

## FACTS ABOUT ASIA

## Human Flourishing, Energy, and the Environment

by the EAA Editorial Office

**Editor's Introduction:** In keeping with a theme of this issue, ideal outcomes, although never obtainable, encompass the perpetual human quest for necessities and luxuries of life and for the privilege of living in a nontoxic environment. The types of energy humans utilize must satisfy, at some level, both human needs. What follows is not intended to recommend energy solutions but, with particular attention to Asia, stimulate more thoughtful discussion concerning the status quo, and the feasibility, or lack thereof, of energy source possibilities.

### *Asia's energy market, already the world's biggest, will soon be the most advanced.*

Source: Joseph Jacobelli, *Asia's Energy Revolution* (De Gruyter, 2021).

#### Utilized Energy: How Much? What? and Impact?

By the end of 2019, four Asian countries ranked in the top ten worldwide in total energy consumption, the majority of which is derived from fossil fuels. The Asia Pacific region alone consumed 257.6 exajoules (a joule is a unit of energy measurement and one exajoule is one quintillion joules) of energy, the most in the world. China leads the world by a considerable margin with 141.7 exajoules of energy consumed, almost 50 more than the second-place user, the United States.

#### Leading Countries in Primary Energy Consumption Worldwide in 2019 (in Exajoules, or EJ)

1. China 141.7
2. United States 94.65
3. India 34.06
4. Russian Federation 29.81
5. Japan 18.67
6. Canada 14.21
7. Germany 13.14
8. Brazil 12.40
9. South Korea 12.37
10. Iran (Southwest Asia) 12.34

BP's *Statistical Review of World Energy 2020* report indicates how much of these nations' consumed energy comes from coal. Looking at Asia, China (81.67 EJ) and India (18.62 EJ) are respectively the overwhelming numbers one and two worldwide. Japan (4.91 EJ) and South Korea (3.44 EJ) also rank in the top ten worldwide for coal usage, but far below China and India. Fossil fuels like coal generate emissions of harmful greenhouse gases like carbon dioxide and, reflecting data on energy usage, seven Asian nations (including Iran and substantial portions of the Russian Federation) rank in the top ten of leading emitters of carbon dioxide with China ranking as the overwhelming leader.

#### 2018 Top Ten Carbon Dioxide Emitters (in Gigatons, or Billions of Tons)

- |                          |       |
|--------------------------|-------|
| 1. China                 | 10.06 |
| 2. United States         | 5.41  |
| 3. India                 | 2.65  |
| 4. Russian Federation    | 1.71  |
| 5. Japan                 | 1.16  |
| 6. Germany               | 0.75  |
| 7. Iran (Southwest Asia) | 0.72  |
| 8. South Korea           | 0.65  |
| 9. Saudi Arabia          | 0.62  |
| 10. Indonesia            | 0.61  |

In order to meet high energy demands while reducing carbon gas emissions, Asian nations such as China, Japan, South Korea, and India are increasingly turning to alternative energy sources and electric cars instead of gas vehicles. Rising demand for cleaner energy sources generates rising controversies.

Sources: "Leading Countries in Primary Energy Consumption Worldwide in 2019," *Statista*, accessed April 16, 2021, <https://tinyurl.com/antpheel>; "Primary Energy Consumption Worldwide between 2010 and 2019, by Region," *Statista*, accessed April 16, 2021, <https://tinyurl.com/4x39m7vk>; BP, *Statistical Review of World Energy 2020*, accessed April 21, 2021, <https://tinyurl.com/2m23pt5d>, 47.

#### Nuclear Energy

Nuclear energy is a clean energy source derived from nuclear reactions such as fission, decay, or fusion. Asia is the major global location for significant nuclear power growth, with 135 nuclear power reactors now in operation. As of 2021, approximately two-thirds of the world's total nuclear plants under construction are located in Asia.

#### Asia: Nuclear Power Leaders

China: 49 operable reactors, 17 under construction, 38 planned  
 Japan: 33 operable reactors (many temporarily shut down), 2 under construction, 1 planned  
 South Korea: 24 operable reactors, 4 under construction  
 India: 23 operable reactors, 6 under construction, 14 planned

Nuclear power is a reliable source of energy. Plants are designed to operate twenty-four hours a day and can operate at mostly full power for this cycle. Storage and disposal of used fuel is a major problem with nuclear plants, as is their costly and complex maintenance. Plant meltdowns, while rare, can have long and far-reaching consequences. In the most recent major incident on March 11, 2011, in Japan, an earthquake and tsunami triggered a meltdown at the Fukushima Daiichi Nuclear Power Plant in Okuma, Fukushima Prefecture. Although not as bad as Chernobyl, scientists consider the Fukushima meltdown the most severe nuclear accident since the 1986 Russian disaster. The spread of radioactive particles in the air and the contamination evacuated 164,000 people in the surrounding areas of the plant. As of 2021, over 43,000 residents still remain displaced, as much of the area remains uninhabitable.

Sources: "Asia's Nuclear Energy Growth," *World Nuclear*, March 2021, <https://tinyurl.com/32kbbbsf7>; "How Does Nuclear Energy Affect the Environment?," *Sciencing*, April 25, 2018, <https://tinyurl.com/3dvj24zk>; "Fukushima Disaster: What Happened at the Nuclear Plant?," *BBC News*, March 10, 2021, <https://tinyurl.com/u6pa5kbbx>.

#### Liquefied Natural Gas (LNG)

LNG is natural gas that has been cooled down to liquid form for ease and safety of nonpressurized storage or transport. It is odorless, colorless, nontoxic, and noncorrosive. LNG is viewed as a much cleaner alternative fuel for utilities than coal and oil.

China, Japan, and South Korea are the three largest importers of LNG, accounting for approximately 60 percent of all imports

worldwide. Presently, South Korea ranks as the world's top importer, with the state-owned Korea Gas Corporation (KOGAS) ranking as the top company worldwide that purchases LNG fuel imports. Japan ranks second with its utilities corporation Jera Co., just behind KOGAS as the second-largest LNG buyer, followed by China in third place. Competition for LNG imports is beginning to cause problems, especially with massive rising demand in China and the relatively low number of LNG exporters. Qatar ranks as the world's largest exporter, followed by Australia and the US. US exports are rising, and just in the month of February 2021 alone, American-based companies shipped 3.2 million tons of LNG to these three major consumers.

China aims to become carbon neutral by 2060 and imported 7.6 million tons of LNG in December 2020 for its state owned gas and petroleum enterprise, Sinopec: the firm's all-time largest import of the alternative fuel. This caused shortages at Japanese utilities dependent on LNG, which forced these firms to temporarily utilize oil and other dirtier means of energy production to avoid country-wide blackouts. As China's demand for LNG increases, and the ability of the three countries to produce adequate amounts of LNG internally is a distant future prospect, it threatens to create new conflict and competition between these nations for the world's supply of LNG.

Sources: "Asia Became the Main Export Destination for Growing US LNG exports in 2020," *US Energy Information Administration*, March 15, 2021, <https://tinyurl.com/mp55bv2b>; "Liquefied Natural Gas (LNG)," *US Department of Energy*, accessed April 16, 2021, <https://tinyurl.com/32dbsk4u>; Aaron Sheldrick, "US LNG Export Bonanza Reshapes Energy Map in Asia," *Reuters*, April 2, 2021, <https://tinyurl.com/h489s2d9>; "Korea LNG business," *Shell Korea*, accessed April 16, 2021, <https://tinyurl.com/yextdvxm>; Chuin-Wei Yap and Chieko Tsuneoka, "China's Pursuit of Natural Gas Jolts Markets and Drains Neighbors," *The Wall Street Journal*, March 5, 2021.

### Electric Vehicles (EVs)

Electric vehicles (EVs) are driven by one or more electric motors, using energy stored in rechargeable batteries. Compared to internal combustion engine vehicles, electric cars are quieter, have no exhaust emissions, and overall lower emissions. EV demand is increasing in Asia, lowering air pollution and oil dependency. In 2012, the Indian government launched the National Electric Mobility Mission Plan, 2020 (NEMMP), with the goal of jumpstarting the usage of hybrid and electric to at least six to seven million total vehicles by 2020 and to realize a savings of 2.2 to 2.3 million tons in fuel use. A recent Nissan company poll indicated that 64 percent of respondents throughout Southeast Asia are more willing to consider an electrified vehicle than was the case five years ago.

Beginning in 2018, China became the world's largest manufacturer and buyer of electric vehicles, with over half of global sales. A number of Chinese EV public companies have now emerged, including the Shanghai Automotive Industry Corporation (SAIC), Li Auto, and Nio. The Wuling HongGuang Mini EV manufactured by SAIC was the top-selling EV in China in January 2021, with over 36,000 units sold. The numbers 2 and 3 selling EVs in China that month? Surprisingly, US automotive manufacturer Tesla's Model 3 and Model Y vehicles. The company also operates one of its production factories, called a Gigafactory, in Shanghai.

Despite rising demand in many Asian nations for electric vehicles, Japan lags behind. In 2020, Japanese cars accounted for less than 5 percent of global sales of battery-electric vehicles. Akio Toyoda, chairman of the Japan Automobile Manufacturers Association and president of Toyota Motor Company, criticized EVs in a December 2020 interview, where he scoffed at the idea of Japan replacing hybrids with all-electric vehicles, accusing the national media of inflating their commercial and environmental viability. In the interview, Toyoda stated that EVs are only as clean as the electricity that powers them and the factories where they are

built. He also warned that switching to more EV production could cost millions of jobs and destroy a whole "ecosystem" of auto parts suppliers.

Sources: "National Electric Mobility Mission Plan," *Department of Heavy Industry, Government of India*, accessed April 16, 2021, <https://tinyurl.com/2m9ens5j>; James Morris, "Chinese EV Invasion!," *Forbes*, January 9, 2021, <https://tinyurl.com/22xtz4vv>; "Enthusiasm for Electric Vehicles Grows in Southeast Asia," *WARC*, May 2, 2021, <https://tinyurl.com/cwabo87kc>; "Why Japan Is Holding Back as the World Rushes Toward Electric Cars," *The New York Times*, March 9, 2021, <https://tinyurl.com/rb43e6ps>.

### Renewable Resource Energy

Renewable resource energy, generated from natural resources such as wind, solar, and water, represent a much smaller, but growing percentage of Asia's energy production. Despite the initiatives of multiple Asian countries to increase their percentage of energy generated from renewable resource energy, it is doubtful most, if not all, of these nations will be able to meet these goals, let alone achieve anywhere close to running on 100 percent renewable energy. A number of factors hinder renewable energy growth including the financial costs of building and installing renewable energy plants, facilities, and equipment, as well as the geographical limitations of a country in harnessing renewable energy.

China ranks as the world's largest producer of energy from renewable resources, with over 790 gigawatts produced from hydroelectric, solar, and wind power sources in 2019—26 percent of its total energy generation. The PRC also has the world's largest number of solar, wind, and hydroelectric plants. India is a prime area for solar power utilities because of its level of solar insolation (the amount per area of electromagnetic radiation from the sun due to its geographic location) and high population density. Much of the country lacks an electric grid, and solar energy is now an important state investment. In 2003, the Indian Solar Loan Program created government-financed solar panels for over 16,000 homes through over 2,000 bank branches, particularly in rural areas lacking an energy grid, winning the UN Environmental Program's Energy Globe Award for Sustainability. Other large-scale solar projects have been proposed in India, including a major initiative in a 35,000-square-kilometer area of the Thar Desert that could generate anywhere from 700 to 2,100 gigawatts (a billion watts) of energy.

Japan currently produces only about 15 percent of its energy from renewable resources, but with planned government initiatives that could increase this share to about 50 percent by 2050. South Korea currently generates 11 percent of its energy from renewable resources, but the government plans to quadruple this percentage to approximately 42 percent by 2034. Southeast Asian countries like Viet Nam, the Philippines, and Indonesia generate a combined percentage of only 15 percent of their energy from renewable resources. Southeast Asia has an increasing dependency on coal and other fossil fuels in order to meet rising energy demands in the region.

Sources: River Davis, "Renewables Are Primed for Growth in Asia," *The Wall Street Journal*, August 30, 2020, <https://tinyurl.com/ra2zh3ty>; "Japan Sets Sights on 50% Renewable Energy by 2050," *Nikkei Asia*, December 26, 2020, <https://tinyurl.com/9zc49w6m>; "Korea Sets 42% Renewable Energy Target by 2034," *Institute for Energy Economics and Financial Analysis*, December 16, 2020, <https://tinyurl.com/t5rt3w49>; Sara Jane Ahmed and Han Chen "Is Southeast Asia's Energy Transition in Favor of Renewables?," *Asia Society*, June 25, 2020, <https://tinyurl.com/2p7sb67f>.

### Conclusion

It is critical, especially with students in developed countries who have never seriously considered the two human wants described earlier and the complexity involved in improving them, to engage in critical thinking and reflection about the importance of energy in the attainment of prosperity and environmental improvement locally, nationally, and globally.