

Energy Efficiency in
Municipal Water
and Wastewater
Treatment

**SAVING ENERGY
EQUALS
SAVING MONEY**

**Iowa
Association of
Municipal
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North Liberty Water Utility Saves Energy and Money with Off-Peak Pumping and VSPs

City of North Liberty

Mike Keating, Water Department Superintendent

Population: The community is experiencing a growth phase and estimates 7,100 citizens as of March 2004 (up from 5,367 in the 2000 census).

Treatment System Profile

North Liberty gets approximately 75% of its water from two Jordan aquifer wells (approximately 1,850 feet deep), and the remainder from four Silurian aquifer wells (approximately 500 feet deep).

Water is pumped from the wells into a ground storage system from where the blended Jordan and Silurian water discharges to an up flow aeration process for iron removal. After this step, water goes through the two iron removal filtration systems. Next, a portion of the water goes through zeolite softening that prevents corrosivity and varies with demand. Polyphosphate and chlorine are injected at the effluent point of the treatment process as it enters the distribution system and fills two 200,000 and 400,000 gallon water towers.

The plant was updated two years ago with the addition of a zeolite softening process, a second filter system, and two variable speed, high service pumps. The softening system benefits both the customers and the water department.

Energy Efficiency Program

North Liberty's Supervisory Control and Data Acquisition (SCADA) system controls the entire plant and has been upgraded and in use for eight years. The plant utilizes off peak pumping and filling of the water towers to take advantage of cost and energy savings. The SCADA system allows water operators to control operations by time of day, by water tower level, or by a combination of both to reflect the needs of the community, which allows the facility to operate as efficiently as possible.

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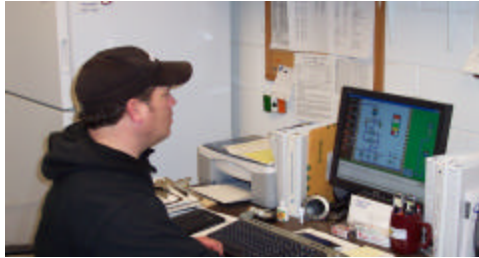
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The only exception to this timetable is when operators must circulate water in the tower to prevent freezing.

The SCADA system was programmed to conduct the majority of pumping during off peak hours that run from

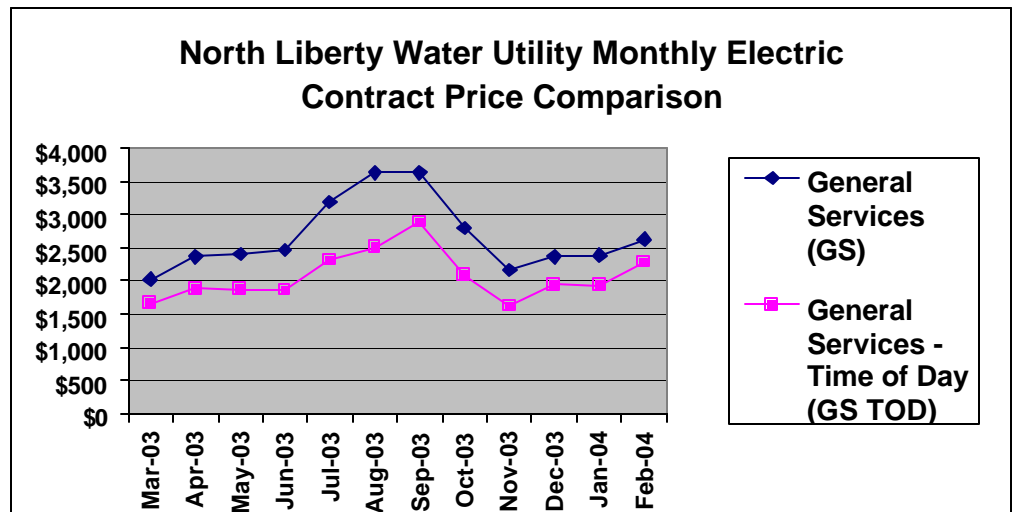


Mike Keating views SCADA system at North Liberty.

8 pm to 8 am in the summer, and 9 pm to 9 am in winter.

When SCADA was first installed, the utility formed an arrangement with Alliant Energy, the local electric provider, to take

advantage of off-peak energy usage. The graph below shows the price comparison between the General Services Time of Day contract that North Liberty has with Alliant Energy for off-peak pumping and the higher charges for a General Services contract. At that time, the city contacted the utility and requested this program, explaining that they wanted to reduce energy costs by running the pumps predominately at night and as little as possible during the day. "We are trying to save money by reducing energy costs. This will, in turn, benefit the city and the community," said Mike Keating, Water Department Superintendent.



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Soft start pumps are used on all of the wells to reduce the torque on the motors thus relieving the startup stress on the motor and machinery. This reduction in torque allows the motors to have a smooth, longer acceleration rate. Two high service variable speed pumps are used in the plant that pull water out of the ground storage tank and push it through the plant and water treatment processes. These soft start pumps prevent water hammer in the system and fluctuation in water pressure.

Future Plans and Suggestions for Water Utilities of Similar Size

North Liberty plans to replace regular light bulbs with florescent bulbs. No savings estimate is available.

Mr. Keating offers this advice for other cities, "My recommendation for Iowa water treatment facilities is that each should look at their operation to determine if they can make changes to reduce energy consumption and costs, taking into consideration that each plant is unique and not all plants operate in the same manner. This works for us because we have enough capacity with our water towers. This allows us the luxury of running our pumps during off peak hours."



Mike Keating checking gauges at NLWD.

Acknowledgements

We are grateful to Mike Keating at the North Liberty Water Department for providing us with the information needed for this case study.