



# Green Infrastructure Investment Opportunities

**INDONESIA**  
UPDATE REPORT



**Climate Bonds** INITIATIVE



Supported by European Climate Foundation

# Green infrastructure presents an opportunity for growth: an introduction to this report

Green infrastructure presents a huge investment opportunity globally, with an estimated USD100tn worth of climate compatible infrastructure required by 2030 in order to meet Paris Agreement emissions reduction targets.

The effects of climate change and the risks associated with a greater than 2°C rise in global temperatures by the end of the century are significant: rising sea levels, increased frequency and severity of hurricanes, droughts, wildfires and typhoons, and changes in agricultural patterns and yields.

Investment in low-carbon solutions will be essential for meeting global emission reduction pathways under the Paris Climate Change Agreement.

Over the past few years, there has been an increasing demand from institutional investors, particularly from OECD nations and China, for investment opportunities that address environmental challenges and support sustainable development. Institutional investors and banks have over USD120tn assets under management that can be potentially used as a capital source for infrastructure investment.

The growing level of interest from investors in green projects has resulted in the development and growth of innovative financial products. The global green bond market in particular has grown rapidly, with issuance in 2018 reaching almost USD170bn. However, green finance needs to scale up much further to achieve global climate targets and infrastructure needs.

This report builds on the inaugural [Green Infrastructure Investment Opportunities Indonesia](#) report released in May 2018. It provides updated content to help meet the growing demand for green investment opportunities, including green bonds, as well as to support the country's transition to a low-carbon economy.

The report is intended for a wide range of domestic and regional stakeholders including policy makers, project development bodies, region institutional investors, asset managers and infrastructure groups as well as relevant Government ministries (Finance, National Development Planning, Energy & Mineral Resources, Transportation, Environment & Forestry).

*"We will accelerate development and connect infrastructure projects, such as ... railways, seaports and airports."*

**Joko Widodo, President of Indonesia**<sup>46</sup>

*"I believe that, there isn't a universal model of green financing. Respective countries policies and investment choices need to be localised through a comprehensive strategy. In this case, I welcome innovative financing that will create the opportunity for green infrastructure [development] that no doubt, will bring great benefits in the future."*

**Sri Mulyani, Minister of Finance, Government of Indonesia**<sup>50</sup>

*"Renewable energy, is still left behind... This is what we want to be accelerated, for example, by bringing in investors and setting a more appropriate pricing scheme."*

**Bambang Brodjonegoro, National Development Planning Minister, Government of Indonesia**<sup>48</sup>

## Indonesia's Nationally Determined Contribution under the Paris Agreement

Reduction in annual greenhouse gas (GHG) emissions: 29% below 2005 levels by 2030, and up to 41% with international support.

*The next update to Indonesia's NDC can be provided in 2020.*

## Methodology

This report considers four key sectors: renewable energy, low-carbon transport, sustainable water management and sustainable waste management. We use the Climate Bonds Taxonomy (see back cover) to identify which projects and assets are green.

Case studies have been used to show the different types of opportunities available in the short- and medium-term future. The 'green' credentials, funding options, status, financial structures and possible investment pathways are explored for each case study.

The transport, water and waste projects have been drawn from the government's pipeline of National Strategic Projects, as outlined by the Committee for the Acceleration of Priority Infrastructure Delivery (KPIP)2 as well as from the government's latest catalogue of proposed Public Private Partnerships (PPPs).3 The energy projects were chosen based on their national significance, whereby solar power and bioenergy are both priority renewable energy sources.

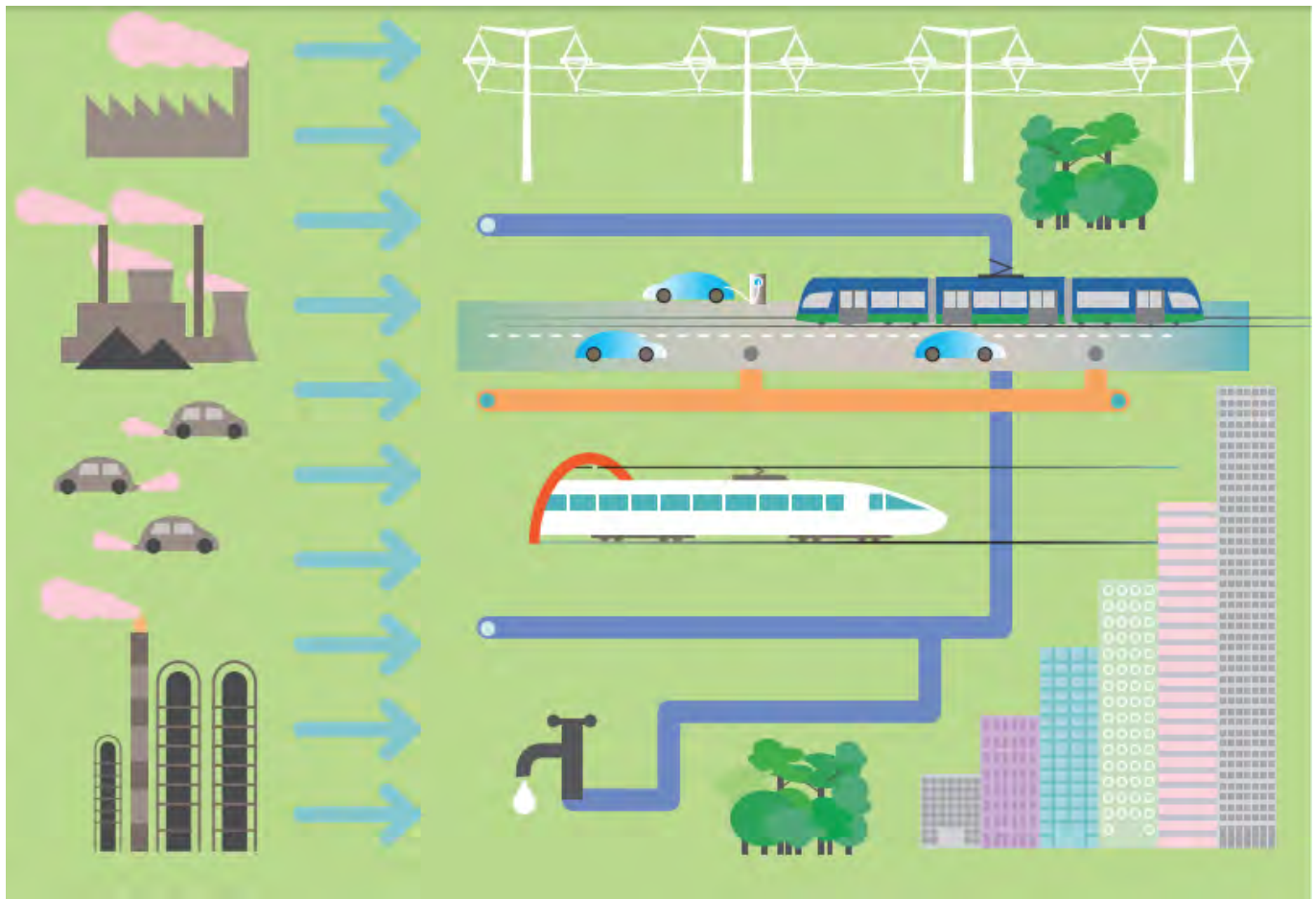
There are various ways for an investor to gain exposure to a specific project, asset or portfolio. The possible investment pathways will vary depending on the asset ownership structure, the stage in the asset's financing lifecycle, and the investor's mandate. Projects with public and private funding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

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

- Completed projects: high profile, recently completed projects;
- Projects under construction: major projects from national, state and local government pipelines that are under construction; and
- Planned projects: major projects from national, state and local government pipelines that have not yet begun construction but have been announced and/or have undergone business case planning and/or have been allocated budget.

This update report features two case studies per sector. A more comprehensive list of green projects from public pipelines is available as a supplement on the report webpage on the Climate Bonds website.

## The brown to green transition



Global green investment opportunities are growing and yet there remains a scarcity of offerings, pointing to a lack of supply of green issuance particularly from non-financial corporates, i.e. the real economy. Furthermore, segments of the real economy, that offer significant emissions reductions potential – such as energy, cement and concrete, mining and metals, oil and gas (including biofuels), transport and manufacturing – are yet to be activated towards a brown-to-green (BtG) transition. When such industry sectors start to align with a 2-degree emissions trajectory, new green financing opportunities could be created for assets and projects with ambitious climate targets and an increased focus on low carbon production modes.

CBI has been active in promoting a 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 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.

In **Indonesia**, the current emission pathway is not compatible with the Paris Agreement.<sup>1</sup> This is largely due to reliance on fossil fuels. The GHG emissions from power generation, industry and transport increased by 18% between 2012 and 2017. The government expects that 56GW of new capacity will be needed in the next decade, with plans to deliver 26,8GW of this through coal, which is expected to contribute to the doubling of coal use between 2017 and 2025.<sup>1</sup>

A brown-to-green transition aims to reverse this unsustainable trend. Green infrastructure allows Indonesia to position itself as a leader for climate-compatible growth among neighbouring and emerging economies. It creates 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 the nation's vast archipelago.

A national BtG strategy should require 'brown' organisations both public and private 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 TCFD and, ultimately, to a visible reflection of green investment on budgets, balance sheets, in capex plans and borrowing programmes.

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 all stakeholders that the nations' development path is interlinked with achieving carbon targets and progressing towards zero carbon operating models as economic and business and destinations between now and 2050.

# Green infrastructure can help build Indonesia's sustainable future

Indonesia is the fourth most populous country in the world and one of the fastest growing emerging markets. This rapid growth has improved living standards, but has also seen environmental degradation and increased vulnerability to the impacts of climate change.

Indonesia ratified the Paris Agreement, committing to making finance flows consistent with a pathway towards low-carbon and climate-resilient development.

Indonesia now plans to expand its green infrastructure to achieve positive environmental and economic benefits. During his first term, President Joko Widodo has positioned infrastructure development as one of Indonesia's highest national priorities.

The aim was to deliver almost USD400bn worth of new public-works projects in the transportation, energy, water and waste sectors between 2015 and 2019. This includes green infrastructure such as 639km of railway lines, representing almost a third of the total annual budget in 2018 and the highest ever allocation in an Indonesian government budget.<sup>4</sup>

In the 2019 budget, there was a rise in spending on infrastructure by 2.4% to IDR420.5tn (USD28.8bn), which represents 17.2% of total government spending.<sup>5</sup> About a quarter of the investment required for infrastructure in 2015 – 2019 is expected to come from State-owned enterprises (SOEs) (see diagram below).<sup>6</sup>

The government now anticipates that between 2020 and 2024 the value of investment required for all infrastructure is about IDR6,445tn (USD460bn).

Despite these significant commitments by the government, about a third of infrastructure development will need to be financed by private partners and the capital markets. Consequently, the government has been actively seeking USD130-150bn in investments to fund their ambitious agenda.

These estimates are set to change by the end of 2019, as the incumbent Indonesian President Joko Widodo – who was re-elected in April 2019 – will set out his new administration's agenda for the next five years. Based on his election commitments, infrastructure and energy will be expected to remain priorities. It is expected that green finance will continue to grow.

Although climate change did not take centre stage in his campaign, President Widodo's government is expected to continue to grow its use of green finance as a means of supporting the administration's significant infrastructure objectives and to meet Paris Agreement targets.

The Low Carbon Development Initiative (LCDI) estimates that Indonesia's low carbon pathway requires a total amount of low carbon development investments that would average USD21.9bn per year for the period 2020-2024, which is about 1.7% of GDP. Accordingly, required LCDI investment represents about 2.3% of GDP through 2045.<sup>60</sup>

## The green finance landscape

Indonesia has a fairly developed green bond policy landscape. In 2015, the OJK and the Ministry of the Environment and Forestry (KLHK) published a roadmap for

## Greening Islamic finance

Sukuk is an Islamic financial instrument, that complies with Sharia law. The issuer sells an investor group certificates, uses the proceeds to purchase an asset, of which the investor group has partial ownership, and distributes part of the asset revenues as profit to the investors. The assets need to comply with Islamic ethical values, which include green assets and projects.

The first green sukuk was originated in 2017 in the private sector to finance Malaysian solar projects with deals from Tadau Energy and Quantum Solar Park. There have been five green sukuk from Malaysian issuers and Indonesia's sovereign green sukuk (USD2bn).

Malaysia and Indonesia have large sukuk markets. They present a clear growth opportunity for property finance, solar energy, desalination plants and resilience investment.

sustainable finance in Indonesia with the aim of achieving sustainable development through comprehensive support by the financial service industry.<sup>7</sup> The country's commitment towards many of the medium-term (2015-2019) targets have already taken place (see table below).

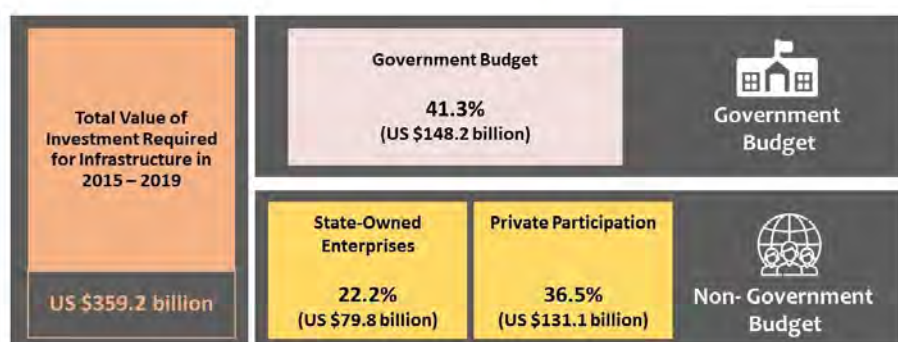
This has paved the way for the growth of green finance. In 2018, Indonesia issued the world's first sovereign green sukuk. In early 2019, it returned with a deal featuring a green and a traditional tranche, which attracted strong investor interest.<sup>8</sup> The State-Owned Enterprise (SOE), PT. SMI, also issued a green bond in 2018, making it the first green issuance by an SOE in Indonesia.

The PT. SMI and sovereign demonstration deals have contributed significantly to Indonesia becoming the largest green bond market in ASEAN.<sup>9</sup>

**PT. SMI:** PT. SMI is a state-owned enterprise under the Ministry of Finance's Coordination, that actively participates in fostering the sustainable development through the financing of infrastructure in sectors such as energy, water, sanitation, and new and renewable energy and other sectors.<sup>47</sup>

## Financing Infrastructure Commitment 2015 – 2019<sup>6</sup>

*Efforts to Increase the Role of Private Sector in Infrastructure Development*





Since the signing of the Paris Agreement, there has been an increase globally in the development and growth of green financial products for green infrastructure, such as green bonds and loans, dedicated infrastructure investment funds and index products.<sup>10</sup> In Indonesia, this has included green loans, green sukuk and green bonds (more in the Annex, Table 1).

Collectively, they address significant demand from institutional investors, particularly from OECD nations and China, for investment opportunities that address environmental challenges and support sustainable development.

Indonesia's strong macroeconomic outlook has delivered investment-grade sovereign ratings from major international credit rating agencies. This more positive investment environment has been supported by government reforms that aim to encourage foreign investment and the provision of sovereign guarantees.

Securing investment in green infrastructure will help the government to reach Indonesia's climate targets, spur innovation, broaden the economic base, and promote more sustainable economic and social well-being. As the number of green financial products and supportive policies increases, the impact of initiatives and regulations is becoming more evident.

## The role of development banks

Indonesia benefits from the support of development finance institutions (DFI's). Where the government is not able to bear the risks associated with large projects, DFIs can support investment by providing blended-finance instruments and credit enhancement such as partial credit or risk guarantees, viability gap funding, first-loss provisions, contingent and A/B loans.<sup>10</sup>

In Indonesia, this type of support can be provided directly to governments, SOEs and investors. It is also available via funds like the IIGF, ASEAN Credit Guarantee Investment Facility, ASEAN Infrastructure Fund, the Leading Asia's Private Sector Infrastructure Fund or the AMUNDI Planet Emerging Green One (EGO) Investment Fund. To make the most of this type of DFI support, the government of Indonesia is creating a regulation to facilitate blended financing.

DFI's can also issue and invest in green bonds, used to support local green infrastructure. The IFC's Green Komodo Bonds was an offshore Rupiah-denominated issued for investment into climate projects in Indonesia.<sup>9</sup>

## Blended finance and the SDGs

Globally, the blended finance model is seen as an innovative approach to attract private capital. The approach helps de-risks investment by reducing the barriers to private finance entry using official development or philanthropic finance.<sup>57</sup>

Indonesia has signalled a strong commitment to scale-up the blended finance model to accelerate its sustainable projects development. The Government launched the **Blended Finance and Innovation Institute** during the New York UN Climate Summit Action in September 2019. The institute will be the ASEAN hub and global accelerator for blended finance to achieve the SDGs.<sup>58</sup>

It follows the **Tri Hita Karana Roadmap for Blended Finance** that was introduced by Indonesia in October 2018 during the World Bank-IMF Summit in Bali; a roadmap that is supported by OECD partners from governments, DFIs and the private sector.

A landmark blended finance model is the Tropical Landscape Finance Facility (TLFF), which issued a USD95m sustainability bond with a project preparation and blended finance partnership with UN Environment, the World Agroforestry Centre that enabled private capital from ADM Capital and BNP Paribas.<sup>59</sup>

### Snapshot - Indonesia green bond market

Indonesia has an almost USD3bn green bond market. Four of the five green bonds from Indonesian issuers came to market in 2018, with the latest issued early this year.

Indonesia's initial USD1.25bn green sukuk was the first sovereign debt instrument to come out in the region and the 5th globally. It is not the only benchmark-size deal, however: Star Energy Geothermal issued a USD580m deal for its Wayang Windu plant.

Indonesia's economic growth has come at the expense of nature – deforestation is a key problem. In its second party opinion of the Indonesian green sovereign sukuk, CICERO specifically highlighted the need for the issuer to avoid deforestation projects. As per Indonesian regulation, it is mandatory to undertake an Environmental Impact Assessment (AMDAL) for all projects that have a boundary overlap with, or may impact on, any of the classifications of protected area including forest area, national parks and reserves.

It is heartening to see that a large share of green bond proceeds from Indonesian issuers are earmarked for sustainable land use including sustainable agriculture, afforestation and rainforest conservation, as well as climate change adaptation measures. Investment in renewable energy should also help reduce the need for further rainforest clearing.

Indonesian green bond issuers demonstrate best practice in terms of external review: all deals have received a second party opinion.

#### Indonesian green bond issuers as at October 2019

Issuer Name	Issued (USD)	Issue date	Issuer type	Use of proceeds
TLFF I Pte Ltd	95m	Feb 2018	Non-financial corporate	Land use
Republic of Indonesia	1.25bn 750m	Mar 2018 Feb 2019	Sovereign	Energy, Buildings, Transport, Waste, Land use, Adaptation
Star Energy Geothermal (Wayang Windu)	580m	Apr 2018	Non-financial corporate	Energy
PT Sarana Multi Infrastruktur	50m	Jul 2018	Government-backed entity	Energy, Transport, Water, Waste, Land Use

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

## Further policy considerations

The Roadmap for Sustainable Finance also features long-term activities for the period 2019-2024, which target integrated risk management, corporate governance and the development of an integrated sustainable finance information system.

There is room for further integration of medium-term activities. Increased green bond issuance from both central and local governments is crucial to sending a strong signal to the market.

Beyond direct engagement in the market, some examples of how other governments and institutions have sought to support and promote green bond issuance include:

- **Offering subsidy schemes**, such as government-backed grants, to cover green bond issuance costs, often including the cost of obtaining an external review. The Monetary
- **Offering credit guarantees** to provide default risk coverage and attract a wider range of investors. For example, CGIF (part of ADB) provided a Partial Credit Guarantee to the PHP10.7bn (USD226m) deal issued by energy company AP Renewables (Philippines).
- **Launch of incentives for issuers or investors**, such as the tax-exemption introduced in Malaysia in 2018 to increase investor engagement. Subsidy schemes for interest rates or third-party engagement are other considerations.
- **Adopting a blended-finance approach** in order to channel capital flows – possibly in combination with credit support to improve the

bankability of projects. The Tropical Landscapes Finance Facility, which raised funding for investment in two Indonesian provinces, is an example of a government supported partnership with UNEP, World Agroforestry Centre, ADM Capital and BNP Paribas.<sup>10</sup>

- **Promoting climate-related financial risks disclosure** – e.g. supporting the implementation of recommendations of the Task Force for Climate-related Financial Disclosure (TCFD) – can boost investor confidence in the market.

These measures support critical finance channels for infrastructure development stakeholders, diversify risks and create more options for investors.

## Actions facilitating green finance and infrastructure

Previous actions (up to May 2018)	New and planned actions (since May 2018)
<p>The government developed the <b>Roadmap for Sustainable Finance in Indonesia 2015-2019</b>, with the aim of achieving sustainable development through comprehensive support of the financial service industry.</p> <p>The same year, the Ministry of Finance launched a <b>climate finance tracking and reporting system</b>, and undertook a green budget tagging exercise with support from UNDP.</p> <p>The government created a <b>Green Bond and Green Sukuk Framework for sovereign bonds</b> and has issued two sovereign green sukuk.</p> <p>The Financial Service Authority developed a <b>Regulation on the Issuance and Terms of Green Bonds</b>. Domestic green bonds are required to comply with it and encouraged to adopt the ASEAN Green Bond Standards.<sup>12</sup></p>	<p>Ministry of Finance launched <b>Sustainable Development Goals (SDG) Indonesia One</b> - a platform for integrating funding for SDG projects in Indonesia, sourced from private sector, donor, philanthropy, multilateral and bilateral organizations.</p> <p><b>PT. SMI issued a green bond in mid-2018</b>, making it the first SOE to issue in Indonesia (see box on page 4 for more information).</p>
<p>Government <b>removed barriers to and undertook reform for developing/ investing in infrastructure</b>, including:</p> <ul style="list-style-type: none"> <li>• Reforms for streamlining approval and procurement procedures for infrastructure projects.</li> <li>• Removal of the withholding tax on interest payments in foreign-currency denominated government bonds.<sup>11</sup></li> <li>• Opening up direct lending from multilateral organizations to SOEs.</li> <li>• Improvements to the government's public private partnership (PPP) regulations for infrastructure, the provision of subsidies for PPPs, and credit enhancement for PPPs and SOEs in the form of sovereign guarantees, gap viability funding, and availability payments.<sup>13</sup></li> </ul> <p>The government developed the <b>Indonesian Internal Credit Rating scorecard system and the Indonesia Infrastructure Guarantee Fund (IIGF)</b> for administering sovereign guarantees. It also created specialised agencies, including:</p> <ul style="list-style-type: none"> <li>• The Investment Coordinating Board of Indonesia (BKPM), a centralised service, responsible for issuing more simplified foreign investment licences.</li> <li>• The government's non-budget financing scheme (PINA), a scheme that encourages private involvement in infrastructure development.</li> </ul> <p>The Committee for Acceleration of Priority Infrastructure Delivery (KPIIP), established as a coordinating unit to <b>streamline national infrastructure project management</b>, in line with National Strategic Projects and Priority Projects.</p>	<p>The Indonesian government launched:</p> <ul style="list-style-type: none"> <li>- <b>The Upgraded Online Single Submission licensing system</b>. This expedites the issuance of licensing and simplifies the investment procedure.</li> <li>- <b>Three new special economic zones (SEZ)</b>, to attract investment, develop new infrastructure and spur economic growth in less developed areas.</li> </ul> <p><b>Bappenas published a report this year on 'Low Carbon Development</b>: A paradigm shift towards a green economy in Indonesia', committing the government to increasing green assets.</p> <p>Indonesia incorporates low-carbon economic development into its <b>Medium-Term National Development Plan 2020-2024</b>.<sup>60</sup></p> <p>Outside of government, eight National Banks and WWF-Indonesia Launch the <b>Indonesia Sustainable Finance Initiative (ISFI)</b>.<sup>14</sup></p>

# Green infrastructure investment opportunities

The national government aims to develop billions of dollars of new public-works projects. An analysis of two green infrastructure pipelines shows that there are projects of different sizes and technologies spread across the island nation. These range from a USD4.8m waste management facility to the USD6bn Jakarta-Bandung High-Speed Rail, from bonds issued by transport SOEs to a stake in a PPP.

The government's **National Strategic Projects** is shown in the **KPPIP pipeline** tool. The proportion of projects aligned with the Climate Bonds Taxonomy is low. Out of 242 mostly infrastructure projects in 26 sector categories, there are only 22 green projects and 22 projects that might

be green, but more information is needed to determine 'greenness'.<sup>2,15</sup>

The government's **PPP Infrastructure Projects Plan** in 2018 shows a similar, although more promising trend: of the 23 projects already tendered, ready to offer or under preparation, there are 6 green and 1 potentially green project. Of the 70 projects that could be prospective PPPs, there are 11 green and 11 potentially green projects.<sup>3,15,16</sup>

It would be beneficial if – in the future – the government prioritises projects that are in line with international definitions for 'green' and provides clear 'green' labelling, when it prepares infrastructure pipelines. Providing this level of visibility for green infrastructure investment

opportunities could facilitate access to private sector capital for Indonesia's transition to a low-carbon economy and help meet global institutional investor demand for green assets.

Indonesia has begun incorporating low-carbon economic development aspects into its **Medium-Term National Development Plan 2020-2024** (also known as RPJMN) in accordance with the findings of the Low Carbon Development Initiative (LCDI).

The report acknowledges the urgent needs for Indonesia to attract private finance to achieve its sustainability target, it also emphasises the inevitable growth of sustainable infrastructure.

## Blue sky thinking for Jakarta:

### Move the capital or become a global leader in transport and resilience solutions?

*The Government of Indonesia officially announced that it will relocate its capital city from Jakarta to North Penajam Paser and Kutai Kartanegara regencies in East Kalimantan, amidst rising concerns regarding environmental issues faced by Jakarta. The concept of relocating the capital city has been raised by the previous Presidents; however, President Joko Widodo, has made it a priority for his second term, hoping it will have the dual effect of addressing the nation's economic inequality and resolving the environmental issues.*<sup>48</sup>

*The greater Jakarta area is nearly at a gridlock; it is home to about 30 million people with a density of 15,000 per square kilometer, twice the density of Singapore. The city is also the fastest sinking city in the world; some parts of the city are sinking at 20cm a year.<sup>48</sup> Jakarta is also struggling with an increasing unhealthy level of air pollution: According to Air Quality Index, Jakarta hit its record for being the worst air quality in the world in June 2018.*<sup>49</sup>

*Moving the capital is estimated to cost IDR466tn (USD32.8bn), of which the state aims to fund 19%, with the rest to come from public-private partnerships (PPPs) and private investment.<sup>51</sup> The new capital will be home to all 1.5m civil servants which are expected to move to the new city as early as 2024. Once the parliament approves the move, construction of the new city could begin as early as 2020.*<sup>48</sup>

*East Kalimantan has been chosen to host the new capital, because it is seen as less vulnerable than Jakarta, with less exposure to the natural disasters of floods, earthquakes, volcanic eruptions and tsunamis compared to other regions of Indonesia.<sup>52</sup> It is located 1400km away from Jakarta, on the Island of Borneo, which is most well known for being home to a diverse range of wildlife and lush rainforests and is especially known for being home to the endangered orangutans.*

*Environmental groups are concerned that major infrastructure development would jeopardize the forest and its wildlife.<sup>52</sup> The Indonesian government insists that safeguards are already in place for reducing the negative impacts of the relocation, and that environmental and social considerations will be incorporated into the planning of the new capital city.<sup>53</sup> Initial plans indicate that at least 50% of the capital will consist of green spaces, following the concept of a smart "forest" city.<sup>54</sup>*

*Moving the city will, however, solve only some problems. Jakarta will remain the commercial and financial centre of Indonesia and therefore the majority of the population will remain.*

*Jakarta is at the forefront of many of the global challenges that cities around the world, particularly in developing economies, are grappling with: pollution, congestion, urbanisation and poor resilience to climate. With strong commitment to infrastructure development to solve some of these issues, particularly in transport, it could also become a leader among developing nations in how to address such challenges. East Kalimantan is also cited by the Government of Indonesia to already have some of the key infrastructure needed for a capital city, such as an international airport in Balikpapan and a domestic one in the neighbouring city of Samarinda, a cargo seaport, and six dams.<sup>55</sup> Although, there is still the need for significant infrastructure development. The aspiration of establishing a more sustainable, 'green' city may provide significant opportunities for green infrastructure investment.*



# Renewable energy

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

## Sector overview

As Indonesia's population continues to grow, the national energy consumption is set to grow another 80% by 2030. In anticipation of this surge, the Government aims to increase the nation's overall installed capacity as well as increase the share of renewable energy from 12% to 23% by 2025 and 31% by 2050.<sup>17</sup>

To produce an ideal renewable energy mix, the government is aiming to continue to grow hydropower and geothermal energy, complemented by increased power generation from solar, wind and tidal technologies as well as different types of bioenergy. One of the election-promises for the incoming government is to increase

the use of biofuel made from palm oil to lift energy self-sufficiency.<sup>18</sup>

Indonesia is the largest palm oil producer in the world. Palm oil production generates abundant wastewater (Palm Oil Mill Effluent – POME), which can be converted into biogas through gasification (POME to electricity). There are more than 680 palm oil mills in Kalimantan and Sumatera alone that would benefit from investment in Palm Oil Mill Effluent (POME) to electricity biogas power. To ensure that this source of energy remains sustainable, only palm oil waste should be used, and it should only come from existing palm oil mills that are Certified Sustainable Palm Oil (CSPO).

Although the National Energy Policy 2014 contains targets for the reduction of oil, coal and natural gas in power generation, election commitments included a focus on coal.<sup>17,18</sup> It would be useful for the government to specifically identify and promote climate change mitigation and adaptation measures.

## Investment pathways

In Indonesia, renewable energy generation and distribution assets are owned privately or by SOEs. State-owned electricity distribution company PLN accounts for the majority of the country's power output.

Renewable energy project developers and asset owners should 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.

## Renewable energy case study: Bali Solar Farm

**Title:** Melaya Solar Farm

**Proponent:** Akuo Energy Indonesia

**Location:** Sangiang, Melaya, Bali

**Status:** Planned – expected completion in 2020

**Classification:** Solar energy, generation facilities

**Description:** Melaya Solar Farm will be a ground-mounted solar project developed with an expected generation capacity of 100MW. It will cover an area of 55 hectares of uncultivated farmland secured from the Government of Bali and the Regional Owned Enterprise PERUSDA Bali.

**Output:** The solar plant will be the first electricity generator to supply electricity directly from Bali. The island of Bali has relied on electric supply from Java and, therefore, this solar plant will contribute to Bali Island's energy security.<sup>22</sup>

**Cost:** USD245m<sup>23</sup>

**Financial structure:** Privately funded by Akuo Energy.

Akuo Energy develops, finances, builds and operates renewable energy power plants all over the world. As part of its project finance model, it has a facility called, AkuoCoop, which allows members of the public to make an interest-bearing loan to help finance green power projects developed and operated by Akuo Energy.<sup>24</sup>



Source: Akuo solar farm<sup>21</sup>



## Renewable energy case study: Bioethanol Facility

**Title:** Gempolkrep Bioethanol Facility

**Proponent:** PT Perkebunan Nusantara (an SOE)

**Location:** Mojokerto, Surabaya, West Java

**Status:** Planned – expected completion in 2020

**Classification:** Bioenergy, facilities producing biofuel

**Description:** This project is a joint project with the sugar facility in Mojokerto. This facility will have a Food Grade CO2 recovery plant, and Fuel Grade Ethanol to produce an alternative source of energy.<sup>20</sup>

**Output:** The facility will have a capacity to process 100kg cane per day. It has an anticipated generation capacity of 20MW.

**Cost:** IDR1.12tn (USD78m)

**Financial structure:** Penyertaan Modal Negara (SOE budget)/ State Budget



Source: PT Perkebunan Nusantara bioethanol facility<sup>19</sup>



## 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 accounts for approximately 30% of Indonesia's total GHG emissions<sup>60</sup> – comparatively more than the global share of around 23%.<sup>61</sup> Improving connectivity and public transportation is a critical social and environmental priority for President Widodo, aiming to improve access for more people in more places, reduce congestion and air pollution, and drive trade and economic growth – without contributing to total GHG emissions.

Large cities such as Jakarta and Bandung are particular priorities with increasing congestion and pollution resulting in economic, health and climate impacts. Transport infrastructure Jakarta particularly is seeing huge growth – it has the largest BRT system in the world and while late to develop metro or light rail, now has its first metro line (see below) in place with light rail currently under construction.

The future of green transport in Indonesia will include the expansion of the existing rail network, the addition of high-speed rail routes and upgrades to the rolling stock from diesel to electric. There will also be an expansion and upgrade of the BRT systems, more interconnectivity with other modes of public transport, and more hybrid buses.

50% of the government's National Strategic Projects pipeline is dedicated to transportation infrastructure, with just under a quarter of these being green infrastructure. There is scope for even further investment particularly for rail and BRT development as well as electric vehicle generation and sustainable waterborne transport in the future.

### Investment pathways

Many funding structures are available to encourage private sector involvement in the long-term financing required for low-carbon transport projects including green bonds, outright asset acquisitions, public private partnerships (PPPs) and the securitisation of green assets.

Government-backed concessional loans are a new structure 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.

In Indonesia, several SOEs responsible for rail have already issued bonds for transport works. For example, in 2017, State-owned railway operator PT Kereta Api Indonesia (KAI) listed bonds worth IDR2tn (USD148m) on the Jakarta Stock Exchange (IDX).<sup>25</sup>

Future issuance from these organisations could be tagged as "green" in advance to raise their profile as potential sustainable investments. As private sector appetite increases, funding sources will continue to diversify, and investment will accelerate.

Investors seeking exposure to low-carbon transport projects and assets should consider the various investment pathways available. For instance, government-owned low-carbon transport assets are often identified in their green bond offerings. This pathway provides indirect exposure for investors to specific projects and assets and provides attractive credit and liquidity credentials for institutional investors.

More direct investment pathways include participation in consortium debt arrangements and/or equity stakes in individual projects via PPPs or other public-private ownership and financing structures.

## Low-carbon transport case study: MRT Jakarta<sup>26</sup>

**Title:** MRT Jakarta (North – South Corridor Phase 1 and Phase 2)

**Proponent:** Provincial Government of Special Region of Capital Jakarta

**Location:** Special Region Capital of Jakarta

**Status:** Phase 1 – Completed in 2019. Phase 2 – Planned: construction begins late 2019 and is expected to be completed in 2024

**Classification:** Public passenger transport, train

**Description:** This mass rapid transit project consists of 2 phases running along the same North – South route:

- Phase 1 is a 23.3 km corridor between Kampung Bandan and Lebak Bulus, and
- Phase 2 North-South Corridor, runs between Bundaran HI – Kampung Bandan.



Source: MRT Jakarta map<sup>27</sup>

**Output:** MRT Jakarta is a key mode of public transportation that should help to resolve traffic congestion, improve mobility of the people, reduce carbon emission and create new job opportunities in DKI Jakarta.

**Cost:** IDR39.5tn (USD1.8bn)

**Financial structure:** Japanese International Cooperation Agency (JICA) Official Development Assistance (ODA) and State Budget and Jakarta Regional Budget.

## Low-carbon transport case study: Jakarta-Bandung high speed railway<sup>28</sup>

**Title:** Jakarta-Bandung High Speed Train

**Proponent:** Indonesian-Chinese Consortium (PT Wijaya Karya, PT Kereta Api Indonesia, and China Railway Engineering Corporation)

**Location:** East Jakarta, Province of Special Capital Territory of Jakarta (DKI Jakarta)

**Status:** Under construction – expected completion in June 2021

**Classification:** Public passenger transport, train

**Description:** The total railway length will be 142.3km long and, will have 13 tunnels. The train will travel at 350km/h.

**Output:** The project should ease traffic congestion between the Jakarta – Bandung route, and reduce the travel time between Jakarta-Bandung by 45 minutes.

**Cost:** Approx. USD6bn

**Financial structure:** Private, Business-to-business (B2B), via Indonesian-Chinese Consortium (PT Wijaya Karya, PT Kereta Api Indonesia, and China Railway Engineering Corporation)



Source: Kompas Research Center

For more pipeline projects, see the pipeline supplement at <https://www.climatebonds.net/resources/reports>



# Sustainable water management

*Assets that do not increase or aim at reducing GHG emissions over the operational lifetime of the asset, address adaptation, and increase the resilience of the surrounding environments.*

*This could include water capture, collection and storage, water treatment with methane emissions treatment, flood and drought defence, stormwater management, and ecological restoration/management.*

*This covers built environment as well as nature-based water infrastructure.*

## Sector overview

The provision of clean drinking water is a priority for the Indonesian Government and municipal authorities. This is made clear by the fact that a third of the pipeline of the government's National Strategic Projects is dedicated to water-related infrastructure.

The government plans to increase capacity and to raise water availability per capita through new greenfield developments and significant upgrades to existing infrastructure.

The ownership and regulation of water assets varies by jurisdiction as does the urgency to upgrade aging infrastructure and respond to the needs of a growing population and the challenge of climate change. Although underrepresented in the government's list of priorities, resilient water infrastructure and low-emission wastewater treatment facilities should be included in the next phase of green projects.

Many of the challenges, for example, faced by Jakarta's subsidence are related to water use and management. The subsidence is due to the extraction of groundwater for drinking and bathing - as water is pumped out, the land above it sinks.<sup>62</sup> One reason that groundwater is pumped so extensively is that while river water is abundant (the city sits on a swamp with 13 rivers running through it), rivers are too polluted to be a healthy water source. While large engineering solutions are being proposed to deal with subsidence (such as a USD40bn giant sea wall<sup>63</sup>), they may only last a few decades. Longer-term solutions will require a complete re-thinking of how water is extracted, used and re-used and how ecosystems such as mangroves can

be used to increase flood resilience or how river systems can be cleaned to enable drinking.

Currently, just under a quarter of the government's National Strategic water projects are green. Enhanced planning processes and increased upfront investment will be required for water infrastructure to meet the challenges of climate change and rapid urbanisation.

## Investment pathways

The majority of water infrastructure in Indonesia is publicly owned. The water authorities are owned by local government and funded by the respective treasuries. This is unlikely to change in the medium-term.

An investment pathway for sustainable water infrastructure could be through green bonds issued by the local governments (provinces, cities, or utility companies owned by them).

Further investment pathways exist in the construction, ownership and refinancing of new types of infrastructure such as water desalination assets and commercial / industrial water infrastructure.

## Water management case study: Jatiluhur Water Supply System (SPAM)

**Title:** Water Supply System (SPAM) Jatiluhur

**Proponent:** Perum Jasa Tirta II (an SOE)

**Location:** Jatiluhur, West Java

**Status:** Planned - in the procurement phase, planned commercial operation in 2021<sup>32</sup>

**Classification:** Water Infrastructure, Water treatment

**Description:** Jatiluhur Drinking Water Supply project utilize the water from Jatiluhur Dam, and will have a capacity of 5000 litre/second.<sup>33</sup>

**Output:** This project will increase the capacity and reliability of clean water supplies especially for DKI Jakarta province. It aims to reduce the use of ground water in DKI Jakarta province to prevent soil surface subsidence.<sup>34</sup>

**Cost:** IDR1.92tn (USD134m)

**Financial structure:** Built-own-operate-transfer, PPP



Source: Jatiluhur dam<sup>31</sup>



## Water management case study: West Semarang Drinking Water Supply System

**Title:** West Semarang Drinking Water Supply System

**Proponent:** PT Aetra (an SOE) and Municipal Government of Semarang

**Location:** Semarang, Central Java

**Status:** Under Construction – commercial operation date 2021

**Classification:** Water infrastructure, Water treatment

**Description:** The project will provide drinking water for 31 sub-districts in 3 districts ( West Semarang, Tugu, Ngaliyan), in which around 60,000 families do not yet have access to the Drinking Water Supply System (SPAM) network.<sup>29</sup>

**Output:** The project aims to resolve clean water crisis and reduce the use of ground water in Semarang. This project will use water from Jatibarang Dam and aims to resolve the problem of raw water supply shortage in Semarang, which is currently supplied by Kudus Regency.

**Cost:** IDR1.17tn (USD82m)



Source: West Semarang Drinking Water Supply<sup>29</sup>

**Financial structure:** PPP. There are currently four consortia that have passed the prequalification process:<sup>30</sup>

- |  |  |
|--|--|
| 1. Suez (Southeast Asia) Limited – PT Brantas Abipraya | 3. Cobra Instalaciones Y Servicios – PT Pembangunan Perumahan Tbk.     |
| 2. PT Aetra Air Jakarta – PT Medco Gas Indonesia       | 4. Manila Water Inc., PT Adaro Tirta Mandiri – PT Sarana Tirta Ungaran |



## 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 waste-to-energy facilities. Where waste must go to land fill, there are gas capture systems installed to minimise emissions as well as measures to minimise run-of and other negative impacts on surrounding environments.*

### Sector overview

About 70% of solid waste produced by Indonesians each year is sent to open dumpsites, which has a negative effect on the health of the environment and local communities.<sup>35</sup> Jakarta ranks as the second lowest capital city in Southeast Asia in terms of sanitation.<sup>36</sup>

In response, the government committed to develop a comprehensive strategy to improve policy and the institutional capacity for waste management at the local level; enhancing the management capacity of urban waste water; reducing landfill waste by promoting the “Reduce,

Reuse, Recycle” approach; and turning waste into energy (WtE).<sup>37</sup>

The latter has become central to the government’s waste management strategy, with seven WtE plants planned for development in the near future. As long as these facilities undertake adequate sorting and removal of plastics and metals, they will make a significant contribution to the achievement of both national waste reduction and low-emission energy targets.

In March 2019, the Government released its ambitious national plan for waste management with the goal of reducing marine plastic debris by 70% and solid waste by 30%, and to handle 70% of solid waste by 2025.<sup>38</sup> The Ministries of Maritime Affairs and Environment and Forestry will work with the private sector and civil society groups as well as global partners to identify solutions for plastic pollution, and develop a corresponding investment strategy.<sup>39</sup> This initiative is part of the Global Plastic Action Partnership, which uses an innovative, analytical model for data-driven decision making that estimates the investment

needed, timeline, environmental footprint and greenhouse gas emissions, as well as the impact of projects on people’s lives.<sup>40</sup>

### Investment pathways

Most of the major waste management assets and projects in Indonesia 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 significant capital. An investment pathway for sustainable waste infrastructure could be through green bonds issued by local governments.

There are also new facilities proposed for development via PPPs. In this case, investment pathways include participation in consortium debt deals and/or equity stakes in individual projects via PPPs or other public-private ownership and financing structures.

Privately owned asset and projects, which include recycling facilities and some waste to energy facilities, also offer other means of debt and equity investment.



## Waste management case study: Multimodal regional waste management

**Title:** Nambo Regional Waste Management

**Proponent:** PT Jabar Bersih Lestari<sup>42</sup>

**Location:** West Java

**Status:** Planned – operation planned for 2020

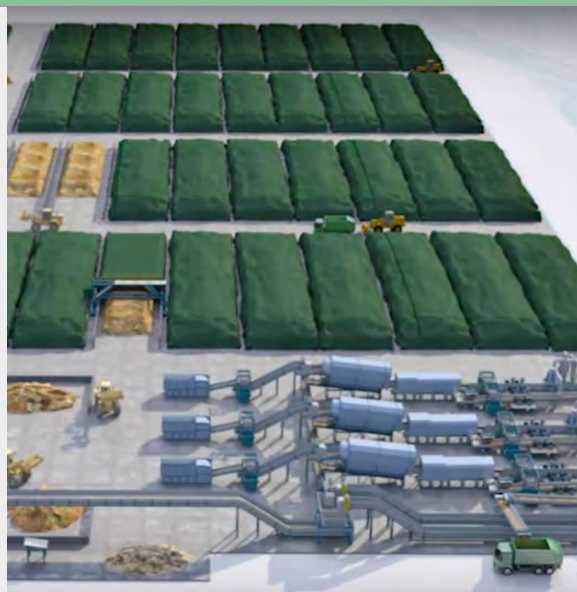
**Classification:** Waste, Recycling, Waste to energy, and Biological treatment facilities

**Description:** The Nambo waste treatment project will consist of green facilities such as sorting and materials recovery facility (MRF), and compost and refuse-derive to produce alternative energy facilities.<sup>43</sup>

**Output:** Nambo waste processing technology can accommodate 1500-1800 tons of waste every day being turned into compost and Refuse-derived Fuel.<sup>43</sup>

**Cost:** Appox. USD 4.8m

**Financial structure:** Proposed PPP



Source: Visual representation of Nambo Regional Waste Management facility<sup>41</sup>

## Jakarta Sewage System

**Title:** Jakarta Sewage System

**Proponent:** Provincial Government of Special Capital Region of Jakarta

**Location:** Special Capital Region Jakarta

**Status:** Planned project – target commercial operation date 2021

**Classification:** Wastewater, Water treatment

**Description:** Jakarta Sewage System project will manage domestic waste treatment in 15 zones, with the initial focus on Zones 1 and 6.

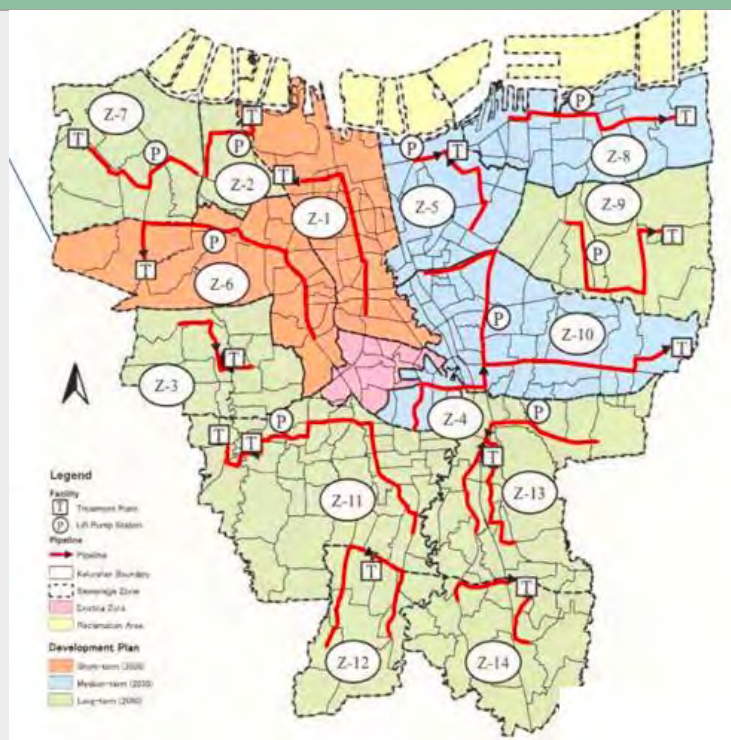
Both are targeted for operation in 2021.<sup>45</sup>

Zone 1 will serve the central and north areas, and Zone 6 will serve the west area.

**Output:** The construction of Zones 1 and 6 will increase the area coverage of waste water service in DKI Jakarta by 20%. The commencement of the Zone 1 project preparation is aimed to have a spill-over effect to the construction of other Zones.<sup>45</sup>

**Cost:** IDR69.9tn (USD4.8bn)

**Financial structure:** State budget, B2B, and PPP



Source: Jakarta Sewerage System Plan<sup>44</sup>

For more pipeline projects, see the pipeline supplement at <https://www.climatebonds.net/resources/reports>

Equity structure	Debt Instrument	Indonesian example
<b>Islamic finance, including Sukuk</b>	Supra-national and sovereign green bonds	The <b>Republic of Indonesia</b> 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. <sup>1</sup>
<b>Public-private partnership</b>	Sub-sovereign green bonds	State-owned infrastructure financing company <b>PT Sarana Multi Infrastruktur</b> (Indonesia) issued a 2-tranche IDR500bn (USD50m) unsecured green bond in 2018. Proceeds will be allocated to refinancing three light rail transit projects, two mini hydro power plants, a water treatment plant and irrigation systems. <sup>2</sup>  PT SMI supports the Government's infrastructure development agenda for Indonesia through partnerships with private and/or multilateral financial institutions in PPP projects <sup>3</sup> It facilitates infrastructure financing, project development and infrastructure advisory services.
<b>Joint venture, public-private partnership</b>	Green bond Sustainability bond	The <b>Tropical Landscapes Finance Facility</b> (TLFF) is a partnership between UN Environment, World Agroforestry Centre, ADM Capital and BNP Paribas launched its landmark USD95m bond to help finance a sustainable natural rubber plantation on heavily degraded land in two provinces in Indonesia. <sup>4</sup>
	Green loan	The <b>World Bank</b> is providing a loan of USD150m to support Indonesia Geothermal Resource Risk Mitigation (GREM) project. The loan from the World Bank will support public and private sector developers to lessen risks in geothermal resources exploration. <sup>5</sup>
<b>Infrastructure/property funds</b>		<b>Indonesian Infrastructure Finance</b> (IIF) is a state-owned company that provides infrastructure financing and advisory services for viable infrastructure projects. In December 2018, it provided a USD28.7m financing for the Project Company to develop a 2x5 MW Mini Hydro Power Plant Project in North Sumatera. The Project is to fulfil the electricity demand for North Sumatera region where the electricity demand in this region is projected to grow by 10% until year 2027 and historically the increase of demand ranging from 5% – 8% from year 2011-2017. <sup>6</sup>
<b>Viability Gap Funding (VGF)</b>		Viability Gap Funding (VGF) is a fiscal support provided by <b>Indonesia Ministry of Finance</b> to improve the certainty and viability of PPP infrastructure projects. This support was provided for the Bandar Lampung Water Supply project, this project is a joint project between government and business entity in order to increase the coverage of drinking water services for society in Bandar Lampung from 20% (2015) to 46% (2024) and improving environmental sanitation, living standards, and public health. <sup>7</sup>

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Please access the PDF version of this report online at <https://www.climatebonds.net/resources/reports> to click through to reference sources.

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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