hamper investments in renewable energy and energy efficiency and a transition to sustainable energy systems. Furthermore, subsidies disproportionally benefit the more well-off population who consume substantially more fuels and electricity than an average or low-income consumer through their ownership and use of cars and various electric household appliances.

105. ADB will encourage DMCs to phase out fossil fuel subsidies and advise on tariff reforms designed to create sound electricity tariff structures and time-of-use pricing that reflect the full cost of the operations, promote energy efficiency, and penalize peak-hour and peak-season electricity consumption. When removing subsidies on electricity, lifeline tariffs may be introduced for vulnerable groups of consumers. In particular, it is necessary to incorporate dedicated support to female customers, particularly poor, marginalized, and female-headed households for whom connection charges may be prohibitive. Such social support should be recognized by regulation and funded through cross subsidies on other customer groups.

106. International experience shows that a comprehensive package of policies is necessary to ensure that fossil fuel subsidy reform leads to the right incentives and ultimately successful and sustainable policy change. A reform strategy ideally addresses the following: pricing mechanisms and institutions, the impacts of reform, and the political economy barriers. The strategy should include welfare measures to shield the poor and vulnerable from high fuel prices, independent pricing mechanisms, and public awareness and support campaigns through consultation and communication. The current period of low fuel prices would allow governments to pursue subsidy reforms with more fiscal flexibility and less resistance.

Private Sector Participation

107. The energy sector reforms of most DMCs have increased opportunities for private sector participation, particularly in the electricity generation subsector when renewable energy technologies have become increasing competitive. ADB public sector support to build smart and strong electricity grids will help to integrate renewable energy sources developed by private sector. Even though a fully open generation subsector with a competitive electricity market remains a rarity in the region, many DMCs have opened the subsector for private sector investments through regulated entry points, such as public-private-partnerships, renewable energy auctions, feed-in-tariffs, and independent power producers with long-term power purchase agreements. ADB will continue supporting public-private-partnerships and independent power producers as vehicles for attracting private capitals into the energy sector.

108. In this context, ADB will actively catalyze private investments in energy efficiency and renewable energy projects in the region through direct financing to companies, banks, financial intermediaries, and projects. To achieve this, ADB will use various tools, including loans and equity, credit enhancements, and risk mitigation instruments, such as in favor of foreign and local commercial banks lending to energy projects that contribute to sustainable, affordable, and secure energy supply in DMCs. ADB will provide policy advice and support for the preparation and structuring of projects. It will also provide transaction advisory services and assistance for drafting project agreements and managing the procurement processes. Through its participation in these processes, ADB will promote sustainability, integrity and transparency, high standards of corporate governance, gender equality, social and environmental safeguards, and address market failures without distorting the market.

109. ADB pursues the development of competition and private sector participation as these often lead to higher operational efficiency, cost-effectiveness, and better responsiveness to customer needs. Private sector actors are expected to contribute greater dynamism to the sector and be better geared to take advantage of opportunities created by new technologies and business models. The next generation of electricity market reforms should also focus on open access to transmission system and retail competition. ADB will offer support in the unbundling of vertically integrated utilities, corporatization of specific utility functions, securitization, asset recycling, and, if requested, the privatization of public enterprises created in the process. In particular, as part of the wider state-owned-enterprise (SOE) reform work pursued by ADB in DMCs, any project lending to an SOE including in the energy sector will require a dialogue on how to introduce SOE reforms. The government steering of the operations of natural monopolies particularly with respect to electricity transmission and distribution, requires strong regulatory bodies and enacting a carefully designed set of regulations. ADB is also positioned to support the DMCs in this context.

Greater Impact Through Sector-Wide Long-Term Planning

110. ADB will seek to increase the impact of its support to DMCs by giving priority in its financing of energy infrastructure to priority projects identified through rigorous long-term energy planning. Integrated resource plans, energy and power system masterplans, and consequent road maps and sub-sectoral plans create dialogue between DMCs and ADB, facilitate project due diligence, and reduce the project transaction cost and time as opposed to taking a reactive approach to DMCs' financing requests for infrastructure projects. Such long-term plans should be supported by strategic environmental and social assessment. For example, strategic environmental assessment of transmission or renewable energy master plans could help ensure that resulting projects are environmentally sustainable having considered location constraints upfront.

111. Given the recent changes in the energy landscape—including technological advancements, emerging new business models, and the more significant role of demand-side for system planning—ADB will encourage the adoption of a holistic approach in the energy sector that focuses not only on optimizing electricity supply but also considers how electricity and fuels are interchangeable for the evolving consumption patterns in industry, building (heating and cooling), and transport. It is particularly important to conduct independent energy planning at city or district levels, which will facilitate the development of integrated energy systems on the ground. Planning exercises should apply integrated resource planning techniques, use proven methods for optimizing long-term generation expansion and simulating short-term dispatch, and use geo-spatial planning for transmission. System optimization should internalize greenhouse gas and other emission costs in accordance with reputable consensus estimates and ADB guidance for such costs. System modeling should consider the systemic properties of variable renewable energy and incorporate flexibility measures to integrate variability.

112. ADB will increase its engagement with DMCs to support integrated energy planning. Decision making relies increasingly on technoeconomic assessment to inform policy development and to set national targets. Planning and simulation are not, however, a mere techno-economic cost-benefit analysis, but should also include constraints stemming from climate, sustainability, resilience, and social equity demands. The planning process should be a consultative one in its creation of various scenarios for planning, modeling, and testing,

and in setting criteria and indices for a multicriteria analysis of the results, which then leads to choosing the recommended way forward for the energy sector. ADB will also support an enabling institutional structure to deliver and implement such an integrated energy plan at a time the energy sector is increasingly decentralized and deregulated.

113. Sector-wide planning provides overarching goals for preparing sub-sectoral plans and targets. ADB encourages DMCs to develop consequent masterplans and roadmaps that include low carbon energy transition, rural and urban electrification programs, energy efficiency and conservation masterplans, hydrogen development roadmaps, and others. ADB can provide technical assistance to DMCs to familiarize them with the best practices and lessons from countries that have reached demonstrable stages of piloting, for instance, renewables-based hydrogen infrastructure and related roadmap development. Sector-wide long-term plans valuably inform the dialogue between DMCs and ADB on policy design and institutional reforms, infrastructure financing, and improving the electricity markets.

114. National climate policies, including long-term climate strategies with goals of reaching carbon-neutrality by mid-century, are also being announced by a number of DMCs. In this context, ADB will continue and reinforce its assistance to DMCs in enhancing their climate ambitions. ADB will help refine energy strategies aligning with the goals expressed in the NDCs and long-term climate strategies and identify energy sector and cross-cutting projects that can translate climate goals into action. ADB will work with DMCs to mobilize skills, technology, and financing to implement priority projects. ADB has established NDC Advance as a dedicated technical assistance platform to continue its work with DMCs aimed at mobilizing finance, building capacity, and providing knowledge and other support needed to implement their NDCs. During the 2020's, DMCs will face two rounds of updating their NDCs. ADB will provide assistance in this process to refine energy strategies to align with the climate goals and to express the energy strategies in the NDCs.

Partnering to Shape National Energy Policies

115. ADB is committed to providing DMCs with support for the creation of enabling policy frameworks for the provision of affordable, reliable, and sustainable energy and to manage the energy transition from fossil fuels to low-carbon energy. The energy landscape is changing ever more quickly, and policies must be adjusted to integrate emerging new technologies and business models while also considering specific circumstances of countries and maintaining an appropriate degree of stability to ensure investor confidence. Strategic approaches and policies will also be needed to ensure a just transition in the energy sector by addressing the socioeconomic consequences of efforts to transition away from fossil fuels. ADB will support DMCs in exploring this issue, particularly with respect to how improving the sustainability of energy systems can create new opportunities for employment and entrepreneurial activity.

116. The possible selection of policy measures is extensive and ranges from technology neutral policies, such as carbon trading and tax, to highly specific regulation aimed at individual technologies, such as building codes for energy efficiency or feed-in tariff for the accelerated deployment of on-shore wind power. International experience provides ample references of successful and failed policy measures for DMCs to draw on in their policy design. Several examples confirm that seemingly small weaknesses in details of regulation may cause policy measures to fail.

117. ADB is committed to continuing its support for enhancing the use of carbon pricing

instruments in the region. Carbon pricing is an integral element of the broader policy architecture and can be implemented in tandem with other policies such as removal of fossil fuel subsidies. Clear and predictable carbon price signals in domestic and international markets can enhance the economic viability of low carbon technologies and help ADB's DMCs in achieving climate targets articulated under their respective NDCs cost effectively.

118. Carbon price signals can be achieved through carbon taxes, emissions-trading systems (ETS—cap and trade) and international offset mechanisms. Carbon pricing can be effective in raising domestic revenues (carbon tax or ETS) as well mobilizing international carbon finance to incentivize investments in advanced low-carbon technologies (international offset mechanisms). If designed and implemented appropriately, robust carbon pricing instruments can be effective in achieving energy transition by accelerating diffusion of advanced low carbon technologies, enhancing deployment of renewable energy technologies, e-mobility, incentivizing fuel switching and use of different forms of non-fossil fuel energy.

119. Carbon finance mobilized through any of the bilateral, regional, or international carbon markets can alleviate financial barriers and facilitate cross border trade of electricity, enhanced share of renewables in the overall electricity supply mix, and foster regional integration. Momentum is growing for the use of carbon pricing instruments in the region, including domestic and bilateral as well as international carbon markets. ADB has a long-standing engagement with carbon markets, providing technical capacity building and mobilizing carbon finance to support GHG emission mitigation activities in the region. ADB will continue to adopt a holistic approach by mobilizing international carbon finance through its trust funds and provide technical support for policy development, capacity building, and strengthening institutional infrastructure for enhancing DMCs' ability to participate in and take advantage of emerging carbon markets.

120. Deployment policies are purported to accelerate investments in potential new technologies through various kinds of financial incentives. These include, for example, feed-in-tariffs, renewable energy auctions, tradable certificates, tax incentives, and investment grants. These are typically applied to the power sector. In the transport sector, the most common mechanisms are quotas, blending obligations, and mandates related to the use of ethanol, biodiesel, advanced biofuels, drop-in liquid fuels, synthetic fuels, and biogas. These mandates drive the fuel producers, blenders, or distributors to sell these products to a certain share in their total portfolio. In particular, ADB through technical assistance can support piloting these technologies in DMCs crowdsourced through ADB's open innovation platform (challenges.adb.org). ADB has also established ADB Ventures Investment Fund to support impact technology startups and leverage ADB's operational networks and industry expertise to generate technology pilot opportunities in DMCs.

121. ADB will help DMCs formulate new types of policy measures and regulations, which are needed as the reduced cost of wind and solar PV electricity increases the share of variable and intermittent electricity supply as well as distributed generation in electricity systems. Commercially, increasing share of variable renewable energy would require power utilities to adopt new business models to ensure their financial health. Technically, the integration of renewable energies into existing systems calls for the reinforcement of ancillary services through energy storage, digitalization, and other innovative technologies as well as grid management. Increased system flexibility is a property of the whole power system rather than its components. Creating flexibility therefore depends on a wide array of factors and requires the cooperative operation of assets by different independent entities in the power

system, including power producers, district heating utilities, large consumers, grid owners and operators, market exchanges and single-buyer hosts, and government agencies. The challenge of regulation is to navigate this complex landscape in order to effectively mobilize the flexibility resources.

122. ADB will help DMCs plan and implement improved electricity market designs that enable short-term efficiency through competitive and optimized dispatch and long-term efficiency with sufficient price signals and incentives for investments in new resources to ensure capacity adequacy. In doing so, particular attention will be paid to the market design to avoid large fluctuations and sharp spikes in prices. ADB will also support DMCs in building institutional and technical capacities to operate the improved electricity markets.

4) Promoting Energy Security and Regional Cooperation

123. Fostering regional cooperation and integration is one of ADB's seven operational priorities under its Strategy 2030. In addition to supporting bilateral economic cooperation, ADB has supported subregional economic cooperation platforms such as the Greater Mekong Subregion Program, the Central Asia Regional Economic Cooperation, and South Asia Subregional Economic Cooperation Programs and has engaged with Association of Southeast Asian Nations and countries in Northeast Asia. ADB's support for energy cooperation plays a significant role in all these contexts and has included power trade and natural gas pipeline projects.

124. ADB's support to DMCs on cross-border electricity trade has sought to address barriers and complexities in international and domestic politics and finance as well as technical and operational risks. Moving forward from bilateral cross-border trade to sub-regional competitive markets has proven particularly challenging. However, ADB will continue to advance cross border energy trade and markets through provision of knowledge and support for crucial intercountry dialogue in order to address political barriers and strengthen cooperation. Overall, intensified transboundary economic cooperation contributes to maintaining and deepening peace and stability in the region.

125. Cross-border interconnections and long-distance high voltage lines enable DMCs to tap into hydropower, solar, wind, and geothermal energy resources in remote areas and across borders. Larger balancing areas can allow for higher renewable electricity shares in the DMCs' power systems, reducing emissions of greenhouse gases and other air pollutants. Temporal complementarities in the production and consumption patterns between the trading countries create cost differences underpinning mutually beneficial energy exchange. Transboundary trading with electricity and grid services can also improve energy security and system stability and reduce generation costs and system losses. ADB will also advance demand side collaboration opportunities such as harmonization of grid codes and other energy performance standards.

126. In addition to technical assistance, ADB supports DMCs in cross-border and sub-regional electricity interconnection infrastructure development. To help DMC's meet their climate goals, ADB will prioritize projects that pursue the large-scale deployment of renewable energy resources and the integration of variable renewable electricity at scale to wide-area grids created electricity interconnection. ADB will refrain from supporting dedicated cross border transmission lines linked to coal-fired power plants.

127. The development of ultra-high voltage technology for both alternating and direct current electricity transmission, together with the rapid cost declines for solar and wind power, have extended the quest for large-scale development and utilization of hydro, wind, and solar resources to inter-subregional contexts. ADB will continue to encourage subregional interconnectivity initiatives in Central Asia, Southeast Asia, and South Asia. At the same time, ADB will also recognize the emerging possibilities for extended interconnectivity, among other Asia and Pacific interconnection initiatives, from Central Asia to South Asia and Central Asia to East Asia.

5) Integrated Cross Sectoral Operations to Maximize Development Impact

128. ADB will also continue to use a wide range of financial instruments to provide the most targeted and effective support for its DMCs. It will continue financing energy infrastructure and other interventions through financial assistance, primarily project loans, and associated technical assistance. These methods represent the traditional, proven, and most common mode of ADB support.

129. Other instruments, however, may offer particular value for achieving the energy sector reforms still on the agenda for many of the region's DMCs. The use of policy based lending is a long-standing modality to support a DMC's reform agenda, that has been increasingly used by some DMCs. Policy based lending can play an important role in supporting the energy sector reforms, commercialization, and enactment of new energy policies necessitated by more stringent climate commitments. Given the central role of disbursement-linked indicators in results based lending, energy sector operations can generate objectively verifiable indicators backing the results based lending modality, be it on the access agenda, emissions, energy efficiency, or the share of renewable energy. Consequently, when its assistance is requested by a DMC, ADB will seek to apply these instruments to maximize their use and benefits.

130. ADB will respond to the need to improve efficiency in supporting development programs that involve small and widely dispersed subprojects. Such subprojects are common in rural electrification, clean cooking, island energy supply, and demand-side energy efficiency programs, all of which this policy lends ADB's support to. ADB will apply the financial intermediation modality partnering with local banks and specialized financial institutions. In addition, ADB will collaborate with other development partners that have experience and presence in the DMC and the field in question. Through the broader aggregation of subprojects to a subregional level, ADB may also seek higher implementation efficiency on selected programs and with such technologies as cannot be applied in scale on the national level. In this context, ADB will cooperate with national banks and private financial institutions signed to Equator Principles[27] to ensure its goals are achieved.

131. Building on its strong track record of collaboration, ADB will coordinate and work with a range of development partners in the energy sector, including other multilateral development banks, international development agencies, multilateral and bilateral institutions, private sector entities, civil society organizations, community-based organizations, and philanthropic foundations in formulating policies, designing, implementing,

[27] The Equator Principles is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence and monitoring to support responsible risk decision-making.

and monitoring projects. In particular, with support of development partners, ADB established the Clean Energy Financing Partnership Facility to support the deployment of new, more efficient clean energy technologies, and support policy, regulatory, and institutional reforms that encourage clean energy development.

132. Through its activities with DMCs, ADB has accumulated a wealth of experience and knowledge base on energy sector policies, structural and institutional set-ups, project designs and implementation, financial modalities, technologies and innovation, as well as how all of these have been proven on-the-ground. ADB's interventions have been subject to systematic professional validation and evaluation against several criteria, most notably for their relevance, effectiveness, efficiency, and sustainability. From this basis, ADB supports the DMCs by producing research, knowledge products, manuals, and advisory services that convey the best practices and lessons learned for their energy sector development and transition. This complements the toolkits and staff guidance notes to enhance internal ability to better respond to ADB clients.

133. ADB will continue improving its processes to generate, capture, and disseminate knowledge, while also paying attention to collecting and documenting the valuable tacit knowledge accrued through its work. Knowledge will be shared internally so that staff can integrate it into day-to-day work. It will also be shared externally to help DMCs build their capacities to shape policies and regulations and to identify, assess, and implement programs and projects. ADB will expand and nurture its existing knowledge partnerships with bilateral and multilateral agencies and institutions, think tanks, academia, civil society organizations, and the private sector. It will promote knowledge sharing across the institution and communicate externally through capacity building and advisory services, publications, training, and workshops. ADB will also continue its dialogues on critical energy sector issues with DMCs, development partners, the private sector, and civil societies within the framework of the Asia Clean Energy Forum.

134. Strategy 2030 pledges that ADB will reinforce a One ADB approach, bringing together ADB's own diverse expertise and knowledge in a range of areas from across the institution, including collaboration and joint development of projects by public and private sector operations. Through better management of its own knowledge resources, ADB will be better able to develop integrated solutions that incorporate advanced technologies with support from sector and thematic groups.

135. Energy sector operations are coupled closely with other sectors and thematic groups, and this linkage must be understood as reciprocal. Firstly, energy services are part of the necessary infrastructure for society. They enable and provide critical support to economic activities, public services, and everyday life. When ADB addresses social and economic development challenges, the adequacy of energy supply and consumption is a part, small or large, of the equation. This inter-reliance can be easily seen in integrated solutions where the energy supply side is linked to multi-thematic end-uses.

136. ADB's energy operations encounter increasing proposals with development objectives in other thematic areas than energy but with a considerable need for energy sector contributions. Such may include developments for carbon neutrality communities, developing a sustainable tourism island, or a hybrid solar PV mini-grid designed to drive village water pumps for irrigation that will support agriculture, provide water for sanitation, cold storage for medicine in a health center, and cold chain for delivery of vaccines.

137. However, the energy sector is not just a means of tackling development challenges arising from other sectors or themes. It is the locus of a complex array of development challenges connected to pressing social and environmental needs. DMC energy sector policies, programs, and projects, motivated by climate commitments and supported by ADB, drive various consumer side responses. The challenges raised by responding to these policies and needs are multifaceted.

138. Deployment of electric mobility, for example, can be considered in the contexts of climate change, power distribution development, transport and urban planning, private sector participation, and social equity. ADB will support development of charging infrastructure to meet the requirement of electric passenger cars and electric buses in DMCs. Such charging infrastructure will be included in the power sector development plan, and prioritize use of renewable energy sources. In the long run, battery powered electric vehicles have the potential to serve as electricity storage capacity and interact with electricity grids to integrate more renewable energy.

139. Maximizing ADB's development impact in rapidly changing and interconnected energy sector will therefore require new and more comprehensive and cross-cutting approaches. The energy transition will bring with it projects that require ADB to integrate cross-sectoral perspectives to its interventions in a more sophisticated and holistic manner to the energy–transport and water–energy nexus through new technologies such as electric or fuel cell vehicles and solar water pumps. ADB will also provide support education, health, agriculture, and other sectors through deployment of energy technologies. ADB will meet the challenges of the changing energy sector by providing DMCs with its knowledge and expertise through cross-sectoral and cross-thematic teams to help design new policies and manage demanding projects with broad and complex environmental, social, and economic implications.

E. REVIEW OF THE ENERGY POLICY

140. A review of this energy policy will be conducted in 2025 to reflect the progress in energy technologies to support DMCs to enhance their commitments towards carbon neutrality. Accordingly, the specific guidance notes on energy sector operations (natural gas, large hydropower, and waste-to-energy) should be updated.

141. Implementation of Energy Policy requires adequate human and financial resources. The staff skills mix and technical capacity must be enhanced in energy policy reforms, energy efficiency and emerging new low carbon technologies. These requirements would be met by reprioritization of available staff positions and consultant positions under budget funds, and the Clean Energy Financing Partnership Facility, and technical assistance sources. The needed staff strength and other resources will be reviewed in 2025 to ensure ADB's effectiveness and ability to meet the requirements of DMCs in their long-term energy transition.

Appendix 1

Linkage between the Guiding Principles of Energy Policy and the Seven Operational Priorities of ADB Strategy 2030

Guiding Principles of Energy Policy	Support to Operational Priorities (OP)
1. Securing energy for a prosperous and inclusive Asia and the Pacific	OP 1—Addressing remaining poverty and reducing inequalities: provision of last-mile access for power, light, clean cooking and heating. OP 2—Accelerating gender equality: reducing persistent gender gaps, addressing gender inequality and reducing women's burden of care and unpaid work.
2. Building a sustainable and resilient energy future;	OP 3—Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability: through the increased use of renewable and low-carbon energy, achieve a planned and rapid phase-out of coal in Asia and the Pacific. OP 4—Making cities more livable: energy efficiency, renewable energy, and electric mobility, will help make cities more livable by improving ambient air quality. OP 5—Promoting rural development and food security: off-grid electrification and solar pumps to support agricultural activities to enhance food security in rural communities.
3. Engaging with institutions and framing policy reforms	OP 6—Strengthening governance and institutional capacity: support energy sector reforms, including strengthened regulatory frameworks and introduction of competitive markets, attract private sector investment, and ensure the long-term financial viability of energy entities.
4. Promoting regional cooperation to enhance energy security	OP 7—Foster regional cooperation and integration: promote regional cooperation through policy dialogue, knowledge sharing, and investments in cross-border energy trading to reduced greenhouse gas emissions and increase energy security.
5. Providing integrated solutions and cross sectoral operations to maximize development impact.	Supporting all seven OPs through integrated energy and cross-sector solutions to address more complex development challenges.