

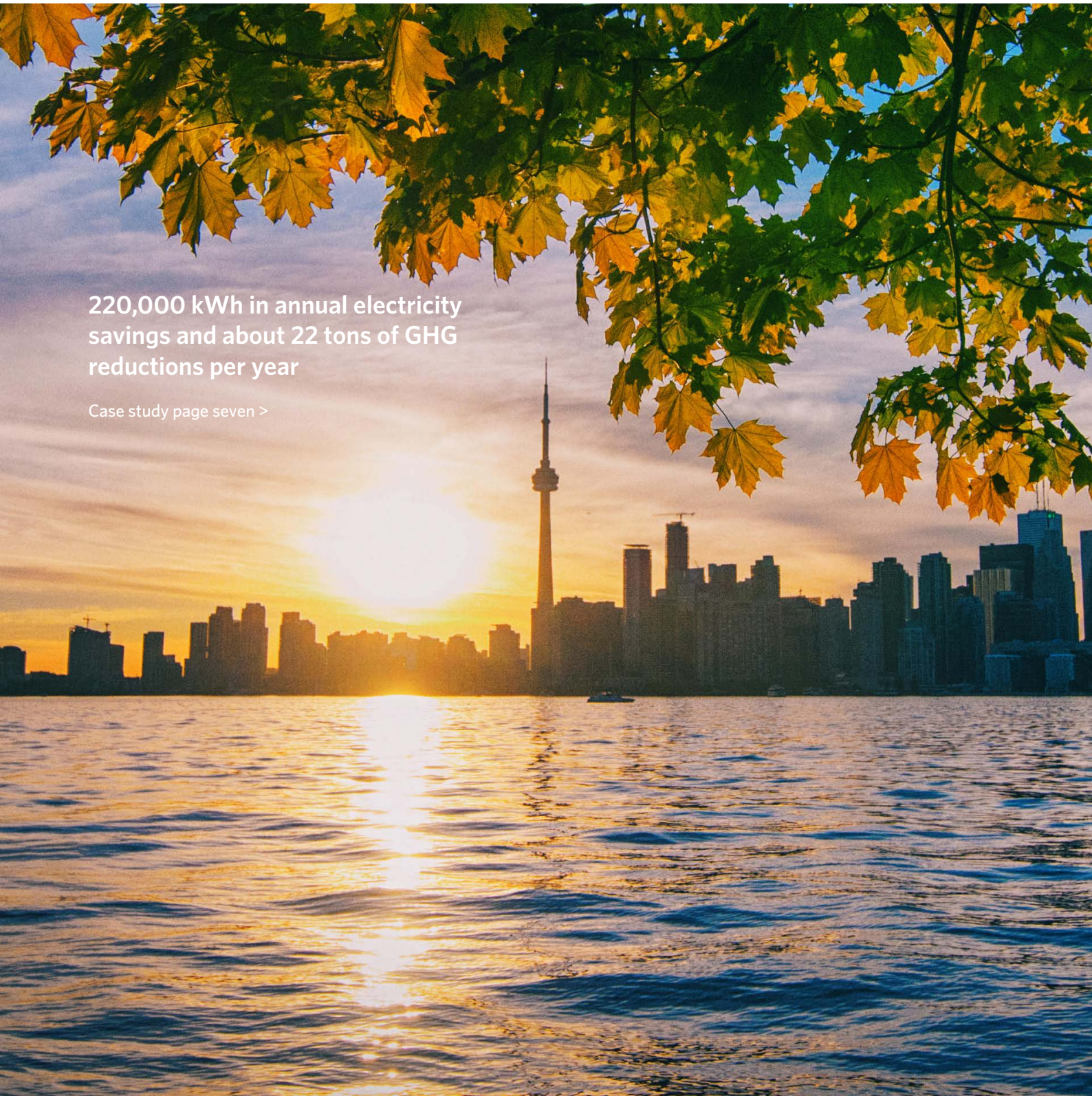


# Sustainability Report for the 2017 Operating Year



220,000 kWh in annual electricity  
savings and about 22 tons of GHG  
reductions per year

[Case study page seven >](#)





## Fluid flow management has always been, and still is, a vital component of urban life.

Fluid flow management is an increasingly vital component of urban life. With the current growth rate of cities and the obvious need for larger more condense buildings, fluid flow management becomes even more crucial. From water and wastewater, to climate control and fire safety, the demand from these systems is rising and as are the potential energy consumption and associated adverse environmental effects. Armstrong's products and services help mitigate these adverse consequences. Our solutions are designed to enable the smart cities of tomorrow and lead the industry on energy efficiency.

We live in an increasingly connected world, and our new line of products are designed to integrate, communicate, and allow a new level of system optimization and performance. As an example, Armstrong's new Pump Manager service is a cloud-based performance management service that leverages the built-in connectivity in the new Design Envelope Pumps to deliver insights in real-time. Systems rarely operate as designed, as building load and equipment performance evolves (and often degrades) over time. With active Performance Management in place, our customers can make real-time informed decisions and take immediate action to deliver the best possible system and environmental performance.

## We invite you to comment and provide constructive input that will help us improve

As a cleantech company we place our responsibilities and commitments on two parallel and complementary dimensions: solutions that allow our clients to achieve their sustainability goals, and our environmental and social responsibility to develop and manufacture these solutions with a positive net impact. Although the former impact on sustainability is a magnitude greater than the latter, we are committed to doing things right. We have articulated our objective of reducing our CO<sub>2</sub> emissions by 20% in 2020 over 2014 levels.

Through this report we aim to share our achievements and challenges in a transparent way. This is only one of the channels we use to interact with our communities, customers, and stakeholders in general. We invite you to comment and provide constructive input that will help us improve our products, operations, and our common environment.

Lex van der Weerd  
**Chief Executive Officer**





Since 1934, our values have been the foundation for our approach to business.

For Armstrong, acting responsibly, with the highest social, environmental and ethical standards is a fundamental business principle. Since 1934, our values have been the foundation of our approach to business. They guide the way in which we interact with our stakeholders, and how we develop and share our products and solutions. These values are embedded in our Planet Proposition Charter and its three pillars.

### Our Solutions

By designing and supplying industry leading energy-efficient, cost effective, connected and intelligent fluid-flow solutions, we help our customers reduce their energy consumption and save money while reducing their environmental footprint in general and their Greenhouse-Gas emissions in particular.



### Our Environment

By applying stringent environmental standards to our operations, measuring our performance and continually raising the bar, we are minimizing our own consumption of valuable resources and the generation of non-recyclable waste, as we design and manufacture products that reduce environmental impacts.



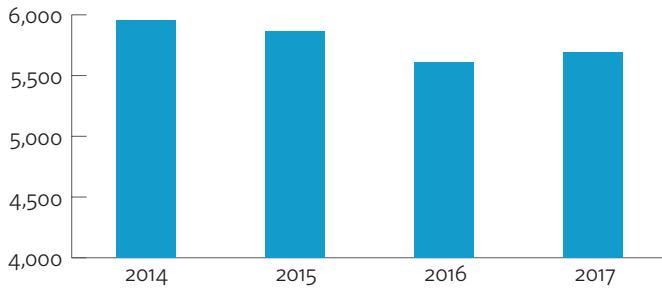
### Our Community

By being transparent regarding our operations, achievements and challenges, and by educating and supporting our communities to help them make environmentally responsible choices at work and at home, we are helping the community at large become more sustainable.



These values are embedded in our Planet Proposition Charter and its three pillars.

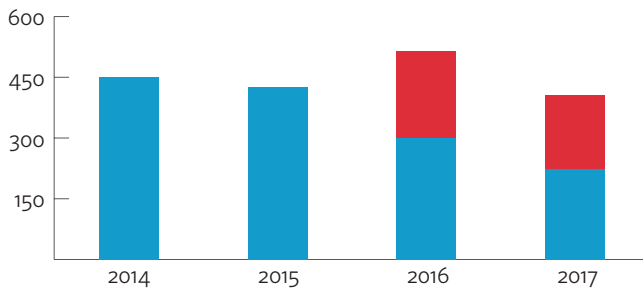
**Total Electricity Consumption (MWh)**



**4%**  
REDUCTION

4% reduction since 2014.

**Renewable Energy Generation at the Manchester Plant (MWh)**



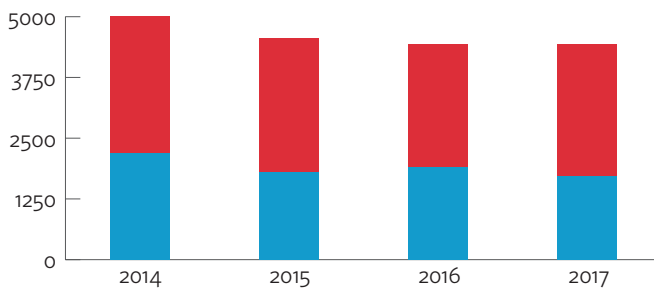
■ GRID ELECTRICITY ■ SOLAR ELECTRICITY

**39%**  
CONSUMPTION

**43%**  
CONSUMPTION

Locally generated solar electricity accounted for 39% of local consumption in 2016 and 43% in 2017.

**Total CO<sub>2e</sub> Emissions (Ton)**



■ SCOPE 1 ■ SCOPE 2

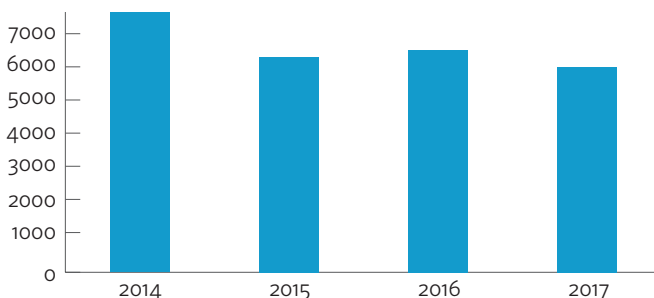
**22%**  
REDUCTION  
SCOPE 1

**3%**  
REDUCTION  
SCOPE 2

**11%**  
REDUCTION  
SCOPE 1+2

Scope 1 emissions at Armstrong include Greenhouse Gas emissions from the direct use of fuels on site. Scope 2 emissions are the Greenhouse Gas emissions associated with the off-site generation of the electricity that Armstrong facilities consume.

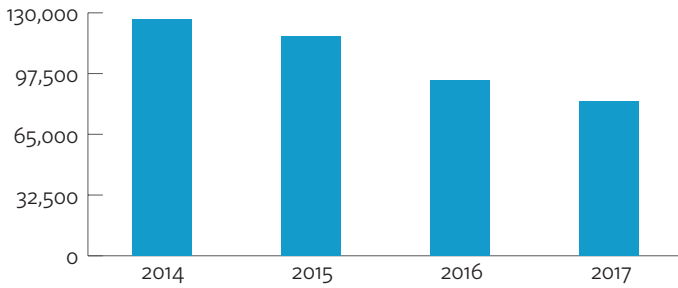
**Total Natural Gas Consumption (MWh)**



**28%**  
REDUCTION

Natural Gas is primarily used for space heating in the UK, USA and Canada. There is no significant change in consumption when correlated to outside temperature.

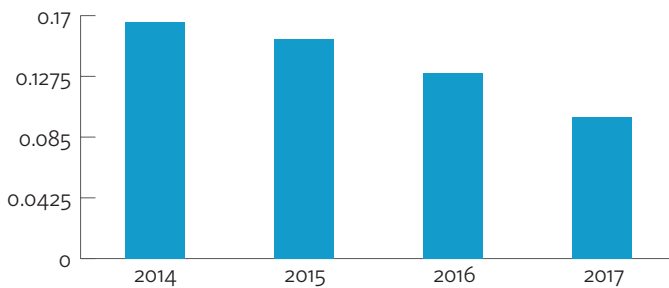
**Total Diesel Consumption (LT)**



**35%  
REDUCTION**

35% reduction since 2014.

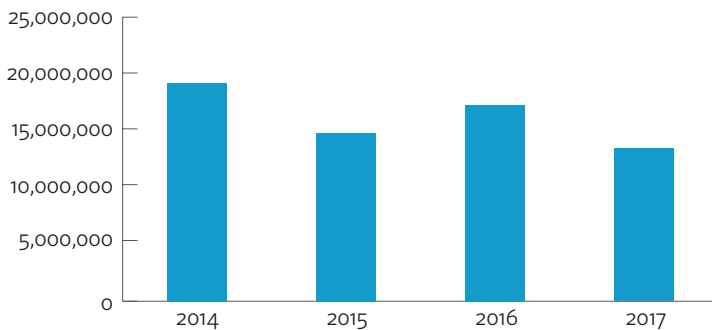
**Diesel Consumption Per kg Product at the Bangalore Foundry (LT/kg)**



**38%  
REDUCTION**

The Bangalore plant is the only Armstrong location where Diesel is used for the production process. Diesel use per kilogram of product reduced by 38% over the period 2014-2017. In the other locations Diesel is used for backup generators and transportation.

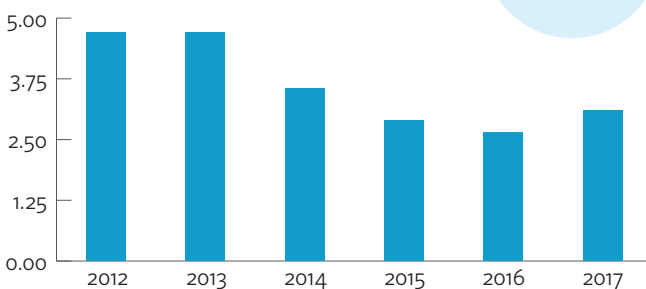
**Total Water Consumption (LT)**



**28%  
REDUCTION**

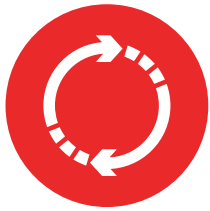
Water consumption at Armstrong is mostly linked to product testing. The actual amount used depends on product type and production fluctuations.

**Bangalore Foundry Sand Use Per Product (kg/kg)**



**34%  
REDUCTION**

Sand consumption is tracked based on purchase records. In 2017, production was slightly lower but due to long-term sand supply agreements, incoming sand shipments remained at previous year's level. This causes the sand use per product index to falsely suggest an increase in sand consumption. We expect that in 2018 the sand use per product ratio will return to 2016 levels.



# Armstrong’s connected solutions paves the way for sustained performance.

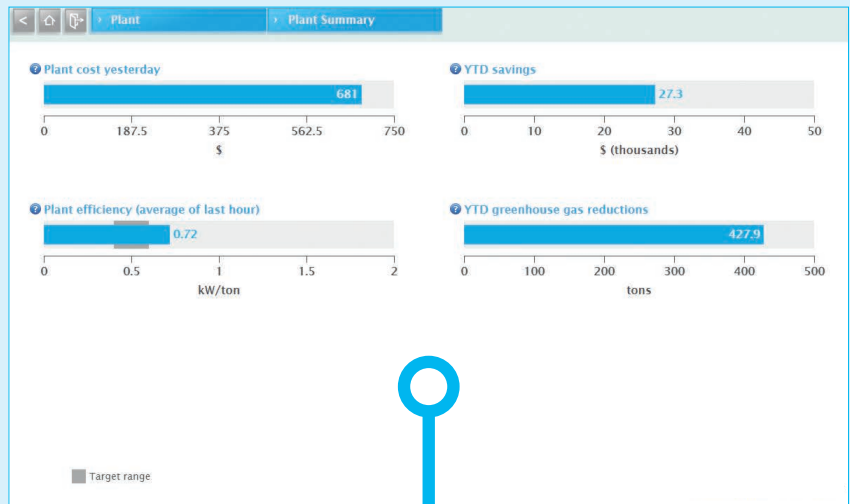
In the majority of buildings, heating ventilation and air-conditioning (HVAC) systems represents a major energy consumer. Historically, these systems were designed as independent components, with limited connectivity and actual performance monitoring technology. Due to their direct effect on the comfort level of the residents, operating margins are dictated by output requirements with very limited attention to efficiency.

Armstrong’s Design Envelope equipment takes a holistic view of the HVAC system. We unlock the trapped energy savings by applying Design Envelope technology to the components and then integrating the elements through our imbedded connected technology and our Performance Management solutions. We deliver real-time insights that allow building operators to make informed decisions and take prompt action.

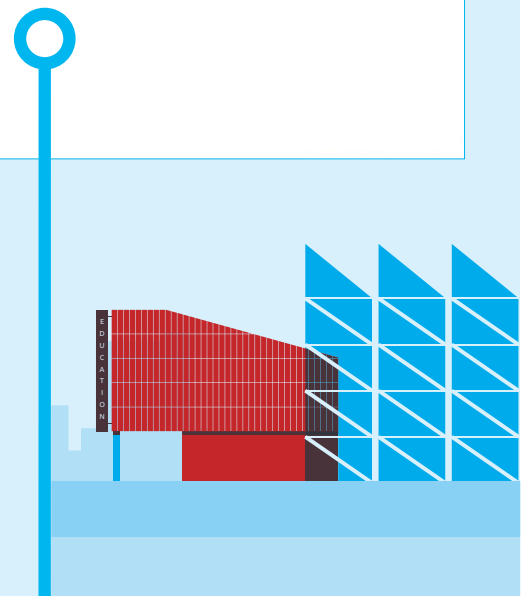
In the future, such connected systems will support Smart Cities. In present-day building systems, Armstrong’s connected solutions pave the way for sustained performance, lower operating costs, reduced environmental footprint, and smarter buildings.

## ECO\*Pulse

ECO\*Pulse is a subscription-based HVAC performance management service for improving and maintaining chilled water plant performance and energy efficiency.



ECO\*Pulse provides invaluable insights, alerts, real-time diagnostics, daily energy efficiency summary, and practical recommendations for maintaining plant efficiency at its optimum for best energy, carbon, and cost performance.

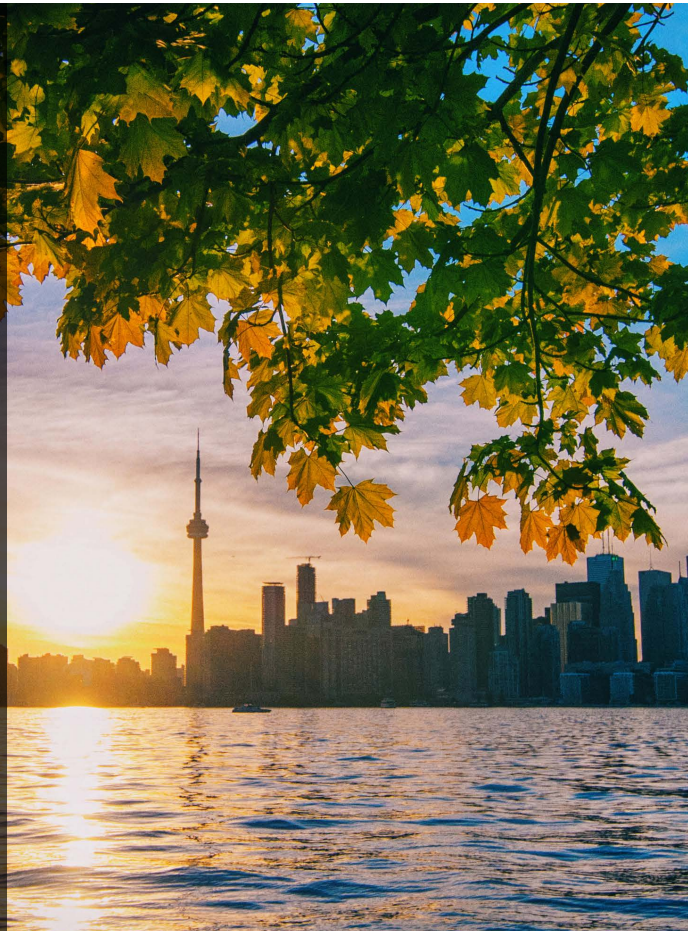


## 220,000 kWh in annual electricity savings and about 22 tons of GHG reductions per year

**A** 13 year-old, fifty-two floor condominium in downtown Toronto was retrofitted in 2017 with an Armstrong Design Envelope domestic cold-water booster package.

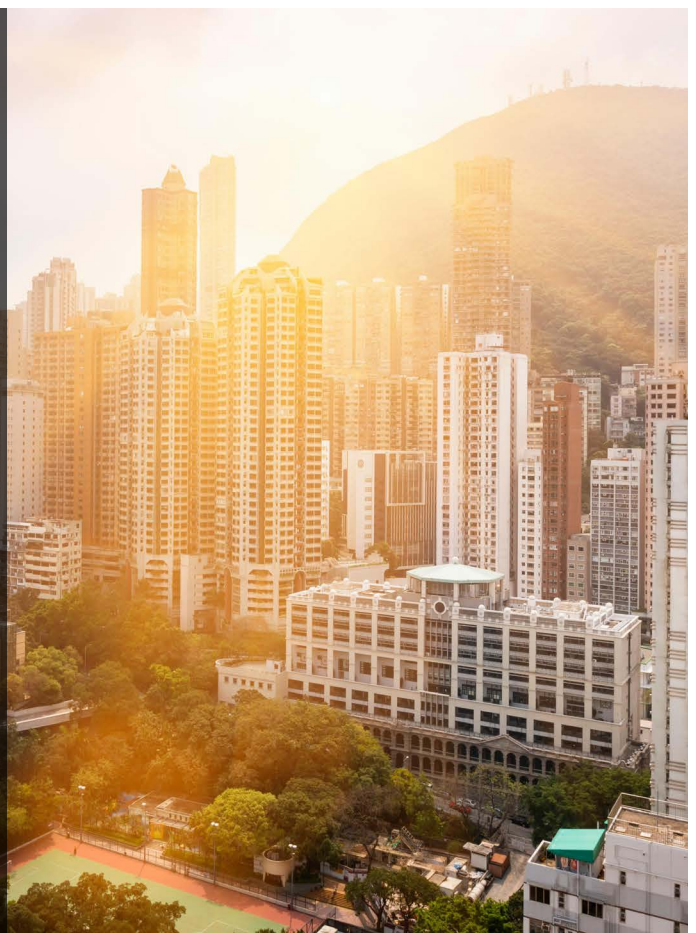
The package included three 6800 Design Envelope boosters with controls, piping and valves. Armstrong applied on behalf of the building management company for the Ontario Save-on-Energy Retrofit incentives program and secured a grant of just over \$CAD 22,000. Based on verified savings of 60% compared to previous energy consumption, the project will pay for itself in 3 years, and reduce GHG emissions associated with electricity consumption.

**I** f these are the savings our current technology can achieve in a 13-year-old building, imagine the potential saving in retrofitting older buildings.



## With a total building area of 127,000 square meters, the Wuhan International Convention & Exhibition Center is one of China's trade show and convention facilities.

**I** n 2017, Armstrong completed a plant automation project at Wuhan Expo that included 10,000 tons of electrical driven chillers, 3,000 tons of absorption chillers, 1 MW Combined Heat and Power unit, and a boiler plant for top-up heating. The plant control is based on 2 Integrated Chilled Water Plant Control System, and the installation also included 32 Design Envelop pumps. Compared to a conventional design approach, the installed system can deliver 24% annual energy cost savings, or about 3.3 Gigawatts of energy savings per year. These savings are equivalent to an annual Greenhouse Gas emissions reduction of about 2,500 tons.



### Halesowen

About 90% of lighting fixtures were upgraded to LED lighting which consumes up to 80% less energy.



### Toronto & Manchester

As part of our commitment to sustainability, and recognizing the potential environmental effects of everyday commuting, 4 Electric Vehicle charging stations were installed at our Toronto plant and 2 at our Manchester plants. We hope that the availability of these charging station 'at work' will encourage more of our employees to consider electric mobility.



### Corporate

Realizing that most of our products' environmental footprint lies upstream in our supply chain, we launched in 2017 our Sustainable Procurement Program. With more than a thousand different suppliers, this is a long-term journey that requires prioritization and perseverance. This past year we adopted a framework, developed an action plan and a policy, identified a priority list of just over a hundred suppliers, and developed and launched employee training modules.

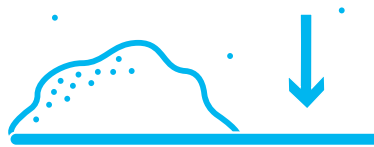
As our Sustainable Procurement Program is based on building an atmosphere of collaboration, we notified suppliers on the priority list of our intentions. In 2018 we plan to agree on, and launch, several cooperative efforts to lower our products' upstream Environmental Footprint.



### Bangalore

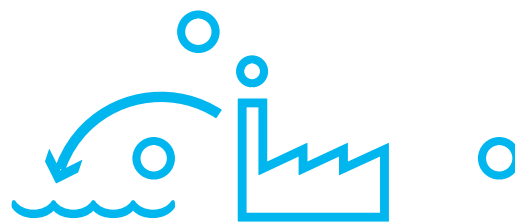
Our foundry uses the sand casting method to produce impellers for our pumps, as well as other components and products. Sand is a natural resource that needs to be conserved, and therefore most of the sand we use is recycled back into the process.

However, some of the sand cannot be re-used due to its chemical composition or properties and ends up as waste to be disposed of. Continued efforts at the foundry to reduce both the amount of sand used and the amount of waste generated achieved notable results. Since 2012 the amount of sand used per kg of product reduced by more than 34%.



### Bangalore

Starting January 2017, the design process for every new component includes a report showing the embedded environmental impact of the component. This report includes the air and water pollution impact, Carbon Footprint impact and the embedded energy. The next step in our internal strategy is to use this information to compare potential design and material alternatives, to produce products with a smaller Environmental Footprint.





### Halesowen

Employees raised £580 for the local charity The White House who offer practical help, emotional support, information, and transportation to and from hospital appointments for Cancer patients and their families.



### Manchester

Employees worked to keep the local garden up and running. All donations raised from the produce were donated to the British Heart Foundation.



### Buffalo

In partnership with the Boys & Girls Club of North Tonawanda and the local Boy Scout Troop, employees and management supported and participated in several campaigns and initiatives including an Arbor Day campaign focusing on the importance of plants, trees & bumblebees, as well as event sponsorship and advertising to help purchase a new van.

One of the more successful programs was with the Camp Spirit summer camp and included a lunch and learn event, and an agreement with the City of North Tonawanda to provide the camp with recycling bins. The children and staff at the camp become so engaged that the camp asked for additional recycling bins due to lack of capacity.



### Bangalore

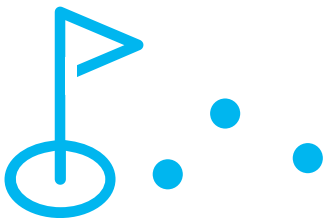
Continued support for the local primary schools with books, uniforms, and basic amenities, as well as sponsoring a sustainability related drawing competition with prizes. Local employees expanded the organic garden and sold the produce. All proceeds were donated back into the community. In collaboration with local engineering schools, three events were organized where students visited the Foundry to learn about the technology and sustainability initiatives.



### Toronto

Employees and management participated in several drives throughout the year, in most cases with corporate matching. The Armstrong Annual Golf Day Fundraiser yielded \$648 for Ronald McDonald House; Jeans Day fundraiser raised, \$3,792 that were shared between the Scarborough Hospital Foundation and Red Cross Canada;

The Christmas drive raised \$948 in cash, plus toys and supplies for the Red Door Family Shelter; And the Payroll deduction program collected \$11,032 for The United Way of Greater Toronto and York Region.



### Shanghai

In collaboration with the Shanghai Charity foundation, Armstrong employees participated in a cloths donation initiative. The focus was on children’s winter clothing like coats and sweaters, as well as bed quilts, to be sent to economically challenged communities.



### International

In late 2017, Armstrong announced the sponsorship of two internships as part of the US Green Building Council’s (USGBC) Green Tech Legacy Program. The program creates awareness of green building technologies in the facilities management, electrical, HVAC, plumbing and carpentry trades.

Armstrong will provide scholarships for two deserving students at Madison Park Technical Vocational High School in Roxbury, Massachusetts, and will also participate in the program curriculum with a presentation on energy-saving HVAC technologies and solutions.

This contribution represents our continued commitment to achieving more energy efficient and sustainable buildings, by helping to equip the next generation of building operators and technicians with the education and skills they need to succeed, save energy and reduce Greenhouse Gas emissions.



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To find out more about  
our sustainability journey visit:  
[our-sustainability-vision](#)

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MAKING  
ENERGY  
MAKE  
SENSE<sup>TM</sup>