mechanisms, including carbon pricing instruments such as carbon taxes, emissions-trading systems (ETC—cap and trade), and international offset mechanisms. However, cost reflective tariffs and governance measures to ensure sector accountability and sustainability remain an issue in many countries in the region.

20. **Role of Natural Gas**. Across Asia and the Pacific, natural gas is used in buildings, industry, and power generation, including combined heat and power plants. The region imports 9% of the world's total pipeline imports and 75% of liquefied natural gas (LNG) (mainly PRC, Japan, the Republic of Korea, and India).[14] Though natural gas has played a key role in helping many countries reduce emissions from coal, the Paris Agreement calls for deep decarbonization to achieve climate stabilization. This has raised questions about whether continued investment in gas is aligned with the Paris Agreement objectives. Replacing coal with natural gas reduces but does not eliminate GHG emissions, and fugitive emissions from natural gas production and transmission have risen on both the energy and climate agendas. Despite these concerns, the current supply contracts and plans are expected to cause natural gas use to increase in the region during the next decade. LNG terminals and gas transmission and distribution infrastructure require high capital costs. In this context, it is a likely scenario that many of the region's economies will continue to include gas in their energy transition strategies to replace coal and fuel oil as a transitional fuel to reduce particulates and GHG emissions and to provide flexible thermal power generation capacity to balance intermittent renewable power sources.

21. **Emerging Technologies**. Green hydrogen, produced with electricity from renewable energy sources, has attracted a lot of investment in recent years for the role it can play in decarbonization. Hydrogen can be used for energy storage for variable renewable electricity in the system, with electrolyzers acting as flexible demand to the power system, especially for long-term storage to fill gaps of seasonal supply and demand. Hydrogen also has application in the more difficult to decarbonize sectors; it can be a power source for electric mobility in cars, aviation, and ships using fuel cells, and it can replace natural gas in some industrial processes. Hydrogen can also be a power source for mobility as a synthetic fuel, used in traditional combustion engines or turbines. DMCs would benefit from the move toward a hydrogen economy. On the supply side, developing countries could tap their renewable energy resources to produce hydrogen and export it to other countries. On the demand side, developing countries could start using hydrogen technologies in specific areas such as fuel cell vehicles with zero CO2, sulfur dioxide, or nitrogen oxide emissions. The PRC, India, and a number of DMCs have issued or are preparing their national hydrogen development strategies.

22. Bioenergy, and particularly liquid biofuels, potentially offer DMCs many advantages provided that their potential negative impacts on food security through crowding out of food production are properly managed. Bioenergy and biofuels contribute to decarbonizing sectors that are difficult to electrify. Sustainable sources of solid biomass, pellets, and biogas can provide for small- and medium-scale localized energy demands and substitute use of coal, and biomass collected unsustainably. Liquid biofuels are produced mainly for road transport and are deployed through blending mandates, but in the future advanced biofuels may also be applied by some industry sectors, shipping, and aviation. Biofuels have been proven technically feasible but are still costly and have problems with immature feedstock supply chains. There are also environmental (such as deforestation) and food security concerns linked with the production of biofuels.

[14] BP Statistical Yearbook 2020.

23. Alongside these possible energy sources for decarbonization, new opportunities for sustainable heating and cooling have arisen through coupling renewable electricity with heat pump technology. Heat pumps operating with shallow-depth or medium-depth geothermal resources represent a promising low-carbon and clean heating and cooling solution. Future space conditioning systems may also be hybrids, combining solar collectors, air- and ground source heat pumps, and heat storage technologies. District cooling systems based on absorption chillers, either stand-alone or integrated with district heating, can also use these heat sources and are gaining popularity in Asian cities.

24. The Asia and Pacific region has many of the world's largest cities. Cities, large and small, in general have emerged in the national and international energy policy arenas as important actors with highly dynamic and cross-cutting agendas. City administrations are now perceived as playing a key role, for example, in designing and managing transport systems as well as regulating the way buildings are designed and built, or how waste is collected and disposed of, and what kind of water, wastewater, electricity, gas, and district heating systems are promoted or discouraged. The role of cities is manifested, for example, in the way electric mobility is incentivized and charging infrastructure developed, whether waste is recycled and utilized as an energy source, or by allowing the use of waste water as a source for heat pumps to feed energy to the district heating network. There is also growing momentum for leading global cities to achieve carbon neutrality in the next 10–20 years.

25. Considering the level of energy services accessible to rural populations, the region's energy access agenda has advanced, but work remains to be done. During the last decade, countries in the region have made significant progress in providing electricity access to their citizens. Nevertheless, more than 200 million people still lack electricity access across developing Asia. In many DMCs, the economically viable potential for electrification through grid extension has largely been achieved and the focus is now placed on achieving the "last mile" through off-grid solutions such as mini-grids. However, the financial sustainability of mini-grids and affordability for consumers remain major challenges. Moreover, services provided through mini-grids are not always continuous and reliable, and can be insufficient to run, for example, flour mills or water pumps for productive purposes. The issue of how to achieve universal access to sustainable, reliable, and affordable electricity, therefore, will remain on the agenda of governments and national and international development financing institutions for the next decade.

26. While there has been good progress with the provision of electricity, access to clean fuels and technologies for cooking and heating continues to be a challenge for DMCs in both rural and urban contexts. Cooking using traditional technologies and fuels such as charcoal and cow dung is a major source of indoor air pollution and associated health problems. Every year, 3.8 million people die prematurely from illnesses (including pneumonia, stroke, ischaemic heart disease, chronic obstructive pulmonary disease, and lung cancer) attributable to the household air pollution caused by the inefficient use of solid fuels and kerosene for cooking.[15] As these impacts disproportionately burden women and children, lack of access to sustainable cooking solutions is also a social problem. In addition, using charcoal and wood to cook has a significant impact on climate change, contributing 3% of global $CO_2$ emissions every year. These challenges must be confronted during the 2020s. In addition to electricity, biogas, liquified petroleum gas, and natural gas, the decade will likely bring new

[15] World Health Organization. 2018. *Household Air Pollution and Health.* https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health

advanced biomass cookstove models, solar cookers, collectors, and discs for cooking and heating applications.

27. Improving energy sector resilience and security has been clearly identified as a need during the COVID-19 pandemic, and this will be needed as Asia and the Pacific recovers from the pandemic. Although energy systems have operated well so far, concerns over reliance on international access to skills and capabilities, technologies, and fuel resources mean that energy systems have been put at risk. Renewable energy technologies, when manufactured as well as deployed and maintained locally in DMCs, can create energy generation systems that are resilient to supply chain interruptions. While COVID-19 has reduced the cost of imported fossil fuels, the next shock or crisis could result in limited access or spikes in global fossil fuel prices as seen in the past, and therefore a reduction in the use of imported fuels increases resilience against probable future events. Moreover, increased use of ICT across energy infrastructure will require a focus on cybersecurity to ensure that such use of advanced technologies does not introduce other security vulnerabilities.

## C. THE OBJECTIVE AND GUIDING PRINCIPLES OF ENERGY POLICY

28. In response to the challenges and energy sector outlook, and to reflect the findings of the Sector-Wide Evaluation, feedback from stakeholders concerned, lessons learned, and the policy analysis, ADB has prepared a new Energy Policy. This 2021 Energy Policy is developed based on greater awareness of climate risks, costs, and mitigation opportunities; greater knowledge of the needed scale and urgency of response to the climate change challenge; and evolving and highly differentiated DMC priorities and commitments for action under the SDGs and the goals of the Paris Agreement. The 2021 Energy Policy is consistent with Strategy 2030, enabling sovereign and non-sovereign energy operations (including lending through financial intermediaries) to align with ADB's vision of a prosperous, inclusive, resilient, and sustainable Asia and the Pacific and the seven operational priorities of the Strategy. The 2021 Energy Policy will ensure that ADB's energy sector operations are consistent with the goals of Sustainable Development Agenda and the Paris Agreement, and make all finance flows consistent with low-GHG emission and climate-resilient development pathways.

29. The objective of the 2021 Energy Policy is to guide ADB's energy sector operations to help DMCs develop sustainable and resilient energy systems. In this policy, ADB strengthens its commitment to climate change mitigation and adaptation. Strategy 2030 pledges that at least 75% of its committed operations, including sovereign and non-sovereign operations, will be designed to support climate change mitigation and adaptation by 2030. Climate finance from ADB's own resources will reach $80 billion cumulatively from 2019 to 2030.

### Alignment with the Paris Agreement

30. ADB is committed to helping its DMCs pursue the goals of the Paris Agreement. ADB provides technical assistance and financing to these DMCs within the framework of planning and implementing their nationally determined contributions (NDCs), which embody their short and medium-term efforts to reduce GHG emissions and adapt to climate change. ADB will also support DMCs to set up a comprehensive and coordinated approach for the development

and implementation of long-term low GHG emission and resilient development strategies and long-term climate strategies as encouraged by the Paris Agreement to establish a whole-of-economy approach to transitioning to low-carbon and resilient development. NDCs and long-term climate strategies will sit within a coherent planning framework that also includes National Adaptation Plans established under the Cancun Adaptation Framework.[16]

31. Furthermore, the Paris Agreement Article 2 (1c) obligates the parties to the agreement to make finance flows consistent with a pathway towards low GHG emissions and climate-resilient development. ADB and the other multilateral development banks have jointly declared their intention to align their financing with the mitigation and climate resilience goals of the Paris Agreement and have worked to develop methodologies to assess and characterize their operations in this respect.

32. Accordingly, ADB will systematically assess the extent to which its proposed energy sector operations in its DMCs align with both the mitigation and adaptation goals of the Paris Agreement. On adaptation goals, it will identify and assess physical climate risk faced by the proposed operation and integrate climate resilience measures that are not inconsistent with national climate adaptation priorities. The assessment will also set the basis for follow-up reporting on how its operations have aligned with the agreement. It will rely on lists of types of projects that can be universally considered aligned or not aligned with the Paris Agreement's mitigation goals. For project types not included in these lists, assessment will consider specific criteria arising from the project's details, including its national and sectoral circumstances. The characterization of an operation as not aligned does not necessarily lead to non-engagement with the project proponent as the assessment may lead to ADB's opportunity to work with the client on developing an alternative low-GHG, resilient climate strategy or project for the targeted impact. In planning its project or economic activities, ADB will apply a decision tree for assessing the alignment with the Paris Agreement.

33. In preparing energy sector projects, ADB will conduct least-cost stable energy supply (based on levelized-cost of energy) assessments. In doing so, renewables and energy efficiency should be considered carefully first, and support should be provided to DMCs to always use the best available technologies for reducing GHG emissions. ADB will consider the social cost of carbon across all energy projects. A review of the empirical estimates of the global social cost of carbon reported by the Intergovernmental Panel on Climate Change suggests a unit value of $36.30 per ton of CO2 (2016 dollar),[17] increased by 2% annually in real terms to allow for the potential of increasing marginal damage of global warming over time. This unit value can be used to estimate the value of avoided GHG emissions for projects that reduce emissions and the cost in damage created for projects that increase emissions. The unit value may be revised in the future as more and new estimates of damages caused by climate change become available.

### Differentiated Approaches to Groups of Countries

34. In accordance with Strategy 2030, the 2021 Energy Policy underscores that ADB's work with and for the DMCs in the energy sector encourages urgent action to combat climate

[16] The United Nations Climate Change Conference was held in Cancún, Mexico in 2010 and established Cancun Adaptation Framework, which will strengthen action on adaptation in developing countries through international cooperation.
[17] See Intergovernmental Panel on Climate Change. Fifth Assessment Report (AR5). https://www.ipcc.ch/report/ar5/