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Sascha von Meier

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Smart Grids for a Smarter Electric Future

Sascha von Meier

During an October heatwave in 2019, the power was turned off for days across California. Kids didn't go to school, businesses closed, food spoiled because refrigerators were off, and hospitals ran on backup generators to keep patients alive. Faced with the threat of extreme wildfires, California's largest electric utilities pulled the plug on two-and-a-half million people to prevent the electric grid from sparking and starting a blaze. This wasn't the first vast blackout in California's electric grid history. And it wouldn't be the last. The utility companies predicted they would have to resort to similar shut-offs in coming years as global warming increased wildfire risk.

Alexandra "Sascha" von Meier sees a different electricity future, one with a smarter electric grid. She's an energy grid expert whose goal is electric grid reliability, safety, and a lot more. Sascha wants to speed our shift to energy sources that don't worsen global warming. She envisions a grid that harnesses the clean power of the sun and wind to run our homes, businesses, and cars.

But Sascha's not an electrical engineer, as most grid experts are. She's a scientist, a teacher, a communicator, and a mom. No worries that she's an "outsider"—Sascha turned that into her superpower, the perfect position to think up unique solutions to electric grid shortcomings.

The electric grid

When you flip on a light switch, where does that electricity come from? Sascha explains that the electric grid is a vast network of power plants, big and small, across the continent, that use different energy sources to generate electricity. The grid transmits electricity through power lines thousands of miles over deserts, mountains, farmland, and cities, and finally converts it into a form your home can use. When the grid is working well, electricity sources are fed into the grid to exactly match the electricity needed at any given time. It's when electricity demand overwhelms the grid's capacity, or when the grid breaks down, that the electric grid shows its dark side.

A better electric grid

To ensure the electric grid is safer, better for the environment, and more reliable, Sascha is making it "smarter." Smart sensors, for example, can respond instantly to electrical sparking and other mishaps, turning off small sections of the grid to prevent fires.



Smart controls also support clean solar and wind power in the grid. It may seem obvious that solar panels only produce energy when there's sunlight, and wind turbines only when there's wind. But that inconsistency can be a problem. Like high-tech traffic cops, smart sensors manage energy movement through the grid, so power can get where it needs to go without creating traffic jams.

Sascha is helping develop another smart-grid solution: small, neighborhood-sized electric grids called "microgrids." These produce and store energy—often

solar—locally, but also feed energy into the main grid. Community microgrids are up and running in Chicago, Arizona, Alabama, and California. During California's October 2019 blackout, for example, the Blue Lake Rancheria microgrid in northern California kept the power running for homes, businesses, and the medical center in its tribal community.

These are just a few examples of the many smart grid solutions Sascha is working on, using her "outsider" superpowers to approach things from a new angle. But being an outsider wasn't always a superpower, like when—alone and a teenager—she moved to America from Germany.

Growing up in Germany

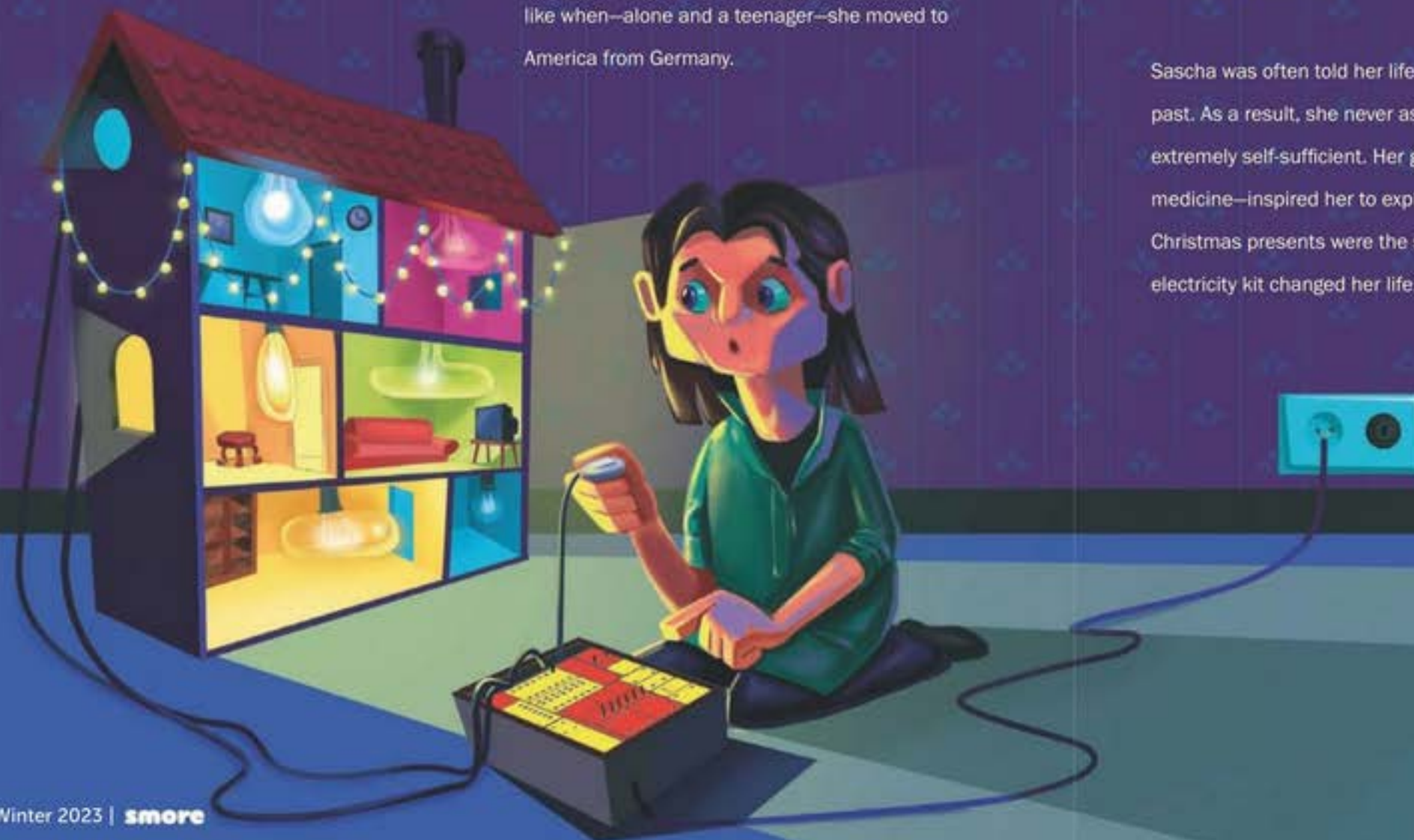
Sascha grew up in West Berlin, with her German mother and grandparents during the 1960s and 70s. Looking back, she recalls the lingering pain caused by World War II. "Everybody carried a burden from the war," she says. "Many lost family members, or knew people who died, were persecuted, or jailed. Many older people felt guilty about what they should have done to stop the war, but no one talked openly about it." Sascha became perceptive to the "unspoken" around her, a peacemaker attuned to others' emotions, skills that would serve her during her entire life.

Sascha was often told her life was easy, compared to the past. As a result, she never asked for help and became extremely self-sufficient. Her grandfather—a professor of medicine—inspired her to explore science. Her favorite Christmas presents were the science kits she got. The electricity kit changed her life. She built her own

dollhouse, decorated with wallpaper and furniture, then wired it with lightbulbs in every room.

In 1979, when she was fourteen, the entire world was horrified by an accident at Three Mile Island, a nuclear power plant in the United States that released poisonous radiation into the air. In Germany, Sascha's family and friends all started talking about nuclear power, convinced that it was dangerous. Sascha began to think about energy more seriously.

At seventeen, she moved to America, to California where her father lived. She enrolled at the nearby University of California at Berkeley. Disappointed there wasn't an energy major, she chose physics because it was something so difficult that she couldn't learn it from a book on her own.



Being an Outsider is a superpower

Even though there were only three women in Sascha's physics major cohort, her greatest obstacle wasn't being in a classroom full of men. Rather, it was being an outsider—she was a German in America, speaking a different language, trying to fit into a new culture. German schools had covered different math and chemistry topics, so she often felt she was supposed to know things that she didn't. "But it turns out, at Berkeley,

Even the smart kids ask for help on their homework.

she says. "Until then, I didn't know that was okay." She came to realize that "being an outsider" was, in fact, her strength; she could see the same thing through many different lenses. She could understand why some experts saw nuclear power as an excellent energy source while others saw it as dangerous. She's learned to put people at ease by adopting their word choices and accepting their perspectives. "I'm pretty much equally comfortable talking to millionaires, high-ranking government officials, grocery store clerks, janitors, musicians, and dirtbag climbers [Sascha plays keyboard and sings in a band, plus she's a rock climber]. The one person in the world who would probably have me completely starstruck and unable to get a word out is Barack Obama."

The path to an energy career

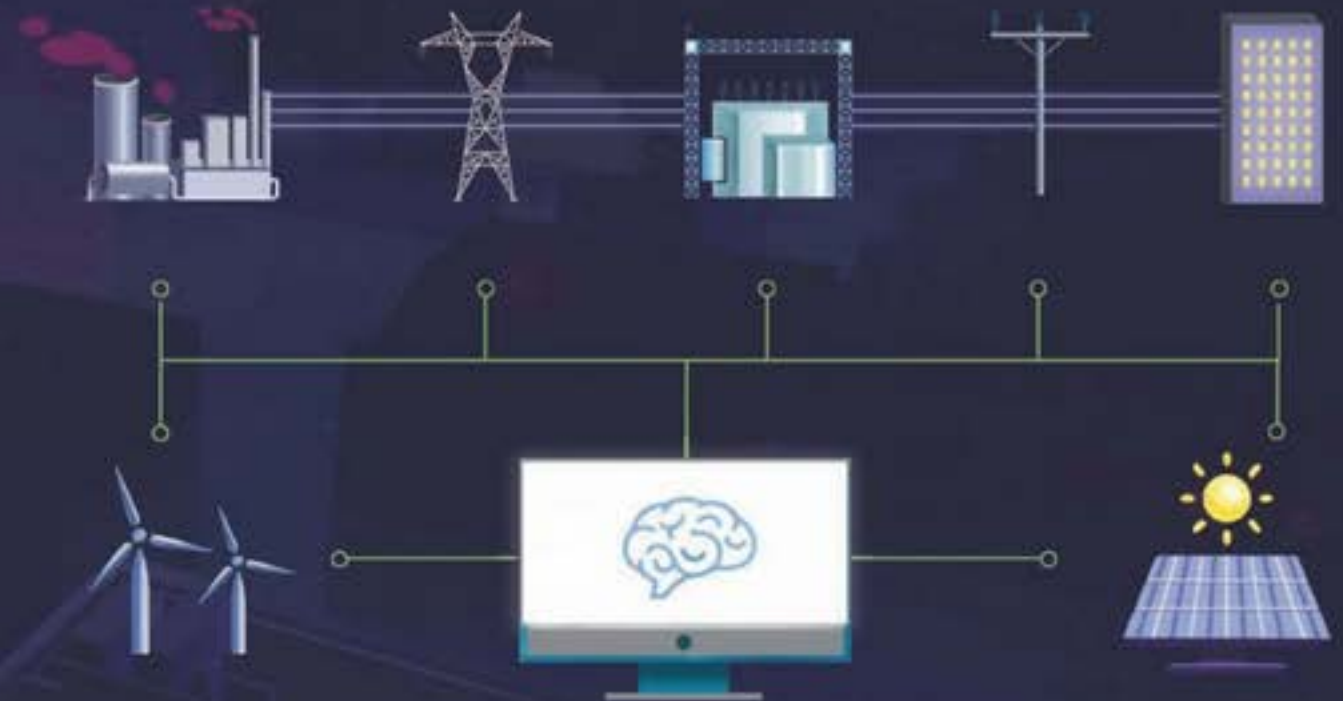
Meanwhile, solar technology was evolving very quickly as an important non-polluting energy source, but progress was stymied by the challenges of including solar into the electric grid. So, Sascha started graduate school at Berkeley to find solutions. She relied on her superpower of seeing through many lenses to research the human side of electricity, interviewing grid operators, engineers, and power plant managers about how to make the grid more automated. "And that led me to the topic of smart grids," she says.

When Sascha finished her PhD in 1995, she was a single mom and needed to support herself and her child. She taught an energy program at Sonoma State University and used her "outsider" sensitivity with students who didn't understand the language well or didn't have a strong background for the subject.

Usually, I can figure out what piece they're missing and fill it in for them, so they don't feel stupid or out of place.

No wonder Sascha has received numerous teaching awards.

After twelve years, she was offered a professorship in Berkeley's Department of Electrical Engineering and Computer Science. She was thrilled, but she kind of felt like an imposter. "I'm not an electrical engineer, I'm a physicist working in energy." But, actually, her skills at teaching and communicating complex energy systems, the skills that came from being an "outsider," were exactly what they needed. So were her peacemaker skills, which allowed her to read "unspoken" things in a room and so manage teams with diverse backgrounds. She went on to lead the Electric Grid Research program at the California Institute for Energy. Now she consults with research groups, electric utilities, and California's energy programs, working towards a smarter, safer, and more reliable electric grid future.



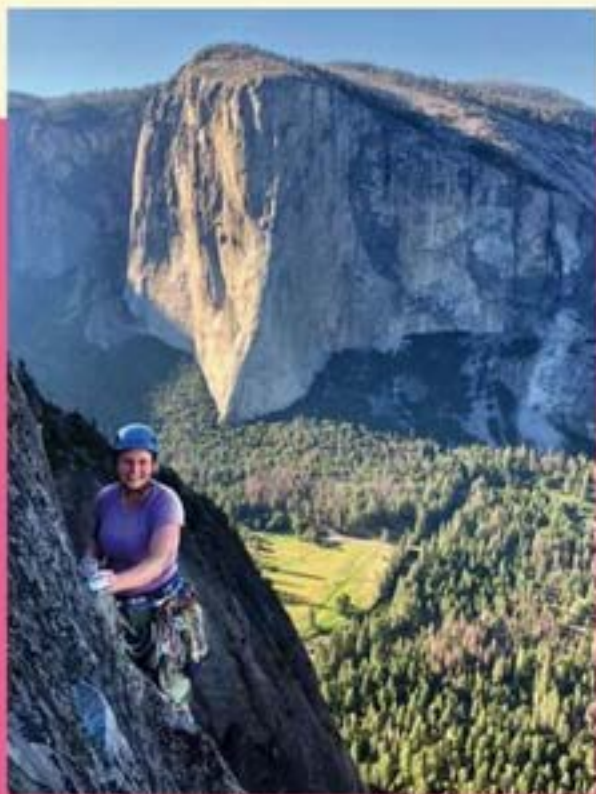
Getting kids connected to the future's smart grid

Not surprisingly, Sascha emphasizes that smart grid technologies benefit from skills outside electrical engineering. "There's a need for people who can translate between disciplines. The future of the electric grid, particularly microgrids, will include a whole lot of legal and economic questions, so we need lawyers, and business and policy people who have a literacy in science and technology."



Sascha with a micro-PMU, a sensor used in smart grid technology.

Credit: Sascha van Meier



When Sascha's not working...

If you could choose any song to play every time you walked into a room, what would you choose?

Elton John's "I'm Still Standing."

What's your next big mountain adventure?

I'm meeting a friend and we're rock climbing in Yosemite.

If you could perform with any musician, who would you pick?

I'd sing a duet with Prince.



The Future of Energy: Smart Grids

A smart grid is like a high-tech version of the power lines and systems we use to get electricity. It's smart because it can automatically control and adjust how electricity is sent out, making sure we get power in a more reliable and environmentally friendly way.

