

BREAKING DOWN INDUSTRY JARGON, PART V



In this issue, we will discuss the backup generators and associated equipment. As you know, we have been sequentially working our way through the system here on the Island so that you can have a better understanding of some of the Jargon used as well as a better understanding of how our system works (or, in some cases, why it doesn't work).

Generator and Switchgear

Up until the first submarine cable was laid in 1981, the Island's only power source was the generating plant, which operated 24/7. We have discussed all the older equipment in earlier issues and have, in fact, discussed the new equipment as well (although maybe not so new, really). We have also tried to explain how it works in general.

In 1996 Wisconsin Public Service (WPS) began offering an interruptible rate, which was essentially a credit on our wholesale demand charge. This credit justified borrowing the money from the USDA Rural Utility Service to install two V-16 Caterpillar engines (known as "Prime Movers"), generators and associated switchgear and substation equipment to provide backup power for the Island.

The old engines, while still operational, were configured differently from WPS system and consequently we had to be physically disconnected from the cable when operating them. In addition, the capacity and reliability of the old engines were just not there for them to be viable and qualify for the interruptible rate. In addition, the automation required to qualify was not there as well.

These two new engines (new in 1996) were 2316 horsepower, 1,600 kW units that were designed to run in conjunction with each other. Unloaded, they burn approximately 40 gallons per hour each of diesel fuel and depending on load can burn anywhere from 50 gallons per hour to 100 gallons per hour each when carrying the Island. The diesel fuel they run on comes from a 1,000-gallon day tank that is filled from the two 30,000-gallon tanks to the west of the generating plant.

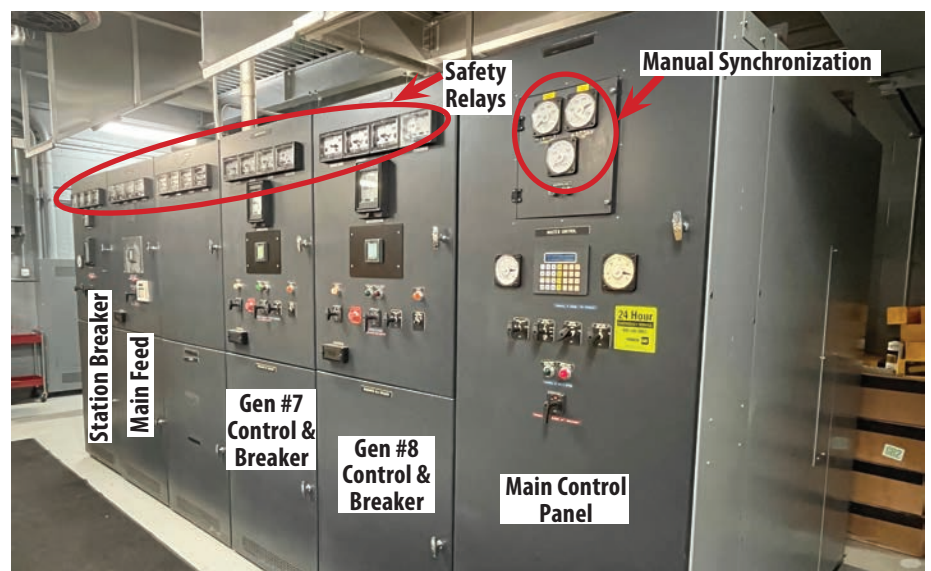
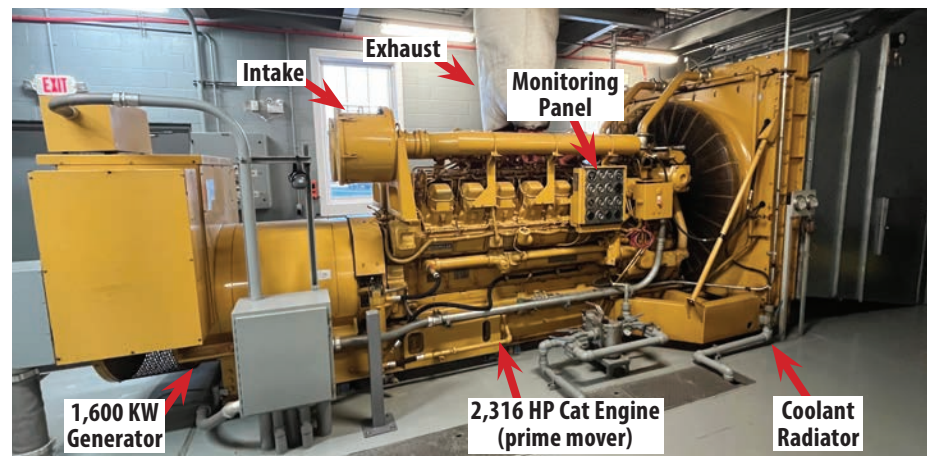
With our average loads, we probably would burn around 120 gallons per hour total.

If left in "Automatic" the engines will start immediately and within 10 minutes begin taking on the load of the Island. When all functions properly, they will sense a return of shore power and

automatically unload and shut down once it is stable. We can also transfer to engines while still on shore power and then transfer back under an economic or health and safety situation without any of our members knowing it.

We do not leave these engines in "Automatic" and that is for good reason. When starting these engines, we want to be able to monitor oil pressure, temperatures, and in the winter months, there are fan room doors and other steps necessary to run them. The added 15 minutes is worth the piece of mind that you are

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A photograph of a snowy forest path. The path is covered in snow and leads into a dense forest of bare trees. In the distance, a utility pole with a transformer is visible, and a light source, possibly a street lamp, glows through the trees. The overall scene is misty and wintry.

APRIL FOOLS' COMES A DAY LATE

Discussing the generating portion of our system is timely, because as we are all painfully aware, April 2 brought an unprecedented winter storm. In my 22 years, we have not experienced a storm that had as much widespread damage.

We were not alone. Oconto Electric Cooperative, across Green Bay from us, was hit hard and Wisconsin Public Service had a huge amount of damage.

Initial weather forecasts were all over the map, with some predicting something close to what we actually got and some predicting the storm would go south. As we all know, it did not. Our first outage came around 3 p.m. and was a broken pole on Green Bay Road. As the storm was worsening, we knew more outages were inevitable so we secured and then cut the wires in order to not only clear the road, but to allow us to get everyone prior to the broken pole back on.

We lost power from the mainland at 5:06 p.m. and things got steadily worse from there. When all was said and done, we had nine broken poles (and a couple that were damaged to the point that we will need to replace them), seven broken cross arms on poles, seven destroyed transformers and one that we were able to get operational but will also need to replace, and lines down in virtually every section of the Island.

Heavy wet snow, icing, and strong sustained winds with gusts over 50 mph were the culprits. As most of you probably saw, trees were across roads, branches and large sections of trees came down and in several cases along Jackson Harbor Road, the crossarms simply gave out due to the weight of the snow and ice on the lines, which in many places were stretched to the ground.

Restoration and Repairs At the time of this writing, after a long two weeks, we have all homes except for one seasonal home back with power, and that is a home on South Shore drive that was fed from a broken pole along the beach. Luckily, we had started the project to eliminate those spans that are virtually unreachable along the beach, and we were able to bypass that stretch. That last home will be the first one connected to the new underground that Michels installed for

us only a few weeks back, and we expected to have that termination work completed by the end of the week of the 15th. Beyond that, we have leaning poles to straighten, several to still replace, primary system neutrals that we need to pull back up, stranded and low lines to repair, and services pulled off of houses that need to be put back up. Hopefully by the time you are reading this, we will have put most of this work to bed, but we fully expect to hear about more than what is on our list as some of you arrive for the season.

This is a good point to remind everyone that if you come across a downed line or service, report it and do not touch it. Even if it is already on our list, we want to hear about it if for no other reason than to keep you safe.

During this storm, after losing power from the mainland, we were able to get the south side of the Island up and on generators and were able to keep it up until around 2 a.m., when a combination of repairs and additional damage caused the load to go very unbalanced. At that point we made the decision to continue with repairs and run the engines only to power the cooperative facility, which would give folks a place to get water, charge phones, etc., even though we are small. This allowed us to open breakers and isolate lines to allow people to help us safely deal with the issues without the risk of the power coming back on.

Community Cooperation We have a lot of people to thank for helping us through this ordeal. The fire department assisted with patrolling lines, reporting damage, and knocking ice and snow off low lines. Rich Ellefson coordinated this effort and there were too many involved to name them all. It was imperative that we knew where crews were at all times and that lines of communication be clear and concise so that crews could be removed from areas once we regained power from the mainland. This work helped us significantly because it allowed us to concentrate on repairing damage instead of looking for it and then repairing it.

The town crew was essential in helping to clear roads and move trees as well as experience in knowing what to look for. Walker Rugley, Tony Young, Patty Cornell, Tom Jordan, and



Brian Jordan also were of significant help in going out with us so that we were not working alone. Not only is there a bit of risk, but the up and down from the bucket is very wearing, especially when doing it for 16 or 18 hours, and having someone to pass up material to you is a huge help. Having a second set of eyes also never hurts.

Two Michels crews who have worked here before came up on Wednesday and with all them being line trained and the lines being isolated and de-energized, they were able to help with pole replacements, cross arm replacements, and pulling up fiber (which was surprisingly affected less than the electric service).

We also greatly appreciated all the encouraging words and the snacks that people brought us as we were able to get the power back on. The long hours under really crappy conditions are shortened a bit by your kindness.

Outage Reporting and Restoration A bit about our procedure in dealing with an outage of this type: First and foremost, to report an outage or damage, call the cooperative. You can leave a message if you do not reach one of us. We have repeated this before, but Facebook is not the place to report an outage. We may make updates and status reports on our page on Facebook, but under these circumstances we do not have time to monitor comments on our own page, let alone on the Island bulletin board or the like. We also do not monitor Messenger. Call us. It is the only way to report an outage that we will get. We might not return your call, but we will listen

and make note of your message as we wade through all the other things we are doing.

We have plans to get the core areas of the town, both north and south, on again during an incident like this and it involves isolating those areas from damage and repairing damage that occurs in those areas. Our goal is always going to be to get the Community Center, School and Rec Center on so folks have a place to go. Next, we will get the downtown area up and running so that the grocery store, two churches, and restaurants are operational for the same reason. In this case, a broken three-phase pole, which was one of our main isolation points, delayed us making this happen.

In addition to these core areas, we will then concentrate on those lines that get the most folks back on, with particular attention paid to those folks who are infirm, on oxygen, or have other such medical issues.

By the time we got power back from the mainland at 3:30 p.m. on Wednesday, we had made adequate repairs and figured out how to isolate damage by other means than our initial plans, and this meant that we could get both the North and South core areas up and running. In the meantime, Joel Gunnlaugsson and myself had contact with Door County Emergency Manager Joseph “Jeb” Saelens, and he came up to the Island to assist the town in declaring an emergency and to help coordinate Red Cross efforts in the now energized community center.

Once power was restored from the mainland (thank you, WPS line crews) we then out of necessity pulled the untrained volunteers off of their line patrol duties and started working



All photos on this page except the view from the top of the bucket at right are courtesy of Police Chief Tyler McGrane.

on repairs radiating out from the core areas. By Wednesday, April, 10, we had everyone except that last seasonal home back on.

For Safety's Sake A couple further notes about safety since we are talking about April **Fools'**: If one of our trucks is driving slowly along the road with our lights flashing, passing us at excessive speed is unwise. We are looking at lines, either trying to find or to assess damage. Slow down and give us room. If we have two vehicles stopped and occupying both lanes of the road, it does not mean that you should drive down in the ditch in order to go around us or try to squeeze

between the vehicles. We have the road blocked for a reason. We do not have the personnel to have flagging crews especially during a storm situation. If your impatience causes you to hook a line that we are pulling up you could make the damage worse or injure one of us. There are few places on the Island where you can't turn around and go another way.

Thanks for your patience and thanks for reading through this wordiness. We apologize for not having many pictures (and want to thank Tyler McGrane for his). Even with everyone having a camera in their pocket, it is hard to think of taking pictures when you are scrambling to get the lights back on!



A primary wire was pulled against a tree and left this basketball-sized burn mark.

Industry Jargon

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monitoring equipment that is worth around \$1.5 million.

These engine/generators are controlled by electronics that regulate voltage, synchronize their operation, and monitor for numerous types of faults. These electronics are the switch gear and they not only operate and protect the equipment, but they also protect anything connected to the other end of the line.

Without going too far down the rabbit hole of Delta vs. Wye configuration, the way (Wye) these generators are wired makes it necessary for the load on all three phases to be balanced. We have discussed this before in previous "how the system works" writings and this is one of the drawbacks of the configuration, especially under storm conditions. This means that if the three phases on the generators are not within 29 amps of each other, excessive return current will cause the engines to trip off-line to protect the windings on the generators. This is good in that we don't burn up extremely expensive equipment, but bad in that it means we cannot provide backup to the entire Island under certain conditions.

The generators generate at 4,160 volts and this is then stepped up in the generating substation to our distribution voltage of 12,470/7,200v. Keep in mind, they do require wires to be in the air to get electricity to your home and cannot

magically jump over trees that are down even if they are functioning perfectly.

In next month's edition, we will get out onto the lines that you drive by every day and talk about how all the previous keeps the lights on in your house.



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