By Joe Burkal | April 23, 2020 | Uncategorized 0 Comments

Shopping for Tomatoes

When you shop for tomatoes, says Hadas Merzel, the CEO of electrical & electronic manufacturing company Engis, you have several options. If you are a convenience-first consumer, you probably prefer the broad selection and long business hours your local supermarket offers. If you are health-conscious, you may buy organic produce at a local weekend farmers market, which also supports the local economy. Or, perhaps, you go all the way and grow your own tomatoes in a small patch in your back yard or cultivate a hydroponic tomato garden on the porch.

Merzel beleievs consumers should have similar flexibility and range of choices when purchasing electricity.

Indeed, in the US, eligible customers can shop around and choose an electric or natural gas provider that best suits their needs and preferences. That supplier may be the utility or one of several suppliers licensed to market in the consumer's area. Customer energy choice programs use competition to lower electricity prices and introduce new electric service products to the market. Yet, perhaps surprisingly, participation in electricity customer choice programs has remained unchanged since 2013.

But what about generating your own clean electricity the same way you grow organic tomatoes in your backyard?

Personal Power Generation

Urban areas around the globe consume as much as 80 percent of energy production worldwide and account for around 70 percent of global greenhouse gasses emission.

This huge carbon footprint results from longstanding poor urban planning that created suburban sprawl with homes built far from work and shops and inadequate public transport means more cars on the roads emitting greenhouse gasses. Additionally, most residential and commercial buildings still use fossil fuels for their energy needs.

Cities are a major cause of climate change. But they are also the most vulnerable, as many cities are located near water, exposing them to risks from floods and rising sea levels.

But cities can also be a part of the solution to reducing harmful greenhouse gases.

Which brings us back to growing your own tomatoes and generating electricity using your personal power generation (PPG). And if you have excess energy, you can donate or even sell it to the utility, reducing the consumption of “dirty” electricity and saving money.

Most consumers today are aware of the benefits and cost savings offered by rooftop photovoltaic panels, which drastically reduce electric bills and, in many regions, can eliminate them altogether. PPG protects consumers against temporary power disruptions and shields against rising energy costs.

Indeed, as of the end of 2018, the US had installed solar panels that generate 64.2 GW of electricity–enough to power 12.3 million homes. Solar energy accounts for 1.6% of total US electricity

Given the promise of photovoltaic panels, you'd think that the adoption pattern of rooftop panels it is somehow based on household income, perhaps boosted by rebates and tax incentives. But it isn't. As Clive Thompson wrote in Wired recently, studies in the US and Switzerland show installation patterns looking like epidemiological hotspots: streets in which nearly every house is covered with a solar panel, surrounded by neighborhoods with no panels at all.

The adoption of solar panels is viral. People invest in them because their neighbors and friends do, and they want to be seen as supporting the environmental cause. And the stories about energy bill savings and the magic of selling electricity back to the utility helps build confidence in making a significant investment in an unknown product. Thompson: "Installing an array on your roof is environmental exhibitionism—and it's contagious."

Smart Grid for Electric Vehicles

Personal solar panels are one source of personal power. Another resource is the growing number of electric vehicles that act as virtual power plants to help utilities manage peaks loads more effectively and provide a superior level of service.

A vehicle-to-grid system connects an electric vehicle with the distribution grid to provide demand-response services by either returning electricity to the grid or by slowing down their charging rate. Analysis of Southern California Edison customers' hourly loads and commuting patterns showed that residential peak period loads could be offset using a mere 10% of electric vehicles as storage.

Here, again, we can recruit vanity to help create a viral response.

When asked why they chose Toyota Prius, the majority of respondents to a 2007 study said: "[because it] makes a statement about me." These consumers had the means to purchase a bigger and more expensive Toyota vehicle, such as the hybrid version of the Toyota Camry. Yet, they felt

Merzel and many others in the field often quote Vaclav Smil, a Distinguished Professor Emeritus at the University of Manitoba whose interdisciplinary research interests encompass a variety of energy, environmental, economic and public policy topics.

Microsoft co-founder Bill Gates is a confessed avid reader of Smil's books. "I learn more by reading [him] than just about anyone else," Gates wrote. "I wait for new Smil books the way some people wait for the next Star Wars movie."

In an IEEE article, Smil wrote: "Once you put [a power plant] in place, you don't want to tear it out and start again. So innovation will happen mainly at the margins."

Innovation at the margins is the more practical way to revitalize the existing old grid infrastructure and could lead to profound changes in the future grid if cities, utilities and the private sectors get it right. Cities should develop city-integrated renewable energy strategy, and utilities must be able to work with cutting-edge technologies and novel consumption and payment models.

The future is of a distribution grid that includes management and coordination of private rooftop solar panels, domestic energy storage and electric vehicles through a complex, interconnected system of local microgrids.

The hypothetical risk, of course, is the mass defection of consumers and that too many off-grid personal power stations will undercut underserved communities. Poorly designed and maintained infrastructure of hodgepodge personal energy generation and storage devices could result in chronic blackouts and price swings.

None of these PPG technologies are viable today, and perhaps not for a long time. But the price of photovoltaic panels and energy-storage technologies continues to drop while their efficiency and

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