

How the World's First Digital Circuit Breaker Could Completely Change Our Powered World

3,000 times faster than the fastest mechanical breaker, this innovation could radically alter how we manage power.

By [Jill Kiedaisch](#) May 22, 2019



This week the world's first and only digital circuit breaker was certified for commercial use. The technology, invented by [Atom Power](#), has been listed by Underwriters Laboratories ([UL](#)), the global standard for consumer safety. This new breaker makes power easier to manage and 3000 times faster than the fastest mechanical breaker, marking one of the most radical advancements in power distribution since Thomas Edison, next to Nikola Tesla.

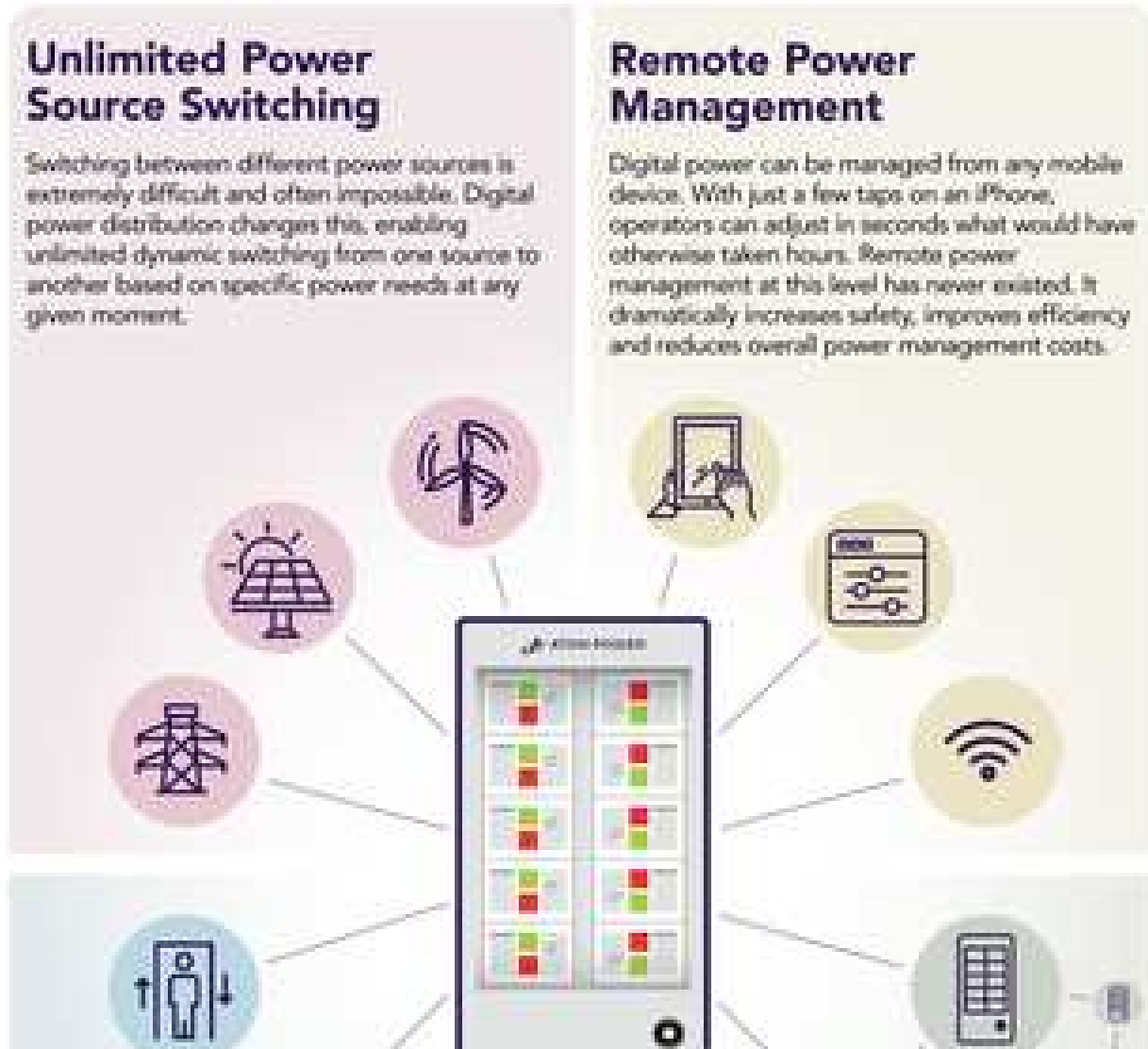
Picture the fuse box in your basement, each switch assigned to different electrical components of your home. These switches are designed to break a circuit to prevent the overloaded wires in your wall from overheating and causing a fire. When this happens, you plod down to your mechanical room and flick the switches on again.

Now multiply that simple system in your home to city high rises and industrial buildings, which might have 250 circuit breakers on any given floor, each one ranging from 15 to 4000 amps at higher voltages. At this scale, the limitations and dangers of a manually controlled power system become much more evident—and costly.

Going Digital

Say Hello to the Impossible— the First-Ever Digital Circuit Breaker

The circuit breaker hasn't changed since Edison's Lab more than 100 years ago. Atom Power has created the first-ever digital, solid state circuit breaker. It changes the economics, safety and possibility for all aspects of power distribution, including sourcing, intelligent energy routing, remote management and connected power (The Internet of Power).



ATOM POWER

Ryan Kennedy, CEO of Atom Power, has been working to build a better electrical system since he began his career 25 years ago, first as an electrician and then as an engineer and project manager on large, high profile commercial electrical projects. His experienced based inquiry has revolved around a central assertion that analog infrastructure doesn't allow us to control our power the way we should be able to. That idea has led to some pretty critical questions: "What would it take to make power systems controllable?" and "Why shouldn't that control be built in to the circuit breaker itself?"

In 2014, Kennedy and Atom Power CTO Denis Kouroussis set out to answer these questions. They designed an infrastructure of digital circuit breakers that use solid-state semiconductors and software to manage the flow of power from numerous disaggregated sources, known to industry insiders as Distributed Energy Resources, or DER. The state-of-the-art digital platform consolidates the incoming streams into one hyperintelligent device, dynamically adjusting amps based on demand and application.

"Instead of using mechanics to switch the power, we apply digital inputs," Kennedy told *Popular Mechanics*. "Now I have no moving parts. Now I have the ability to connect things like iPhones and iPads for remote power management, which increases safety and improves efficiency. I can set the distribution panel to a schedule so the flow of power is seamless, unlimited, and shifts between sources automatically. You literally wouldn't notice. The lights wouldn't even flicker."

The Growing World of Renewable Energy



The Atom Power switch combines new solid state technology with real-time monitoring and networking abilities, the first of its kind to be listed by UL.

ATOM POWER

When you consider the mechanical complications of switching between renewables and grid-centralized sources of power, the idea becomes even more powerful. Sometimes it's flat-out impossible. Kennedy believes the static nature of existing power distribution systems is one of the reasons we haven't seen widespread adoption of renewables at the residential level.

For a grid-connected solar home, for example, residents sometimes have to disconnect their solar input because traditional power systems (including the circuit breakers) aren't advanced enough to properly manage multiple power sources that change.

In short, "the modern world has outgrown the risks and constraints of traditional circuit breakers"—a [company claim](#), but also a compelling fact when you consider these inefficiencies and the dangers of a system that requires manual remediation of power surges and failures.

"Old school breakers simply can't operate as fast as the flow of power," says Kennedy.

“When things go wrong in larger buildings, they go *really* wrong because you typically have a much bigger source feeding that demand.”

Safety First



Atom Power’s digital circuit breakers are 3000 times faster and 100 percent safer than mechanical circuit breakers.

ATOM POWER

Poor energy management results in 30,000 electrical hazard accidents per year. Arc flash events can take out an entire building for weeks. Due to their ability to interrupt 100,000 amps with unprecedented speed, digital breakers effectively eliminate these risks, resulting in “the safest, fastest, most intelligent system to date.”

Surprisingly, this idea is not new. Manufacturers have tried and have been unsuccessful in finding a comparable solution, primarily because semiconductor technology was not advanced enough until recently. Additionally, many viewed the problem as a circuit-breaker function issue rather than a holistic, systems design issue.

Having cleared that 140-year hurdle, which involved adhering to UL’s rigorous

construction and endurance requirements, Atom Power's next challenge is to reduce the thermal losses sustained by their digital circuit breakers to make them as efficient as their mechanical counterparts.

Thanks to investments from three of the four largest circuit breaker manufacturers, Siemens, ABB, and Eaton, Atom Power hopes to meet the challenge and continue their pathbreaking work shaping the future of networked power.