Water and Process Solutions for the Brewing Industry

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For more than a century, GE has provided sustainable solutions to help customers around the globe address some of the world’s most pressing challenges. Today, GE’s Water & Process Technologies continues that commitment. We are a forward-thinking and thoughtful leader in developing the water, water recycling, wastewater treatment and process solutions our customers need to operate more efficiently and profitably, while minimizing their environmental footprint. Our goal is to help industries thrive and communities prosper.

Brewing Industry:
A Sector in Expansion

The global brewing market is continuing to expand, particularly in growth markets such as China and Brazil. In conjunction with this growth, there is an increasing focus on also creating a better and more sustainable world. Brewing companies are setting targets around reducing energy and water consumption as well as decreasing their overall greenhouse gas (GHG) emissions.

The brewing process—including the actual brewing, cleaning of vessels and producing the power needed to run a brewery—is both energy and water intensive. Breweries are making significant strides in reducing the energy and water needed; in the early days of the industry, producing one hectoliter of beer required using five times as much water. Today, many major brewers have set aggressive goals of reducing the water needed in the brewing process—potentially approaching and breaching 2 hl/hl.

With a global team of experienced professionals, GE is uniquely positioned to deliver the solutions needed by brewers to create a more sustainable brewery, design more efficient ways to provide power, install water solutions to improve efficiency and water recycling and reuse, and provide the infrastructure necessary to use available resources more effectively.

Get to know more about GE’s solutions and how we can help breweries to reduce their overall cost of operation while allowing increased production in a world of shrinking resources.

GE Solutions

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GE Solutions for the Brewery Industry

1. Process Solutions
2. Cooling Water Services
3. Boiler Treatment
4. Water and Wastewater Treatment
5. Membrane Chemicals
6. Monitoring Solutions

Utilities
Whirlpool Separator
Kettle
Yeast
Fermentation Vessel
Wort Chiller
Cooling Water
Wastewater Plant

Malt
Milling
Bright Beer Tank
Keg Filler
Can Filler
Bottle Filler

Filtration
Chiller
Moturation Tank
Chiller
Revers Osmosis
Water

Mash Mixer
Lauter Tun
Kettle
Hops

1. 2. 3. 4. 5. 6.
Tunnel Pasteurizer  
Corrosion and Scale Control  
During pasteurization of beer cans and bottles, corrosion can attack anywhere: the internal parts of the equipment made of different types of alloys, pipes, heat exchangers, recirculation pumps, screens, control equipment, jets, sprays, bottles' and cans' crowns, lids and caps. The treatment to avoid corrosion can be especially difficult when the water has a corrosive characteristic; the water in the pasteurizer is continuously circulated and is highly oxygenated.
  
Oxygen-saturated water can create a severe environment for corrosion, which is adversely influenced by low pH, carbon dioxide, dissolved solids and temperature. Proper water conditioning—accomplished by utilizing the appropriate corrosion inhibitor and proper pH control—is required to minimize the potential for corrosion. Scale can also affect a pasteurizer's internals, damage can and bottle appearance, and impact heat exchanger and water spray efficiency. Scale results from poor treatment control, water quality and high can and bottle spoilage, causing product bio-fouling. The correct water treatment of beer pasteurizers must control scaling by properly dosing of scale inhibitors and dispersants.
  
Microbiological Control  
One of the most challenging issues to control in a pasteurizer system, microbiological fouling can severely limit the performance of the system if not properly managed. Bacteria and fungi (aerobic and anaerobic) can be found in the compartments, pump screens and bulk water of the pasteurizers. Bacterial growth is enhanced by nutrients found in the water system due to container leakage and breakage, as well as contaminations from grain or yeast cells that are scrubbed out of the air in the cooling system.
  
Serious problems—such as odor, plugged spray nozzles, sump screen fouling and low efficiency of operation for the pasteurizer—may develop if microorganisms are not controlled. Scaling and corrosion are also increased by bio-fouling.
  
GE provides a complete biocide and microbiological control program featuring products that can be used during running periods and also for holdover conditions.
  
Off Line Cleaners  
During the pasteurization process, cans and bottles often break. The content and the glass solids settle on the compartment surfaces. A collection of this debris, broken glass and slime can act as a haven for bacteria and deposit accumulation. If not quickly addressed, this causes offensive odors, affects the efficiency of pasteurization operations and compromises food and beverage safety.

Can Staining and Spotting  
To adhere to environmental regulations, breweries now use non-conversion coated cans. Originally, most cans were conversion coated through a process called ‘phosphating’ or ‘chrome-phosphating’ during which high concentrations of phosphate or chromium phosphate are applied to the metal to form a pretreatment prior to the application of the final layer—typically paint or lacquer. As this conversion coating practice has been changed such that fewer hazardous pretreatment chemicals are used, the cans are unprotected in the pasteurization and packaging process.
  
Can spotting, known as dome staining, occurs through a corrosion mechanism on the aluminum of the can material. Though it does not affect the quality of the beer, dome staining is an aesthetic problem characterized by the appearance of grayish spots on the cans. The problem can be sporadic at individual breweries or during certain operating conditions, and can usually be tracked back to cans with insufficient coating or to water conditions such as high alkalinity, pH, silica and chlorine residuals.
We understand the cause and implications of dome staining and can design and provide specific treatment programs to meet brewery needs and properly condition the water to prevent dome staining from the start. GE offers Balanced Alkaline Technology (BAT) as a preventative option, along with treatment programs based on zinc, corrosion and scale inhibitors and surfactants.

Process Solutions

Commonly, the pasteurizer is taken out of service and boiled-out every two to three months, using caustic or other chemicals for cleaning. If the brewery is under high production demands or improper microbiological control conditions, more frequent boil-outs are required, leading to higher water and chemical consumption, elevated wastewater generation, and more downtime when pasteurizers are out of service. A proper pasteurizer treatment would help increase the equipment campaign, consequently reducing chemicals and wastewater.
  
GE has formulated and tested a specially formulated boil-out program for pasteurizer cleaning, which has been proven effective in many ongoing applications. GE boil-out products are added directly to compartments to establish between a 0.5-5 percent strength solution.
  
The solution is then heated and circulated, resulting in:

- Cleaned pasteurizer surfaces
- Improved heat transfer efficiency
- Less frequent boil-out
- Higher production throughput

Spent Grain Recovery System  
Spent grain from the brewing process is generally concentrated through the use of dewatering equipment, evaporation, or a combination of both. Once recovered, the spent grain is sold as an animal feed supplement. To enhance the dewatering operation, GE provides U.S. Food and Drug Administration (FDA) approved polymers and deposit control agents to enhance the spent grain recovery process.

Anti-Scuffing  
During the washing process, glass bottles are subject not only to chemical attack, but also to attack from abrasion and friction, which can lead to scuffing. Often used to remove dirt, debris and labels from both the inside and outside of the bottles, caustic can also compromise the glass structure as both calcium and silica ions are released. This has the effect of reducing the protective layer, causing the glass to begin dissolving.
Helping combat these issues, GE’s FoodPro® DCF product line is used as a cleaning and anti-scuffing agent, reducing mass loss of glass bottles by over 50 percent.

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Bottle and Keg Washers  
Labels, organic debris and other soils must be cleaned off of returnable glass bottles and kegs. Bottles are washed in a 1-2 percent caustic solution, and a mix of detergents and other cleaning additives is used to improve cleaning. GE offers a range of solutions, including:

- Scale inhibitors to be used in the rinse zones to inhibit inorganic scale formation
- Surfactant mix to support label removal
- Silicon-free defoamers

Crown and Cork Corrosion  
Crowned bottles and crown caps are made of mild steel, coated by a protective layer of paint. The edges of the cork, however, are not completely covered with the paint and are in contact with the process water—which can lead to corrosion on the edges of the crown corsets. As a result, rust spots, which are difficult to remove, can form on the glass around the opening of the bottle. These rust spots can cause customer complaints and even hygienic problems. In beer can pasteurizers, crown and cork corrosion is also a matter of concern. GE offers a series of products, specifically formulated according to pasteurizers’ water characteristics, to protect the appearance and integrity of crowns and corks, reducing quality losses and reinforcing food and beverage safety.

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Cooling Water in Brewery Plants

In the brewing process, both cooling towers and heat exchangers require protection from microbiological proliferation, deposition, scaling and corrosion. GE provides a range of applications and technologies to address these forces and keep operations running smoothly.

Microbiological: Bacteria Counts

Cooling towers are prone to microbiological contamination from the high airborne contaminant levels drawn in by induction fans. Process-related contamination can also occur, which then allows for rapid bacterial growth and associated fouling in the cooling tower’s nutrient-rich environment. When bacteria growth is not controlled, biofilms interfere with equipment performance. Biofouling reduces, or in some cases blocks, water flow, reducing heat transfer and increasing microbiologically induced corrosion (MIC) rates. Some biofilm organisms attack wood, which weakens structural components of wooden cooling towers. Dirty cooling systems also increase the risk of contracting airborne disease from inhalation of microorganisms that are present in cooling tower drift.

Deposit Control

The gradual accumulation of deposits in cooling water systems directly affects production. Process heat exchangers are usually the prime sites for deposition since most scaling species have retrograde solubility characteristics. Simply put, scale forms at the hottest locations in the system—the heat exchange surfaces—including the shell/tube and plate/frame variety. Deposition problems can lead to reduced tower efficiency and decreased heat transfer rates, and can reduce the carrying capacity of pipelines. If unchecked, deposition can result in production loss, excessive energy usage, shortened equipment life and increased costs due to frequent cleaning or added pumping requirements.

Corrosion

Corrosion most often occurs in both the process heat exchangers and system transfer piping. It is the result of an electrochemical reaction that is accelerated in the presence of higher temperatures, low flow or stagnant water conditions and in cases where the cooling water possesses a high concentration of dissolved solids. Causing heat exchangers to leak and rust to form, corrosion shows up as thinning of the tubes or pitting of the base metal. Failure of a critical heat exchanger can mean unscheduled downtime, loss of productivity and increased operational costs. The objective of an effective corrosion control program is to reduce metal corrosion to an acceptable level. Success depends on effective mechanical design, acceptable exchanger metallurgies, and selection and application of an effective chemical treatment program, based on existing system operational and water conditions.

GenGard® Technology: For Open Recirculating Cooling Systems

GenGard is an advanced and cost-effective water treatment technology for the control of corrosion and deposition in open recirculating cooling systems. GenGard reduces production issues and helps costly capital equipment serve its intended useful life. GenGard programs can be applied across a pH spectrum from neutral to alkaline and GenGard improves results even under stressful conditions. The patented GenGard technology includes a new Stress Tolerant Polymer (STP) to maintain phosphate solubility for steel corrosion prevention, and to control iron and suspended solids deposition. Alkaline Enhanced Chemistry (AEC) to provide threshold inhibition of calcium carbonate scale formation, and Halogen Resistant Azole (HRA) to provide corrosion protection for copper and copper-based alloys, all in combination with phosphate-based steel corrosion inhibitors. 

Cooling Water Services
Wastewater Treatment Benefits
By separating liquids from solids, more insoluble matter can be removed. Anaerobic and aerobic biological systems are able to provide high removal rates for soluble contaminants, increased gas production for steam or electricity and low levels of scaling.

Biological Control
Proper biological control is critical to the prevention of waterborne disease and proper operation of equipment, such as cooling towers, heat exchangers, water scrubbing systems and reverse osmosis units. Encouraging microbial growth in wastewater treatment systems may sometimes be appropriate, however, to help ensure the health of beneficial microorganisms that remove specific types of organic matter. As such, GE offers products and treatments to either reduce or augment microorganism growth in water systems.

Clariﬁcation
Using exclusive blends of custom-designed polymer formulations, GE’s treatment programs can remove organic color, calcium and magnesium hardness, iron and suspended solids from inﬂuent water. These polymers help reduce the need for pH adjustment, decrease load on dematerializers, increase ﬁlter throughput and reduce sludge volume. GE also offers technologically advanced and comprehensive resources for wastewater treatment, making efﬁcient waters acceptable for reuse or discharge.

Metals Removal
The removal of heavy metals from waste streams is a critical component of industrial wastewater treatment, as these metals do not naturally degrade and can be toxic to aquatic life, even at low concentrations. GE makes it possible for industrial facility operators to reduce heavy metals—including soluble and/or particulate heavy metals, such as lead, copper, chromium, iron and manganese—from waste streams to help ensure regulatory compliance.

Odor Control
Whether you process water for public consumption, treat wastewater or run industrial processes in which water purity is essential, control of objectionable odors is a challenge. GE provides a range of advanced products and treatment options for cost-effective odor control in water processing and wastewater treatment.

Boiler Solutions
In order to provide the heat and power necessary to maintain efficiency and production, deposits and corruptions in boiler systems need to be avoided. FDA standards related to regulated chemical treatments and utility plant operations to prohibit cross contamination from occurring in the steam system also need to be adhered to. GE’s goal is to help our customers maintain plant reliability at low cost while producing high-quality products—be it starches or corn syrups, citric acid or ethanol.

Boiler Deposit Control
Getting the maximum heat transfer from fuel to steam in boilers is essential to maintaining safe, cost-effective, long-term boiler reliability and low-cost corn milling product operations. A scaled boiler burns more fuel less efﬁciently than a clean one and is more subject to tube failure, which leads to lower production. The use of high-quality feedwater coupled withoptimized chemical treatment—as found in GE’s OptiSperse® AP, OptiSperse CL, or OptiSperse PO Series products—helps maintain boiler cleanliness.

Boiler Corrosion Control
Boiler corrosion can occur in several areas throughout the system. In the preboiler circuit, oxygen pitting can destroy feedwater piping and require a system shutdown while the affected piping is replaced. In the condensate system, boiler feedwater alkalinity or oxygen that has entered the system at some point and process contaminants from evaporator leaks in the corn milling production can cause corrosion. These corrosion mechanisms can cause the loss of piping and transfer of corrosion products into the feedwater, impacting boiler cleanliness and reliability. Proper treatment to minimize preboiler system corrosion requires optimizing mechanical deaeration, followed by using the most appropriate oxygen scavenger—such as CorTrol™ IS or CorTrol QS Products.

Steam Purity
High-purity steam is essential to keep rotating equipment that uses steam as the source of power generation operating safely and efﬁciently. Solids in the steam that are a result of carryover will slow down this equipment. These solids will also lead to unsafe operation of the steam plant due to water hammer and hot, high alkaline water entering the steam headers or steam end users. To ensure boilers are operating under the best possible mechanical and chemical conditions, steam purity needs to be maintained at the highest level.

Water and Wastewater Treatment

Boiler Treatment
Membrane Chemicals are designed to reduce operating costs and decrease energy and water demand while simultaneously improving our customers' environmental safety. MemChem solutions include a variety of products, including dechlorination, antiscalants, bio control, cleaners and filtration aids that are formulated to enhance the performance of pure water equipment such as cartridge filters, multimedia filters (MMF), carbon, microfiltration, ultrafiltration, nanofiltration and reverse osmosis (RO). Making it possible for your team to focus on core activities, GE provides on- and off-site services to identify and implement a MemChem service program customized to meet your needs.

On-Site Services:
- Testing of water chemistry, pH, conductivity, free chlorine, turbidity and SDI
- MB tests, microbiological count, BioScan®
- System audits, pretreatment and RO systems, system optimization
- CIP operation training, membrane storage and system trouble shooting and diagnostics
- Optimization of chemical dosages

Off-Site Services:
- Membrane autopsy to identify causes for membrane performance degradation
- Complete water analysis
- Membrane restoration services

MemChem Solutions:
- Solisep® MPT Filtration Aid removes particulates that foul membranes, reduces CIP cleaning frequency and operation cost, extends filters and membrane life
- MPH NSF® pH Adjustment maintains desired pH, reduces scaling potential, reduces iron and aluminum fouling
- DCL Dechlorination removes chlorine from water and protects membrane from damage
- Biocontrol® and BioMate® MBC maintain clean pretreatment and RO system, maintain optimum membrane rejection percentage, reduce chemical usage and CIP cleaning frequency
- Hypersperse® MDC and MSI Antiscalant optimizes RO operation at maximum recovery and extends membrane life, reducing capital cost and chemical costs by reducing CIP cleaning usage
- Kleen® MCT Cleaner restores membrane performance, lengthens membrane life and helps reduce membrane replacements

Productivity Tools:
- Argo Analyzer® Software predicts critical fouling potential, offers guidance in selecting the best antiscalant, recommends dosages for best RO operating conditions and percent RO recovery and supports operational cost savings
- Winflows® engineering design simulates RO system’s optimum configuration and operation and provides predictions of permeate quality throughout membrane lifespan
- RO Normalization Data Sheet engineering tool tracks and monitors RO performance by tracking key operational parameters, helps users troubleshoot and maintain RO and provides guidance in selecting membrane chemicals to provide optimum performance
GE proudly provides TrueSense, a technology platform that offers users previously unavailable tools to optimize productivity and increase water savings in the monitoring and control of cooling water systems.

TrueSense integrates three new and unique functionalities into one platform: direct online monitoring of critical water chemistries; personal instrumentation that dramatically cuts offline testing time; and a powerful data analysis and display capability that provides deep insight into system status. TrueSense is a tangible result of GE’s focus on developing solutions to address water management challenges even in the toughest operating conditions.

Key elements of the TrueSense platform are TrueSense Online for Cooling and TrueSense View.

- TrueSense Online for Cooling is a single, unified online technology that can directly measure and monitor multiple core chemistries that are applied for effective cooling water treatment such as orthophosphate for corrosion control; proprietary polymers for deposit control; and the management of halogens like chlorine or bromine for microbiological control. TrueSense Online provides a better understanding of cooling system status, enabling users to tighten control parameters to avoid or better respond to system variation and upsets, reduce water use and costs and to lower total cost of operation.

- TrueSense View provides a knowledge-management solution for system visualization, analysis, alarming and reporting. TrueSense View arms plant personnel with the right information in terms of content, frequency and form, with the flexibility to have data stored either locally and/or on the Web. In addition, wireless features minimize deployment time and cost. TrueSense View is compatible with other platform components.

The TrueSense platform is designed to work in conjunction with GE’s most advanced cooling chemistry, GenGard with Stress Tolerant Polymer. The synergy between these two technologies enables optimal performance of cooling water systems with forgiving chemistry that performs even in the toughest conditions.
CASE STUDY: Bioscan® Helps Successful Treatment of Tunnel Pasteurizer

A brewery in northeast France operated a tunnel pasteurizer made of mild steel. Because of major biological problems, the plant experienced unplanned downtime and had to undertake regular manual cleaning of the system and filters, further increasing the risk to the pasteurizer, its efficiency and integrity.

GE’s Water & Process Technologies conducted a thorough study of the system to determine the water volume and distribution throughout the different zones of the tunnel pasteurizers and installed a fully automated dosing system. A Bioscan unit checks the ideal dosing regime and controls the biological activity in the system on an ongoing basis.

The complete approach to the microbiological treatment of the tunnel pasteurizers was determined through identification of the optimum dosing points, optimization of the non-oxidizing biocide dosing regime, and microbial monitoring with Bioscan. Adopting this program resulted in problem-free tunnel pasteurizer operation and a 350 percent return on investment from reduced cleaning frequency.

CASE STUDY: Changing Treatment and Monitoring Program of Brewery Pasteurizer Improves Performance and Saves Water

A large brewery in Iberia produces draught and bottled beers for distribution throughout Portugal and Spain. The brewery faced several challenges, including bacterial fouling in the tunnel pasteurizers, distribution channels, sprays and pipe work; cap corrosion; production downtime; high product reject rate and high water usage.

GE performed a complete audit of the water quality and flow characteristics within the pasteurizers and concluded that the main area of concern was the point of chemical dosing. By adjusting the application points and changing the control strategy, it was possible to reduce the cleaning demands—which increased production—and to reduce the crown corrosion—which led to lower reject rates and reduced water consumption. In addition to the revised application strategy, a performance monitoring program was introduced, allowing precise monitoring of system conditions in terms of microbial activity, corrosion rates, cleaning frequency, chemical addition rates and product quality.

As a result of GE’s solutions, water usage at the brewery was reduced by 5.3 m³/hr, productivity increased, and the product reject rate decreased.

CASE STUDY: Reduction in Beer Out Temperature

A brewery in Ireland operated a tunnel pasteurizer that became increasingly fouled with microbial slimes, requiring weekly boil-outs to remove them. Simultaneously, beer out temperature (BOT) increased, causing a reduction in throughput of beer and an increasing number of quarantined cans due to the high final product temperature.

GE’s Water & Process Technologies investigated the operating conditions of the tunnel pasteurizer and recommended a complete solution to the problem. They proposed a complete treatment programme, optimising the non-oxidizing biocide dosing regime and microbiological treatment with Bioscan. Implementing this program resulted in problem-free tunnel pasteurizer operation and a 350 percent return on investment from reduced cleaning frequency.

CASE STUDY: Biocide Regime Saves Significant Costs in Pasteurizer Treatment

A large brewery in northwest England with the largest, double deck pasteurizer was spending £148,300 (£75,000) on annual treatment costs. GE’s Water & Process Technologies already provided cooling and boiling water treatments, and sought to provide the pasteurizing treatment for this brewery as well. After a thorough analysis, GE proposed a two-biocide program complemented by a zinc inhibitor and control of makeup pH.

Since implementation, plate counts have shown microbial activity at 1x10⁵ bacteria/ml. Corrosion rates are at <5 mpy and the pump screens have shown no increase in fouling. Finished cans remain bright and shiny with no evidence of tab and dome staining. GE’s carefully monitored biocide regime and accurate pH control resulted in smooth tunnel pasteurizer operation and significant cost savings for the brewery.

CASE STUDY: Eliminating Corrosion During Tunnel Pasteurization Saves Brewery US$691,000

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CASE STUDY: Ferroquest® Cleaning Increases Chiller Capacity at UK Brewery

A brewery in northern England produces a popular brand of beer for packaging at a sister plant. This plant operates with active corrosion, iron oxide deposits, fouling and low chilling efficiency, reducing capacity from a planned four brews per day to only three.

The inefficient chilled water system was the bottleneck in the process, which was treated with Ferroquest rust remover to clean the system. The Ferroquest treatment has reduced chilling times from 8 to 5 hours per fermentation vessel, resulting in an increase in chilling output from 2,113 to 3,698 gallons (80 to 140 hectoliters) per hour, allowing the production of four chilled brews per day. Significant energy savings also resulted from the cleaning with electricity costs per hectoliter of beer falling by 34 percent for an annual savings of US$155,722 (£98,000).

With the elimination of corrosion, the brewery was able to pasteurize four million shiny cans a year with no aesthetic problems, representing an annual net savings of US$691,000 (£518,847).
Ecomagination*: A GE Commitment to the Environment

Protecting the major existing asset—the world—is one of GE’s highest priorities. GE is committed to imagining, encouraging, developing and building innovative solutions to today’s environmental challenges while also driving economic growth. Ecomagination represents the company’s commitment to delivering new clean products and technologies to market that help solve our toughest environmental challenges.

GE has made significant progress against its ecomagination commitments to:

• Double investment in clean research and development: In 2010, GE continued to demonstrate the importance of investing in the future, deploying $1.8 billion in ecomagination R&D, and making steady first-year progress toward the new goal of $10 billion cumulative investment between 2010 and 2015.

• Increase revenues from ecomagination products: GE set an ambitious new goal of growing ecomagination revenues at twice the rate of total company revenue in the next five years. In our first year of this goal, the ecomagination portfolio saw strong growth, adding 22 new products and solutions, generating $18 billion in revenues.

• Reduce its greenhouse gas (GHG) emissions and improve the energy efficiency of its operations: GE reduced its energy intensity nearly 33 percent—a one percent improvement over 2009, surpassing the goal of 30 percent in 2012. It also reduced GHG emissions 24 percent—a two percent downturn from the progress made in 2009. By 2015, GE will improve the energy intensity of its operations 50 percent and reduce its absolute GHG emissions 25 percent. (Note: all figures in this section are compared to a 2004 baseline).

• Reduce water use and improve water recycling: In 2010, GE’s water use was 11.9 billion gallons, a 22 percent reduction from the 2006 baseline, and an eight percent increase from 2009. We are still on track to exceeding the company’s target of 20 percent by 2012 from a 2006 baseline.

To reach such goals, GE works at the forefront of innovation, constantly pushing the boundaries of technology to make a positive impact on our environment.

Consider some of the initiatives currently underway:

• Renewable Energy: More efficient wind-power systems and less expensive solar energy

• Coal: Technologies that allow reducing the atmospheric emissions produced when burning mineral coal

• Hydrogen: Power generation processes, involving all the hydrogen chain stages—from production to storage

• Water: Revolutionary water treatment systems to be used in agricultural, industrial and sanitation activities

GE’s growing line of sustainable products currently numbers more than 45. To be given the ecomagination approval seal, products need to be global leaders in their categories in terms of environmental and economic performance. GE aircraft turbines, locomotives, water desalination technologies and fluorescent bulbs are among the products that bear the ecomagination seal.

GE meets its clients’ business needs by providing them with products and services that improve their activities and helps them grow in a profitable and responsible manner by reducing the impact products have on the environment.

Proof Not Promises Award

GE’s Proof Not Promises® Award (PNP) recognizes customers and sales representatives for significantly improving industrial operational performance.

As part of the award program, customers and sales representatives work to solve operational, production, environmental and health and safety issues to meet strategic business goals that result in proof—not promises. The PNP three-tier selection process examines the set goals as well as the achieved operational and financial benefits.