

Addressing Climate Challenges and Air Pollution in Asia and Pacific Region through Innovations

Asian Development Bank's Approach

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Outline of Presentation

- Environmental sustainability is key to energy systems
- Asian Development Bank's approach
- Supporting Innovations in Asia

Energy Trilemma: Measuring Energy Sector Performance

ENERGY SECURITY

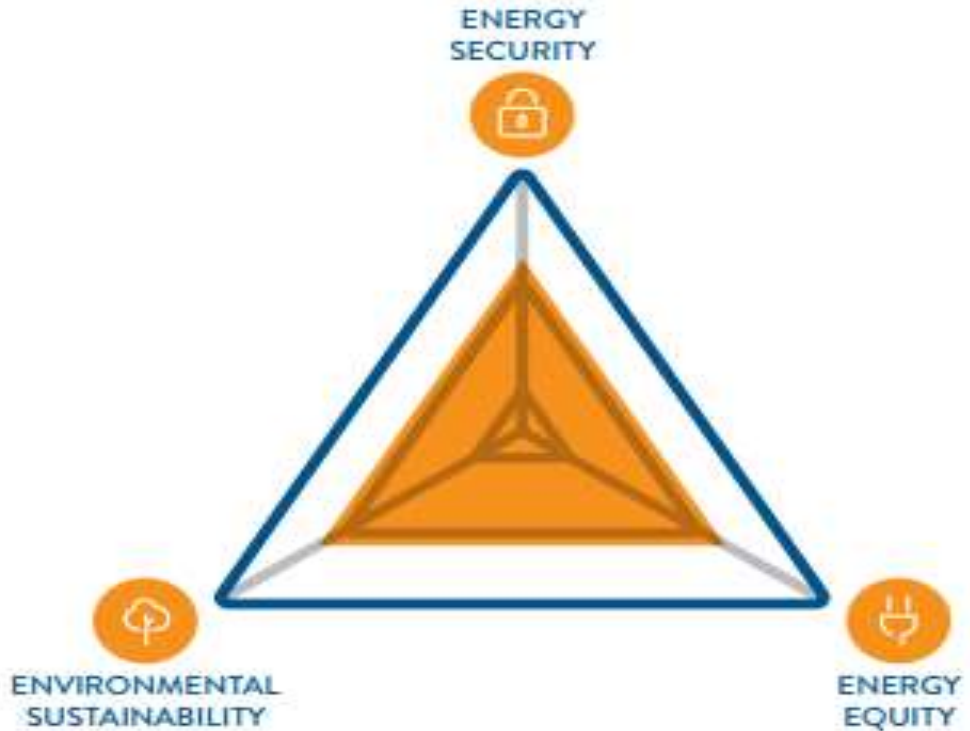
Effective management of primary energy supply from domestic and external sources, reliability of energy infrastructure, and ability of energy providers to meet current and future demand.

ENERGY EQUITY





Accessibility and affordability of energy supply across the population.

ENVIRONMENTAL SUSTAINABILITY

Encompasses achievement of supply- and demand-side energy efficiencies and development of energy supply from renewable and other low-carbon sources.



Energy Trilemma index structure and weighting

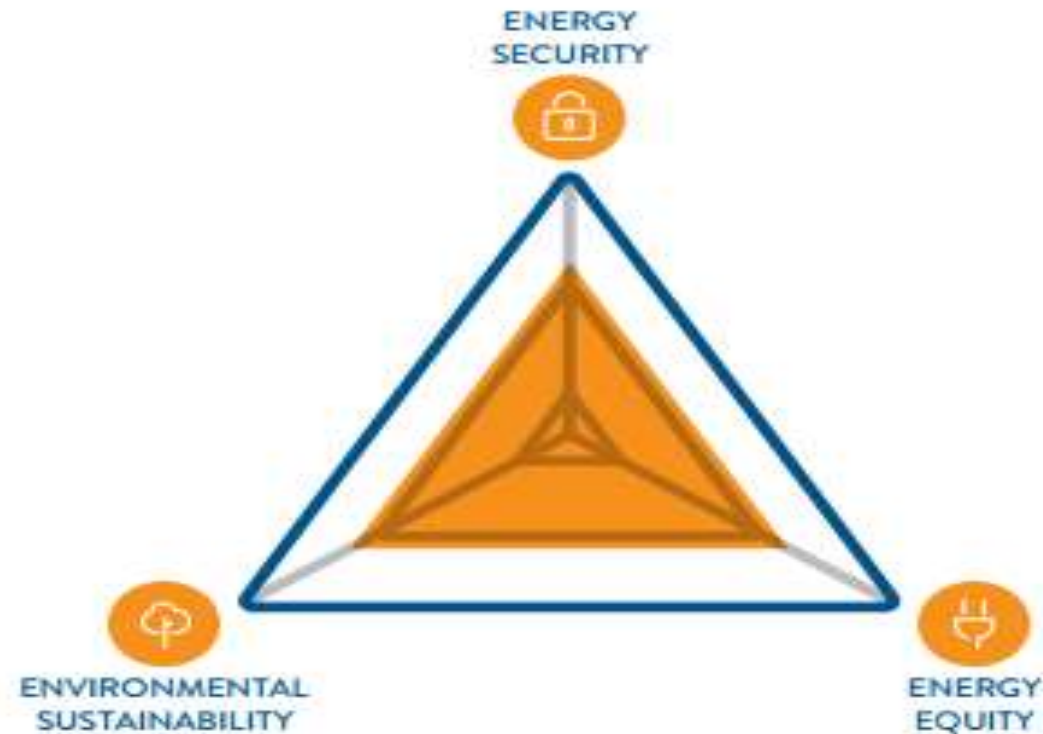
Dimension	%	Indicator category		%	Indicator	%
Energy security 	30%	1	Security of supply and energy delivery	15%	a Diversity of primary energy supply	5.0%
					b Energy consumption in relation to GDP growth	5.0%
					c Import dependence	5.0%
		2	Resilience	15%	a Diversity of electricity generation	5.0%
					b Energy storage	5.0%
					c Preparedness (human factor)	5.0%
Energy equity 	30%	1	Access	10%	a Access to electricity	5.0%
					b Access to clean cooking	5.0%
		2	Quality of supply	10%	a Quality of electricity supply	5.0%
					b Quality of supply in urban vs. rural areas	5.0%
		3	Affordability and competitiveness	10%	a Electricity prices	3.3%
					b Gasoline and diesel prices	3.3%
Environmental sustainability 	30%	1	Energy resource productivity	10%	a Final energy intensity	5.0%
					b Efficiency of power generation and T&D	5.0%
		2	GHG emissions	10%	a GHG emission trend	5.0%
					b Change in forest area	5.0%
		3	CO2 emissions	10%	a CO2 intensity	3.3%
					b CO2 emission per capita	3.3%
Country context 	10%	1	Coherent and predictable policy framework	2.0%	a Macroeconomic environment	0.5%
					b Effectiveness of government	0.5%
					c Political stability	0.5%
					d Perception of corruption	0.5%
		2	Stable regulatory environment	2.0%	a Transparency of policy making	0.7%
					b Rule of law	0.7%
					c Regulatory quality	0.7%
		3	Initiatives that enable RD&D and innovation	2.0%	a Intellectual property protection	0.5%
					b FDI & technology transfer	0.5%
					c Capacity for innovation	0.5%
		4	Investability	2.0%	d Number of patents issued by residents	0.5%
					a Foreign direct investment net inflows	1.0%
					b Ease of doing business	1.0%
		5	Air pollution, land and water impact	2.0%	a Wastewater treatment	1.0%
					b Air pollution	1.0%

Each country's overall Index ranking is based on underlying indicators across 13 categories in 4 dimensions – some of which are supported by multiple datasets. For example, “Affordability and competitiveness” is measured using three indicators, each of which is supported by multiple datasets. The left figure provides an overview of underlying indicators and weighting regimes.

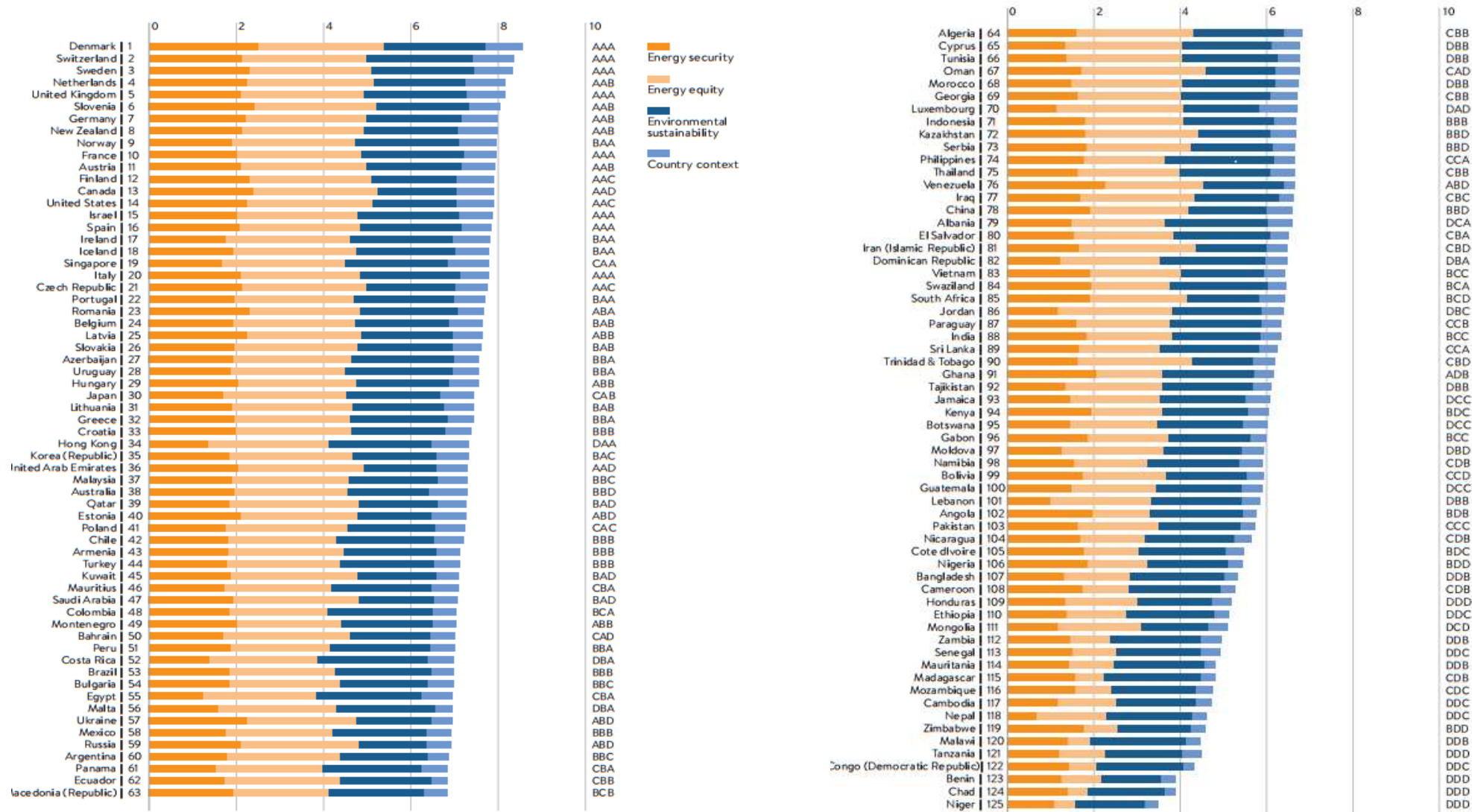
Top 10 Energy Trilemma Index Performers

TOP 10 OVERALL RESULTS

1. Denmark
2. Switzerland
3. Sweden
4. Netherlands
5. United Kingdom
6. Slovenia
7. Germany
8. New Zealand
9. Norway
10. France



Global Ranking of Energy Trilemma Index



China's Energy Trilemma Index Position

WORLD ENERGY COUNCIL | TRILEMMA INDEX | 2018

CHINA

TRILEMMA INDEX RANKINGS AND BALANCE SCORE

RANK

78

SCORE

BBD



	2016	2017	2018	Trend	Score
Overall rank and balance score	87	86	78	▶	BBD
Energy performance					
Energy security	62	58	43	▶	B
Energy equity	77	76	81	▶	B
Environmental sustainability	117	117	104	▶	D
Contextual performance	62	47	45	▶	

China's Energy Trilemma Index Position

KEY METRICS

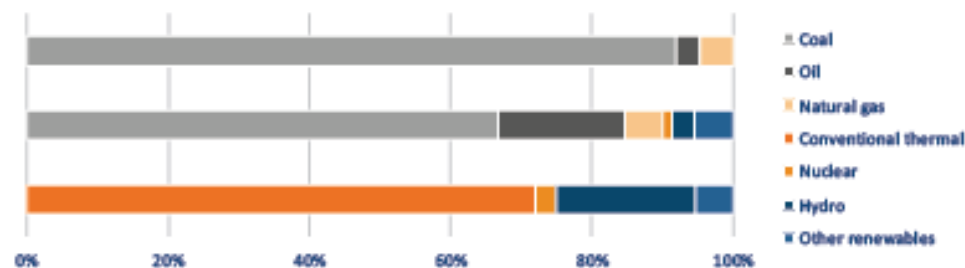
Industrial sector (% of GDP)	40.93	GDP per capita, PPP US\$ (GDP Group)	15,529 (ID)
Energy intensity (koe per US\$)	0.11	Diversity of international energy suppliers	High (HHI = 518)
Population with access to electricity (%)	100	Access to clean cooking (%)	59
Household electricity prices (US\$/kWh)	0.08	Rate of transmission and distribution losses (%)	5.84
CO ₂ intensity (kCO ₂ per US\$)	0.51	GHG emission growth rate 2010 – 2014 (%)	8.42

ENERGY PROFILE

Fossil fuel reserves: 105,606 Mtoe

Total primary energy supply composition

Diversity of electricity generation



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The responses from Asian Development Bank

STRATEGY 2030

PROSPEROUS
INCLUSIVE
RESILIENT
SUSTAINABLE

ASIA AND THE PACIFIC



ADB Strategy 2030: 7 Operational Priorities

Energy Sector's Contributions

Operational Priorities	Energy Sector Contributions
Addressing Remaining Poverty and Reducing Inequalities	Clean energy for meeting basic needs (lighting and cooking); skills development and job creation with renewable energy; productive use of energy to generate income; solar home systems
Accelerating Progress in Gender Equality	Clean energy access relieves women for fuel collection which allows women more time to pursue income-generating activities
Tackling Climate Change, Building Disaster Resilience	Integrating climate change mitigation (GHG reduction) and adaptation into project design
Making Cities More Livable	Supporting smart electricity supply to cities, energy efficient buildings and electric vehicles, rooftop solar for household and commercial buildings
Promoting Rural Development and Food Security	ADB will support use of solar powered pumps for smart irrigation to replace diesel or electricity powered pumps
Strengthening Governance and Institutional Capacity	Promoting energy sector reforms and developing institutional capacity for renewable energy development
Fostering Regional Cooperation and Integration	Promoting energy connectivity (power interconnections, gas pipelines), and sharing best practices and technologies in renewable energy development

ADB Energy Project Review: Strategic Considerations and Key Questions Asked

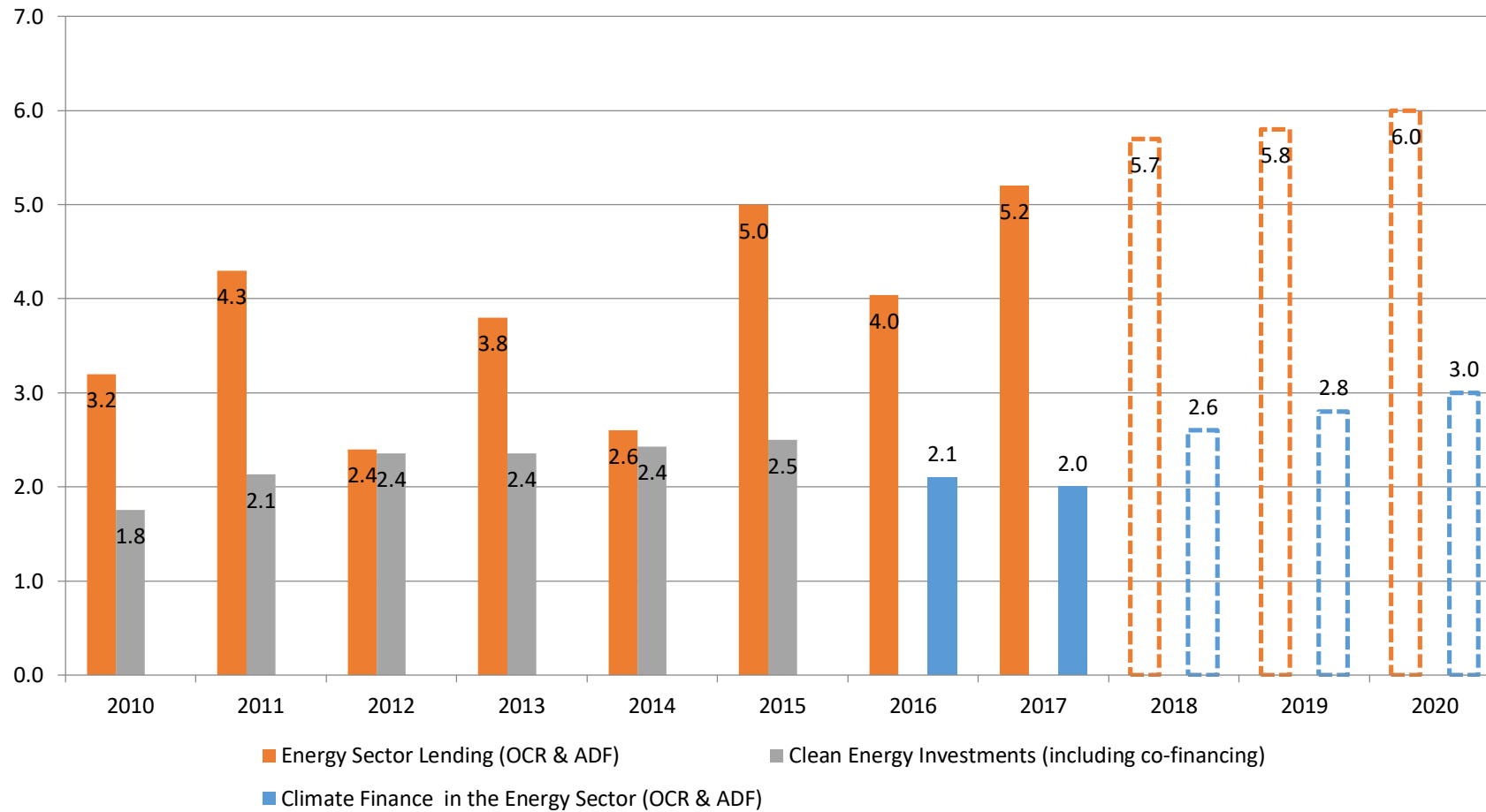
Three Strategic Considerations:

- How the project will contribute to the achievement of SDG 7 (universal energy for all by 2030)?
- How the project is aligned with the country's Nationally Determined Contribution under Paris Agreement and helps them in achieving their targets?
- How the project contributes to climate financing?

Three Key Questions Asked:

- Does the project include new and/advance technologies?
- Does the project include new business models/approaches (e.g. cross sectoral)
- Does the project include innovative financing instruments?

ADB Energy Sector Achievement and Target (US\$ billion)



ADB's Approach to Promote Innovations

- Establishment of Pool of Experts:
 - IoT, smart grids, waste-to-energy, gas-to-power...
- Establishment of High Level of Technology Fund
 - Piloting new and advanced clean technologies
- Reforming Procurement Guidelines
 - Giving more weight to quality and innovations
- Application of Shadow Carbon Price
 - About \$37/ton of CO2 equivalent

Yongping Zhai



Chief of Energy Sector Group, Sustainable Development and Climate Change Department

Dr. Yongping Zhai has been working on energy development in Asia and Africa for 25 years. He is currently in charge of overall energy policy coordination and technical support to ADB energy sector operations. He is also in charge of developing energy sector knowledge work for ADB and interacts with worldwide energy sector partners.

Blogs by this Author



Smart meters in rural India are a win-win solution for all

Published on Wednesday, 24 October 2018

Demand-side energy efficiency brings benefits to four key stakeholders amid India's low-carbon energy transition program.



Solving the Energy Trilemma in developing countries through innovation

Published on Tuesday, 16 October 2018

With innovative business models, financing and procurement, developing countries can leapfrog to secure, affordable, and clean energy systems.



Can we achieve universal electricity access without coal?

Published on Friday, 31 August 2018

While coal will still keep the grid up and running for now, renewable energy-based distributed systems can meet growing demand in the near future.

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ADB IS BUILDING A CLEANTECH ECOSYSTEM IN ASIA



1

Support
accelerators
& incubators



2

Support new
cleantech
investors



3

Support
cleantech
marketplaces



4

Support
networking &
collaboration

- In 2012, ADB established the Climate Technology Finance Center (CTFC), which aims to build a “platform of platform” for low-carbon technology innovation and entrepreneurship, and support the creation of a healthy and comprehensive ecosystem.
- Meanwhile, CTFC also participates in various activities to explore the innovation of different financial models through cooperation with ADB loan business units and different external financial institutions.

1

SUPPORTING ASIAN CLEANTECH ACCELERATORS

NINE

accelerators supported

1000+

startups evaluated

100+

startups accelerated

20+

startups seed-financed

Our Partners



clje



TusStar
启迪之星

powerstart



NEW ENERGY
LEADERS 2018

ideaspace



1

SUPPORTING ASIAN CLEANTECH ACCELERATORS

NINE
accelerators supported

1000+
startups evaluated

100+
startups accelerated

20+
startups seed-financed

Various Activities, Capacity Building & Workshops



ADB

1

SUPPORTING ASIAN CLEANTECH ACCELERATORS

2018 China Cleantech Startup Competition

- The 3rd annual competition organized by ADB, partnering with TusStar
- BP participated as Strategic Partner this year
- 130+ startups, Top 3 startups received \$50K USD prizes from BP
- Sector coverage: Clean energy & smart grid, environmental protection, low carbon technologies, advanced mobility, and other digitalization &



2 SUPPORTING ASIAN CLEANTECH INVESTORS



Low-carbon private equity fund (\$400m) based in Hong Kong and co-managed by ADB, Orix and Robeco

EXAMPLE OF INVESTMENTS



India's leading cold-chain logistics company

FLUIDICENERGY™

World-leading zinc-air energy storage technology



China's largest pure solar power plant investor and operator

2 SUPPORTING ASIAN CLEANTECH INVESTORS

ADB works with partners to explore innovations in financial instruments & models in loan projects

Green Financing Platform (2016)

- The financial intermediary is China National Investment and Guaranty Corporation (I&G)
- Aims to improve small & medium-sized enterprises' access to finance and helps them scale up investments in pollution-reduction projects in the region
- Financial instruments include: entrusted loan, financial leasing, credit guarantee, and equity investments

Emission-Reduction & Pollution-Control Facility (2017)

- The facility is managed and administered by CECEP
- Identify subprojects for deploying advanced technologies at scale, and provide financing, including debt and equity investments
- Will also set up an industry-specific fund to support energy-saving and emission-reduction subprojects in the iron and steel industry

- A multiyear, multisector ADB support program for air quality improvement in the greater BTH region (\$500 Million per year during 2016 - 2020) has been carried out.
- BTH region covers: Beijing, Tianjin, and the province of Hebei, Henan, Shandong, Shanxi, Liaoning and Inner Mongolia Autonomous Region.
- CTFC helps recommend investment targets, and provides related capacity building and support.

2 SUPPORTING ASIAN CLEANTECH INVESTORS



India's first and only early-stage cleantech venture capital fund (\$25m) hosted by CIIE at IIM Ahmedabad

EXAMPLE OF INVESTMENTS



Provides energy intelligence to 400+ commercial, industrial and utility clients



No 1. retail brand for solar pumps in India



Industry-leading zero-capex green building specialist



Fastest growing innovative cold chain product company in India

3 SUPPORTING CLEANTECH MARKETPLACES

ADB supports different domestic and international partners to promote the deployment and transfer of low-carbon technologies.



3 SUPPORTING CLEANTECH MARKETPLACES

BEC-TAD

Technology Assessment & Dissemination

- “Pop-idol” for next gen cleantech
- Selected cleantech companies assessed in public (around 100+ participants)
- Senior-level international jury from industry, academia, finance, government.
- Assessed according to technology attractiveness, market potential, regulatory & policy environment, and environmental& social impact
- Detailed recommendations to founder, policy-makers, industry, & investors



3 SUPPORTING CLEANTECH MARKETPLACES

Changzhi Rural Clean Heating Pilot

- In January, hosted an international workshop on accelerating clean cooking and heating and showcased 12 technologies
- Changzhi City then invited ADB to conduct pilot in rural area, to explore the technical, financial viability and suitability of various solutions through government scheme
- Four solutions including air-to-air heat pump, air-to-water heat pump, biomass combined stove and heater and, grapheme heating panel have been applied and a remote monitoring platform is under construction





New Energy Leaders

- The New Energy Leaders program was launched by ADB in 2017 and aimed at supporting Asian clean energy entrepreneurs and encouraging innovation
- It brings together leading young clean energy entrepreneurs and innovators from across Asia
- By now, three batches, 18 young entrepreneurs from 12 countries have been selected as New Energy Leaders

Asia-Pacific Forum on Low-Carbon Technology 2018

- 24-26 October 2018, the 3rd Asia-Pacific Forum on Low-Carbon Technology was co-hosted by ADB and the Government of Hunan in BROAD Town, Changsha City, Hunan Province
- 520+ participants from 37 countries and regions
- 2 high level plenary sessions + 8 thematic breakout sessions + 2 Hot Pot business matchmaking
- The 3rd Batch of “New Energy Leaders” was selected and received the awards during the forum



China Cleantech Nexus

- China's first community for cleantech incubators & accelerators
- A resource-sharing platform created by a number of organizations serving cleantech startups and entrepreneurs
- More than 20 members, including incubators, accelerators, early investment funds, and consulting firms, etc.
- CTFC team co-founded and provides capacity building and resource support



BUILDING A CLEANTECH COMMUNITY



NEW ENERGY NEXUS

- First global network of cleantech accelerators
- 30+ members that has supported 1000+ start-ups and helped raise \$2+ bn
- Co-founded by California Clean Energy Fund and Asian Development Bank

NEW ENERGY
NEXUS





Asia Development Bank Rooftop Project / 571 KW / Manila, Philippine