



POWER OUTAGE PART II

HOW A MAJOR STORM CAN AFFECT US IN DELANO

More than 600,000 homes and businesses without power. All of Oklahoma under a state of emergency due to ice storm that crippled a region. Linemen from dozens of states head to the area to restore power to a stricken population. Headlines from major national newspapers across the country tell a story of large population areas without power, and joint efforts from many utilities to get power restored for Christmas.

So why did Oklahoma get hit so hard? Why did it take so long to get the power restored? The majority of the southern states electrical distribution is overhead. Overhead electrical distribution is a quick, easy, and relatively inexpensive way to distribute power. You don't have to dig trenches or use boring machines to bury specially insulated direct bury conductors. If there is a fault you don't need to dig up a driveway to repair it. Transformers can hang on the pole well out of reach of the average child which means they don't need to be armored vaults with special locks. There are, however, many downsides to an overhead system. Unattractive telephone poles with their wires dot the landscape like a giant connect the dot picture that somebody else already finished. Utility poles also make an unforgiving obstacle when the roads are icy and cars slip from side to side trying vainly to get some kind of traction. In the case of Oklahoma, an ice storm blanketed the area in a thick layer of ice, snapping the lines between utility poles and in some cases, snapping the utility pole itself.



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If you read my article last month, I had talked about substations and briefly mentioned the transmission lines between them. If enough frozen water clings to these transmission lines, they too will come down putting an entire city, county or region in the dark.

Okay, so now we are in the dark. Now what? The first thing that happens is one of our linemen reports to the plant to determine whose problem it is, ours or not ours. Do we have power coming into the city from the transmission lines. If we do, we isolate the faulted area from the rest of the system, and restore power to the majority of the city. Our system is a series of feeders, most of them looped. A looped feeder leaves the plant swings through an area, and then returns to the plant. If a fault occurs on a looped feeder, we can "un-plug" the bad portion to the loop and feed from both ends covering the majority, if not all of the customers on the feeder. A radial feeder just leaves the plant and dead ends somewhere at the end of our system. If a fault occurs on a radial feeder, all customers from the fault out will be out of power until the fault is repaired. We have designed all our feeders to be looped, but other projects like the Highway 12 project have delayed completing some of the looping projects.

Okay, at this point we have power restored to most of the city, leaving a portion of the city without power, anywhere from 100 to 800 customers. Next, our crew, using specialized fault finding equipment, examine the faulted conductors until they find the problem. Sometimes customers will call and give us information that helps isolate the fault, such as reporting a smoking transformer, hearing a loud buzzing then the lights went out, and so forth. **Thank you customers, you know who you are.** Now that the fault is found, the crew disconnects that portion of the line from the system and turns power back on to the remaining customers on the feeder. If the fault is an underground conductor on a looped feeder, everybody's power should be back on. If the fault is a transformer, there could be up to 8 customers without power.

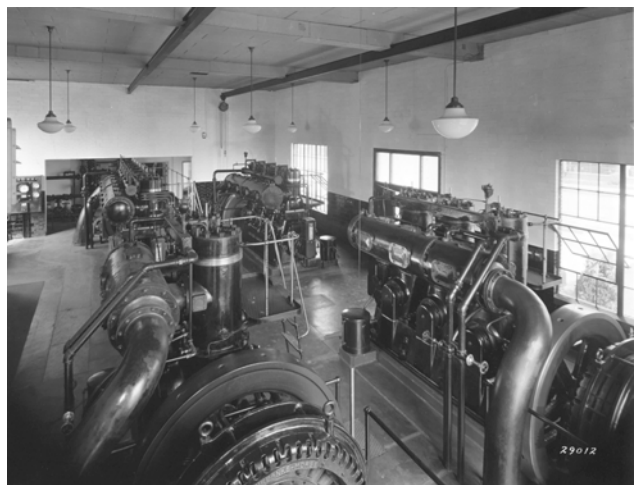
Depending on the severity and location of the fault, as well as a hundred other factors, power could be out for as little as a few minutes or up to a few hours. The point is we will be troubleshooting the fault within a few minutes of an outage.

That is if the problem is in our system, but what if it is outside our system somewhere on the grid? Now the fun begins. Our lineman has determined that the problem is not ours. He disconnects Delano from the grid, by this time help has arrived, the rest of the crew has been called in to lend a hand. Literally, from the beginning, for 112 years, Delano Municipal Utilities has had its own generators, from the original DC units that they only ran until 10:00 at night at the turn of the 20th century, to our Rolls Royce SPEY turbine that is currently on standby waiting to generate 12 megawatts of energy. One by one the generators are started, capable of generating up to 24 megawatts of electricity, and before long power is restored to Delano. We are now an island, a little patch of light in a sea of dark. Now all we have to do is wait for Xcel or whoever owns the transmission lines to repair the fault. If it is an isolated fault it could only be a few hours, but if there is a major event, similar to what Oklahoma experienced last month, it could be many days before we shut down the generators. Once we disconnect from the grid, our electricity stays within our borders, our neighbors will still be in the dark. It is also important to note that the majority of our system is underground. The possibility of multiple lines being damaged simultaneously is highly unlikely.

With our own crews, our own generation and our buried electric system, the customers of Delano Municipal Utilities enjoy benefits that our neighbors, for example, Watertown, Montrose, and even Buffalo, who has its own crews but no generation, maybe don't even know exist. In fact, many of our own customers don't know these benefits exist, but when the power goes out and you hear the rumble coming from next to the river, no matter how long it takes to repair the grid, Delano will have electricity to keep our town running as long as needed. Once again our linemen, willing to drop anything that they are doing, come to the rescue to restore power to our city.



Delano Power Plant 1900



Delano Power Plant 1938