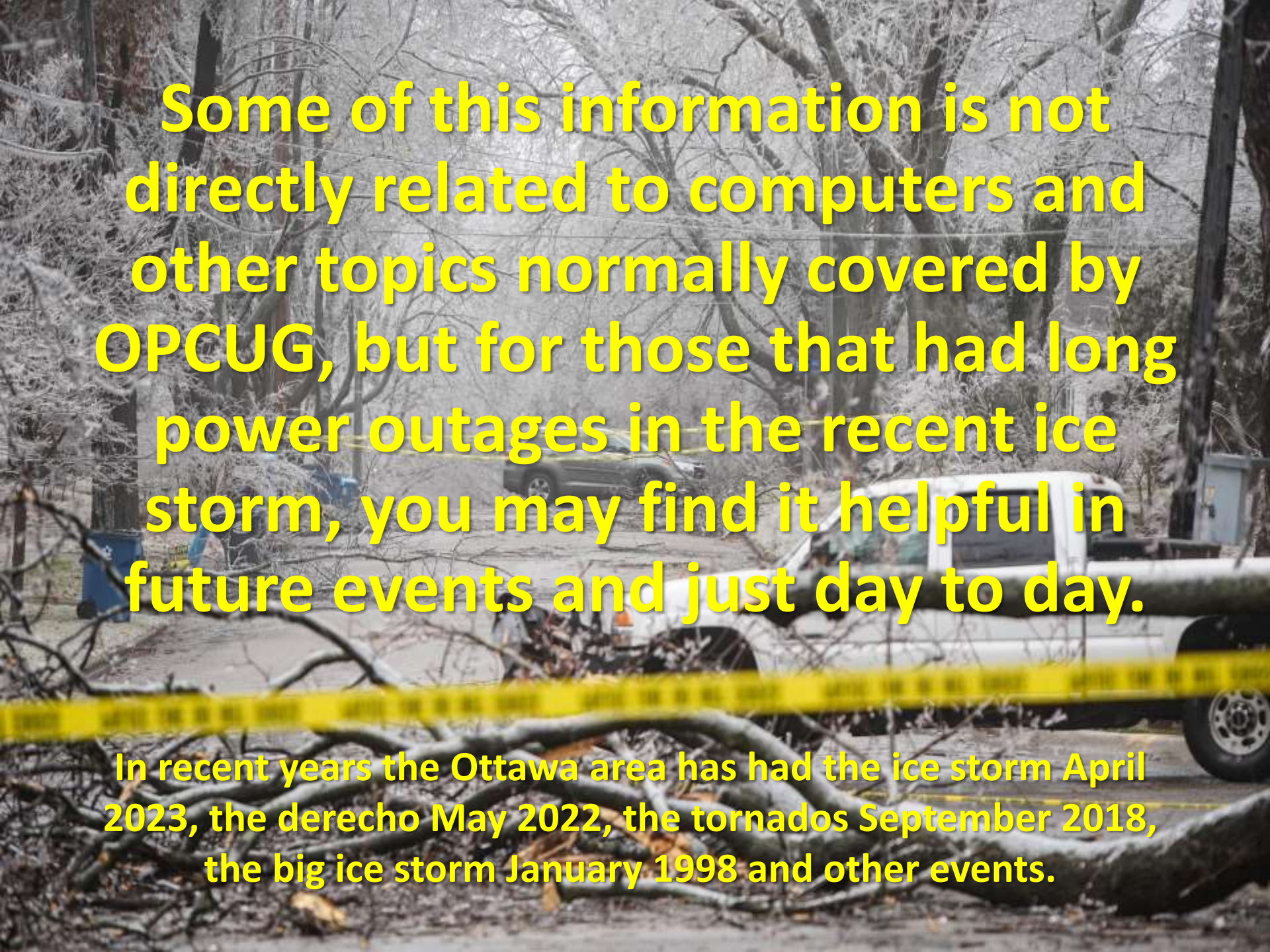


UPDATE

Inverters, UPS's, Backup Power Sources & So Much More





Some of this information is not directly related to computers and other topics normally covered by OPCUG, but for those that had long power outages in the recent ice storm, you may find it helpful in future events and just day to day.

In recent years the Ottawa area has had the ice storm April 2023, the derecho May 2022, the tornados September 2018, the big ice storm January 1998 and other events.



We'll cover not just some backup power technology, but some of the other power outage things you may want to cover to prepare and cope with a power failure.

In recent years the Ottawa area has had the ice storm April 2023, the derecho May 2022, the tornados September 2018, the big ice storm January 1998 and other events.

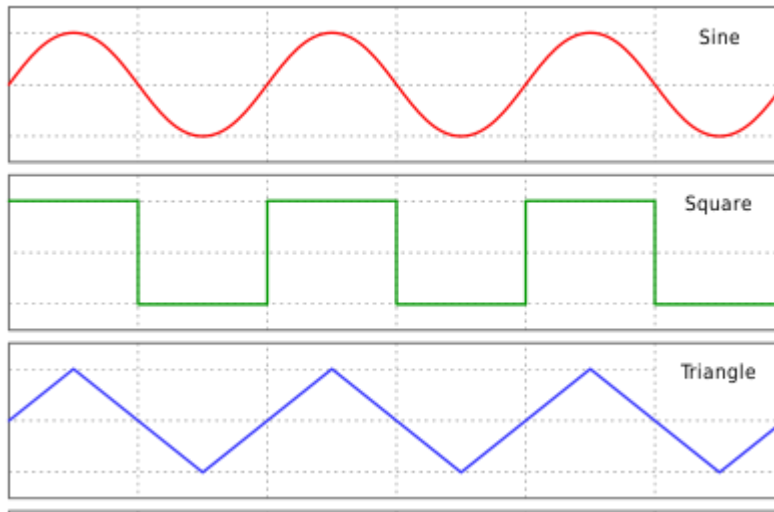
Inverters

- In a presentation in September 2021 we looked at backup power sources, including inverters.
- Inverters take DC power (most often 12 volts) and turn it into AC power (usually 110 volts).
- Consumer models range in size from ~100 watts (some of which plug directly into a vehicle's 12 volt socket/cigarette lighter) to over 5,000 watts that connect directly to large 12 volt batteries.



Inverters - Output

- Many inverters output '*square wave*' AC that is suitable for heating devices, lights, some motors, or for plugging in power supplies for laptops and other devices, but may not be suitable to directly power sensitive electronics (e.g. computers, TV's).
- More expensive inverters can put out '*full sine wave* (this is what you get from the power company)' AC or at least '*modified sine wave*' AC .



Sine Wave

Square Wave

Triangle (Modified Sine Wave)

Inverters - Batteries

- Large inverters should be powered by 'deep cycle' batteries that can be almost fully discharged without damage, instead of regular car batteries.
- Batteries used for inverters should be 'topped up' EVERY FEW MONTHS.
- For lead acid batteries, it is preferable to use a 'smart' or 'intelligent' charger that can:
 - Sense the type of battery and the battery condition, and have a battery repair mode that uses a slow pulse reconditioner to reduce battery sulfation and acid stratification in lead acid batteries.
 - SAFELY charge a dead or near dead battery.
 - Maintain a full charge without overcharging the battery (Note: Cheap trickle chargers can overcharge and damage the battery).
- Deep cycle batteries are available at Total Battery, Canadian Tire and several other places. The chargers are available at Total Battery, Amazon, Canadian Tire and elsewhere. Charger capacities range from ~1 amp to whatever you want to pay, and prices start at ~\$60. You'll want a 5 to 10 amp one for charging car or deep cycle batteries.



Uninterruptable Power Supplies (UPS's)

- **UPS's contain their own surge protector, inverter and battery. The inverter in MOST UPS's put out full sine wave AC. You should check out the specs of any UPS you are considering buying to verify this.**
- **The lifespan of UPS batteries is typically 2 to 6 years, depending largely on the number of discharge/recharge cycles. You should test the battery condition at least once a year or so by unplugging the UPS from the wall outlet with your devices running. If the UPS doesn't power them for as long as you expect it to, it's time to replace the batteries.**
- **CyberPower, APC and other UPS manufacturers sell OEM replacement batteries directly or through their dealers.**
- **Third-party batteries are also available, including replacements for batteries that the UPS manufacturer no longer supplies. Third-party batteries are available over the counter at Total Battery (bring in the old battery to make sure you get the proper replacement part), or online from several sources including Amazon.**

Power Stations and Packs

- Rechargeable portable power stations and power packs may fill your light duty needs (e.g. run some LED lights, charge your smart phone, etc.) during a power outage.
- They can be charged with USB (5 volt DC), 12 volt DC and/or 120 volt AC sources, and will output USB (5 volt DC), 12 volt DC and/or 120 volt AC, and some that will even boost start a car with a dead battery.
- Some come with their own solar panels, or can use any 5 volt DC and/or 12 volt DC solar panels to charge. Make sure the specs (i.e., voltage) for the solar panel and the power station match.
- They are available from Total Battery, Canadian Tire, Amazon and other places from ~\$150 and on up from there, depending on capacity and output.



Lightning

- It is a good idea to unplug your UPS's, surge protectors and other expensive equipment or devices from the wall during a thunderstorm.
- It is also a good idea to disconnect any outside antennas or dishes during a thunderstorm. You can get coaxial cable quick connects to make this easier (Amazon). A lightning strike that gets into the device from the antenna or dish ~~can~~ will travel through the device and into your home wiring, causing a lot of damage.



Maintenance of Standby Equipment - Batteries

- Rechargeable batteries self-discharge over time. Rechargeable batteries used for standby power should be 'topped up' EVERY FEW MONTHS*. This includes any batteries required for equipment like generators and any rechargeable flashlights.
- When charging lead acid (i.e., car and deep cycle batteries) you should do it in a well ventilated space. Even sealed lead acid batteries can give off explosive vapors during charging.
- You should avoid alkaline batteries in any equipment that they will be sitting in for a long time. They tend to leak and cause damage (even Duracell and Eveready). Use lithium batteries instead, they last longer and don't leak. Never use the cheap batteries that come with stuff except to make sure the stuff works.

* - Set up a schedule like using the first week of January, April, July and October to do your routine maintenance work.

Maintenance of Equipment – Gas Powered

- Small engines in GENERATORS, lawnmowers, snowblowers, etc. normally do NOT like ethanol in the gasoline. Modern car and truck engines are made for ethanol, but ethanol in many small engines can damage gas lines, gaskets, etc., and ethanol can retain water moisture, an enemy of ANY internal combustion engine. MOST premium gasoline is ethanol free.
- You should also use premium fuel stabilizer (2 year rated instead of 6 month rated) in ALL the gasoline for your small engines. At the end of the season put the equipment away with less than ¼ tank of gas, and top it up with FRESH gas at the start of the next season.
- Also at end of the season, change the oil, filters and spark plugs, and do any other regular maintenance, before putting the equipment away.

Maintenance of Equipment – Gas Powered

- For equipment like generators that does not get used regularly, two to four times a year you should put a bit of fresh gas in it and run it for 15 minutes or so to exercise it. You can then drain most of the gas out until you run it again. Something like the Ontel Turbo Pump Automatic Liquid Transfer Pump is useful for doing this (~\$65 at Amazon). Since the gas you just put in is fresh, you can drain it back into your gas can.
- You are often advised when putting gas equipment away for the season to drain all the gas and to run the engine until all of the gas in the fuel line and carburetor is used up. However, when the film of gas in the carburetor evaporates it can leave a residue that causes the float needle to stick, causing problems when you gas it up again. If you have fuel stabilizer in your gas, draining the gas is completely unnecessary.
- If you have 2-cycle equipment (e.g., chainsaws, weed whackers) that require you to mix oil in the gas, you can get cans of 50:1 mix at Home Depot and other stores. This fuel has stabilizers so it is fresh for 2+ years after opening and 5+ years unopened.

Equipment – Battery Powered

- Most gas equipment can be replaced with battery powered equipment (18 volt to 56 volt) that eliminates most of the maintenance requirements.
- Some 18 volt equipment (e.g. chainsaws, weedwhackers, leaf blowers) is suitable for occasional or light duty use. For heavy duty or frequent use, and for larger equipment (e.g., lawnmowers), you will want 48 to 56 volt equipment.
- Some manufacturers have a whole family of tools and equipment that use the same batteries and chargers. For example, Ryobi (Home Depot, Amazon) has a huge assortment power tools and yard equipment that uses their 18 volt batteries and chargers, and a family of yard equipment that uses their 48 volt batteries and chargers. Ego (Rona, Lowes, Amazon) has a 56 volt family of yard tools, including riding and zero turn lawnmowers and snowblowers, that uses their 56 volt batteries and chargers.
- In most of the tool families, you can buy a kit with one or more tools, a battery and a charger, or buy the tools, batteries and chargers separately. Kits are the cheaper option, especially if you're just getting started. Note that 48 and 56 volt batteries can be eye wateringly expensive to buy on their own, especially the larger capacity batteries (\$650 for a 10 amp hour 56 volt required for the riding lawnmower that needs 4 of these).

A Shout Out For Total Battery

- **Total Battery has all sorts of batteries, including:**
 - Watch batteries,
 - Car, boat and deep cycle batteries,
 - The sometimes hard to find alarm system gel cells,
 - AAA, AA, C, D, 9V in alkaline or lithium,
 - and just about any other battery you could possibly need.
- They also sell battery related products like chargers, power packs, cases, etc.
- They will recycle most used batteries, and pay you a core fee for used car and deep cycle batteries.
- Three Ottawa area locations:
 - 65 Bentley Ave, Unit #12, Nepean (pictures below)
 - 1151 Newmarket St, Ottawa
 - 119 Iber Rd, Stittsville



Hydro Outage Sites & Hotlines

Hydro One (rural Ottawa and most of rural Ontario)

<https://www.hydroone.com/power-outages-and-safety/outage-tools>

1-800-434-1235

Hydro Ottawa (urban Ottawa)

<https://hydroottawa.com/en/outages-safety/outage-centre>

613-738-0188

Hydro Quebec

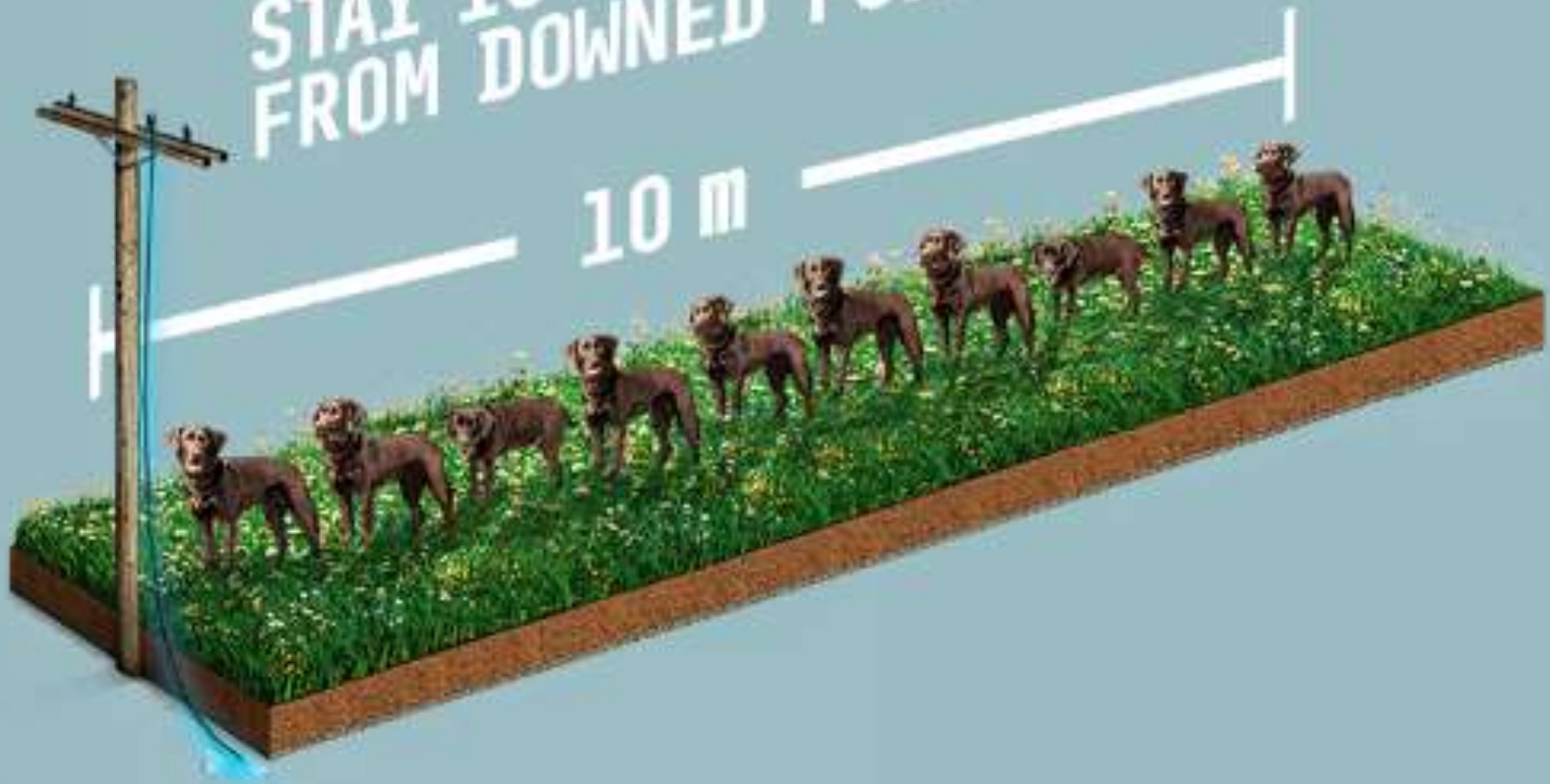
<https://poweroutages.hydroquebec.com/poweroutages/>

1-800-790-2424

Safety – Power Lines

STAY 10 METRES AWAY
FROM DOWNED POWER LINES.

10 m



Safety – Carbon Monoxide

- If the power is out so that your source of heat isn't working, do NOT bring your barbeque indoors for heat.
- Even if it is raining or snowing, do NOT run a generator inside an attached garage, even with the door open.
- You should have a working carbon monoxide detector in the house if you are using a catalytic heater in the house for emergency heat (or all the time if you have an oil or gas furnace). You should also have a working carbon monoxide detector in the garage.

**Improvised rain shelter
for generator after the
May 2022 derecho.**



Related Information

Uninterruptable Power Supplies (UPS's)

https://opcug.ca/qa_recordings/20230329_PowerPoint.pdf

Surge Protectors

https://opcug.ca/qa_recordings/20230322_PowerPoint.pdf

Solar Charging for Your Smartphone and Other Devices

https://opcug.ca/qa_recordings/20210825_Solar.pdf

Solar Charging 2: Other Backup Power Sources

https://opcug.ca/qa_recordings/20210901_Solar_02.pdf

Recycling

In a future session, we'll cover recycling batteries, stale gas and used oil, old electronics, printer ink cartridges, compact fluorescent bulbs, etc.

In another future session, we'll cover the care & feeding, the dangers and disposal of the lithium batteries that power so many of our modern devices, from smart phones to electric vehicles.