

Transforming the Energy Economy

Cleantech takes flight as renewable energy becomes the most economical option.

By Bill Radford III

Nationally and internationally, energy is becoming greener and more sustainable — and that change will only accelerate in the near future.

“The factors that determine the overall energy mix are a combination of technology, policies, and finance, and all three are in a dynamic change going forward, particularly with innovations in all three spheres in the United States,” says Doug Arent, executive director of the Joint Institute for Strategic Energy Analysis at the National Renewable Energy Laboratory in Golden.

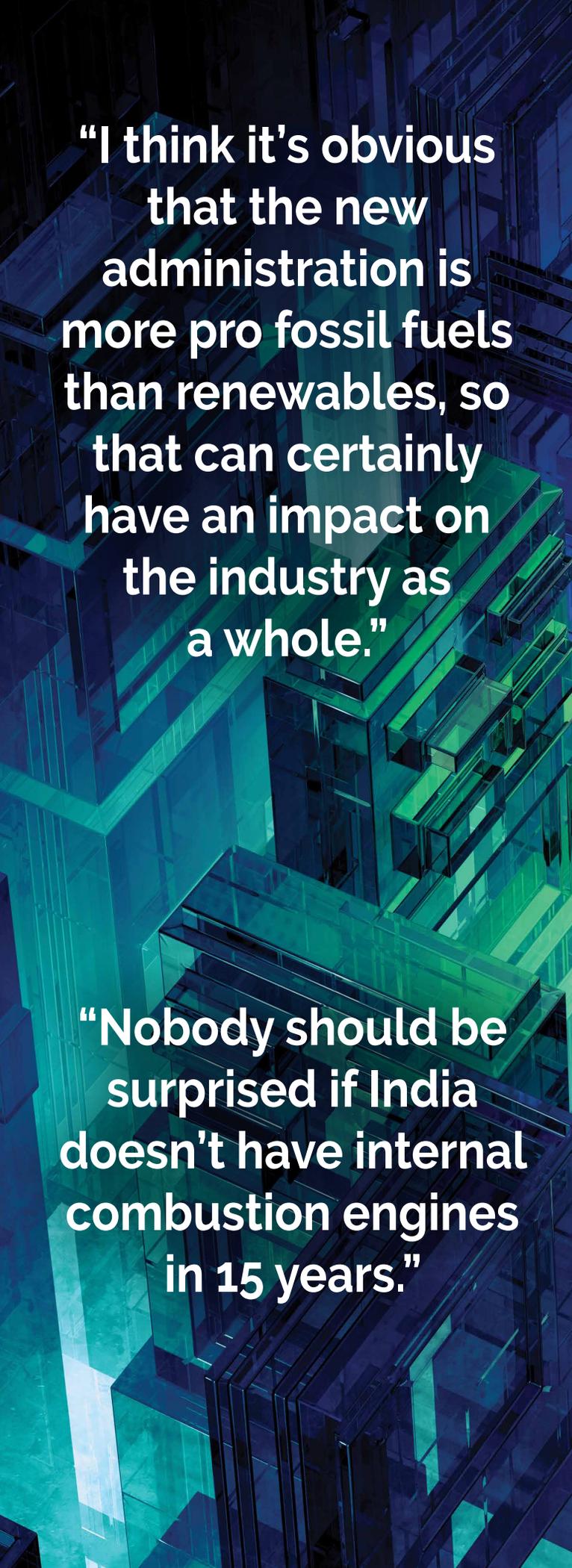
In terms of technology, changes range from the shale fracking revolution in the oil and gas arena to dramatic decreases in cost coupled with increases in performance for wind and solar, Arent says. On the finance side, he cites “incredible innovations” from crowdsourcing and

other new ways for companies to raise money to expand options for consumers for their energy.

“On the policy side, the U.S. is a very broad landscape because of jurisdictional authorities over energy,” Arent adds.

“That’s everything from a rural co-op to a municipality to a state, going up to regions, interstate commerce and then federal policy.”

At the state level, “Colorado has a long history, obviously, in the oil and gas realm,” says Patty Silverstein, president and chief economist at Development Research Partners, which produces the annual *Resource Rich Colorado* report for



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the Metro Denver Economic Development Corp. The report analyzes the state’s competitive position in the global energy economy.

While oil and gas provides a relatively small employment base, Silverstein says it has “a huge influence on overall economic activity, mainly because of the large multiplier effects that oil and gas production has.”

But Colorado was also among the first in the nation to pass a renewable energy standard requiring utilities to supply a certain percentage of energy from renewable resources. Silverstein also points to the entry into Colorado by Danish wind turbine maker Vestas in 2008 as a point “that really started the interest and excitement around renewable energies.”

Colorado now ranks 10th in installed wind capacity and seventh in wind-energy generation as Vestas employs more than 3,000 people statewide. The state is ninth in installed solar capacity and 10th in solar generation, according to the latest *Resource Rich Colorado* report.

In 2016, Colorado ranked fourth in the nation for cleantech industry employment concentration, the report found; employment in cleantech in the state grew 22.4 percent over five years. “We have a relatively short history in renewable energies, but it’s a very strong history, and hence it has really led to the whole idea of a balanced energy economy here in Colorado,” Silverstein says.

At the federal level, she adds, “I think it’s obvious that the new administration is more pro fossil fuels than renewables, so that can certainly have an impact on the industry as a whole.”

While policy can drive advances, it can also hinder them. “Trying to navigate the changing federal environment for energy production and potentially on the energy use side is part of the normal course of business,” says Arent.

Policies on climate control are a big driver in the energy transition, says Ned Harvey, the managing director at Rocky Mountain Institute who’s responsible for leading its Carbon War Room business unit. He believes the U.S. has given up “its moral authority” on climate and energy, but also points to the many major U.S.-based corporations, especially those with a global audience of customers and investors, that have released statements that they will persist in their environmental efforts. “Investors see a lot of unknown risks about not dealing with climate,” he says.

The appetite for a greener energy base “is clearly growing pretty substantially domestically, and also globally, so the major companies that have a global customer base are also looking to greenify, if I can use that term, their supply chains throughout the world,” adds Arent. “And that’s driving interesting conversations in everywhere from Japan to Hong Kong to Vietnam to China.”

Meanwhile, there are several countries happy to fill the void in the wake of the U.S. retreat from the Paris climate accord, including China, France, and Germany. “These countries,” Harvey says, “will get the business from the rest of the world on renewables.”

Arent and Harvey also point to India as a country to watch; India has set a goal of 175 gigawatts of renewable energy capacity by 2022. “Nobody should be surprised if India doesn’t have internal combustion engines in 15 years,” Harvey says.

At home and elsewhere, market forces will continue to drive change, Harvey says. “In the utilities world, most utilities try to dispatch the cheapest power they have available. Right now, wind and solar are often that cheapest power.”

The costs of wind and solar will fall even further as demand grows, he says. He points to LED lights as an example of that dynamic: LED lights were very expensive just 10 years ago, but in the time since, “They’ve dropped like a rock.”

Consumer demand, especially among younger people who don’t want “a dirty world or a dirty brand,” is driving change as well, Harvey says. Arent notes that consumers now have more options for greener power, such as purchases through a local co-op or utility or perhaps a leasing arrangement. “Consumers have to look at the landscape of tools,” he says, “rather than think their only option is self-investment and self-generation.”

Arent sees a solidly greener future, with substantially more renewables in the mix. Countries and companies are working toward that future for many reasons, he says, from smart business to air quality to jobs to reduction of greenhouse gases.

“There’s a plethora of reasons why countries and other jurisdictions are pursuing these pieces,” he says. “I think we’ll continue to see pretty robust growth going on over the next many, many decades.” □