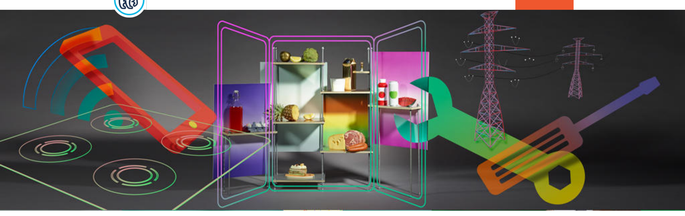

Hey, Your Fridge is Calling

Today's technology will make tomorrow's refrigerator the command center of the kitchen, helping you waste less food, energy, and money. Cool.

April 21, 2015 | Melissa Denchak

As refrigerators go, so goes the kitchen. At least we hope so, as fridges are the great success story of appliance efficiency standards. The former energy hogs now use less than a quarter of the energy they did when efficiency standards took effect in the late 1970s, all while becoming bigger, cheaper, and more user-friendly.

So what's next for the old icebox? Environmental concerns, shifting demographics, and changes in how we shop, cook, and eat are driving a push for new technologies that will make tomorrow's fridge greener, smarter, and, above all, more connected. Your future fridge will join the "internet of things," the world in which devices (25 billion by some estimates) interact with each other and a growing network of infrastructural systems.

What does that mean, exactly? To put it simply, your fridge will talk—to you, to its manufacturer, to your utility company, and even to other appliances. (What do you think a fridge and a toaster chat about all day?) By doing so, it will help you save energy and money and cut down on food waste, too. Heck, it might even make you a better cook. The future of the fridge is looking pretty chill.

Got milk? Text Your Fridge.

Using new technologies, like internal cameras and weight sensors, fridges will take inventory of what's on hand and send mobile alerts when you're out of butter or running low on eggs. Software like LG's HomeChat will allow you to text your fridge from the grocery store for a virtual shopping list of what's needed—and, just as importantly, what's *not*, curbing unnecessary food purchases that significantly contribute to Americans throwing out 25 percent of the food they buy.

Goodbye to the Bad Apple

New technologies, like built-in ethylene detectors that track the decay of produce, and food storage containers that monitor freshness, will help you keep track of what perishables are, in fact, perishing. You fridge will even suggest customized recipes for using up what's on hand. Leave the door open accidentally? You'll get a text alert ("Hey, big spender!"), or a notice if the temperature inside rises to unsafe levels during power outages—all of which will go a long way toward reducing spoilage.

The On-the-Grid Fridge

With "smart grid" technology, refrigerators will engage in a constant conversation with utility providers to reduce the demands on national power grids and save you money. After chatting, so to speak, with computers at your local utility company, your social fridge will know to wait until off-peak hours—when rates are cheaper and electric grids are far less stressed—to run certain functions, like the defrost cycle. The result? Lower electric bills for you, and fewer power outages for all.

Home Repair 2.0

Imagine an appliance that could tell you what was wrong any time it coughed or sputtered. New technology, like LG's Smart Diagnosis, allows refrigerators to troubleshoot issues by communicating data to the manufacturer via your phone. If a problem is easy to fix, you'll be told what to do. If a service visit is necessary, a technician will arrive with the right parts, ensuring repairs are made in a single visit, cutting down on the costs—environmental and other—of travel.

The Kitchen That Cooks Together…

Designers are dreaming up next-generation kitchens with touchscreen cooktops, backsplashes that allow for live "chats," and ovens that can be preheated remotely. The modern mess will be fully connected, with app-controlled appliances that "talk" to one another. At the helm will be the refrigerator-cum-sous-chef, which—in addition to taking inventory of its contents and suggesting recipes—will also perform tasks like programming the oven and setting timers. An unnecessary luxury? Perhaps for some. But for those more inclined to cook when there's an extra hand (of sorts) to help, it could mean more ingredients used for dinner and less destined for landfills, which are already filled with what we *don't* eat—as much as 40 percent of all food produced in United States.

OTHER WAYS YOUR FRIDGE WILL FLOURISH

Cool Runnings Keeping today's iceboxes icy requires a churning system of compressors and environmentally hazardous chemical refrigerants working 24-7. One new technology that could replace all that is magnetocaloric refrigeration, which uses magnets and a water-based fluid to create food-friendly temps. This technology, which GE predicts may be used commercially as early as 2020, could make fridges up to 20 percent more efficient, as well as easier to recycle at the end of their functional lifespan. Meanwhile, another clean technology known as thermoelectric cooling—which modulates temperatures by moving a current between two conductors, without the need for refrigerants—is starting to show up more and more in things like wine fridges and "air-conditioned" car seats. While it can't compete currently with today's methods of refrigeration in terms of cost or efficiency, according to Bolin Liao, a graduate student in MIT's Department of Mechanical Engineering, "many efforts have been devoted to this technology in the past few years and a lot of progress has been made."

Sleek & Streamlined… As housing becomes more compact and urban, refrigerators will adapt accordingly, boasting a smaller footprint and a more integrated design—all of which bodes well for reduced food waste and improved energy efficiency. One vision, put forth by GE's tireless futurists, is for an all-in-one kitchen amenity that combines the functionalities of a refrigerator, a freezer, and a pantry; the temperatures within its adjustable, thermally sealed shelves would be set individually to maintain optimal coolness for frozen foods, fresh fruit and vegetables, dairy, and dry goods. Meanwhile, Virginia Tech's Center for Design Research has introduced its own streamlined fridge, which would seamlessly blend into the surroundings of a compact "cartridge" kitchen.

…Or Bigger & Better? So long as big box stores are around, large capacity fridges for housing bulk items will be, too. Fortunately, manufacturers are developing ways to organize all those goods and reduce the time it takes to find the milk—a good thing, as leaving the door open while you mindlessly browse accounts for up to 7 percent of your refrigerator's overall energy consumption. New door-in-door designs allow you to store the foods you grab most in compartments that can be easily accessed without opening the refrigerator's main chamber. (According to LG, this one feature alone can reduce cold air loss by 47 percent, keeping food fresh longer.) In the same vein is a still-in-beta door scheme that boasts a see-through touchscreen display, enabling you to look inside your fridge without opening it. Further pushing all things possible is a fridge with no doors at all, efficiently cooling whatever foodstuffs are placed inside it using—believe it or not—sound waves. Sounds cool.

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