Capgemini

WEMO 2019

World Energy Markets Observatory

Five Key Findings

Five key findings: climate change, energy transition, industry transformation, sector technology and geopolitical concerns

Robust economic growth is generally seen as a positive—unless one is considering its effects on energy demand and, by extension, environmental impact. Further complicating matters, when the fastest growing economies also happen to be the largest consumers of fossil fuels, such as in India and China, it heightens concerns about global warming.

The growing threat of climate change, particularly as it relates to energy consumption and efficiency, is the focus of the 2019 edition of the World Energy Markets Observatory (WEMO), Capgemini's annual thought leadership and research report that tracks the development and transformation of electricity and gas markets around the world. Now in its 21st edition , our research indicates that addressing climate change will certainly be challenging, but that it is possible for the industry to mitigate some of the negative effects through increased use of renewable energy sources, transition efforts and technology. Here we review the report's five key findings:

1 Climate change is an increasing global concern

The world is not on track to reach targets set in the 2015 Paris accord. Global greenhouse gas (GHG) emissions climbed 2 percent in 2018, a significant uptick from the plateau of 2014 to 2016. Many countries are contributing to the rise in carbon emissions, with India and China experiencing the highest growth. EU emissions, which have flatlined after a decade of marked decline, still fall short of long-term goals, as do those in the U.S. Meanwhile, population growth and "power for all" initiatives further contribute to a bleak long-term landscape.

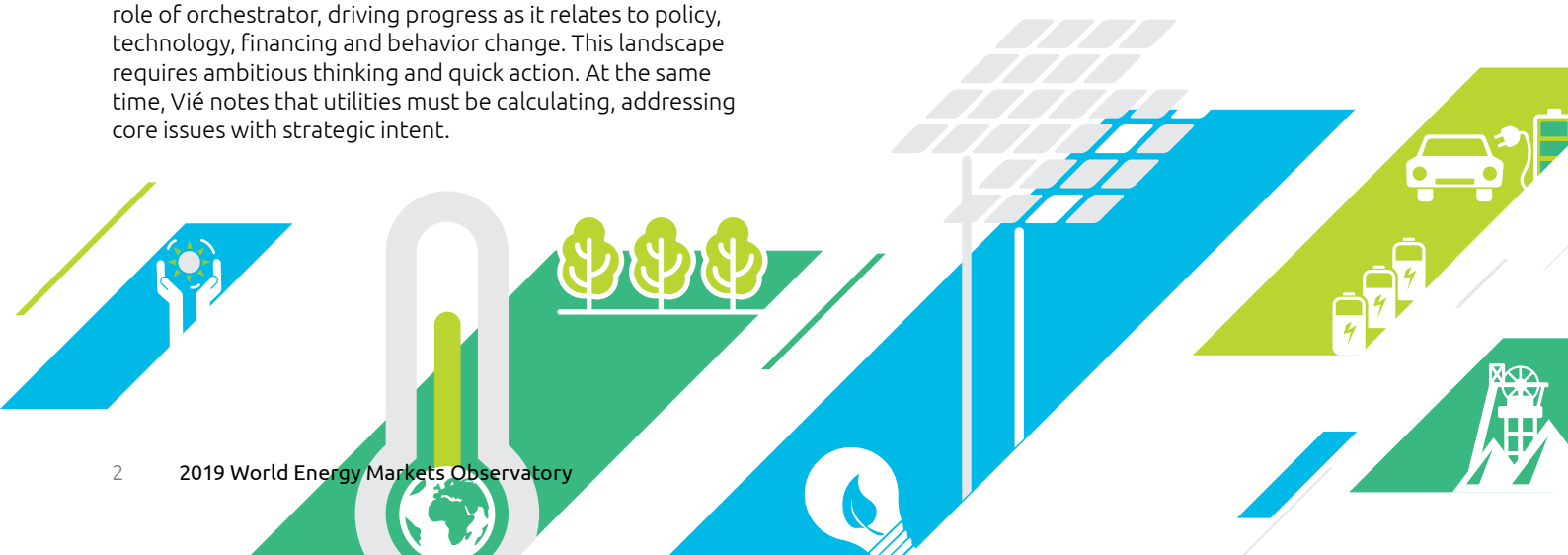
"Our research shows that we, as a society, should be doing more to combat climate change," explains Philippe Vié, Global Head of Energy, Utilities and Chemicals at Capgemini. *"Utilities, governments, corporations and private citizens all must take action to address this issue."*

Our research underscores the need for utilities to adopt the role of orchestrator, driving progress as it relates to policy, technology, financing and behavior change. This landscape requires ambitious thinking and quick action. At the same time, Vié notes that utilities must be calculating, addressing core issues with strategic intent.

2 Advances in non-carbon emitting generation and storage will increase the viability of renewables

Renewables remain the fastest-growing worldwide energy source, with consumption increasing 14.5 percent in 2018. As solar and wind markets continue to grow, costs continue to fall. Meanwhile, advancements in clean energy storage, including pumped hydro storage, li-ion batteries and clean hydrogen production are improving accessibility—as is at-scale deployment of the smart grid.

"Looking to the future, a modern network will include more fiber than copper," says Vié. However, our research indicates that the pace of renewables growth depends not only on equipment improvements and costs, but on technology advancements, public acceptance, sales agreements, such as corporate PPAs, and financing.



3 The worldwide energy mix remains dominated by coal, hampering broader energy transition efforts

While many countries are reducing the use of fossil fuels, the energy mix in the developing world is dominated by coal. As a result, worldwide coal consumption grew by 4 percent in 2018.

"It may be feasible for Europe to phase out coal plants by 2040, but this is not the case for the developing world," explains Vié. *"Countries like China and India rely on coal to improve electricity access and reliability for rural populations, which is crucial to their economic development as well as the quality of life for millions of people."*

To offset this need, developing countries must adopt sound policies related to cleaner extraction methods in mining and clean coal combustion technologies, while also accelerating RD&D investments in carbon capture and storage (CCS). Governments can also set carbon prices at a point that encourages carbon free investments and a dedicate 100 percent of environmental taxes to energy transition projects.

"Long term transition goals are dependent on our ability to balance intermittent renewables with zero carbon dispatchable plants," says Vié. *"While there is certainly a need to add more generation capacity from renewables, it is equally important to improve the reliability of those sources."*

4 Continuous advancement in existing technology will drive incremental gains over the next two decades

While the energy industry does not expect any major technical breakthroughs by 2040, advances in existing technologies will continue to decrease the cost of renewables, electric batteries, electric vehicles, and small modular reactors. In addition, at-scale deployment of the smart grid, as well as advancements in intelligent automation, will help improve system reliability and cost savings, while also reducing the environmental impact of increased generation and consumption.

"Deep sector technologies combined with the digital revolution is the main transformation trigger for the energy sector," explains Vié. *"Our research confirms a savings opportunity of up to $813 billion for energy and utilities organizations that implement intelligent automation at scale."* Coincidentally, many of the so-called "quick wins" in intelligent automation use cases—such as forecasting, grid optimization and energy storage—are highly pertinent to the renewables sector.

5 Geopolitical tensions are increasing energy market volatility

Developments in the energy sector have contributed to geopolitical tensions around the world—and vice versa. U.S. oil independence has allowed the country to enact an aggressive international policy in the Middle-East. U.S. sanctions in Iran and Venezuela, coupled with regional instabilities, have led to a significant decrease in oil production and sustained commodities prices at certain levels. Meanwhile, China could use rare earth exports as a strategic advantage.

This landscape, while troubling, is unlikely to change significantly in the future. Geopolitical tensions may shift, but they never dissolve. Perhaps more concerning, as seen with the U.S., achieving energy independence may not assuage volatility, but rather spur more aggressive policies.

We also see mounting tensions around climate change efforts. Countries like Australia and the U.S. are struggling to agree on how to combat the issues at the city, state and federal level—and whether is a matter for the government or private industry to manage. Meanwhile, on the global stage, we see some backlash against the developing world for overuse of fossil fuels and failing to cut emissions.

"Global cooperation is an absolute necessity. Climate change is an issue that will affect every country, every company and every person. We all must adapt our ways of living, working and consuming to address this issue."

- Philippe Vié, Global Head of Energy, Utilities and Chemicals

To learn more, download the 2019 World Energy Markets Observatory report.

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