



Economic and Social Council

Distr.: General
8 February 2013*

Original: English

Economic and Social Commission for Asia and the Pacific Regional Preparatory Meeting for the Asian and Pacific Energy Forum

Bangkok, 14-15 March 2013

Item 4 of the provisional agenda**

**Emerging and persistent challenges as well as
opportunities for regional cooperation to promote and
enhance energy security and the sustainable use of energy**

Emerging and persistent challenges as well as opportunities for regional cooperation to promote and enhance energy security and the sustainable use of energy

Note by the secretariat

Summary

The purpose of this present document is to facilitate identification of common challenges facing the Asia-Pacific region in terms of energy security and the key emerging opportunities to achieve enhanced energy security in preparation for the Asian and Pacific Energy Forum 2013.

It is aimed at enabling a discussion of the progress achieved in Asia and the Pacific in addressing the energy security challenges at the regional, national and household levels, and at facilitating continuous dialogue among ESCAP member States with a view to enhancing energy security and working towards sustainable development. The document builds on the preparatory process for the Forum, including the subregional consultation meetings held in 2012.

The representatives of member States may wish to deliberate on the prospects outlined in the present document, along with the draft ministerial declaration on regional cooperation for enhanced energy security and the sustainable use of energy in Asia and the Pacific, and the draft plan of action on regional cooperation for enhanced energy security and the sustainable use of energy in Asia and the Pacific, and provide the secretariat with suggestions with a view to transforming these opportunities into a common regional response and appropriate initiatives aimed at ensuring energy security and enhancing the sustainable use of energy in Asia and the Pacific.

* The present document was submitted late owing to the need for the authors to conduct extensive research.

** E/ESCAP/APEF/RPM/L.1.

Contents

	<i>Page</i>
I. Introduction.....	2
II. Energy security and sustainable use of energy.....	4
A. Current situation and trends.....	4
B. Challenges and opportunities.....	9
III. Issues for consideration	19

I. Introduction

1. Energy is essential for production and income and employment generation in agriculture, manufacturing, commerce, mining and service industries. It also plays a significant role in promoting sustainable development with respect to poverty reduction and environmental sustainability, offering opportunities for improving people's lives. The provision of energy products and services has impacts on every aspect of society; therefore, lack of accessible, affordable and efficient energy presents a barrier to inclusive and sustainable development. Disruptions in the availability of energy or its price can have serious consequences for the development of a society and economy. As such, improving access to energy is widely considered to be a missing Millennium Development Goal.

2. Intermittent economic crises, political unrest and conflict and structural transformations in social and environmental trends continue to have adverse impacts on energy security. Compounding these negative aspects are such factors as the uneven distribution of energy resources, which adds to the uncertainties that cause the impact and perception of energy security risks to differ across countries. For instance, while a stable energy supply is sought by importing countries, exporting countries seek stable demand for energy.

3. Despite the differences in perceptions of energy security risks, economies in the Asia-Pacific region are bound together by their shared vulnerability to global financial situations, regional and global political developments and increased environmental impacts. These factors influence the structure of the global economy; they also pose new challenges while offering opportunities for enhancing energy security and achieving sustainable economic growth in the region.

4. In addition to producing negative environmental impacts, high dependence on fossil fuel imports renders countries susceptible to global financial and economic crises. Developing countries are particularly vulnerable to price increases, which affect their balance of payments position. As such, market fluctuations in fossil fuel prices pose a major threat to the ability of countries to attain the Millennium Development Goals.

5. In 2012, the General Assembly unanimously declared 2014-2024 as the United Nations Decade of Sustainable Energy for All,¹ underscoring the importance of energy issues for sustainable development and the elaboration of the development agenda beyond 2015. In adopting the resolution, the General Assembly reaffirmed its determination to make sustainable energy for all a reality. The General Assembly called upon States Members of the United Nations to galvanize efforts to make universal access to sustainable

¹ See General Assembly resolution 67/215.

modern energy services a priority. It is noted in the resolution that 1.3 billion people are without electricity and 2.6 billion people in developing countries rely on traditional biomass for cooking and heating, and that, even when energy services are available, millions of poor people are unable to pay for them.

6. In addition, the Secretary-General launched the initiative “Sustainable Energy for All” to mobilize action from all sectors of society in support of three interlinked objectives to be achieved by 2030: providing universal access to modern energy services; doubling the global rate of improvement in energy efficiency; and doubling the share of renewable energy in the global energy mix.

7. The Secretary-General’s High-level Group on Sustainable Energy for All and its co-chairs have already catalysed significant commitments to action by Governments, the private sector and civil society in support of the achievement of the three above-mentioned objectives. Commitments to the initiative announced at the United Nations Conference on Sustainable Development (Rio+20) include the following: (a) more than 50 developing countries are now participating in the initiative, with more joining it; (b) more than \$50 billion has been mobilized from the private sector and investors; (c) tens of billions of dollars have been committed by multilateral development banks in Asia, Europe and Latin America; (d) hundreds of actions have been catalysed and commitments have been made in support of the three core objectives; (e) commitments to support energy access will provide more than 1 billion people with access to modern energy during the lifespan of the initiative; and (f) new public-private partnerships are forming on transport, energy efficiency, solar cooking, finance and energy access for the poor.

8. At the Rio+20 Conference in 2012, the Member States recognized the critical role that energy plays in the development process, as access to sustainable modern energy services contributes to poverty eradication, saves lives, improves health and helps provide basic human needs. The conference reaffirmed support for the implementation of national and subnational policies and strategies based on individual and national circumstances and development aspirations. It also supported using an appropriate energy mix to meet developmental needs, including increasing the use of renewable energy sources and other low-emission technologies, the more efficient use of energy, a greater reliance on advanced energy technologies, including cleaner fossil fuel technologies, and the sustainable use of traditional energy resources.

9. Regional cooperation offers a unique opportunity to develop a common vision and response to the shared vulnerability and enhance energy security for ESCAP member States. For instance, the region’s energy security could be enhanced by improving physical connectivity and building institutions to promote cooperation between the region’s energy importers and energy exporters, by harmonizing policies and by exchanging knowledge, particularly in the areas of energy efficiency and renewable energy technologies. Such an approach will be increasingly needed in view of the region’s economic dynamism, the imperative for making energy available to all and the expectation that the price of crude oil will continue to increase over the next two decades.²

² United Nations, Economic and Social Commission for Asia and the Pacific, *Economic and Social Survey of Asia and the Pacific 2011: Sustaining Dynamism and Inclusive Development – Connectivity in the Region and Productive Capacity in Least Developed Countries* (Sales No. E.11.II.F.2).

10. In Commission resolution 67/2, the Executive Secretary is requested to convene, in 2013, the Asian and Pacific Energy Forum at the ministerial level to discuss the progress achieved in the Asia-Pacific region in addressing the energy security challenges at the regional, national and household levels, and to facilitate continuous dialogue among member States with a view to enhancing energy security and working towards sustainable development.

11. The present document contains an analysis of both emerging and persistent challenges common to the region, as well as key opportunities to enhance energy security and the sustainable use of energy in the Asia-Pacific region. The preparation of the document has taken into consideration the outcomes of the subregional consultation meetings³ and the expert group meeting held from 21 to 23 November 2012 in preparation for the Asian and Pacific Energy Forum.

II. Energy security and sustainable use of energy

A. Current situation and trends

12. Global energy consumption grew by 2.5 per cent in 2011, broadly in line with the historical average but well below the 5.1 per cent growth rate seen in 2010.⁴ The Asia-Pacific region accounts for the largest share of global energy demand. The region accounts for the consumption of more than 39 per cent of the world's energy, while North America and Europe account for about 22 per cent each. The Asia-Pacific region also accounts for 71 per cent of the growth in global energy consumption.⁴

13. In terms of total fossil fuel reserves, the North and Central Asian subregion stands out with over 7 per cent of the world's oil resources, more than 35 per cent of the world's gas reserves and about 22 per cent of the global coal reserves. On the other hand, the South and South West Asian subregion has more than 16 per cent of world's proven reserves of natural gas and more than 10 per cent of oil reserves.

14. In terms of production in 2011, the Russian Federation was the largest gas producer, accounting for 20 per cent of world's total, and the second largest oil producer, accounting for 12.7 per cent the world's total. It was superseded by Saudi Arabia with 12.9 per cent of the global total. China is in an invincible position as a major source of coal, having been the source of almost half the world's production of coal in 2011, followed by the United States of America at 12.9 per cent and India at about 7.5 per cent.⁵

15. In 2010, ESCAP members were among the top five electricity producers globally (in order of production: United States, China, Japan, Russian Federation and India). Collectively, they accounted for about 50 per cent of world's total gross production of electricity (minus production from pumped storage). In the same year, China was the top producer of hydro

³ Meetings were held between September and November 2012 for the Pacific, South-East Asia, North and Central Asia, East and North-East Asia and South and South-West Asia.

⁴ For more details, see the *BP Statistical Review of World Energy, 2012*. Available from www.bp.com/genericarticle.do?categoryId=9003467&contentId=7075430.

⁵ International Energy Agency, *Key World Energy Statistics, 2012* (Paris, 2012).

electricity (including pumped storage) accounting for 20.5 per cent of world's total hydroelectricity.⁶

16. However, owing to uneven distribution, only a few countries satisfy their energy needs from their own resources. The Asian and Pacific region as a whole is a net importer of primary energy. Nevertheless, the region's net imports are, by global standards, relatively small: 83 million tons of oil equivalent (Mtoe) in 2008 compared with 477 Mtoe for North America and 1,020 Mtoe for Europe. However, this average hides large net surpluses and deficits across subregions. For the period 1992-2008 the main energy trading subregions were North and Central Asia, the surplus of which increased from 382 Mtoe to 767, and East and North-East Asia, the deficit of which increased from 550 Mtoe to 947. Net exports of South and South-West Asia deteriorated, from a small surplus of 48 Mtoe to a deficit of 134 Mtoe. The Pacific and South-East Asia have relatively small surpluses that have changed little over time.²

17. Trade in electricity, though currently limited at the regional level due to infrastructure constraints, is increasingly being perceived as a major export item at the subregional level contributing to both foreign currency accumulation and domestic social progress. The South-East Asian subregion leads large-scale efforts to promote energy trade with the establishment of not only the Trans-ASEAN (Association of Southeast Asian Nations) Gas Pipeline project (widely known as TAGP) but also the implementation of the ASEAN Power Grid.

18. Although fossil fuels dominate global energy consumption, with a market share of 87 per cent of the total, the fossil fuel mix is changing. Oil, still the leading fuel accounting for 33 per cent of global energy consumption, has lost market share for 12 consecutive years. Global trade in oil in 2011 grew by 2 per cent, accounting for 62 per cent of global consumption, with net imports by China rising by 13 per cent. Global natural gas consumption grew by 2.2 per cent, with the largest volumetric gains (21 per cent) being recorded in China. In terms of consumption, coal was once again the fastest-growing fossil fuel in 2011. Coal consumption, grew by 5.4 per cent in 2011, the only fossil fuel to record an above-average growth rate. Coal now accounts for 30.3 per cent of global energy consumption, the highest share since 1969, and is the dominant fuel in the Asia-Pacific region.⁴

19. The region's growing energy demand has real implications for the world's efforts to control greenhouse gas (GHG) emissions. Fossil fuels, which account for over 70 per cent of GHG emissions, continue to be the primary source of fuel for energy generation. As such, the Asia-Pacific region's economic expansion was accompanied by rising GHG emissions in 2011. Whereas Australia, Brunei Darussalam and New Zealand have the highest per capita emissions in the region,⁶ a significant portion of the growth in emissions was due to increased coal consumption in China and India.⁷

20. Following the economic recession in the last decade, 2011 was an unusually eventful year in terms of global energy. The events in Northern Africa and the Middle East had impacts on energy markets. The earthquake and tsunami in Japan were a humanitarian disaster with immediate

⁶ Details are from the *Statistical Yearbook for Asia and the Pacific 2011* (United Nations publication, Sales No. E.11.II.F.1). Available from www.unescap.org/stat/data/syb2011/II-Environment/Air-pollution-and-climate-change.asp.

⁷ International Energy Agency, *World Energy Outlook 2012* (Paris, 2012).

implications — in Japan and around the world — for nuclear power and other sources of energy. Furthermore, following the disruption in Libyan supplies, oil prices hit an all-time high in April 2011.

21. While the majority of economies in Asia and the Pacific continue to rely on imports for their energy consumption requirements, the Pacific subregion has the highest petroleum fuel dependency of any region or subregion in the world, exceeding by far that of the Caribbean island States, with a high proportion of the petroleum used by the Pacific being devoted to transport: about 42 per cent in Papua New Guinea, 54 per cent in Fiji and 75 per cent on average for others. Similarly, in the South and South-West Asian subregion, Bhutan and the Islamic Republic of Iran are the only net exporters of energy in that subregion. In contrast, Maldives imports 100 per cent of its energy requirements.

22. Energy security remains high on the agenda for energy and development policymakers in the Asia-Pacific region to ensure a shift towards a sustainable path. Many countries and subregions have announced new initiatives to enhance energy security and sustainable use of energy.

23. For instance, the Pacific leaders endorsed, in 2010, a 20-year Framework for Action on Energy Security in the Pacific and an associated implementation plan. These were developed through wide consultation with Governments, power utilities, donors and financial institutions and the private sector. Similarly, ministers from more than 20 countries, including 8 in the Asia-Pacific region, met in London in April 2012 at the third Clean Energy Ministerial Meeting (CEM3) to explore ways to enhance collaboration between participating Governments and develop strategies to drive public-private engagement to support clean energy deployment. Later that year, energy ministers of member economies of the Asia-Pacific Economic Cooperation forum met in Saint Petersburg, Russian Federation, to discuss energy security challenges and strategic choices; they declared that enhancing energy security required concerted action in many areas.

24. At the same time, concerns about energy security have also led some economies in the region to secure energy supplies through foreign direct investments in countries in North and Central Asia, Africa and the Americas that have rich energy resources. China, India and the Republic of Korea are particularly noted for such investments.⁸ In addition, a parallel strategy to improve energy security has been to diversify the energy mix by investing in renewable resources, which also helps to reduce negative environmental impacts, improve health, create jobs, support rural development and increase energy access — in some countries leading to closer integration of renewable energy with policies in other economic sectors.

25. Renewable energy, including hydropower, generated an estimated 20.3 per cent of electricity globally and accounted for almost half of the estimated 208 gigawatts (GW) of new electricity generation capacity installed globally in 2011. In 2010, renewable energy supplied an estimated 16.7 per cent of global final energy consumption, with 8.2 per cent being from modern renewable energy sources — counting hydropower, wind, solar, geothermal, biofuels and modern biomass. China, India and Japan are among the top

⁸ United Nations Conference on Trade and Development, *World Investment Report 2011: Non-equity Modes of International Production and Development* (Sales No. E.11.II.D.2), p. 62.

seven countries that account for 70 per cent of all non-hydro capacity worldwide.⁹

26. In 2011, the output of hydroelectricity grew globally by 1.6 per cent, the weakest growth rate since 2003. Of this, the Asia-Pacific region accounts for over 30 per cent. The use of other renewable energy sources continues to grow but still accounts for only 2 per cent of energy consumption globally. Here again, the Asia-Pacific region does relatively well, accounting for about 24 per cent of this consumption. In the same year, nuclear power witnessed a downward revision of over 4 per cent globally, with the Asia-Pacific region accounting for 18 per cent of total global consumption.⁴

27. In 2011, global new investment in renewables rose by 17 per cent to a record \$257 billion. Net investment in renewable power capacity, including large hydropower, was some \$40 billion higher than net investment in fossil fuel capacity. China led these renewable energy investments with a value of \$52 billion, followed by United States (\$51 billion) and India (\$12 billion). However, India displayed the fastest expansion in investment among all large renewable energy markets in the world, with a growth rate of 62 per cent due to a sharp rise in the financing of solar projects under the country's Jawaharlal Nehru National Solar Mission and increases in wind capacity additions, as well as growth in venture capital and private equity investment in companies involved with renewable energy.⁹

28. The potential of the renewable energy sector to create jobs is increasingly being recognized. Recent estimates indicate that about 5 million people worldwide work either directly or indirectly in the renewable energy industries. Many significant examples of job creation exist in the developing countries of the Asia-Pacific region. For instance, India estimated that 350,000 jobs in renewable energy were created in 2009. Although there is no distinction between urban and rural jobs, technologies such as off-grid solar, biogas and small-scale hydro, principally relevant in a rural context, account for more than 190,000 of jobs in renewables in India. As of December 2011, Bangladesh had installed 1.2 million solar home systems in rural areas, creating an estimated 60,000 jobs in the solar sector. Since 1998 a United Nations Development Programme (UNDP) initiative in Nepal has supported the construction of 323 microhydro plants, leading to the equivalent of 3,850 full-time jobs.⁹

29. In contrast with North America and most of Western Europe where growth in nuclear power levelled out for many years, a number of countries in the North-East Asian and South and South-West Asian subregions are building and planning new nuclear power reactors to meet their increasing demand for electricity. Much of this growth is projected to be in China, India and the Republic of Korea. There are currently 117 nuclear power reactors operable in the region and 44 units are under construction; there are firm plans to build 92 more such reactors, and serious proposals for an additional 180.¹⁰

30. In taking into consideration the various conversion losses, energy saved through energy efficiency and conservation could be considered as the "fifth fuel"¹¹ or "virtual energy", the potential of which is not yet fully

⁹ Renewable Energy Policy Network for the 21st Century, *Renewables 2012 Global Status Report* (Paris, 2012). Available from www.ren21.net/gsr.

¹⁰ For details, see World Nuclear Association, *Asia's Nuclear Energy Growth*. Available from www.world-nuclear.org/info/inf47.html.

¹¹ Coal, petroleum, nuclear and alternative energy are the four fuels normally used.

exploited. Therefore, energy efficiency is an important component for enhancing energy security. A macro indicator of energy efficiency, namely energy required per unit of GDP, also termed as “energy intensity”, has been widely used to indicate the relationship between economic growth and the use of energy.

31. Most economies in the region have improved their performance in this area. In the North and Central Asian subregion, energy intensities in 2009 ranged from 0.3 tons of oil equivalent (toe) per \$1,000 of GDP produced in Armenia to 2.7 toe in Uzbekistan.¹²

32. Many factors affect energy intensity. In general, agriculture and services consume lesser amounts of energy per unit of GDP produced than manufacturing. Thus, a reduction in energy intensity may result from structural changes in the economy, such as a shift from manufacturing to services. Another factor that may have an important influence on energy intensity is fossil fuel subsidies, which tend to encourage overconsumption of fossil fuels. As such, it would be helpful to assess the reasons that have led to observed reductions in energy intensity.

33. Subsidies for fossil fuels continue to distort energy markets, and such subsidies expanded considerably in 2012 despite international efforts at reform. Global fossil fuel consumption subsidies totalled \$523 billion in 2011, a figure that is almost 30 per cent higher than that in 2010. The subsidy bill would have been even more expensive without reform efforts in several countries. The increase reflects higher international energy prices and rising consumption of subsidised fuels. By comparison, financial support for renewable energy amounted to \$88 billion in 2011.⁷

34. Unbalanced energy subsidies put pressure on the public budget and usually benefit mostly rich consumers and households. Phasing out subsidies would benefit both economies and the environment. At the same time, past experience, such as in Indonesia and elsewhere, suggests that such reform is likely to face stiff opposition and would therefore need to be carefully designed and communicated. Compensation in the form of targeted cash transfers would help to shield low-income households from attendant rises in energy prices.¹³

35. Furthermore, pricing of fossil fuels tends to provide an important signalling mechanism to induce measures to lower energy intensity and also promote renewable energy. However, with the recent volatile and upward trend in global oil and gas markets, the key challenge to Governments is to balance the varying needs of people. While an appropriate pricing signal on fossil fuels or electricity may lead to investments in energy efficiency and renewable energy, the same may also delay efforts to provide affordable modern energy services for all.

36. Despite progress in recent years, the Asia-Pacific region remains characterized by a large number of people living without access to modern energy services. Globally, nearly 1.3 billion people remain without access to electricity and 2.6 billion do not have access to clean cooking facilities. Of

¹² Calculation based on the National Accounts Main Aggregate Database for GDP (constant 2005 prices), the 2009 Energy Balances and Electricity Profiles, and the ESCAP statistical database for industrial output and 2009 population values.

¹³ Annabelle Mourougane, “Phasing out energy subsidies in Indonesia”, OECD Economics Department Working Paper, No. 808, OECD Publishing. Available from <http://dx.doi.org/10.1787/5km5xvc9c46k-en>.

the countries where large numbers of people are without electricity, just 10 of them account for two thirds of the total (4 of them in developing Asia and 6 in sub-Saharan Africa), and only 3 countries — Bangladesh, China and India — account for more than half of those without clean cooking facilities.⁷ However, the situation varies at the subregional level.

37. Of more than 600 million people without electricity in Asia and the Pacific, the South and South-West Asian subregion (specifically the countries of Bangladesh, India and Pakistan) alone accounts for about 449 million such people.¹⁴ In the South-East Asian subregion, about 81 million people in Indonesia and about 43 million in Myanmar continue to live with no access to electricity.¹⁵ In Papua New Guinea in the Pacific subregion, only 10 per cent of households have access to electricity.¹⁶ In the North-East Asian subregion, large numbers of people in China, the Democratic People's Republic of Korea and Mongolia experience problems in accessing electricity (8 million people in China, 17.7 million in the Democratic People's Republic of Korea and about 1 million in Mongolia) live without access to electricity.¹⁷ On the other hand, although access to energy services is not the primary energy-related challenge in North and Central Asia, there are concerns in some countries about that subregion. For instance, 98 per cent of the population of Kyrgyzstan have access to the electricity grid, but there are forced blackouts and rationing when hydropower abates during the winter.¹⁸ Likewise in winter, more than 1 million people in Tajikistan, the population of which is fewer than 7 million, have little or no access to an adequate supply of energy.¹⁹

B. Challenges and opportunities

38. In the absence of further action, it is projected that in 2030 nearly 1 billion people globally will be without electricity and 2.6 billion people will still be without clean cooking facilities.⁷

39. The current situation and ongoing trends in the socioeconomic realm point to persistent and emerging challenges and opportunities to enhance energy security in the Asia-Pacific region.

40. The global population reached 7 billion in 2011. With a population of more than 4 billion people, the Asian and Pacific region accounts for about

¹⁴ Details contained in *Project Report of South and South-West Asia Consultations for Asia-Pacific Energy Forum: Subregional Perspectives* (2013). Prepared for the United Nations Economic and Social Commission for Asia and the Pacific, Subregional Office for South and South-West Asia. International Energy Agency, *World Energy Outlook 2011* (Paris, 2011).

¹⁵ International Energy Agency, *World Energy Outlook 2011* (Paris, 2011).

¹⁶ United Nations Development Programme and World Health Organization, *The Energy Access Situation in Developing Countries: A Review Focusing on the Least Developed Countries and Sub-Saharan Africa* (New York, Bureau for Development Policy, 2009).

¹⁷ International Energy Agency, *World Energy Outlook 2009* (Paris, 2009).

¹⁸ N. Abdyrasulova and N. Kravsov, "Electricity governance in Kyrgyzstan: an institutional assessment". The Electricity Governance Initiative, Civic Environmental Foundation UNISON, October 2009. Available from http://electricitygovernance.wri.org/files/egi/Kyr_EGI_FINAL_5.6.10.pdf.

¹⁹ See UNDP-UNEP Poverty-Environment Initiative, Country fact sheet on Tajikistan, subheading "The context of poverty-environment mainstreaming in Tajikistan". Available from www.unpei.depiweb.org/what-we-do/pei-countries/tajikistan.html.

60 per cent of the global population and constitutes the largest energy market in the world, as it accounts for about 40 per cent of total global energy consumption. It is a diverse region, home to seven of the world's most populous countries as well as many of the world's smallest countries, several of which are located in the Pacific subregion. Every country in the Asia-Pacific region has completed or is in the midst of a demographic transition²⁰ but with different timing and pace. Demographic change affects the size and composition of energy demand directly and through its impact on economic growth and development. Furthermore, it is assumed that the global population will increase to 8.6 billion by 2035, representing another 1.6 billion energy consumers, mainly in Asia and Africa, compared with current numbers.⁷

41. This rapid demographic expansion was accompanied by an urbanization rate of 42.2 per cent in 2010, making the Asia-Pacific region the second least urbanized part of the world, following Africa where the urbanization rate is 40.0 per cent. At the same time, half the world's urban population now live in Asian and Pacific cities, resulting in high population density in such urban centres. In 2010, Asian cities were home to almost 1.8 billion people. The proportion of Asia's urban population increased from 31.5 per cent in 1990 to 42.2 per cent in 2010, the highest percentage increase (10.7 per cent) among all regions globally (the second highest being the 9.3 per cent increase in Latin America and the Caribbean during the same period). While the world became predominantly urban in 2008, Asia is expected to reach the 50 per cent mark by 2026. This evolution means that, over the next decade, two thirds of the demographic expansion in the world's cities will take place in Asia.²¹

42. Today 13 of the world's 23 megacities are in Asia and it is estimated that another 9 will be added by 2025. Megacities currently account for 9.9 per cent of the world's urban population. The number of megacities is projected to increase to 37 in 2025, at which time they are expected to account for 13.6 per cent of the world's urban population.²²

43. With accelerated urbanization and industrialization, cities become "hot spots" for energy consumption and also witness an increase in energy intensity. At the same time, the widening income disparities in cities indicate that people at the extremes of the spectrum have very different patterns of energy consumption, with higher-income groups consuming an amount of energy comparable perhaps to those in the developed world. Further, it is likely that cities will continue to compete with rural areas to attract commercial-scale financial investments in energy infrastructure to keep up with ever-increasing demand; it is anticipated that this phenomenon would account for the major portion of the region's economic growth.

44. The global economy bounced back strongly in 2010 from the recession of 2008/09, but experienced a slowdown in 2011, with some economies dipping back into recession. Global GDP is expected to demonstrate a modest rebound in the near term and an average rate of growth

²⁰ The demographic transition refers to the change from high to low rates of both mortality and fertility in a population.

²¹ United Nations Human Settlements Programme and United Nations, Economic and Social Commission for Asia and the Pacific, *The State of Asian Cities 2010/11*. Available from www.unescap.org/esd/apuf-5/documents/SACR.pdf.

²² United Nations, Department of Economic and Social Affairs, *World Urbanization Prospects: The 2011 Revision*. Available from <http://esa.un.org/unpd/wup/index.htm>.

in real terms of 3.5 per cent per year through 2035, with growth slowing gradually as the emerging economies mature.⁷

45. Along with the ongoing problems in the euro zone, which have led to a so-called double-dip recession in many of the economies in that region, Asia and the Pacific may be significantly affected by any compromise agreement reached in resolving the “fiscal cliff” issues in the United States of America. It has been estimated by ESCAP that failure to resolve that situation adequately could lead to a slowing of the growth rate in Asia-Pacific economies by up to 2.2 percentage points in 2013, with exporting economies, such as Malaysia, Singapore, and Hong Kong, China, being the most seriously affected.²³

46. The impact of the generalized slowdown in 2012 on inclusive and sustainable development in the region could be substantial. Job and income growth is expected to decline, with fewer people forecast to be able to pull themselves out of poverty. By 2013, when considering a poverty line of \$1.25 a day, some 10 million people in the Asia-Pacific region will be adversely affected, and based on a \$2-a-day poverty line, 13.7 million people will be affected. This means that nearly 14 million fewer people in the region would be able to escape poverty due to the ongoing global economic crisis.

47. The tumultuous political events and natural disasters that occurred in 2011 underscore the importance of maintaining spare capacity and strategic stockpiles for dealing with supply disruptions. However, crises and disruptions aside, the Asian and Pacific region continues to be the growth-pole of the global economy, and the region is likely to continue as the centre of gravity for global energy consumption in the long run. This situation would assume that regional economies could maintain their momentum and adapt to a shifting global economic and technological environment by continually recreating their comparative advantage. The basic dynamics of regional growth depend on three factors: technical progress, capital accumulation and labour force growth. In addition to these classical growth drivers, economic growth will be driven by other significant trends, such as the emerging middle class.

48. Led by China and India, energy demand in the region will almost double by 2030, with a projected annual growth rate of about 2.2 per cent, which represents a faster rate than the global average of 1.2 per cent annually.⁷ The implications of this projection transcend national boundaries, especially for conventional energy, as such an outcome could lead to intense competition for energy resources.

49. Fossil fuels such as oil, gas and coal continue to dominate energy consumption as demand for these energy sources is likely to grow in absolute terms over the same period. Although the combined share of these fuels in the global energy mix has fallen from 81 per cent to 75 per cent,⁷ the dominance of fossil fuels through 2035 hints at resource constraints that will threaten future growth prospects.

²³ United Nations, Economic and Social Commission for Asia and the Pacific, *Economic and Social Survey of Asia and the Pacific 2012: Year-end Update* (ST/ESCAP/2649). Available from www.unescap.org/pdd/publications/yearend2012/Year-End-Update-2012.pdf.

50. The Secretary-General's High-level Panel on Global Sustainability, in its 2012 report,²⁴ warned that by 2030 the world would need at least 50 per cent more food, 45 per cent more energy and 30 per cent more water. The Asia-Pacific region currently uses three times more of such resources than the rest of the world to create one unit of GDP. Between 2000 and 2005 the resource intensity of the region's economy increased, in contrast with trends in the rest of the world. Resource-intensive growth patterns have exacerbated the vulnerability of the region to resource price volatility while negatively affecting its ecological sustainability.²⁵

51. Since early 2010 global food and oil prices have been on a sustained and synchronized upward trend, and in 2035 the average crude oil import price is expected to approach \$125 a barrel (in 2011 dollars).⁷ Energy price increases also have an impact on the price of food. Studies show that a 10 per cent increase in crude oil prices is associated with a 2.7 per cent increase in the World Bank's food price index.²⁶ ESCAP has estimated that oil price increases will reduce growth by up to 1 percentage point in some developing Asia-Pacific economies, as well as cause inflation and adversely affect current accounts.

52. The negative impact on human well-being of such an expansive trend in population growth, urbanization, economic development and over-reliance on fossil fuels or traditional biomass can hardly be overstated.

53. Household indoor air pollution from the use of biomass in inefficient stoves, coupled with inadequate ventilation, could lead to more than 1.5 million premature deaths per year (over 4,000 per day) in 2030, which is greater than estimates for premature deaths from malaria, tuberculosis and HIV/AIDS.²⁷ These estimates of premature death make women and children in particular the most vulnerable groups, revealing the need to secure gender inclusiveness within any economic model. Further, the use of inefficient traditional biomass not only induces negative health impacts through indoor air pollution but also induces pressure on forests that bind carbon dioxide and store it (the so-called green carbon process) which helps mitigate climate change. Deforestation accounts for an estimated 17 per cent of global carbon emissions: about 1.5 times greater than emissions from all the world's air, road, rail and shipping traffic combined.²⁸

²⁴ *Resilient People, Resilient Planet: A Future Worth Choosing* (United Nations publication, Sales No. E.12.I.2). Available from www.un.org/gsp/sites/default/files/attachments/GSP_Report_web_final.pdf.

²⁵ United Nations, Economic and Social Commission for Asia and the Pacific and the Korea International Cooperation Agency, *Low Carbon Green Growth Roadmap for Asia and the Pacific: Turning Resource Constraints and the Climate Crisis into Economic Growth Opportunities* (ST/ESCAP/2631). Available from www.unescap.org/esd/publications/environment/lcgg-roadmap/Roadmap_FINAL_15_6_12.pdf.

²⁶ See World Bank and the Poverty Reduction and Equity Group, *Food Price Watch*, April 2011. Available from http://siteresources.worldbank.org/INTPOVERTY/Resources/335642-1210859591030/FPW_April2011.pdf. International Energy Agency, *World Energy Outlook 2009* (Paris, 2010).

²⁷ International Energy Agency, *World Energy Outlook 2010* (Paris, 2010).

²⁸ *Green Carbon, Black Trade: Illegal Logging, Tax Fraud and Laundering in the World's Tropical Forests - A Rapid Response Assessment*. Christian Nellemann, ed. (Nairobi, United Nations Environment Programme and INTERPOL, 2012).

54. If mankind is to limit the rise in global temperature to less than 2° Celsius by 2050, as acknowledged by the parties to the United Nations Framework Convention on Climate Change,²⁹ global emissions would have to be cut in half by that time. The Asia-Pacific region, while emitting relatively low levels of greenhouse gases on a per capita basis, is one of the fastest-growing sources of emissions that have negative impacts on climate.²⁵

55. Few things seem probable. The demography of the region is likely to change. Urbanization is likely to continue. Economic growth and thus demand for energy is likely to grow, yet natural resources to support these transformations remain finite. At the same time risks, such as the recent economic and financial crises, natural disasters, political unrest and conflict, are likely to pose threats. However, this very context creates opportunities to promote sustainable socioeconomic development and build resilience.

56. Managing such contrasts are mostly within the framework of national policies on energy security and development. However, there is also a role for regional cooperation that could contribute to national efforts. Among them are the development of a shared vision to enhance energy security for Asia and the Pacific with regard to formulating long-term strategies in a sustainable manner.

57. The provision of sustainable energy services is not commonly associated with, or integrated into, broader development or poverty goals, including the Millennium Development Goals. None of the investment clusters expressly intended to achieve those goals, such as increasing food output, promoting jobs, ensuring universal access to essential health services and investing in improved natural resource management, mention electricity or energy specifically. Although it is now widely recognized that energy is a critical input into the development process and is acknowledged to be a key component in the pursuit of the Millennium Development Goals, its linkages with other areas of national and subregional economic and social development remain weak.

58. Rural communities in the region remain deficient of the infrastructure needed to provide people with access to modern energy services. This deficit not only has impacts on basic household needs, such as lighting and cooking, but also income-generating activities, such as food processing, irrigation and manufacturing. The lack of energy infrastructure seems to affect women and children the most. In addition, options for community services in terms of health care and education remain severely limited.

59. Through the Secretary-General's Sustainable Energy for All initiative, action by Governments, the private sector and civil society partners globally is being mobilized; the initiative has played a vital role in raising awareness of the urgent need to increase access to modern energy services. It has been estimated that a total investment of nearly \$1 trillion (\$979 billion) would be required to achieve universal access to energy by 2030, an average of \$49 billion per year from 2011 to 2030. This requirement is small when compared with investment in global energy-related infrastructure, which is equivalent to about 3 per cent of the total.⁷

60. Given the scale of the effort, access to various sources of financing is critical. Traditionally these are known to come from fiscal measures, such as government subsidies, cross-subsidization, end-use tariffs and concessional

²⁹ United Nations, *Treaty Series*, vol. 1771, No. 30822.

loans, apart from various international grants and development assistance programmes funded by international financial institutions. While these measures continue to be applied in an optimum manner, there are opportunities to engage the private sector in multiple ways (for example, voluntary services, corporate social responsibility, project finance and public-private partnerships) and at multiple levels (national, subregional and regional).

61. In attempting to attain sustainable energy for all, many initiatives are currently being undertaken by various agencies. For instance, through the provision of policy advice, development and implementation of programmes, UNDP has promoted a wide range of clean energy technologies and has worked across a range of scales, from individual households and villages to national, regional and global levels.

62. The Bioenergy and Food Security Approach of the Food and Agriculture Organization of the United Nations (FAO) supports countries in developing evidence-based policies derived from country-level information and cross-institutional dialogue involving relevant stakeholders. In 2012, FAO launched its multipartner “Energy-Smart” Food for People and Climate programme, which is focused on country action, although it also includes an international support component. On the other hand, the United Nations Industrial Development Organization furnishes assistance in the areas of resource-efficient and low-carbon industrial production, clean energy access for productive use and capacity-building for the implementation of multilateral environmental agreements.

63. Similarly, ESCAP is currently executing projects designed to enhance access to energy services in rural areas using locally available renewable sources. To meet its goal, these projects are aimed at promoting innovative business models and financing sources, such as the pro-poor public-private partnership model and carbon financing. Under these projects, the potential is being explored for strengthening the policy, legal and regulatory frameworks of member States, with a view to encouraging private sector participation in the rural energy sector, using locally available renewable sources to ensure market development and business continuity. At the same time, the projects are focused on gender mainstreaming so that policies and programmes reflect women’s needs and priorities in a better way and are supported by a more equitable distribution of resources. The projects recognize the need to encourage the active participation of women in the national governance of energy policy, as well as in businesses, for sustainable energy technology, products and services, and are aimed at building on the lessons learned in such sectors as health, education and agriculture, which indicates that a participatory approach to planning is considered more likely to create greater opportunities for women’s voices to be heard.

64. The Asian Development Bank, in 2008, launched its Energy for All Initiative to build platforms for cooperation, exchange, innovation and project development for solutions to widespread energy poverty. The initiative brings together key stakeholders from business, finance, Government and non-governmental organizations to drive action towards the goal of providing 100 million people in the Asian and Pacific region with access to energy by 2015.

65. Renewable energy remains a promising option, despite its seemingly high cost, a reflection of energy prices not internalizing externalities. However, some Governments of countries in the region have successfully devised policies to promote business and industry that provide renewable energy products and services at relatively low cost. Such efforts have hinged

on national market development driven by sound national commitments to promote the use of renewable energy. Additionally, over the years specialist skills have been demonstrated in subregions and countries, which have positioned themselves as niche providers of capital, material, low-cost labour, product design and manufacturing capacity, as well as low-cost expertise in formulating conducive policies and legal, regulatory and financial frameworks. Many of these are either economies in transition or developing countries themselves, which suggests the “replicability” of development experiences. The region is uniquely placed to exploit South-South cooperation to enhance the affordability of renewable energy options. This forms the background for assisting developing countries to become part of a regional renewable energy value chain through the provision of assistance in facilitating the introduction of adaptable, suitable technologies and technical know-how on the application of renewable energy resources in accordance with national conditions.

66. Using the mechanism of South-South cooperation, ESCAP is currently leading a regional project that is aimed at strengthening the governance capacity of policymakers in selected developing countries to assist key stakeholders, such as financiers, industrialists, project developers and social entrepreneurs, in identifying economically viable local production, distribution and consumption options for affordable renewable energy products and services. While the project is expected to highlight direct economic benefits in promoting the competitiveness of local industries in terms of renewable energy, it is also aimed at highlighting the indirect social benefits of investing in such economically viable models.

67. With regard to decentralized solutions (off-grid, mini-grid power projects), the financing trend during the past decade has been to furnish large amounts of funding to local private or public financing institutions that are committed (or trained) to support rural and renewable energy projects. Typically, such banks or funds have developed a portfolio of possible projects, although they can also react to requests for new lines of financing by reviewing project proposals. They do not provide households with financing directly; rather, it is up to private companies, concessionaires, non-governmental organizations and microfinance groups to organize demand for energy services and to apply for project funding after developing a sound business plan to serve rural consumers. This successful model has been implemented in many countries of the region, such as in Bangladesh and Sri Lanka.

68. As a result, renewable household systems, improved biomass stoves and village or community small-grid systems can all be serviced by the same financing agency. In practice, many of these funds specialize initially in a single technology, such as solar home systems, but they are expanding increasingly to other renewable energy systems, as well as to systems for accessing non-renewable energy sources. On the other hand, carbon credits are another growing source of project finance. One such project initiated in China in late 2008 involves the promotion of biogas digesters using animal waste to produce energy for domestic heating, lighting and cooking. More than 33,000 households in low-income rural communities, or approximately 165,000 people, are benefiting from the installation of domestic digesters, which are displacing carbon-intensive domestic fuels, such as coal and coke.³⁰

³⁰ Renewable Energy Network for the 21st Century, *Renewables 2011 Global Status Report* (Paris, 2011). Available from www.ren21.net/gsr.

69. Rapid urbanization and economic growth has resulted in corresponding growth of waste that municipalities are finding increasingly difficult to dispose. Reducing the amount of waste that needs to be disposed at landfills is crucial. In the face of predictable resource constraints, recovering resources from waste through recycling, composting and turning waste into energy can solve the waste challenge while generating revenue and jobs.

70. A welcome forecast is that, during the period through 2035, renewable energy deployment will be on the rise. It is being driven by incentives, falling costs, rising fossil fuel prices and, in some cases, carbon pricing; the share of renewables in electricity generation is likely to grow from 20 per cent in 2010 to 31 per cent by 2035.

71. A main driver propelling renewable energy policies is their potential to create jobs. Globally, an estimated 5 million people work directly or indirectly in renewable energy industries. More and more Governments around the world are acknowledging the benefits of energy efficiency and renewable energy as central elements of any green economy strategy. Renewables are also increasingly viewed as critical for providing access to energy, particularly in rural areas of the developing world.

72. Other welcome news is that the declining trend in global energy intensity over the last several decades is expected to continue to fall by 1.8 per cent per year between 2010 and 2035; that trend is being underpinned by several factors, including changes in industrial structure, technological advancements and the energy mix. However, the region is experiencing relatively high levels of energy intensity when compared with other regions, such as North America or Europe. The trend towards higher energy prices and higher energy intensity could have a harmful cascading effect on national and regional competitiveness, jeopardizing employment opportunities and threatening income levels. In this regard, major energy-consuming countries in the region have announced new measures in 2011: China is targeting a 16 per cent reduction in energy intensity by 2015; the United States has adopted new fuel economy standards; and Japan intends to cut its electricity consumption by 10 per cent by 2030.⁷ This situation indicates that there is an opportunity to enhance the sharing of experiences to promote similar measures elsewhere in the region.

73. As a “fifth fuel”, energy efficiency promises some good opportunities. It is estimated that the total savings from energy efficiency opportunities would reach about \$250 billion to \$325 billion a year in 2030. This would also result in a reduction of 12 to 17 per cent in the total GHG emission in 2030 against the baseline scenario, and at a third of the cost of implementing low-cost abatement approaches. As the amount of energy required is reduced, the need for capital-intensive investment in new power supply is also reduced, which helps to ease infrastructure bottlenecks.³¹

74. It is important to note that efficiency investments are usually characterized by low payback periods and substantial benefits from increased economic competitiveness. Furthermore, energy efficiency lessens the pressure related to energy security. As many countries continue to rely on

³¹ *Energy for a Sustainable Future: The Secretary-General's Advisory Group on Energy and Climate Change (AGECC) – Summary Report And Recommendations*, 28 April 2010, New York. Available from www.unido.org/media-centre/news/article/date///un-secretary-generals-advisory-group-report-calls-for-new-initiative-to-bring-clean-energy-to-the.html.

imported energy resources, their vulnerability to international energy price fluctuations increases. In such cases, curbing energy demand by improving energy efficiency represents an attractive option. The implementation of energy efficiency measures could potentially account for about 70 per cent of the reduction in projected global energy demand in 2035.⁷ Developing economies have a huge opportunity to strengthen their economic prospects by boosting energy productivity and thereby saving foreign exchange. Thus, it would be beneficial to explore various economic instruments that encourage the development of a market for energy efficiency.

75. While achieving energy security will require changes in public policy, business strategies and personal behaviours, it will also require better technologies. Although most technology transfers are currently the domain of the private sector, the public sector will also need to become a more proactive influence.

76. Research and development on cleaner fossil fuels and low-emission technologies in many countries in the Asia-Pacific region are still at relatively low levels. If the region is to make faster progress it would need to create a conducive environment to attract appropriate investment in such technologies. Towards this goal, the establishment of a centre for “technology incubation” would provide support for application-oriented research and development and help stakeholders from the region to develop sustainable energy solutions.

77. Many countries in the region will also require assistance in the diffusion of clean energy technologies; in that regard, they should be able to rely on greater bilateral, regional and international cooperation. The creation of a regional knowledge-management system for ideas and emerging knowledge from ongoing projects is of particular relevance for the domains of energy access and clean energy to help in scaling up isolated, scattered experiments.

78. Most of the countries in the Asia-Pacific region are net importers of oil. However, the ratio of energy imported to energy exported is close to 1, indicating self-sufficiency for the region. This uneven distribution of primary energy resources indicates that there is potential to enhance trade in energy and electricity to support energy security through regional cooperation.⁶ International trade and exchange of electricity make for both economic and logistical advantage. For instance, it may be economically more advantageous for the border regions of one country to rely on power from a nearby power station in a neighbouring country than a distant station within that country’s territory.

79. The challenges facing the region in attempting to facilitate this trade would require enhanced cooperation and initiatives across national boundaries, such as the proposed Asian energy highway.³² This would not only lead to better physical connectivity between countries but also promote institutional cooperation, including development of financial energy markets. Under such a potential regional energy arrangement, low carbon paths that place more emphasis on efficiency and take greater advantage of renewable resources should also be explored. In addition, it is important for countries in the region to consider issues of pipeline security and safety and to develop a deep, liquid and transparent market for crude oil, petroleum products and gas.

³² The Commission at its sixty-eighth session adopted resolution 68/11, which is a milestone in the promotion of regional energy connectivity.

80. The concept of an Asian energy highway is aimed at leveraging existing initiatives for regional energy cooperation by advancing to the regional level national energy planning, infrastructure development and power trading across the entirety of Asia and the Pacific. In the light of the growing dominance of the power generation sector in terms of consumption of resources, the development of an integrated regional grid is the focal point for promotion of diversification within the energy generation mix, optimizing efficiencies in energy resource consumption and reducing exposure to power shortages in a cleaner and more low-carbon manner.

81. Cross-border energy cooperation and trading is not a new concept within Asia, as recognition has been developing for some time regarding the mutual benefits of cross-border energy trading as a means to address energy imbalances. There are several regional and subregional initiatives that enable energy trade in Asia and the Pacific. Such initiatives demonstrate the feasibility of further integration at the regional level, by establishing linkages to form a single integrated electricity network. A few existing and emerging examples in the region are the ASEAN Power Grid, the Greater Mekong Subregion Economic Cooperation Program and the proposed SAARC (South Asian Association for Regional Cooperation) energy ring.

82. In the Asia-Pacific region, the energy situation and challenges, including the apparent geographical disparity in resource distribution, vary substantially among countries. Some countries have considerable unmet demand for electricity, while others are heavily dependent on imported fossil fuels and often suffer from an undiversified energy sector. What binds them together is their increasing vulnerability to global and regional crises and natural disasters. Thus, a key challenge is to evolve a systemic response based on future risks in order to make the region resilient.

83. The General Assembly unanimously declared the period 2014-2024 as the United Nations Decade of Sustainable Energy for All,¹ underscoring the importance of energy issues for sustainable development and for the elaboration of the development agenda beyond 2015. In this context, the United Nations Development Group is leading efforts to catalyse a “global conversation” on a new development framework beyond 2015 through more than 60 national consultations and 11 global thematic consultations, with energy being one of the most important themes. This is a unique opportunity for ESCAP member States to pursue coherent policies towards a shared future and also establish a progress-monitoring mechanism through 2030. To start with, member States could pursue a joint exercise for collecting credible data and creating an authoritative regional energy statistics database that would furnish a common platform for coherent policies.

84. In this context, there is an urgent need to ensure effective linkages between global, regional, subregional and national processes in order to advance sustainable development. More efficient and effective capacity-building, development and implementation of various agreements and exchange of information, best practices and lessons learned are critical to strengthen those linkages. Achieving regional cooperation represents a significant step in promoting a balanced integration of the economic, social and environmental dimensions of sustainable development.

III. Issues for consideration

85. The region's economic prospects are expected to be on a continued growth trajectory for the next 20 years. However, rising energy demand in the years ahead pose a daunting challenge for the region. Challenges related to governance and institutional capacity compound the problem.

86. With volatile energy prices and heavy dependence on fossil fuels, energy security and environmental degradation are likely to remain high on the agenda of energy and development policymakers in the Asia-Pacific region. In addition, with the recent natural disasters, political unrest and conflict, and the food, fuel and financial crises, issues surrounding social inclusiveness and resilience to shocks have also risen to prominence across the region. Furthermore, regional, subregional and national competitiveness could become key concerns as economies emerge from the recent crises and compete for finite natural resources.

87. To support and ensure sustainable development, the region needs to overcome the challenges associated with energy security and the sustainable use of energy that have been identified in the present document.

88. There is an urgent need for new and better regional cooperation on energy. A regional energy compact — in effect, a possible game-changer — is needed to transform Asia and the Pacific into an energy-resilient region. A renewed commitment as part of a regional compact to enhance energy security and the sustainable use of energy through regional cooperation should include, among other things, the development of a regional consensus on common challenges and opportunities related to energy security, the establishment of effective collaboration with development partners in order to mobilize financial and technical support, the establishment of an effective mechanism for ensuring coordination with other United Nations bodies and agencies and improvement in the capacity of member States to formulate policies, strategies and institutional frameworks in order to develop and implement a shared strategy for the region.

89. The representatives of member States may wish to deliberate on the prospects outlined in the present document, along with the draft ministerial declaration on regional cooperation for enhanced energy security and the sustainable use of energy in Asia and the Pacific, and the draft plan of action on regional cooperation for enhanced energy security and the sustainable use of energy in Asia and the Pacific, and provide the secretariat with suggestions with a view to transforming these opportunities into a common regional response and appropriate initiatives aimed at ensuring energy security and enhancing the sustainable use of energy in Asia and the Pacific.