

INTERNATIONAL INDEX OF ENERGY SECURITY RISK®

ASSESSING RISK IN A GLOBAL ENERGY MARKET

2013 Edition Highlights



Institute for 21st Century Energy • U.S. Chamber of Commerce



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Highlights

This second edition of the International Index of Energy Security Risk (International Index) provides an updated look at energy security risks across different countries for the years 1980 through 2012. The risk index calculates scores for the United States and 24 other countries that make up the large energy user group: Australia, Brazil, Canada, China, Denmark, France, Germany, India, Indonesia, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Poland, Russian Federation, South Africa, South Korea, Spain, Thailand, Turkey, Ukraine, and the United Kingdom. The scores for these countries are reported in relation to a reference index representing the average risks for Organization for Economic Co-operation and Development (OECD) member countries.² The OECD average risk index is calibrated to a 1980 base year figure of 1,000. This calibration enables us to track changes across countries as well as countries across time. Keep in mind that a higher score means higher risk, a lower score means lower risk.

Please note that the addition of a new metric (GDP per capita), changes to an existing metric, new metric weightings, and revisions to historical and estimated data mean that the results reported in last year's edition will be slightly different than in this year's edition.

2012 Energy Security Rankings

Table H-1 shows how energy security risks in 25 large energy-consuming countries compare against each other and the OECD average in 2012. The rankings in the table are analogous to the leader-board at a golf tournament where the highest (best) rank has the lowest numerical risk score and the lowest (worst) rank the highest numerical risk score.

Norway was the most energy secure country in the large energy user group in 2012 and has been since 2001. Its total risk score of 909 was 14% below the OECD average score of 1,051. Mexico was the second ranked country with a score of 928.

For the entire period from 1980 to 2012, either Norway or Mexico has occupied the top spot except for 1997, when the United Kingdom was ranked number one. Mexico's risk scores, however, continue to rise faster than the OECD baseline average. If this trend persists, the country's ranking would slide in future years. New Zealand, the United Kingdom, and Canada round out the top five for 2012.

The Ukraine was least energy secure country in the large energy user group. With a 2012 score of 2,250, its overall risk was 114% above the OECD average. It has not moved out of the 25th spot since 1992, the first year data for the country became available. Nevertheless, the Ukraine is one of the few countries that has seen its energy security risk score decline since the mid- to late-1990s, both absolutely and relative to the OECD baseline average (from 296% above the OECD average in 1996 to 114% above in 2012). The country's scores are still so high, however, that much greater progress will be needed for the Ukraine is to break out of the bottom position. Thailand, South Korea, the Netherlands, and India make up the rest of the bottom five.

The United States climbed one place in 2012 and now ranks as the sixth most energy secure country in the group. With a 2012 score of 999, its energy security risk was about 5% below the OECD average. The revolution in domestic unconventional oil and natural gas output in the United States was the biggest factor in the country's move up the rankings. Since 2002, when it came in at number 10, the United States has climbed four places.

Table H-1. Energy Security Risk Scores and Rankings for 25 Large Energy Using Countries: 2012

Country	Risk Score	Large Energy User Group Rank
Norway	909	1
Mexico	928	2
New Zealand	955	3
United Kingdom	973	4
Canada	987	5
United States	999	6
Australia	1,000	7
Denmark	1,024	8
Germany	1,047	9
OECD	1,051	
France	1,088	10
Poland	1,101	11
Indonesia	1,127	12
Spain	1,173	13
Russia	1,176	14
Turkey	1,194	15
South Africa	1,207	16
Italy	1,208	17
Japan	1,219	18
China	1,228	19
Brazil	1,231	20
India	1,237	21
Netherlands	1,312	22
South Korea	1,514	23
Thailand	1,559	24
Ukraine	2,250	25

Key Developments

Energy security risks for all countries in the large energy user group and for the OECD average fell in 2012, primarily because of lower energy prices and expenditure volatility. This follows two consecutive years, 2010 and 2011, in which risks for all countries rose. The biggest drivers for the reduction in risk in 2012 were the large reductions in metrics measuring

crude oil volatility and energy expenditure volatility. Because crude oil is priced in a global market, the 27% decline in crude oil price volatility benefited everyone about equally. As expenditures on oil make up a big part total energy expenditures, the volatility for this metric for this metric also improved in every country, though its impact in each country was more variable, depending on the share of oil in the energy mix.

The benefits of greater unconventional oil and natural gas production from oil sands and shale formations in North America are beginning to be seen. Lower oil and gas import supply and expenditure risks have contributed to lower overall risk scores for Canada and the United States. In 2012, both of these countries moved up one place in the rankings, to five and six, respectively.

Additional U.S. oil output of 835,000 barrels per day and Canadian output of 235,000 barrels per day in 2012 kept the world oil supply risks lower than they would have otherwise been the case.

Increased production from stable suppliers reduces global reliance on supplies from more unstable parts of the world. Moreover, the increase in oil output from the United States alone in 2012 was more than enough to offset the decline in oil output from Iran (687,000 barrels per day), whose oil production is under international export sanctions. Greater output from North America will become an even more important factor moderating risks as output from the North Sea declines.

Expanded U.S. production natural gas from shale formations is lowering global supply risks. Gas import risks remain very high for many countries, especially in Europe and Asia. It is now expected that by 2020, the United States will be a net exporter of natural gas. This is already having an impact on overseas markets, where shipments once destined for the United States are being diverted to European and other markets. Japan, too, is looking at U.S. natural gas as a reliable source of energy as it considers the future of its nuclear plants. Other countries also are looking to expand natural gas, so it is important that the federal government quickly approve applications to export of liquefied natural gas (LNG) if the U.S. is to establish a presence in global natural gas markets.

Low retail electricity prices in coal- and natural gas-rich countries such as Australia, Canada, and the United States have made them comparatively more energy secure and competitive. Electricity prices in much of Western Europe and Japan have increased sharply in recent years and are now among the highest in the world. This in turn creates competitive pressures, especially on energy-intensive industries. The use of affordable coal and, increasingly, natural gas for power production in North America and Australia has kept electricity prices comparatively low. Large-scale hydropower, especially in Canada, also has contributed to lower electricity prices.

Even as Japan's overall energy security benefited from lower energy expenditure volatility (like for others countries), the deep drop in electric power generation from nuclear facilities in 2012, a reaction to the Fukushima Daiichi nuclear incident in March 2011, worsened that country's energy security relative to other countries in the large energy user group.

By March 2012, all but two of the country's 54 nuclear reactors had been shut down, and under public pressure, they remained closed for the remainder of the year. As a result, Japan faced growing risks related to energy imports and expenditures, reduced power sector diversity, non-carbon generation, and price volatility, all of which contributed to Japan falling from an already low rank of 14 in 2011 to 18 in 2012. The accident also prompted rethinking about nuclear power in other countries, with the German government deciding to shut down all of its nuclear capacity by 2022.

Historical Trends in International Energy Security Risks: 1980-2012:

The time trend of the OECD risk scores and many other countries in the large energy users group resembles a shallow U-shaped trough, with high risks but declining risks after 1980, comparatively low risks in the 1990s, and rising risks through the 2000s (Figure H-1). From a score of 1,000 in 1980, average OECD energy security risks fell steadily to 766 in 1998, after which risks rose steadily, reaching their highest level of 1,125 in 2011 before retreating to 1,051 in 2012. The declining risk from 1980 to the mid 1990s reflected lower risk scores in 22 of the 29 individual risk metrics. Rising risk scores from 1998 to 2012

were almost as broad-based, with 16 metrics getting worse and 13 showing improvement. Risks associated with import exposure, the reliability and diversity of fossil energy supplies worldwide, and energy prices, volatility, and expenditures all contributed to rising risks over this period. Metrics measuring energy intensity, petroleum intensity, GDP per capita, and transport energy intensity risks improved consistently throughout the entire 33-year period.

The dip in overall energy security risk in 2012 interrupted a general trend of rising risks since 2000 or so for most countries in the large energy user group. Of the 23 countries in the large energy user group in existence since 1980, 14 have higher total energy security risks in 2012 than they did in 1980, a year of extraordinarily high risk.³ The United States is among the nine countries with lower risk scores in 2012 than in 1980.

The decade of the 1990s was the best for energy security risks. Of the 23 countries in the large energy user group in existence in 1980, 13 had their best risk score somewhere between 1990 and 1999. For the United States, it was 1998.⁴

The disparities in risk between the countries in the large energy user group and the OECD average have narrowed even as overall risks have risen. If the Russian Federation and the Ukraine are removed from consideration (because no data are available for these two countries until 1992), the spread between the highest and lowest risk scores has dropped from 1,257 in 1980 to 651 points in 2012, and the average absolute departure from the OECD average has declined from 22% to 14%. This means the disparities in risk among the countries in the large energy user group generally have been getting smaller even as overall risks have been rising.

A large energy resource base does not guarantee a high energy security ranking, and a small resource base does not guarantee a low ranking. Table H-2 ranks energy security risks from the most secure to the least secure—that is, from best to worst—revealing a broad range of energy security risks among the countries in the large energy user group. Trends in country rankings have been driven by four types of factors: (1) global factors that affect all countries and which are largely immune to policy responses; (2) country-specific factors such as resource

base, stage of economic development, population density, climate, and others; (3) technology innovation and adoption; and (4) energy policies. Some countries, such as Mexico, United Kingdom, and Australia, consistently have had very good risk rankings for almost the entire period since 1980. Other countries, like Denmark, Norway, and the United States, have improved their rankings greatly over the years, while others—notably China—improved only to slip back down the list. Still others, such as India and Turkey, have seen their rankings go from good to bad over the years, and some, such as Brazil, the Netherlands, and South Korea, have seen their ranking go from bad to worse.

For many emerging economies like China, India, South Africa, and Turkey, rapid economic growth

since around 2000 has exacerbated underlying energy security risks. Even Mexico, a country with some of the best scores historically, has seen over many years its dominant position weaken relative to other countries. Rising industrialization and growing middle classes in these countries has tended to increase energy intensity and energy use per capita, increasing demand and squeezing energy supplies. It is anticipated that continued economic growth will increase energy efficiency and allow greater investment in energy exploration and production and infrastructure, which will put downward pressure on energy risks. Moreover, as these countries increase in wealth creation, they will be better situated to make capital investments in expanding and improving energy infrastructure and to deal with energy shocks.

Table H-2. Energy Security Rankings for Large Energy User Group: 1980-2012

	1980	1985	1990	1995	2000	2005	2010	2011	2012
Australia	2	5	3	4	4	6	5	5	7
Brazil	12	8	11	13	16	14	14	18	20
Canada	8	7	5	5	6	5	6	6	5
China	23	23	23	20	17	18	21	20	19
Denmark	18	14	12	16	8	8	8	8	8
France	17	16	15	12	11	11	10	10	10
Germany	14	15	16	10	7	7	9	9	9
India	13	20	19	21	21	20	19	21	21
Indonesia	7	9	7	6	12	12	13	12	12
Italy	15	18	21	17	19	19	18	17	17
Japan	20	21	18	19	20	16	15	14	18
Mexico	1	1	1	1	1	2	2	2	2
Netherlands	21	19	20	18	18	22	22	22	22
New Zealand	3	2	4	3	3	4	3	3	3
Norway	6	6	6	8	5	1	1	1	1
Poland	11	12	13	14	10	10	12	11	11
Russia	24	24	24	23	22	21	20	19	14
South Africa	16	13	14	15	14	13	16	16	16
South Korea	22	22	22	24	24	23	23	23	23
Spain	10	11	9	11	13	17	11	13	13
Thailand	19	17	17	22	23	24	24	24	24
Turkey	5	4	10	9	15	15	17	15	15
Ukraine	25	25	25	25	25	25	25	25	25
United Kingdom	4	3	2	2	2	3	4	4	4
United States	9	10	8	7	9	9	7	7	6



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