

## Executive summary

- …► The energy industry is changing fast and in multiple directions, with important consequences for energy-rich countries. Malaysia is also experiencing unprecedented political changes with the election of the Pakatan Harapan (PH) coalition on May 9 of 2018, the first alternation of power since the country's independence. Some of the key promises made by the PH's manifesto are related to the energy sector, including a fast growth of renewable generation and the promotion of green technologies. **This paper discusses the global energy scenario, Malaysia's energy policy challenges, and explains why it is important to put energy innovation at the forefront of the national development strategy.**
- …► In the last decade, the energy industry has been affected by two important factors: the growth of unconventional oil and gas (O&G) production and renewable sources of energy. The former **brought abundance of fossil fuels**, starting from the United States but with potential to spread to other countries. The latter represents **alternatives to fossil fuels**, which can be key to diversifying the energy sources and upholding commitments to limit greenhouse gas emissions as called for by governments that signed the Paris Agreement (2015), which includes Malaysia.
- …► In terms of total contribution to the world energy supply, unconventional O&G far exceeds the growth of modern renewables such as wind and solar. In 2017, unconventional O&G (from shale and tight oil), in the United States alone, added 12.8 million barrels of oil equivalent per day (MMBOE/d). In contrast, solar and wind energy provided equivalent to 2.1 MMBOE/d, globally, in 2016. However, **renewables have shown impressive gains in competitiveness in recent years** and, in some cases, are the cheapest sources for electricity generation. In addition to these dramatic cost reductions, **renewable sources are poised to gain** from the electrification of energy demand (e.g., electric vehicles), climate change-related policy activism that discourages fossil fuels, and consumers' pressure in favor of low carbon alternatives.
- …► Both the abundance of fossil fuels unlocked by new technologies and the increasingly competitive alternative energy sources will disrupt business models of firms that rely on the extraction of conventional O&G, as well as the public finances of oil-rich countries like Malaysia.
- …► **Unlike the rest of the world, Malaysia's energy matrix is becoming more carbon-heavy:** in terms of primary energy share, coal has increased from 5% in 1996 to 20% in 2016. In electricity production, coal has replaced natural gas as the main source of energy and now accounts for 46% of electrical energy generation. Meanwhile, modern renewable sources (solar and wind) make up less than 1%.
- …► Malaysian policymakers will need to devise policies to expand the supply and generation of natural gas (to replace coal) and drastically incentivize low-carbon sources of energy such as solar in order to de-carbonize the energy matrix and reach the target of 20% of renewable energy by 2025 as promised by the PH manifesto.
- …► Both objectives can be facilitated by a national innovation system that prioritizes the research and development (R&D) of the energy sector. Malaysia's high-cost and complex O&G resources need to continuously innovate to remain competitive in a world of fossil fuel abundance and to unlock new gas fields that can replace the growing coal consumption. Incentives for local R&D and collaboration between lead firms, suppliers and universities are also key to building capabilities in renewables.