effective response to tackling climate change and building climate and disaster resilience, one of the key operational priorities of Strategy 2030.

6. SDG Goal 7 aims to achieve universal access to affordable, reliable, sustainable, and modern energy, of which a key target is increased share of renewable energy in the energy mix to combat climate change. Globally, the energy transition to cleaner and more sustainable systems has already begun, and significant declines in the costs of renewable energy technologies are accelerating this transition. Between 2010 and 2019, the costs of solar PV decreased by 82%, concentrating solar power by 47%, onshore wind by 39%, and offshore wind by 29%, and costs are continuing to decline.[4] These trends, which are projected to continue, have resulted in a reduction in the cost differential between traditional fossil fuel power generation technologies and renewable energy generators. The cost of electricity from unsubsidized renewable energy can be lower than that from conventional generators, and, in some cases, renewable power costs are competitive with those of existing conventional generators. [5] The imperative to reduce GHG emissions and cost trends of cleaner technologies have resulted in significant reductions in financing support for new fossil fuel generation due to risks that plants would be retired before the end of their useful life, becoming stranded assets, and the availability of financially viable, cleaner alternatives.

7. SDG 7 also targets improved end-use energy efficiency, which can play a key role in driving down the costs of the energy transition. Energy efficiency can result in greater economic productivity and provide social and environmental benefits, including increased energy affordability, improved air quality, reduced pollution, and global climate change mitigation. Energy intensity has steadily declined across Asia and the Pacific, with efficiency gains in the region outpacing the global rate of progress. Still, energy intensity in the region—5.2 MJ per 2011 PPP $ in 2017—remains higher than the global average of 5.0, and the potential for the application of energy efficiency measures is still large.[6]

8. In view of profound changes in the energy landscape and considering the new emphasis of Strategy 2030, ADB's Independent Evaluation Department (IED) conducted a Sector-wide Evaluation: ADB Energy Policy and Program, 2009–2019 (IED evaluation).[7] While the IED evaluation revealed significant successes in energy sector operations, the 2009 Energy Policy was found relevant to the program during the evaluation period,[8] but it is no longer adequately aligned with the global consensus on climate change, the ongoing global transformation of the energy sector, and recent changes in the energy sectors of ADB DMCs. The three objectives of the 2009 policy were aligned at the time of its approval with the needs of the energy sectors in DMCs, Strategy 2020, approaches of other multilateral development banks, and climate change priorities at that time. However, the Paris Agreement of 2015, the SDGs, recent technological developments, and ADB's recently adopted Strategy 2030 have created new conditions and demands for ADB's energy assistance. ADB has not financed investments in coal power plants since 2013, even though the policy allowed such financing. The current energy and climate change contexts present ADB with the opportunity and rationale to support the phase-out of coal fired power plants in the region. Therefore, the 2009 Energy Policy needs an update that considers the opportunities provided by innovative

[4] IRENA. 2020. *Renewable Power Generation Costs in 2019*. International Renewable Energy Agency. Abu Dhabi.
[5] Lazard. 2020. Levelized Cost of Energy and Levelized Cost of Storage – 2020. https://www.lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2020/
[6] UNESACP. 2021. *Regional Trend Report: Shaping a Sustainable Energy Future in Asia and the Pacific*, Febirry 2021. Bangkok.
[7] ADB. 2020. *ADB Sector-wide Evaluation: ADB Energy Policy and Program, 2009–2019*. August 2020. Manila.
[8] ADB. 2009. Energy Policy. Manila

technologies and with its price dynamics, decentralized energy systems, digitalization, energy efficiency and new business models for enhancing sustainability, resilience, inclusiveness, energy access and security. The IED evaluation also proposed that guidance on energy sector operations be more frequently updated as ADB moves into the 2020s.

9. As highlighted in the IED Sector-Wide evaluation, the main challenges in the DMCs have been electricity access (coverage and affordability), energy security (reliability, quality of service, demand, and supply balances), sustainability (financial, resilience to climate change and extreme events, climate mitigation, health, and environmental impacts) and sector governance (regulations, utilities' performance, and private sector participation). While many DMCs have made significant progress in these areas, especially since the 2009 Energy Policy, ADB needs to continue to support DMCs to consolidate the achievements and address emerging new challenges. This policy paper has been prepared to seek Board approval of the proposed new Energy Policy in light of the IED evaluation's findings, global consensus on climate change, regional and global economic developments, innovation and technological developments, ongoing global energy transformation, and ADB's Strategy 2030. It also outlines guidance for the implementation of ADB's new Energy Policy.

B. CHANGING ENERGY LANDSCAPE OF THE 2020s

10. The Asia and Pacific region covers a vast territory, home to most of the world's population, and its economies represent a wide diversity of social and economic development strategies. The region's progress in poverty reduction and economic growth in recent decades represents one of the most remarkable changes in the global economy. Coal and other fossil fuels have played a large part in ensuring access to energy for the region's economic development, but they have not solved the energy access challenge, and their use harms the environment and accelerates climate change. Due to the region's reliance on fossil fuels for its energy systems, the region contributes a disproportionate share of global GHG emissions. DMCs in this region contribute 45% of global energy sector GHG emissions, although their share in total final energy consumption is 37%.[9] Though their aggregate contribution to global GHG emissions is high, the region's per capita emissions remain below the global average, reflecting the relatively low per capita energy consumption; with continued economic growth, emissions from these countries will further increase if energy systems continue to rely on expanded use of fossil fuels.

11. In addition to the challenges of climate change mitigation, many DMCs are highly exposed and vulnerable to natural hazards and impacts of climate change, such as the growing frequency and intensity of extreme weather events, sea level rise, changes in rainfall patterns, and increasing temperatures. Disaster related losses are already growing due to insufficient regard for climate and disaster risk in either the design or location of new infrastructure. Climate change impacts and disruption of ecosystem services can lead to severe effects on livelihoods and food security, which in turn would affect human health. Indeed, the region is known to be the most vulnerable in the world to natural disasters from typhoons and flooding to earthquakes and tsunamis.

12. To become truly sustainable, economic growth must be decoupled from environmental degradation. To support economic growth infrastructure investment planning must consider a time horizon that meets the needs of the present generation without

[9] IEA. 2020. IEA Data and Statistics online database for 2018.

compromising the ability of future generations to meet their own needs. Doing so requires that investment and financing decisions to support low-carbon development and build resilience to future changes and shocks, including avoiding carbon lock-in[10] and sharply curbing fossil-fuel use. At the same time, demand for affordable, reliable, sustainable and modern energy services continues to increase with economic expansion, population growth, urbanization, and developing countries catching-up in their social and economic development. To ensure that the next phase of growth across Asia and the Pacific is sustainable, economic development must be rapidly decoupled from its high dependence on energy demand, and energy supply must in turn be decoupled from its reliance on fossil fuels.

13. Energy transformation thus involves the following four intertwined changes:

- Implementation of incentives and policies to support structural and behavioral changes for improved end use **energy efficiency**.
- Transformation of the conventional carbon intensive energy systems to **low and zero carbon power** systems, with **digital technologies** to facilitate integration of variable renewable energy sources.
- Transition to **electrification** of the transport, industry, and space cooling and heating sectors in parallel with decarbonization of the electricity grid.
- Participation of **distributed renewable energy providers,** including consumers as producers ("prosumers").

14. **Energy efficiency.** Traditionally, economic and population growth results in greater energy demand for industry and agricultural processes as well as for energy services such as mobility, heating and cooling, and lighting. In this context, energy efficiency—"the first fuel"—is a key component of an energy transition in decoupling economic growth from energy demand. Energy efficiency can yield multiple benefits, such as reducing energy costs, GHG emissions, and air pollutant emissions, while improving energy security and increasing energy access. However, after decades of effort in promoting energy conservation and energy efficiency, the unrealized potential is considerable. The progress in energy efficiency has been modest due to various factors, including lack of legal framework and regulatory standards, insufficient financial incentives, and inadequate financing instruments. Globally, improving energy efficiency could lower GHG emissions by 37%, contributing significantly to climate stabilization goals.[11,12]

15. **Low and zero carbon power systems.** A transition to a low or zero carbon power system requires addressing many different challenges. Additions of new generating capacity should ideally come from zero energy sources or coupled with carbon capture, use, and storage. Grid regulatory, operations, and transmission systems must be expanded and upgraded to integrate and manage new sources of power. Energy storage opportunities should be exploited to further support grid stability and supply and demand management. Markets and regulation must support the access of new technologies and their providers and be flexible enough to accommodate emerging technologies as they reach maturity. There has been progress across Asia and the Pacific on all dimensions in the last decade, but opportunities remain to more rapidly bring about the region's energy transformation.

[10] The term "carbon lock-in" refers to the tendency for certain carbon-intensive technological systems to persist over time, "locking out" lower-carbon alternatives, and owing to a combination of linked technical, economic, and institutional factors.
[11] IEA. 2019, World Energy Outlook 2019. Paris.
[12] IRENA. 2020. Global Renewables Outlook 2020. Abu Dhabi.

16. **Cleaner Generation**. Wind and solar PV power are already mainstream technologies supported by various deployment policies, including feed-in-tariffs,[13] renewable energy portfolio targets/standards, tradable renewable energy certificates, and reverse auctions. Significant reductions in installed cost for these technologies have been realized globally, including in the People's Republic of China (PRC) and India, which are global leaders in solar and wind power installations. Asian economies are also major renewable energy technology suppliers, and therefore reap many of the economic benefits of the ongoing transition to renewables. The cost reductions of renewable energy are expected to continue, and the lessons learned on both technological and policy fronts can be applied for more widespread renewable energy deployment across the region. Offshore wind, floating solar PV, and concentrated solar power installations are increasing, which may result in similar cost reductions that accelerate deployment.

17. **Strong and Flexible Grid**. Increasing the share of variable renewable energy requires an electricity system to be flexible and balance the fluctuations in output from renewable generators without compromising security of supply, the viability of which has been demonstrated in many countries. A strong and expansive transmission grid, including high-voltage transmission networks that connect areas with the highest quality solar and wind resources on the same grid as a range of other generation sources can supply power across regions, including to large consumption centers. Countries with smaller national grids can develop regional interconnections and establish cross-border trading mechanisms to widen the balancing capacity of variable renewable energy.

18. **Energy Storage**. Energy storage systems can also support power system optimization and higher levels of integration of variable renewable electricity. The average price of battery storage has dropped significantly during the last decade, and it is expected to fall further as newer battery technologies go into mass production; these systems can provide grid stability services and store energy when production exceeds demand for dispatch during higher-demand hours of the day. Pumped storage hydropower can add similar value to a power grid and can also provide seasonal energy storage to help manage seasonal imbalances between supply and demand. Existing thermal power plants can also be operated more flexibly than they have been traditionally, and combined heat and power plants connected to heat storage to decouple supply of heat from electricity generation as well as electric heaters can be used to couple heating and electricity sectors.

19. **Sector Governance**. Accommodating increased flexibility and new technologies will require governance, market, and regulatory reform in many DMCs. Many of the electricity market systems and their supporting regulations in the region are developed based on a traditional centralized system not designed to deal with supply-side variability, the large role of renewable energy characterized by high capital costs and extremely low operating costs, deployment of distributed energy resources, and demand-side participation in the operation of the power system. The region's governments continue deregulating and reforming their power sectors to increase efficiency through restructuring sector entities and by introducing competition. New power exchanges are likely to emerge and existing ones strengthened. Newer power generation technologies and fuels are being placed on a more equal footing by accounting for the social and environmental costs of fossil fuel use through introducing

[13] Feed-in-tariff is needed to encourage investment in newer unestablished renewable energy technologies; other approaches, such as reverse auctions, are more efficient for procuring for a mature technology, such as solar PV, in an established market.