

Executive Summary | Progress in Sustainable Energy in Asia and the Pacific

Overview

The Asia-Pacific region comprises 58 economies¹, ranging from highly industrialized to least-developed, with a population of 4.3 billion, representing 60 per cent of the world total. Economies of the region produce 32 per cent of the world's GDP and consume more than half of the global energy supply. With the world's fastest rising energy demand and some of the largest deficits in energy access, the decisions and actions taken by Asia-Pacific countries will largely shape the face of progress toward achieving global sustainable energy objectives, including targets under the Sustainable Energy for All initiative and Goal 7 of the Sustainable Development Goals. In 2014, Asia and the Pacific was responsible for 55.2 per cent of global emissions from fuel combustion, nearly two-thirds of which were from coal, and eighty-three of the world's top 100 polluted cities², as measured by PM 2.5 levels, are found in the region.

Though facing many challenges, Asia-Pacific countries are demonstrating global leadership across the three main pillars of sustainable energy, offering strong commitments and innovation in the areas of access, efficiency, and renewables. New technologies and approaches have emerged, and as the Paris Agreement turned the world's focus toward decarbonization, nations across the region offered up new and increasingly ambitious targets for increasing energy efficiency and the renewable energy share. Following is an overview of progress under each of the three pillars.

Progress in Access to Energy: Electrification

Key Figures

- More than 421 million people, or 9.7 per cent of the Asia-Pacific population, remained without access to electricity in 2014. 389 million of those are located in rural areas.
- Between 2012 and 2014, an estimated 93.1 million people gained access to electricity.
- The regional rate of electrification rose to 90.3 per cent, up from 89.8 per cent in 2012.
- Urban areas are gradually approaching universal access at 98.7 per cent in 2014, while rural areas have stagnated at 83.3 per cent.
- In the period 2012-2014, China, India and Pakistan each added between 13 and 16 million people to their populations with access to electricity, while in Afghanistan, Bangladesh, Indonesia, and the Philippines, electricity service was extended to between five and nine million people.

Energy poverty impedes sustainable development progress, yet it is experienced by a large portion of the Asia-Pacific population. Energy-hungry countries of the region are working to bring electricity to

¹ This number includes UNESCAP Asia-Pacific regional members and associate members. In addition to these regional members, UNESCAP includes four non-regional member States, including France, the Netherlands, the United Kingdom, and the United States of America.

² Data is available from the World Health Organization for over 3000 human settlements, mostly cities in 103 countries, though not all cities collect or report on their ambient air quality.

their growing populations in order to underpin social development and economic growth for households, businesses, and nations. Recent years have shown the establishment of clear policy targets that are increasingly backed by supportive programmes and economic measures.

During the years 2012-2014, Afghanistan, Bhutan, Cambodia, the Lao People's Democratic Republic, the Marshall Islands and Nepal showed some of the region's fastest progress in raising their electrification rates. China achieved universal access, while countries such as Cambodia and Lao PDR combined grid extensions with broad solar home system distribution efforts to boost rural electrification. Meanwhile others, including India and Nepal, have demonstrated the potential for solar microgrids to offer higher quality and economically sustainable off-grid power. Examples are emerging of governments joining hands with the private sector and civil society to pioneer new models incorporating the latest technologies and approaches to off-grid renewable power systems that serve the most remote and disadvantaged communities.

However, the challenges are many. Though progress in electrification continued at the regional level, it slowed in the recent period, attributable to population growth in rural areas of some key countries and difficulty in extending services to remote areas. The rate of progress has declined in countries with the largest deficits, namely India, Bangladesh, and Myanmar, while the lowest access rates are found among several Pacific Island and least developed States. Though urban areas in most economies have achieved universal access, rural areas lag behind, and in a few cases, rural electrification rates are falling. Furthermore, poor quantity, quality, and reliability of the power supply is a challenge in many places, as is affordability, a situation that severely hinders uptake and socioeconomic progress.

Government budgets are insufficient to meet the challenge due to the high costs of building and maintaining infrastructure in far-flung and geographically challenging regions. And coordination and integrated planning between the various government actors responsible for planning national grid extensions and rural or off-grid electrification is inadequate, leading not only to inefficiencies and overlaps, but also the creation of an uncertain investment atmosphere.

Lastly, current measures of access to electricity suggest nearly one in ten people lack electrical connections. However, this binary measure fails to capture highly relevant aspects of quantity, quality, reliability and affordability. With forthcoming data to be published in the next issue of the Global Tracking Framework report according to the multi-tier framework (which ranks the level of access under 5 tiers), light will be shed on these aspects, and the electrification picture may dim. A recent study suggests that many who are considered to have access to electricity may fall into Tier 0, meaning that their connection was very poor, with less than four hours of power per day.

Progress in Access to Energy: Clean Cooking

Key Figures

- In the Asia-Pacific region, almost 2.1 billion people – nearly half the region's population and more than a quarter of the global population – remain without access to clean cooking.

- The World Health Organization (WHO) attributes 92 deaths per 100,000 people to household air pollution in developing Asia.
- In 2014, the regional rate of access to clean cooking reached 51.2 per cent, up from 39.8 per cent in 2000.
- Only 12 Asia-Pacific economies have access levels of at least 99 per cent.
- The average annual share increase has hovered around 0.8 per cent over the period 2000-2014, well below the pace to achieve universal access by 2030.

The use of traditional biomass in the form of wood, charcoal and dung in open fires or inefficient stoves compromises indoor air quality, especially affecting women who are typically responsible for food preparation and the children who accompany them. Generally, women also bear the burden of gathering biomass, such as fuelwood, which is time that could be spent on other social or productive activities. The use of clean fuels and technology (such as LPG, biogas, electricity, advanced biomass cookstoves and solar cooking) improves indoor air quality and reduces time spent on gathering fuels.

At the regional level, small, steady gains have been made in closing the gap between those with and without access to clean cooking fuels and technology, but the overall regional pace of improvement falls well short of what is required to achieve universal access to clean cooking by 2030. National situations are highly varied. High income countries and those endowed with abundant natural gas supply make up the small Asia-Pacific country group that has obtained universal access. Among the others, some countries are making slow progress, while others are losing ground. Growing populations in rural areas, where traditional biomass use is most prevalent, has led to slipping access to clean cooking in countries such as Bangladesh, Afghanistan, Sri Lanka and Timor-Leste.

Exceptions to the overall lackluster progress have emerged. In particular, Indonesia led the world in its pace of increasing access through the expansion and promotion of LPG fuel and technology markets, resulting in a dramatic increase from a mere 2.4 per cent in 2000 to 56.6 per cent in 2014. The Maldives also demonstrated impressive progress and is approaching universal access, and a number of other countries doubled their rates over the same period, though still have far to go.

Looking forward, progress may gain momentum as more attention is being paid to the issue by the region's policymakers. Several Asia-Pacific nations have recently put forward clean cooking targets, and undergone new efforts in research and expanding markets for clean cooking fuels and technology. Though, current efforts remain small in comparison to the scope of the problem and the challenges are great. For a broad switch from traditional to clean cooking to take place, the expansion and reliability of technology and fuel distribution networks is necessary, along with greater efforts to improve utility and affordability. Clean cooking must be better integrated into energy policy frameworks, and greater investments made in the development of options that meet consumer needs and overcome barriers such as cost and cultural preferences. Furthermore, increasing employment opportunities for women in rural areas raises the opportunity cost of gathering fuel households, therefore making households more likely to choose more efficient technologies with shorter cooking times.

Progress in Energy Efficiency

Key Figures

- The region of Asia and the Pacific has demonstrated a steep decline in energy intensity, falling from 9.1 MJ/\$ in 1990 to 6.0 MJ/\$ in 2014, progressing toward convergence with the global average of 5.4 MJ/\$.
- The region's energy savings between 2012 and 2014 are equivalent to the 2014 total final energy consumption of the Republic of Korea and Thailand combined.
- Supply-side efficiency in power generation showed progress, with regional thermal power generation efficiency increasing from 33.4 per cent in 1990 to 38.8 per cent in 2014.
- The industrial sector is responsible for the largest drop in energy intensity in 2012-2014 with a 3.2 per cent average annualized change in energy intensity, though the service (2.5 per cent) and, to a lesser extent, agricultural (0.8 per cent) sectors also showed progress.
- Energy efficiency gains in China between 2006 and 2014 eliminated the need for over USD 230 billion in investment for new power generation.
- The Asia-Pacific region needs an average of USD 211 billion annually to reach the 2030 target, but current levels falls short.

Energy efficiency offers numerous and substantial benefits. It supports increased energy security through energy savings, reduced investment needs for capacity additions, lowered reliance on energy imports and decreased vulnerability to fluctuations in energy prices. Energy efficiency for importing countries can raise currency reserves, and for exporting countries, domestic energy efficiency increases energy resources available for export. For those with energy subsidies in place, it can also lower government expenditures. Greater economic productivity is made possible, while social and environmental benefits include increased energy affordability, improved air quality, reduced pollution and lowered greenhouse gas emissions.

The Asia-Pacific region has demonstrated a long-term decoupling of GDP growth and energy consumption, increasingly producing more with less energy, and rapidly converging with global intensity levels. During the years 2012-2014, the region demonstrated acceleration in efficiency progress, achieving a short-term annual average energy intensity drop that outpaced other global regions, and moved the rate of progress toward the long-term 2.6 per cent global annual energy intensity improvement rate needed to meet the SEforAll 2030 energy efficiency target.

Energy intensity has fallen within the region primarily due to significant efficiency gains made in the industrial sector, where China, as a global leader in implementing industrial efficiency policies and measures, has largely driven the regional trend. Improvement was also seen in power, agriculture and services sectors. In contrast, the Asia-Pacific residential sector accelerated a climb in energy intensity, the transportation sector is experiencing a surge in energy consumption as GDP per capita rises and populations adopt higher standards of living that are also more energy-intensive.

Energy intensity targets have been widely established at the national level among Asia-Pacific countries, as well as at regional levels by ASEAN and APEC. They have grown increasingly broad and ambitious in scope, further driven by the Paris Agreement. Backing these targets, on the demand side, strong progress has been made in introducing and strengthening measures including minimum energy performance standards (MEPS) and energy conservation, particularly for lighting, appliances, space

heating and cooling, and water heating. On the supply side, policies to upgrade inefficient power generation and reduce technical and non-technical transmission and distribution losses have had positive effects, with most countries showing falling loss rates.

Government financial incentives are helping drive investment and participation within the energy efficiency market, and include tax reductions, subsidies, low-interest loans, equity, risk guarantees, and others. Several countries have also established dedicated funds to alleviate technical and financial project barriers. In addition, carbon taxation and emissions trading are raising motivations to adopt efficiency measures.

Energy service companies are helping realize the financial benefits of energy efficiency and are supported by several governments to enable a shift away from direct subsidies for energy efficiency investments, toward a market-based approach based on measures such as risk guarantees, increased lending, and dedicated credit lines. Led by China, the Asia-Pacific region also emerged as the 2016 global top issuer of green bonds, which have played a significant role in providing capital for energy efficiency as well as renewable energy, especially in transport, industry and building sectors.

Large and sustained improvements in both supply- and demand-side energy efficiency are needed to meet the SEforAll target. Although it has demonstrated fast progress in lowering energy intensity, Asia and the Pacific remains the most energy-intensive of all global regions. More final energy consumption across end-use sectors needs to be covered by standards, and enforcement improved to support the uptake of latest technologies. However, advanced technologies remain cost-prohibitive, especially for developing countries, and a lack of investment and financing remains a major barrier. Governments are challenged to strengthen policies and standards that create a favorable investment environment and support competitive markets, particularly as data within end use sectors remains limited, hindering efforts at identifying the most promising interventions.

Progress in Renewable Energy

Key Figures

- The share of renewable energy consumption, including both traditional and modern forms, reached 18.3 per cent of the region's total final energy consumption in 2014, down from 23.0 per cent in 1990, though up from a low of 17.9 per cent in 2011.
- In absolute terms, total renewable energy consumption amounted to 31.1 EJ in 2014.
- In 2014, modern renewables reached a share of 6.8 per cent on a promising upward trend.
- Investments in renewable energy (excluding large hydro) in Asia and the Pacific rose from USD 97.2 billion in 2012, reached an all-time high of USD 171.1 billion in 2015, then fell dramatically in 2016 to USD 114.8 billion.
- The estimated yearly investment needed in Asia and the Pacific to meet the renewable energy goal by 2030 is \$298 billion.

The Asia-Pacific region has emerged as the global leader in renewable energy with more investment, installed capacity, and consumption than any other region. Yet, at the same time, the energy-hungry

region's consumption of fossil fuels has risen substantially, limiting the growth of the share of renewable energy (including both traditional and modern forms) within the overall energy mix, and resulting in significant local and global environmental impacts.

However, Asia and the Pacific's relatively low and recently stagnant share of renewable energy masks the surge that the sector has experienced. Modern renewables (which excludes traditional biomass and includes resources such as solar, wind, modern biofuels, and geothermal) are rapidly gaining traction and exhibit a promising upward trend. Large increases in hydropower underpin this development, though wind and solar are increasing at exponential rates, though have yet to compete with more conventional energy sources.

The region's investments reached a record high in 2015, though fell in 2016 in large part due to installation slowdowns in the region's two largest markets, China and Japan, while dropping technology costs as well as project commissioning timing were also contributing factors. China has accounted for over half of the total new investments in renewable energy in the region since 2008, and has been leading renewable energy investments globally since 2009.

Backing this development is the introduction of ambitious targets, financial incentives, public financing measures, and new regulation. Capital subsidies, grants, and rebates for equipment and services are utilized by many countries to attract investment to both on- and off-grid sectors, helping reduce the cost of project development. Feed-in tariffs (FITs) have been one of the most successful instruments used to drive renewable energy investment in distributed installations, and more recently, auctions are serving to lower the costs of renewables. Hydropower remains the least costly among technologies, though onshore wind and solar PV are approaching price parity, and are even beginning to compete with coal in some countries such as China, India, the Philippines and Viet Nam. India demonstrates the lowest costs for solar PV and onshore wind within the region. Biomass and biogas are also highly competitive in some contexts and are on the rise in countries introducing energy crops and taking advantage of agriculture and forestry residues. Looking forward, prices are expected to continue to fall. Supporting this, several countries are investing heavily in technology research and development. Australia, China, India, Indonesia, Japan, and the Republic of Korea have committed to doubling their respective clean energy research and development investment over five years, targeting to invest USD 9.85 billion in clean energy research and development by 2021.

However, in order to realize the goal of doubling the share of renewable energy faster progress is needed. Much of the share of renewable energy is contained within traditional biomass, which, if universal access to clean cooking is to be realized, means that the region will need to increase modern renewable energy use at greater rates. Importantly, across the region, grid system capacity and readiness for variable renewable energy integration remains a key limiting factor, and bigger and faster grids are needed. In addition, the region has yet to show strong progress in incorporating renewables beyond the power sector, and focus is needed particularly in transport and buildings. Investment falls well below the level needed achieve target of doubling renewable energy's share, and therefore legal and regulatory aspects supporting renewable energy development require strengthening and alignment to create the necessary enabling environment for investors.