ASIAN DEVELOPMENT BANK

Innovative mechanisms for NDC financing

Tristan Knowles
September 2019
Rising Global Temperature

How much cooler or warmer every year was compared with the average temperature of the late 19th century.

Source: NASA | By The New York Times
Chart 3: Global bond yields at 120-year lows

UK + Australia + Japan + Swiss + France + USA govt bond yields (avg)

Source: BofA Merrill Lynch Global Investment Strategy, Bloomberg, Global Financial Data
Market Value of Negative-Yielding Bonds in the Bloomberg Barclays Global-Aggregate Index

Data: Compiled by Bloomberg
Asia Infrastructure Needs Exceed $1.7 Trillion Per Year, Double Previous Estimates

Table 2: Estimated Infrastructure Investment Needs by Sector, 45 DMCs, 2016–2030
($ billion in 2015 prices)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Baseline Estimates</th>
<th>Climate-adjusted Estimates</th>
<th>Climate-related Investments (Annual)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Investment Needs</td>
<td>Annual Average</td>
<td>Share of Total</td>
</tr>
<tr>
<td>Power</td>
<td>11,689</td>
<td>779</td>
<td>51.8</td>
</tr>
<tr>
<td>Transport</td>
<td>7,796</td>
<td>520</td>
<td>34.6</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>2,279</td>
<td>152</td>
<td>10.1</td>
</tr>
<tr>
<td>Water and Sanitation</td>
<td>787</td>
<td>52</td>
<td>3.5</td>
</tr>
<tr>
<td>Total</td>
<td>22,551</td>
<td>1,503</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Note: - denotes not applicable.
Source: ADB estimates.

$241 billion additional for climate-adjusted pathway
Table 3: Estimated Infrastructure Investments and Gaps, 25 DMCs, 2016–2020
($ billion in 2015 prices)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Annual Needs</td>
<td>Gap</td>
<td>Gap (% of GDP)</td>
</tr>
<tr>
<td>Total (25)</td>
<td>881</td>
<td>1,211</td>
<td>330</td>
</tr>
<tr>
<td>Total without PRC (24)</td>
<td>195</td>
<td>457</td>
<td>262</td>
</tr>
<tr>
<td>Selected Central Asia Countries (3)</td>
<td>6</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Selected South Asia Countries (8)</td>
<td>134</td>
<td>294</td>
<td>160</td>
</tr>
<tr>
<td>Selected Southeast Asia Countries (7)</td>
<td>55</td>
<td>147</td>
<td>92</td>
</tr>
<tr>
<td>Selected Pacific Countries (5)</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>118</td>
<td>230</td>
<td>112</td>
</tr>
<tr>
<td>Indonesia</td>
<td>23</td>
<td>70</td>
<td>47</td>
</tr>
<tr>
<td>PRC</td>
<td>686</td>
<td>753</td>
<td>68</td>
</tr>
</tbody>
</table>

PRC = People's Republic of China.
Numbers in parentheses refer to the number of selected countries.

Note: The gap as a % of GDP is based on the annual average of projected GDP from 2016 to 2020. The 25 DMCs covered here are listed in Annex Table 2.

Source: ADB (2016a); Country sources; Investment and Capital Stock Dataset, 1960–2015, IMF; Private Participation in Infrastructure Database, World Bank; World Bank (2015a and 2015b); World Development Indicators; World Bank; ADB estimates.
About the Asian Development Bank (ADB)
What is a green or climate bond?

Green Bond Principles
• Renewable energy
• Energy efficiency
• Pollution prevention and control
• Sustainable management of living resources
• Terrestrial aquatic and biodiversity conservation
• Clean transportation
• Sustainable water management
• Climate change adaptation
• Eco-efficient products, production technologies and processes.
## Types of green bonds

<table>
<thead>
<tr>
<th>Type</th>
<th>Proceeds raised by bond sale are</th>
<th>Debt recourse</th>
<th>Example</th>
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<tbody>
<tr>
<td>&quot;Use of Proceeds&quot; Bond</td>
<td>Earmarked for green projects</td>
<td>Recourse to the issuer: same credit rating applies as issuer’s other bonds</td>
<td>EIB &quot;Climate Awareness Bond&quot; (backed by EIB); Barclays Green Bond</td>
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<td>Covered Bond</td>
<td>Earmarked for eligible projects included in the covered pool</td>
<td>Recourse to the issuer and, if the issuer is unable to repay the bond, to the covered pool</td>
<td>Berlin Hyp green Pfandbrief; Sparebank 1 Bolligkredit green covered bond</td>
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<td>Loan</td>
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<td>Convertible Bonds or Notes, Schuldcschein, Commercial Paper, Sukuk, Debentures</td>
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</table>

Source: Climate Bonds Initiative
Nearly $170 billion of green bonds were issued globally in 2018.
ADB’s regional footprint

- 68 member countries; 48 in the region
- Japan and the United States are the two largest members
ADB’s Private Sector Activities in East, South-East Asia and the Pacific

**People’s Republic of China** ($3,924m)
- (CWA) Urban-Rural Water (CWA II)
- (BEWG) Wastewater Reuse
- (Le Giga Holdings) Greenhouse (Le Gaga)
- (Sound Global) Rural Smart Wastewater
- (CTEG) SME Industrial Wastewater
- (Beijing Capital) Western Counties Water
- (Kinkai Water, China Water Envi. Group) Integrated Wastewater
- (CEB Greentech) China Everbright Renewable Energy
- (SGE) Geothermal District Heating

**Viet Nam** ($120m)
- (CEIL) Municipal WTE Project
- (DHD) Floating Solar PV Energy Project

**Philippines** ($317m)
- (GMAC) Mactan-Cebu Airport
- (EBRPC) Burgos Wind
- (AP Renewables) Tiwi-MakBan Geothermal Green Bonds

**Cambodia** ($20m)
- (Akay Flavors & Aromatics, SpiceRich Seasoning) Spice Value Chain
- (Sunseap) Cambodia Solar Power

**Indonesia** ($3,601m)
- (Aetra Air) East Jakarta Water
- (Sarulla, PT Medco Geopower) Sarulla Geothermal
- (PT. Supreme Energy) Rantau Dedap Geothermal
- (PT. Supreme Energy) Muara Laboh Geothermal
- (HSBC) Tangguh LNG Expansion
- (PT. Supreme Energy) Muara Laboh Geothermal
- (Equis Group) Eastern Indonesia Renewable Energy Project (Phase 1 & 2)
- (Jawa Satu) Jawa 1 LNG to Power

**Myanmar** ($1,027m)
- (Yoma) Connectivity infrastructure Project
- (Ooredoo) Nationwide Telecommunications
- (Sembcorp) Myingyan Natural Gas Power Plant
- (Yoma, Mitsubishi) Yangon Urban Renewal and District Cooling
- (ITAH, IGT) Telecommunication Towers Infrastructure

**Thailand** ($2,330m)
- (Bangchak) Bangchak Solar Power
- (DGA, EGCO, CLP) Solar Power Project (NED)
- (Gulf, JPower) Nong Saeng Natural Gas-fired Power
- (Gulf, JPower) Ayuthaya Natural Gas-fired Power
- (Bangchak) Provincial Solar
- (EGCO) Teppana Wind
- (EGCO) Central Thailand Solar
- (EGCO) Subyai Wind
- (Sunseap, Weng) Grid-parity Rooftop Solar
- (B. Grimm) ASEAN Distributed Power Project Phase 1
- (B. Grimm) ASEAN Distributed Power Project Phase 2
- (Gulf) Southern Thailand Waste-to-Energy
- (Gulf) Cornerstone Investment in Leading IPP
- (BTS) Bangkok MRT Pink and Yellow Line
- (Gulf) GSRC Chonburi Natural Gas Power

**Lao PDR** ($566m)
- (NNP1PC) Nam Ngiep 1 Hydropower

**Philippines** ($134m)
- (Distributed Energy Storage)
- (Fluidic) Distributed Energy Storage

**Pacific** ($54m)
- (Cofely) SE Asia Energy Efficiency
- (Fluidic) Distributed Energy Storage

**Regional** ($45m)
- (Cofely) SE Asia Energy Efficiency
- (Fluidic) Distributed Energy Storage

**Transaction Focus**
- Renewables/Efficiency
- Water/Sanitation
- Conventional Energy
- Social Infrastructure
- Multi-sector

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*Figures reflect total ADB approvals (OCR and other)*
ADB has issued over $6 billion in green bonds since 2015

**Green Bond Commitment by Country (%)**

- China, People’s Republic of 21.7
- India 17.4
- Pakistan 8.5
- Viet Nam 12.1
- Bangladesh 17.0
- Thailand 6.1
- Indonesia 7.2
- Sri Lanka 6.9
- Others

**Green Bond Commitment by Sector (%)**

- Renewable Energy 41
- Energy Efficiency 6
- Renewable Energy and Energy Efficiency 3
- Transport 52

Source: Treasury Department, ADB.
ADB’s milestone private sector green/climate bond transactions in ASEAN support nearly 4.8 GW of renewable energy

**LANDMARK TRANSACTIONS**

AC Energy wind and solar 2019: $20 million of $410 million issuance

*First listed Certified Climate Bond in Asia-Pacific* supporting nearly 4000 MW of wind and solar including around 2200 MW in ASEAN
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*inclusive of ~B9.7 billion parallel non-green bond issuance*

*First Certified Climate Bond in Thailand and first green bond issued by a Thai energy company* supporting 98.5 MW of solar in Thailand
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Tiwi-MakBan geothermal 2015: PCG of P8 billion ($168.7 million) of P10.7 billion issuance

*First Certified Climate Bond in Asia-Pacific Region* supporting 676 MW of geothermal in the Philippines

Total private sector investment of over $330 million since 2015
ADB’s milestone private sector green/climate bond transactions in ASEAN support nearly 4.8 GW of renewable energy

**ADB VALUE ADD**

- *Cornerstone investment* to catalyze issuance
- Enhanced *market validation* and awareness
- *Assistance with verification* and certification
Five things required for sustained growth of green bond markets

1. Sufficient investment-grade green assets already in operation (or expected) and generating cash flows

2. Supply from willing issuers

3. Demand from a large and diverse pool of investors (banks, insurance companies, institutional investors, pension funds etc.)

4. Awareness of the benefits and applicable guidelines and standards

5. Experienced pool of verifiers and assurance providers
Interactive component – slides to be printed for participant group discussion
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Source: Climate Bonds Initiative
### Climate Bonds Taxonomy

<table>
<thead>
<tr>
<th>ENERGY</th>
<th>TRANSPORT</th>
<th>WATER</th>
<th>BUILDINGS</th>
<th>LAND USE &amp; MARINE RESOURCES</th>
<th>INDUSTRY</th>
<th>WASTE</th>
<th>ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>Private transport</td>
<td>Water monitoring</td>
<td>Residential</td>
<td>Agriculture</td>
<td>Cement production</td>
<td>Preparation</td>
<td>Broadband networks</td>
</tr>
<tr>
<td>Wind</td>
<td>Public passenger transport</td>
<td>Water storage</td>
<td>Commercial</td>
<td>Commercial Forestry</td>
<td>Steel, iron &amp; aluminium production</td>
<td>Reuse</td>
<td>Telecommuting software and service</td>
</tr>
<tr>
<td>Geothermal</td>
<td>Freight rail</td>
<td>Water treatment</td>
<td>Products &amp; systems for efficiency</td>
<td>Ecosystem conservation &amp; restoration</td>
<td>Glass production</td>
<td>Recycling</td>
<td>Data hubs</td>
</tr>
<tr>
<td>Bioenergy</td>
<td>Aviation</td>
<td>Water distribution</td>
<td>Urban development</td>
<td>Fisheries &amp; aquaculture</td>
<td>Chemical production</td>
<td>Biological treatment</td>
<td>Power management</td>
</tr>
<tr>
<td>Hydropower</td>
<td>Water-borne</td>
<td>Flood defence</td>
<td>Nature-based solutions</td>
<td>Supply chain management</td>
<td>Fuel production</td>
<td>Waste to energy</td>
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<tr>
<td>Marine Renewables</td>
<td></td>
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<td>Landfill</td>
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<tr>
<td>Transmission &amp; distribution</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
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</tr>
</tbody>
</table>
The ‘four pillars’ of deep decarbonisation

**REDUCE ENERGY USE**
Choose equipment and assets that use less energy and get more out of the energy that is used in areas such as buildings, manufacturing, transport and infrastructure.

**PRODUCE CLEANER ELECTRICITY**
Transition electricity generation away from imported fossil fuels to cleaner, locally produced low emissions sources such as solar, wind, hydro and bioenergy.

**SWITCH TO CLEANER FUELS**
Once electricity is powered by clean energy, switch every energy-using activity you possibly can to electricity and everything else to low emissions alternatives (e.g. from diesel to biodiesel in transport).

**SORT OUT AND STORE THE REST**
Reduce non-energy emissions like agriculture and refrigerant gases and capture and store remaining emissions through actions like restoring forests and blue-carbon ecosystems.
<table>
<thead>
<tr>
<th>Issuers (sellers)</th>
<th>Investors (buyers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Corporate</td>
<td>• Institutional investors</td>
</tr>
<tr>
<td>• Government and agency</td>
<td>• Pension and/or mutual funds</td>
</tr>
<tr>
<td>• Municipal</td>
<td>• Banks</td>
</tr>
<tr>
<td>• Mortgage-backed, asset-backed, and collateralized debt obligations</td>
<td>• insurance companies)</td>
</tr>
<tr>
<td></td>
<td>• Governments</td>
</tr>
<tr>
<td></td>
<td>• Individuals</td>
</tr>
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