

Working to Create a Brighter Tomorrow



Annual Report on Environmental and Safety Concerns

2018

axcelis

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Our Commitment to the Environment and Health and Safety

The mission of Axcelis Technologies, Inc. ("Axcelis" or the "Company") is to ensure our customers' success by providing enabling semiconductor manufacturing and support solutions that deliver the best performance at the lowest total cost of ownership. Axcelis' vision is to achieve and maintain market share leadership in ion implantation, and deliver profitability and positive cash flow through the industry cycles to maximize shareholder and employee value.

Axcelis is committed to achieving our business mission while protecting the environment and the public health of the communities in which we operate. These commitments include:

- Compliance with all environmental regulations, legislation, and other environmental requirements applicable to our business and its environmental aspects.
- Conservation of natural resources.
- Continual improvement of our environmental management systems.
- Setting appropriate, achievable objectives and targets for the prevention of pollution.
- Periodically reviewing our environmental objectives and targets.
- Maintaining records regarding environmental policies, procedures, and performance.

Axcelis also understands that achieving our business mission depends, ultimately, on the sustained high performance of our employees. This is dependent, among other factors, on the maintenance of a high level of employee health and safety. In support of this principle, Axcelis Technologies is committed to the following:

- Preventing occupational injuries and illnesses to our employees, visitors and contractors.
- Compliance with all occupational health and safety regulations, legislation, and other requirements applicable to our business and its Occupational Health & Safety ("OH&S") hazards.
- Continual improvement our OH&S management and performance.
- Setting appropriate, achievable objectives and targets for the prevention occupational injuries and illnesses.
- Periodically reviewing our OH&S objectives and targets.
- Maintaining records regarding OH&S policies, procedures, and performance.

These commitments are included in Axcelis' OH&S and Environmental policies, which are communicated to all personnel working at Axcelis facilities. Axcelis also has required training for employees and others on environmental and safety topics. In addition, Axcelis' OH&S and Environmental policies are included in Axcelis' Supplier Code of Conduct, and all direct suppliers as well as other companies in our supply chain are expected to comply with these policies as if they had adopted them directly.

Axcelis Environmental and Safety Management Systems

The Axcelis Environmental, Health and Safety (EHS) Leadership Team (the “Leadership Team”) is responsible for the overall performance of the Environmental and Health and Safety Management Systems (the “Management Systems”), and for setting and reviewing OH&S and environmental objectives, targets, and goals. The Leadership Team is comprised of all Axcelis executive officers and the VP of EHS and Facilities. EHS staff assist the Leadership Team in ensuring that Axcelis’ OH&S and environmental objectives, targets and goals, and the Management Systems appropriately control the OH&S risks and minimize the environmental impacts of our activities, products and services. Our Management Systems are designed to support the ISO certifications sets forth below.

Axcelis annually reviews and sets OH&S and environmental objectives, targets and goals. We also annually identify and commit to actions and initiatives to appropriately control the OH&S risks and minimize the environmental impacts of our activities, products and services. This annual review and goal and initiative setting is part of Axcelis’ annual strategic planning process in which overall company goals and objectives are set.

Each year, Axcelis’ Vice President of EHS and Facilities prepares a business environment analysis for the Management Systems that also includes elements of an overall situational analysis for the Company. Overall strategy for the Management Systems, any changes in scope of the Management Systems, and annual goals and objectives for the Management Systems are developed within the strategic planning process that are appropriate to Axcelis’ strategy and in context of our overall strategic goals.

With the approval of the Leadership Team, goals and objectives for the Management Systems are set for each year, and progress against these goals, as well as review of the effectiveness of the Management Systems, is conducted on a quarterly basis as a portion of Axcelis’ business-wide Quarterly Business Review.

Axcelis ISO Certifications

Axcelis has been registered to the ISO 14001 Environmental Management Systems standard since 2000. It is currently registered to the ISO 14001: 2015 version of the standard with an expiration date of February 24, 2022. The scope of Axcelis’ ISO certification is “All activities for the manufacture of semiconductor manufacturing equipment and similar products at the headquarters plant at 108 Cherry Hill Drive, Beverly MA.”

Axcelis has been registered to the ISO 9001 Quality Management System standard since 1999. Axcelis’ Health and Safety Management System is run under the Business Support Infrastructure portion of our Quality Management System. The Axcelis Health and Safety Management System is based on the principles outlined in the OSHAS 18001 and ISO 45001 HSMS standards.

Environmental Compliance and Sustainability of Axcelis Operations and Products

Identification of Significant Environmental Impacts

Each year, Axcelis identifies and evaluates the environmental aspects of our activities, planned, new or modified products, and services that it can control and influence to determine those that may have a significant impact on the environment. When determining aspects, Axcelis takes into account abnormal conditions and reasonably foreseeable emergency conditions. Certain environmental aspects are identified as “Significant Environmental Impacts.” Axcelis conducts quarterly evaluations to ensure that the identification and current performance of Significant Environmental Impacts are understood.

Axcelis' Significant Environmental Impacts are:

- Electricity Consumption.
- Natural Gas and other Fuel Consumption.
- Fossil Fuel Consumption from Employee Commuting.
- Contribution to Global Climate Change.

Each of these Significant Environmental Impacts is discussed in detail below.

Operational Performance Relative to Significant Environmental Impacts

Electricity Consumption

In 2018, Axcelis' Beverly facility used 18.125 Million kWh of electricity. While this was a 2% increase in kWh over 2017, this consumption represented a 10% decrease in kWh used per ion implanter shipped.

Axcelis continually strives to reduce our electricity consumption at our Beverly headquarters, which includes our manufacturing and product demonstration facilities. Past projects include:

- Conversion from incandescent and fluorescent lighting to Smart LED lighting throughout the facility and parking areas.
- Optimization of clean room HVAC systems.
- Chiller optimization to take advantage of "free (cooling tower based) cooling" during periods of colder weather.
- Use of variable frequency drives where appropriate.

In June of 2019, Axcelis began operation of a 250 kW Combined Heat and Power ("CHP") plant. This CHP plant is expected to reduce our electricity consumption from ISO-New England (the independent, not-for-profit corporation providing electricity across the six New England states), by more than 1.9 Million kWh per year.

Natural Gas and other Fuel Consumption

Axcelis uses natural gas for facility heating, and steam generation for clean room humidification when necessary. In 2018, Axcelis' Beverly facility used 42.626 million cubic feet of natural gas. While Axcelis has sized its CHP plant to minimize waste heat, the CHP plant is expected to require more natural gas than the boilers per BTU of heat generated. As such, Axcelis anticipates that natural gas consumption will increase in 2019 because of the CHP plant coming online in June 2019. In addition to natural gas, Axcelis uses diesel fuel to power our emergency generator, emergency fire pump, and yard tractor. Axcelis uses gasoline for vehicles and snow removal equipment, and propane for a fork truck. In 2018, totals for these additional fuel-burning uses were 142.6 gallons of diesel fuel, 255.7 gallons of gasoline, and 235.6 gallons of propane.

Fossil Fuel Consumption from Employee Commuting

The majority of our employees work in our headquarters facility in Beverly, Massachusetts and commute by automobile. Each quarter, Axcelis estimates the gasoline consumption of our employees from commuting to and from our Beverly facility. This estimate is based on the average quarterly headcount of Beverly employees multiplied by an estimated average of two gallons of gasoline per round trip commute multiplied by the number of weekday workdays in the quarter. The estimate of two gallons of gasoline is based on an estimated average one-way commute of 20 miles, and an average vehicle fuel efficiency of 20 miles per

gallon. In 2018, the estimated fuel consumption for Beverly employee commuting was 333,560 gallons of gasoline.

Axcelis is making efforts to reduce the impact of employee commuting and reduce the number of single occupant vehicle trips made for employee commuting. Axcelis is a member of the North Shore Transportation Management Association ("NSTMA"), which serves the Beverly community. Through our membership in the NSTMA, Axcelis offers a Green to Work incentive program, which provides new participants with incentive payments for using alternatives to commuting by automobile alone. Participants in Green to Work are also enrolled in a Guaranteed Ride Home program that provides free transportation by Uber for employees who cannot use their alternative transportation because of unexpected overtime, illness, or family emergency. Membership in the NSTMA also provides Axcelis employees with ride matching services and one on one commuting advice for those employees requesting it. Axcelis also sponsors the North Shore Wave Shuttle, which provides free shuttle service from the Beverly commuter rail station to area employers, including Axcelis.

Contribution to Global Climate Change

Axcelis recognizes that emissions from our operations contribute to climate change. Axcelis supports the goals of the Paris Agreement made under the United Nations Framework Convention on Climate Change. Axcelis is committed to measuring and minimizing the impact that our operations have in this area, where feasible. To do this, Axcelis uses the Greenhouse Gas ("GHG") Protocol Corporate Standard, the international standard for corporate GHG accounting and reporting. The GHG Protocol classifies a company's GHG emissions into three "Scopes." Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.

Axcelis tracks 100% of our Scope 1 and 2 emissions for our Beverly headquarters and manufacturing facility, and tracks Scope 3 emissions related to employee commuting to and from Beverly as well as worldwide air travel for employees on Axcelis business. Axcelis has goals to ensure our Scope 1 emissions are minimized to the greatest extent practical. As a part of our effort to reduce fuel burning, Axcelis has replaced one of our boilers with two high- efficiency heating units. In addition to direct fuel burning, Axcelis Scope 1 emissions include fugitive emissions of perfluorinated process chemicals ("PFCs") used in manufacturing our products. Axcelis has greatly reduced our use of these materials and has instituted a means of recycling Sulfur Hexafluoride (SF6) gas used in the final test process of Axcelis high energy implanters. As a result, Axcelis has reduced our Scope 1 emissions from a high of 10,681 tons of Carbon Dioxide equivalents (CO2e) in 2011 to 3,644 tons of CO2e in 2018. Axcelis 2018 Scope 1 emissions were comprised of 2,512 tons of CO2e from fuel burning, and 1,132 tons of CO2e from SF6 emissions.

Axcelis recognizes that our climate impact does not end with Scope 1 emissions. We also track and maintain goals for reducing Scope 2 and selected Scope 3 emissions (employee commuting and air travel). In 2018, Axcelis achieved our goal of <15,000 tons of CO2e from our Beverly facility operations. The breakdown for 2018 based on source is shown below:

- Fuel Burning: 2,512* tons CO2e (Scope 1).
- SF6 Emissions: 1,132 tons CO2e (Scope 1).
- Electricity Consumption: 6,601 tons CO2e (Scope 2).
- Employee Commuting: 3,364 tons CO2e (Scope 3).
- Employee Air Travel: 1,266 tons CO2e (Scope 3).
- Total: 14,875 tons CO2e (Scope 1, 2 and selected Scope 3).

*includes CO2e from 85 pounds of Nitrous Oxide (N2O) and 86 pounds of methane (CH4).

Axcelis continually monitors the energy marketplace for opportunities to obtain or enable low carbon energy production. We continue to consider the return on investment from the potential installation of solar energy panels at our Beverly headquarters, but have not yet found it significantly attractive, due in part to the period of time remaining on our lease of the facility. However, Axcelis is in the process of establishing an agreement for Alternative On-Bill Credit for 50% of the proposed output of an offsite community solar project planned under the Massachusetts SMART program. Although Axcelis will not directly use the electricity generated by the project, Axcelis believes our participation will help to enable the growth of solar power within the Commonwealth of Massachusetts.

Operational Performance Relative to Other Environmental Factors

Water

Axcelis uses water for evaporative cooling, laboratory processing, aqueous cleaning, our cafeteria operations, and other domestic uses. Occasionally, water is added to our closed loop chilled water and process cooling systems. Axcelis recognizes that water is a vital natural resource and makes efforts to minimize water use where appropriate. In 2019, Axcelis modified the deionized water rinse used in our manufacturing operations for aqueous cleaning systems. We now only add water if needed based on an increase in conductivity, or a low level in the rinse tank as a result of evaporation of the 130-degree rinse water. By making this change, Axcelis has reduced the water consumption of the aqueous cleaning system by approximately 70%.

In 2018, Axcelis used 12.173 million gallons of water at our Beverly facility. This represents a reduction of 1.319 million gallons (9.8%) from 2017's total of 13.492 million gallons. Of this total water usage in 2018, 6.22 million gallons of this water were lost to evaporation from our evaporative cooling towers serving our chilled water plant. Another approximately one million gallons were discharged to the sewer to prevent buildup of particulate and dissolved minerals in the cooling tower loop from repetitive evaporative cycling.

At our Beverly facility, we generate industrial wastewater that is pretreated for metals precipitation and for non-metals pH adjustment, and then discharged to the South Essex Sewerage District, a publicly owned treatment works serving Beverly, Danvers, Salem, Peabody and Marblehead, Massachusetts. In 2018, Axcelis treated 191,669 gallons of industrial wastewater. The remaining 4.784 million gallons were used within the plant, mainly for domestic and cafeteria operations.

Solid Waste and Hazardous Waste

In 2018, Axcelis generated 617 tons of non-hazardous solid waste. Axcelis recycles wood pallets, paper, cardboard, and beverage containers. Through these recycling efforts, in 2018 Axcelis diverted 95 tons of materials from the non-hazardous solid waste stream. Axcelis also prevented the generation of 1.5 tons of solid waste by contracting for the refurbishment of 203 office chairs due for replacement in 2018.

Axcelis is a small quantity generator of hazardous waste, generating 15,386 pounds of hazardous waste (average of 1281 pounds per month) in 2018.

Air Emissions

Axcelis has Limited Plan Application Air Emissions approvals from the Massachusetts Department of Environmental Protection for our boilers, emergency generator, and process emissions in Beverly, Massachusetts. Under the process emission approval, our 12-month rolling average of total Volatile Organic Compounds ("VOCs") may not exceed five tons. In 2018, the maximum 12-month rolling average VOC emissions was 2.18 tons, and the average for calendar year 2018 was 2.13 tons. Approximately 42% of these emissions were from fugitive Isopropyl Alcohol vapors from cleaning operations related to Axcelis products.

Environmental and Safety Stewardship of Our Products

Axcelis is committed to delivering safe and effective products to our customers. Many of our customers actively solicit continuous improvement in both the safety and environmental impact of our ion implantation systems. Each Axcelis product is evaluated against guidelines published by our trade organization, SEMI (formerly Semiconductor Equipment and Materials International). SEMI's guideline S2, called "Environmental Health and Safety Guideline for Semiconductor Manufacturing Equipment," requires a review of equipment by a third party evaluator which, based on the results of the evaluation, certifies that the product is in conformance to the guidelines outlined in the SEMI document.

Axcelis also ensures that our products comply with all environmental and safety laws and regulations applicable to our systems, in the countries in which our systems are located. Our customers use our systems in the United States, Europe and Asia. The European Union has taken a leadership role in safety regulation, and Axcelis ensures its systems comply with the European Union's Machinery Directive (2006/42/EC) and the Directive's "Essential Health and Safety Requirements relating to the Design and Construction of Machinery," as well as the European Union Electromagnetic Compatibility (EMC) Directive (2014/30/EU).

Axcelis also maintains a compliance program for the EU Registration, Evaluation, and Authorization of Chemicals (REACH) Regulation (EC/1907/2006). As a component of our compliance program, Axcelis provides web-based reporting to our customers on Substances of Very High Concern ("SVHCs") or Candidate List Substances, known to be included into our products. We monitor the inclusion of SVHCs in our products from purchased parts and components, and require our suppliers to notify us if SVHCs (regardless of the amount or concentration) are included in parts and components they sell to Axcelis.

Axcelis evaluates the use of utilities by our ion implantation systems according to the SEMI guideline S23, "Guide for Energy, Utilities, and Materials Use Efficiency of Semiconductor Manufacturing Equipment," and continually looks for process improvements to reduce the consumption.

Occupational Health and Safety Performance Information

OSHA Incident Rate

In 2018, Axcelis worldwide OSHA recordable incident rate equivalent (applying US OSHA recordable criteria to all employees regardless of country) was 1.13 recordable incidents per 100 full time employee equivalents. However, over the last five years, our average incident rate was 0.86 recordable incidents per 100 full time employee equivalents, and over the last 10 years, this average has been 0.70 recordable incidents per 100 full time employee equivalents.

Employee Training

Axcelis invests heavily in EHS training for our global work force. In 2018, Axcelis successfully delivered more than 11,000 individual EHS, HR, Legal and Ethics training courses through our online Learning Management System. Monthly reports regarding training performance of all employees are sent to the Leadership Team. In order to motivate timely completion, our CEO directly contacts employees with low training completion rates to reinforce the importance of completing assigned training on time. Training completion is also included in our annual performance review process. In 2018, employees completed 98.8% of all assignments by year-end.

Other Occupational Health and Safety Metrics

Other OHS metrics are tracked and reviewed with the Leadership Team on a quarterly basis. These metrics include the number of days a corrective action related to an accident or other incident is open before resolution, and the number and content of health and safety communications delivered to employees.

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