

ALLETE is an energy company based in Duluth, Minn. that provides *affordable, reliable electric services* in the upper Midwest and has *investments* in other energy-centric businesses, including the **AMERICAN TRANSMISSION CO.** ALLETE's **MINNESOTA POWER** electric utility, incorporated in 1906, serves about 144,000 residents, 16 municipalities and some of the nation's largest industrial customers. **SUPERIOR WATER, LIGHT & POWER** provides electric and water service in northwest Wisconsin. ALLETE also owns **BNI COAL**, a low-cost producer of lignite in North Dakota. Listed on the New York Stock Exchange (ticker symbol: ALE) for more than 60 years, ALLETE has paid dividends on its common stock since 1948.

For more than a century, ALLETE has drawn energy and strength from its *skilled and dedicated workforce*. In the coming years, as new team members join us from a rapidly changing pool of talent, we'll *continue to forge* a bright future for our employees, our communities, our shareholders and customers alike.

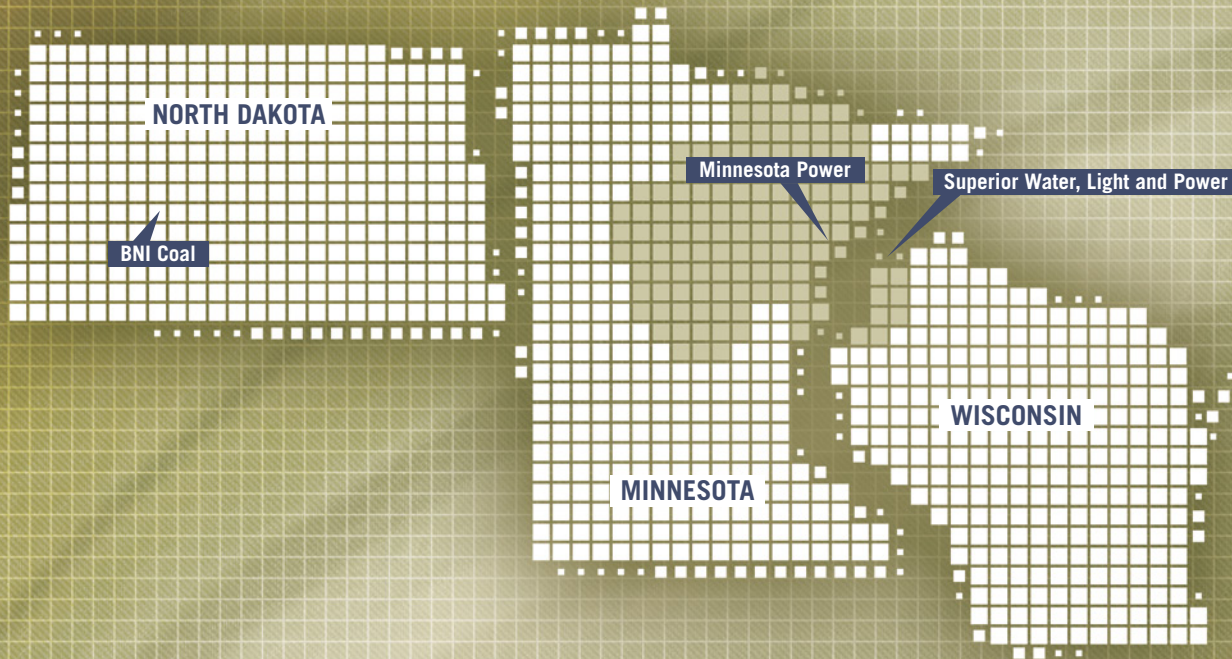
RENEWABLE ENERGY PAGE 1-6:

- Minnesota Power is poised to begin work on phase two of the Bison 1 wind project in North Dakota after completing its first phase on time and on budget.
- The groundwork is being laid in Duluth to increase biomass production at the Hibbard facility.

TRANSMISSION PAGE 7-9:

- Work is underway on initial projects of CAPX2020, in which ALLETE/MP is investing heavily. This consortium, working with MISO, is helping to redefine the landscape of utility infrastructure.
- ALLETE's investment in ATC continues to grow. The critical transmission line tying Bison to the DC line in North Dakota is put in service.

ALLETE OPERATIONS



CUSTOMER GROWTH PAGE 10-12:

- Polymet Mining, already an MP customer, nears completion of its permit requirements as Mesabi Nugget finishes its first year of operation.
- Essar Steel and Magnetation represent potential growth in MP's industrial sector.

EFFICIENCY/TECHNOLOGY PAGE 13-16:

- Bison shifts to direct drive wind turbines for phase two.
- Boswell 4 emerges as a more powerful and efficient generator.
- Novel wastewater control technology removes more mercury.
- Smart Meters undergo a rigorous examination.
- New reservoir in Superior, Wis. uses ultraviolet system.
- A change of direction at ALLETE's lignite mine in North Dakota.



Not much besides trees and wind generators, old and new, intrude upon the skyline of south-central North Dakota, where ALLETE division Minnesota Power is working to bring more renewable energy to the electric grid.



GEARING UP

NEXT STAGE OF BISON WIND PROJECT UNDERWAY

In the five months it took to build the first phase of its Bison wind farm in North Dakota, Minnesota Power blew through a blizzard of milestones:

- a June groundbreaking ceremony had to be moved indoors due to high winds and rain
- a shipload of turbines and rotors sailed across the Atlantic Ocean and docked in sight of ALLETE headquarters in Duluth, Minn.
- commissioning of 17 giant turbines before Christmas energized a newly-purchased direct current transmission line with renewable wind energy for the first time.

One building season is all it took for Minnesota Power to start pulling renewable energy from wind-rich North Dakota into its service territory 465 miles to the east. It was transmitted by a direct current line between Center, N.D. and Duluth purchased by ALLETE for \$69.7 million on Dec. 31, 2009.

By the time giant rotors of the Bison project's first phase were converting North Dakota wind into kilowatts of energy in December of 2010, Minnesota Power had already made the decision to upgrade to new higher-efficiency turbines for the 2011 installation of phase two of the Bison I Wind Energy Center (see page 13).

A fierce spring storm packing torrential rain and wind gusts exceeding 70 miles per hour rumbled across south-central North Dakota the day before the Bison groundbreaking event scheduled by Minnesota Power.



ALLETE CEO Al Hodnik met with landowners at a lunch in New Salem on the June day when the Bison groundbreaking ceremony was moved indoors due to high winds and rain.

PICTURED ABOVE: Hay bales, antelope and grain crops share the landscape with the Bison project. "Salem Sue," billed as the world's largest Holstein Cow, stands on a hillside in the nearby town of New Salem, N.D.



Instead of inviting nearby landowners to a tent near a turbine construction site, organizers moved the event indoors to an auditorium in New Salem, about 12 miles away.



Large Capital Projects Control Manager Ron Gullicks talks to a landowner in the New Salem Auditorium.

Rather than hosting guests on rented buses to tour the wind farm construction site, employees set up maps and cobbled together a slide presentation to show invited guests while lunch was served and speakers, including Governor John

Hoeven, addressed the audience. The massive storm diverted the flight from Duluth of ALLETE CEO Alan R. Hodnik, who didn't arrive at the auditorium until after the program had commenced.

"We will not be successful going forward without connecting with and maintaining quality relationships with the many North Dakota landowners who granted us easements," Hodnik told his audience. He and other company representatives lunched with dozens of nearby landowners who attended.

Duluth was perfectly positioned as the headquarters city of ALLETE to coordinate the complicated staging of a new wind farm hundreds of miles away. Duluth is the eastern terminus of the DC transmission line that runs to Center, N.D., which is the location of ALLETE subsidiary BNI Coal. Lignite from BNI has fueled the Young Generating Station in Center for decades. ALLETE's purchase of the DC line will allow the company to phase out its purchase of coal-based power from the Young Station and replace it with renewable wind energy.

Duluth also happens to be a major inland port at the western end of the St. Lawrence Seaway. In early August of last year, a ship called the BBC Ems carried the integral components of the

PICTURED ABOVE: ALLETE CEO Al Hodnik, at right, stands on the bridge of the BBC Ems last August while the ship was unloading wind turbine equipment destined for North Dakota at the Duluth, Minn. port.

ALLETE 2011 PROFILE



first phase of Bison — 16 nacelles and 16 rotor hubs — into the Duluth port, a short walk from ALLETE headquarters. Hodnik and other company executives took the opportunity to inspect the ship and its cargo, manufactured by Siemens in Denmark.

Meanwhile, work in North Dakota continued at a brisk pace. A 22-mile transmission line connecting Bison I with the Square Butte Substation in Center was installed while roads were built and foundations for the turbine towers poured. Substations and an operations building with ground source heating were erected. Wind turbine towers fabricated in West Fargo, N.D. were trucked to the site in a complex “just-in-time” delivery schedule that included blade shipments from Iowa.

When considering the amount of heavy equipment transported from around the world, the Bison schedule proceeded quickly. Its first tower sections were set into place in the second week of September, and the first rotor hub fitted with blades was hoisted atop the first completed tower Sept. 24. Once two large cranes arrived on the Bison site, only a couple days of hoisting were lost to inclement weather.

The last of the 16 turbines in the first phase of the Bison project was assembled just over a month after the first tower base sections were set into foundations. By late November, the wind turbine generators erected by MP and Siemens last fall


were operational and then proceeded to commissioning. Additions to the 230-kilovolt Square Butte Substation were completed, and the new 230-kilovolt Bison-to-Square Butte transmission line was energized and put into service.

Phase two of the Bison I wind farm is scheduled for construction in 2011, when 15 more powerful Siemens turbines will be installed. About two-thirds of the \$177 million project was spent on phase one. The Minnesota Public Utilities Commission (MPUC) in 2009 approved Minnesota Power’s petition for current cost recovery eligibility for the project.

The company will next seek regulatory approval and current cost recovery eligibility for Bison II, a 105-megawatt installation it plans to construct in 2012 at an estimated cost of \$160 million. Minnesota Power and ALLETE are looking beyond the Bison projects in anticipation of developing additional wind energy projects to be marketed to others.

Using the experience gained in developing Bison I and II and leveraging relationships developed through BNI Coal and the company’s many wind energy leaseholders, ALLETE intends to establish a non-regulated renewable business. The plan is to secure long-term power purchase agreements prior to construction of facilities, which, though non-regulated, would require appropriate regulatory approval. ■

PICTURED ABOVE, (left to right): A ship bearing wind turbine components passes a lighthouse on the ship canal in Duluth, Minn.; a rotor installation using two cranes; a 2.3 megawatt Siemens wind turbine installed in the first phase of Bison I.



Minnesota Power's Hibbard Renewable Energy Center, flanked by the Richard I. Bong Memorial Bridge in Duluth, Minn., is fueled by a mixture of biomass, coal and natural gas.

KEEPING THE LIGHTS ON

WIND, WATER, WOOD AND REDUCED EMISSIONS

To meet anticipated customer demand for electricity in the next 10-15 years, ALLETE's Minnesota Power will rely primarily on a combination of wind, water and wood to keep the lights on in northern Minnesota.

In filings with Minnesota regulators, the utility explains it will make its generation more flexible, reduce its emissions and comply with mandated renewable energy standards. To accomplish these goals in the coming decades, Minnesota Power plans to reshape its generation by adding 300 to 500 megawatts of renewable energy and explore options to incorporate

intermediate resources such as a natural gas-fired "peaking plant." Conservation and demand side management will also play a role in meeting the energy savings goals established in Minnesota legislation.

Minnesota Power has been busy adding wind energy to its portfolio for the past five years. And, it's relied on renewable hydroelectric power since its incorporation more than a century ago. Beyond the company's long-term power purchase agreement with Manitoba Hydro, which expires in 2015, Minnesota Power in April of 2010 signed an agreement with the

ALLETE 2011 PROFILE



Canadian energy producer to purchase surplus energy beginning in May of 2011 and continue through April 2022. The agreement, subject to regulatory approval, calls for Minnesota Power to purchase at least a million megawatt-hours of surplus hydro energy from Manitoba Hydro's system that will be delivered at forward market prices.

Minnesota Power is also planning to boost its biomass production at its Hibbard Renewable Energy Center, a 50-megawatt facility in Duluth, Minn. fueled by a mixture of biomass, coal and natural gas. The Hibbard upgrade project, subject to approval, is designed to leverage existing assets to increase biomass renewable energy production by approximately 200 percent at a cost of approximately \$22 million. Construction would begin upon receipt of all regulatory and permit approvals, which the company will seek in 2011, and could be completed by the end of 2012. Minnesota Power plans to request in 2011 current cost recovery status from the MPUC, which would allow upgrade costs to be paid by customer rate riders on a real-time basis.

The state of Minnesota enacted one of the nation's most stringent renewable energy standards in 2007, requiring that 25 percent of Minnesota Power's total retail energy sales come from

renewable energy sources by 2025. As a step toward that goal, in 2009 Minnesota Power purchased two boilers, wood handling systems and associated systems from the city of Duluth at the site of the city's oldest power plant.

The equipment has been used to generate steam for the NewPage paper mill and Minnesota Power's Hibbard Energy Center in West Duluth. The Hibbard facility, built originally in 1929-30 as a Minnesota Power coal-fired generating plant, has seen many changes over the decades. Hibbard was retrofitted to burn wood along with coal in order to facilitate economic development. Duluth Steam District No. 2 came into service in 1987, when the City of Duluth, Minnesota Power and Pentair, Inc. teamed up to construct Lake Superior Paper Industries. Minnesota Power bought out the city's ownership portion in 2009.

That year, the MPUC approved the \$2.5 million purchase and authorized the investment of another \$22 million for upgrades that will eventually triple the amount of electricity produced at Hibbard from wood waste biomass fuel. A primary source of the fuel will continue to be wood waste from the nearby paper mill, now owned by NewPage. The paper company also utilizes steam from the plant in its papermaking operation. ■

PICTURED ABOVE: The Bison Wind Energy Center, Fond Du Lac Hydro Station, and a conveyor of wood-waste biomass at the Hibbard Renewable Energy Center.



An ATC transmission structure at Ledge Stone Vineyards in Greenleaf, Wis.
(Photo courtesy of American Transmission Co.)

ALLETE WIRED IN

STRATEGIC INVESTMENTS EXPAND BEYOND BORDERS

Transmission infrastructure is not only the backbone of an electric utility, it's also the nerve center of our nationwide electric grid. While ALLETE beefs up its transmission assets for the benefit of its Minnesota Power customers, it's also strategically investing in the regional grid to promote electric reliability and renewable energy for the future.

With a transmission network in its service territory that's expanded to more than 2,500 miles (115 kilovolts or higher), Minnesota Power and its engineers understand the critical nature of transmission assets in a northern climate. In recent

years, ALLETE has ventured beyond its utility service territory to make additional transmission investments.

On the last day of 2009, the company purchased a 465-mile direct current transmission line from Center, N.D. to Duluth, Minn. to carry renewable energy eastward from the Bison Wind Energy Center now under construction near New Salem, N.D. A 22-mile transmission line connecting the wind farm's new substation to the DC Line terminal in Center was completed and energized in 2010.

In November of 2010, Minnesota Power executives posed

with shovels at the groundbreaking for a new transmission line between Monticello and St. Cloud. This new transmission line – well beyond Minnesota Power’s service territory -- is being constructed by a consortium of 11 Minnesota utilities called CapX2020. This initiative, formed to upgrade and expand the regional electric transmission grid, is also jointly financing a longer transmission line between St. Cloud and Fargo, N.D. and also a new transmission line linking Bemidji and a Minnesota Power substation near Grand Rapids.

Five years before the CapX2020 groundbreaking near St. Cloud, ALLETE signed an agreement with Wisconsin Public Service Corp. and WPS Investments, LLC, to become an eight percent equity investor in the American Transmission Company, the first multi-state, transmission-only utility in the U.S. ALLETE’s investment in ATC has expanded to more than \$93 million.

■ **Transmission upgrades needed now**

Electricity consumption has doubled since 1980 in Minnesota, Wisconsin and the Dakotas, according to data from the U.S. Department of Energy. Yet the electric transmission grid in the Upper Midwest hasn’t had a major upgrade in nearly 30 years. From an operational as well as strategic standpoint, it makes sense for ALLETE to beef up the electric grid.

Planning studies show that customer demand for electricity in the region will increase by 4,000 to 6,000 megawatts (MW) by 2020 – more than today’s system has the capacity to deliver. New transmission lines will be built in phases designed to meet growth in electric demand, as well as to support renewable



This new substation, built in 2010, serves the Bison Wind Energy Center.

energy expansion.

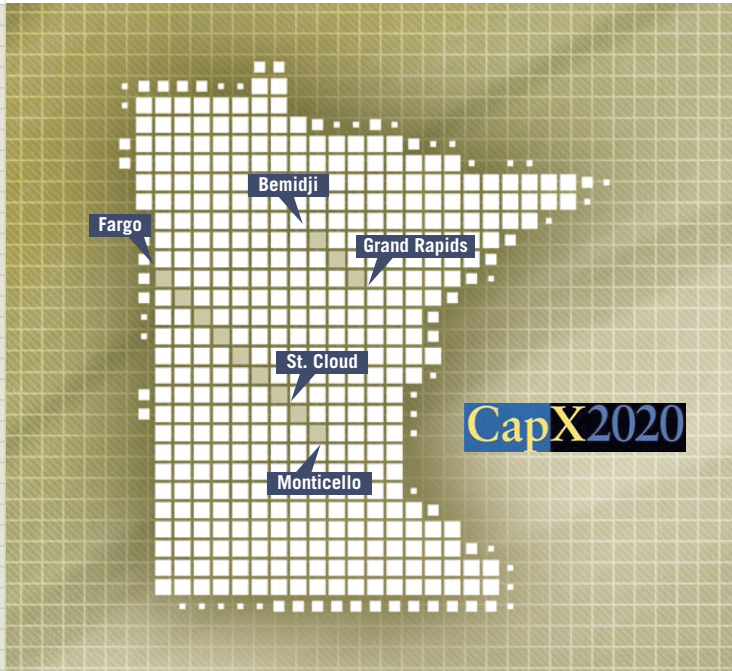
With the introduction of the open wholesale electricity marketplace in the late 1990s, the transmission system is required to move electricity more than just locally. It now must be able to move large quantities of power into, out of and through a greater region so that utilities have the option to buy and sell electricity when it’s economic to do so. Minnesota Power and Superior

Water, Light & Power are members of the Midwest Independent Transmission System Operator (MISO), the primary market for electricity in the Midwest.

While both ALLETE electric utilities retain ownership of their transmission assets and control area functions, their transmission network is under the regional operational control of MISO, which standardizes rates, terms, and conditions of transmission service across a broad region, which spans 15 states and one Canadian province. ALLETE’s two electric utilities are also members of the Mid-Continent Area Power Pool, which maps out future transmission needs and ensures equal access by its participants to the transmission system.

■ **CapX2020: Energy-centric investment for ALLETE**

Groundbreaking for the 345-kilovolt CapX2020 transmission line linking Monticello and St. Cloud represented for ALLETE the beginning of a major investment in transmission infrastructure, with ramifications for renewable energy and electric reliability. The 28-mile long line was the first CapX2020 project to be approved by the Minnesota Public Utilities Commission (MPUC). Construction is expected to be complete by the spring of 2012.



NEW TRANSMISSION INVESTMENTS

CAPX2020

- Joint initiative of 11 utilities to upgrade, expand grid
 - ALLETE investing \$100 - \$125M in 3 projects
 - Current cost recovery

AMERICAN TRANSMISSION COMPANY

- ALLETE'S equity investment exceeds \$93 million

Minnesota Power plans to initially participate in three CapX2020 projects, the Monticello-St. Cloud line, the extension of the line to Fargo, N.D. and a new 230-kilovolt line between Bemidji and a Minnesota Power substation at its Boswell Energy Center near Grand Rapids. The MPUC granted a route permit for the Bemidji-Boswell project in October of 2010. Construction began in early 2011 and is scheduled to be completed by 2012.

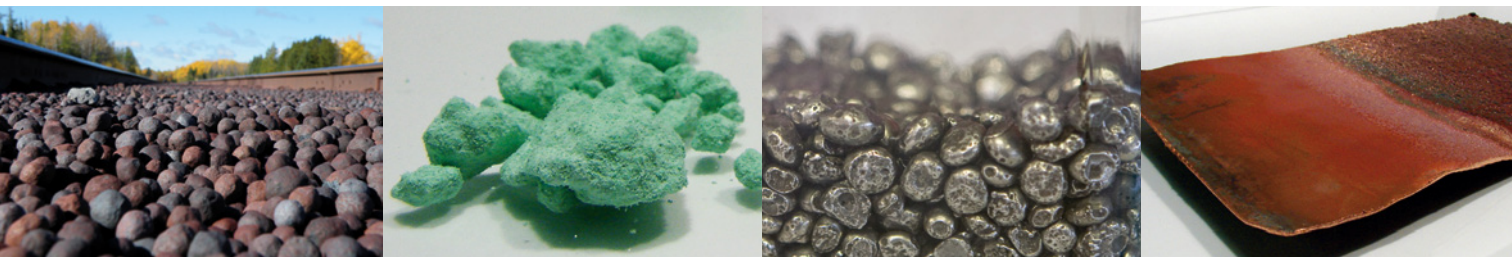
Based on projected costs of the two transmission lines and the percentage agreements among participating utilities, Minnesota Power expects to invest between \$100 million and \$125 million in the CapX2020 initiative through 2013. CapX2020 project costs are eligible for current cost recovery; the company has petitioned the MPUC to recover project costs under a “transmission factor rider.”

These initiatives will not only strengthen the reliability of the regional electric grid, they exemplify a lynchpin of ALLETE strategy: investing in energy-centric growth.

▪ ALLETE investment will grow as ATC expands

In January of 2011, ALLETE invested an additional \$800,000 in ATC, and the company expects its total investment balance to increase by approximately \$6 million through the remainder of 2011. ATC has identified \$3.4 billion in future projects needed over the next decade to improve the adequacy and reliability of the electric transmission system and also to meet regional needs based on economic benefits and public policy initiatives for renewable energy.

This investment is expected to be funded by ATC through a combination of internally generated cash, debt, and investor contributions. As additional opportunities arise, ALLETE plans to invest more in ATC through general capital calls based on the company's ownership interest. ■



CUSTOMER GROWTH

NONFERROUS MINING, NEW PROCESSING BRING POTENTIAL LOAD

Minnesota Power's prospects for selling a lot more electricity to its industrial customers rely on a number of potential developments within its service territory: further refinement of iron nuggets, mining of copper and precious metals, production of more taconite, construction of a new steel mill and the progress of a new way to sift through old ore tailings.

The largest division of ALLETE staked its claim to energizing natural resource development in northern Minnesota more than a century ago. Today, innovative ways of using those resources have led to new power contracts and raised expectations for further electric load growth at Minnesota Power.

A variety of projects with potential value for ALLETE, many of them backed by large international companies, are in various stages of development on the Iron Range northwest of Duluth, Minn. Following is a description of them, listed in the order of progress to date:

■ Mesabi Nugget

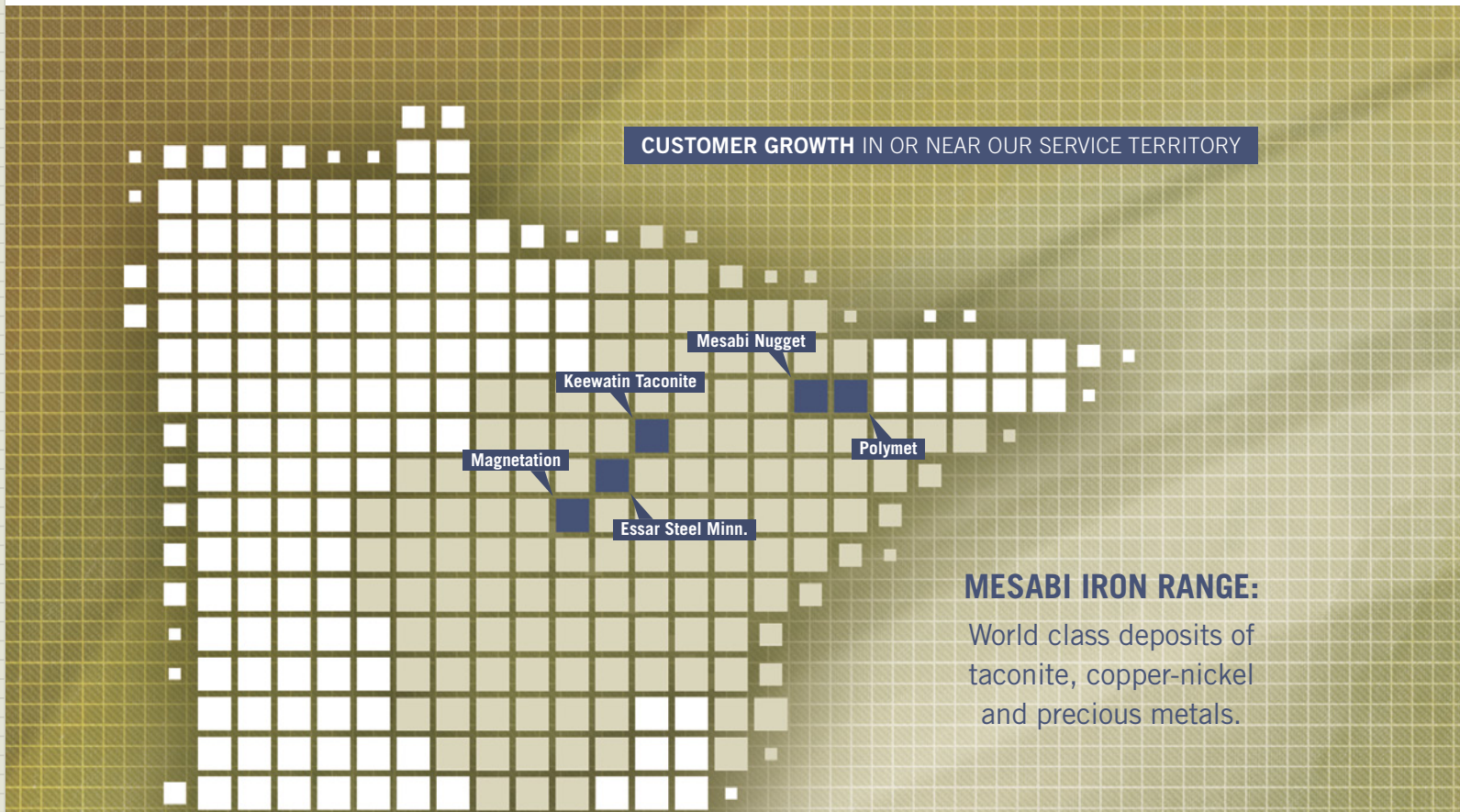
Construction of the \$260 million commercial iron nugget plant – the first in the world -- is essentially complete, with the first 96 percent iron-rich nuggets produced in January 2010. Steel Dynamics, Inc. owns 81 percent of Mesabi Nugget, and Kobe Steel Lt. of Japan, which developed and patented the Itmk3 process, owns the other 19 percent. Ramp-up activities will continue in 2011, with full production levels expected by the end of this year. Mesabi Nugget is pursuing permits to mine taconite on lands formerly mined by Erie Mining Company and LTV Steel Mining Company near Hoyt Lakes, Minn. If permits to mine are secured as expected, mining activities would begin in 2012, allowing Mesabi Nugget to supply its own taconite concentrates. This would result in increased electrical loads for Minnesota Power beyond the 15-megawatt power supply contract with Mesabi Nugget that runs through 2017.

PICTURED ABOVE: Taconite pellets, nickel-cobalt hydroxide, iron nuggets and copper plate.

▪ **PolyMet**

Minnesota Power executed a contract in 2006 to provide all PolyMet's electric service needs through at least 2018 at its proposed copper, nickel and precious metals mine. But permits and approvals for this non-ferrous mining operation have been slow in coming. A Supplemental Draft Environmental Impact Statement begun in 2010 further addresses environmental issues, most notably those dealing with a land exchange

between PolyMet and the U.S. Forest Service. Release of this SDEIS is expected in mid-2011, to be followed by a public review and comment period. Presuming successful completion of this process and subsequent issuance of permits, Minnesota Power would begin to supply PolyMet between 45-70 MW of power through the long-term power supply contract. PolyMet is the first of several potential non-ferrous mining projects that could occur in Northeastern Minnesota.



■ Keewatin Taconite

United States Steel Corporation, ALLETE's largest customer, announced in 2008 its intent to restart a taconite pellet line at its Keewatin Taconite processing facility in Keewatin, Minn., but the economic recession delayed plans for the start-up. Idled since 1980, the pellet processing line could be restarted and updated as part of a \$300 million investment, bringing about 3.6 million tons of additional pellet making capability to northeastern Minnesota. The Final Environmental Impact Statement has been judged to be adequate by the Minnesota Department of Natural Resources, and approval by the US Army Corps of Engineers is expected in the first quarter of 2011. This expansion project could come on line in 2014-2015.

■ Essar Steel Minnesota

Controlled by India-based Essar Steel Holdings Ltd., this major project on Minnesota's Iron Range involves a conventional open pit taconite mine, a concentrating and pellet plant operation, to be followed by a direct reduced iron plant and a mill to cast steel slabs. The operation is located in the small town of Nashwauk, Minn., which is a municipal customer of Minnesota Power. A minimum 10-year electric service agreement between the city of Nashwauk and Minnesota Power was signed in early February of 2011. Upon regulatory approval, the agreement becomes effective when the current one expires. It includes electric service to Nashwauk as well as any development within the municipality, including electricity for Essar Steel's proposed 100MW taconite facility currently under construction. The electric service agreement could also include approximately 300 megawatts of power for Essar's proposed direct-reduced iron and steel making facility anticipated to come online in 2015.

Essar has secured the rights to mine an iron ore body it considers capable of supporting low cost pellet and direct reduced iron production. Essar Steel Minnesota plans to transform direct-reduced iron into steel in an electric arc furnace. Essar Steel Minnesota was acquired by Essar Steel Holdings Ltd in 2007. Essar Steel is a global producer of steel with operations in India, Canada, the U.S., the Middle East and Asia. The Essar Steel Minnesota project, upon successful completion, would be the first ore-to-finished steel producer on the Iron Range.

■ Magnetation

Also located in Nashwauk, Minn., the privately-held Magnetation, founded in 2006, is a specialty iron ore mining company that uses a proprietary mineral processing technology to recover high-grade iron ore concentrate from low-grade hematite iron resources, such as those found in tailings basins, ore stockpiles, and virgin ore bodies. Magnetation's development efforts began in 2008 at its first plant near Keewatin, Minn., and shipped its first concentrate in February of 2009. Early in 2011, Magnetation reached an agreement with Cargill Inc. under which the companies will explore opportunities to develop and utilize Magnetation's proprietary mineral processing technology. As part of the agreement, Cargill has the exclusive, worldwide right to jointly develop and apply the technology with Magnetation, and the rights to market the recovered iron concentrate to its international iron ore customers. Magnetation's patent-pending Rev 3 Separator technology allows mining operators to recover a marketable, high-grade iron ore concentrate from low-grade hematite iron deposits. ■

EFFICIENCY/TECHNOLOGY

INNOVATION AND PLANNING STEER ALLETE IN NEW DIRECTIONS

Major projects at an energy company frequently take years of advance planning. In the time between drawing board and ribbon-cutting or the span between construction and renovation, the advancement of technology can create efficiencies.

The following projects by ALLETE companies, either undertaken recently or in the planning stages, show how a nimble and forward-looking company can convert careful planning and technology into operational efficiency.



Bison shifts to direct drive wind turbines for phase two

Minnesota Power's biggest project of 2010, the first phase of the Bison I Wind Energy Center, went online just before winter arrived in south-central North Dakota. The company is shifting into 2011's second phase of Bison by upgrading to even more efficient new direct drive turbines that will deliver more wind energy for the same cost.

This year MP will install 15 new 3 -megawatt turbines manufactured by Siemens instead of the 17 turbines of 2.3 megawatts originally planned for phase two of Bison I. The new turbine arrangement is expected to generate an additional 10,000 MW-hours of energy per year.

The new SWT-3.0-101 direct drive wind turbines were described as "game-changing" by the CEO of Siemens' wind

power business unit in a news release announcing Minnesota Power's order for the new equipment. Siemens' direct drive wind turbine features a

permanent magnet generator but no gearbox. With the number of parts in the turbine reduced by half, the direct drive technology has the potential to reduce maintenance time, resulting in higher turbine availability.

"Embracing new technology reflects our commitment to providing greater value to our customers and shareholders," says ALLETE CEO Alan R. Hodnik.



New wind turbines to be installed this year at the Bison wind farm will be more efficient than those that went online in 2010.

Boswell 4 emerges as a more powerful and efficient generator

The largest, most comprehensive planned outage at Unit 4 of Minnesota Power's Boswell Energy Center since it was commissioned in 1980 was successfully completed late in 2010.

Unit 4, the largest generator in the MP fleet, emerged as a more powerful and efficient generator as 93 separate projects overseen by 17 managers were undertaken by about 600 contract employees. Installation of a more efficient steam turbine resulted in more power capacity.

Unit 4 achieved an increase of about 60 megawatts (MW) more than the 520 MW typical before the outage work began. In addition to the new steam turbine, other major tasks included boiler tube replacements, emission control upgrades and additions, a generator rotor rewind, an exciter rebuild, the replacement of condenser tubes and cooling tower work.

Another bright spot in the overhaul of Unit 4 was the use of natural gas for ignition, rather than fuel oil. Natural gas burns cleaner and is currently a better value for customers in terms of cost per energy unit.

Novel wastewater control technology removes more mercury

Minnesota regulators in the fall of 2010 approved Minnesota Power's design of a novel filtration technology for the wastewater discharge at Laskin Energy Center. Once complete, the technology will cleanse even further the process water discharged to the Partridge River under Laskin's National Pollutant Discharge Elimination permit.

Minnesota Power engineers and scientists expect that the



Madelen Schuemann, right, thermal operations manager, inspects the Boswell Unit 4 boiler with a contractor.

unique water treatment system will reduce mercury levels to under one part per trillion – less than the background levels in surrounding waterways. The mercury reduction efforts at Laskin began with pilot-scale testing in 2006. Laskin, located in Hoyt Lakes, Minn., discharges more than a million gallons of water every day.

By using a metal-scavenging chemical called an organosulfide to bind these miniscule mercury particles to larger particles, the company's research team was able to remove almost all of the mercury through multi-media filtration units in a series of pilot tests. The full-scale system to be installed at Laskin consists of eight 72-inch carbon steel tanks packed with sand of various-sized filter media, including garnet, sand, and anthracite.

During the testing, MP technicians experimented with many kinds of sand filtration, different flow patterns, various methods of "backwashing" the water, and testing of additional technologies including ion exchange, ultra-filtration, and adsorption. The combination of organosulfide dosing and multi-media filtration combined excellent mercury removal rates with operational feasibility, the study's two main goals. The end result is technology that should reliably provide one of the best mercury removal rates for wastewater in the nation.

"The technology itself isn't really new," said Laskin Thermal Business Operations Manager Lainie Plotnik. "It's the application our people have found to apply this to water-borne mercury that's new. That in itself is a breakthrough."

A building to house the mercury-reduction equipment has been constructed at Laskin, and the new filtration equipment is expected to be installed and operational in the summer of 2011.

Federal grant will help 'Smart Grid' pilot project

Minnesota Power has been making prudent investments in a “smarter” electric grid for more than 30 years, so when the company received a U.S. Department of Energy (DOE) “Smart Grid Investment Grant” in 2009, it was another step in a long progression of deploying innovative technology to promote electric reliability and the wise use of electricity.

For example, the company in 1978 became the first in the U.S. to use utility-owned fiber-optic cable in its electric distribution operations. Presently, the focus is on optimizing the use of digital technology.

The 2009 DOE matching grant of \$1.5 million was for a Smart Grid-AMI (Advanced Metering Infrastructure) Pilot Project, but Minnesota Power’s Smart Grid project is broader than that. It encompasses improvements to the utility’s longstanding “dual fuel” load control program, in which customers who qualify can receive lower electric rates for using backup heating systems when conditions warrant.

The DOE grant will also enhance an outage management system with the goal of increasing electric reliability for customers and incorporate a meter data warehouse to evaluate customer usage information for load research purposes.

Minnesota Power is also developing a modest, research-based smart meter pilot program to test customer response to enhanced usage feedback that advanced meters enable. This approach will provide valuable insight about the interaction between customers and these emerging technologies, recognizing that advanced metering applications are in the early stages of consumer involvement.

The pilot project will initially test advanced meter technology and consumer behavior in the homes of about 2,000 residents who volunteer. The pilot will be coordinated with Minnesota Power’s broader “Power of One” conservation program.

New reservoir in Superior, Wis. uses ultraviolet system



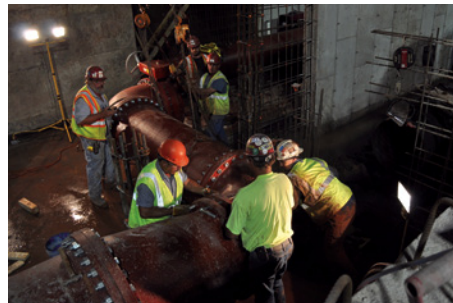
Painting and landscaping are all that’s left to complete at a new 1.5 million gallon water reservoir adjacent to the Superior Water, Light & Power treatment plant in Superior, Wis.

Construction of the new reservoir was substantially complete and operational in mid-December of 2010. The reservoir gives SWL&P, an ALLETE subsidiary, additional onsite storage capacity of finished water.

Throughout the summer and fall of 2010, contractors assisted by a 100-ton crane and guided by SWL&P employees poured concrete, laid block and installed heavy-duty pipe for the project. SWL&P needed to replace its two existing underground water reservoirs to accommodate the state of Wisconsin’s plan to add a turn lane at a busy Superior intersection adjacent to the SWL&P plant.

The new 1,500,000 gallon reservoir was constructed on the same site where a million-gallon reservoir had existed since its construction in 1911. The project was completed in 2010 to accommodate the state’s plan to reconstruct the intersection in 2011. The new turn lane will be built over the site of a second SWL&P reservoir of 300,000 gallons built in 1899.

Both of these reservoirs have outlived their useful lives. The new reservoir rests



Superior Water, Light & Power employees and contractors connect a water intake pipe during construction of SWL&P’s new reservoir.

about five feet underground and rises about 15 feet above ground level. It will provide for overflow capabilities that, during plant operation, will allow excess water in the tank to run off and drain into a storm sewer, thereby avoiding high pressure that could structurally damage the reservoir.

The new reservoir will use ultraviolet light to help purify the water in the treatment process. High intensity ultraviolet bulbs were installed in one of the reservoir's chambers to build additional safety and reliability into the water supply.

Using ultraviolet purification will allow the Wisconsin utility to use less chlorine in the treatment process. Water will pass through an apparatus that looks like a pipe with fluorescent lamps going through it. Chlorine will be added later, in the distribution area.

The rectangular reservoir is shaped into two separate sections so that either half of the reservoir can be taken out of service for maintenance at any time. SWL&P was able to keep water flowing to its 10,000 water customers throughout construction.

When construction began, one of the first obstacles was to dismantle the 99-year-old concrete roof of the old reservoir. Much of the old cement was eventually used as fill material.

A landmark date in the project came August 14, when a huge new water intake pipe was fitted into the new structure below ground. An above ground storage tower constructed in south Superior in 2008 helped accommodate the transition to the new reservoir.

BNI  **COAL** **A change of direction at ALLETE's lignite mine in North Dakota**

ALLETE subsidiary BNI Coal is in the process of teeing-up the largest reinvestment since its opening in 1970. By taking major steps to literally change directions, BNI is moving to increase efficiency for the long haul.

The BNI operation in Center, N.D. mines about four million tons each year of lignite, a brownish-black fuel with a higher moisture content than bituminous coal. The BNI mine is adjacent to the Young Generating Station, which uses lignite to produce power for two electric generating cooperatives, Minnkota Power and Square Butte.

BNI's first Center mining pit was opened 40 years ago just west of the company's office and shop facilities in the middle of the company's 600-million-ton lignite reserves. Excavation and reclamation has proceeded in a westerly direction for the last four decades. Now, the company is preparing to take half the company's mining operation in a southerly direction while continuing its steady westward expansion.

BNI is seeking approval from state and federal agencies to add 10,000 acres to its mining program, which is equivalent to the size of the area already mined in the last 40 years. The permitting process, which started about three years ago following a long-range mine study, has involved baseline analyses of vegetation, wildlife, and archaeology in the path of future mining, as well as groundwater surveys and analytical drilling.

BNI plans to submit permit applications to the North Dakota Public Service Commission later this year. It's expected to take two years for final approval, after which mining in the new area could begin in the first quarter of 2014.

Efficiency is a key component driving BNI's change of direction. One reason why the company has been a low-cost producer of lignite in the state is the mine's proximity to the Young Station. Over 40 years, the draglines and haul trucks have been slowly moving further from the Young Station's boilers. It costs about 25 cents to move a ton of lignite one mile.

BNI has ordered "pre-stripping" equipment capable of removing larger amounts of overburden from the lignite in the proposed new mine areas. ■

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30 West Superior Street | Duluth, Minnesota 55802-2093
Shareholder Services | 1-800-535-3056 or 218-723-3974
www.allete.com

Listed on the New York Stock Exchange: ALE