TOWARDS A SUSTAINABLE FUTURE

ENERGY CONNECTIVITY IN ASIA AND THE PACIFIC

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Economic and Social Commission for Asia and the Pacific

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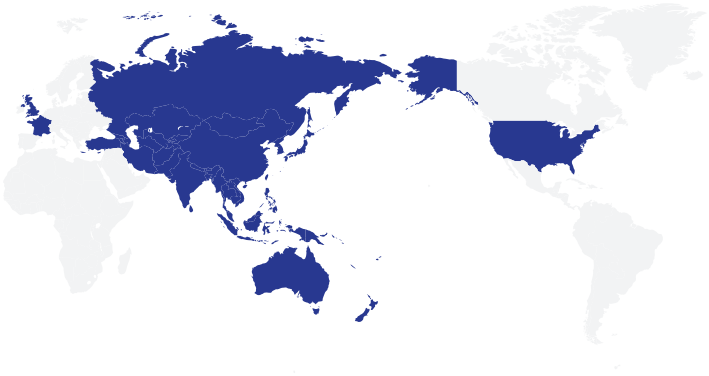

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Japan	Georgia	Indonesia	Bhutan	Kiribati	French Polynesia	Netherlands (the)
Mongolia	Kazakhstan	Lao PDR	India	Marshall Islands	Guam	United States of America
Republic of Korea	Kyrgyzstan	Malaysia	Iran (Islamic Republic of)	Micronesia, IS	Hong Kong, China	
	Russian Federation	Myanmar	Maldives	Nauru	Macao, China	
	Tajikistan	Philippines	Nepal	New Zealand	New Caledonia	
	Turkmenistan	Singapore	Pakistan	Palau	Niue	
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		Timor Leste	Turkey	Samoa		
		Viet Nam		Solomon		
				Tonga		
				Tuvalu		
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TOWARDS A SUSTAINABLE FUTURE

ENERGY CONNECTIVITY

IN ASIA AND THE PACIFIC

Foreword

The energy choices we make today will shape the development of the Asia-Pacific region throughout the 21st century. The global community has recognized that energy is not only central to economic and social progress but also has a profound impact on the environment. This is why energy is critical to the successful implementation of the new universal and transformative 2030 Agenda for Sustainable Development. It is also why Sustainable Development Goal 7 specifically emphasizes the need to ensure access to affordable, reliable, sustainable and modern energy for all, aiming to ensure access, double the share of renewable energy and double the rate of implementation of energy efficiency by 2030.

Driven by the quest for economic growth, and largely reliant on fossil fuels, the Asia-Pacific region already consumes almost half of the world's energy. The strong economic potential of the region, as well as its population pressures and rising middle class, all point to an energy scenario in which Asian energy demand will continue to outstrip that of every other region. The sources of energy we choose to exploit, their efficiency of use, and how we share them across borders, will greatly influence the course of economic development, environmental health and social progress in the region and beyond.

There is growing agreement that Asia's energy challenges can best be addressed through enhanced regional energy connectivity, as well as diversification of energy sources — which will also promote clean energy. Asia-Pacific energy resources, both fossil and renewable, vary greatly in their distribution across countries and subregions. The ability to share and trade these resources, in order to address energy surpluses and deficits, requires physical connectivity infrastructure, such as electricity transmission links and gas pipelines, which in turn require significant financing for construction. Underpinning this goal, however, must be a shared vision, political agreement and the institutional infrastructure necessary for energy exchange between countries, to enable benefits to be equitably shared.

In recent years, Asia-Pacific market integration has advanced at an impressive rate, contributing to the region's strength and resilience in the global economy. In contrast, however, trade in energy has not progressed as rapidly. With the notable exception of a few subregional energy market integration successes, the long-term and capital-intensive nature of the infrastructure required for energy trade, along with the political and institutional complexities involved, have prevented regional energy integration from reaching its full potential. Asia-Pacific regional economic cooperation and integration therefore requires a firm commitment to energy integration, which is also a central element in the development of integrated markets and responses to shared vulnerabilities and risks across the region.

The ratification of the Paris Agreement on climate change, backed by Nationally Determined Contributions (NDCs), has provided new impetus for economies to decarbonize in order to limit global warming to 2 degrees Celsius. Clean energy, as a climate change solution, is now at the forefront of many national policy agendas, and is benefiting from rapid advances in both renewable energy and power transmission technologies. These advances have made decentralized, utility-scale renewable power generation, as well as energy transmission over longer distances, increasingly practical and cost-effective.

The new development and energy paradigm has offered an opportunity to examine, with a fresh perspective, the long-term potential for greater energy connectivity in the Asia-Pacific region, and to outline a road map to realize these possibilities.

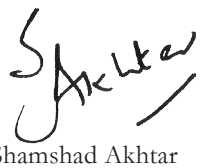
Progress towards developing a more interconnected and integrated Asia-Pacific energy system, which increases energy access, lowers costs and facilitates sharing of clean energy resources, will help member States deliver on the ambitious United Nations 2030 Agenda for Sustainable Development, allowing them to better address climate change risks. This will also provide a strong foundation for realizing the full potential of the Asia-Pacific region in the 21st century.

The development of affordable and sustainable energy is essential to meet the needs of both current and future generations, through economic growth and more effective climate resilience, which in turn supports poverty alleviation and improves regional stability. These elements have particular resonance for the Asia-Pacific region as we confront the related issues of growing demand for energy, unequal energy access, urban air pollution and acute concern about the impacts of climate change.

Transforming energy systems in a way that addresses these multiple concerns requires a comprehensive approach, combining national action and regional cooperation. In this context, this report places emphasis on augmenting Asia's energy security through increased regional energy connectivity, on the grounds that this will offer significant potential for increasing access to energy, lowering energy costs and enabling greater use of renewable and low-carbon energy, contributing to the sustainable development of developing and advanced economies alike.

This report also provides a historical perspective on regional energy connectivity and its implementation challenges, as well as outlining an action plan for accelerated regional energy integration to bring shared benefits to ESCAP's member States. The report concludes that energy connectivity can increase the supply and reduce the cost of energy, while lowering its social and environmental costs and addressing the challenges of energy security.

Capturing these benefits for current and future generations in Asia and the Pacific will require enhanced regional energy cooperation between member States, and the creation of regional institutional governance to guide the progress of energy connectivity and integration.



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Abbreviations and Explanatory Notes

ACM	(the Netherlands) Authority for Consumers and Markets
ADB	Asian Development Bank
AMEM	ASEAN Ministers on Energy Meeting
APAEC	ASEAN Plan of Action for Energy Cooperation
APEA	Asia-Pacific Energy Agency
APEC	Asia-Pacific Economic Cooperation
APEF	Asian and Pacific Energy Forum
APG	ASEAN Power Grid
ASEAN	Association of Southeast Asian Nations
BCF	Billion cubic feet
BCM	Billion cubic metres
BIMP-EAGA	Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area
BNEF	Bloomberg New Energy Finance
BoS	Balance of systems
BRICS	Brazil, Russian Federation, India, China and South Africa
CAREC	Central Asia Regional Economic Cooperation
CASA-1000	Central Asia South Asia Electricity Transmission and Trade Project
CCS	Carbon capture and storage
CEER	Council of European Energy Regulators
CFPP	Coal-fired power plant
CHP	Combined heating and power
CPS	Current Policies Scenario
CRIE	Comisión Regional del Interconexión Eléctrica
CROP	Council of Regional Organizations in the Pacific
CSP	Concentrated solar power
EAEU	Eurasian Economic Union
ECLA	Economic Commission for Latin America
ECO	Economic Cooperation Organization
EE	Energy efficiency
EEC	Eurasian Economic Commission
EIA	Energy Information Administration, US Department of Energy
EIRR	Economic internal rate of return
EOR	Ente Operador Regional
ENTSOE	European Network of Transmission System Operators for Electricity
EPR	Empresa Propietaria de la Red
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
FBC	Fluidized bed combustion
FERC	Federal Electricity Regulatory Commission
FIRR	Financial internal rate of return
FOB	Free-on-Board
GDP	Gross domestic product
GHG	Greenhouse gas
GMS	Greater Mekong Subregion
GTS	Gasunie Transport Services
GW	Gigawatt

GWh	Gigawatt hours
HCB	Hidroeléctrica de Cahora Bassa
HDI	Human development index
HELE	High-efficiency, low-emissions
ICE	Intercontinental Exchange
IEA	International Energy Agency
IGC	Inter-Governmental Council
IGCC	Integrated gasification combined cycle
IGM	Intergovernmental memorandum of understanding
IMT-GT	Indonesia-Malaysia-Thailand Growth Triangle
INDCs	Intended nationally determined contributions
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
kgoe	Kilogram of Oil Equivalent
kW	Kilowatt
kWh	Kilowatt hours
LCOE	Levelized cost of electricity
LHV	Lower heating value
LNG	Liquefied natural gas
MBD	Million barrels per day
MCM	Million cubic metres
MDGs	Millennium Development Goals
MER	Mercado Eléctrico Regional
MESSAGE	Model of Energy Supply Systems Alternatives and their General Environmental Impacts
MMBtu	Million British thermal units
MoU	Memorandum of understanding
MPa	Megapascal
MT	Metric tons
Mtoe	Million tons of oil equivalent
MTPA	Million tons per annum
MW	Megawatt
MWh	Megawatt hours
NAFTA	North American Free Trade Agreement
NAPCI	Northeast Asia Peace and Cooperation Initiative
NDCs	Nationally determined contributions