

Tecogen[®]

Advanced Modular CHP Systems



Making Ice at Half the Price

Combined heat and power (CHP) systems can take many forms: electrical (simultaneous production of electricity and hot water), such as Tecogen's flagship traditional "cogen" product Inverde e+[®] or mechanical (simultaneous production of shaft power—turning a refrigeration compressor shaft and hot water), such as Tecogen's Tecochill[®] glycol chiller or Tecofrost[™] ammonia screw package. The ability to significantly reduce facility operational costs and put money in owners' pockets is the invariable characteristic of Tecogen's CHP systems. The savings to an owner inclusive of service for the CHP system can be anywhere from 40-60% when compared to making ice and hot water with traditional equipment.

Many of the issues below are compelling owners to get creative and look beyond the status-quo electric ice plant:

1. High electric bills cutting into your profits? As electric rates and time of use (demand) charges continue to increase, natural gas prices are projected to decrease, allowing an average of 50% reduction in ice production costs. Many owners do not realize that the demand (\$/kW) component of their electric charges can make up over half of the bill compared to the energy charge (\$/kWh); leveraging natural gas removes this punitive time of use charge from the equation.

2. Have an old R-22 system and thinking about replacing it? Think twice



before choosing electric again. The benefits of natural gas are substantial, with the ability to produce ice at half the cost, plus free high grade (> 200°F) hot water for ice resurfacing, dehumidification, ice pit melting, domestic hot water production, space heat and sub-soil heating.

3. Should I stick with ammonia?

The efficiency benefits of using ammonia can be significant and regardless of whether you want to keep using a natural refrigerant, such as ammonia, or switch to a synthetic refrigerant, Tecogen has you covered. Our Tecochill product, which is a packaged chiller utilizes a synthetic refrigerant with a flooded evaporator for utmost efficiency. Its efficiency however, still cannot rival that of ammonia which is superior both from a hp/ton basis and a refrigeration capacity standpoint for the same compressor size. Our Tecofrost screw compressor package is a great option for those looking to continue ammonia use and enjoy its benefits.



Some common myths de-bunked:

1. Energy Efficiency vs. Energy Cost?

We often hear electric powered equipment manufacturers touting their “high” efficiency, which while may be true, the true unit of measure that is most significant to owners is *operating cost*. Tecogen’s Tecochill and Tecofrost products are indeed very efficient from a refrigeration cycle standpoint, equivalent or in many cases better than their counterparts, however they also provide the added benefit of operating on a much lower cost energy source. Natural gas is typically 3-5X cheaper per energy unit than grid-supplied electricity, in addition to the free high-grade heat recovery, combined can deliver 40-60% operational cost savings. The electric and natural gas powered systems could possibly have very similar refrigeration cycle efficiencies but the electric powered system will still cost significantly more to operate, again due to the difference in energy costs.



2. Electric chillers have heat recovery too.

Not all heat recovery is equal. An electric chiller may have some level of heat recovery but it is generally very low-grade (< 100°F) and is not hot enough on its own for many of its intended uses, therefore requires a boost from other sources such as a natural gas water heater. If the electric system produces higher grade heat, this is due to the discharge pressure being raised enough to get higher grade heat, at the expense of additional compressor energy input. Natural gas engine driven refrigeration systems are able to run a very low condensing/discharge temperature for utmost refrigeration cycle efficiency, as there is ample high-grade heat in the form of 220°F hot water recovered from the engine jacket, engine exhaust and engine oil. This hot water is hot enough to serve any need in the rink without an additional supplement of energy, such as ice resurfacing, dehumidification, ice pit melting, domestic hot water production, space heating and sub-soil heating.



3. Natural gas engine driven chillers are less reliable and have higher maintenance costs.

Over the last 30 years Tecogen has built a strong reputation by providing reliable products backed by a local factory service offering. We produce ice at AHL and NHL rinks, and (2) Stanley Cups have been won on our ice. It is quite common for rinks to see 99.9% uptime over the course of the year, with 10 hours or less scheduled downtime for routine PM service. As with all combined heat and power systems there is generally a slightly higher maintenance cost associated with the upkeep of the engine, however the savings produced by the system will always outweigh this additional service cost, that is the crux of the combined heat and power model. Tecogen also often partners with local refrigeration contractors to provide a full level of service with Tecogen technicians handling the engine maintenance and leaving the refrigeration plant maintenance to the incumbent refrigeration contractor to handle.

4. Electricity is the only option for compressor motive power...

Just as you would not choose to heat your home with expensive electricity as your first choice, you should not choose to make your ice with electricity either. If you are in need of an ice plant upgrade, ask your current service provider to present a natural gas cooling option for consideration. If you have recently upgraded your ice plant and want some relief from crippling electric bills, consider a traditional electrical CHP system, commonly referred to as “cogen” or “cogeneration.”

Tecogen is more than happy to provide a free assessment and economic analysis and can work with your preferred installer or service provider to bring the project from concept to completion.

For more information about Tecogen’s **Ultra-Clean and Efficient Natural Gas Engine-Driven Products**

please visit www.tecogen.com or contact us at 781-466-6400

