Consumers Energy
Count on Us

DTE Energy

Ludington Pumped Storage Plant

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Ludington Pumped Storage Plant
3525 South Lakeshore Drive
Ludington, MI 49431

Owned by Consumers Energy and Detroit Edison.
Operated by Consumers Energy.

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Visitors can view the plant's 842-acre reservoir from an observation deck.

Ludington Pumped Storage has a capacity of 1,872 megawatts.

Ludington
Pumped Storage Plant
Producing Power When You Want It ...

From the outside, it looks like a grassy hillside topped by an inviting crystal blue lake. But at the base of this man-made masterpiece, huge turbines generate electricity for thousands of Michigan consumers.

Welcome to the Ludington Pumped Storage Plant — one of the world's biggest electric batteries — which celebrated its 30th anniversary in 2003.

An engineering marvel, Ludington enables Consumers Energy and Detroit Edison — the joint owners — to provide safe, reliable and economical energy at a moment's notice.

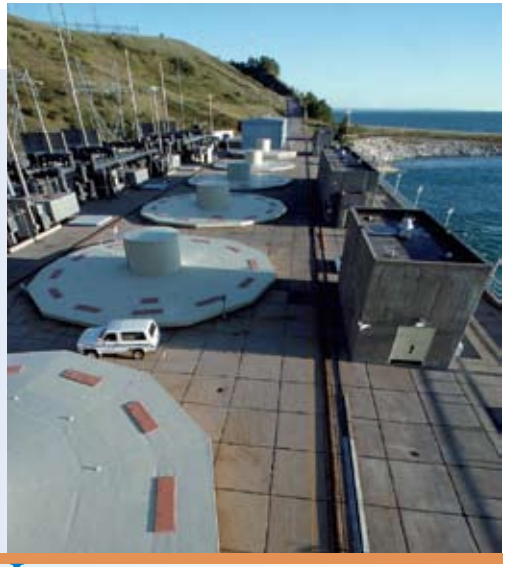
The secret is a 27 billion gallon reservoir of water — the size of 2 million backyard swimming pools — and a set of six turbines that double as giant water pumps.

At night, when customer demand for electricity is low, Ludington's six reversible pump-turbines move Lake Michigan water 363 feet (about 35 stories) uphill through six large pipes to the reservoir. During the day, when customer demand for electricity is high, water is released from the reservoir to flow back downhill through the large pipes (penstocks), turning turbines in the powerhouse to make electricity.

This electricity is sent to customers throughout Michigan's Lower Peninsula. The total output is enough to power a city of 1.4 million people.

Because it's "storing" the potential energy in the reservoir, Ludington can begin generating electricity within a few minutes. Powering up a coal- or oil-fueled plant takes much longer, because first, water must be heated to make steam that turns the generator's electricity-producing turbines.

Ludington's relatively simple technology enables the plant to respond quickly to the daily, weekly and seasonal highs and lows of Michigan's energy demand.



Ludington's six turbines help provide power within minutes during peak electric demand.

Power generated at Ludington is distributed throughout Michigan's Lower Peninsula.

The plant also saves customers money, because it reduces the need to buy more expensive power from an outside supplier.

Chances are you don't think about Consumers Energy or Detroit Edison when you turn on your appliances or flick the switch on your central air conditioner. But we're there when you want us — thanks to Ludington Pumped Storage. Operated by Consumers Energy employees, Ludington is an important member of Michigan's family of electric generating plants.

Deer freely roam on the expansive and hilly grounds.

Environmentally
Safe and Friendly

Like solar, wind and geothermal energy, pumped storage is one of the most environmentally friendly forms of electrical generation. The plant itself does not consume fossil fuels such as coal or oil or require the expensive handling of waste materials. The power used to pump water into the reservoir does come from power plants using other fuels.

Since Ludington is located next to one of the world's largest and most beautiful expanses of fresh water — Lake Michigan — great care has been taken to protect fish during plant operations. Each spring, workers install a 2 1/2-mile-long barrier net to keep alewives, yellow perch, salmon and trout away from the plant. Workers remove the net in the fall, since Michigan's severe winters would damage it. Also, fewer fish are near the plant in winter. Even though it costs $1.6 million annually to install, remove and maintain the net, it has proved effective in protecting fish, while enabling Ludington to continue as an economical generator of electricity.

Employees also help make the Ludington site an enticing area for wildlife by protecting and managing local plants and wildlife habitats. These efforts maintain the beauty of the site and its surroundings.

In a joint project with the Oceana Audubon Club, volunteers have installed dozens of bluebird boxes around the plant. Bluebirds, tree swallows, chickadees and sparrows have made homes in the boxes. They also have planted pine and mountain ash trees and autumn olive bushes.

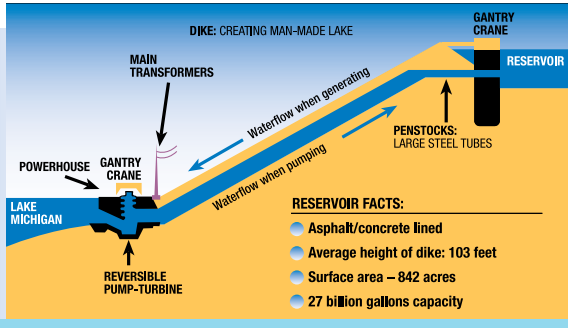
The national Wildlife Habitat Council (WHC) certified the bluebird nesting box project. WHC is a coalition of industry, environmental and conservation groups, which encourages companies to enhance and protect their lands for wildlife.

Wildlife enhancement is a priority for Ludington plant employees.

An Engineering Marvel

During Michigan's Sesquicentennial in 1987, the Michigan Society of Professional Engineers cited Ludington Pumped Storage as one of the 10 outstanding engineering achievements in the state's 150-year history.

The American Society of Civil Engineers honored the facility as the Outstanding Engineering Achievement of 1973. The award has honored the Gateway Arch in St. Louis, the World Trade Center in Manhattan and the St. Lawrence Seaway.



How pumped storage works.

Construction and Operations

It took four years and a lot of ingenuity to turn a section of the Lake Michigan shoreline into one of the world's most remarkable power resources, while preserving much of the shoreline's natural beauty.

From 1969-73, the town of Ludington overflowed with 2,800 engineers, electricians, welders and other workers on the project.

Operators guided bulldozers and other earth-moving equipment year-round through wind, freezing rain, heavy snow and blazing sun to carve out the 110-foot-deep reservoir.

Six steel penstocks, about one-fifth of a mile long and each large enough to drive an 18-wheel semi-truck through, were designed so a maximum 33 million gallons of water could gush through each minute, using gravity to spin the plant's turbines. Those turbines, each 433,000 horsepower, turn at 112.5 revolutions per minute. That's more horsepower than an aircraft carrier engine.

On a foggy day, it's impossible to see across the expansive reservoir, which is 2.5 miles long and 1 mile wide. Its 842-acre surface area could hold about 820 football fields.

The reservoir sits 950 feet above sea level and overlooks Lake Michigan, which is 579 feet above sea level. The dike around the reservoir stretches six miles.

When the reservoir is full, the plant can use the water to generate electricity for more than 8 hours. Each of the six turbines lowers the reservoir about 1 foot per hour.

When constructed, the $327 million Ludington Pumped Storage Plant was the largest facility of its kind in the world. It remains one of Consumers Energy's largest electric generators.

Consumers Energy owns 51 percent of the plant, and operates the facility. Detroit Edison owns 49 percent.

Plant output is efficiently and safely coordinated with customer need.

Employees
at the Controls and Behind the Scenes

The technical and engineering aspects of Ludington sometimes overshadow an important and crucial resource: people. Forty-one employees make Ludington the success it is.

In the control room, they monitor plant operations. To match power generation with customer need, they communicate with internal and external sources representing system requirements for both Consumers Energy and Detroit Edison, as well as neighboring utilities.

In the plant, employees maintain equipment and make sure it's operating properly. Their vigilance and awareness of safety help them find more economic and environmentally friendly ways to improve processes while still preserving system reliability.

Safety
First and Always

Maintaining equipment and making sure it operates properly is one of the major duties in the plant.

The plant has an extensive public safety program, including frequent monitoring and inspections of the condition of the reservoir and its dike.

Monitoring instrumentation helps ensure the dike is operating safely.

Community Support

Ludington plant employees also donate personal resources and time to the community.

Community activities include: giving generously to the Mason County United Way and raising funds for the local hospice or the Mason County Mental Health Foundation. Other activities include: serving as a reserve sheriff's deputy and helping obtain landing lights for a helicopter pad for Memorial Medical Center in Ludington.

The plant and its employees contribute to the Ludington area in many other ways, too.

Employee involvement strengthens their communities.

The nearby Mason County Campground offers outdoor recreation.

Annual property taxes for the plant exceed $10 million. Those monies help support education, services and other opportunities for community residents. Some of the dollars go to Ludington area schools, West Shore Community College, the intermediate school district, and toward county and township services.

The plant's operation and maintenance spending total $11.6 million a year. These expenses include employee salaries, which pump money back into the community. Expenses also include plant materials and supplies, such as valves, fittings, piping, etc. that could be purchased locally.

Ludington employees are proud of the jobs they do in producing electricity for customers and in making their community a better place in which to live.

Quick Facts

- The Ludington Pumped Storage Plant was built from 1969-1973 at a cost of $327 million.
- The plant can produce 1,872 megawatts of electricity — more than double the capacity of any single unit on Consumers Energy's system.
- The plant can power a city of 1.4 million people.
- By displacing higher-cost generation, Ludington saves Consumers Energy and Detroit Edison customers millions of dollars a year.
- The reservoir is 2.5 miles long, 1 mile wide and 110 feet deep. It has a surface area of 842 acres.
- Annual taxes exceed $10 million, which are converted into community and school improvements.
- Total annual operation and maintenance spending is about $12 million, which through salaries and materials puts money back into the community.
- Forty-one area residents are employed at the plant.
- The plant is a tourist attraction with recreational facilities such as the Lake Michigan and reservoir scenic overlooks, Mason County Campground and Picnic Area, and periodic open houses and group tours.
- Consumers Energy owns 51 percent and operates the plant. Detroit Edison owns 49 percent.