ADB Business Opportunity Seminar

18 August 2020

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BUSINESS OPPORTUNITIES

Outline of Presentation

- Energy Access, Energy Mix and Cos Emissions in Developing Asia, 2018
- ADB Energy Sector Operations: Guiding Principles
- Energy Sector Lending, 2009-2019
- Energy Sector Pipeline, 2020-2022
- Opportunities for Developing Asia in the Clean Energy Transition

Progress and Challenges in Asia and the Pacific

- Asian Developing Countries are on track in meeting SDG 7 for electricity access by 2030; but will not achieve 100% clean energy access by 2030
- High share in coal for power generation (60%+) in East, Southeast and South Asia, and high share of oil in the Pacific, low carbon transition is more difficult than in other regions
- Most DMCs cannot meet their NDCs without external support. Moreover, NDCs that are intensity based and therefore economic growth will still grow emissions even with aggressive actions to reduce energy emissions Asia's coal fleet is quite young and therefore will produce GHG's for many years.
- For Asia and the Pacific to achieve 1.5 degrees Celsius requirement under Paris Agreement, new technologies are needed.

Energy Access in Developing Asia, 2018

Country	Proportion of the population with access to clean cooking (%)	Proportion of the population with access to clean cooking (%)
People's Republic of China	72	>99
Indonesia	68	98
Cambodia	20	72
Laos	6	95
Myanmar	21	43
Philippines	44	>95
Thailand	76	>95
Viet Nam	73	>95
India	49	95
Bangladesh	19	85
Nepal	30	94
Pakistan	46	77
Sri Lanka	28	>95
Other Asia	35	63

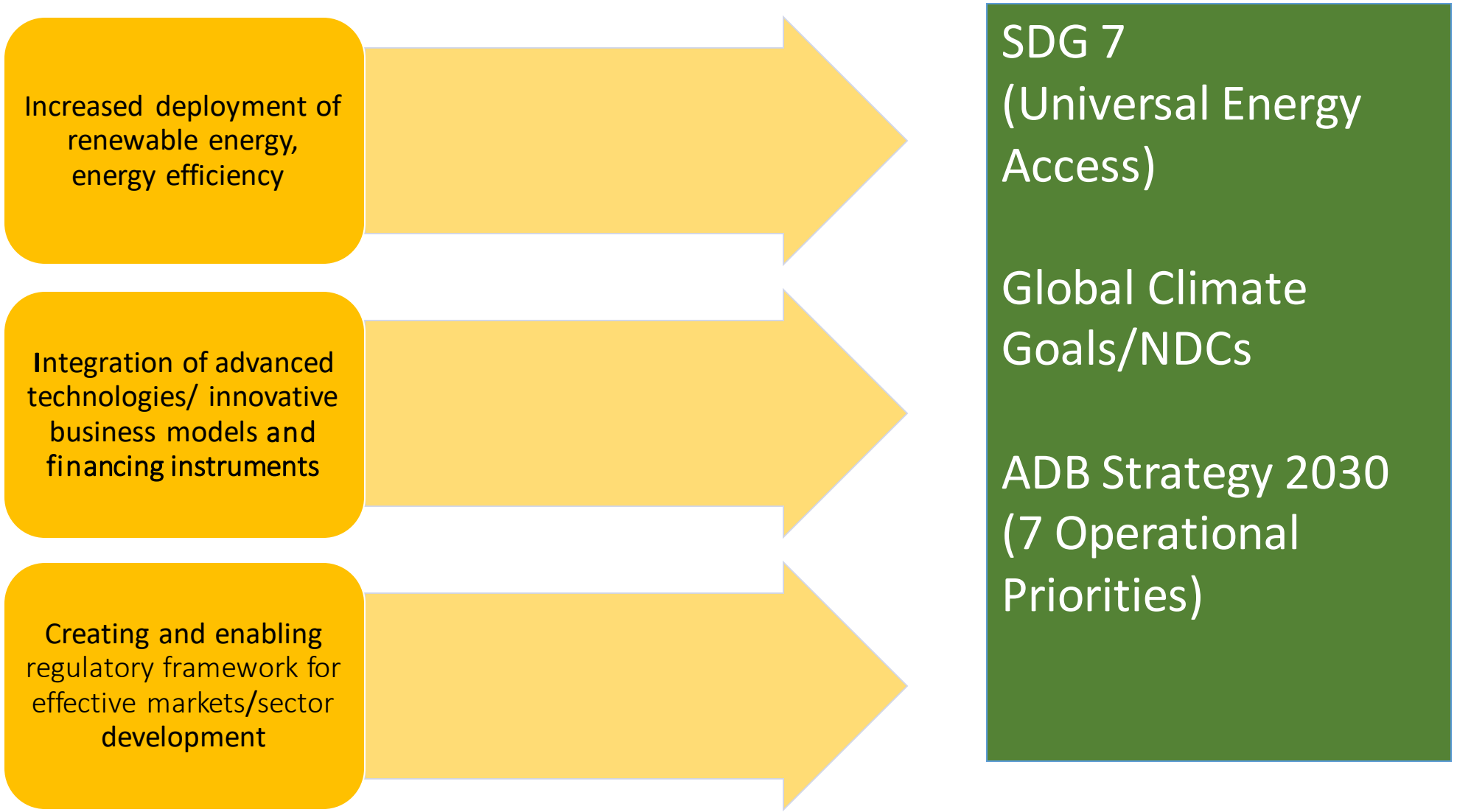
Source: IEA. World Energy Outlook. 2019

Energy Mix and Related CO_2 Emissions, 2018

%, Share	World	OECD	A&P[a]	USA	GER	FRA	AUS	JPN	KOR	PRC	IND
Oil	33.6	38.9	28.3	40.0	34.9	32.5	37.0	40.2	42.8	19.6	29.5
Natural gas	23.9	26.6	11.9	30.5	23.4	15.1	24.7	21.9	16.0	7.4	6.2
Coal	27.2	15.2	47.5	13.8	20.5	3.5	30.7	25.9	29.3	58.2	55.9
Nuclear	4.4	7.9	2.1	8.4	5.3	38.5	–	2.4	10.0	2.0	1.1
Hydropower	6.8	5.7	6.5	2.8	1.2	6.0	2.7	4.0	0.2	8.3	3.9
Renewables[b]	4.0	5.8	3.8	4.5	14.6	4.4	5.0	5.6	1.6	4.4	3.4
Total primary energy consumption (Mtoe)	**13,865**	**5,669**	**5,986**	**2,301**	**324**	**243**	**144**	**454**	**301**	**3,273**	**809**
Total primary energy consumption per capita (toe/capita)	**1.83**	**4.35**	**...**	**7.03**	**3.91**	**3.62**	**5.77**	**3.59**	**5.83**	**2.35**	**0.60**
Total CO_2 emissions (Mt)	**33,891**	**12,405**	**16,744**	**5,145**	**726**	**312**	**417**	**1,148**	**698**	**9,429**	**2,479**
CO_2 emissions per capita (tons/capita, 2014)	**4.98**	**9.55**	**...**	**16.50**	**8.89**	**4.57**	**15.39**	**9.54**	**11.57**	**7.54**	**1.73**

Source: ADB. Asia's Journey to Prosperity: Policy, Market and Technology Over 50 Years

ADB Energy Sector Operations: Guiding Principles



Energy Sector Project Criteria:
Peer Review Screening Questions

i. Contribution to SDG7 (Universal energy access, number of households connected)

ii. Contribution to the country's nationally determined contributions (NDC) under the Paris Agreement (tons of CO2-eq reduction)

iii. Contribution to ADB climate finance targets ($ million investment)

iv. Adoption of advanced technologies, new business models and/or innovative financing instrument/needed sector and regulatory reform

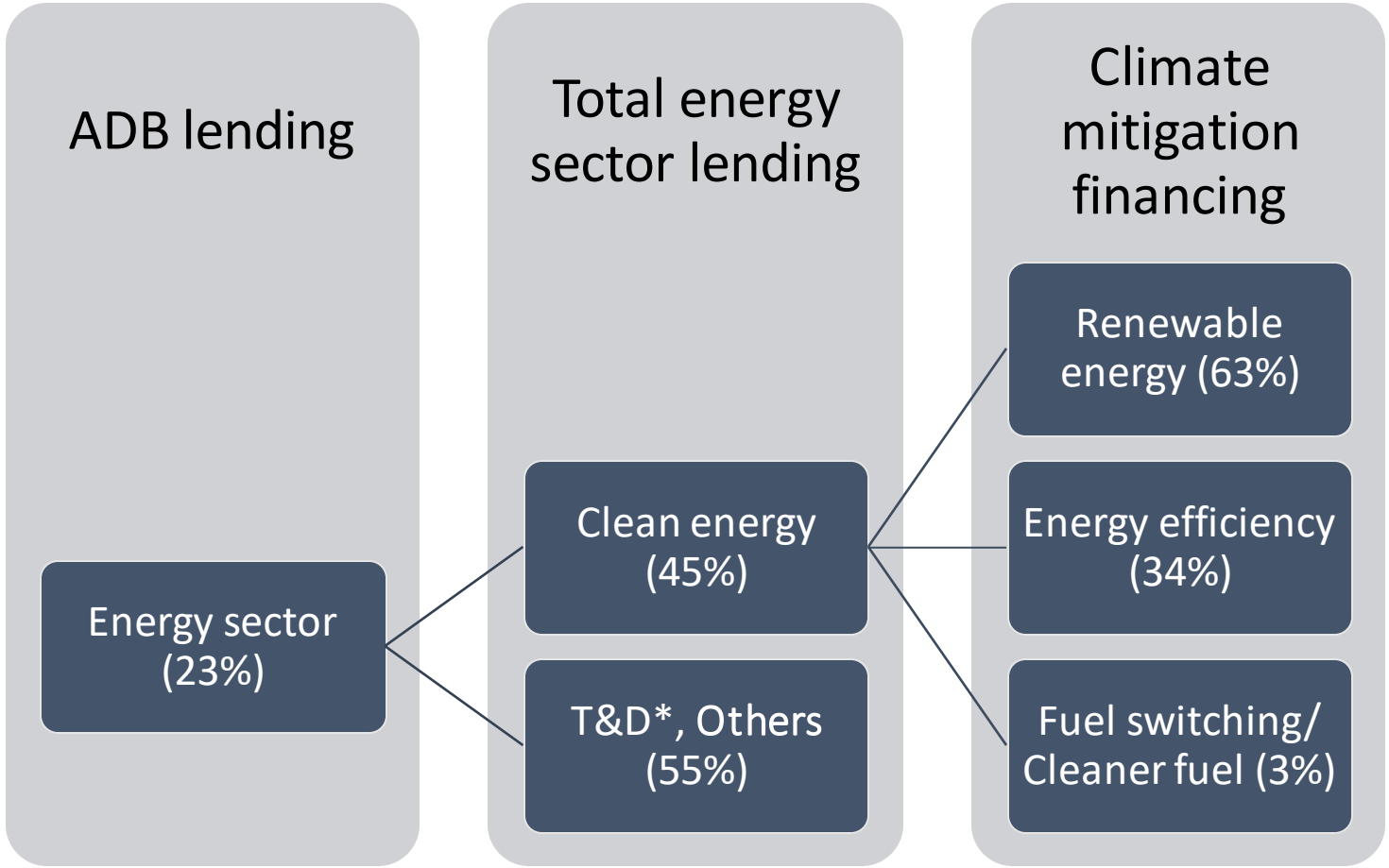
v. Energy sector specific contribution to 7 OPs under Strategy 2030

Energy Sector Contributions to S2030
7 Operational Priorities

Increased access to clean energy to meet basic needs, income generation through RE employment	OP 1: Addressing **remaining poverty and reducing inequalities**
Job creation and skills development for women in RE; productive use of women's time for income generation	OP2: Accelerating **progress in gender equality**
Climate change mitigation and adaptation, air quality improvement, energy water nexus	OP3: Tackling **climate change, building disaster resilience**
Supporting energy smart buildings, electric vehicles, **microgrids, waste-to-energy, and demand-side energy efficiency**	OP4: Making **cities more livable**
Distributed renewable energy applications in irrigation and agriculture (e.g. solar pumping), biomass-to-energy	OP5: Promoting **rural development and food security**
Promoting energy sector reforms and enabling clean energy development	OP 6: Strengthening **governance and institutional capacity**
Promoting energy connectivity, cross-border clean energy trade, and knowledge exchange	OP 7: Fostering **regional cooperation and integration**

Energy Sector Lending, 2009-2019

Average annual share, in percent



BUSINESS OPPORTUNITIES

Energy Sector Lending in 2019

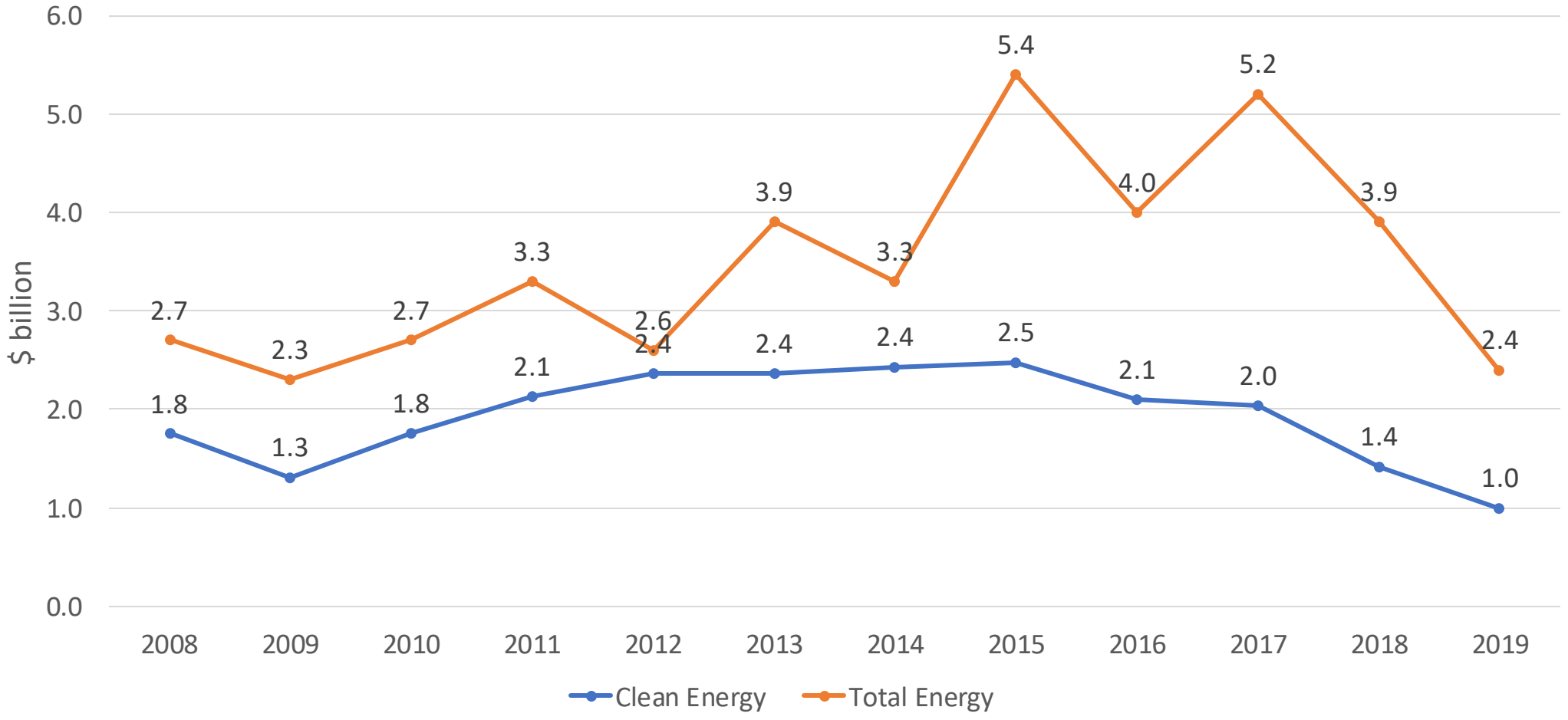
- Total approvals in the Energy Sector in 2019 amounted to $2.4 billion including $ 0.40 billion from PSOD (17% of total energy sector lending)
- Total climate mitigation finance approved in the sector in 2019 amounted $1.0 billion including $0.33 billion from PSOD (or 29% of the total climate financing)
- Transmission and distribution projects without energy efficiency improvement and greenfield natural gas projects are usually not considered as climate financing.

Amount	CWRD	EARD	PARD	PSOD	SARD	SERD	Total
Total	460.0	460.0	85.2	419.1	1,001.0	7.6	2,432.9
Climate Finance	200.0	87.3	85.2	333.7	452.6	7.6	1,166.4
- Mitigation	189.8	78.4	77.6	333.7	357.4	6.5	1,043.4
- Adaptation	10.2	8.9	7.6	0.0	95.2	1.1	123.0
T & D, Others	260.0	372.7	0.05	85.4	548.4	0.0	1,266.5

Contributions to S2030:
Energy Projects by Operational Priority in 2019

S2030 Operational Priority	Number of projects
Addressing remaining poverty and reducing inequalities	8
Accelerating progress in gender equality	9
Tackling climate change, building disaster resilience	24
Making cities more livable	3
Promoting rural development and food security	1
Strengthening governance and institutional capacity	8
Fostering regional cooperation and integration	4

Energy Sector/Clean Energy Finance 2009-2019
(Approvals in $ billion)



Past Trends in Clean Energy Investments

Clean energy finance fell from $2.5 billion in 2015, $1.4 billion in 2018 to $1.0 billion in 2019, due to:

Globally:

- declining cost of renewable energy (solar, wind) vs. technical limits on additional renewable energy capacity
- reduced subsidies (most countries have stopped feed-in-tariff), thus higher market risk – learning curve for investors

ADB:

- as renewable energy markets mature, commercial banks more active in providing funding
- increasing support to distributed energy systems (rooftop solar, mini-grids etc.) that are smaller in size

Projected Energy Sector Lending in 2020-2022

- In 2020, energy sector sovereign lending approval program is $6 billion* :

- Clean Energy : $2.4 billion, i.e. 40%
- Transmission & distribution: $2.6 billion, i.e. 43%
- Others (sector project, gas): $ 1 billion, 17%

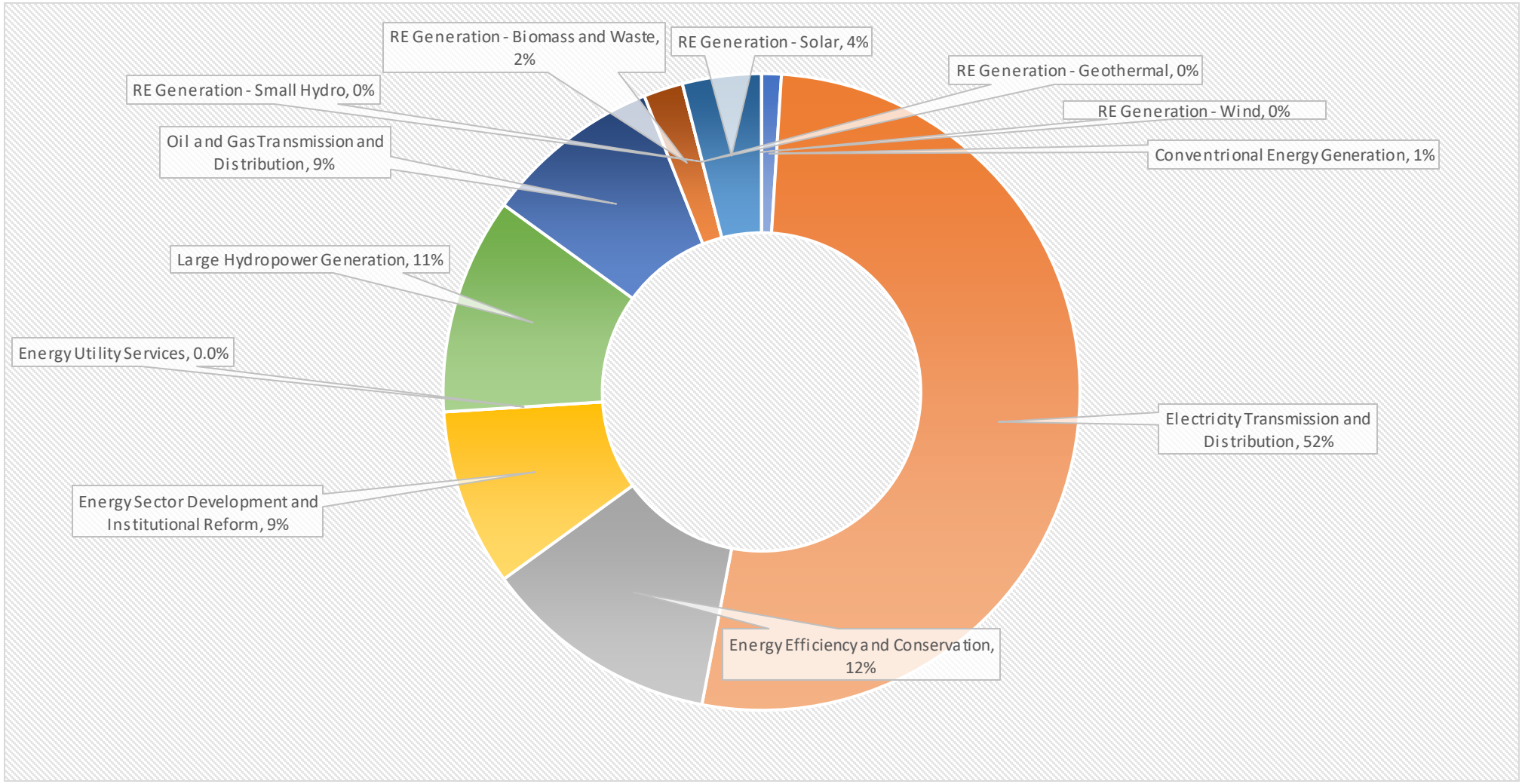
- As of 28 May 2020, $907 million loans () approved in energy sector. Due to Covid-19, challenges in delivering this program because DMCs' priorities for resources allocation and field work constraints

- In 2021-2022, the projected average lending will be $5 billion/year, with clean energy representing about 40-50% of the lending.

**Based on data from the WPBF 2020-2022*

Energy Sector Sovereign Operations Pipeline, 2020-2022

Average share per year by subsector in percent



ADB Innovation Challenges
($2.0 million supported by HLT Fund)

- **Clean heating and efficient cooling ($0.5 million)**
  - Energy efficient and renewable energy sourced heating and cooling technologies
- **Sustainable renewable energy-based microgrids ($0.5 million)**
  - Renewable energy based micro-grid or off-grid power electrification with storage solutions/blockchain applications
- **Artificial intelligence (AI) for energy demand management (0.5 million)**
  - Monitoring & analyzing the supply & demand data and optimizing the efficient use of energy
- **Clean and Disease Resilient Centralized Air Conditioning in Public Buildings (0.5 million)**
  - Deployment of digital technologies to operate the A/C systems with high efficient filters

Energy Sector Knowledge Work

- Technical Handbooks
  - Handbook on microgrids
  - Handbook on waste-to-energy
  - Handbook on energy storage

- Op-ed/Blogs
  - “How to mobilize $1 trillion for 1 trillion watts of solar power”
  - “It’s clean, powerful and available: Are you ready for hydrogen energy?”
  - “Artificial intelligence and human education, needed to advance energy efficiency”

COVID-19 Pandemic: Challenges and Opportunities

- Global CO2 emissions -17% by April 2020; whole year about -4% in 2020. Rebound expected in 2021.
- Electricity demand -20% by April 2020, share of fossil fuels -30%, renewable energy generation +10% in developed countries (renewable energy generation has priority in dispatch)
- However, renewable energy projects in many DMCs suffered delays due to supply and travel interruptions – need to develop local manufacturing capacity and technical skills
- Opportunities to remove fossil subsidies and introduce carbon pricing when oil price and demand are low

Review of Energy Policy 2009

- The energy landscape of the region is going through profound changes since the introduction of Energy Policy 2009.
    - Falling cost of renewable energy
    - Emerging new and innovative energy technologies

- Global commitments to universal access and climate action play a key role in shaping the energy system.
    - SDGs – Goal 7: Universal Energy Access
    - Nationally Determined Contributions (NDCs) for GHG reduction

- To remain relevant and effective in assisting DMCs and to be in line with Strategy 2030, ADB will review its Energy Policy in 2019-2020.

Annex
Examples of Innovative Projects

Addressing Remaining Poverty and Reducing Inequalities

Tackling Climate Change, Building Disaster Resilience, and Enhancing Environmental Sustainability

Accelerating Progress in Gender Equality

Strengthening Governance and Institutional Capacity

UZB: Distribution Network Modernization Program

- Sovereign operations
- Subsectors: Electricity Transmission & Distribution; Energy Efficiency
- Approval by Q4 2019
- Results-based loan
- $600 million (OCR)

- **Issues:** (i) high electricity losses from lack of investment in modern distribution assets; (ii) urban-rural disparities are widened due to unreliable supply of electricity; and, (iii) inadequate sector reform and institutional capacity of newly created power entities.
- **Approach:** Complements ongoing sector reform through the engagement with newly established distribution utility and prepares near-term private sector participation through the introduction of specific measures for public-private partnership. Demonstrates One ADB approach through collaboration among CWEN, OPPP, SDCC , and URM.
- **Design/Innovative Solution:** Proposed program adopts the result-based lending modality to support:
  i. Deployment of smart meters nation-wide starting with 3 priority regions
  ii. Sector reform through disbursement-linked actions for the commercialization and corporate governance of the new distribution utility
  iii. Effective gender mainstreaming through female-targeted programs (communication, gender-segregated customer database, social program, and gender equality policy)

PRC: Air Quality Improvement in the Greater Beijing-Tianjin-Hebei Region - Henan Cleaner Fuel Investment Program

- Sovereign operations
- Subsectors: Energy Efficiency; Renewable Energy - Biomass
- Approval by Q4 2019
- Results-based loan
- $300 million (OCR)

- **Issues:** Henan province is one of the major air pollutant emitters in the Greater Beijing-Tianjin-Hebei Region and highly dependent on coal. Gas supply has increased significantly in cities, but semi-urban and rural areas remain unserved due to high capital cost of connecting scattered population with low demand size, and persistence in use of traditional energy sources.
- **Approach:** Facilitate fuel switch from coal to natural gas and biogas in industrial, commercial, and household energy use in semi-urban and rural areas of Henan.
- **Design/Innovative Solution:** Proposed program adopts the result-based lending (RBL) modality to support cleaner fuel switch by
  i. Developing the gas distribution system
  ii. Pilot piped biogas production facility – proposed technology dry anaerobic fermentation
  iii. Awareness campaign on use of cleaner fuel – behavior change of rural population
  iv. Public private collaboration - institutional capacity enhancement for sustainable program implementation and mobilizing local commercial co-financing (China Development Bank $200 million).

Addressing Remaining Poverty and Reducing Inequalities

Accelerating Progress in Gender Equality

Tackling Climate Change, Building Disaster Resilience, and Enhancing Environmental Sustainability

TON: Renewable Energy Project

- Sovereign operations
- Subsector: Electricity Transmission & Distribution
- Approved on 11 March 2019
- $12.2 million project loan (ADF)
- Green Climate Fund grant co-financing: $29.9 million
- Government of Australia grant: $2.5 million

- **Issues**: multiple challenges (climate change, energy insecurity and high electricity cost, and low energy access rate)
- **Approach**: assist Tonga generate more than 50% renewable energy by 2020 and 70% by 2030. The project will create technically enabling environment for IPPs: a 6 MW solar PV of IPP transaction is being finalized (PSDI provided transaction advisory services, and PSOD is considering to co-finance the transaction under Pacific Renewable Energy Program approved in 2019)
- **Design/Innovative Solution:**
  - The project is under Pacific Renewable Energy Investment Facility (approved in 2017)
  - A large battery energy storage system capacity in the main island to store intermittent electricity renewable energy
  - Solar PV, hybrid system, and grid technologies and management upgrade in the outer islands
  - Effective gender mainstreaming

Addressing Remaining Poverty and Reducing Inequalities

Making Cities More Livable

Tackling Climate Change, Building Disaster Resilience, and Enhancing Environmental Sustainability

BAN: Dhaka and Western Zone Transmission Grid Expansion

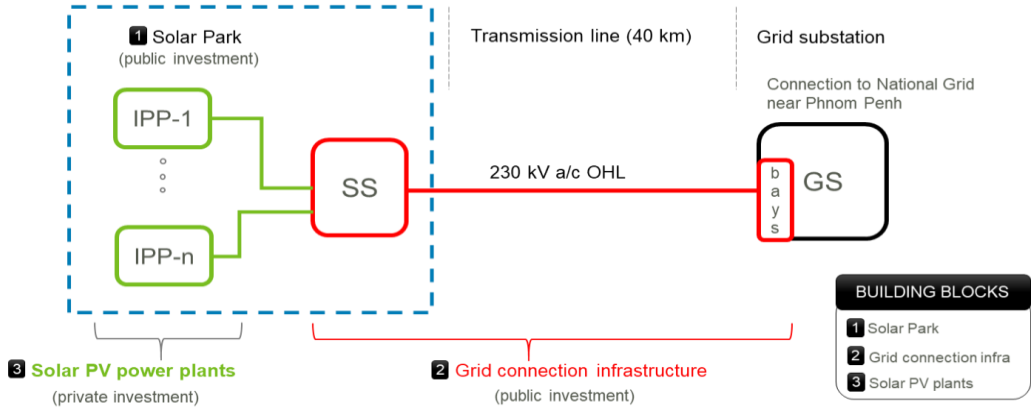
- Sovereign operations
- Subsector: Electricity Transmission & Distribution
- Approval by Q3 2019
- $300 million project loan (OCR)
- PRC Fund grant: $0.75 million
- AIIB co-financing: $200 million by Q4

- **Issues:** unstable supply of electricity and weak transmission capacity in the southern and western zones
- **Approach/Innovative Solution:** improvement in the reliability and efficiency of electricity supply in the Greater Dhaka and western zone of Bangladesh and expand the national transmission grid system; pilot of a drone inspection center to demonstrate advanced technology application; and improve Power Grid Company Bangladesh (PGCB)'s information flow, financial capacity and optimization of corporate operations through digitalized Enterprise Resource Planning system.
- **Design specifications/components:** (i) 40 km transmission line and 4,450 megavolt-ampere (MVA) substations in Greater Dhaka; (ii) 368 km transmission lines, 2,990 MVA substations and 20 bay extensions in the western zone; and, (iii) institutional capacity building of PGCB

CAM: National Solar Park Project

- Sovereign Operations/OPPP
- Subsector: Electricity Transmission & Distribution
- Approved on 23 May 2019/Signed on 28 June 2019
- $7.6 million project loan (OCR)
- Strategic Climate Fund: $14 million (loan & grant)
- Expected private sector investment: $100 million by 2020 (potential PSOD support)

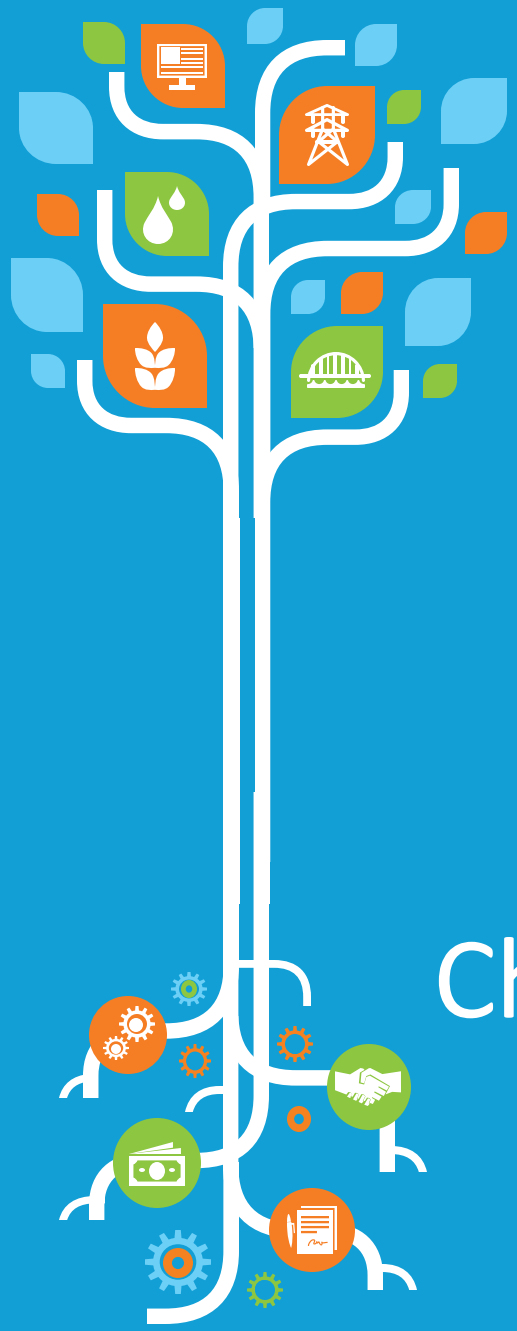
- **Issues:** overreliance on hydropower and fossil fuel generation and rapidly growing demand, high system costs, low private sector participation in large utility-scale solar power
- **Approach/Innovative Solution:** (i) demonstrate the ability of large-scale solar parks to lower solar energy prices, while providing technical benefits to the national grid and complementing hydropower through One ADB approach; (ii) combined an OPPP-led transparent, competitive tender for private solar PV generation with SERD public sector support for the common park facilities and transmission interconnection, de-risked the project and attracted strong private sector interest; and, (iii) PSOD is exploring financing for private PV generation within the park.
- **Design/Specifications:**



AFG: Kandahar Solar Power Project

- Non-sovereign operations
- Subsector: Renewable energy - Solar
- Approved on 2 April 2019/ Signed on 17 May 2019
- $4.0 million LIBOR-based loan (OCR)
- Canadian Climate Fund for Private Sector in Asia-II: $3.85 million

- **Issues:**
  - AFG ranks amongst lowest 5% per capita electricity consumption (100 kWh compared to global average of 3,125 kWh).
  - Total installed generation capacity of 568 MW falls far short of required demand. Chronic power shortage.
  - Significant import dependence (80% of power and 97% of fuel); major implications for scarce FX reserves.
  - Non-availability of long-term financing to support any infrastructure due to heightened country risk.
- **Approach/Innovative Solution:**
  - Identify a credible sponsor (with established track record and experience in Afghanistan)
  - Crowd in a blended finance package (innovative combination of long-term loans and concessional financing) to ensure commercial viability and meet entire financing requirement
  - Set precedent for private sector grid-connected solar sector by supporting the first, highly demonstrational solar power plant
  - Fully consistent with objective to support FCAS countries by providing essential infrastructure.
- **Design/Specifications**:
  - 15.1 MW solar power project; 6 KM transmission line upgradation; equipment procured from highly reputed suppliers; 20-year PPA with DABS
  - Generates 27.5 gigawatt-hours per year; Annual CO2 emission avoidance of 8,500 tons



BUSINESS OPPORTUNITIES

THANK YOU!

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