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# Perspectives: Why The Future Is Bright For Renewables And Fossil Fuels

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The energy landscape is transforming significantly, but a constant remains: Global demand keeps growing. Even as consumption rises, the world's need to reduce its burning of carbon-emitting fossil fuels has become apparent. Finding ways to do that presents challenges and opportunities. Projects generating energy from renewable sources have become viable additions to the mix. Vehicles are evolving, along with their energy inputs. New technologies are modernizing the distribution and storage of energy.

KPMG looked at game-changing ideas in energy and other industries in 2016 as part of The Great Rewrite series. In this first installment of the Perspectives series, we revisit the Energy chapter, speaking to three thought leaders. Regina Mayor is KPMG's Global Sector Head and U.S. National Sector Leader of Energy and Natural Resources. Graciela Chichilnisky, an economist who helped devise the carbon market of the 1997 Kyoto Protocol, is CEO of Global Thermostat, a startup featured in The Great Rewrite that is developing technology to capture carbon from the air. Steve Hargreaves is co-director of the Energy Transition desk at Climate Nexus, a consultancy that works with NGOs, private groups and other institutions to communicate on energy and climate issues.

**What do you see as the most promising renewable energy sources?**

**Hargreaves:** I like solar. It generates electricity in a simple way: passes the photon of sunlight through silicon, creates an electric charge. It's a different way from how most electricity is created. Most electricity is created by boiling water that turns a turbine, that spins a magnet. Solar is simpler. It's growing rapidly in terms of the megawatts that it produces. And there's a lot of room for prices to fall further.


Graciela Chichilnisky

**Chichilnisky:** Solar beats the rest hands down. It's very promising. But solar takes a long time to build up and is less than 1 percent of all the energy in the world. The world can suffer catastrophic effects of climate change even while solar is still the most promising.

**Mayor:** Solar will continue to evolve to where it becomes as thin as paint — solar-panel paints. But there are some other interesting technologies being developed, like geothermal, that will be able to use drilling techniques that we used for extracting hydrocarbon resources to help extract renewable sources. There are biomass, biodiesel, biofuels, the potential for algae to generate electricity. Those are really exciting.

**Are we going to be using oil, gas and coal for the foreseeable future?**

**Hargreaves:** Most projections show an increase in fossil fuels up to 2040. I think the decline will happen quicker. The real question is does that happen fast enough to forestall some of the worst effects of climate change?

**Chichilnisky:** Humans have great difficulty with change. And these forms of energy are accessible. In Australia, if you put your hand in the soil, you get coal. In China, they have visions for climate policy and carbon markets, but they're also building coal plants.

**Mayor:** There's an ongoing role for fossil-fuel based alternatives, and there's an ongoing role for renewables. How we as a country manage that mix will be key to our energy dominance, as the Trump administration is saying, as opposed to just energy independence or energy security. I don't think coal is going to be a big part of the mix. You are already seeing coal-fired generation being retired, for economic reasons. Natural gas is far more efficient and cheaper. But I don't see carbon-based fuels disappearing at least for another century. There are still a billion people in the world without access to electricity. If we're going to lift the world out of poverty, they have to have access to electricity, and I think some of that is going to still come from fossil-fuel-based solutions.

**How do you see the future for fueling cars and trucks?**

**Mayor:** With the advent of autonomous vehicles, we see a really large increase in personal vehicle miles traveled. More people will be riding in cars. It's unlocking latent demand — for example, with the elderly: You won't need to have the conversation about taking the keys away from Mom or Dad. Do we see a point when gasoline demand falls off a cliff? We are not predicting when, but there are certain pockets of the country where it will happen a whole lot quicker. Southern California probably will be 50 percent electric vehicles within the next decade or two. I also see electric and hydrogen developing together. Some of our clients are getting really excited about hydrogen fuel-cell vehicles.


Steve Hargreaves

**Hargreaves:** Toyota has made big bets on hydrogen, and there are a few other technologies out there. But most of the automakers are making big bets on electric. Volvo announced that all their vehicles by 2019 will be either hybrid or fully electric. Tesla could be a game-changer. They're essentially trying to do with electric vehicles what the Chinese did to solar panels, building these huge factories with the plan of just churning these things out. If they're successful, they could fundamentally change the marketplace. But we will be using more efficient gasoline or diesel-powered cars as well.

**How do you see the electric grid evolving? What kinds of innovations and changes are smart utility companies going to be making?**

**Hargreaves:** I think the new utilities, the successful utilities, will figure out how to make money — not necessarily by selling more power and by building more infrastructure, but by allowing their regulators to let them charge for things like energy efficiency, and figuring out how they can still make money when consumers are generating their own power at home.

**Mayor:** The grid needs a lot of investment. It's going to take billions of dollars to harden it, make it more resilient, enabling it to handle different kinds of load factors. It's a little bit akin to bridges and roads and the kinds of things we need to do to sustain those. Imagine an electric-vehicle future, where you have a charging point with 10 bays and 10 cars recharging at the same time. The grid is not really well designed to manage that kind of peak generation capacity coming on and off in such rapid fire. In places like Hawaii, they have had to limit residential solar panels, because the grid in Hawaii can't handle all that power coming back into the grid. The other piece where the grid needs more management is cyber, being able to protect it from attacks.

**What role can governments play in the energy sector to support new technologies?**

**Chichilnisky:** There are states like California, where the grid is forced to buy electricity that's produced in a decentralized way. Every household can sell the electricity to the grid. What does it take? Simple — one piece of legislation. Germany has passed legislation that says any CO2 you buy and you use, all of those tons, cannot come from fossil fuels after 2020. They have to come from air, removing it from air. It's all a question of a single regulation.

**Hargreaves:** You see a lot of the incentives right now from state and federal governments to build out the vehicle-charging infrastructure. These are really important. I think people might be hesitant to buy an electric car until it gets a longer range and until the charging infrastructure is there. Volkswagen had to devote something like $2 billion from their Dieselgate settlement to building out electric-vehicle charging infrastructure.

**Mayor:** The Trump administration rollback of some of the more onerous regulation is important. U.S. industry has done a whole lot in terms of carbon emission reduction without government help. Because it's economic: Gas is cheaper than coal. I think they have to balance trying to incentivize the right behaviors without slowing down what in essence makes American business or global business work — understanding when the economics are in favor of some direction that you already want to go, and getting out of the way. A lot of people believe that the renewables need to stand on their own two feet right now.

**How optimistic are you about the future when it comes to climate change?**

**Chichilnisky:** I'm very optimistic about being able to tackle this problem. We have the technology, we have the economics. The technologies will fix the economy, produce more jobs, produce exports at the same time as they clean the atmosphere. I'm pessimistic about the time this will take. I don't know if we'll move fast enough to avoid catastrophic results. This is a battle for decades, and the outcome is by no means simple or clear.

**Hargreaves:** Yes, I think eventually we will be using mostly clean energy, mostly renewable energy. I just think the economics are there. How quickly the transition happens is the real question. Does it happen fast enough to ward off the worst effects of climate change? It's going to be a challenge.


Regina Mayor

**Mayor:** I am very optimistic. The industry as a whole has embraced the idea that they need to reduce carbon. They may not say that it is a direct tie to global warming, or they might not say it's because of climate science. But in general, the industry is embracing a carbon-reduction mindset. It's a resilient and incredibly smart, entrepreneurial, technologically savvy industry. I have no doubt that when they start setting their minds to doing something, things happen.

*To learn more about Chichilnisky's company and find other energy stories, visit The Great Rewrite.*

Regina Mayor *contributes regularly to the national energy discussion and has been featured on Bloomberg TV and Radio, and in The Wall Street Journal and Reuters. For more information, visit the KPMG Global Energy Institute.*