1 water treatment plant phase 1	Hau Giang province	Completed	Green
	Song Da water treatment plant phase 2	Hanoi, Hoa Binh - northern Vietnam	Under construction	Green
	Song Hau II water supply facility, Chau Thanh	An Giang province	Planned	Potentially green
	Song Duong water supply facility	Hanoi	Planned	Potentially green
Sustainable waste management 	High Tech Waste Treatment Factory, Waste-to-energy Complex, Bac Son	Hanoi, Northern Vietnam	Planned	Green
	Nam Son Waste Treatment and Waste to energy Complex, Soc Son	Hanoi, Northern Vietnam	Under construction	Potentially Green
	Minh Hung Recycling Facility	Tien Giang, Mekong Delta, Vietnam	Under construction	Green
	Wastewater treatment facility in the Chan May-Lang Co economic zone	Thua Thien Hue province	Planned	Potentially green

Note: Bolded projects are featured in case studies earlier in the document.

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Climate Bonds Taxonomy and Sector Criteria

The Climate Bonds Taxonomy identifies the assets and projects needed to deliver a low carbon economy and gives GHG emissions screening criteria consistent with the 2-degree global warming target set by the COP 21 Paris Agreement. More information is available at <https://standard.climatebonds.net/taxonomy>.



ENERGY	TRANSPORT	WATER	BUILDINGS	LAND USE & MARINE RESOURCES	INDUSTRY	WASTE	ICT
Solar	Private transport	Water monitoring	Residential	Agriculture	Cement production	Preparation	Broadband networks
Wind	Public passenger transport	Water storage	Commercial	Commercial Forestry	Steel, iron & aluminium production	Reuse	Telecommuting software and service
Geothermal	Freight rail	Water treatment	Products & systems for efficiency	Ecosystem conservation & restoration	Glass production	Recycling	Data hubs
Bioenergy	Aviation	Water distribution	Urban development	Fisheries & aquaculture	Chemical production	Biological treatment	Power management
Hydropower	Water-borne	Flood defence		Supply chain management	Fuel production	Waste to energy	
Marine Renewables		Nature-based solutions				Landfill	
Transmission & distribution						Radioactive waste management	
Storage							
Nuclear							

Certification Criteria approved
 Criteria under development
 Due to commence

	Can be certified now	Criteria in development	TWGs launching soon
Energy	WIND SOLAR GEOTHERMAL MARINE	HYDROPOWER BIOENERGY	ELECTRICAL GRIDS
Transport	RAIL VEHICLES BUS/RAPID TRANSIT	WATER TRANSPORT	
Utilities	WATER	WASTE & POLLUTION DISPOSAL	ICT TELECONFERENCING
Buildings	RESIDENTIAL COMMERCIAL		
Natural Resources	FORESTRY	FISHERIES AGRICULTURE	
Industry			CEMENT STEEL MANUFACTURING & PROCESSING