St. Pauli News in Detail





Greeting and Ushering

April 5 Neil & Sharon Bugge (8:00am)
April 12 Ken & Cindy Cedergren
April 19 Craig Folkedahl
April 26 Bryan Grove (Blanket Sunday)

Altar Preparation:
April 5, 12 and 26 Cindy Cedergren

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Holy Communion

April 5
April 12
April 26

We will celebrate Holy Communion three times in April. Kevin Reich has permission from the Bishop to serve communion on April 5, Easter Sunday. Pr. Darrel Cory is able to be with us twice in April, so we will have Holy Communion with him on April 12 and April 26.

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Lydia Circle

Wednesday, April 8

3:00 pm

We will meet at hostess Jan Strandlie's home.

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WELCA

April 22

3:00 pm

We will finish assembling the Lutheran World Relief kits and arrange them and the quilts around the altar for Blanket Sunday.

Church Council

April 16

7:00 pm

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St. Pauli Cemetery Association

April 23 (SPCA)

Both at 7:00 pm

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Potluck on April 26th

Blanket Sunday

As is our custom, we will have potluck on the last Sunday In April with freewill offering to benefit NSI Senior Meals.

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April Milestones



Birthdays
None.

Anniversaries
No April anniversaries either.

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In Memorium



Lillian M. Seado

November 21, 1926 – February 12, 2026

Lillian was the beloved aunt of Sue Kotz, her mother Alice's sister.

Lillian "Lily" Seado was born on November 21, 1926, the third child of John and Palma (Bakken) Strand. A loving mother, grandmother, sister and friend, Lily passed away on February 12, 2026 in Plymouth, Minnesota at the age of 99.

She is survived by her daughter, Linda Cahill, and was a proud grandmother to Christopher and Ryan Cahill. She is also survived by two sisters, Patty Hallgren and Virginia Perraudt, along with many nieces and nephews.

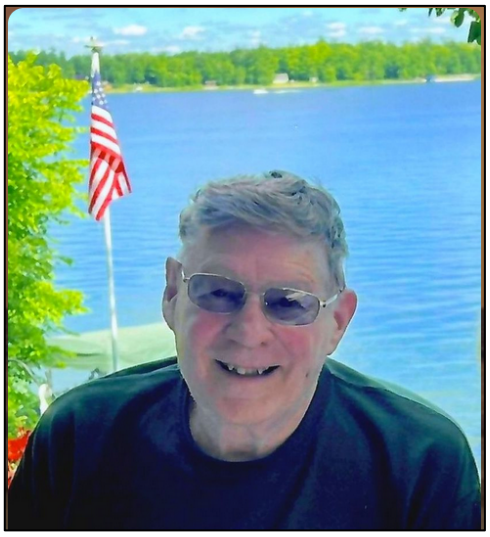
She was preceded in death by her parents; her husband, Wilmar "Bud" Seado; three sisters, Elaine Myrum, Bernice Wiener and Alice Hedalen; and two brothers, Kenneth and Clifford "Chipper."

Lillian will be remembered for her generosity, kindness, and love of life. She will be deeply missed by all who knew and loved her.

A funeral service was held on Tuesday, March 3, at 1:00pm, at Calvary Church, 7520 Golden Valley Road, Golden Valley, MN. Private burial will take place at Fort Snelling National Cemetery.

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In Memorium



Dale Knotek

April 4, 1935 – March 22, 2026

We remember Dale with all fondness and appreciation for the many times he served as our lay pastor.

Dale Howard Knotek, age 90, died Sunday evening, March 22, 2026. He was born to Charles and Gladys Knotek on April 4, 1935, in Ravenna, Nebraska. He lived a short time in Central City, but all his years of school K-12 were spent in Holdrege, Nebraska. He graduated from HHS in 1953. He participated in HHS basketball and track, setting the Nebraska state H.S. high jump record in 1953 which stood for many years. He enrolled at the University of Nebraska Lincoln, participating in track there as well. Dale loved to tell the story of having to jump against Wilt Chamberlain, who was enrolled at the University of Kansas at that time. Dale graduated from UNL with a degree in Psychology/Personnel Management in 1958.

Dale served the required military service at that time at Ft. Leonard Wood, Missouri and Ft. Lee, Virginia, followed by years in Army Reserves, mustering out in 1964.

He married Mary Ann Thompson of Sterling, Nebraska in 1959 and they raised a family of four children: Jeffrey (Staci) Timothy (Crystal), Leah (David), and William Ladd (Katherine).

Dale began his working career at Zion Lutheran Church in Rockford, Illinois as Youth Director for four years, followed by four years at the University of North Dakota Lutheran Center as associate to the Lutheran Campus Pastor. While working at UND, he procured his master's degree in counseling and guidance. When the University of Minnesota Crookston opened, Dale was hired as Student Activities Director, taught a psychology class, and was registrar for a short period of time. He worked at UMC for thirty years with wonderful staff and administrators, retiring in 1996. Through the years, Dale took many courses from Luther Seminary in St. Paul and was a Synod Authorized Minister (SAM), serving as a temporary pastoral replacement for vacant parishes in the Red River Valley (NW Minnesota Synod).

Dale was an avid cross-country skier and helped build and maintain several C.C. trails in the area. He was a member of the Crookston Bikers Association and swam laps at the community pool every day possible. He enjoyed spending time up at the cabin at Union Lake. When he was forced to enter the Villa St. Vincent Benedictine Living Community in the fall of 2023 because of emergency health issues, Dale was physically fit, had a thick head of hair, and all of his teeth! (This was still true until the day he died).

Dale was a member of Crookston Lions and served on many of their committees, also taking his turn as President. He was active on many Crookston community boards and committees, including Habitat for Humanity where he served as chair for many years, and served on International Habitat Builds in the Philippines and Costa Rica. He and Mary Ann have been members of St. Paul's Lutheran Church in Crookston since 1967, and he has been chairman of the Board of Deacons and on numerous committees.

Dale was preceded in death by grandparents, parents, aunts and uncles, and several cousins. He is survived by his wife of 66 years, Mary Ann, four children and their spouses: Jeff (Staci), Tim (Crystal), Leah Ellefson (Dave) and W. Ladd (Katie), nine grandchildren: Alissa Brandvold (Trevor), Jake Knotek (Jenna), Lexi Olschlager (Ty), Jaxon Knotek, Tyler Ellefson (Tessa), Samuel Ellefson (Kaylee), Brittney Ellefson, Derek Knotek, and Dylan Knotek. Ten Great-Grandchildren: Izraya Brandvold, Abel Brandvold, Siloam Brandvold, Sequoia Brandvold, Aviella Olschlager, Owen Olschlager, Rowe Olschlager, Cal Ellefson, Adalaigh Knotek, and Nevaeh Knotek.

Dale was proud of the accomplishments of his children and grandchildren and will be missed by his wife and family.

A celebration of Dale's life will be held at St. Paul's Lutheran Church in June of 2026. Service details at a later date.

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Minutes of the Church Council

February 19, 2026

The St. Pauli Lutheran Church council held its monthly meeting on Thursday, February 19, 2026 at Marisa Benson's home. Members present included Faye Auchenpaugh by phone, Marisa Benson, Jim Rondorf, Jordan Rondorf and Jana Prickett.

Council Treasurer Marisa Benson called the meeting to order at 7:11 pm. Marisa read the opening prayer provided by Kevin Reich.

Approval of Agenda: M/S/C (Jim Rondorf/Jordan Rondorf) to approve the agenda.

Secretary's Report: M/S/C (Jim Rondorf/Jordan Rondorf) to approve the Secretary's report for January 2026.

Treasurer's Report: M/S/C (Auchenpaugh/Prickett) to approve the Treasurer's report for January 2026.

Checking Account Balance End of Dec 2025	$ 27,253.94
Jan 2026 Revenue	3,384.00
Jan 2026 Expenses	(2,744.08)
Checking Account Balance End of Jan 2026	$ 27,893.86
Other Account Balances End of Jan 2026	
Edward Jones	$ 95,837.68
Memorial Fund	8,327.28
Savings	45,913.11
Total St. Pauli Acct Balances End of Jan 2026	$177,971.93
Cemetery Association Funds End of Jan 2026	$ 67,755.11

Kevin Reich's Report: In Kevin's absence, he provided a written report. The conference summit is scheduled for April 11, 10am - 2pm at Redeemer. The hope is to have at least two representatives from each congregation attend the summit. The Synod Assembly is scheduled for May 30. It will be a one-day event and a virtual-only event.

Other Reports:
- WELCA – 8 quilts were finished in February, and 31 soup meals were made and delivered to 21 homes.
- Board of Education – no report provided

Old Business:
- Pulpit Supply
  a. February 18, Ash Wednesday Service - Kevin Reich
  b. February 25 Lent Service – Kevin Reich
  c. March 4 Lent Service - Kevin will provide the message to be read
  d. March 8 - Pastor Cory
  e. March 11 Lent Service - Kevin Reich
  f. March 18 Lent Service – Kevin Reich (tentative)
  g. March 25 Lent Service - Kevin will provide the message to be read
  h. March 29 - Bishop Tesch
  i. April 3, Good Friday, Tenebrae Service – Kevin Reich
  j. Easter service – Kevin Reich, approved to serve communion
- A new kitchen faucet has been purchased but not installed.
- Red Lake County Co-Op has installed a propane tank monitor. Both Myles Alberg and Gary Iverson have downloaded the app to monitor propane levels.

New Business:
- Pulpit supply compensation (closed session). Kevin Reich accepted our proposal for increased compensation. See attached.
- M/S/C (Benson/Prickett) to approve Pathways Bible Camp tuition of $1160 total for Ella and Kyland Rondorf.

- Faye Auchenpaugh has asked council members to look at the church steeple trim and consider hiring someone to paint it this summer.
- Jana Prickett asked the council to consider taking on a new project to update our membership list. This project would include communication with everyone listed and removal of in-active members, per member's request.

Next meeting date: Thursday, March 19.

The meeting closed with the Lord's Prayer and adjourned at 8:03 pm.

Jana Prickett, St. Pauli Church Council Secretary

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Minutes of the Women of the ELCA

February 10, 2026

The St. Pauli Women of the ELCA met on February 10, 2026 at 3:00 pm with 7 members present. President Cindy Cedergren opened with devotions titled "Carving Out Quiet Time" based on Psalm 119:49-50.

Thank you to all quilters for their work and Sharon Bugge for serving today.

Cindy passed out prayer adventures for the month of February, and members each read several to the group.

Secretary's report: The minutes of our January 6, 2026 meeting were read.

Treasurer's report: December 31, 2025 – February 8, 2026: Expenses: $283.25; Income: $300.00. Checking balance $1,233.45. No statement for January 31 received yet, so for report purposes, savings balance as of 12-31-25 is $613.58. CD balance as of 12-31-25: $6,929.76.

M/S/C Jan Strandlie/Kathy Alberg to approve both the secretary's and treasurer's reports.

Stewardship Report:
Kathy read the list of people for soup deliveries: a total of ten doubles and 11 singles for a total of 21 homes to deliver to and a total of 31 people. Cindy is donating homemade jams for each delivery. We will include a note saying something to the effect that we would appreciate return of baskets and jars for next year's deliveries.

We completed 4 quilts today and 2 more are set up for tomorrow. We will see how much we accomplish along with the soup making.

Should we give a baby quilt for each baptism? Currently we give a candle and cloth. Discussion centered around perhaps not, since not all are infant baptisms and quilts aren't used in the same manner anymore. We will think about it, but it may be more worthwhile to spend our time on other efforts.

Free diapers: Sweet Repeats had major water damage to their store and the diapers were ruined. They have moved next to Oil Boyz on Hwy 59.

We will collect personal care kits again for Lent.

Council Report: January council meeting dealt primarily with annual meeting preparation. Jim Rondorf has purchased a new kitchen faucet but hasn't installed it yet.

Communications: None.

Old Business: Since no one picked up the free vacuum cleaner, Sharon Bugge took it home and put it in the garbage.

New Business:
- Cindy has a potential singer for our Fall Event: Peter Samuelson. His fee Is $250.
- Next quilting days are March 5-6. Faye Auchenpaugh and Cindy Cedergren have switched serving days, so Cindy will serve on Thursday and Faye on Friday. No WELCA meeting in March due to Lent.
- Next Lydia Circle meeting is March 5 at 3:00 pm.

Prayers partners exchanged and offering taken. Lord's Prayer prayed.

Faye Auchenpaugh, Secretary

Roasted Rutabaga Soup (A Norwegian recipe called *Ovsbakt kålrotsuppe*)

Ingredients:

1 lb. rutabaga	Pepper	1 tbsp. grated ginger
2 carrots	4-5 garlic cloves	1 tsp. paprika
1 medium onion	3 ½ cups vegetable broth	Fresh parsley
Olive oil	½ cup sour cream	Crispy bacon bits (optional)
Salt	½ cup heavy cream	

Directions:
1. Preheat the oven to 350 degrees.
2. Peel the rutabaga and carrots and chop into 1-inch cubes. Cut the onions into ½-inch strips.
3. Spread rutabaga, carrots, and onions on a large baking sheet. Drizzle generously with olive oil and toss to make sure all of the vegetables are well coated . Sprinkle them with a little salt and pepper and back for 35-40 minutes until they're tender.
4. For the last 20 minutes, add the garlic cloves with the skin on and coated in olive oil to the baking sheet.
5. Squeeze the garlic cloves out of the skin. Add all the vegetables and 2/3 of the vegetable stock to a pot and use an immersion blender to blend the soup. Or add all ingredients to a blender and transfer the soup to a pot.
6. Stir in the rest of the vegetable stock until the soup has a smooth, but still somewhat thick consistency.
7. Mix sour cream and heavy cream together, then add to the soup along with ginger and paprika. Salt and pepper to taste. Heat the soup until it's almost boiling.
8. Serve the soup topped with chopped fresh parsley, freshly cracked pepper, and crispy bacon bits.

Around the Neighborhood



Gabe Haugen
Photo courtesy of *The Times*

Gabe Haugen Selected for Boys State

Arlo Rude, commander of Ecklund-Holmstrom Post 117 of the American Legion in Thief River Falls has announced the post recently voted to send five high school juniors to Boys State. These are Lincoln Davis, Gabe Haugen, Caleb Mauch, Luke Paulson and Michael Rowe. Paulson attends Goodridge High School while the others attend Lincoln High School. Gabe is the son of Heidi and Marc Haugen.

The 77th Annual American Legion Boys State will be held June 14-20 on the campus of Saint John's University in Collegeville. Al Melbye serves as the local post's Boys State chairperson.

Scholars to Boys State must be high school juniors. They are singly honored in view of the outstanding qualifications set forth as requirements in selecting them. They are named through cooperation of the post, high school faculty and leading citizens in the community.

Legion Boys State is a practical learning experience in local and state government. Its citizens will apply knowledge already gained through their school experience and additional knowledge provided through instruction by competent individuals from selected governmental areas to organize and operate their own city, county and state governments. They will be encouraged, through participation, toward a better civic behavior and appreciation of our democratic ideals. It is in no way a military training camp. Programs will be considered without reference to any existing political party and will be free from political propaganda. It isn't a recreational outing. Post 117 has been represented by boys through the history of Legion Boys State, which was first held in Minnesota in 1949.

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Chad's Team has Done It Again!



ABOVE: Pennington/Mower/Marshall Senior Poultry Team: L to R – Elly LeClaire, Elizabeth Jarshaw (Marshall); Chad Torstveit; Rueben Drees (Mower); Briley Olsonowski, Brianne Ellison (Pennington).

RIGHT: Pennington/Red Lake Junior Poultry Team: L to R – Arlo Rupprecht, Niah Rupprecht (Red Lake); Audrey Shaw, Owen Shaw, Ryder Olsonowski (Pennington).

The Pennington/Mower/Marshall Senior Poultry and the Pennington/Red Lake Junior Poultry 4-H Project Bowl teams competed at the Northern Regional on Saturday, March 21 in Bemidji. Both teams took first place and will now move on to the State Project Bowl contest in Sauk Rapids on April 11th.







And Chad is a Grandpa Again!

This time we welcome Blaine and JeAnna Torstveit's daughter, Azora Jean, who arrived on March 24th. She's a beauty – and she resembles Chad, doesn't she?

Congratulations to the family and especially to Val Torstveit, who is now a great-grandmother for the second time.

What Keeps the Lights On

If you think the power system must run itself by now, you're wrong. Behind every nicely toasted bagel is a vast network of generators, transformers, computers, wires — and, yes, people in backrooms sweating to make sure the juice flows exactly where, and when, it needs to go. What could possibly go wrong?

Put a bagel in a toaster oven and push a button. In a few seconds, heating elements inside the oven glow red and heat the bagel. The action seems simple — after all, ten-year-olds routinely toast bagels without adult supervision. Matters look different if you inquire into what must happen to make the oven work. Pushing the button engages the mechanism of an incomprehensibly vast multinational network: the North American electrical grid.

The numbers are dazzling. The United States alone has more than 6 million miles of power lines, enough to stretch to the Moon and back twelve times. An average U.S. single-family home contains almost 200 pounds of copper wire — and there are more than 80 million U.S. single-family homes. The Empire State Building alone has more than 470 miles of electrical wiring. And all these miles upon miles upon miles of wire and cable and circuit are so routinely and reliably coupled that most of us think nothing of the fact that southern California gets power from hydroelectric dams a thousand miles away in northern Washington State. Constructed over more than a century, embodying entire political and economic histories, the North American electrical grid may be the most complex object ever created by our species.



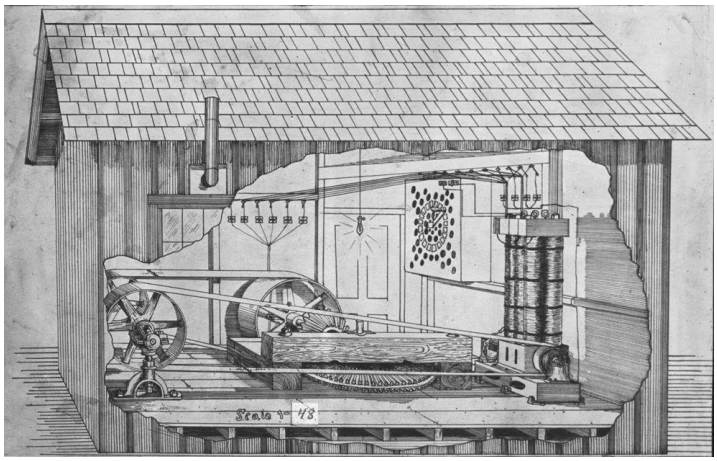
The 75,000-pound central shaft of a rotor being built in Pittsburgh, Pennsylvania, for a generator in the Watts Bar Dam in Tennessee, 1943.

Despite its complexity, though, every bit of that vast system is focused on just one task: transmitting an electric current.

To create an electric current, rotate a coil of copper wire around a child's bar magnet or, conversely, rotate the bar magnet inside the coil. Either way, the magnet's magnetic field moves with respect to the wire. All of us know the solar-system image of an atom, with a central nucleus orbited by electrons. Metals like copper — conductive metals, as they are known — are different. The electrons aren't tied to individual atoms. Instead, they float among them, like dust motes in sunlit air. In conductive metals, a moving magnetic field "pushes" the electrons through the metal in a direction dictated by the magnetic field. The result is an electric current.

Electric generators, whether they are fueled by coal, oil, wind, water, natural gas, nuclear fission, or geothermal energy, all consist of the same two things: a *rotor* (a rotating part, as the name suggests) and a *stator* (a stationary part). One of these is a conductive metal, usually copper wire; the other is a magnet. The coal, oil, water, fission, and so on provide the power to spin the rotor around the stator, which produces electricity.

The big exception to this general rule is solar power. Solar power is primarily derived from photovoltaic panels, which directly convert the energy in sunlight into electricity. Rather than having rotors or stators, photovoltaic panels are made of "cells" of materials called semiconductors. When sunlight strikes the semiconductors, its energy knocks electrons free from their atoms. One surface of the panel is treated to make it receptive to the dislodged electrons, so they shift toward it. Electrons all carry a negative charge. When they move toward the treated surface, it becomes relatively more negative; meanwhile, the other side becomes relatively more positive. This imbalance creates a situation akin to the negative and positive terminals of a battery. When the cell's terminals are connected, electricity flows through the circuit.



The hydroelectric power plant in Appleton, Wisconsin: magnets (stator) to the right, rotating coil (rotor) in the center. The river turned the wheel in the back, which turned the rotor. The belts in the back were used to speed up or slow down the turning force to compensate for small fluctuations in the river's current.

Whatever the energy source, making a current is straightforward, even easy — but everything else is a problem. Early electric utilities discovered this the hard way. The first commercial electric power plant in North America opened in Appleton, Wisconsin, on August 20, 1882. The second, built by the famed inventor Thomas Edison in Manhattan, opened two weeks later, on September 4. The Appleton plant, on the Fox River, was also the world's first hydroelectric plant. The plant channeled the Fox's current through the plant to turn a turbine — an axle with waterwheel-style blades. The turbine, spinning, turned a set of gears. The gears rotated a cylinder of conductive metal (the rotor) by six big magnets (the stator). An electric current emerged.

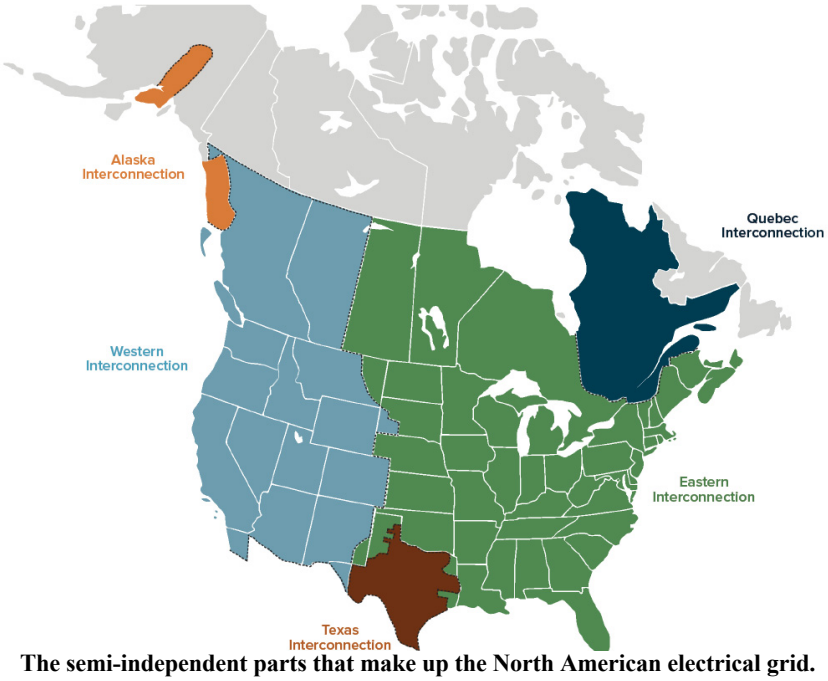
Edison made money from his patents on electric plants — his plant in Manhattan was mainly a demo. The people in Appleton had to cover their costs, which included paying Edison to license his patents, by selling and distributing electricity. This meant putting up big poles all over town and stringing wire on them, a pricey endeavor. Unfortunately, the

costs didn't go down as the customer base grew. Connecting the ten-thousandth home was nearly as expensive as the first.

Equally high were the costs of maintaining the system. The flow of electrons in a power line is not, so to speak, friction-free — it heats the metal, a phenomenon called *resistance*. (Resistance is why the elements in an electric range glow red and get hot.) If resistance heat can't dissipate, a metal wire will soften, expand, and lengthen. If the wire is a power line, the heat will make the line sag between its supports. If the line droops too low, it can spark out onto nearby trees or other objects, causing a spike in the current or shorting out the line entirely. Today's electric cables reduce the risk of flashes by being built with a complex multilayer design and sheathed with insulation. But sagging power lines are still responsible for a large fraction of the big wildfires in the West.

Swamped by the costs of building and maintaining infrastructure, the Appleton plant went belly-up in 1896. So did a host of other early utilities. Customers were furious. The upheaval lasted for decades — one reason why today's utilities are heavily regulated and, often, publicly owned. It is also why the national grid is a patchwork jumble of older and newer elements, all hooked together higgledy-piggledy as they developed.

Today North America's more than 12,500 utility-scale electric power plants are divided into three primary, semi-independent electric grids. One, in the east, runs from Ontario to Florida. A second, in the west, sprawls from western Canada to Baja California. The third, in most of Texas and bits of northern Mexico along the Rio Grande (not shown on the map below), stands between the other two. A few other places — Quebec and Alaska, for example — have their own, smaller grids.



The semi-independent parts that make up the North American electrical grid.

The three big grids have little interconnection with each other and the smaller grids, and they don't follow the same rules. A severe cold snap in 2021 froze up many coal- and gas-fueled power plants in Texas, causing a huge blackout. Oklahoma and New Mexico next door had plenty of spare power, but because they were part of another grid, they had no way to send it quickly where needed. The crisis lasted almost two weeks. North America's electric system is a miracle, but also kind of a mess.

The People Who Prevent the Blackout — or Don't

Appleton's generator was in a one-room shack. The generator and its controls were to one side. Hanging from the ceiling in the middle of the room was a bare electric light bulb to serve as a warning signal. Fluctuations in the river's flow would make the waterwheel spin slower or faster, changing the speed of the turbine and making the bulb dim or flare. The operators were supposed to compensate by adjusting the waterwheel to speed up or slow down the turbine. Sometimes they didn't compensate fast enough for a sudden rise in the river's flow. The resulting power surge would blow out light bulbs across town. Customers didn't like the blackouts. They *really* didn't like replacing those early light bulbs, which typically cost the equivalent of $35 today.

Electric utilities now are vastly more sophisticated. And they now provide power to devices — motors, computers, appliances, heating and ventilation systems — that Appleton's investors never imagined. But utilities today still face those same problems. All those new devices require a steady, constant current, just like Appleton's light bulbs. Pulses, variations, gaps — all can fry the motor, burn out the heater, brick the computer. A sag or surge of even a few percent can be too much.

Minute by minute, power plants have to produce just about exactly as much electricity as is being used at the moment. Too much electricity is as much of a problem as too little. Water systems maintain a continuous flow by storing extra water in reservoirs, releasing it when needed, taking it in when there is surplus. For electricity, the equivalent of a reservoir is a battery. Battery costs have fallen in recent years, but storing electricity remains much more difficult and costly than storing water. As a result, electric power is still mostly generated, transported, and used in real time. The energy you use to turn on your monitor was a ray of sunshine or a puff of natural gas just milliseconds before. Every time a big building — a factory, say, or a stadium — switches on its lights or heating system, it suddenly draws power from the network. The same happens when thousands of commuting workers come home and simultaneously turn on their stoves or air conditioning. And it happens in reverse when the factories, stadiums, and homes turn off their lights and heating — power is abruptly released into the grid. Generating a steady current while simultaneously matching it to demand with no backup is an amazing technical feat.

The people who accomplish this feat work at what are called reliability centers. Scores of these operate across North America. Inside them, people oversee the grid, ramping up or reducing activity at power plants and shunting current around electric lines like air traffic controllers guiding planes. In a sense, they are doing the same thing as the people in the shack at Appleton who sat and watched the light bulb — except that the "shack" is wallpapered with computer screens and they are watching, so to speak, countless millions of light bulbs.

The centers' work is never-ending, because every part of each grid is connected to every other part, and all are constantly changing how much power they need or produce. We switch on our lights and computers without thinking about

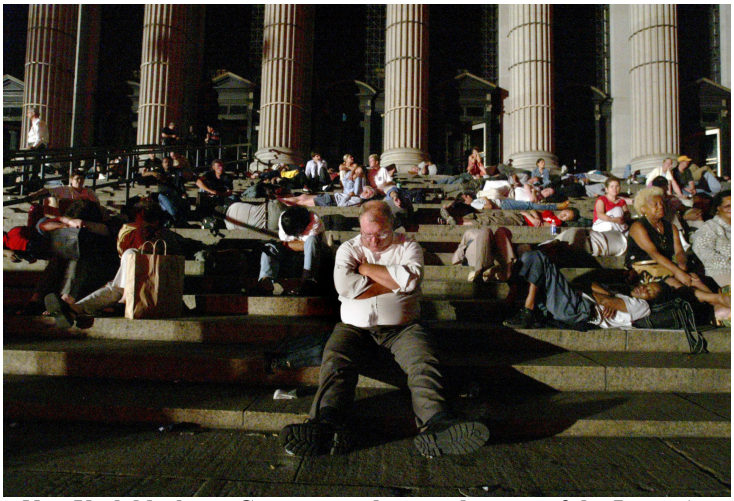
it. But that smoothness and reliability is the result of the invisible, watchful labor of thousands of people. There are countless points where things can go wrong — and do. Fast.



Workers of the Electric Reliability Council of Texas, which oversees 1,250 power plants, 54,000 miles of transmission lines, and power supply for 27 million customers.

On August 14, 2003, an operator at a reliability center in Ohio was fixing a software problem just before his lunch break. After he finished his work, he forgot to switch on a control system he had turned off during the repair. At 1:31 p.m., a coal power plant went offline. This required importing power to the area from elsewhere, which put more load on the power lines, causing more sag from heat resistance. Ninety minutes later, in an all-too-common occurrence, an overhead power line sagged into an overgrown tree. The line shorted out in a shower of sparks. Nobody in the reliability center noticed, because the control system wasn't on to alert them. Even when operators realized the problem and turned it on, the control system delivered false readings of available power in the grid. In a separate, simultaneous bit of bad luck, an alarm function in the control room of the utility company went out. Now both the reliability center and the utility operators were flying blind and didn't know it.

The current in that shorted-out line had to go somewhere. It flooded into other lines, which further sagged. Half an hour later, one of those lines, which hadn't had the proper distance around it cleared of trees, hit a tree and stopped working. Thirty seconds later, a third line hit a tree and failed. Within half an hour, sixteen more lines failed as current from the other failed lines surged through them. Suddenly some parts of the grid had too little power, but there was no way to get it to them. By 4:11 p.m. the cascade of outages had spread as far east as New York and Massachusetts and as far north as Michigan and Ontario. Within four hours, a combination of software failure and small human errors had spiraled into a blackout that affected more than 50 million people.



New York blackout: Commuters sleep on the steps of the James A. Farley Post Office during the early house of August 15, 2003, after subways stopped working the day before.

Current Problems

The electric current in a power line can be thought of like the flow of water in a firehose. Much as the power of the water from the firehose is due both to its pressure and its volume, the power of an electric current is the product of its *voltage* (the "pressure," so to speak, of the current) and its *amperage* (the "volume" of current).

Higher pressure will shoot water through a hose more forcefully. Similarly, higher voltage creates a current that can do more work. Big electric motors in factories require higher voltage than do small electric lights in homes. For early electric utilities like the one in Appleton, this was a problem. Because the Appleton waterwheel produced a fixed amount of current, it couldn't power both low- and high-voltage systems. Utilities like Appleton faced the prospect of stringing separate power lines for each type of device.

Luckily, half a dozen Europeans solved this problem in the 1870s and 1880s. The steady-stream current from a turbine is known as *direct* current. The Europeans developed transformers, devices that could convert direct current to *alternating* current, in which electrons flow back and forth along the wire, switching direction many times a second.

Alternating current has a major advantage over direct current. Just as a moving magnetic field produces a flowing electric current, a current that shifts back and forth produces a magnetic field. That magnetic field can be used to create secondary electric currents with lower or higher voltage than the initial current. With transformers, a single power installation can power many different types of devices.

In addition, utilities can use transformers to raise the voltage and lower the amperage on their lines. Because lower-amperage currents create less resistance, the switch to alternating current allowed companies to lose less energy as they sent power through the system.

The switch from Appleton-style direct current to modern alternating current led to a wild fight. In what became known as the War of the Currents, Thomas Edison, whose plants used direct current, falsely claimed that alternating current was inherently dangerous.

An engineer and Edison ally named Harold P. Brown staged spectacles in which he publicly electrocuted stray dogs to demonstrate the purported risks of alternating current. To discredit alternating current, Brown craftily promoted its use in the then-new electric chair and then campaigned against "executioner's current." Eventually, though, the superiority of alternating current for most then-known uses of electricity could not be denied.

Alternating current did add complexity. Many devices today work on direct current: cell phones, computers, flat-screen TVs, and electric cars. For each, alternating current must be re-converted to direct current. And even devices powered by alternating current need the frequency of the current — the number of times per second that the electrons go back and

forth — to be precisely steady. The U.S. standard for alternating current is 60 times a second. Grid operators must ensure that this frequency remains precisely stable 24 hours a day, 7 days a week. Even 59 cycles per second can damage delicate machinery. When there are sudden drops and peaks in power demand, the fluctuations in the current are accompanied by fluctuations in frequency. Add frequency to the list of factors reliability centers must oversee.

More Power, More Politics

Simply keeping the present system going requires constant watchfulness and expense. Unfortunately, that is not enough. According to the Census Bureau, the U.S. population will increase to between 360 and 380 million by 2050. Numbers in Canada and Mexico will also rise. The grid will have to be expanded to serve those new people. On top of that, most economists believe that the number of affluent people will also jump. Affluent people typically use more power — think of second homes, high-priced appliances, fancy entertainment consoles, and heated swimming pools. Think also of all the new data centers required to power the AI models that are now rapidly proliferating. Finally, society has been "decarbonizing" for decades — using less coal, oil, and gas in homes, businesses, and automobiles, and switching to electricity. All these factors will greatly increase the demand for electric power. The exact amount can't be known, but typical estimates are that we will have to increase electricity supply by a quarter or more in the next twenty-five years and keep increasing it thereafter.

This year, according to the U.S. Energy Information Agency, more than 90% of newly constructed U.S. power plants will use renewable energy — that is, energy from sources that are constantly restocked. (About 7 percent will run on natural gas.) When oil is burned or uranium has its atoms split in a conventional reactor to produce energy, the oil and uranium are consumed forever. Renewables, by contrast, draw on sunlight, wind, rivers, tides, or underground heat — energy sources that never need to be replenished (though the supply can be interrupted). Homeowners who heat with propane run out of fuel and must refill their propane tanks, but homeowners who heat with electricity from solar panels get new sunlight every morning.

Renewables have two primary advantages and one big disadvantage. The advantages are that they are inexpensive — indeed, their costs keep dropping — and they do not release climate-changing gases into the air. Their disadvantage is that they are, as a rule, variable: the amount of power they send into the grid shifts with the vagaries of sun, wind, and water. During droughts, hydroelectric plants often have to cut back. When storm clouds suddenly blot the sun, solar-powered grids must adjust. Because wind turbines' rate of rotation changes with wind speed, their output is highly inconstant. To make their power usable, wind turbines pass it through circuits and batteries that "smooth out" the flow. Even then, wind farms often have to be shut off in high winds, because they produce too much power.

Critics of renewable energy argue that these extra levels of variability and complexity mean that renewable energy could destabilize the grid. Adding in the extra capacity needed to buffer their variability outweighs their initial cost advantage, skeptics say. In addition, critics are dismayed by the amount of land that wind and solar installations require. Instead, they argue that new energy should come from nuclear power, which doesn't release climate-changing gases, uses little land, has no problems with variability, and has an excellent safety record — surprising to some, fewer people die from the production of a terawatt-hour of nuclear energy than of water or wind. Nuclear critics in turn argue that nuclear plants are stunningly expensive and that nobody knows how to safely dispose of the resulting waste, a fraction of which is highly radioactive. Some reactor designs propose to address these problems. Small, prefabricated modular reactors should ultimately cost less and there are designs for reactors that produce power from high-level waste. But as of yet very few of these types of reactors have actually been built.



How and what to build? Go all-in on renewables and bet that we can develop the technology to stabilize the grid? Push for nukes and bet that their price and complexity will go down? These questions are inherently subject to the political process. But before we can choose what to build, another issue must be faced: the ever-mounting obstacles to building anything at all.

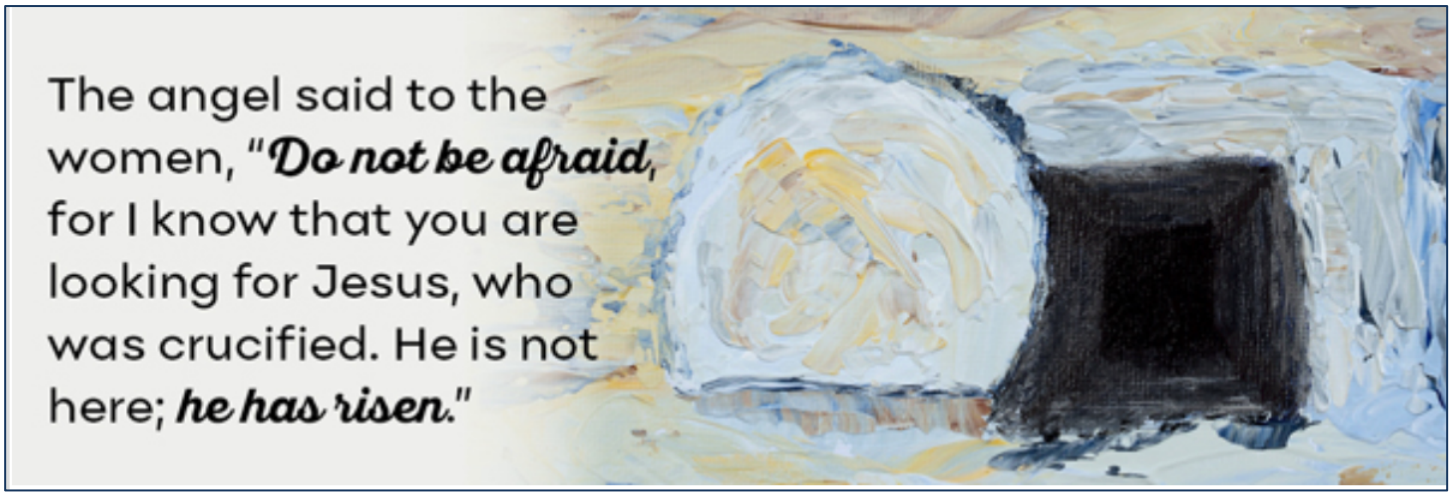
Gas pipelines, high-tension wires, solar farms, wind installations, nuclear plants, petroleum wells, power substations — plans to emplace any of these spend years struggling through multiple levels of regulation, seemingly without exception. All too often they are then mired in litigation, especially if the projects are of any size. Some of the litigation is for good reasons. More than one pipeline firm, for instance, appears to have been careless about spills. One can readily imagine neighbors demanding safeguards. But all too much of the opposition appears driven by simple revulsion — people don't like being reminded of the presence of systems that help keep them alive and comfortable. It is as if the United States is rebelling against its own energy infrastructure.

In turn, this springs from an act of society-wide forgetting — that every nicely toasted bagel we eat is made possible by decades of effort and the continuing presence of thousands of people who, almost imperceptibly, take care of a grid that sustains us all.

Kevin Reich has loaned us a DVD that Red Lake Electric did for an anniversary.

It contains several interviews with patrons who remember when electricity first came to their homes and farms. We should designate a "Movie Night" for a Tuesday in April!

The Back Page



We remember the whispers of Advent as we anticipated the birth of Jesus. Now, as we journey through Holy Week, we anticipate the joyful noise of alleluias on Easter Sunday. But before we reach the Easter celebration, we make our way through Lent, through an in-between time where we don't know what tomorrow will bring. We often describe ourselves as an Easter church, but in this holy, solemn time that begins with Ash Wednesday and moves on to Maundy Thursday, Good Friday and Holy Saturday, we are also a Lenten church. Living in uncertainty, waiting and hoping for renewal. Longing for the moments when God's presence feels closer and more sure.

During Lent, we learn what it means to live on unsettled ground.

In Matthew's retelling of the resurrection, he describes a "violent earthquake" as the angel came down from heaven and rolled the stone away from the entrance to the tomb where Jesus lay.

I imagine the earthquake, the rumble deep below the earth, as the ground shifted far under the surface. Perhaps those who were nearby felt the tremble. Maybe the women who were on their way to the tomb with prepared spices felt the earth shift. They were unsettled, but they knew something powerful was happening.

We can understand that human experience of feeling out of control, of not being able to make sense of what's happening around us. Many of us can relate to this as we witness the current unrest in our world and in our communities. Like the women at the tomb, we feel isolated, disconnected. We're unsettled, unsure, living the Lenten reality of waiting and hoping.

And then, in the midst of that shaking, comes the promise.

The angel said to the women, "Do not be afraid, for I know that you are looking for Jesus, who was crucified. He is not here; he has risen."

God's promise offers reassurance and hope. The resurrection does not deny disruption — it meets us within disorder and disturbance. The stone is rolled away. Death does not have the final word.

Yes, we are Easter people. Even when the ground below us is shaking, we will not grow weary. We know that Jesus is our foundation. Christ is risen, and that truth strengthens us. It gives us courage to live, to hope and to proclaim joy.

Christ is risen. Christ is risen indeed. Alleluia!

The Rev. Yehiel Curry, Presiding Bishop
Evangelical Lutheran Church in America