

Connecting the grid: DC ties serve critical role

U.S. electric grid integrated at a handful of sites

Most people might think of the U.S. electric grid as one, giant complex system. In reality, it's actually three systems operating essentially independently except at a handful of integrated connection points.

These points, known as Direct Current ties, or DC ties, serve a critical function to the nation's electric system. To understand the function and purpose of DC ties, it's helpful to know how the nation's electric grid is configured.

Understanding the U.S. Grid

The three separate electric systems in the continental U.S. are:

- The **Eastern Interconnection**, which encompasses the area east of the Rocky Mountains to the East Coast including a portion of Northern Texas;
- The **Western Interconnection**, which encompasses the area from the Rocky Mountains to the West Coast;
- The **Texas Interconnection** (also known as the Electric Reliability Council of Texas or ERCOT), covers most, but not all, of Texas.

Electric generators (power plants) within each of the regional interconnections operate in sync with each other (same frequency and phase) — this is critical to maintain reliability of each interconnection. An effort was

Energy Education 101

Energy Education 101 is an ongoing series in the Essent newsletter focusing on energy-related topics with the goal of providing straightforward information that can help provide a better understanding of the energy that powers our modern society.

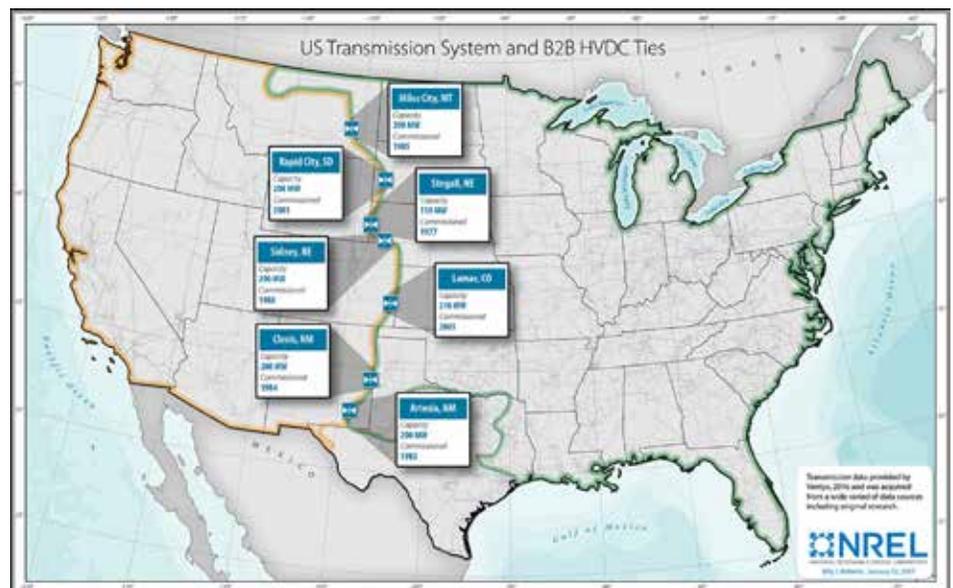
made decades ago to connect the Eastern and Western Interconnections but failed as the frequencies on each side did not match. The mammoth systems were simply too large and had

too much inertia to be synchronous. A simple analogy is to picture two giant floating ocean liners trying to stay tied together by a rope.

Enter the need for DC ties.

Technology advancements in the 1970s paved the way for the development of DC ties, which allowed the east and west grids to connect with a limited amount of power being able to flow back and forth across the two systems. The DC ties act as a sort of ultra high-tech “shock-absorber” between the two systems.

See 'CONNECTING THE GRID' on page 4



The seven DC ties form a north-south “seam” that allows for a limited flow of electricity across the East and West Interconnections.

Member utilities honored for safety, reliability efforts

NMPP member utilities were recently noted for their safety and reliability efforts at the American Public Power Association's (APPA) Engineering and Operations Technical Conference held recently in Raleigh, N.C.

The NMPP member utilities earning APPA's Safety Award of Excellence were: City of **Gillette, Wyo.**, **Fort Morgan (Colo.)** Municipal Power and Light, **Indianola (Iowa)** Municipal Utilities, and the **Nebraska Public Power District**.

Duane Richardson, Chair of the Association's Safety Committee and Transmission and Distribution Superintendent at Crawfordsville Electric Light and Power in Indiana, presented the awards at the conference.

More than 300 utilities entered the annual Safety Awards, which is the highest number of entrants in the history of the program.

Entrants were placed in categories according to their number of worker hours and ranked based on the most incident-free records during 2017.

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Seven NMPP member utilities earned the Reliable Public Power Provider (RP3) designation from the American Public Power Association for providing reliable and safe electric service. The utilities were among 254 utilities across the nation holding the designation out of more than 2,000 public power utilities in the United States.



Neil James, manager of distribution operations at Santee Cooper in South Carolina and chair of APPA's RP3 Review Panel, presented the designations.

The RP3 designation lasts for three years and recognizes public power utilities that demonstrate proficiency in four key disciplines: reliability, safety, workforce development and system improvement. Criteria include sound business practices and a utility-wide commitment to safe and reliable delivery of electricity.

This is the 13th year that RP3 recognition has been offered. NMPP member utilities holding the designation, including the year they earned the designation, are:

Diamond Level

Waverly Utilities, Iowa (2018)
Lincoln Electric System (2018)
Neb. Public Power Dist. (2017)

Platinum Level

Hastings Utilities, Neb. (2017)
Indianola Muni. Utilities, Iowa (2017)

Gold Level

Fort Morgan, Colo. (2017)
Grand Island, Neb. (2017)

Trump seeks recommendations to stem closing of power plants

Trump Administration officials are considering plans to order electric grid operators to buy electricity from struggling coal and nuclear plants in an effort to slow the trend of retiring older power resources struggling to compete in today's wholesale power markets due to cheap natural gas supply and renewable energy.

White House Press Secretary Sarah Huckabee said President Trump directed U.S. Secretary of Energy Rick Perry to prepare immediate steps to stop the loss of fuel-secure power facilities (coal and nuclear plants) that is "leading to a rapid depletion of a critical part of our nation's energy mix and impacting the resilience of our power grid... and looks forward to receiving his recommendations."

As older coal and nuclear baseload power plants retire, the administration is concerned that relying too much on natural gas and intermittent renewable energy may put the reliability of the nation's electric grid at risk.

In January, the Federal Energy Regulatory Commission rejected the U.S. Department of Energy's proposed rule to provide cost recovery assistance to coal and nuclear power plants in wholesale markets and initiated a broader proceeding regarding grid resiliency within each Regional Transmission Organization.

Lower tax rate triggers credit to Choice Gas customers

Nebraska Choice Gas customers, which includes natural gas customers served by ACE, the Public Alliance for Community Energy, will receive an annual fixed credit on their natural gas bill due to the lowering of the federal corporate income tax rate to Black Hills Energy.

The Nebraska Public Service Commission (PSC) approved in June the credit to Choice Gas customers from Black Hills Gas Distribution. The average residential customer will receive an annual credit of approximately \$9, the average small commercial customer approximately \$15 and the average large commercial customer approximately \$93, according to the PSC order. The credits will



be applied to July gas bills and will continue annually until Black Hills files its next general rate case, which is currently anticipated in 2020.

As part of the federal Tax Cuts and Jobs Act of 2017, the federal corporate income tax rate was lowered from 35 percent to 21 percent, which results in savings being passed to consumers.

NPGA Board approves fund distribution

The National Public Gas Agency (NPGA) Board of Directors approved a distribution of \$5 million to its tier one charter members from NPGA's net position at their June board meeting.

Members will be paid based on total gas volumes used during the immediately preceding seven audited fiscal years minus certain disallowed large loads designated as ineligible for purposes of distribution by the Board of Directors.

Distribution payments to each qualifying NPGA member will be sent out in July.

NPGA still retains a small cash reserve to help with volatility in commodity costs and usage.

Committee members reappointed at NMPP Board meeting

NMPP Board Vice President Jeff Wells reappointed committee members to the Energy Research and Development Fund (ERDF) and the Computer Services Review Committee during the NMPP board meeting held in late May.

Those reappointed to the ERDF Committee were:

- Collin Bielser, **Fairbury**, Neb.
- Pat Davison, **Imperial**, Neb.
- Tom Goulette, **West Point**, Neb.
- Duane Hoffman, **Oxford**, Neb.
- Bob Lockmon, **Stuart**, Neb.
- Mike Palmer, **Sidney**, Neb.
- Chris Rodman, **Wall Lake**, Iowa
- Jeremy Tarr, **Burwell**, Neb.
- Randy Woldt, **Wisner**, Neb.

The ERDF Committee manages ERDF grant funding for innovative energy projects to com-

munities/utilities participating in the voluntary program.

* * *

Those being reappointed to the CSRC were:

- Nancy Bryan, **Stromsburg**, Neb.
- Kellie Crowell, **Ravenna**, Neb.
- Lanette Doane, **Ansley**, Neb.
- Stephanie James, **Wisner**, Neb.
- Karla Rader, **Cozad**, Neb.
- Pam Rasmussen, **Gibbon**, Neb.
- Mary tenBensel, **Arapahoe**, Neb.
- Kari Wilson, **Haxtun**, Colo.

The committee reviews PowerManager® software program requests from software users and assists in providing input and recommendations on software upgrades and improvements. For more information on these committees, contact Andrew Ross at NMPP, (800) 234-2595.

Connecting the grid

Continued from page 1

There are seven DC ties connecting the Eastern and Western Interconnections in the United States, including two in the panhandle of Nebraska: the Virginia Smith Converter Station near Sidney, Neb., and the David Hamil DC tie near Stegall, Neb. The seven ties run north/south and form a vertical “seam” across the country.

DC Ties and the Evolving Energy Landscape

With aging electric assets and an evolving energy mix that includes increasing amounts of renewable energy and natural gas, efforts are under way to look at enhancing and modernizing the interconnectedness of the separate systems as part of the U.S. Department of Energy’s overall Grid Modernization Initiative. Due to the sheer complexity of the nation’s electric grid, this is a huge undertaking and includes many stakeholders.

One of the components to the initiative is studying the DC ties and cross-seam transmission to move more renewable energy from the middle of the country to the coasts and sharing capacity between regions for improved grid reliability. Upgrading the ties and the accompanying transmission lines that would also likely be needed would come with a high price tag.

Another factor that has possible impacts is the consideration of a group of utilities known as the Mountain West Transmission Group joining the Southwest

What do DC ties do?

The seven DC ties (Direct Current ties) connect the Eastern and Western Interconnections in the U.S. The DC ties convert Alternating Current (AC) to Direct Current and back to AC. This conversion is necessary so the energy is in sync on each side of the East and West Interconnection systems. The Virginia Smith Converter Station near Sidney, Neb., is shown in the photo.



Western Area Power Administration photo

Power Pool (SPP), the regional transmission organization responsible for coordinating the dispatching of power resources and transmission in a 14-state region in the Midwest. If the Mountain West group joins SPP it would expand SPP’s footprint farther into the Western Interconnect, placing more uncertainty on how this would affect the operation of the DC ties and the utilities that move power across them.

The Mountain West group was moving toward integration with SPP until April when Xcel Energy, the group’s largest member, decided to withdraw from the group. The remaining group participants are currently evaluating their next steps.

Possible impacts to MEAN

As a wholesale electricity supplier to communities stretching from Iowa to Colorado and Wyoming, the Municipal Energy Agency of Nebraska is one of a few utilities that has power delivery obligations in both the Eastern and Western Interconnections.

MEAN holds firm (highest priority) transmission rights to move a limited amount of electric load across the Virginia Smith Converter Station to serve electric load in both Interconnections. Historically, this served as an asset for MEAN as it provided flexibility in serving electric load with resources in both Interconnections, whichever was most economical for participants. MEAN also uses the DC ties near Rapid City, S.D. and Lamar, Colo., on a non-firm (lower priority) basis when advantageous.

MEAN continues to be active by attending stakeholder meetings regarding the DC ties and modernizing the connectiveness of the Interconnections and the possible integration of the Mountain West group into SPP.

For now, the one thing certain is uncertainty; any changes could impact MEAN and its participants operationally and economically.

nmpp Meet ENERGY your staff...

JEFF LINDSAY

Forecast Optimizer

Joined NMPP Energy: 2013

What organization are you assigned to?

Municipal Energy Agency of Nebraska



How do you assist member communities in your position?

I am responsible for submitting the daily bilateral settlement schedules in the Southwest Power Pool (SPP). I review current weather forecasts and look for similar past weather patterns, and submit demand bids based on historical loads in several electric load zones. MEAN participates in two Regional Transmission Organizations (RTOs) systems, which coordinate, control and monitor electric loads across multi-state regions.

I also forecast the daily preschedule for MEAN's electric loads in the Western Area Power Administration Colorado-Missouri Balancing Authority (WACM), Aspen, Delta, Gunnison, and Wray load zones in Colorado.

WAPA (Western Area Power Administration) requires us to submit a preschedule forecast, so they know how much hydro-electric generation we plan on scheduling for that specific trading day. The scheduling process is the same as the demand bids for the RTOs. I look for similar weather patterns from historical loads for each load zone. The next day, the preschedule will become the day-ahead schedule. Any changes to resource availability or weather changes will be taken into account at this time. Once finalized, I schedule resources to loads based on the most efficient path of delivery to each load zone.

I also provide a seven-day load forecast in the regions where MEAN operates (SPP, MISO and the West). My other responsibilities include creating, tracking and submitting monthly reports to the Western Area Power Administration.

What do you love about your job?

I enjoy working with everyone in MEAN Operations, I also enjoy the unexpected challenges that my job brings from time to time.

NPA launches new website with resources

The Nebraska Power Association unveiled its new website in June. The website (www.nepower.org) includes changes to navigation and content structure and is desktop and mobile friendly.

The website provides information on Nebraska's public power system as well as the benefits of

public power in general. NPA is planning to modify content and release toolkits and reports to NPA members through the site's member portal. It also includes NPA's Twitter feed to feature the latest industry news. Among the current content available is a public power fact sheet and a

public power Powerpoint presentation.

For NPA member login information, contact kporter@les.com for assistance.



THIS MONTH'S FEATURED CHAMPION BUSINESS



Spiegel & McDiarmid advocate for NMPP Energy at federal level

Spiegel & McDiarmid LLP is a Washington, D.C. law firm specializing in representing state and local governments in energy, telecommunications, environmental, transportation, and government affairs matters. The firm has more than 20 attorneys and, over the last 40 years, has provided legal services to more than 500 clients located throughout the United States.

Spiegel & McDiarmid has long represented MEAN and a number of NMPP Energy members

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at the Federal Energy Regulatory Commission (FERC), including proceedings pertaining to the Mid-continent Independent System Operator (MISO), Southwest Power Pool and individual transmission provider rates.

In addition, Cindy Bogorad represents the Transmission Access

Policy Study Group (TAPS), an informal association of transmission dependent utilities in more than 35 states, including MEAN. TAPS is active in FERC policy proceedings, in reliability-related efforts, and on Capitol Hill.

Attorneys from Spiegel & McDiarmid have assisted MEAN and NMPP members on issues in past years. For more information, call (202) 879-4000 or visit www.spiegelmc.com.

For a complete listing of NMPP Energy Champion Businesses, see page 7

Employment Opportunities

Utility/Maintenance Personnel

The Village of **Fairmont**, Neb., is accepting applications for a full-time utility/maintenance personnel to learn all aspects of municipal functions including electric, water and sewer. The interested individual must have the ability to meet the requirements, which include climbing into and out of manholes with a 21" opening, climb 150' interior water tower ladder, lift 100 lbs. and must hold a valid Class O State of Nebraska Driver's License, Must also be able to obtain a Grade 4 State of Nebraska Water License and a Nebraska Department of Environmental Quality Lagoon License within the first year of employment. Pre-drug screening, employment physical and background check required. For detailed job description and more information contact Dan Slocum, acting utility superintendent at (402) 268-3251; 7 a.m. – 4 p.m. or contact Village of Fairmont; P O Box 156; Fairmont NE 68354. Salary based on experience. The Village of Fairmont offers an excellent benefits package. Position opened until filled.

Electric Lineman

The City of **Carlisle**, Iowa, (Des Moines suburb; 4,168 est. pop.), seeks full-time Electric Journeyman Lineman. Duties include operating

To submit an ad

NMPP members can advertise job openings for free in the *Essent* newsletter and on the NMPP Energy Web site. E-mail kwickham@nmppenergy.org.

All job openings posted at www.nmppenergy.org

and maintaining an overhead and underground electric distribution system. Radio reading and servicing meters, substation inspection and maintenance, operating construction equipment. Class (A) CDL driver's license needed. Salary DOQ. EOE. Send resume to City of Carlisle, 195 N. 1st Street, Carlisle, Iowa 50047 or dmiller@carlisleiowa.org. For more information please contact Don Miller at (515) - 989-0840, or Andy Lent at (515)-989-3224.

Public Works Dept. Maintenance II

The City of **Hickman**, Neb., is seeking applicants to perform various tasks in the Public Works & Parks Departments. Applicants must have a valid Nebraska Driver's License and ability to pass drug screening. DHHS Water, Wastewater and/or electrical certifications preferred. Full-time position with

benefits. Hourly wage dependent on qualifications presented and verified. Full job description and employment applications available at City Hall, 115 Locust Street, Hickman, Nebraska 68372 or www.hickman.ne.gov. Please deliver completed applications and resumes to Hickman City Hall. Screening process begins immediately; position open until filled. EOE.

Journeyman or Apprentice Lineman

The City of **Torrington**, Wyo., is accepting applications for a Journeyman or Apprentice Lineman with experience in the Electric Department. Applications and qualifications may be submitted at City Hall, 436 East 22nd Ave, Torrington, Wyo. Must have a valid class A or B CDL driver's license, or be able to obtain one within 60 days. Must have a high school education or GED. This is a full-time position with benefits and will be open until filled. For more information, contact Dana Youtz at (307) 532-1856 or (307) 532-2422. For applications, contact City Hall at (307) 532-5666, P.O. Box 250, 436 East 22nd Ave, Torrington, WY 82240 or on the web at www.torringtonwy.gov. The City of Torrington maintains a drug and alcohol-free workplace. EOE.

Support NMPP member communities through the Champions Business Program

Champions are businesses and organizations that support NMPP Energy's effort to provide products and services to members. Consider these businesses when your utility or municipality has a business need. If your business is interested in becoming an NMPP Energy Champion, call Andrew Ross at (800) 234-2595.



Champions Business Directory of Services

Financial

Ameritas Investment Corp. (Ameritas.com)	Omaha, Neb.
D.A. Davidson & Co. (dadavidson.com/ficm)	Omaha, Neb.
First National Bank (Firstnational.com)	Omaha, Neb.
UNICO Group, Inc. and Midlands Financial Benefits (unicogroup.com)	Lincoln, Neb.
Nebraska Energy Federal Credit Union (ne-fcu.org)	Columbus, Neb.
RBC Capital Markets (rbc.com)	Denver, Colo.

Regulatory/Compliance

Air Regulations Consulting (airregconsulting.com)	Lincoln, Neb.
Power Plant Compliance (Powplant.com)	Oketo, Kan.
NAQS Environmental Experts (naqs.com)	Lincoln, Neb.

Utility/Community

EnergySolutions, Inc. (energysolutions-inc.com)	Omaha, Neb.
Hometown Connections, LLC (Hometownconnections.com)	Lakewood, Colo.
Hubbell Power Systems (Hubbellpowersystems.com)	Bellevue, Neb.
Foundation for Educational Services (fes.org)	Lincoln, Neb.
JK Energy Consulting, LLC (JKenergyconsulting.com)	Lincoln, Neb.
Kriz-Davis Co. (Krizdavis.com)	Grand Island, Neb.
NovaTech (Novatechweb.com)	Lenexa, Kan.
PDS, Inc. (PDSinc.biz)	Omaha, Neb.
Protective Equipment Testing Laboratory (petl.com)	Great Bend, Kan.
REM Electric, Inc. (Davidsoncompanies.com)	Nebraska City, Neb.
RESCO (Rural Electric Supply Cooperative) (resco1.com)	Ankeny, Iowa
Solomon Corporation (Solomoncorp.com)	Solomon, Kan.

Computer/Technology

Proteus (Proteus.co)	Lincoln, Neb.
Salt Creek Software, Inc. (Saltcreek.com)	Lincoln, Neb.

Engineering

EPSIM Corporation (epsim.us)	Boulder, Colo.
Exponential Engineering Company (exponentialengineering.com)	Fort Collins, Colo.
JEO Consulting Group, Inc. (jeo.com)	Wahoo, Neb.
Lutz, Daily & Brain, LLC (ldbeng.com)	Overland Park, Kan.
Olsson Associates (Olssonassociates.com)	Lincoln, Neb.
Power Engineers (powereng.com)	Overland Park, Kan.

Insurance

League Association of Risk Management (larmpool.org)	Lincoln, Neb.
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Legal

Chapman and Cutler, LLP (chapman.com)	Salt Lake City, Utah
Spiegel & McDiarmid (spiegelmcd.com)	Washington, D.C.

Telecommunication

River Oaks Communications Corp. (rivoaks.com)	Centennial, Colo.
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Upcoming Meetings

Aug. 15MEAN Committees
Aug. 16 MEAN/Mgmt Comm.
Sept. 6 NMPP Board
Sept. 20NPGA Board

Education Opportunities

Upcoming APPA Webinars (www.publicpower.org)

July 10: Deep Dive into 5G Small Cell
Wireless: Truths, Myths and Implica-
tions for Public Power.

July 26: Prepare for Change: Blue-
printing Your Strategic Plan

August 7: New Regulatory and
Legislative Developments Impacting
Wireless Attachments

(All webinars are 1-2:30 p.m. Central
time.)

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