



## Steam Turbine

*Utilize plant steam to generate up to one-third of your plant's electricity requirements*

In place of the pressure-reducing valve and desuperheater arrangement often used in the ethanol industry to reduce steam pressure and temperature to usable levels, ICM's Steam Let-down Turbine conditions the steam to meet the requirements of the evaporation area.

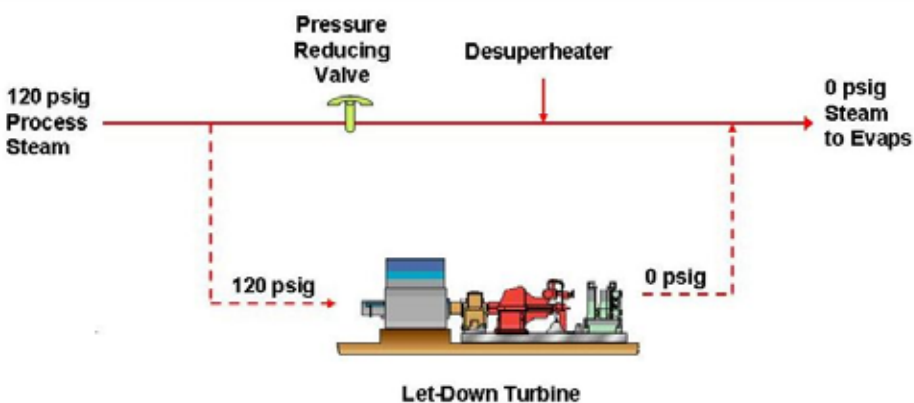
The let-down process generates enough electrical power to make a significant dent in your energy bill and increase your plant's self sufficiency. Depending on the size and equipment demands of your plant, you can expect this system to generate one-third to one-fourth of your plant's electrical requirements.

That reduction also cuts your plant's overall fossil fuel use by reducing power required from the utility, allowing you to integrate steam let-down as a potential component of a long-term plan to improve the carbon footprint of your plant.

## Capturing energy to increase your bottom line

In a typical ethanol plant, the boilers used to power the plant create steam that reaches about 350° F at 125 lbs. of pressure. Before that steam can be sent to the evaporation section of ICM-designed plants, which requires non-pressurized steam at 210° F, the temperature and pressure must be reduced. That reduction process, known as let-down, creates a significant potential energy source that's often underutilized. Plants that employ a Steam Turbine rather than the standard pressure-reducing valve (PRV) and desuperheater are able to capture that potential.

With ICM's Steam Turbine, your plant can harness the energy created by the let-down process and turn it to usable electrical power to help meet your plant's energy requirements.



Adding a Steam Turbine creates a parallel path to your plant's evaporators, allowing some of the steam to be directed through the let-down turbine instead of the PRV, creating electricity. This also reduces the steam to 210° F at atmospheric pressure, the exact requirements of your evaporators.

The Steam Turbine takes advantage of steam already produced by the plant boiler to create significant energy savings for your plant. It will require a small amount of additional natural gas energy to run the let-down turbine, but the increased electrical savings outweigh the additional expense. The table below illustrates expected production based on differing plant sizes.

Plant Size	40 MGY	50 MGY	110 MGY
Steam flow (lbs/hr)	34,000	42,000	77,000
Power generated	950 kW	1180 kW	2150 kW
Nominal rating of turbo generator	2 mW	2 mW	4 mW
Approximate installation cost	\$2.8 M	\$3.0 M	\$4.0 M



the energy of innovation™



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## Call us today to find out how your plant can turn lost energy into found savings

As the ethanol industry matures, ICM designed plants have a significant advantage. They're backed by a team of experts who have been supporting ethanol and renewable fuels for more than thirty years.

Our experience with the highs and lows of corn and ethanol pricing over the past three decades has proven to be an invaluable asset as we work with our customers to help them implement strategies to remain profitable in tight times. Learn more about how the Steam Turbine and the 30-plus other products and services ICM has developed can help your plant meet its financial objectives! Call our Customer Service department today.

**877.456.8588**

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## Durable and reliable equipment installed by professionals

ICM fully investigates each new piece of equipment or technology we employ in the facilities we engineer, and our Steam Turbine is no exception. We began installing Steam Turbines in 2006, and by the end of 2009, ICM will have installed ten of these systems. Steam Turbine installation includes:

- Facility expansion in the form of a new building or a building addition to house the Steam Turbine Generator
- All required concrete, piping, and wiring
- Control integration with existing plant DCS
- Coordination of required electrical interconnection with local electric utility
- Unit commissioning
- Operator training



*Steam let-down Turbines have been or will be installed in eight ICM-designed plants by the end of 2008.*

## Return on investment

ROI will vary from plant to plant based on several factors, including natural gas pricing and electric rates. Again, the minimal increase your plant will see in natural gas usage will be offset by the considerable savings your plant will realize in reduced electrical charges.

Electric Rate (\$ per kWh)	Recommended Action
< \$0.04	Careful study of all factors; possible gain
\$0.04 — \$0.06	Study all factors; probable gain
> \$0.06	Seriously consider; real gain

