

Skyscrapers around Tokyo Bay at night. With oil consumption almost entirely dependent on imports, the Japanese government is working hard to improve energy security by using more natural gas, nuclear power, and coal. © Michael S. Yamashita/Corbis



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Concerns about energy security in the Asia-Pacific region focus primarily on efforts to secure adequate oil supplies to support economic growth. Policy-makers in the United States and Europe face similar challenges.

To illustrate the current situation and changes over time, an energy insecurity index has been developed, based on oil consumption, for selected countries in the Asia-Pacific region and for Europe and the United States. The index is based on the importance of oil in an economy, the dependence on imported oil, and, more specifically, the dependence on oil imported from the Middle East. These three factors are each weighted by a different percentage according to their perceived importance, as follows:

1. Share of net imports in total oil consumption (40 percent weight): Overall dependence on imported oil is considered the most important factor determining oil-related energy insecurity for a country/economy or a region.
2. Share of oil in total primary commercial energy consumption (35 percent weight): The relative importance of oil plays a pivotal role in overall energy security.
3. Share of the Middle East in total oil imports (25 percent weight): Use of this factor might be debatable because overdependence on any region for oil supplies could be a cause for concern. In addition, the oil market is global, so if supplies are disrupted anywhere in the world all importing countries will pay higher prices. Nevertheless, many countries consider diversifying their sources of oil away from the Middle East as a fundamental component of an energy-security strategy.

Other factors—such as strategic oil stockpiling, long-term cooperation between oil producers and consumers, and investments in oil production overseas—are treated as responses to concerns about energy security rather than representing an economy's fundamental energy-security situation. Such factors are thus excluded from the calculation of the index.

Index Table 1 shows the energy insecurity indices for 1995, 2005, and 2015 (projected) for selected economies in the Asia-Pacific region and for Europe and the United States. A low index rating for energy insecurity indicates that an economy is relatively self-sufficient in terms of oil supply. Among economies in the Asia-Pacific region, Brunei Darussalem, Malaysia, and Vietnam had the best energy-insecurity ratings in 2005. Negative index values for these countries indicate that they produced more than enough oil domestically to meet their

**HOW IS THE ENERGY
INSECURITY INDEX
CALCULATED?**

To calculate the energy insecurity index for China in 2005, we proceed through the following steps:

1. Oil accounted for 21 percent of China's total primary commercial energy consumption in 2005. Multiplying by 35 percent gives a weighted value of 0.0735.

2. Net imports accounted for 46 percent of China's total oil consumption in 2005. Multiplying by 40 percent gives a weighted value of 0.184.

3. The Middle East accounted for 40 percent of China's total oil imports in 2005. Multiplying by 25 percent gives a weighted value of 0.1.

4. Adding the three weighted values gives a total of 0.3575, or an index value for China in 2005 of 36.

A similar calculation for India in 2005 is as follows:

1. Oil accounted for 30 percent of India's total primary commercial energy consumption in 2005. Multiplying by 35 percent gives a weighted value of 0.105.

2. Net imports accounted for 70 percent of India's total oil consumption in 2005. Multiplying by 40 percent gives a weighted value of 0.28.

3. The Middle East accounted for 71 percent of India's total oil imports in 2005. Multiplying by 25 percent gives a weighted value of 0.1775.

4. Adding the three weighted values gives a total of 0.5625, or an index value for India in 2005 of 56.

Index Table 1. Energy insecurity index, 1995, 2005, and 2015 projected, and change over 10-year periods, selected Asia-Pacific countries/economies, Europe, and the United States

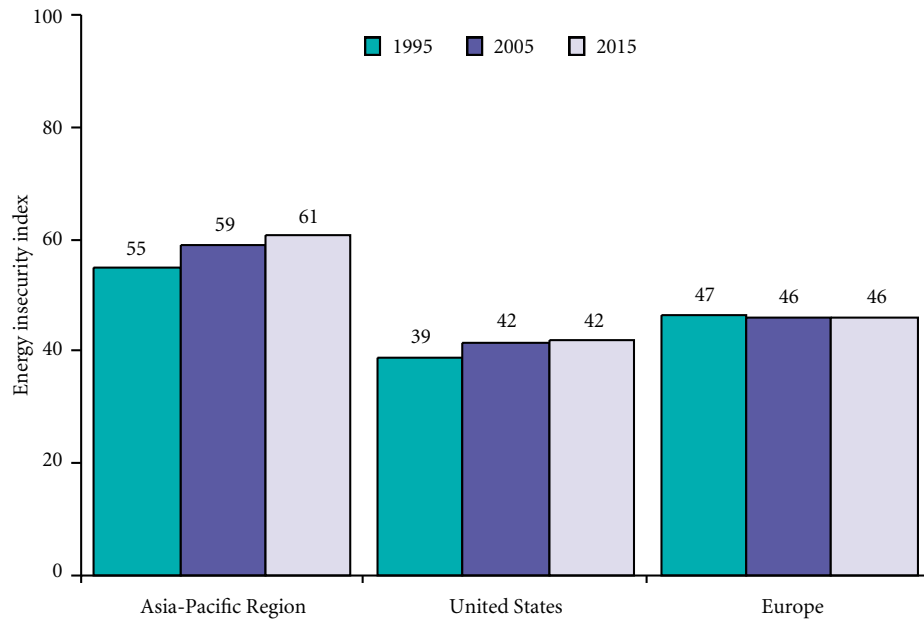
Country/economy	1995	2005	2015 Projected	Change 1995–2005	Projected change 2005–2015
Australia	34.3	33.3	35.2	–1.0	1.9
Bangladesh	57.8	57.9	56.3	0.1	–1.6
Brunei Darussalem	–629.7	–890.0	–599.0	–260.2	291.1
China	12.9	35.8	45.2	22.9	9.4
Democratic People's Republic of Korea	42.2	41.6	42.0	–0.6	0.4
Hong Kong SAR ^a	76.5	76.7	77.0	0.2	0.3
India	47.9	56.3	59.3	8.4	3.0
Indonesia	–14.2	24.6	37.9	38.8	13.3
Japan	77.8	76.7	75.5	–1.1	–1.2
Malaysia	–5.8	–13.7	0.0	–8.0	13.7
Myanmar	43.6	42.6	51.5	–1.0	8.9
Nepal	51.3	64.2	63.4	12.9	–0.8
New Zealand	43.8	52.0	55.6	8.2	3.6
Pakistan	60.3	62.1	60.9	1.8	–1.2
Philippines	76.6	77.4	74.1	0.8	–3.3
Republic of Korea	82.5	76.3	75.2	–6.2	–1.1
Singapore	95.4	89.5	88.7	–5.9	–0.8
Sri Lanka	69.8	85.9	88.0	16.1	2.1
Taiwan	77.5	73.8	73.6	–3.7	–0.2
Thailand	75.3	71.3	71.8	–4.0	0.5
Vietnam	–25.2	–15.3	6.6	9.9	21.9
Other Asia–Pacific	–0.8	51.9	64.3	52.7	12.4
Asia–Pacific Total	55.3	59.0	60.9	3.7	1.9
Europe	46.6	46.0	46.2	–0.6	0.2
United States	38.9	41.6	42.1	2.7	0.5

Source: Compiled by the authors.

Note: Europe includes Albania, Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia and Montenegro, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

^a Special Administrative Region.

Index Figure 1. Energy insecurity index for the Asia-Pacific Region, the United States, and Europe 1995, 2005, and 2015



Source: Compiled by the authors.

Note: See note to Index Table 1 for European countries included in the index.

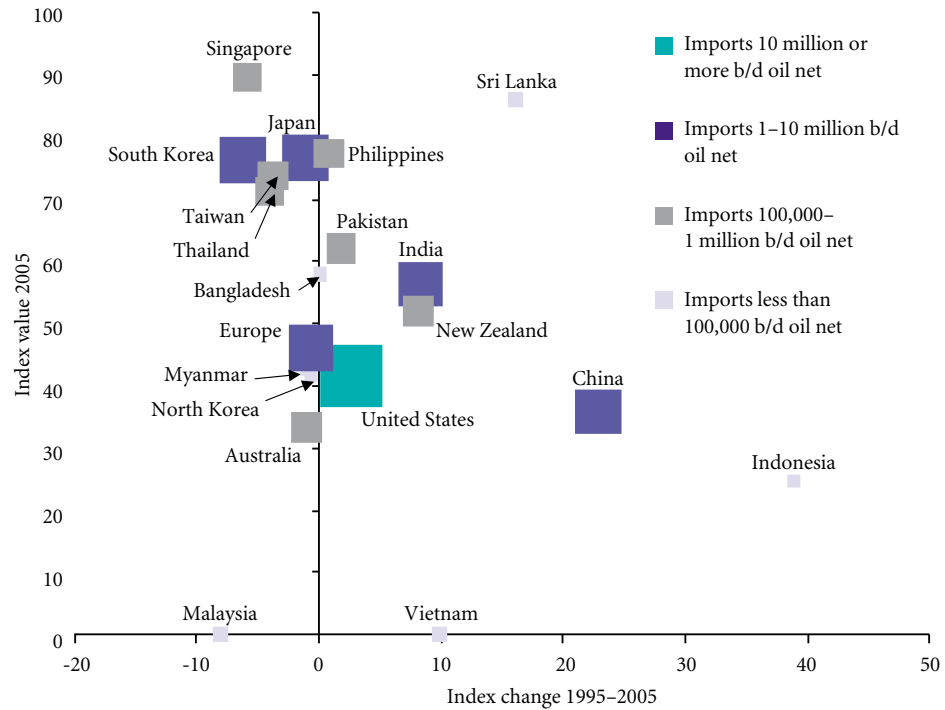
consumption needs. Conversely, a high positive index rating denotes a high degree of dependence on imported oil and thus high energy insecurity. Among Asia-Pacific economies, Singapore had the greatest energy insecurity in 2005 with an index value of 90.

Several interesting observations emerge from these calculations. Already in 1995, the Asia-Pacific region was more insecure in terms of oil supply than was the United States or Europe (Index Figure 1). Energy security in Asia and the Pacific worsened between 1995 and 2005 and is projected to worsen further by 2015.

The largest oil consumer in the world, the United States, became less secure between 1995 and 2005, due to the growing importance of oil in total primary commercial energy consumption and a growing dependence on oil imports (Index Figure 2). Over the next 10 years, however, energy security in the United States is likely to remain stable, with a projected expansion in the share of oil imports offset by a lower share of oil in total primary energy use.

Energy security in Europe lies somewhere between the situation in the United States and the Asia-Pacific region. Between 1995 and 2005, the importance of oil in Europe's total primary commercial energy consumption went down. The share of net imports in Europe's total oil supply went up, but more of Europe's oil imports came from sources outside the Middle East. As a result, the energy-security situation in Europe remained fairly stable. This pattern is likely to continue over the next 10 years. It is worth noting, however, that one of the major energy policy concerns in Europe does not focus on the Middle East at all, but rather relates to dependence on Russia and Central Asia for oil and natural gas.

Index Figure 2. Energy insecurity index (2005) and trends (1995–2005), for selected Asia-Pacific economies, the United States, and Europe



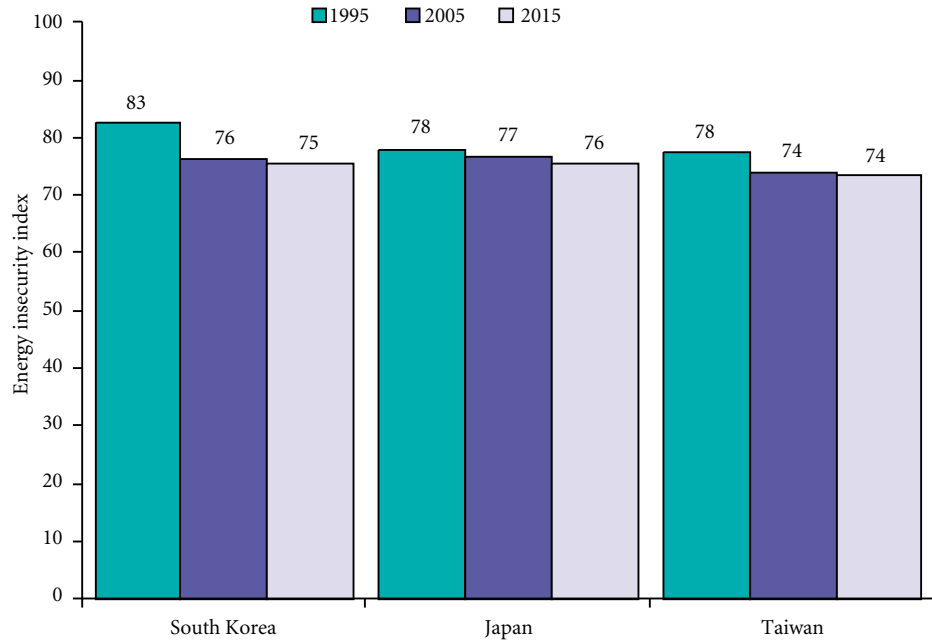
Source: Compiled by the authors.
 Note: See note to Index Table 1 for European countries included in the index.

Because the energy-security situation in the United States and Europe is projected to remain fairly stable while security in the Asia-Pacific region is projected to deteriorate, differences between the three regions will widen, with the Asia-Pacific region becoming increasingly less secure than the United States or Europe. The negative trend in Asia and the Pacific results primarily from a very insecure situation in three of the region’s most-developed economies, Japan, the Republic of Korea (South Korea), and Taiwan (Index Figure 3), combined with rapidly increasing insecurity in the region’s two largest economies, China and India, as well as Indonesia (Index Figure 4).

In 1995, Japan, South Korea, and Taiwan were among the most insecure economies in the region in terms of oil supply after Singapore, which is a special case. Although oil consumption in all three economies is still almost entirely dependent on imports, with a large share from the Middle East, all are managing to stabilize or improve their energy security—even if only slightly—by increasing their use of other energy sources, such as natural gas, nuclear power, and coal.

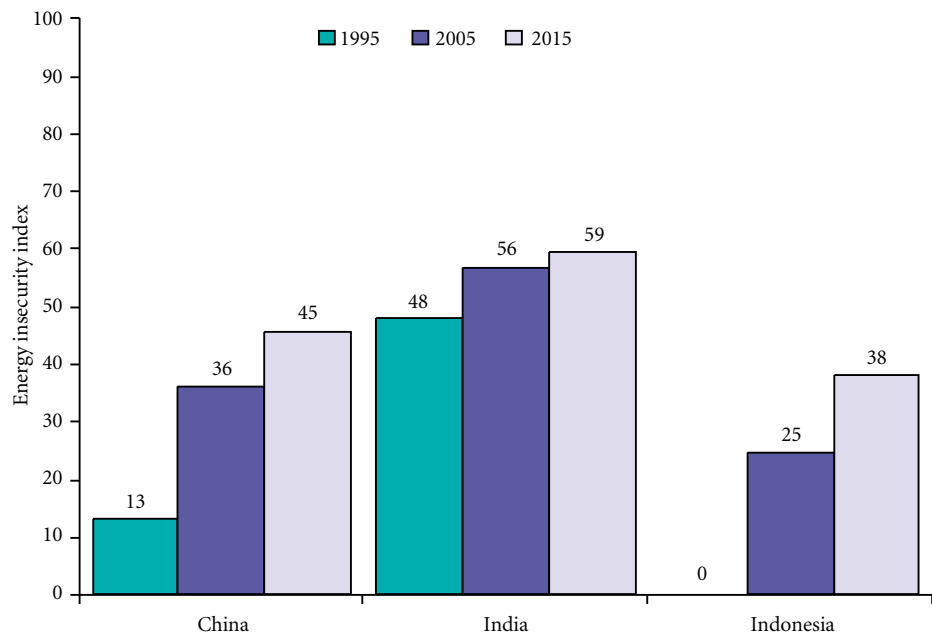
The steepest increases in energy insecurity have been in China and Indonesia (Index Table 1). Indeed, China is projected to surpass the index value for the United States by 2015. The share of oil in China’s total primary commercial energy consumption is expected to remain stable over the next 10 years, but oil imports are projected to rise, and the proportion of oil imports from the Middle East is also increasing.

Index Figure 3. Energy insecurity index for South Korea, Japan, and Taiwan, 1995, 2005, and 2015



Source: Compiled by the authors.

Index Index Figure 4. Energy insecurity index for China, India, and Indonesia, 1995, 2005, and 2015



Source: Compiled by the authors.

Indonesia is the only member of the Organization of the Petroleum Exporting Countries (OPEC) in Asia, but it is also the only OPEC member that imports more oil than it exports. In 1995, Indonesia was a net oil exporter, but by 2005, it had become a net oil importer, with a steep rise in energy insecurity. This trend is expected to continue over the next 10 years due to a projected increase in Indonesia's net oil imports.

India was already experiencing relatively high energy insecurity in 1995. By 2005, the share of oil in India's total primary commercial energy consumption had risen significantly, along with the share of imports in India's total oil consumption. As a result, India's index value for energy insecurity increased by 8 points (Index Table 1). Over the next 10 years, the share of oil in India's total primary commercial energy consumption is expected to remain stable, but more oil will be imported, and more imported oil will come from the Middle East, worsening the country's energy security.

Singapore is dependent on oil for 89 percent of primary commercial energy consumption, dependent on imports for 100 percent of its oil supply, and dependent on the Middle East for nearly 75 percent of its oil imports. As a result, Singapore has the highest index value in the region (Index Table 1). The Singaporean government is trying to reduce the country's energy insecurity by switching from oil to other energy sources, particularly natural gas. As a result, Singapore's energy security index value improved between 1995 and 2005 and is projected to improve further—but slightly—by 2015. In terms of dependence on imported oil, however, Singapore will still be the most insecure economy in the region.

Other Asia-Pacific economies with high levels of energy insecurity in 2005 include Bangladesh, Hong Kong, Indonesia, Myanmar, Nepal, New Zealand, Pakistan, the Philippines, Sri Lanka, Taiwan, Thailand, and several smaller countries in the region (combined in Index Table 1 as "Other Asia-Pacific"). All have index ratings of more than 50. The list is projected to remain the same in 2015, with the addition of Myanmar.

Between 2005 and 2015, energy security is projected to deteriorate significantly in Australia, China, India, Indonesia, Myanmar, New Zealand, and several smaller countries of the Asia-Pacific region. By contrast, Bangladesh, Japan, Nepal, Pakistan, the Philippines, Singapore, South Korea, Taiwan, and Thailand are projected to stabilize, or slightly improve, their energy-security status.

In terms of dependence on imported oil, and more specifically on oil imported from the Middle East, the Asia-Pacific region is facing an energy security crisis. By 2015, only two countries in the region—Brunei and Malaysia—will produce enough oil domestically to meet consumption needs. Economies with high dependence on imported oil, such as Japan, South Korea, and Taiwan, will have made little progress in improving their security status. At the same time, energy security will have deteriorated significantly in China, India, and other

important economies of the region. Overall, the Asia-Pacific region faces greater energy insecurity than the United States or Europe, and the security gap is projected to increase. This sobering analysis underlines the critical importance of policies to address energy security in the region.