



The World's Most Innovative Countries, 2018

Solving the energy/environment equation requires a significant innovation push.

With a predicted 10 billion people by 2040, our planet will need up to 30 percent more energy than today. While we need to generate more energy, we also need to do it in a way that will not damage the long-term environmental balances of the planet. Countries around the world have unique approaches to this challenge, based on their own economic, social and political realities.

That is why the relationship between energy and the environment features prominently in the U.N.'s Sustainable Development Goals (SDGs). **Goal 7** is "Ensure access to affordable, reliable, sustainable and modern energy for all." International cooperation is necessary to facilitate access to clean energy research and promote investment in clean energy technology. Goal 9 refers to innovation and industry.

This year's **Global Innovation Index (GII)** report, "Energizing the World with Innovation", a collaboration between INSEAD, Cornell University and the World Intellectual Property Organization (WIPO), examines how the leaders in global innovation bring education, R&D and business together to solve challenges, such as how to power the future.

Encouraging signs emerge from all parts of the world, showing how innovative policies and systems

can address the challenge. For example, Costa Rica (54) has been edging towards complete independence from fossil fuels for several years. Reliance on renewable energy sources – hydro, geothermal and wind – already provided 98 percent of the **country's** electricity in 2016. It combines natural sources (e.g. volcanoes) and smart grids, including **micro-grids** using solar energy as a back-up source of electricity.

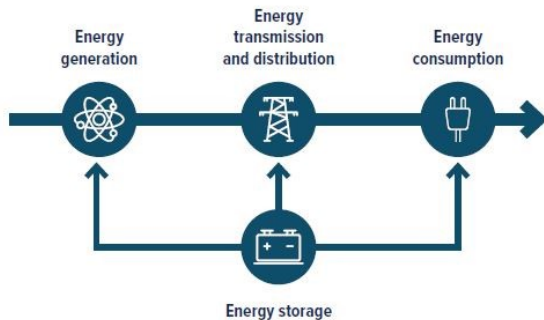
In 2016, the **GII** had already sounded a warning about diminishing budgets. Over the past year, the private sector has bounced back (global business R&D budgets have increased by more than 4 percent), but this has not been matched by the public sector.

When public authorities accept the responsibility to drive significant investment policies towards innovation, we see remarkable results, as in China (17). China's embrace of energy innovation has translated into a blend of Chinese and European technology creating "clean nuclear energy" in Guangdong: The world's first Evolutionary Pressurised Reactor (EPR) should connect to the **electricity grid** this month. Other countries are concurrently working on the EPR, but after years of work, China – with a public policy commitment – is the first to bring this safer nuclear energy technology to the operational stage.

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Energy innovation

In this year's GII, we note that the transition to a **green economy** could lead to an increase of around 18 million jobs worldwide. Yet, the energy/environment conundrum we live with today can only be solved with significant innovation. Such innovation is necessary in all four components of the energy ecosystem: generation, transmission, storage and consumption.



Energy generation or production needs to move continually towards greener fuels and techniques, specifically becoming more reliant on renewable energies. The transmission of energy sources could be more efficient, especially as oil and gas reserves continue to diminish. For example, efficient access to electricity over long distances is still patchy in many parts of the world. Storage capabilities will be an important focus of innovation, as the availability of high-powered batteries will continue to revolutionise transportation (see Tesla/SolarCity). Storage will also help to reduce troughs and peaks along the production curves required to face energy demands. Changes in consumption behaviours (e.g. individual consumers should understand smart grids) will have an important role to play too.

This year's rankings

Such innovation must be facilitated and encouraged. This requires governments to come up with incentives and regulations that stimulate energy innovation. The leaders in our index demonstrate the effect of such crucial attributes.



GII 2018

This is the first time in the history of the GII that the same countries are in the Top 10 for two years running. Switzerland (1) remains on top for the 8th year in a row, with considerably improved R&D expenditures continuing to feed its dominance. The Netherlands (2) excels in business sophistication and online creativity.

The GII measures a country's innovation performance based both on its innovation inputs (such as regulatory environment, higher education, R&D and infrastructure) and its innovation outputs (such as online creativity and knowledge creation). Small countries perform well in the GII and may seem overrepresented. Although small countries can make changes to spur and advance innovation more quickly due to spatial factors like distance, there is no small-country bias. Yet, the more diversified a country's economy is, especially a high-income economy, the more innovative it is in our rankings.

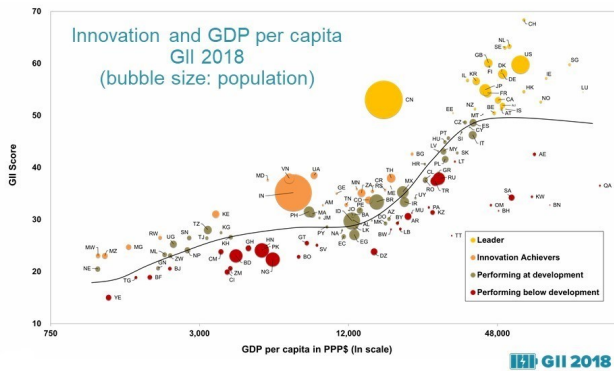
Singapore (5) remains the only Asian country at the top of the rankings, moving up two slots; it scores well across the GII's pillars, especially in political stability and safety, market capitalisation and high-tech exports. It is also home to the **Solar Energy Research Institute of Singapore (SERIS)**, a research institute focused on contributing to global sustainable development and the solarisation of Singapore.

The United States (6) moves down two slots, losing ground across several pillars, including infrastructure. European countries once again dominate the top of the rankings. Six out of the Top 10 countries in this year's GII come from the European Union. The EU is clearly an important force for innovation, especially in education, R&D expenditures, intellectual property filings and high-tech manufacturing output.

Top 25 movers and entrants

All the countries in the Top 25 of the GII are high-income economies – except for China, an upper-middle income economy. China's steady climb through the rankings can serve as a model to other middle-income economies, with improvements in patents, publications and R&D expenditures.

Other impressive movers this year include Israel (11) which moves up six places. When it comes to business sophistication, Israel was better than all other countries, even Switzerland.



some strong individual performers. Six out of our list of 20 innovation achievers (those countries that outperform on innovation in relation to their development) are from this region. Kenya (78), Rwanda (99), Madagascar (106), Malawi (114) and Mozambique (115) have been on this list at least three times in the past eight years.

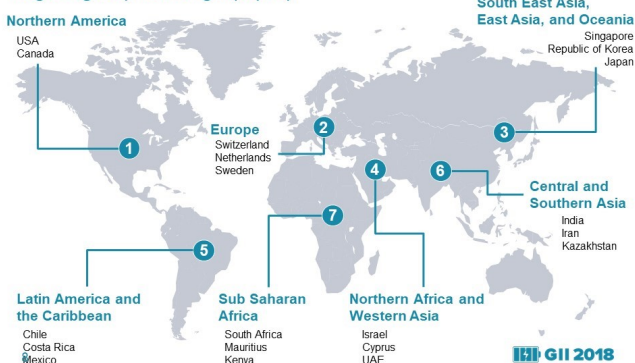
Income group rankings (top 3)



Regional differences

Northern America and Europe fare best amongst regions in the GII. In the Latin America and Caribbean region, potential exists – see Costa Rica – but as a region, it has not improved in the way we would expect. On the bright side, Mexico (56) has moved up through the ranks consistently over the years and Colombia (63) is identified, along with Costa Rica, as an innovation achiever this year.

Region group rankings (top 3)



The case for optimism

This year's GII, although optimistic on some fronts, reminds us that continued investments in energy innovation are necessary for global economic growth and mandatory to address environmental challenges. Policy incentives must be considered to spur the wider acceptance of existing innovations. If the public or private sector finds solutions to the difficult problem of balancing global needs for energy and the fragility of our environments, consumers and businesses must have an easy access to them. Innovation requires ecosystems that only policymakers can facilitate. Energy innovation is hence crucial to make our planet not only healthier but also more peaceful and less unequal.

*The GII is created by INSEAD, the **World Intellectual Property Organization (WIPO)** and **Cornell University**. It covers 126 economies around the world and uses 80 indicators across a range of themes. The full report can be downloaded for free [here](#).*

Bruno Lanvin is the Executive Director for **Global Indices at INSEAD**.

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