Contents

Message from the President and CEO .......................... 3
About the Company ........................................... 4
Employees and the Workplace ............................... 16
Ethics and Legal Compliance ................................... 18
Environment, Health, Safety and Security .................. 20
Procurement and Supply Chain ............................... 23
Technology and Innovation ..................................... 25
Success Stories .................................................. 26
Message from the President and CEO

Sustainability is crucial to Solenis, not only in what we do at our plants and facilities, but in what we do to help our customers meet their own sustainability goals. We are working toward a comprehensive sustainability strategy encompassing all of the environmental, social and governance elements of sustainability as outlined by the Global Reporting Initiative.

This report is a broad overview of our efforts to create a more sustainable Solenis. It highlights many initiatives since our founding in 2014 to build a unique culture around the core elements of People, Performance and Results.

People are our most valuable asset and are the core to a culture that keeps employees safe, affirms they will be treated with respect and recognizes their contributions. Our diversity and inclusion strategy and leadership training programs ensure we are developing our people to be the best they can be.

Performance encompasses both individual accomplishment and the overall performance of the company, making certain we have in place clear performance metrics as well as practices and processes to be compliant, efficient and effective.

Results for our customers and investors will spring from this strong growth culture.

Our vision is to ensure our customers’ success through innovative water and process solutions. Combining team expertise with data-driven technology, we solve our customers’ problems and deliver and document results effectively. Part of meeting our customers’ needs is partnering with them to deliver their own sustainability targets. In addition to developing innovative solutions and maintaining an active safety culture, we also focus on optimizing production or treatment yields, optimizing and ultimately reducing water and energy use, and optimizing raw material utilization. We highlight a few examples in the Success Stories section of this report.

Another component of our external sustainability strategy is what we are doing to help the communities in which we work and live. I am very proud of our employees across the globe who have volunteered their time to contribute to their communities and we have spotlighted some examples. Among these are consistent support in Canada and the United States for the United Way charity through a company-match campaign and, since 2016, sponsorship of The Water Project, a non-profit organization that focuses on addressing water scarcity and water quality issues in small communities in sub-Saharan Africa.

As one of the largest global industrial water treatment companies, we believe it is critical that we grow sustainably and demonstrate how we are able to unlock this same potential for our clients. I am happy to share this initial Sustainability Report with you.

Sincerely,

John E. Panichella
President and Chief Executive Officer
About the Company

Delivering sustainable solutions to customers’ challenges in water-intensive industries

Our Company

The Solenis name is relatively new, dating to August 2014, when the business was acquired from Ashland Inc. by the U.S. private equity firm Clayton, Dubilier & Rice. Solenis has a long and strong heritage of providing solutions to customers in water-intensive industries, built on the legacy of paper- and water-treatment predecessor companies including Hercules, BetzDearborn, Stockhausen and Ashland. Headquartered in Wilmington, Delaware, USA, Solenis is a global manufacturer of specialty chemicals which bring value to water-intensive industries such as biorefining, chemical processing, hydrocarbon processing, mining, oil and gas, power, and pulp and paper, plus public wastewater treatment plants and others.

Our product portfolio includes a broad array of sophisticated process, functional and water-treatment chemistries, as well as state-of-the-art monitoring and control systems. These technologies make water work more effectively in customers’ complex environments, improving their operational efficiencies, as well as enhancing their product quality, protecting plant assets and minimizing environmental impact.

Solenis melds its advanced product capabilities with unique application insights. We are one of only a few global companies to offer complete solutions to customers’ pressing process and industrial water challenges. Our team’s in-depth process and product knowledge helps find the right approach for any client seeking to improve its sustainability profile.
Perspectives on Sustainability

Solenis views sustainability from environmental, social and governance perspectives, all of which are represented in this report.

Our environmental focus is on ensuring responsible stewardship of the natural environment. This includes confirming that all our manufacturing and non-manufacturing facilities meet or exceed all regulatory and environmental requirements; keeping abreast of and, at a minimum, complying with changing applicable environmental laws and regulations, and providing products and services to our customers to help them meet or exceed their own environmental objectives.

Our social focus is on responsibly managing relationships with employees, customers, suppliers and others. An important element of this is partnering with employees to help address the needs of the communities where we operate, as well as other geographical areas where we can make a difference.

Our governance focus is on both operating with the highest ethical standards in all aspects of our business and protecting the rights and interests of all our stakeholders, individually and collectively.

As Solenis continues to develop a comprehensive sustainability strategy, there are five key themes at its heart for both the operation of our facilities and manufacturing plants and in helping our customers meet their own sustainability targets. They are:

- water conservation,
- energy reduction,
- waste and emissions reductions,
- raw materials management / optimization of raw materials use, and
- social impact.

These five themes are interwoven throughout this report and examples of how we have helped customers meet their sustainability targets are highlighted in the Success Stories section.
People: The Company’s Most Valuable Asset

Solenis’ widely-held reputation for solving highly complex customer challenges is directly attributed to approximately 3,700 outstanding professionals working in 118 countries across five continents. Among them are manufacturing teams at 35 sites, plus the members of our Global Technology team, comprising more than 250 professionals organized strategically to address the most pressing concerns of customers and to develop state-of-the-art technology to meet customers’ future challenges.

Culture

The Solenis culture is centered on fundamental beliefs about the importance of our people, their performance and the results in growing the business.

We take pride in hiring only the most talented people and embrace a diverse workforce as a significant competitive advantage. We actively invest in employees’ professional development, so they can achieve their personal and professional goals while driving business growth.

Solenis employees clearly understand their performance will be evaluated based on their contributions to operational excellence and business performance. Compliant, simple and efficient business processes are constantly benchmarked against industry best practices to ensure continuous performance improvement.

The Solenis culture is one of creating a positive experience for every customer during every interaction as a way to fuel the growth of our business.
Our Vision
The Solenis vision is to ensure customers’ success through water and process solutions. Combining team expertise with data-driven technology, the company solves customers’ problems, such as sustainability objectives, and delivers and documents the value more effectively than anyone could imagine just a few years ago.

Our Mission
The Solenis mission is to strive to stay ahead of customers’ next challenges. This begins with our legacy of industry expertise and continues with our ongoing innovations. Solenis matches each customer’s unique process with the right people, bringing the right experience and offering the right technology. Solenis is so much more than a supplier of specialty chemicals; our teams are proactive, building deep business partnerships to provide results customers value. Solenis is always in reach; for the genesis of every solution, customers look to Solenis.

Innovation Drives the Company
Everything at Solenis begins with research and development. Almost two-thirds of the company’s annual technology investment supports the discovery and development of new solutions, including chemical treatment platforms and cutting-edge monitoring and control equipment. The goal of this investment is to generate, on an ongoing basis, 25 percent of our revenues from products that are less than five years old.

Research and development and customer application work is conducted at facilities in Wilmington, Delaware, USA; Krefeld, Germany; Shanghai, China; Paulínia, Brazil; Barendrecht, the Netherlands; Terrassa, Spain and Drammen, Norway. These facilities enable Solenis scientists to identify and analyze customer problems and rapidly select the best chemistry or process to address them.

As a gauge of our impact on the marketplace, Solenis holds more than 2,000 patents, including patents for chemical and equipment technologies that have transformed key processes in a variety of industries.
Environmental Stewardship

As a matter of company policy, Solenis is committed to excellence in environment health, safety, and security, and to having a positive impact on both the communities where we operate and society as a whole. We continually review the environmental impact of our products and manufacturing processes to ensure adherence with all relevant regulatory requirements. Resources are constantly evaluated to protect or improve the environment and meet or even exceed ever-tightening environmental regulations.

Importantly, Solenis’ greatest impact on the environment goes beyond the boundaries of our own business. The company’s focus is on helping our customers meet the challenges of more efficient and effective water use, as well as reducing energy and raw material consumption in their plants, not only today, but into the future. This is critical, given projections for water scarcity and declining water quality. The World Economic Forum, for example, calls future water crises “highly likely,” with greater potential impact on global industry than all other risks.
Responsible Care, Environment, Health, Safety and Security

OUR COMMITMENT

Solenis is committed to protecting the environment and ensuring the health, safety and security of our employees, their families and the communities where we work and live. Solenis strives to provide exceptional product stewardship in support of our customers, suppliers and the markets we serve. We work to be an industry leader in these areas and we are committed to operating our global facilities and businesses using the principles of Responsible Care. Conforming to Solenis’ policies is the responsibility of every employee as a condition of employment and of contractors who act on our behalf. Our management will lead by example as well as educate and train employees and interested parties.

Responsible Care at Solenis includes continual improvement toward the goals of our policy for environment, health, safety and security:

- **Operate with zero incidents**: Solenis believes that all injuries, occupational illnesses and incidents are preventable.
- **Ensure compliance**: Solenis abides by applicable laws, regulations, technical specifications and internal standards while adhering to high ethical standards.
- **Reduce impact**: Solenis continually examines ways to reduce operational impact while providing products that meet our customers’ needs to support the company’s sustainability efforts.

The main keys to Responsible Care at Solenis consist of:

- **Transparency**: Solenis maintains an open dialogue with employees and the communities where we operate.
- **Product stewardship**: Solenis works with supply chain partners and customers to enhance product safety.
- **Global management system**: Solenis follows standard processes that provide a foundation to achieve our goals.

1Trademark owned by a third party
REACH

REACH compliance is one example of many Solenis activities in product stewardship. The impact of the European Union’s Registration, Evaluation, Authorization and Restriction of Chemicals legislation on the future availability of chemicals is of vital importance for Solenis, our customers and the entire global chemical industry. As a Responsible Care company with a long standing commitment to product stewardship and the practice of making health, safety and environmental protection an integral part of the entire life cycle of chemical products, we have actively supported the objectives of REACH before and since the legislation passed.

Our first priority as a major supplier, manufacturer, importer and purchaser of chemical substances in the European Union is to comply with the REACH regulations as well as to ensure the supply of goods to us and to our customers is not disrupted. Several Solenis teams are in place and committed to cooperating with our customers and suppliers to support the successful implementation of REACH. This includes coordinating the exchange of information across the supply chain, from suppliers and manufacturers to customers and end users. The worldwide Solenis organization actively supports the implementation of REACH as an effective legislation in the spirit in which it was designed – to protect health and the environment by providing information across the supply chain supporting the safe use of chemicals and chemical products.
Memberships

Solenis and/or its employees are members of numerous local, national and international professional organizations, including, but not limited to:

- American Chemical Council
- American Chemical Society
- Associacao Brasileira Tecnica de Celulose e Papel
- American Fuel & Petrochemical Manufacturers
- American Forestry and Paper Association
- American Institute of Chemical Engineers
- American Society of Mechanical Engineers
- Association of International Chemical Manufacturers in China
- Brazilian Chemical Industry Association
- Ethanol Association of Minnesota, Iowa and Nebraska
- European Chemical Industry Council
- Growth Energy
- Iowa Renewable Fuels Association
- Minnesota Biofuels Association
- NACE International
- National Ethanol Association
- Paper Industry Management Association
- Renewable Fuels Nebraska
- Society for Mining, Metallurgy & Exploration
- Technical Association of the Pulp and Paper Industry

Sustainability Strategy Team

Our Sustainability Strategy Team develops and implements our overall action plan, with this report being the first step toward building a cohesive strategy. The team of 20 individuals encompasses the breadth of Solenis’ global businesses and functions.
Community and Social Service

Helping build vibrant communities where employees live and work enhances business performance

Solenis seeks opportunities to work with the communities where we do business, as well as other areas of the world where we can make a difference. As a good corporate citizen, Solenis and our employees act responsibly in all aspects of our business, conduct operations safely, prepare for potential emergencies and make it a point to give back by supporting and partnering with educational, civic and charitable organizations where an impact can be made.

Among the many examples of this are:

Global Outreach: The Water Project

Eshivembe Primary School is located in Bushibo, a village in western Kenya. The school, started in 1998 by community members, has approximately 358 early education and primary school students, plus 11 teachers and two support staff.

Since its inception, the school has faced significant challenges. Like many schools in the region, it had no access to fresh water on its grounds. Students were dispatched several times a day to a spring 450 yards (412 meters) away to collect water for drinking, supplying the lunch program and cleaning the classrooms at the end of the day.

Using the spring was problematic for several reasons. There was no catchment system from which water could be drawn. Instead, students used small containers as scoops to fill their buckets. The process was laborious, with younger students only able to carry three- and five-liter containers.
In addition, the spring water was contaminated by surface runoff from nearby farms, litter and excrement from humans and animals. Algae frequently floated on the surface. Not surprisingly, waterborne diseases, such as dysentery and typhoid, were rampant among those who consumed the water.

Lack of potable water was not the only challenge. Only two pit latrines were available to meet the needs of the school community and there were no hand-washing facilities on the school grounds. Contaminated hands caused a high incidence of diarrhea. Given the lack of clean water and the inadequacy of its facilities, the school was under constant government pressure to shut down.

In 2017, life changed significantly for the Eshivembe Primary School students and teachers.

Funded by a 2016 donation from Solenis, and with oversight by The Water Project, an organization with a track record of successfully addressing water scarcity and water quality issues, construction began on a 30,000-liter rainwater catchment tank to collect clean water on the school’s grounds. Building materials were gathered from the local community by students, teachers and parents, enabling them to have a personal stake in the project.

Today, the catchment tank easily provides enough clean drinking water to meet the school community’s needs. The water can also be used to clean three new latrines and to operate two new 60-liter hand-washing stations.

The work at the Eshivembe Primary School was the first of three water-related projects supported by Solenis.

In 2017, our contribution was directed to a school in Sierra Leone, where numerous communities have been in distress due to lower water levels in local aquifers, leaving wells dry for extended periods and the communities without clean, safe water. Under the direction of The Water Project, a dry well near the school was rehabilitated, deepened to hit the next aquifer and fitted with new hardware.

A third partnership between Solenis and The Water Project will bring clean water to another school in Kenya in 2018. The effort will include increasing the size of the school’s rainwater harvesting tank by 65 percent, constructing six ventilated latrines and building two hand-washing stations.
Giving Back: Better Communities Where We Operate

Helping the United Way in the U.S. and Canada

The annual Solenis United Way Campaign always has been an important part of how employees give back to their communities. In 2017, every Solenis site in the U.S. and Canada participated, raising approximately $250,000, including the company match, for local communities and causes designated by employees. We also supported reading programs for inner-city students, donated bicycles to disadvantaged youths and repainted a center for pregnant and parenting teenagers.

A welcome and education in Gimcheon, South Korea

As a vehicle for introducing managers of plants in the Gimcheon Industrial Park to Solenis and to inform them about safely handling chemicals, our team held an open house in October 2016. Thirteen neighboring plant managers participated, hearing presentations on plant safety and touring our process and product storage areas, as well as the wastewater treatment facilities.

Broadening educational opportunities in Tarragona, Spain

For 17 years, the plant has offered students from Comte de Rius and Joan XXIII high schools and Rovira I Virgili University the opportunity to participate in a work-study program. The program is designed to build competency levels by enabling students to conduct routine tasks in their fields of interest. Participants have elevated their skills in manufacturing, research, logistics, administration and other areas. Typically, two or three students per year participate, working half or full days during the school year.
A minivan for people with disabilities in Busnago, Italy

When the mayor of Busnago needed help purchasing a minivan to transport the disabled in the community, he turned to the manager of our plant for assistance. The manager, the mayor and other community leaders launched a program called Free to Be, Free to Move, which generated enough money for the purchase by selling advertising on the vehicle. Today, the Solenis logo is proudly displayed on the vehicle, which provides an invaluable service to people in the community who need it most.

Life-saving help in Terrassa, Spain

Automated external defibrillators (AED) analyze the heart’s rhythm and deliver a life-saving electric shock when someone is in cardiac distress. Each year, the plant donates an AED unit to a different local organization that focuses on protecting children and disabled people. In 2017, it went to Associacio Valles Amics de la Neurologia, an organization that works with patients who have recently suffered a stroke or are suffering from dementia, Alzheimer’s or other diseases. We also provide additional resources for the required training to use the device.

Reviving the watershed in Macon, Georgia, USA

Each year since 2014, plant employees have helped clean up of the Ocmulgee River and its tributary creeks as part of the statewide Rivers Alive campaign. Employees donate three hours of their time to clean litter and debris from a section of Bowman’s Branch Creek near the plant.

Support for food and furniture banks in Portland, Oregon, USA

Plant employees select a local charity to support during the winter holiday season. In 2016 they collected, boxed and delivered groceries to a local food bank. The following year they collected items for the Community Warehouse, an organization that furnishes housing for homeless families.

Highway cleanup in Franklin, Virginia, USA

Each year, in celebration of Earth Day, manufacturing employees donate their time to clean a three-mile stretch of Shady Brook Trail. The road was chosen because of its proximity to our plant.

Encouraging young athletes in Somercotes, UK

The plant has provided financial support for 10 years for the Leabrooks Juniors Football Club. Approximately 10 teams of boys and girls, ages 5 to 18, benefit from uniforms, balls, nets and upkeep of the changing rooms.
Employees and the Workplace

Developing people in an atmosphere of inclusion and respect

Diversity

We believe it is essential to build a diverse workforce representing the many dimensions that allow each of us to see things from our own unique perspective. This is equally important in all our global locations and in every region in which we operate. By embracing the unique strengths of each person and respecting and promoting differences, we can build the most effective teams and enhance Solenis’ performance.

Along with building a diverse workforce, we also believe having an inclusive environment breaks down barriers and allows employees to bring forward their best thoughts, ideas and perspectives, so they can contribute to their full potential. We strive to build an inclusive environment where everyone can share their views and be who they are regardless of difference.

We believe diverse employees working in an inclusive environment supports our growth culture, makes Solenis a more engaging place to work and allows us to be more agile and effective in delivering innovative products and solutions to customers. We measure our performance through a variety of methods, including quarterly scorecards of metrics that show our recruitment pipeline, how we are converting diverse applicants into hires and our annual employee culture survey.

Women’s International Network of Solenis

An initial focus for our diversity and inclusion strategy, the Women’s International Network of Solenis (WINS) helps create a culture that attracts, retains and develops talented women while supporting the company’s focus on People, Performance and Results. WINS is a global organization inclusive to all employees and is structured as a virtual network with regional leaders and a global steering team. The programs presented and sponsored by WINS focus on development and working together for growth, and have included topics such as communicating effectively, managing priorities, work-life balance, financial acumen and effective networking.
Equitable Hiring Practices

All applicants and employees are judged on their qualifications, demonstrated skills and achievements, without regard to age, color, disability, gender, genetic characteristic, national origin, race, religion, sexual orientation, trade union membership, veteran status or any other personal characteristics that are protected by law. Solenis is committed to maintaining a professional and safe work environment, free from violence, intimidation, discrimination and harassment.

Leadership Development Programs

We believe leadership is every person’s role and that being a leader at Solenis is not about a specific title or grade level. Instead, it’s about our ability to inspire people to achieve their very best, drive and focus our performance to greater heights, and leverage our diverse and inclusive culture so that Solenis achieves top results. Our formal leadership competencies are made up of behaviors tied to People, Performance and Results; support ranges from training classes to yearly performance assessments and development plans.

Employee Recognition

An important part of the Solenis culture is recognizing and rewarding employees whose outstanding contributions support our goals and values. Business growth, sales excellence and customer service are honored, as are excellence in innovation, supply chain operations and overall leadership. We specifically recognize individuals who have contributed to community enrichment, plus those making a significant impact in environment, health and safety. In addition, the Darcy Dauterive WINS Award, memorializing an employee, recognizes exceptional leadership contributions to Solenis by a woman in each region.
Ethics and Legal Compliance

Unyielding focus on always doing the right thing

Global Standards of Business Conduct

Solenis is firmly committed to conducting business throughout the world in accordance with the highest legal and ethical rules and principles. Our Global Standards of Business Conduct, available in 16 languages, is the cornerstone of this commitment and sets expectations for every employee when interacting with each other, customers, business partners and people in the communities where we do business. In addition, any business partners acting on behalf of Solenis in any country, including agents, consultants, contractors, distributors or other third-party representatives, are required to acknowledge compliance with the Global Standards of Business Conduct.

While many laws have international application, Solenis recognizes the importance of observing diverse local customs and the laws of the countries where we do business. If compliance with the Global Standards of Business Conduct or other corporate policies or procedures appears to conflict with local laws or regulations, employees are directed to discuss their concerns with our Legal department.

Compliance

While the Global Standards of Business Conduct is the basis of our worldwide compliance program, a committee of senior leaders from around the world provides executive oversight and direction. The group reviews and endorses activities including training and education, completion of compliance assessments and audits, and driving personal accountability through communication and awareness initiatives. Each year, employees receive the Global Standards of Business Conduct questionnaire and acknowledgment certification form, asking if they are aware of any violations of our standards or company policies, or of any actual or potential conflict of interest involving an employee.
**Reporting Ethics Violations**

We encourage employees who have a question or concern about our business conduct to use our employee hotline, Share Your Concern, a global internet and telephone information and reporting service. Any employee who perceives violations of our Global Standards of Business Conduct, other corporate policies and procedures, or any applicable laws or regulations can make a confidential report and all are investigated. Share Your Concern is available 24 hours a day, seven days a week and a translation service is available for callers who do not speak English. Our Non-retaliation and Whistleblower policies ensure that no adverse actions can be taken against any employee who in good faith reports a concern.

**Remaining Attentive Against Corruption**

Doing sustainable business means avoiding bribery or corruption in any form and compliance with all anti-corruption laws of the countries where Solenis operates. To that end, Solenis is committed to profitable business growth based solely on the merits of our portfolio of offerings and the capabilities of our team. Our Anti-corruption and Third-party Gifts policies are available in 15 languages and provide guidance on how to conduct business in a fair, ethical and legal manner. We conduct periodic anti-corruption trainings to raise overall awareness, as well as internal audits to detect potential misconduct and monitor compliance with anti-corruption laws and policy. In 2017, we updated our Anti-corruption and Third-party Gifts policies, and refreshed trainings. We continue to leverage opportunities to share learnings and successful practices across the company. Additionally, we have implemented a global program to screen all third-party liaisons and obtain their agreement to comply with our Anti-corruption policy and all applicable laws.
Environment, Health, Safety and Security

Creating solutions that minimize risk

The foundation of our commitment to environment, health, safety and security includes:

- Adhering to the principles and ethics of Responsible Care, a global initiative of the chemical industry to advance the sustainable management of chemical products and operations.
- Our environment, health, safety and security policies, available on the company intranet and in some cases on solenis.com.
- A global management system with relevant objectives and programs.
- Employee involvement, open communications and discussion with interested parties inside and outside the company.

A Holistic Approach and Continuous Improvement

We use a holistic approach, not only looking at the numerical performance of isolated metrics, but striving for continuous improvement by all stakeholders, including suppliers, neighbors, clients, third-party manufacturers and the like. We take a life-cycle perspective with products, evaluating risks from the supply of materials through the product development, including manufacturing, and ultimately to how the products are sold and distributed to customers/end users, and then the final disposal. Suppliers, waste vendors and third-party manufacturers are assessed and evaluated before they are approved as preferred vendors, ensuring they meet our minimum requirements. Solenis clients are informed of the risks and other aspects of our products and how final disposal should be handled.
**Effective Management**

Our management system supports the efforts to deliver excellence in environmental, health, safety and security performance by meeting the goals of our Responsible Care policy and supporting continuous improvement. It also supports our manufacturing sites and other facilities in complying with legislation, as well as national, regional, local and business-specific requirements and standards. The corporate management system supports local management systems, where corporate procedures and requirements are implemented. All management systems are certified under RC14001, ISO 14001 and OHSAS 18001 and the certificates are available on solenis.com. Some local management systems are certified under the ISO 50001 energy standard.

**Employee Involvement**

Discussion and reporting of environmental, health, safety and security issues by employees are strongly encouraged and done in local languages. Reporting can be via a web-based global database accessible to all employees or by phone through the employee hotline in all languages used by Solenis employees. Solenis will not tolerate or permit any form of retaliation against an employee who reports an issue. Both incidents and near misses are reported. Reporting near-misses is a proactive way to reduce incidents by using them as leading indicators. Incidents are contained, investigated and corrective actions are taken to prevent recurrence. Corrective actions taken are evaluated to make sure they have been effective.

**Reducing Environmental Impact**

Protecting health and the environment is an important responsibility and is part of the Solenis business strategy as a Responsible Care company. We continuously work to cut our environmental impact by reducing or preventing waste generation, emissions and releases, and by developing processes to safely use, handle, transport and dispose of all raw materials, products and wastes for which the company is responsible.

Solenis helps customers understand how to use our products in a safe and responsible manner. We strive for continual improvement in environmental performance in partnership with governmental agencies, contractors and communities.

**Zero Spills**

“No Spill Is Acceptable!” is an environmental program to reduce and prevent spills at the site level. The ability to identify and control health, safety and environmental hazards in the workplace is a key element of the zero-spill culture. Basic recognition skills can also make the environment inspection, incident investigation and team meeting processes more efficient.
Zero Incidents

A core value at Solenis is the belief in a zero-incident culture and each company location is required to implement a zero-incident process. At each location, safety is approached proactively. Positive safety behaviors, as well as potential risks and hazards, are identified.

Every Solenis employee is responsible for observing the company’s rules and practices that relate to on-the-job health and safety. This includes immediately reporting incidents, injuries or unsafe practices or conditions, as well as taking appropriate and timely action to correct known unsafe conditions.

Security

Protecting sites from both physical and cyber threats is critically important to Solenis and the number and type of security programs are frequently updated. These include:

- Cyber security vulnerability assessments: Corporate functions, research sites and manufacturing sites regularly conduct comprehensive assessments and implement enhancements to protect critical information and intellectual property as well as respond to security threats and incidents.
- Site security rounds: All Solenis sites are controlled and the perimeter routinely inspected to ensure that proper security is in place and in good working order.
- Controlled site access: All Solenis sites require a sign-in and badge for entry. Additional safety requirements including appropriate personal protective equipment and safety training are required at manufacturing and technology centers.

Safety Inspections at Customer Sites

Performing a detailed safety inspection on equipment and the associated work environment enables Solenis to better protect employees who are visiting a customer site. It also helps protect the customer’s employees and others at the site who are working at or nearby Solenis products and equipment.

After performing a safety inspection, a formal report is written by a Solenis safety specialist to document eventual findings, including recommendations for improvement.

By performing regular safety inspections, Solenis and our customers can make ongoing improvements as needed to the work environment. The areas typically assessed during a safety inspection include:

- availability of Safety Data Sheets and date of last update;
- proper labeling of product feed lines and equipment;
- reliability of storage tanks;
- integrity of chemical transfer pumps and equipment;
- status of general housekeeping;
- availability of first aid and personal protective equipment, and
- status of bulk unloading stations.
Procurement and Supply Chain
Creating value for the company

Purchasing Practices
As a matter of company policy, all Solenis purchasing decisions must be based on receiving the best value for the company and must be aligned with the company’s business standards and goals. Important components of purchasing include confirming the legal and financial condition of the supplier, complying with the company’s conflict of interest policy when making purchases, soliciting competitive quotes, exploring partnering arrangements and incentive-based contracts and verifying quality.

Supply Chain
Solenis has championed sustainable supply chain practices globally since our inception. Some examples include:

Krefeld, Germany: Certified Energy Management System, ISO 50001
- Cross-functional energy team meets monthly to develop and track actions.
- Ideas for improvement from employees are a crucial part of the success.
- Key performance indicators in place and tracked.
- Energy data collected online and analyzed.
- 30 households could be heated with energy saved by incineration unit optimization.
- Electrical savings from pumping system redesign would supply 15 households.
Nantou, Taiwan: Impactful recycling program of solid waste implemented
- Raw material packaging, waste water sludge and obsolete equipment were identified as major sources of solid waste.
- Plant area established to collect, organize, segregate and provide short-term storage for waste types.
- Significant reduction in waste cost. Income provided from scrap value.

Paulínia, Brazil: Innovative reuse of waste stream
- Polymer reaction results in a 5-percent waste stream, heavy in amines that are difficult to treat in a wastewater plant.
- A process was developed to remove amines and reuse water in reactions, reducing waste and raw material cost.

Savannah, Georgia, USA: Collaboration with community to preserve Floridian aquifer
- There is a regional problem with saltwater intrusion due to large groundwater withdrawal.
- Our plant manager worked with other companies on a collaborative plan to achieve a net reduction of 12 million gallons daily from the aquifer.
- Solenis groundwater permit withdrawal limits will decrease by approximately 22 percent over 10 years.

Somercotes, Great Britain: Continuous improvement in electrical efficiency
- Electrical consumption per metric ton of production was cut in half over an eight-year period.
- Investments were made in efficient motors and pumps, new windows, efficient lighting, roof repair, skylights and automatic roller doors.
- Employee training and involvement is a key to the success.
Technology and Innovation

Benefitting customers through technology innovation

Solenis is recognized globally for our legacy of technology innovation. We invest in developing new chemistries to improve customers’ products and processes, as well as developing technical solutions that enhance monitoring, dispensing and optimizing the feeding of our specialty chemicals. Historically, Solenis invests approximately 2.2 percent of sales in technology and development. Driving this innovation is a team of about 250 employees, including approximately 70 experts with doctoral or master’s degrees in a variety of fields, who have at their disposal a vast selection of comprehensive paper-testing and water analysis equipment and innovative process-testing instrumentation.

Two-thirds of the company’s technology focus is on new products. This includes short-term opportunities to generate new reformulations with existing raw materials and longer-term technology development with a focus on growth markets. New product concepts are continuously generated, refreshed and prioritized via face-to-face meetings with an array of customers in target industries. Once initiated, new product development is managed with a rigorous stage-gate innovation process that incorporates project checkpoints and cross-functional alignment from ideation to commercialization. The goal of this new product development effort is to consistently generate one-fourth of the company’s revenues from products that are less than five years old.

The remaining third of Solenis’ technology focus is on working with customers to identify and analyze their most pressing problems and rapidly address them using the best chemicals and/or processes available.

Solenis recognizes that technology innovation is not done in a vacuum, but rather by working closely with current or prospective customers in real-world environments. To facilitate this close interaction, Solenis technology sites are strategically located around the world in Paulína, Brazil; Shanghai, China; Wilmington, Delaware, USA; Krefeld, Germany; Barendrecht, the Netherlands; Drammen, Norway, and Terrassa, Spain.
Success Stories

Improving Operation through Biofilm Monitoring and Control

THE SUSTAINABILITY CHALLENGE

Biofilm in cooling water systems is often overlooked as a trouble spot in ethanol plants. However, plant managers who ignore the issue do so at their own peril, because biofilm can wreak havoc on their operations.

Biofilm growing on heat transfer surfaces acts like insulation, reducing the ability of cooling tower water to cool the process in mash and fermentation coolers and ethanol condensers. The evaporation rate is also diminished by biofilm, reducing cooling capacity and efficiency, particularly during hot summer weather when systems are under higher cooling loads.

These issues directly impact an ethanol plant’s sustainability and profitability. Many plants are forced to either throttle back production due to limited cooling capacity or run chillers to compensate for lost cooling capacity. Additionally, persistent biofilm issues can result in significant production inefficiencies, higher energy use and increased carbon intensity, as cooling tower fans and pumps run harder to deliver the same amount of cooling as a clean system.

Biofilm is also harmful in terms of the corrosion it causes. The acid in the biofilm causes pitting in metal surfaces and can shorten equipment life by as much as 50 percent.

THE SUSTAINABILITY OPPORTUNITY FOR SOLENIS

Solenis’ strength is in developing new chemistries to improve customers’ products and processes, as well as providing technical solutions that enhance process monitoring. This has led to new technologies to control biofilm in recirculating cooling water systems, such as those found in ethanol plants.

Our Biosperse™ XD3899 microbiocide is an oxidizing biocide with the ability to penetrate biofilm, improve system cleanliness and reduce the potential for corrosion. The patented product, which can be described as a mild oxidizer, reduces microbiological activity by as much as 99.9 percent.

The Solenis ClearPoint™ Biofilm Monitoring and Control program, which includes Biosperse XD3899 microbiocide and a monitoring and control technology, provides a real-time, in situ view of cooling water cleanliness and the biocide program’s effectiveness in controlling biofilm. Ethanol plant managers who use the ClearPoint program benefit from lower costs, reduced downtime and optimized chemical use.
CAPITALIZING ON THE OPPORTUNITY

As the energy systems chief at Chippewa Valley Ethanol Company (CVEC) in Benson, Minnesota, USA, Bob Jewell is constantly looking for better ways to do things. As plans were being developed for a new cooling tower at the CVEC plant, Jewell’s focus was on finding new approaches to maximize return on investment.

“Biofilm fouling is something I’ve been concerned about for years,” says Jewell. “I wanted to get a handle on dealing with biofilm before the new cooling tower was installed, so I turned to Solenis for help.”

For Jewell, a critical question was the availability of data to substantiate that Solenis technology could effectively address the biofilm issue. Solenis responded by providing performance data that showed real-time biofilm growth in the CVEC cooling system and how the growth could be controlled through adjustments to the treatment program.

Based on the Solenis data and information, Jewell opted to employ the ClearPoint Biofilm Monitoring and Control program after construction of the cooling tower was completed.

MAKING A SUSTAINABILITY DIFFERENCE

Since the new cooling tower system was installed with the ClearPoint Biofilm Monitoring and Control program in place, operating hours for the chiller during the summer months have been reduced an estimated 90 percent, saving energy and associated costs. Additionally, real-time corrosion monitoring has allowed CVEC to optimize the use of corrosion inhibitor chemistry in its system.

“From what I have seen so far, the ClearPoint program is meeting my high expectations,” says Jewell. “It’s definitely much better than my old biocide program. The ClearPoint system is giving me the performance data I need, when I need it, to confirm biofilm control and sustained, efficient heat transfer. That takes much of the worry away and enables me to focus on other areas of our process that need attention.”

As an added benefit, Solenis has been able to provide environmentally superior chemistries to help Jewell update the plant’s National Pollutant Discharge Elimination System permit, which has become increasingly stringent in Minnesota.
Optimizing Production Efficiency by Solving Scaling Problems

THE SUSTAINABILITY CHALLENGE
A remote tailings pond is an integral source of water for a large gold mine in the western U.S. When the pond water intake and 18-inch distribution piping became blocked with hard scale, the plant determined that a scale prevention program, with chemical feed pumps, was necessary.

THE SUSTAINABILITY OPPORTUNITY FOR SOLENIS
The mine manager turned to Solenis, a leader in scale control solutions for the mining industry, for a solution to its problem. Among our products for mines are Zalta™ antiscalants, which use multiple control mechanisms to reduce scale in water processing systems.

CAPITALIZING ON THE OPPORTUNITY
While Solenis technical experts were confident that Zalta antiscalants would efficiently and effectively address the mine’s scale problems, there was a unique and challenging problem to address. Bringing electrical power for the feed pumps to the pond would be costly, divert mine staff from more important matters and take considerable time to implement.

Solenis’ solution was to design a custom-built, solar-powered skid with three pumps to feed Zalta antiscalants to the pond reclaim water intake system.

MAKING A SUSTAINABILITY DIFFERENCE
Deploying the Solenis solar-powered, mobile treatment system enabled efficient and effective treatment of the pond using Zalta antiscalants in a matter of weeks. The Zalta antiscalants quickly reduced the scale in the mine’s water processing equipment, resulting in an eight-week payback on the investment in the system. The customer has realized annualized savings of more than $200,000 and downtime at the mine has been reduced by six days annually. In addition, the solar-feed skid system can be quickly moved to maintain uninterrupted scale control as the pond matures and changes to the piping are required.
Kymene™ Resins: A History of Sustainable Innovation

THE SUSTAINABILITY CHALLENGE
Solenis is the leader in the manufacturing and sales of polyamidoamine-epichlorohydrin (PAE) wet-strength resins to the papermaking industry.

THE SUSTAINABILITY OPPORTUNITY FOR SOLENIS
Regional regulatory drivers and increasing customer demand created an opportunity for Solenis to be at the forefront of efforts to decrease the organic chlorine content in its line of Kymene wet-strength resins.

CAPITALIZING ON THE OPPORTUNITY
Solenis researchers have continued to modify the basic PAE chemistry to develop stronger-performing resins, reduce the levels of hazardous residual chemicals formed during the manufacturing process and meet or exceed changing industry and environmental requirements. Advanced process control and membrane separation purification techniques have been invented and used to minimize the impact of Kymene resins.

MAKING A SUSTAINABILITY DIFFERENCE
More than 60 years of research and innovation has resulted in a broad product portfolio of Kymene resins that enables customization of wet-strength programs by papermakers to meet their unique local regulatory requirements and customer demands. Solenis has introduced market-leading technologies into each of the widely used industry descriptors of G1, G1.5, G2, G2.5 and G3 PAE resins, making it possible to address a full range of customer compliance needs while balancing cost-in-use. Today, Solenis offers Kymene resins that meet even the most rigorous regulatory guidelines, including labeling established by Nordic Ecolabel and recommendations issued by the German Federal Institute of Risk Assessment (Bundesinstitut für Risikobewertung, or BfR).

Our wet-strength resins are also supplied in a wide range of solids content — from 13 percent total solids to 30 percent total solids — to help our customers balance freight costs, shelf life and product stability concerns.
For more information regarding Solenis’ commitment to sustainability, please contact Solenis Communications.