ASIAN INFRASTRUCTURE
INVESTMENT BANK

Energy Sector Strategy: Sustainable Energy for Asia

15 June 2017, amended 11 April 2018

Background and Acknowledgement

On June 15, 2017, the Board of Directors of the Asian Infrastructure Investment Bank recorded its support for this "Energy Sector Strategy: Sustainable Energy for Asia." The Strategy was developed through an iterative, consultative process, including two rounds of public consultations. The Bank wishes to thank all the parties who provided comments for their valuable contributions.

On April 11, 2018, the Board of Directors approved the revised Results Monitoring Framework (Annex 2), which has replaced the preliminary one in the Bank's Energy Sector Strategy.

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Abbreviations

CO_2	Carbon dioxide
EE	Energy efficiency
ESF	Environmental and Social Framework
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GNI	Gross National Income
GWe	Gigawatt of electric output
GWh	Gigawatt hour
IEA	International Energy Agency
MDB	Multilateral development bank
Mtoe	Million tons of oil equivalent
MW	Megawatt
MWe	Megawatt electrical
MWh	Megawatt hour
NDCs	Nationally determined contributions
OECD	Organisation for Economic Cooperation and Development
PPP	Public-private partnership
RE	Renewable energy
SEforALL	Sustainable Energy for All
SDG 7	Sustainable Development Goal 7 – Affordable and Clean Energy
T&D	Transmission and distribution
TWh	Terawatt hour
UN	United Nations
UNSD	United Nations Statistics Division
US$	United States Dollar
WHO	World Health Organization

Energy Sector Strategy:

Sustainable Energy for Asia[1]

Energy is central to nearly every major challenge and opportunity the world faces today. Be it for jobs, security, climate change, food production or increasing incomes, access to energy for all is essential. Sustainable energy is opportunity – it transforms lives, economies and the planet.

Sustainable Development Goal 7 – Affordable and Clean Energy

Introduction

1. Energy services are essential to economic activity, social development and quality of life. They fuel the economy and facilitate the operation of factories and businesses. They are essential to deliver goods and services and to meet people's mobility needs. Finally, they contribute to wellbeing, social development and quality of life, and are essential to lift vulnerable people out of poverty. As noted by the United Nations (UN) Secretary-General: "The decisions we take today on how we produce, consume and distribute energy will profoundly influence our ability to eradicate poverty and respond effectively to climate change."[2]

2. The Bank's Energy Sector Strategy (Strategy) focuses on sustainable energy for Asia. The Strategy's objective is to provide the framework, principles, and operational modalities to guide the Bank's energy sector engagement, including the development of its project pipeline and future subsectoral lines of business. Strategy preparation benefitted from two rounds of public consultations, an overview of which is provided on the Bank's website (www.aiib.org).

3. The Strategy is consistent with the Bank's "Lean, Clean and Green" core values. The Strategy embraces, and is informed by, the principles underpinning *Sustainable Energy for All (SEforALL)*, the *2030 Agenda for Sustainable Development*, and the *Paris Agreement* (Box 1). It lays the framework for the Bank to support its client countries to: (i) develop and improve their energy infrastructure; (ii) increase energy access; (iii) facilitate their transition to a less carbon-intensive energy mix; and (iv) meet their goals and commitments under these global initiatives.

[1] In this document, references to "Asia" and "Region" include the geographical regions and composition classified as Asia and Oceania by the United Nations (Annex 1). This definition does not include Russia. However, Russia is a regional member of the Bank and therefore is listed separately, or additionally, in various places in this document.

[2] "*Energy for a Sustainable Future*," Foreword, The Secretary-General's Advisory Group on Energy and Climate Change (AGECC), Summary Report and Recommendations – 28 April 2010, New York.

Box 1: Global Initiatives

The ***Sustainable Energy for All (SEforALL)*** initiative, launched by the UN Secretary-General Ban Ki-moon in September 2011, has three objectives it seeks to meet by 2030: ensure universal access to modern energy services; double the share of renewable energy in the global energy mix; and double the global rate of improvement in energy efficiency. The initiative was launched to coincide with the UN General Assembly Resolution 65/151 of 20 December 2010 that declared 2012 the International Year of Sustainable Energy for All.

The ***2030 Agenda for Sustainable Development*** is a set of 17 aspirational "Sustainable Development Goals" with 169 targets, developed under UN auspices and involving 193 UN Member States and global civil society. The goals are contained in paragraph 54 of the UN General Assembly Resolution A/RES/70/1 of 25 September 2015. One of those goals, Sustainable Development Goal 7 ***(SDG 7)***, calls for ensuring access to affordable, reliable, sustainable and modern energy for all by 2030.

The ***Paris Agreement****'s* central aim is to strengthen the global response to the threat of climate change by "holding the increase in the global average temperature to well below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5 degrees Celsius." The Agreement also aims to make "finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development." According to the Agreement, countries shall publicly outline nationally determined contributions (NDCs) that they intend to achieve for reductions in greenhouse gas emissions. The Paris Agreement was agreed by 197 Parties during the 21st Conference of the Parties (COP 21) of the UN Framework Convention on Climate Change in Paris in December 2015, and entered into force in November 2016.

Sources: Sustainable Energy for All, www.se4all.org; the 2030 Agenda for Sustainable Development, sustainabledevelopment.un.org/post2015/transformingourworld; the Paris Agreement, unfccc.int/paris agreement/items/9485.php

The Global Energy Landscape

4. The Strategy has been developed in a global energy landscape that is characterized by a growing sense of energy insecurity and widespread environmental concerns at national, regional and global levels. Yet it is also a time of shared hope and promise, as demonstrated both by ambitious goals and commitments under global initiatives, and by technological advances that will ease the transition towards more sustainable development. Bank support will assist client countries to meet their nationally determined contributions (NDCs)[3] under the Paris Agreement and to reap the benefits of new technologies and innovation.

5. ***Energy access and environmental concerns.*** Around 1.1 billion people worldwide still live without access to electricity. Lack of access to energy limits opportunities and hampers economic and social development. Therefore, promoting access to affordable and reliable energy is fundamental to driving sustainable economic growth and ending poverty. Worries about energy security and pricing volatility have been a concern for over four decades. These concerns have been compounded by the free fall of oil prices after their peak

[3] According to Article 4, paragraph 2 of the Paris Agreement, each Party shall prepare, communicate and maintain successive NDCs that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.

in the late 2000s. The extremely high pollution in many of Asia's large cities has heightened concerns about environmental risks and their impacts on the health and wellbeing of the population. Asian countries, especially the most populous ones, are already experiencing floods, devastating storms and drought, and they will face higher risks if climate threats are not mitigated (Table 1). Environmental and social risks and impacts continue to be an important issue in the planning, implementation and operation of energy infrastructure. Particular attention needs to be given to addressing ecosystems, biodiversity and social issues.

Table 1: Countries Most at Risk of Five Climate Change Threats

Drought	Flood	Storm	Coastal Impact	Agriculture
Malawi	Bangladesh	Philippines	All low-lying island states	Sudan
Ethiopia	China	Bangladesh	Vietnam	Senegal
Zimbabwe	India	Madagascar	Egypt	Zimbabwe
India	Cambodia	Vietnam	Tunisia	Mali
Mozambique	Mozambique	Moldova	Indonesia	Zambia
Niger	Laos	Mongolia	Mauritania	Morocco
Mauritania	Pakistan	Haiti	China	Niger
Eritrea	Sri Lanka	Samoa	Mexico	India
Sudan	Thailand	Tonga	Myanmar	Malawi
Chad	Vietnam	China	Bangladesh	Algeria
Kenya	Benin	Honduras	Senegal	Ethiopia
Iran	Rwanda	Fiji	Libya	Pakistan

Source: World Bank (highlighting added for countries in Asia)

6. ***Primary energy consumption growth driven by non-OECD countries.*** Since 2000, global primary energy consumption grew on average 2.2 percent per year to reach about 13.7 billion of tons of oil equivalent (toe) in 2014. However, during 2010–2014, it grew at 1.9 percent per year, a slower growth rate than prior to the financial crisis (2.7 percent per year), likely due more to weaker global economic growth than to gains in energy efficiency (EE). From 2000 to 2014, the primary increase in energy consumption was driven by countries not in the Organisation for Economic Cooperation and Development (OECD); the non-OECD countries accounted for 98 percent of growth during this period and reached 58 percent of total global consumption in 2014.

Issues and Challenges

7. The specific issues that countries in Asia[4] confront in their energy sectors are similar to those facing most non-OECD countries – they are driven by the need for affordable, sustainable and reliable energy systems to support national, regional and global economic growth.

8. Asia is endowed with abundant energy resources:

- More than half of global conventional ***oil and gas*** reserves are in Asia: 3,795 trillion cubic feet of gas and 888 billion barrels of oil (55 and 54 percent of world reserves, respectively), most of which are concentrated in Western Asia: Saudi

[4] See Annex 1 for countries included in reference to Asia, OECD Asia and Non-OECD Asia.

Arabia, Iraq, Kuwait, Qatar and United Arab Emirates. In addition, Russia has 1,688 trillion cubic feet of gas and 80 billion barrels of oil (25 and 5 percent of world reserves, respectively).

- Asia's ***coal reserves*** are also abundant, amounting to more than 369,497 million short tons and representing 38 percent of world reserves, with a high concentration in five countries: China (34 percent), Australia (23 percent), India (18 percent), Kazakhstan (10 percent) and Indonesia (8 percent). Russia's coal reserves amount to 173,074 million short tons, about 18 percent of world reserves.

- Asia's ***hydropower*** technical potential amounts to about 5,980 terawatt hours (TWh) per year, accounting for 37 percent of global potential, while the total generation in 2011 amounted to about 37 percent of the economically exploitable potential. Three countries accounted for more than 75 percent of total generation: China (61 percent), India (10 percent) and Turkey (5 percent). Generation in the rest of non-OECD Asia[5] in the same year amounted to 182 TWh, about 22 percent of the economically exploitable potential. Russia's hydropower potential amounts to 1,670 TWh/year and accounts for about 10 percent of global potential.

- Asia's estimated ***geothermal*** potential amounts to about 63 gigawatts of electric output (GWe) and about 78 to 90 percent of global potential, which is estimated at 70–80 GWe.[6] Asia's potential is concentrated in five countries:[7] (i) Indonesia, with a potential estimated at about 27.8 GWe, an installed capacity of 1,340 megawatts of electric output (MWe) and annual power generation of 9,600 GW hours (GWh); (ii) Japan, with a potential estimated at 23.5 GWe,[8] and an installed capacity of 500 MWe; (iii) the Philippines, with a potential of 6 GWe, an installed capacity of 1,870 MW, the second largest in the world, and annual power generation of 9,646 GWh; (iv) New Zealand, with an estimated potential of 3.65 GWe, an installed capacity of 1,005 MWe and annual power generation of 7,000 GWh; and (v) Turkey, with an estimated potential of 2 GWe,[9] an installed capacity of 397 MWe and annual power generation of 3,127 GWh. Russia's geothermal potential is estimated at 2 GWe.

- Asia's ***solar*** resources are estimated at 119,536 TWh/year, about 30 percent of the global potential. China, Australia and India account for 52 percent of the

[5] Non-OECD Asia is defined by the IEA as: Bangladesh, Brunei Darussalam, Cambodia, China, Chinese Taipei, India, Indonesia, the Democratic People's Republic of Korea, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, the Philippines, Singapore, Sri Lanka, Thailand, Vietnam, and other Asian (definition of the United Nations Statistics Division) countries and territories. Furthermore, the IEA notes that: "Individual data are not available and are estimated in aggregate for: Afghanistan, Bhutan, Cook Islands, Fiji, French Polynesia, Kiribati, Lao PDR, Macau (China), Maldives, New Caledonia, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga and Vanuatu" (IEA, 2014, *World Energy Outlook 2014*, Paris).

[6] Subir Kumar Sanyal, et al (2016), "Comparative Analysis of Approaches to Geothermal Resource Risk Mitigation: A Global Survey," Energy Sector Management Assistance Program (ESMAP), Knowledge Series 024/16, Washington, D.C., World Bank Group.

[7] Geothermal data for the five countries come from the International Geothermal Association unless otherwise stated.

[8] Geothermal potential is an estimated value from heat energy stored at a depth of geological basement or shallower. Source: "Japan – Renewed Opportunities," Kasumi Yasukawa, National Institute of Advanced Industrial Science and Technology (AIST), GRC Annual Meeting 2014, PowerPoint presentation.

[9] Geothermal Country Update Report of Turkey (2010–2015), Proceedings of World Geothermal Congress 2015.

potential. Asia is also endowed with modest onshore ***wind*** potential, about 11 percent of global potential, primarily located in China, Australia, Mongolia, Afghanistan and Pakistan. Russia's potential solar resources amount to 30,586 TWh/year, accounting for 8 percent of the world's resources, and its wind resources amount to 9 percent of the global potential.

- The ***biomass*** potential of Asian countries for power generation, many of which are still primarily agrarian economies, is recognized. Millions of people rely on biomass, such as crop and forest residues, for their cooking and heating needs and as a result are exposed to high indoor pollution. Several member countries have set targets to develop their biomass resources to meet their SDG 7 and SEforALL targets.

9. Energy production in Asia is characterized by fast increasing production of fossil fuels. During 2000–2014, Asia's fossil fuel production annual growth rate was: (i) 5.5 percent for gas, more than twice the global production growth rate; (ii) 6.7 percent for coal, 1.7 times the global rate; and (iii) 1.1 percent for oil, slightly higher than the global rate. Russia's fossil fuel production grew annually at 0.7 percent for gas, 2.8 percent for coal, and 3.6 percent for oil during the same period.

10. There are significant challenges to achieving energy sustainability:

- ***Rapidly growing primary energy consumption***. Asia's primary energy consumption grew at 4.5 percent per year from 2000 to 2014, more than twice the global growth rate of 2.2 percent. It increased from 3,528 million tons of oil equivalent (Mtoe) in 2000 to 6,576 Mtoe in 2014, accounting for 84 percent of the global increase in consumption during this period (Table 2). Of note, 98 percent of Asia's consumption increase was driven by demand in non-OECD Asia. Figure 1 below shows that China accounted for the largest share of Asia's consumption, followed by OECD Asia, India and the rest of Asia. In addition, Russia's primary energy consumption grew at 1.0 percent per year during 2000–2014, much slower than either the global or Asian rate.

Table 2: Total Primary Energy Consumption (Mtoe)

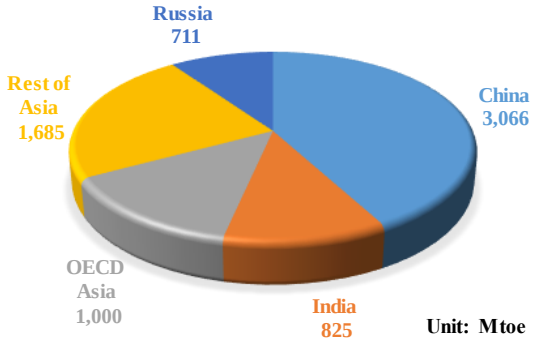
By Region	2000	2014	CAAGR* (2000–2014)
Asia	**3,528**	**6,576**	**4.5%**
China	1,175	3,066	7.1%
India	441	825	4.6%
OECD Asia	926	1,000	0.5%
Rest of Asia	986	1,685	3.9%
Russia	620	711	1.0%
World	**10,057**	**13,699**	**2.2%**

* CAAGR – Compounded Annual Average Growth Rate

Note: numbers are rounded

Source: Table prepared from International Energy Agency (IEA) Database

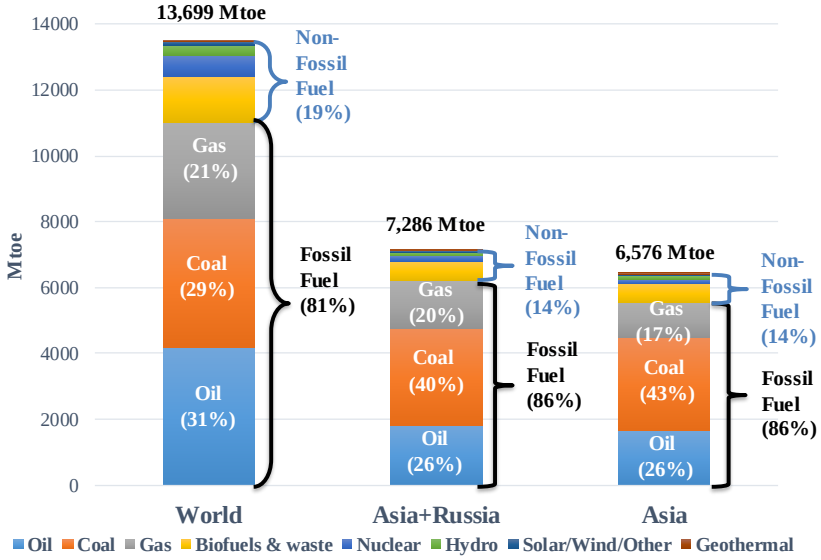
Figure 1: Breakdown of Total Primary Energy Consumption (2014)



Source: Figure prepared from IEA Database

- ***Dominance of fossil fuels***. Fossil fuels accounted for 93 percent of Asia's consumption increase during 2000–2014, and 85 percent of Russia's consumption increase during the same period, with non-fossil fuels making up the remainder in both Asia and Russia. Figure 2 shows that in 2014, Asia's reliance on fossil fuels was 5 percentage points higher than the global average, 86 percent compared to 81 percent. The higher percentage remains unchanged if Russia is added to Asia.

Figure 2: Dominance of Fossil Fuels in Asia, Asia + Russia, and the World (2014)



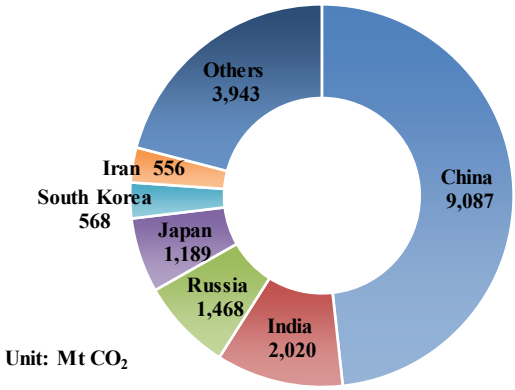
Source: Figure prepared from IEA and United States Energy Information Administration databases

- ***Declining energy intensity, but slower than the global average.*** Energy intensity in Asian countries declined steadily during 2000–2014, indicating increased EE. However, the decline of average energy intensity in Asia was less than the decline in the global average. The average rate of reduction of Asia's energy intensity was greater during 2010–2014 than during 2000–2010. Regionally, OECD Asia (excluding Turkey), Central Asia, Eastern Asia (excluding China) and Southeastern Asia achieved the improvement rate in energy intensity needed to

achieve the EE objective of SEforALL (target of 2.6 percent decrease per year). Russia's energy intensity also declined by 35 percent during 2000–2014. Its energy intensity decreased by 3.6 percent per year during 2000–2010 but slowed to 1.6 percent per year during 2010–2014, which fell short of the SEforALL target.

- ***Low access to modern energy***. Asia's population without access to electricity was estimated in 2012 at 464 million, about 43 percent of the world population without such access. Further, power system reliability in many countries does not meet the standards required by sophisticated equipment and the connectivity needs of households and businesses. According to the World Bank Enterprise Survey,[10] unreliable electricity services have been identified by enterprises as a major constraint in 10 Asian countries, including Afghanistan, Bangladesh, Georgia, Iraq, the Kyrgyz Republic, Lebanon, Pakistan, Papua New Guinea, Syria and Yemen. Moreover, according to the IEA, in 2013 about 2.7 billion people (about 38 percent of the world population) relied on traditional biomass combustion, with over 2 billion (about three quarters of the total) located in Asia and 1.43 million in Russia. This exposes these populations to indoor pollution and devastating health impacts. It is estimated by World Health Organization (WHO) that about 4 million deaths per year are attributable to the lack of access to non-solid fuels for use in lighting, cooking and heating.

Figure 3: Fuel Combustion-related CO_2 Emissions (2014)



Source: Figure prepared from IEA Database

- ***Rapidly increasing combustion-related carbon dioxide (CO_2) emissions.*** Asia's fuel combustion-related CO_2 emissions amounted to 17,362 Mt in 2014, up by 42 percent from its 2006 level. The growth rate, at 4.5 percent, was more than twice the global average during the same period. Although Asia's per capita energy consumption is below the global average, it is growing at a rate 2.5 times faster than the global average. Asia's carbon intensity was on a steady downward trend during 2006–2014, but at a slower pace than the rest of the world. Figure 3 shows that in 2014, five countries (China, India, Japan, South Korea, and Iran) accounted for more than three-quarters of Asia's total emissions. Russia's fuel combustion-related CO_2 emissions reached 1,468 Mt in 2014, amounting to 8 percent of Asia's emissions and 5 percent of the global total. Notably, Asia's emissions grew at 3.6 percent per year during 2006–2014, much faster than the 0.6 percent global

[10] Based on surveys of more than 125,000 firms globally.

average, while Asia's average per capita fuel combustion-related CO_2 emissions were 10 percent lower than the global average (4.47 tCO_2/capita) in 2014. Russia's per capita emissions were practically stable during 2000–2014 at 10.3 tCO_2 per capita, more than twice the global average.

- ***Extensive local pollution.*** PM_{10} – the WHO Urban Air Pollution database 2016 indicates that 16 of the 20 cities with the highest concentration of PM_{10} are located in Asia. The concentrations ranged from 256 to 540, amounting respectively to about 13 and 27 times WHO's recommended annual mean level.[11] $PM_{2.5}$ – another WHO report indicated that the 20 cities with the highest concentration of $PM_{2.5}$ in the world are also located in Asia.[12] Concentrations ranged from 88 to 153, amounting to about 9 to 15 times WHO's recommended annual mean level.

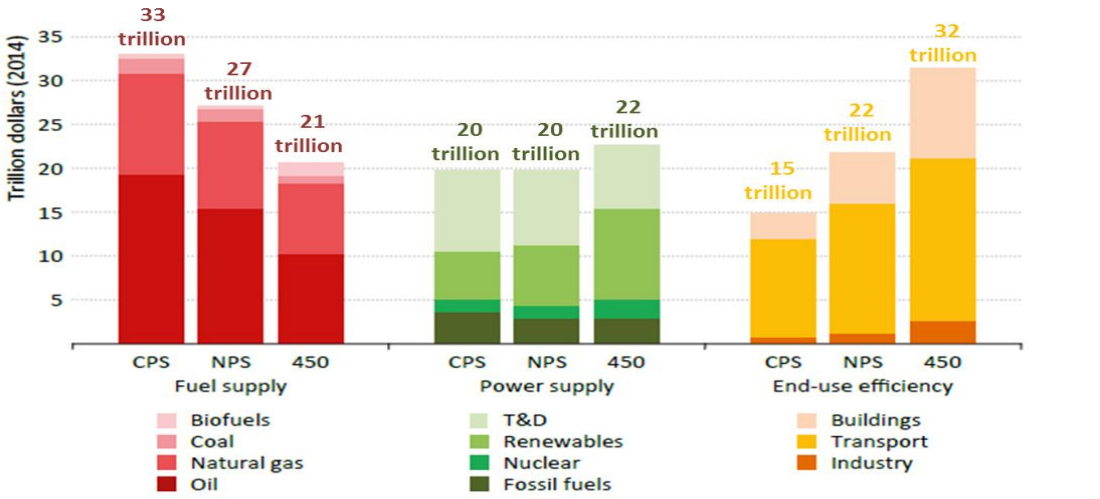
11. According to the IEA's 2015 World Energy Outlook scenarios (Figure 4), global energy investment during 2015–2040 would amount to US$68 trillion under the Current Policies Scenario, US$69 trillion under the New Policies Scenario and US$75 trillion under the 450 Scenario (in 2015 US$).[13] The IEA further pointed out that current energy investment trends "continued to shift in the direction of low-carbon sources and technologies, but not fast enough to meet energy security and climate goals."[14] To meet the Paris Agreement goals would require not only a significant investment increase, but also more focus on EE and renewable energy (RE). Energy investment in Asia and Russia has been estimated based on the 2014 World Energy Investment Outlook,[15] which focuses on energy investment requirements (in 2012 constant US$) for the New Policies Scenario and the 450 Scenario during 2016–2035:

- Global investment would amount to about US$44 trillion under both the New Policies Scenario and the 450 Scenario;
- Asia's investment would amount to about US$18 trillion under the New Policies Scenario and US$18.7 trillion under the 450 Scenario; and
- Russia's investment would amount to about US$2.3 trillion under the New Policies Scenario and US$2.5 trillion under the 450 Scenario.

[11] Adam Shirley, formative content, World Economic Forum at www.weforum.org (12 May 2016).
[12] Ross Chainey, Digital Media Specialist, World Economic Forum at www.weforum.org (25 June 2015).
[13] According to the IEA, the Current Policies Scenario takes into account only formally enacted policies and measures affecting energy markets as of mid-2015 and makes the assumption that these policies persist unchanged; the New Policies Scenario is the central scenario of the Outlook and it takes into account the already adopted policies and measures as of mid-2015, as well as other relevant commitments that have been announced, even when the precise implementation measures have yet to be fully defined; the 450 Scenario takes a different approach, adopting a specified outcome – the international goal to limit the rise in the long-term average global temperature to two degrees Celsius (2 °C) – and illustrating how that might be achieved.
[14] IEA (2016) World Energy Investment, page 159.
[15] Team estimate based on the results of the *World Energy Investment Outlook – Special Report, 2014* (IEA, Paris, 2014).

Figure 4: IEA 2015 World Energy Outlook Scenarios

Cumulative world energy sector investment, by sector and scenario (2015–2040)



Note: CPS = Current Policies Scenario; NPS = New Policies Scenario; 450 = 450 Scenario; T&D = transmission and distribution.

Source: IEA World Energy Outlook 2015

Lessons Learned from MDB Energy Sector Investment in Asia

12. The Bank's Strategy has been informed by the lessons drawn from evaluations of the Asia portfolios of the Asian Development Bank, the European Bank for Reconstruction and Development, the Islamic Development Bank and the World Bank Group.

13. The review by the Bank of the active Asia portfolios of these multilateral development banks (MDBs) indicates that:

- ***Transmission and distribution (T&D)*** financing accounted for the largest share of the MDBs' sovereign portfolios, ranging from 31 percent to 48 percent of total support to the public sector. For non-sovereign or private windows, T&D financing accounted for only 3 percent to 14 percent of total support to the private sector, reflecting the public sector dominance in this segment of the power industry in Asia.

- ***Zero carbon investments (EE and RE)*** accounted for between 20 percent and 41 percent of the total public loans and grants provided by each organization. They also accounted for a large share, from 39 percent to 67 percent, of the non-sovereign financial support. Intermittent (wind and solar photovoltaic) and still high-cost RE (geothermal and concentrated solar power) benefitted from grants and concessional lending. Examples of grant providers include the Global Environment Facility (GEF), Clean Technology Fund, Scaling up Renewable Energy Program, and International Development Association.

- ***Support to public thermal generation projects*** accounted for 7 to 23 percent of respective total sovereign loans. Support to private sector thermal generation accounted from 3 to 30 percent of total respective support to private sector energy investments.

- ***Financing of upstream activities (oil, gas and coal)*** accounted for 2 to 10 percent of total support to public energy projects. They accounted for 6 to 17 percent of total support to private sector projects. The number of projects and loan amounts were limited for sovereign and moderate for non-sovereign operations.

14. ***Evaluations of completed energy projects.*** Evaluations by other MDBs' independent evaluation departments show that the performance of energy projects has usually been higher than the average performance of overall portfolio. For projects that performed less well, many of the implementation problems concerned failure to address weak or inadequate legal and regulatory frameworks and to effectively implement institutional reforms related to corporatization, restructuring and privatization of energy subsectors.

15. Lessons relevant to the Bank's Strategy:

- T&D operations are straightforward in preparation and generally do not raise controversial or complicated implementation or policy issues. They should, however, integrate technological advances to improve management and efficiency of networks and empower consumers.
- Investments in RE and EE (especially at the demand-side level) are fragmented and require, in most cases, access to grants and/or concessional financing. They also require specialized skills and financial intermediation, especially for EE operations.
- Addressing institutional issues requires extensive policy analysis and dialogue, and the ability to provide technical assistance, often on concessional terms.
- There are ample opportunities for investments in oil and gas extraction as clients seek to improve the security of their energy supplies. However, such projects tend to involve higher risk and must be subject to thorough assessment.

Objective of the Energy Sector Strategy

16. The objective of the Strategy is to provide the framework, principles, and operational modalities to guide the Bank's energy sector engagement, including the development of its project pipeline and future subsectoral lines of business.

17. The Strategy embraces, and is informed by, the principles underpinning *SEforALL*, the *2030 Agenda for Sustainable Development*, and the *Paris Agreement* (see Box 1 above). It lays the framework for the Bank to support its client countries to: (i) develop and improve their energy infrastructure; (ii) increase energy access; (iii) facilitate their transition to a less carbon-intensive energy mix; and (iv) meet their goals and commitments under these global initiatives.

18. The Strategy is consistent with the Bank's "Lean, Clean, and Green" core values and its institutional goals. The Strategy embodies the Bank's three thematic priorities: *sustainable infrastructure, cross-country connectivity* and *private capital mobilization*. Implementation of the Strategy will be informed by the strategic and sectoral planning processes of its members at the regional, national and subnational level; it will also benefit from the work undertaken by other development partners in this sector. Regular monitoring and reporting

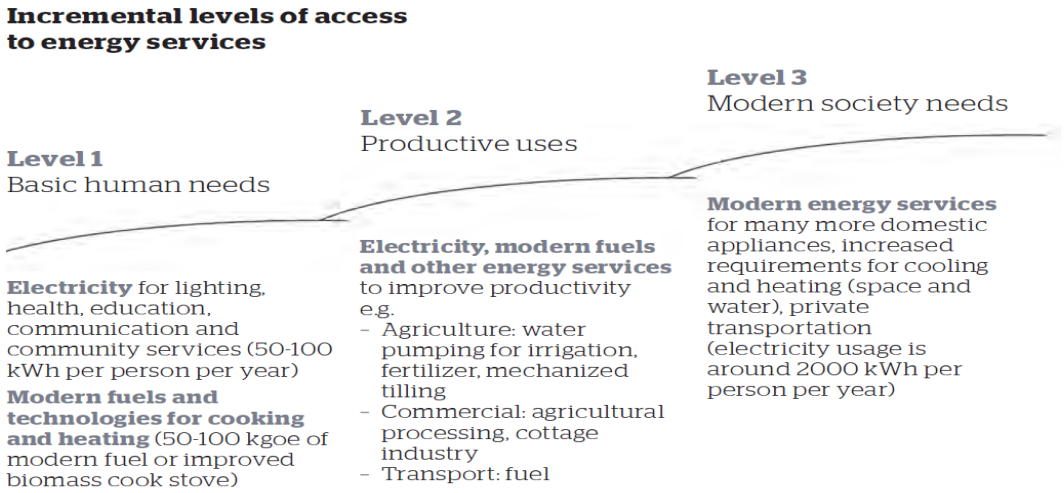
of portfolio composition will be an important discipline and help build a portfolio that reflects the Strategy and is aligned with the Bank's core values.

Guiding Principles

19. The Energy Sector Strategy is developed around six principles, which will guide the build-up of the Bank's energy portfolio during the early years of operation.

20. ***Principle 1: Promote energy access and security***. Lack of access or unreliable access to energy services deprives the most vulnerable people of economic and other opportunities to improve their lives. Bank financing for improved energy access and security will support clients in achieving Sustainable Development Goal 7 (SDG 7). The Bank will place emphasis on: (i) promoting, directly or indirectly, access to modern energy by those who currently have little or no access; (ii) improving the reliability of electricity supply; and (iii) reducing the negative health impacts caused by indoor combustion of solid fuels. In all these, gender will be considered. According to the IEA,[16] achieving universal electricity access for basic human needs by 2030 (Figure 5) would increase global greenhouse gas emissions by just 1.3 percent.

Figure 5: Access to Modern Energy Services



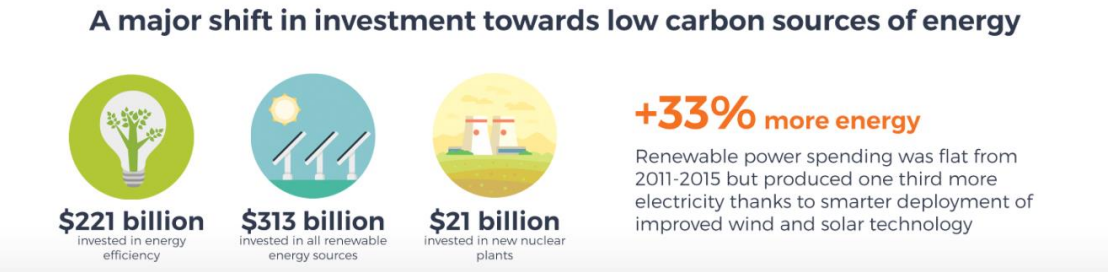
Source: Energy for a Sustainable Future: Summary Report and Recommendations, United Nations Advisory Group on Energy and Climate Change, 28 April 2010, New York, page 13

21. ***Principle 2: Realize energy efficiency potential***. International experience and primary energy forecasts by international institutions indicate that EE is one of the major means to achieve global environmental objectives. Prosperity and wellbeing can no longer be gauged by the consumption of energy but by the services derived from it. Given the high energy intensity in most non-OECD countries in Asia, the Bank will cooperate with other MDBs operating in Asia to tap the existing large, but dispersed, potential for EE in industry, buildings, and transport. Initially, the Bank will focus on projects that make the most of existing energy infrastructure stocks through: (i) rehabilitation and upgrade of existing generation plants, and (ii) aggressive loss reduction and utility-driven EE programs in power

[16] IEA (2009) World Energy Outlook, page 132.

and gas T&D networks. Over time, it will also develop financial instruments and engage with potential financial intermediaries in these areas.

Figure 6: Increased Low-Carbon Energy Production



Source: IEA 2016 World Energy Investment

22. ***Principle 3: Reduce the carbon intensity of energy supply***. Energy is the dominant contributor to climate change, accounting for around 60 percent of total global greenhouse gas emissions. The Bank will support clients to reduce the carbon intensity of energy to help them achieve their long-term climate goals provided in the Paris Agreement. According to the IEA 2015 World Energy Outlook (see Figure 4 above), energy infrastructure investments need to be reshaped to meet the Paris Agreement goals:

- Investments in fuel supply during 2015–2040 need to decrease from US$33 trillion in the Current Policies Scenario to US$21 trillion in the 450 Scenario, mainly through a considerable reduction in oil investments, a sizable reduction in coal investments, and slightly lower investments in natural gas (although gas investments will remain significant in all three scenarios);
- Investments in power supply during 2015–2040 need to increase from US$20 trillion in the Current Policies Scenario and the New Policies Scenario to US$22 trillion in the 450 Scenario. The power sector overall will need to focus more on RE (which will need to more than double to meet the goals of the Paris Agreement), and sustained investment in power T&D.

The IEA 2016 World Energy Outlook confirmed the message above, and showed that more ambitious investments would be required for RE and EE in the New Policies Scenario and the 450 Scenario. A major shift in energy investment towards low-carbon sources of energy was also reported by IEA in its 2016 World Energy Investment (see Figure 6 above).

23. The Bank will support energy investments that minimize adverse environmental impacts and also reflect clients' individual energy situations (e.g., energy resource endowment, affordability of capital-intensive investments, security of supply, etc.). During the transition to a lower carbon-intensive energy sector, fossil fuels will continue to play a significant role in the energy mix of most member countries. The Bank will support and accelerate its members' respective transitions toward a low-carbon energy mix through investments in RE and reduction of carbon emissions from fossil fuels.

24. ***Principle 4: Manage local and regional pollution***. The Bank will support its clients in reducing, limiting and mitigating the deleterious impact of pollution. Fossil fuel production, transport and consumption have severe negative impacts on the local environment, especially

in Asia's densely populated cities. Historically, issues related to local and regional pollution have been addressed mainly by limiting emissions of fossil fuel-based power generation, especially coal-fired plants. New projects are now being developed by MDBs and bilateral agencies to address local pollution specifically and comprehensively, to counter the negative impacts on health and wellbeing. The Bank will cooperate with other MDBs and bilateral agencies on these initiatives.

25. ***Principle 5: Catalyze private capital***. The Bank is committed to promoting private sector investments to help close the enormous infrastructure investment gaps in developing Asia. For varying reasons, to date, private capital investments in energy and infrastructure have been marginal in non-OECD countries, although partial credits, investment and country guarantees by MDBs have been instrumental in promoting successful projects in several countries. Innovative approaches have also been initiated using grants and concessional financing in some countries to reduce the cost of electricity generated under public-private partnerships (PPP) and/or to improve risk sharing in PPP ventures. The largest concentrated solar power generation project in Morocco supported by the World Bank and African Development Bank and the geothermal project supported by the World Bank in Indonesia are representative of the former approach, whereas the envisaged support of a geothermal PPP project in Nicaragua by the World Bank is illustrative of the latter. The Bank will: (i) explore innovative models to catalyze private investments, and significantly increase their contribution to meet the infrastructure needs of countries in Asia, especially those that are budget-constrained; (ii) build upon the successful experience of and lessons learned by MDBs operating in Asia, especially in PPPs, ensuring that the costs and risks are appropriately shared and distributed; (iii) explore with clients and private partners new cooperation modalities to meet country needs; and (iv) in doing so, avoid crowding out the private sector. When pursuing such opportunities, the Bank will evaluate risk carefully and ensure that appropriate measures are put in place to mitigate and manage such risks.

26. ***Principle 6: Promote regional cooperation and connectivity***. Regional integration and cooperation are essential to take advantage of synergies, increase market size to improve competitiveness, and create a critical mass for cooperative R&D and manufacturing capabilities. Efforts deployed by MDBs and bilateral agencies in Asian countries and other regions have had moderate success. The Bank will engage client countries and pursue regional connectivity of energy systems in Asia, especially power and gas, with a view to strengthening systems; improving the security and efficiency of energy supply; optimizing the use of resources; allowing for greater flexibility in their operation; reducing local, regional and global adverse environmental and social impacts; and fostering greater use of RE resources.

Implementation

27. The principles outlined above will guide the Bank's investment approach in the energy sector in its early years. As the Bank matures, accumulates experience, and its portfolio develops, these principles and the investment approach will be reviewed from time to time.

28. A future review of the Strategy would take into account the lessons of experience and integrate, for example, the following:

- Advances in scientific knowledge as emerging technology opportunities become available to accelerate the transition to sustainable energy systems (e.g., power and thermal storage), improve operational efficiency along the power supply chain (e.g., digitization), and facilitate better use of fossil fuel by limiting carbon and methane emissions (e.g., through carbon capture and storage); and
- Changed economic circumstances, as costs of RE technologies, especially wind and solar, are expected to continue the decreasing trend experienced over the last decade.

29. Application of the guiding principles will take into account, to the extent possible, client countries' constraints and uniqueness. Bank support to countries will be aligned with their national energy investment plans/strategies, including their NDCs under the Paris Agreement. All projects financed by the Bank will go through a comprehensive due diligence process to ensure that they meet the requirements of the Bank's Environmental and Social Framework (ESF).

Sectoral Approach

30. The Bank's process for selecting projects will focus on projects that, among others: improve country and regional connectivity; promote efficiency along the supply chain; and use proven, transformational, low carbon-intensity technologies that are economically and financially viable.

31. ***Power T&D.*** Power grid infrastructure development will be an essential component of the Bank's connectivity strategy and promotion of regional cooperation. Support for the development of T&D infrastructure remains indispensable to ensure transfer of generated electricity to demand centers without the bottlenecks and high losses that are hampering economic growth in many Asian countries. MDBs operating in the region have deployed great efforts but substantial investments are still needed to achieve SDG 7 and SEforALL goals of access to modern energy and allow smooth RE integration into power systems.

32. In 2015, global investments in T&D amounted to US$262 billion, or about 15 percent of total infrastructure investments. They are expected to increase, as greener infrastructure will require increased support to RE sources, which are generally far from load centers. International experience also indicates that strong transmission networks allow higher penetration of intermittent RE. In common with most MDBs, lower risk T&D projects are good vehicles for the Bank to build its project pipeline in the early years of operation. Support for power T&D is expected to be one of the core areas for Bank interventions, alone or in association with other MDBs or bilateral agencies. The Bank will support: (i) new T&D projects to increase power systems' resiliency to natural disasters, and assist member countries in "leapfrogging" to state of the art T&D technologies, digital solutions and smart grids to empower consumers, and operate systems efficiently; and (ii) rehabilitation and reinforcement of existing networks to increase their resiliency to natural disasters, reduce technical losses, allow smooth integration of intermittent RE and improve reliability of supply. Despite the generally lower risk of T&D projects, attention will be paid in their design to potential social impacts and risks of ecosystem fragmentation.

33. ***Energy efficiency (EE) investments***. Figure 4 above shows that limiting the world's rise in average temperature to "well below 2 degrees Celsius above pre-industrial levels"

(450 Scenario) would require more than doubling global EE investments. Demand-side EE investments are in most cases economically justified but financially challenging because of pervasive subsidization of fossil fuels and electricity. They are also usually small and fragmented. Their implementation requires financial intermediation and capacity building, as indicated by the most successful public and private sector projects implemented by MDBs to date. For example, investments in EE in new as well as older buildings, especially housing and small and medium enterprises, are often small-scale and might require retailing channels and specific financial instruments (such as financial intermediary loans) and technical assistance to build client capacity. Most EE activities undertaken by MDBs have been supported by grants to build the capacity of financial intermediaries to evaluate potential EE projects and monitor achievements during their implementation. At present, the Bank does not provide such technical assistance; however, it will cooperate with multilateral, bilateral and other partners to address this constraint.

34. The Bank will proactively support generators and utilities to: (i) improve the use of existing electricity generation stocks through rehabilitation, to reduce fuel consumption, introduce predictive maintenance methods, and upgrade regulation systems; (ii) develop and implement loss reduction programs at all levels of the electricity supply chain and demand-side management programs; (iii) design and implement utility-driven final use efficiency initiatives, such as green lighting and improvement in insulation of buildings; and (iv) enhance the efficiency of district heating networks and extend them to meet the needs of rapidly urbanizing cities. While developing the skills and approaches to develop its own portfolio, the Bank will partner with MDBs and bilateral agencies operating in the region to scale up efficiency programs.

35. ***RE investments.*** RE investments are essential to limit CO_2 emissions. The Bank will support clients to develop intermittent RE—hydropower, wind, solar, and other sources—to reduce fossil fuel consumption and increase access to modern energy through decentralized generation, and mini- and micro-grids. Data collected to date indicate that: (i) out of the 20 countries with the largest wind potential, only 4 are in Asia; (ii) out of the 20 countries with the largest solar potential, 8 are in Asia; and (iii) about two-thirds of the hydropower potential in Asia is untapped. Currently, the Bank does not manage grant funds other than its Special Fund for project preparation. To further promote RE development in client countries, the Bank will proactively:

- Support ***hydropower*** that is technically, economically, financially, environmentally and socially viable, in a manner consistent with the provisions of the Bank's ESF, good practices, and lessons learned from other MDBs operating in Asia and elsewhere. Development of hydropower, of different scales, in an environmentally and socially sound manner could make an important contribution to sustainable energy supply. This includes multi-purpose, run-of-the-river and pumped storage hydropower investments. The Bank has already engaged in co-financing the upgrading of generation capacity and rehabilitation of existing hydropower infrastructure to improve efficiency and dam safety. It will continue to pursue such capacity upgrading, rehabilitation and dam safety opportunities at existing facilities as they arise, where possible in combination with intermittent RE generation. The Bank's support for development of hydropower will seek to improve quality, more

comprehensively address environmental and social issues, and reduce the risk of these investments for the public and private sector.[17]

- Support intermittent centralized and decentralized RE generation. For ***wind and solar***, the Bank will build partnerships with other MDBs and bilateral agencies operating in Asia, and seek access to grants from global funds and partners, to improve the financial viability of investments in intermittent renewable technologies, and to share associated risks. The Bank will also promote ***distributed generation*** (e.g., mini- and micro-grids) to reduce burdens on centralized systems, increase RE penetration, and improve reliability of power supply.

- Support selected countries (including possibly high-income countries with sizable intermittent RE resources and the financial capacity to support them) to develop innovative and transformative projects, particularly ***solar*** with adequate storage. The Bank will explore the development of transformative, but still high-cost, technologies such as concentrated solar power, to contain consumption of fossil fuels and help create a market of scale for such technology. The latter could be done through increased cooperation among Asian countries, to tap the synergy of regional technological and manufacturing capabilities and make the RE programs more affordable and replicable at lower cost.

- Support the development of the significant ***geothermal*** resources identified in many Asian countries, alone or in partnership with other MDBs and bilateral agencies, through the development of new approaches to reduce resource risks. Sovereign loans to governments or state owned entities could be considered to confirm resources prior to requesting private sector proposals for power generation or PPP approaches based on appropriate resource risk sharing.

- Support, when appropriate and sustainable, modern ***biomass*** technologies to meet country energy needs, especially in rural areas, and development of biofuels, with particular attention to environmental and social impacts, including ecosystems, biodiversity and food security.

36. ***Local and regional pollution management.*** Stand-alone local and regional pollution management projects represent an emerging area of focus for MDBs operating in Asia. These projects address the debilitating impacts of local and regional pollution on Asian economies and populations. Economic valuations of local environment externality costs are country- and even sub-region-specific for these projects. They require detailed studies of the negative impacts of pollution on the economy and health of the population, as well as a broad range of economic assumptions, including sensitive assumptions such as the valuation of lost lives. The results of high-quality studies carried out in developed and some developing countries can, under carefully determined assumptions, be transferred to Asian countries where fewer studies have been carried out. The Bank will assist client countries in reducing local and

[17] This could be undertaken, where appropriate, as a two-phase process that would comprise: (i) a first phase to support basin-level hydropower planning, including strategic technical, economic, financial, environmental and social studies, leading to the identification of potential investments, to be followed by project-specific feasibility studies covering the same issues; and (ii) a second phase to support the construction of the hydropower investment and associated facilities, and implementation of the environmental and social mitigation and monitoring measures adopted for the project.

regional pollution, in partnership with MDBs and bilateral agencies. Over time, it will consider developing multi-sectoral approaches and instruments that contribute to the cleanup of Asia's highly polluted cities and/or regions. These could include initiatives addressing, for example, the problems of acid rain (SO_2), $PM_{2.5}$, and smog, etc.

37. ***Fossil fuel power generation investments***. The carbon intensity of power generation investments in 2015 was more than 4 times what it should be to achieve climate change stabilization in the next two decades (Figure 7). While fossil fuels will continue to play a significant role in the energy mix of most of its member countries, the Bank will focus on supporting and accelerating its members' respective transitions toward a low-carbon energy mix, including lower carbon emissions from fossil fuels. The Bank will finance investments that are demonstrably compatible with a country's transition toward sustainable, low-carbon energy and internationally agreed targets. Supported fossil fuel-based generation facilities would be expected to use commercially available least-carbon technology. In many countries, gas-fired power generation would form part of such transition. Carbon efficient oil- and coal-fired power plants would be considered if they replace existing less efficient capacity or are essential to the reliability and integrity of the system, or if no viable or affordable alternative exists in specific cases. The Bank will pay attention to the particular needs of its less developed members.

Figure 7: Investments in the Electricity Sector (2015)

Source: IEA World Energy Investments 2016

38. ***Oil and natural gas processing, transportation and distribution.*** Private sector involvement is more likely here than in other subsectors, as international oil and gas companies have the technology and financial strength to support such projects in many cases. In some countries in Asia, national oil and gas companies also are active in these subsectors and governments may express interest in Bank financing. The Bank will support such investments provided that they improve energy security or promote regional integration and trade. The Bank will also consider development, rehabilitation and upgrading of natural gas transportation (including storage) and distribution networks, and control of gas leakage, to foster greater use of gas during the transition to a less carbon-intensive energy mix/power sector, especially in Asia where such penetration is low compared to other regions.

39. ***Nuclear power generation***. Financing of nuclear plants will not be considered by the Bank. Should demand arise for very special cases of support for safety improvement, the Bank could possibly consider engagement. The Bank does not anticipate developing the

highly specialized expertise required to be involved in technically complex and capital-intensive nuclear projects.

40. ***Adaptation projects.*** Climate change adaptation is emerging as an MDB business line in association with grant facilities, such as the Green Climate Fund (GCF), GEF and climate change trust funds. A recent study[18] on infrastructure finance noted "it was estimated that between 10 and 15 percent of the (future) required infrastructure investment could be attributed to making such investment (including adaptation) sustainable, by ensuring lower emissions, higher efficiency and resilience to climate change." The Bank will partner with MDBs and bilateral agencies to support such efforts in the Asian countries most threatened by climate change.

Cross-Cutting Issues

41. Global environmental and SEforAll goals and principles are widely accepted and embraced by other MDBs, bilateral agencies, and clients. However, their realization is not always straightforward. Green energy investments require: (i) new approaches to evaluate their economic viability because they may not be economically justified according to the assumptions traditionally used by most MDBs; (ii) highly skilled and diversified teams and a solid knowledge base; (iii) addressing environmental and social aspects; (iv) taking gender into account; and (v) effective coordination among sectoral teams within the financing institutions to meet client needs efficiently. These issues are discussed below.

42. ***Developing a solid base for economic evaluation.*** The economic evaluation of energy projects raises issues relating to the assumptions used for discount rates, carbon price and externality costs of local pollution, such as: (i) high discount rates indicate a strong preference for the present; (ii) low carbon prices underestimate the economic impacts of climate change; and (iii) low local and regional pollution externality costs lead to pollution levels beyond the absorption capacity of the environment, as experienced in most Asian cities. The Bank will use an appropriate discount rate and shadow price for carbon emissions and other externalities in its economic evaluation of projects to determine their economic viability. Considering the lack of consensus about discount rates and carbon prices, the Bank will test the robustness of its economic analyses using a range of different discount rates and carbon prices.

43. ***Building highly skilled multi-disciplinary teams.*** Highly skilled teams are a prerequisite to developing a strong and diversified energy portfolio. In line with its lean approach to staffing, the Bank will progressively build a highly skilled and diversified team of staff and consultants with recognized expertise in technical, economic, financial, environmental and social aspects of project conception, preparation, evaluation and supervision. For example, specialists with strong technical expertise in hydropower and environmental and social issues are needed to engage with clients in developing hydropower schemes. High-quality staff/consultants directly contribute to a high-quality portfolio and successful project outcomes. In implementing the Strategy, the Bank will focus on developing and deepening its sectoral expertise and knowledge. In the early stages of its

[18] Amar Bhattacharya, Mattia Romani and Nicholas Stern, (2012) *Infrastructure for Development: Meeting the Challenge* (London, Centre for Climate Change Economics and Policy Grantham Research Institute on Climate Change and the Environment).

energy portfolio development, the Bank will build partnerships with other MDBs, bilateral agencies, private financial institutions, think tanks and academia to ensure that its energy team has timely access to existing knowledge bases and sectoral developments. The Bank also recognizes the importance of a supportive policy environment for project success. While the Bank does not foresee support for policy-based financing instruments, it may develop programmatic loans and performance-based lending instruments that are tailored to client needs and circumstances.

44. ***Addressing environmental and social aspects.*** The provisions of the ESF and the Public Information Interim Policy will guide implementation of the Strategy. Energy system impacts include not only climate change and air pollution, but also impacts on human settlements, land use and livelihoods, as well as on water bodies, landscapes, ecosystems and species. As appropriate, environmental and social assessment – both strategic and project-specific – and other specialized instruments, including project-level grievance redress mechanisms, will be used to address environmental and social aspects of operations. Climate risks will be evaluated and mitigation and adaptation measures developed where appropriate. In the case of financial intermediaries, attention will be paid to their capacity for environmental and social management and careful screening of subprojects. The Bank is developing a framework, including work led by the independent Compliance, Effectiveness and Integrity Unit, to ensure policy compliance and grievance procedures to address complaints in its energy sector operations, as in other sectors of the Bank's work.

45. ***Taking gender into account.*** The Bank recognizes that access to modern, sustainable energy and energy-based technologies can significantly enhance women's lives by reducing their time and labor burdens, improving their health, and providing them with opportunities to engage in economic activities. Women can thus increase their incomes through entrepreneurship, and young girls can attend school. The transition to sustainable energy creates benefits and opportunities for both women and men, such as employment generation, market opportunities, and better health conditions. The Bank will seek to ensure that women's needs and capabilities are taken into account in development of its energy portfolio, and that women are included in project consultations.

46. ***Promoting collaborative approaches among infrastructure subsectors.*** In developing its portfolio, the Bank will promote holistic approaches to energy sector development. The Bank aims to: (i) ensure that its other sector strategies recognize the importance of energy and incorporate EE in the Bank's core business; and (ii) promote intra-sectoral collaboration to meet client needs in the most efficient way and maximize synergies among the different subsectors. Examples may comprise: EE and sustainable urban infrastructure, including energy efficient buildings; transport sector initiatives that improve carbon and EE outcomes; multi-purpose dams with agricultural, industrial and urban sectors as users; and access to modern energy within the rural development and agricultural sectors.

Results Monitoring Framework

47. The Bank will monitor outcome and output indicators to assess the alignment of its evolving energy portfolio with the Strategy principles. The Results Monitoring Framework is attached in Annex 2.

Annex 1: Definitions for Asia and Region and Income Classification

In this document, references to "Asia" and "Region" include the geographical regions and composition classified as Asia and Oceania by the United Nations. This definition does not include Russia. However, Russia is a regional member of the Bank and therefore is listed separately, or additionally, in various places in this document. In this analysis, the Asian countries are broadly divided into 3 groups:

- *Five Members of the Organisation for Economic Co-operation and Development (OECD).* They are Japan and South Korea from Eastern Asia, Australia and New Zealand from Oceania, and Israel from Western Asia.

- *Three individual countries – China, India (Non-OECD) and Turkey (OECD)*, are examined separately from their regions because of their size or their different energy characteristics.

- *The Rest of Asia*, which is defined as Asia excluding 6 OECD countries, China and India. The Rest of Asia is then classified into six subregions: Eastern Asia, Southern Asia, Southeastern Asia, Central Asia, Western Asia and Oceania, according to the geographical classification adopted by the United Nation Statistics Division (UNSD) (Figure A.1). *Regionally*, 23 countries/territories are in Oceania, 16 in Western Asia, 11 in Southeastern Asia, 8 in Southern Asia, 4 in Eastern Asia, and 5 in Central Asia.

Figure A.1: UN Geo-scheme of Regional and Subregional Groups

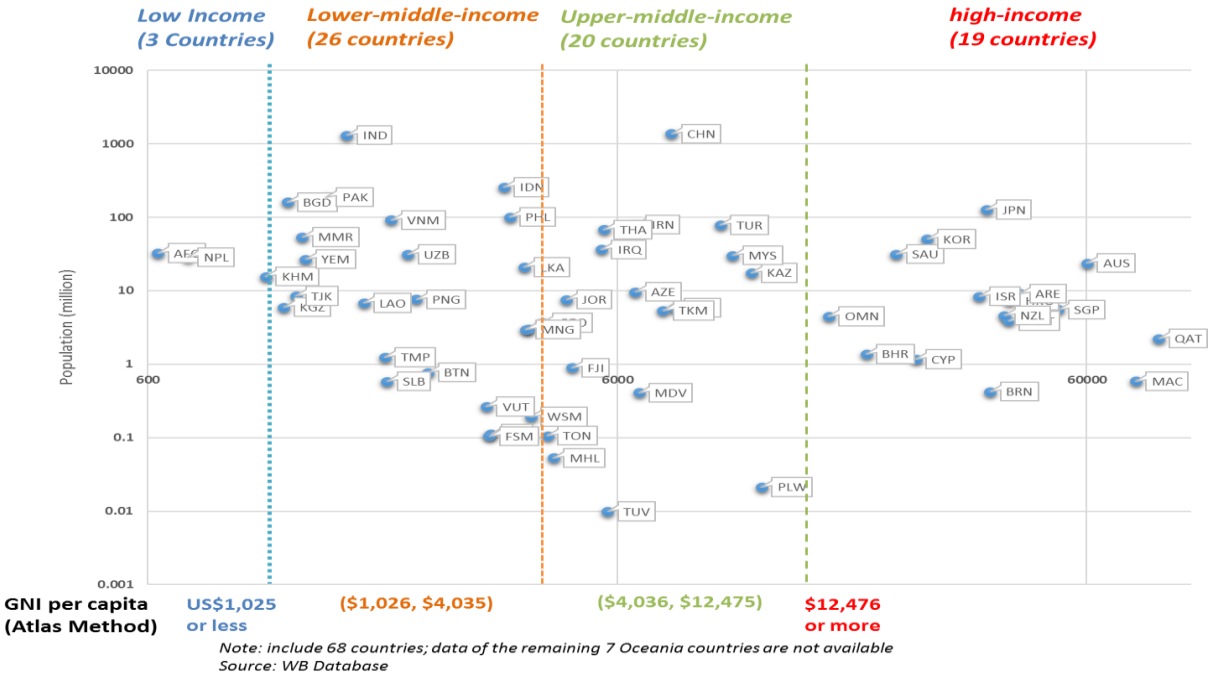
Note: Statistical regions as defined by UNSD. Antarctica is omitted.
Source: CC BY-SA 3.0 based on geographical subregions and breakdown by country information obtained from *unstats.un.org/unsd/methods/m49/m49regin.htm*

The Asian countries can also be grouped into four income classes according to World Bank Income Classification Criteria.[19] As illustrated in Figure A.2, there are 3 countries /

[19] *Low-income economies* are defined as those with Gross National Income (GNI) per capita, calculated with the World Bank Atlas method, of US$1,025 or less in 2015; *Lower-middle-income economies* are those with a GNI per capita between US$1,026 and US$4,035; *Upper-middle-income economies* are those with GNI per capita between US$4,036 and US$12,475; and *high-income economies* are those with GNI per capita of US$12,476 or more. *Source: datahelpdesk.worldbank.org/knowledgebase/articles/906519*

territories classified as low-income; 26 as lower-middle-income; 20 as upper-middle-income; and 19 as high-income.[20]

Figure A.2: Income Classification of Countries in Asia



Note: include 68 countries; data of the remaining 7 Oceania countries are not available
Source: WB Database

[20] In total, 68 countries/territories, as data for the remaining 7 Oceania countries are not available from World Bank database.

Annex 2: Results Monitoring Framework

As part of the implementation of the Energy Sector Strategy, and in line with the six Guiding Principles of the Strategy, the Bank will monitor outputs and outcomes from its energy investments guided by the Principles that contribute to the development objectives of client countries. Key output/outcome indicators have been selected on the basis that they are clear, relevant, and monitorable, and can be aggregated at the portfolio level. All energy projects financed by the Bank will include these indicators in their results framework where applicable. Project level indicators will be aggregated across the Bank's energy investment portfolio to monitor progress towards implementing the Energy Sector Strategy. Total investment guided by each Principle will also be tracked and reported. These indicators will be revisited and refined as experience is gained during the Bank's early years of operation.

Guiding Principles	**Portfolio Level Output / Outcome Indicators**	**Investment amount (US$ million)**
Promote energy access and security	Total generation capacity installed, MW Total T&D lines / pipelines financed, km Number of households with increased access to electricity (grid and non-grid), million	Amount of Bank investments in energy access
Realize energy efficiency potential	Primary energy consumption saved, GWh	Amount of Bank investments in energy efficiency
Reduce the carbon intensity of energy supply	Renewable generation capacity installed, MW Greenhouse gas emission reduction, tons of CO_2 equivalent per year	Amount of Bank investments to reduce carbon intensity of energy supply
Manage local and regional pollution	* measured at specific project level, *e.g.* reduction of CO_2, NO_x, SO_2 and particulate matter, tons per year	Amount of Bank investments in local pollution management
Catalyze private capital	* Cross reference to relevant indicators in the Strategy on Mobilizing Private Capital	Amount of non-sovereign backed Bank energy investments
Promote regional cooperation and connectivity	* measured at specific project level, *e.g.* cross-border transmission of electricity (GWh per year) and natural gas (bcm per year)	Amount of Bank investments to support cross-border trade of electricity and natural gas