

CASE NOTE

# ACS2000 reduces energy consumption and maintenance costs with quick payback at wastewater treatment facility



The City of Beloit in Wisconsin sought improved efficiency and process control for an aeration blower application that would save energy and improve total lifecycle costs.

ABB's ACS2000 medium voltage drive was selected for the job.

## The City of Beloit Water Pollution Control Facility (WPCF)

Beloit is a mid-sized community in southern Wisconsin, with a waste water treatment facility currently treating an average of 4.6 million gallons a day. The City of Beloit Water Pollution Control Facility (WPCF) uses aeration blowers to supply air to the biological process used to remove dissolved organic pollutants.

As the main consumer of electricity in a wastewater treatment plant, usually consuming more than half of the total electric power used at these plants, the aeration system significantly influences operational costs.

The WPCF had an existing blower with an inlet throttling valve, a common solution for blower control. However, variable speed drives offer significant advantages over these traditional methods of flow control.

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### Highlights

600 HP (447 KW), 3600 rpm DOL motor

ACS2000 4kV drive with Active Front End technology for direct connection to the power supply (without transformer)

Plant energy consumption reduced by 15 percent

Power consumption by aeration blowers dropped by over 30 percent

Projected annual energy savings of \$75,000

Simple and quick installation and start-up

High reliability and soft start capability

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The WPCF was interested in the ACS2000's technical specifications and ease of installation as it does not require a transformer to connect to the power supply, minimizing harmonic distortion, eliminating medium voltage power factor correction, and offering a compact and lightweight footprint.

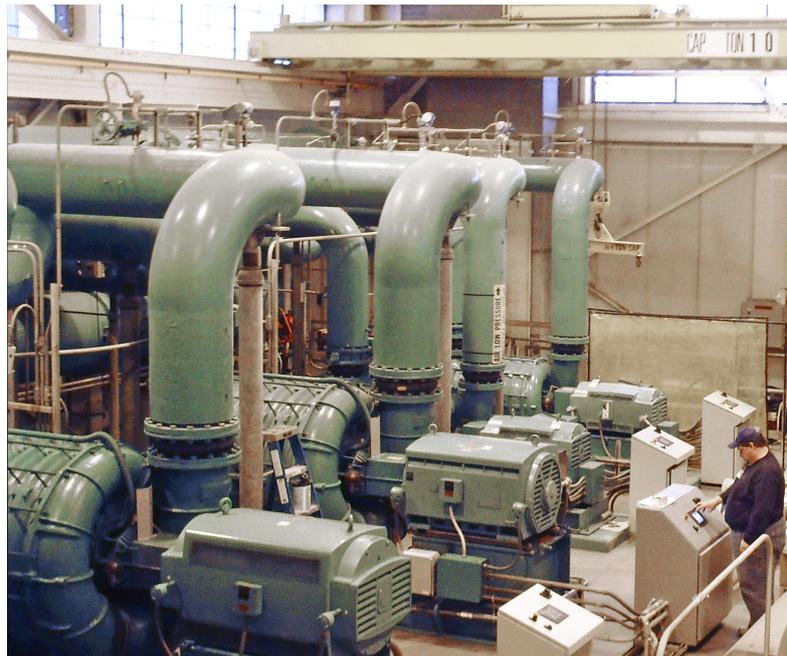
In addition, an ABB DriveMonitor™ was selected for monitoring, controlling and remote diagnostics via a wall-mounted PC connected to the telephone line.



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01 ABB's ACS2000 drive in the blower room

02 The City of Beloit WPCF aeration blower system

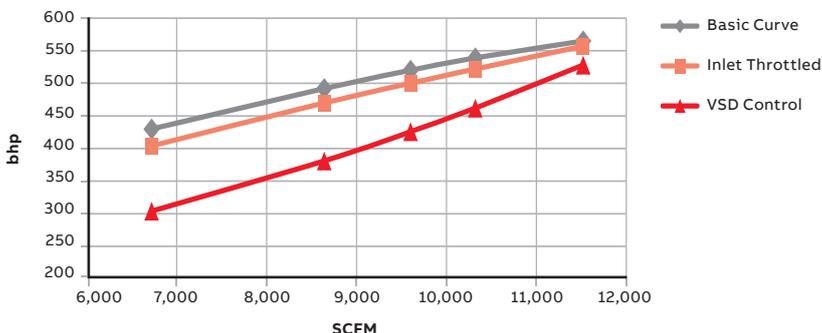


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### Fixed vs. variable speed control

Blower performance was evaluated at annual average conditions for the City of Beloit. The power consumption vs. air flow (SCFM) at these conditions was calculated for the uncontrolled blower characteristic curve, the existing inlet throttling control, and variable speed control.

The resulting average improvement in energy consumption on the 600 HP (447 kW) blower motor is shown in the chart below; these results are consistent with typical aeration blower system savings using variable speed drives in comparison with mechanical solutions for motor control.



### Energy savings with fast payback

The total plant power decreased by over a million kilowatthours once the ACS2000 was installed. At an average composite electric rate of \$0.062/kWh the annual savings of \$75,000 per year were significantly better than the original projection of \$48,000 per year.

As power costs continue to rise the economics of the variable speed drive retrofit are improved further. Projected payback estimate is currently at three years.

#### Key data of ACS2000 product family

Inverter type	Multilevel voltage source inverter (VSI)
Converter cooling	Air cooling
Power range	250 - 3680 kW
Output voltage	4.0 - 6.9 kV (higher on request)
Maximum output frequency	90 Hz
Converter efficiency	up to 97.5%
Power factor	Diode rectifier: >0.95 Active rectifier: 1
Type of motor	Induction motor, PM synchronous motor

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