

Imagine never paying another energy bill
or having to worry about a tree on the line.
And 8 more reasons why now is the time
to go off grid at the cottage

By MARTIN ZIBAUER Illustrations GEORGE WYLESOL

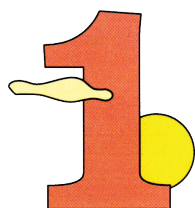
TAKE BACK THE POWER



Admit it, you cottagers who are tethered to the electricity grid: as much as you hate paying the utility bill, some of you secretly think cottagers who generate their own power are a bit eccentric, even downright weird.

At worst, perhaps you think they're apocalypse-any-minute-now preppers who look like *Duck Dynasty* extras and want to swap recipes for squirrel stew and tips for booby-trapping the property line. At best, they're quirky tinkerers who go to bed early because both light-bulbs are flickering and they're exhausted from a day of chopping wood and analyzing battery chemistry.

In fact, almost everything about off-grid power generation is getting more efficient and more reliable—from the solar panels and the battery systems to the appliances that use the power. Maybe it's time you reconsidered. Here's why the 2020s will be the decade of off-grid cottaging.



Storing electricity is getting easier

The sun may not shine, the wind may not always blow, and even a stream's flow may drop in late summer, so any off-grid system needs to bank electricity in a battery array—most cottagers will need enough for two or three “days of autonomy” without any power generation.

A typical off-grid cottage battery bank will use lead-acid technology, although lithium-ion technology is rapidly improving. The oldest, and still the most cost-efficient, off-grid battery technology is flooded lead acid (FLA). It's the same chemistry as in most car and marine batteries.

As FLA batteries charge, a tiny bit of water escapes from the liquid electrolyte in the cells, so you need to add distilled water from time to time to protect the metal plates inside. Until you figure out how often to refill, which varies with usage, check once a month. Topping up a large number of cells is finicky; to save time, single-point watering devices (about \$100 and up, depending on the number of batteries) fill them all at once. You also need to clean the terminals and equalize the charge (if cells aren't equally charged, battery life suffers).

Properly charged and maintained FLA batteries can last about a decade, says Sage Energy's owner Rob Sedgwick, a renewable energy specialist who installs off-grid systems across Atlantic Canada. On the other hand, he's seen neglected batteries fail within a couple of years.

Absorbed glass mat (AGM) technology became familiar in car batteries in the 1980s. These batteries also use a lead-acid combo to generate electricity, but they require far less maintenance. AGM and gel batteries, a close cousin, are valve-regulated lead acid (VRLA), meaning the gases produced are recombined inside the battery, so they lose significantly less water. You should do a visual check of the battery terminals for corrosion about twice a year, but that's about all the maintenance that's required. The catch? You'll pay roughly 30 to 50 per cent more for AGM batteries (and even more for gel) than for conventional FLA batteries and you'll get a lifespan that's 20 to 30 per cent shorter.

Lithium-based batteries, like the ones in electric cars and some forklifts, hold a lot of promise for off-grid cottagers. “Lithium is the new golden child,” says

Brian Douglas, a former board member of the Canadian Solar Industries Association and the VP of sales for HES PV, a Victoria-based solar power system distributor. Low maintenance and compact, lithium batteries tolerate almost total discharge, so you don't need as much capacity as you would with other types. You can easily spend up to four times as much as for lead acid, however, and lithium batteries can't be charged when they're cold.

That limitation doesn't stop Andrew Macklin in the winter. He uses a lithium battery at the off-grid cottage he and his family are building in the Kawarthas, a process they share on their YouTube channel, *Ontario Lakeside*. “You can't charge a lithium battery when it's below zero, but you can use it,” he says. “When the battery is warm enough, I flip the cut-off to the solar panels and start charging again,” he says. Some lithium battery types can be housed safely in a living space—his is in a cabinet drawer by the woodstove, where it warms quickly. Lead-acid batteries, which can release gases such as oxygen and hydrogen, must be stored in a well-ventilated area.

While you might pay several thousand for a new lithium battery array, Macklin's was salvaged from an electric car, a Chevrolet Volt. He got the 4.5 kW battery through a connection on *small-cabin.com*, an online forum for going off grid. Over time, electric vehicle batteries can't give the quick burst of power that cars occasionally need (but buildings don't). These batteries still have about 80 per cent of their original storage capacity and, according to General Motors, another decade or so of useful life. This isn't some renegade survivalist hack; GM itself is reusing Chevy Volt batteries in a demonstration wind power system at a vehicle testing facility.

“The next battery technology will be really exciting,” says Douglas. “Could be lithium polymer, could be another chemical. We really don't know, but every year lithium is getting less expensive and safer, with higher capacities. We're moving in the right direction.”

HOW MUCH ENERGY DO YOUR APPLIANCES USE?*

Water heater (electric)
4,500 watts/hr

Water heater (tankless)
1,500 watts/hr

Lights
Incandescent bulb (100 watt)
100 watts/hr

CFI bulb (100 watt equivalent)
30 watts/hr

LED bulb (100 watt equivalent)
23 watts/hr

Small electronics
Smartphone recharger
6 watts/hr

Clock radio
7 watts/hr

Creature comforts
Hair dryer
1,500 watts/hr

Clothes dryer (electric)
3,000 watts/hr

Central air conditioner (24,000 BTU)
3,800 watts/hr

Cont'd on p. 75

Hot water

off-grid land is cheapish



But that may be changing. With easier power generation and more efficient appliances, says Rob MacDonald, more cottage buyers—especially those who like isolation—are open to off-grid places. MacDonald, the CEO of the Canadian National Association of Real Estate Appraisers, says that might mean considering water-access. “It would be rare to have road access and no power lines,” he says. That said, Rob Serediuk, a sales rep for Chestnut Park says he sees plenty of off-grid places with road access in Muskoka and Haliburton.

“If it's drive-to, it's probably going to have hydro, at least at the lot line,” says Gwen Price, a realtor with Keystone Real Estate in Sudbury, Ont. But if you're willing to boat to the cottage, she adds, “the farther you are from the marina, the less chance of power.” Some buyers want to be completely self-sufficient, she says, but most are still looking for on-grid places and a few even “suffer from Kardashian syndrome: they want the best of the best, and off-grid is so far removed from what they're looking for.”

Buyers like having no utility bills and no dependence on the electrical grid. A 2015 U.S. Department of Energy analysis of 22,000 house sales found that buyers were willing to pay about \$4 per watt more for homes with solar panels. Different country, different energy costs, admits Brian Douglas, but he feels that “every dollar that you put into your roof on solar comes back when you sell.”

3

Solar panels are cheaper now and faster to install

Fifteen years ago, you could rough out the installed cost of a grid-tied solar power system at 10 to 12 dollars per watt. That's come down to about \$2.50, says Brian Douglas, thanks largely to increased supply and less expensive solar panels, racking, and inverters. Some labour costs have dropped too, especially as better roof racking systems speed up installation. Micro-inverters that convert DC to alternating current (AC) right at each panel are also simplifying the wiring, according to Douglas. While all electricians learn to work with high-voltage DC, few encounter it often in the real world. Wiring solar panels, previously limited to a small pool of electricians with the equipment and experience to work with high-voltage DC, is now easier for any knowledgeable electrician.

Does that mean the electrical work on a multi-panel cottage system is within

a driver's capability? Probably not, says Douglas. Small 12V setups to run a couple of lights or plug-and-play kits made for RVs can be diy-friendly, but installing a complex, multi-panel power generation system requires more know-how than most drivers have. And, he warns, if you try to get by without a permit and inspection or don't use a licensed electrician, you may have problems later with insurance. "We work with reputable installers that are going to do it right and not catch a house on fire," he says, wryly.

Even with the drop in panel prices, off-grid systems overall still cost about the same, says Rob Sedgwick. In part, that's because the cost of other equipment (charge controller, inverter, and batteries) has not dropped to the same extent. Regulators are more aware of these systems now too, and require more safety equipment. He suggests a budget for an off-grid system of between \$5 and \$10 per watt. At the low end, you'll likely do more battery maintenance, find used batteries online, and reduce your days of autonomy. You could even draw down more power from your lead-acid batteries, reducing the number you need but shortening their lifespan. There are lots of choices you can make.

5

Appliances are getting more efficient

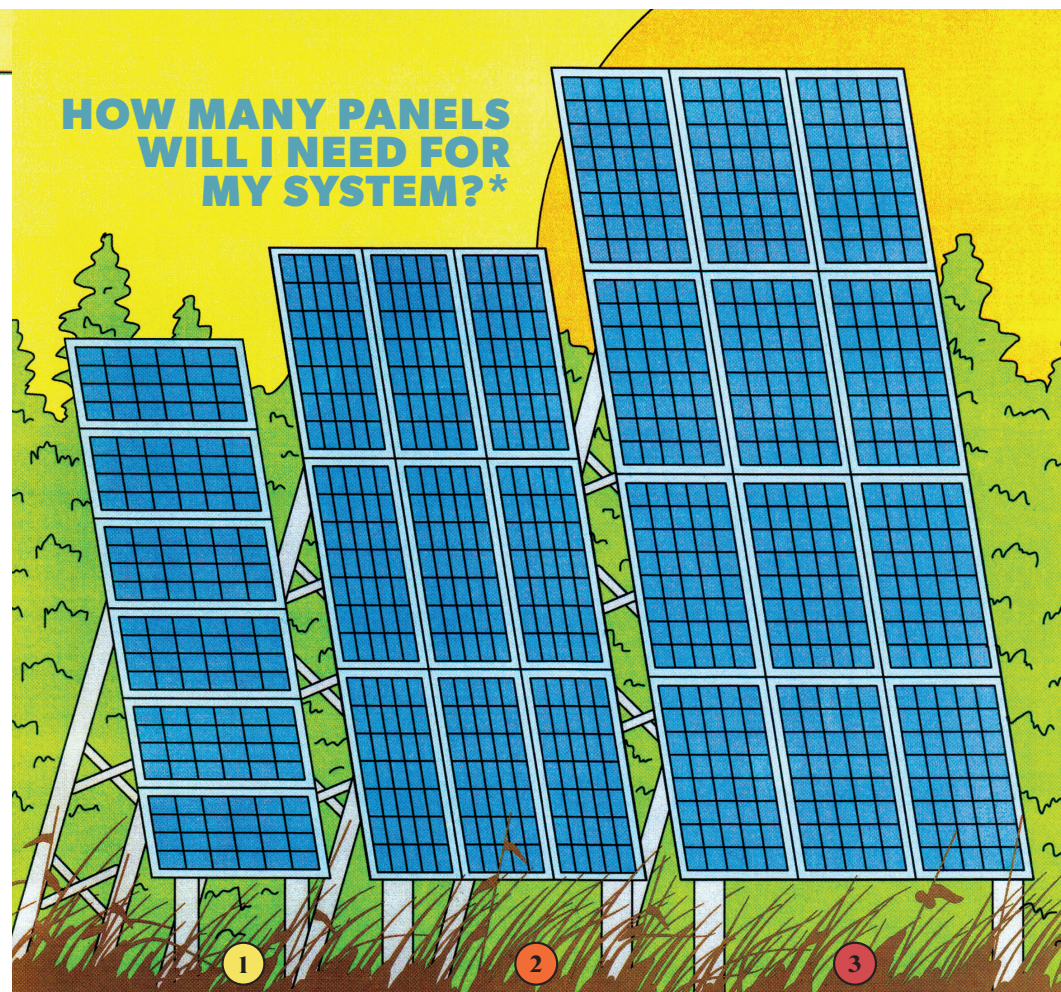
"Fridges used to consume three to four kilowatt hours a day," says Brian Douglas. "Now, they're down to one to two kilowatt hours." Some, such as Unique Appliances 13 cu. ft. DC fridge-freezer, use even less: about 0.6 kWh per day. Douglas—and this is the guy who sells off-grid power systems—advises cottagers who think they need to upsize their system that "buying a new fridge makes more sense than adding two or three more panels and more battery."

4

Tiny self-contained systems bring a little light almost anywhere

Even if the cottage is on the grid, the bunkie or the woodshed need not be. Instead of trying to lay underground wire and conduit from the cottage through the thin soil of the Canadian Shield, consider a small self-contained light system. For \$190, Biolite's plug-and-play SolarHome 620 gives you a 6W solar panel plus three lights (one with a motion detector) and a control box, with another light, that can charge your phone and play your tunes. On a full day's charge, you can power all the lights on medium brightness for about seven hours.

HOW MANY PANELS WILL I NEED FOR MY SYSTEM?*



1

MINIMALIST COMBO

fridge
+ 3 CFL bulbs
+ toaster
+ kettle
+ smartphone charger
= 6 SOLAR PANELS

2

MIDDLE-OF-THE-ROAD COMBO

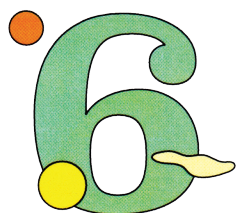
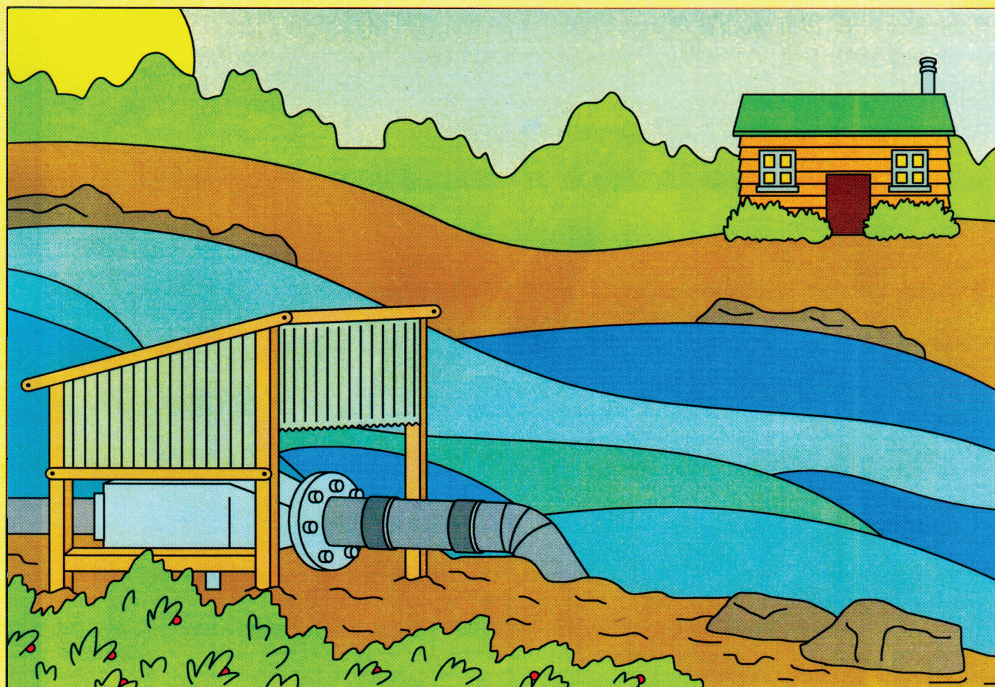
fridge
+ 3 CFL bulbs
+ toaster
+ kettle
+ smartphone charger
+ microwave
+ tankless water heater
+ well pump
+ coffee machine
= 9 SOLAR PANELS

3

FULLY LOADED COMBO

fridge
+ 3 CFL bulbs
+ toaster
+ kettle
+ smartphone charger
+ microwave
+ tankless water heater
+ well pump
+ coffee machine
+ dishwasher
+ TV
+ laptop
= 12 SOLAR PANELS

* There are about a bazillion factors (including shade, location, available panel space, and seasonal use) that affect these estimates, made using the load calculator at wholesalesolar.com. We assumed roof-mounted 300-watt panels and a location with five hours of full sun per day and didn't include an oven—the energy needs of ovens are so intense that most people power them with propane.



For some, there's an even better alternative than solar

First the bad news. Even in Atlantic Canada, where wind resources are good, small-scale wind power is rarely an attractive option for cottagers. Rob Sedgwick has installed or serviced more than 100 off-grid power systems in the region. While he does repair existing wind systems, the demand for new turbine installations, he says, is very low.

The efficiencies of the large wind turbines that produce power for the grid don't scale down easily to cottage size. No matter how small the turbine, to catch enough steady wind, it should sit high off the ground on a strong support structure that's taller than surrounding trees—making the tower a serious engineering effort and something most cottagers don't want to look at. “By the time you put in the infrastructure, the economics are through the floor,” Sedgwick

says. With little demand for wind micro-generation comes a very limited supply of small turbines. Most now are imported from the U.S. or the U.K. He says Canadian manufacturers have come and gone, leaving “a lot of orphans out in the field, and then people are stuck with products that can't be serviced.”

Micro-hydro, on the other hand, can be very economical. A small turbine set in a stream on your property will generate power 24 hours a day, so you don't need a large battery bank for evening power use or any days of autonomy. Even if the stream's flow changes seasonally, solar and micro-hydro in a hybrid system complement each other. The stream probably flows abundantly in spring and fall; the sun is strongest in summer. The biggest hurdle? You do need a stream, which only a few lucky cottagers have.



You don't need to live like an ascetic

Gord Potter's cottage is at the end of a long driveway—and beyond the power lines—on Billings Lake, south of Hali-burton, Ont. He doesn't say so, but he seems to enjoy busting myths about off-grid cottaging. First, he's not just there during the long, sunny days of summer. “I'm up here for a couple of days a week, 50 weeks of the year. The only time I'm not here is if I'm travelling for work,” he says. He's not into tiny house living. For a four-season cottage of 1,300 sq. ft., with “all the features of a home,” he needed eight 250W solar panels (the most his south-facing roof could fit). And although he's in the habit of turning off lights, he says, he's not frugal. “I don't make the house cold to save energy. I listen to music. I use hot water when I need it. I don't change my lifestyle to the point that it's no longer comfortable.”

He's also not interested in micro-managing his system. If the image of the alternative-energy cottager is an engineering nerd who loves watching electrical meters and testing battery banks, he's the opposite. “I love cutting wood, taking care of things. I don't want to play with an electrical system.” He doesn't have to. The inverter charger monitors the panel's electrical output, the battery bank's charge, and the cottage's electrical draw, balancing supply and demand 24-7. If the sun's not shining and the batteries get low (“after about two days,” he says), the propane generator starts up automatically to recharge them.

His off-grid, site-generated electricity, he says, is actually more reliable than the power his neighbours get from the grid. “Every couple of weeks, I watch the entire lake go dark. I've got friends across the lake, and they see my cottage lit up in winter. Sure enough, they'll knock on my door: ‘Hey, Gord, our power's out and it's cold. Let us in.’”

In the Kitchen

HOW MUCH ENERGY... CONT'D

Can opener
150 watts/hr

Stand mixer
300 watts/hr

Fridge with freezer
420 watts/hr

Blender
500 watts/hr

Espresso machine
800 watts/hr

Toaster
850 watts/hr

Microwave
1,000 watts/hr

Coffee machine
1,000 watts/hr

Toaster oven
1,200 watts/hr

Electric kettle
1,200 watts/hr

Dishwasher
1,500 watts/hr

Oven (electric)
12,200 watts/hr

*Data from Home Energy Solutions and load calculator at wholesalesolar.com

But you may enjoy living more like an ascetic

Last year, Marie Kondo's popularity (and the backlash against her) made it clear just how anxious we feel about consumerism. Her approach to clutter draws heavily on the spiritual practices she learned working in a Shinto shrine. The Eastern Orthodox Church also addresses over-consumption, counselling *enkrateia*, or self-control, in using resources. Bartholomew I, the church's leader and a prominent environmentalist, writes, “Consuming the fruits of the earth in an unrestrained manner, we become consumed ourselves by avarice and greed. Excessive consumption leaves us emptied, out-of-touch with our deepest self.” The antidote is a modern asceticism, “not a flight from society and the world but a communal attitude of mind and a way of life that leads to the respectful use, not abuse, of material goods.” Not the isolationism of a prepper planning to survive without society, but the mindful consumption of, say, an off-grid cottager.

Pulling yourself off the grid is part of a long theological tradition, says Robyn Boeré, a research fellow at the University of Toronto's School of Theology. She has also worked as a carpenter building high-efficiency net zero homes. Being off grid, she says, “makes you really aware of how much you consume. It's a lot easier to moderate your consumption if you are constantly reminded that you're using energy.” Even for those who are off grid on weekends only, the experience can “call them to better behaviour when they're in the city with everyone else.”

Cottagers often have an innate sense that connecting with nature can mitigate what's wrong with how we live. Living off grid, she says, is “being witness to what people have believed to be true: that it's a shared creation, and we are most human when we're most in touch with nature.”

Martin Zibauer now wishes a stream ran by his house in downtown Toronto.



GOOD THINGS IN SMALL PACKAGES



Whether you call them dumplings, potstickers,
gyoza, or ravioli, we call them easier than
you think. Make an all-hands-on-deck feast
that's as fun as it is delicious

Recipes MARTIN ZIBAUER Photography JIM NORTON
Illustrations HYE JIN CHUNG



Pork and Bok Choy Dumplings

MAKES ABOUT 50 DUMPLINGS This versatile Chinese-style filling recipe can easily be adapted to one or two of our variations (opposite), or sub in other ground meat for the pork and almost any leafy vegetable or mushroom for the bok choy. Tofu adds moisture, but you can replace it with ground meat, if you prefer.

250 g ground pork
1 cup finely chopped baby bok choy
½ cup tofu, crumbled (see Tip, below)
2 cloves garlic, finely chopped
¼ cup Shaoxing rice wine or dry sherry
2 tsp soy sauce
2 tsp cornstarch
1 tsp sugar
½ tsp sesame oil (optional)
50 wonton wrappers (3-inch dia.)

- 1 In a large bowl, stir together pork, bok choy, tofu, and garlic until well combined.
- 2 In another bowl, stir together rice wine, soy sauce, cornstarch, sugar, and sesame oil (if using). Add to pork mixture; stir until combined.
- 3 Assemble dumplings (see “Fill It, Fold It,” opposite), and cook (see “How to Cook Dumplings,” p. 80).

TIP Medium, firm, or extra-firm tofu work best. Asian grocery stores are a good source for rice wine, wrappers in various sizes and thicknesses (heftier wrappers for boiling or frying; thin ones for steaming), and other common dumpling add-ins, such as kimchi, Chinkiang vinegar, sesame oil, and Sichuan pepper.

Spicy Sichuan-Style Wonton Oil

MAKES ABOUT ½ CUP In a small, unheated saucepan, add 3 cloves garlic, finely chopped; 1 tsp ground Sichuan pepper; 1 tsp ginger, finely chopped; and ¼ tsp hot pepper flakes. In a second saucepan, heat ¼ cup vegetable oil over medium-high heat until shimmering. Pour hot oil over ginger-garlic mixture; set aside to cool for 5 minutes. Stir together 2 tsp each sugar, Chinkiang (or balsamic) vinegar, sesame oil, and soy sauce; add to ginger-garlic oil. Serve drizzled over dumplings with chopped peanuts and fresh coriander scattered on top.

Plan on making a dozen (or more) per person, and serve them with rice, steamed vegetables, and a few dipping sauces

MAKE IT, STUFF IT



Pork and bok choy dumpling



Cheeseburger dumplings, p. 81

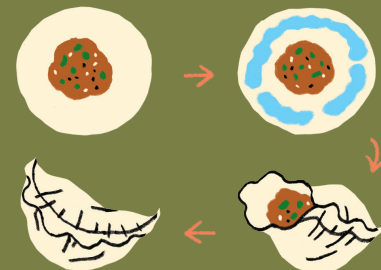


PORK AND BOK CHOY VARIATION
Chicken Shrimp Filling
Replace ground pork with ground chicken, bok choy with fresh coriander, and tofu with chopped raw shrimp.



PORK AND BOK CHOY VARIATION
Beef Kimchi Filling
Replace ground pork with ground beef; bok choy with drained, finely chopped kimchi; and rice wine with orange juice. Replace garlic with 1 tsp grated fresh ginger.

FILL IT, FOLD IT



In many grocery stores, you'll find packages of dumpling (or wonton) wrappers, often near the tofu and the Asian vegetables. Square wrappers or round, it doesn't really matter; the only difference is in the fold. For most dumplings, look for wrappers that are about 3 inches across.

There's no shame in simply folding a dumpling wrapper in half and sealing it to make a triangle or a half-moon. For more wow factor, there are dozens of dumpling folds and YouTube how-to videos.

Dumpling-making takes practice and self-compassion. Don't worry if your early attempts are imperfect; all will taste delicious. Misshapen, poorly sealed dumplings make tasty wontons in soup (even if they burst, it won't matter), but save your best dumplings for the steamer, where all your folding mastery will be preserved for the plate.

1 When your fillings are ready, assemble your dumpling gear on a clean work surface: a small knife or spreader; a small bowl of water; a baking sheet dusted with flour for your finished dumplings; and clean, damp tea towels to keep unused wrappers from drying out, to cover the finished dumplings, and to wipe your hands as you work.

2 Righties, place a wrapper in the palm of your left hand. Using a small knife or spreader,

spread filling in the centre of the wrapper, leaving at least 1 cm clear around the edge. Don't overfill: for 3-inch wrappers, use about 2 tsp filling—less if you're a dumpling novice, more as your skills improve.

3 Using a finger, wet edges of wrapper; fold, pressing edges together to seal. Place finished dumplings on baking sheet, and cover with a damp cloth until you're ready to cook them.

FOLDS TO TRY With round wrappers, turn a folded half-moon into a potsticker shape (with a flat bottom that browns well in a frying pan) by forming three or four pleats along the sealed edge. For square wrappers, after forming a triangle, you can bring the two corners on the long side back, overlapping them slightly and pinching together to make what looks like an overloaded canoe. (The same fold, starting with a round wrapper, creates a dumpling shape known as an ingot.)

KEEP FOLDING, AND BEFORE YOU KNOW IT, YOU'LL HAVE A SUPPLY OF NO-FUSS MEALS FOR EVERYONE'S FREEZER



PYRAMID POWER

Classic crab Rangoon are folded into a pyramid. Bring two opposite corners of a square wrapper together over the centre, then bring the remaining corners to the centre and seal the edges.

BAKED!

Baked crab Rangoon

STEAMED!

Beef kimchi dumpling

BOILED!

Mushroom walnut ravioli

**BOIL IT,
BAKE IT,
FRY IT,
STEAM IT**

How to cook dumplings

BOILING is fast, especially if you are batch-cooking, but dumplings can leak if edges aren't well sealed. Drop fresh (or frozen) dumplings in a large pot of boiling water. When water returns to a boil, lower heat to boil gently. When dumplings float, keep cooking until filling is firm and cooked through, 2–3 minutes. Remove with slotted spoon.

BAKING on an oven-safe wire rack on a baking sheet helps crisp dumplings. Spray dumplings

lightly with oil. Bake at 425°F until an instant-read thermometer inserted in centre registers 160°F and edges are golden.

STEAMING needs little of the cook's attention and helps maintain intricate folds. To keep dumplings from sticking, line steamer basket loosely with parchment paper or a couple of lettuce or cabbage leaves. Pour about an inch of water into steamer pot and bring to a boil. Place basket with dumplings

overtop, cover and steam until cooked through, 10–15 minutes.

STEAM-FRYING creates the crisp bottom crust and soft top of potstickers and gyoza. In a heavy-bottomed or non-stick skillet, heat 2 tbsp vegetable oil over medium heat. Add dumplings in a single layer (seams up), and cook until bottoms are golden brown, about 2 minutes. Add enough water to pan to come about a third up the sides of dumplings. Cover and let

steam until dumplings are cooked through, 7–10 minutes. Remove lid; cook until remaining water evaporates and bottom crust becomes crisp again.

...and store them!

FREEZING uncooked dumplings is as simple as placing the entire baking sheet of dumplings in the freezer. Once frozen, transfer dumplings to a resealable plastic freezer bag. Frozen dumplings keep for up to 3 months. Cook from frozen as above.

Cheeseburger Dumplings

MAKES ABOUT 50 DUMPLINGS All the cottage flavours of a burger in a two-bite dumpling, perked up with dill pickle sauce.

250 g medium ground beef
1 cup shredded cheddar cheese
¼ cup finely chopped onion
1 egg, beaten
1 dill pickle, chopped
2 tbsp finely chopped parsley
2 tbsp barbecue sauce
¼ tsp pepper
50 wonton wrappers (3-inch dia.)

- 1 In a large bowl, stir together all ingredients except wrappers until well combined.
- 2 Assemble dumplings (see "Fill It, Fold It," p. 79).
- 3 Boil, steam, or steam-fry dumplings. Serve with Dill Pickle Green Sauce.

Dill Pickle Green Sauce

MAKES 1 CUP In a blender, purée 1½ cups roughly chopped fresh parsley, ¼ cup liquid from jar of dill pickles, 3 tbsp lemon juice, and 1 clove garlic. With motor on, drizzle in 3 tbsp vegetable oil. Blend until smooth.

Baked Crab Rangoon

MAKES ABOUT 30 PIECES These crunchy, cheesy appetizers were named after Rangoon (now Yangon, Myanmar), but they're actually straight out of the 1950s tiki bar scene in San Francisco. Think mai tais, lounge music, and the bright red sweet-and-sour sauce of Chinese takeout. To make pyramids, use square wontons wrappers (see "Pyramid Power," opposite).

1 pkg cream cheese or goat cheese, softened (250 g)
200 g cooked crab meat or surimi (imitation crab), chopped
2 green onions, finely chopped
1 clove garlic, finely chopped
½ tsp coarsely ground pepper
1 tsp Worcestershire sauce
30 wonton wrappers
Cooking spray

- 1 In a bowl, stir together cream cheese, crab, onions, garlic, pepper, and Worcestershire sauce until well combined.
- 2 For each dumpling, spread 2 tsp of filling in centre of wrapper. Fold and seal.
- 3 Mist dumplings with cooking spray. Bake on oven-safe wire racks set over baking sheets for 7–10 minutes at 425°F. Serve with Cranberry Sweet-and-Sour Sauce.

Cranberry Sweet-and-Sour Sauce

MAKES ABOUT 1 CUP In a saucepan over medium heat, add ½ cup cranberry juice, ¼ cup sugar, ¼ cup vinegar, and 1 tbsp ketchup. Stir until sugar dissolves and bring to a boil. Mix 2 tsp cornstarch with 2 tsp soy sauce; stir into juice mixture, and simmer until thickened, about 1 minute.

Mushroom Walnut Ravioli

MAKES ABOUT 4 SERVINGS Yes, wonton wrappers are indeed just a thin, pre-rolled, precut pasta, and they make a time-saving shortcut for homemade ravioli.

2 tbsp olive oil
250 g button or cremini mushrooms, finely chopped
1 medium onion, finely chopped
⅓ cup chopped walnuts
1 tbsp lemon juice
2 tsp Italian seasoning
Salt and pepper
64 wonton wrappers (3-inch dia.)

- 1 In a skillet, heat oil over medium-high heat; cook mushrooms and onions, stirring often, until mushrooms start to brown, about 5 minutes.
- 2 Push mixture to one side of skillet. Add walnuts; cook, stirring, until fragrant and lightly browned, about 2 minutes. Combine walnuts and mushroom mixture with lemon juice and Italian seasoning. Add salt and pepper to taste. Move to a bowl.
- 3 Lay wrapper on work surface; place 1 tbsp filling in centre. Top with a second wrapper, wetting edges, squeezing gently to remove air pockets, and pressing to seal. Repeat with remaining wrappers and filling.
- 4 In large pot of lightly salted boiling water, cook ravioli until wrappers are tender and translucent, about 4 minutes. Using a slotted spoon, transfer to serving plates. Spoon Lemon Herb Sauce overtop.

Lemon Herb Sauce

MAKES 4 SERVINGS In a saucepan, melt ¼ cup butter over medium heat, stirring frequently. When butter becomes foamy, after about 4 minutes, add 1 tsp chopped fresh rosemary or fresh sage; keep cooking and stirring until butter begins to brown, about 2 minutes. Remove from heat, and stir in 2 tbsp lemon juice. ➤

Freelance writer and recipe developer Martin Zibauer's go-to dumpling dip is soy sauce, Chinkiang vinegar, and grated ginger.



Canned heat

***Propane can do a lot more than
just cook your dinner. How to
buy, haul, store, and, of course,
use it at the cottage***

By MARTIN ZIBAUER

LIAM MCGAN

Propane emits
fewer greenhouse
gases than other fuels
and about half the
CO₂ as charcoal.

Next time

you're wondering whether there will be enough propane for Saturday's barbecue or if the flow will peter out somewhere between the tank and dinner, try this science demo. Pour some hot tap water down the side of the tank, then run your hand along it to feel the boundary where cold metal becomes warm: that's the level of propane.

The hot water test shows that most of the propane in your cylinder is liquid, sloshing around the bottom and absorbing more heat from the water than the pocket of propane gas on top. If it were all gas in there, like a balloon or a scuba tank, the entire metal sheath would absorb heat evenly.

And that there's a liquid in there is more than just a fun science fact. When liquid propane becomes gas, as it does when it leaves the cylinder, it expands to about 270 times its volume. (Technically, your tank is called a "cylinder" if it can be legally transported with propane inside.) Propane gas has about 2.5 times as much energy as the same volume of

methane (natural gas), so that small portable cylinder holds a lot of grilling potential. We use propane because it's a combustible gas with high energy content that's easy to compress into a liquid.

Propane is also a practical fuel because we have a lot available. Canada produces about 11 million cubic metres each year. Even if we didn't need any propane at all, we'd still produce it: about 85 per cent is a by-product of natural gas processing, and most of the rest comes from oil refining.

Propane's last stop in its short trip through your barbecue is at the burner. Propane burns more cleanly than many other fuels, and with fewer greenhouse gas emissions. And any unburnt propane that escapes is not an environmental hazard, like heating oil, or a greenhouse gas, like methane. The flames should be blue with the odd yellow tip, and the bottom of the flame should touch the burner. There's an air shutter on the venturi that you can open a little to reduce yellow flames or close down to constrict air and correct flames that float and dance above the burner. Blue flames are a sign that the propane is producing nothing but carbon dioxide, water vapour, heat, and Saturday dinner. >>

TURKEY TALK

You can thank turkey vultures for that gas smell (propane itself is odourless). In the late 1930s, engineers at Union Oil in California were trying to find small leaks in a pipeline running from Orcutt Hill to Avila. Turkey vultures were known to congregate at gas leaks. The engineers guessed that vultures might be able to smell ethyl mercaptan, a chemical found in rotting flesh and, in very small amounts, in petroleum products. So they tried goosing the natural gas in the pipeline with ethyl mercaptan. Sure enough, the turkey vultures located the leaks, and gas companies realized the chemical would make propane safer for people too.

If ethyl mercaptan smells so distinct, why don't your guests notice it on the crème brûlée you caramelized with a propane plumbing torch (yes, you can do that) or on a grilled steak? Because the compound simply burns up, quickly and easily, without affecting the flavour of grilled food.

The best burn is a blue flame

When you twist open the valve on a propane cylinder and release a little pressure, the liquid propane starts to boil (that is, it changes into a gas), and a tiny bit passes through the valve and into the disc-shaped regulator. Inside, a spring-loaded diaphragm allows the gas pressure to drop way down: from about 100 psi leaving the tank to the equivalent of about 0.4 psi on the other side of the regulator.

Most regulator-hose assemblies in use today have an important, though occasionally mystifying, safety feature. Back in the '80s, a barely plausible charity barbecue plot for *Murder, She Wrote* could have had the villain cut the regulator hose, letting propane spew out silently and increasing Cabot Cove's appalling crime rate. But since the mid-'90s, new-style QCC1 connectors contain a valve that detects excess gas flow and trips—almost like a circuit breaker—allowing only a small amount of gas to pass into the hose. Sorry, Jessica.

You can identify an up-to-date QCC1 regulator valve by the black plastic collar that screws over the brass threads of the cylinder valve. Compared to old-style POL fittings, which screw inside the cylinder valve, QCC1 fittings connect more securely, since there's no possibility of cross-threading and the propane

can't leave the cylinder if the collar isn't screwed on. If you have an old POL fitting, check it carefully for leaks and cracks and replace it if you see any wear.

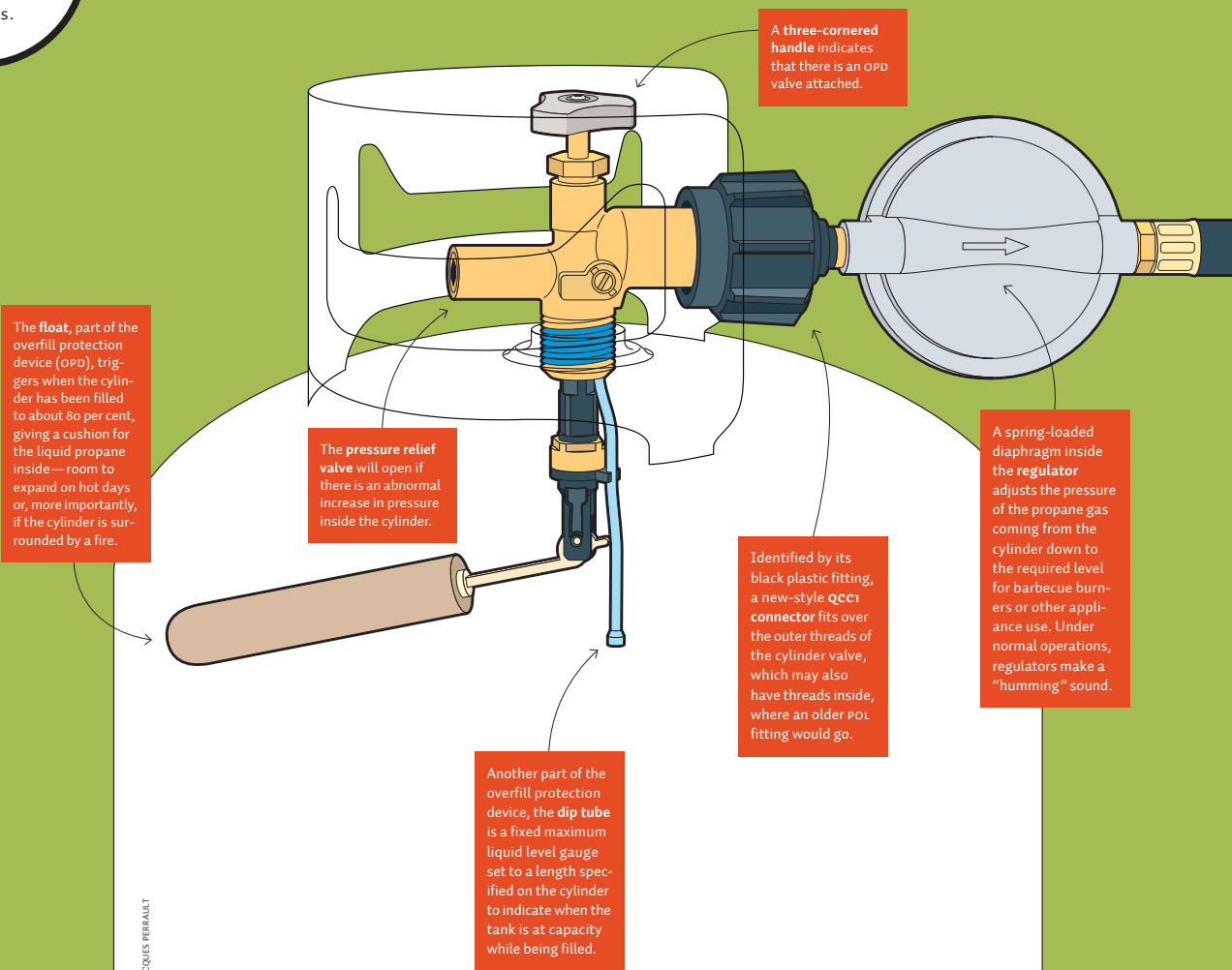
With the new regulators, though, grillers face a whodunit more intriguing even than murder by barbecue. Occasionally, there's plenty of propane in the cylinder, but the burners produce only a weak flame or none at all. Usually, it's because you opened the cylinder valve too quickly or forgot to close all the burner control valves on top—a burst of propane rushing out an open burner can trip the regulator's safety device. Try closing all the burners and the cylinder valve, then waiting about a minute for the regulator to reset itself. At this point, you should also leak-test the connections (see "Play It Safe," on p. 82), just in case the regulator was right to trip.

Once it's decompressed and feeling little pressure, the propane gas should flow up the regulator hose and through the control valves, before hitting the venturi, a narrow orifice that helps the propane to mix with air to support combustion. You'll probably get a slight whiff of that distinct gas smell, a little like skunk or over-boiled cabbage. »

Portable propane cylinders must be inspected and requalified every 10 years.

Cylinder view

What's going on in there, anyway?



JACQUES PERRAULT

Play it safe

The exploding propane tank — common in Hollywood action films, rare in real life — is almost always a result of an already burning, hot fire. Millions of people in North America use propane safely every day, but it's always smart to minimize the risks. Here are some tips:

- Never modify the cylinder, the regulator hose, or anything else that isn't supposed to be adjusted. No home-made flamethrowers, hot-air balloon heaters, or propane-powered bicycles.
- Store propane cylinders outside in the open, even over winter. Propane is heavier than air; in an enclosed space it will sink and collect. In a bedroom, it could potentially asphyxiate someone by displacing air; in a basement, it could reach an ignition source (a water heater or a furnace, perhaps) and ignite.
- If you ever smell gas indoors, get outside and call 911. Don't go inside again until you get the all-clear from emergency services.
- Start your barbecue with the lid open, lighting it immediately after turning on the control valves. If you wait too long, propane will collect in the base of your grill. And if the barbecue doesn't light quickly, turn the valves off, leave the lid open, and wait for the propane to dissipate before starting again.
- Leak test your barbecue annually (and whenever the regulator trips). Squirt soapy water on the cylinder and regulator connections and the hose, then slowly open the cylinder valve. Bubbles indicate a leak. A leaky connection could just need gentle tightening, but if the leak persists, shut everything off, and call your barbecue's manufacturer.
- Hire a licensed heating contractor to install propane appliances — venting a wall furnace properly, for example, isn't something to leave to your handy cousin. And don't buy the ventless propane appliances available in the U.S. They aren't legal in Canada.

Excess propane from oil refining is often stored in underground caverns, as in Sarnia, Ont.

Tank it
Horizontal propane tanks like this one must be sited 10 feet from any building.

ISTOCK/VANKIRLAND

Propane can power a firepit or a furnace

Despite the best efforts of hungry cottagers, most of Canada's propane doesn't go into barbecues; it heats homes, especially in rural areas not serviced by natural gas lines. "Propane is natural gas for people who can't get natural gas," says Brad Hartman, the national partner channel manager at Superior Propane. But why not put natural gas into cylinders or tanks for household use? Compressing natural gas requires much higher pressures than propane and so the tanks are too heavy, complex, and expensive to be practical for residential use.

At a cottage, once you start using propane for more than a barbecue, a stove, and maybe a firepit, you may save money by having a permanent tank installed, says Hartman. Among the cottage applications he sees are in-floor radiant heating, water heaters, stoves, fridges, fireplaces, furnaces, and generators. A typical tank is 1,500 litres, but the size varies depending on how much you use and how accessible your cottage is. Usually, a propane supplier will install a tank sized so it needs three to five refills a year. If winter access is too difficult for a truck, you'll get a bigger tank that

needs only one delivery in the fall, enough to see you through to spring.

The price of bulk propane generally tracks the price of oil. "If there's a war in Venezuela or sanctions put on Iran, for example, these geopolitical factors will have an impact on energy prices as a whole, not just crude oil. Propane follows suit," says James Callow, the president of Budget Propane. Tank rental ranges from about \$50 to \$300 a year, so for most cottagers, he says, heating with propane will be more expensive than natural gas, were it available at the cottage, but much less than electricity.

For cottagers with electric baseboard heating, Hartman suggests a hybrid system to reduce energy bills without an extensive renovation. Wall-mounted propane heaters, which look a bit like oversized bathroom fans, are easy for a heating contractor to install and don't need extensive ductwork (just exterior venting). "They work well in large open rooms, like the big main space in a Vice-roy cottage," he says. Leave the existing baseboard heaters in the bedrooms for extra warmth when needed. ➔

In a Taiwanese night market recently, Martin Zibauer happily lined up for octopus legs grilled with a propane torch.

ALLURING SCENT?

Other animals besides turkey vultures find propane deliciously alluring. Using their antennae, mosquitoes can sense burning propane, according to Jamie Heal, a staff researcher at the University of Guelph who has field-tested propane-burning mosquito traps. To mosquitoes, the CO₂, water vapour, and heat that propane produces appear to come from a warm, breathing mammal.

These traps catch a lot of mosquitoes, Heal says, but it's not clear if the insects are locals or tourists. "When carbon dioxide flows along a gentle wind at night, mosquitoes fly upstream, following the carbon dioxide. So you could be attracting them from other properties," he says, maybe even making the bug problem worse. Some traps also have a blue light, which seems to attract not mosquitoes, but the insects that don't bite, or "non-targets," as Heal calls them.