



Embracing energy efficiency

– how automated entrance systems minimize your energy consumption

ASSA ABLOY
Entrance Systems

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Introduction

The dual threats of climate change and global conflict are forcing us all to look more closely at energy consumption. People and businesses are waking up to the fact that the energy we use to heat, cool and light our buildings comes with a significant price tag, both financially and environmentally.

The key of course is improving energy efficiency and what better place to start than the building's entrance system? A high proportion of a building's energy loss leaks from its windows and doors and well-designed automatic entrance systems can go a long way to minimizing energy leakage.

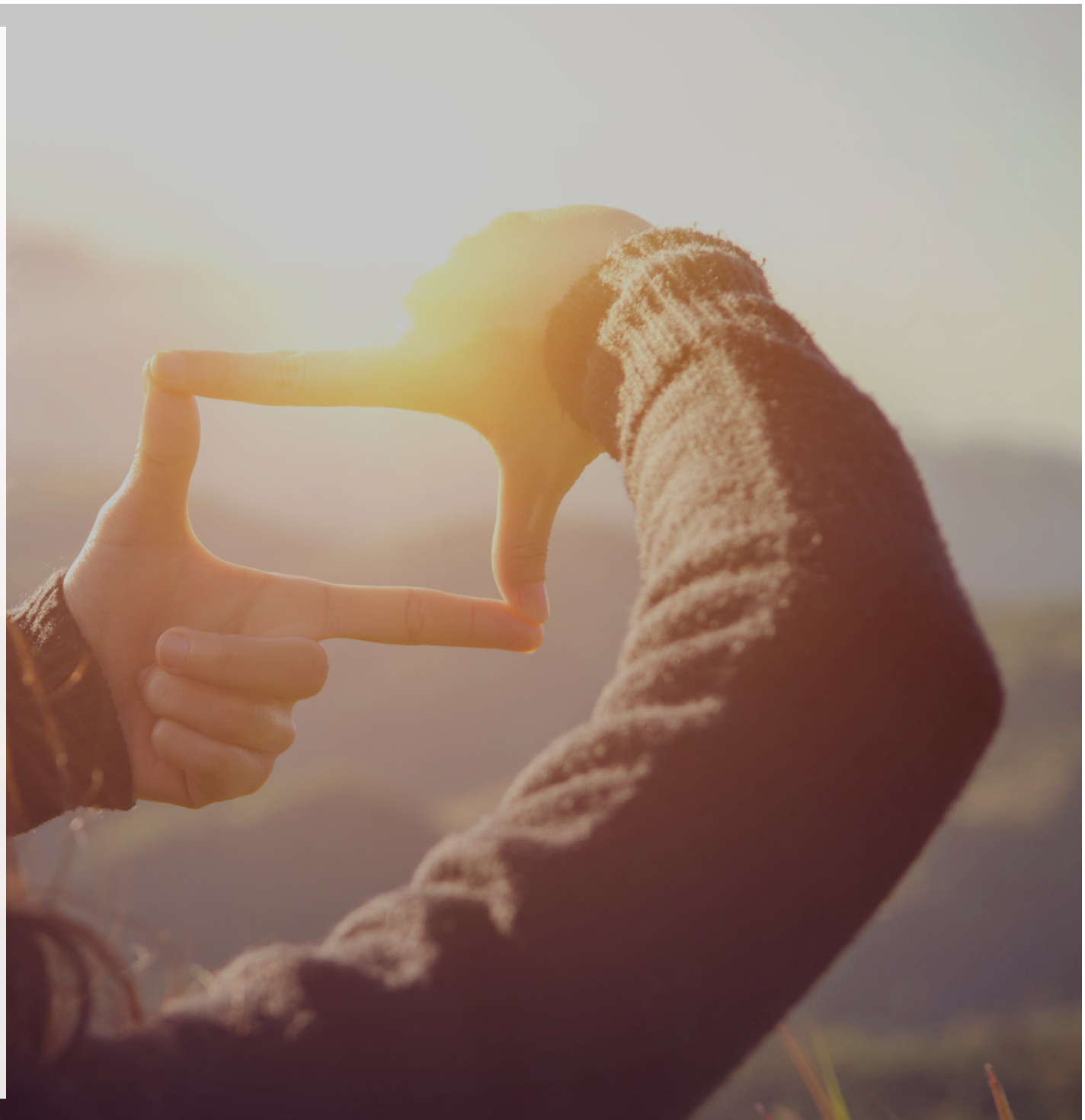
Developments in sensor technology and thermal retention are revolutionizing entrance systems and there has never been a more exciting time to work within the sector. This white paper will assess the need for more sustainable door solutions, explore their evolution and outline how building professionals can select the right product to optimize energy savings.



[See how you can optimize the energy performance of your building](#)

Do you need more information?

ASSA ABLOY Entrance Systems
info@assaabloyentrance.com



Pressure point

The current conflict in Europe has put unprecedented pressures on global energy markets and raises major concerns about security of supply. Consumers had already seen prices rise due to supply issues, general inflation, and a spike in post-lockdown demand. The conflict has taken those concerns to another level.

The world is heavily reliant on fossil fuels and restricted supplies in recent months have set energy prices spiralling, having a major impact on businesses and households alike.

The economic consequences are significant. Eurozone inflation rose to a record 9.9% in September 2022, largely down to increased energy bills. Pressure is now mounting to combat escalating costs with drives to improve energy efficiency.

That push to reduce energy consumption is also key to securing a sustainable future for our planet. We are in the midst of a climate emergency. Human activities have had a devastating impact on Earth's climate and precious ecosystems. According to the Intergovernmental Panel on Climate Change (IPCC), from 1880 to 2012, the average

global temperature increased by 0.85°C and that rise is likely to continue due to ongoing greenhouse gas emissions. The extent of sea ice in the Arctic is shrinking at an alarming rate, and scientists predict the average sea level rise to be 24–30 cm by 2065 and 40–63 cm by 2100.

We may have already seen irreversible change and without drastic action, we face catastrophic consequences. From flooding to heatwaves, wildfires and cyclones, the signs are already there that our world is changing dramatically.

According to IPCC (Intergovernmental Panel for Climate Change), greenhouse gas emissions must peak by 2025 and be slashed by 43% by 2030 to limit global warming to 1.5°C above pre-industrial levels. We must act quickly and decisively.

A growing number of businesses are waking up to the reality of climate change. They are committing to hit net zero or drastically reduce their carbon impact to support the triple bottom line of people, profit and planet.



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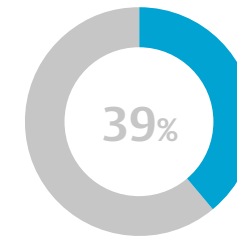
Building resilience

The double whammy of rising prices and the climate crisis is quite rightly forcing organizations to take a much closer look at the energy performance of their buildings. How do we reduce the carbon footprint of the spaces in which we work, rest and play?

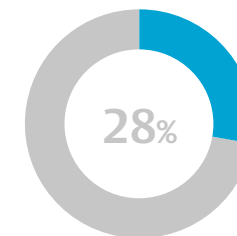
Together, building and construction are responsible for 39% of all carbon emissions in the world, with operational emissions (from energy used to heat, cool and light buildings) accounting for 28% of the total. The World Green Building Council (WGBC) is committed to helping meet the challenge by putting sustainability at the heart of building design and retrofitting existing stock to ensure energy waste is kept to a minimum.

The world's building stock is expected to double by 2060, vastly increasing the built environment's carbon footprint. WGBC has a vision to create smarter building that will cut embodied carbon emissions by 40% by 2030 and achieve zero-net emissions for buildings by 2050.

Achieving that will require a much greater understanding of how to measure building performance, how to understand where energy loss occurs and how it can be combatted.



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Do you know how much warm or cold air flows through your open doors?

Opening the door to sustainable design

We are a partner of WGBC's Europe Regional Network, and we are committed to helping clients improve the energy efficiency of their buildings through automated entrance systems.

When it comes to operational emissions, much of the focus is on how a building is heated and insulated. Yet, how do you ensure that as much of that energy as possible stays within the building? How does the design, the layout and the flow of people and air within that building impact on its carbon footprint?

Choosing the correct type of door that meets the end user's needs and meets sustainability criteria can have a significant impact on a building's carbon footprint.

A study carried out on behalf of the Dutch Ministry of Economic Affairs investigated the potential energy and cost savings for shops that install automatic doors. Researchers focused on a pharmacy in Amsterdam and found that by replacing its manual door with an automatic entrance system with an air curtain, the retailer cut energy consumption for heating by 43%. In addition, the new door had no effect on customer behaviour and the environment within the space was improved by minimising the amount of noise and traffic fumes entering the building.

Having an "open door" policy has significant implications for a building's energy performance, and as more brands attempt to control costs and reduce their carbon footprint, they are looking for alternatives.

Regulators and environmentally savvy consumers are putting retailers under pressure to reduce energy leakage. In France, businesses can be fined up to 600 euros if they don't keep doors closed when the air conditioning or heating is on and in Milan, a requirement for all commercial and public buildings to keep their doors closed has been in effect since January 2023.

International brands such as H&M have had a "closed door" policy for some time and demonstrated how successful it is in cutting costs and emissions whilst having no impact on footfall.

Using best-in-class automatic entrance systems ensures that doors are only open when they need to be and are designed to keep energy loss to a minimum.

Businesses providing door solutions are investing heavily in research and development and innovations which put sustainability at the heart of the product development process. More time and effort are being spent understanding the process of air leakage and heat transfer and the energy performance of different systems.

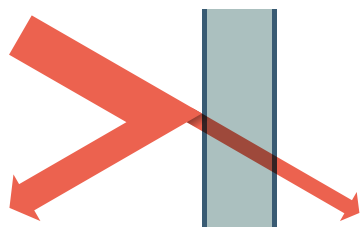
Demand for weather-resistant door and window products is on the rise and as climate change increases the intensity and frequency of extreme weather events, there is a push to make buildings more resilient. Whether it be extreme winds or heavy rain, product designers are finding new ways of preventing leakage and create a safe and comfortable internal environment.

How to measure the insulation performance of your doors and windows

Initially, the focus was primarily on the U-value of a door. It is one of the key factors affecting energy loss. U-value measure how well a building material performs as a thermal insulator. The lower the U-value, the less energy is required to maintain a comfortable temperature and the more effective the door is at preventing heat transmission.

The value indicates how much thermal energy in watts is transmitted through a building component with the size of 1 square meter at a temperature difference of 1 kelvin. Thus, the U-value is expressed as watts per square metre (W/m²).

Doors are also given R-value ratings. R is an expression of the total resistance to heat flow through a complete panel section or construction assembly. R-value represents a value of the thermal resistance in hours - square foot - degrees Fahrenheit per BTU. R-value is the numerical reciprocal of the U-value. The higher the R-value, the higher the insulating value.



$$R\text{-value} = \frac{\text{Temperature difference} \times \text{Area} \times \text{Time}}{\text{Heat loss}}$$

In recent years, the industry has also put more emphasis on measuring air infiltration. This indicates how much air is leaked around the perimeter of a door and is expressed by CFM - Cubic Feet per Minute.

Yet the above only measure the level of energy loss through a door when it is closed and don't factor in what happens when it is in use.

The manual door at the entrance of your building may have a low U-value rating, but that will do little to save energy if it is wedged open for most of the day. Far more attention needs to be paid to what is known as unintended air exchange. This is the factor that has the greatest impact on overall energy losses. If manual doors are replaced with automated entrance systems, building operators have peace of mind that energy loss will be kept to minimum without having to remind people to close the door.

There is a knowledge gap amongst many professionals within the building sector about the contribution automatic doors can make to meeting sustainability goals. The more research and analysis that is conducted regarding the energy performance of different door systems, the better. Knowledge is power and armed with accurate information and practical solutions, professionals can make more environmentally sound decisions.



Manual doors which are left open will have a significant impact on a building's carbon footprint. It is important that professionals such as architects, contractors and facility managers, understand how switching to automatic doors – be it sliding, revolving or swing doors – can transform a building's sustainable credentials.

Research-led solutions

When addressing a building's energy usage, there is a lot to be said starting at the front door. Although a door constitutes only 2% to 3% of the cost of features within a new building, if the right components are used, it can have a massive impact on the building's life cycle energy usage.

Using energy calculators to compare and contrast the efficiency of different door solutions is becoming a popular choice for more environmentally-conscious building professionals. The European Door and Shutter Federation (EDSF) recently developed its Door Energy Calculator. The online application allows owners and tenants to calculate energy costs generated by the opening and closing of automatic doors.

It is essential that the development of sustainable door solutions is informed by thorough research. Every building is unique and entrances function in very different ways. Building professionals require an in depth understanding of how

different scenarios affect energy performance and what might be done to mitigate losses.

- **How does using an automatic door affect air infiltration?**
- **Which types of systems and designs work most effectively in which circumstances?**
- **How does the people flow within a specific area impact on the performance of a door?**
- **How might a door sensor be adapted to allow an entrance to function with greater energy efficiency?**

We have undertaken detailed research into how different entrances impact on energy consumption within buildings and what can be done to minimise losses.

It is clear that most energy is lost through air infiltration when the door is open. Therefore, our research has focused on exploring ways to minimize its impact. The team has

developed a way of calculating energy use and comparing the efficiency of different systems. This method has third party verification.

Researchers have also been exploring how the energy efficiency of automatic revolving and swing doors can be enhanced by adjusting different parameters. This might include closing speed, rate of revolution, or the opening sequencing and distance between sets of doors within a vestibule.

Work is underway to investigate how equipping doors with different types of sensors can optimize energy savings, whilst still prioritize convenience. Existing doors can be easily upgraded with sensors which work far more effectively. In the long term, the aim is to design new types of sensors which can determine people's intentions when approaching the building and avoid opening the door unnecessarily.

Pedestrian traffic flow



It is imperative that building professionals are given information about the energy saving potential of different solutions to help make informed decisions.

That's not only important when designing new builds, but also retrofitting old ones. Tools such as Display Energy Certificates (DECs) can be used to measure a building's energy performance and if adopted more extensively, would raise the profile of more effective energy management.

Doors have a far greater impact on the energy consumption of a building than is widely appreciated. People tend to group doors and windows together when talking about energy wastage and yet doors are used and left open far more frequently. Their role in the journey to greater energy efficiency should not be underestimated.

We are guided by our sustainability compass when designing new products and provides customers with Energy Product Declarations (EPDs) for each of its door solutions. EPDs communicate third-party verified information about the life-cycle environmental impact of products and services in accordance with international standards. The group is leading the way, with more than 325 environmental product declarations since 2008.



THE INTERNATIONAL EPD® SYSTEM

Meeting the needs of the end user

Every building has its own unique people flow requirements. Selecting the right door system depends on understanding how it will be used and by whom. Energy calculators are only valuable if informed by a thorough understanding of how the door will be used. It is impossible to identify the right type of door and understand how to use it effectively if you don't have reliable information on people flow through that particular entrance.

What role does that particular entrance need to fulfil?

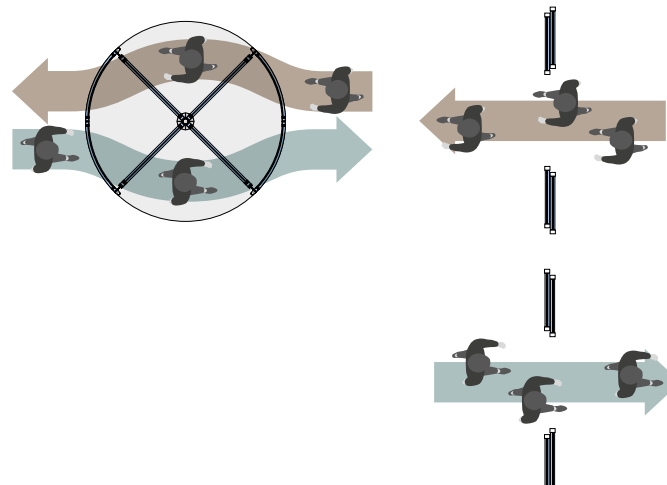
The location, type, dimensions and operating speed of a door solution influence user behaviour and have a direct impact on door capacity. How many people will use it and what is the volume at peak times? What are the main user groups, and do they include people with restricted mobility?

If traffic is coming from one direction, a sliding door might be the best solution, whereas if people are accessing the door from different directions, revolving doors may well be more appropriate. Do you need to consider space-saving options in certain areas of the building? How can you accommodate specific requirements such as hygiene, safety and security?

The smarter and more efficient the door system, the less energy will be leaked. It is not only the frequency of opening a door which impacts on the amount of energy lost. There are many other factors to consider. These include:

- **People flow**
- **Type of building and its degree of water and air tightness**
- **How long the door takes to open and close**
- **Size of the automatic door and thickness of its leaves**
- **Number of annual cycles**
- **Heat transfer co-efficiency and thermal bridging break**

It is all about finding the right solution for the right application. It is important to assess usage, including footfall and opening speed requirements.



By choosing from our extensive range of entrance solutions, users can improve accessibility, guide traffic, retain heat and preserve indoor climate zones.



Sliding doors – There is a choice between single or bi-parting openings, through a variety of styles and configurations. Safe and easy to use, they are suitable for any entrance, from simple opening and closing to providing a hermetic seal.

Our automatic doors not only minimize energy loss. They also reduce dust and harmful particles, lower noise level, improve the internal environment and increase the amount of useable space.

With the right entrance system, it is possible to maintain access whilst reducing the amount of air which escapes from the building. Sliding and swinging doors are only open when they are in use and close automatically as soon as a person has passed. The same applies to revolving doors, primarily selected based on a particular design requirement. They are an ideal way to create a barrier between indoor and outdoor environments.



Swing doors – These doors take up minimal space while providing maximal opening width. The operators are ideal for both new installations and retrofits, and manual opening is easy if needed for convenience or safety.

Vestibules can also help enhance a building's energy efficiency. They reduce infiltration of air into and from a primary entrance door. They create an air-lock entry which helps control the internal temperature and their size and positioning is crucial in optimizing their energy performance.



Revolving doors – An ideal option when climate control is a priority. Available in two-, three- and four-wing models, they guide traffic flow while providing superior separation of indoor and outdoor environments.

Energy efficiency is not only about preventing warm air from leaking out of a building. Preventing cool air from escaping when the outside temperature is uncomfortably hot is just as much a concern. This is set to become an ever-greater challenge as our climate continues to heat up. Extreme weather is leading to increased demand for air conditioning units, even in countries which traditionally have had little need for them.



Vestibules – Vestibules can be used for all types of doors. They create a 'buffer zone' to minimize draughts and air leakage, regardless of the weather.

Be it in cold or hot climates, a significant amount of energy is wasted by leaving manual doors open. It is very difficult for building managers to control their use and thus, they easily become an environmental liability. Automatic doors on the other hand, lead to major savings in terms of energy bills and air leakage.



Built to last

It is important to understand that this responsibility does not end once door systems are identified and installed. These systems need to be regularly serviced and maintained. This is critical not only in ensuring they continue running smoothly but that you can maintain and maximize their energy saving credentials.

Regularly maintaining and updating a door system will significantly extend its lifespan. Our experts can help ensure your entrance system continues evolving to meet the changing needs of your business. In addition, these changes will ensure the building remains compliant with laws and regulations. That might involve replacing worn out parts or adapting the system to use the latest sensors and electronics. All this can be done with minimum disruption.

Expert technicians can help ensure these systems are performing to the right level, that sensors are on the optimal setting and that the doors can respond to changing building requirements. Where necessary, they can fit more suitable sensors which work more effectively and result in greater energy savings, without the need to replace the entire door system.



[Explore our service offer](#)



Conclusion

In uncertain times, one thing we can be sure of is that automatic doors will continue to evolve in the coming decades. It's safe to say that they will play an important role in making our buildings and cities smarter places to be. The Internet of Things is already upon us and will allow everything to be connected as part of an integrated digital infrastructure.

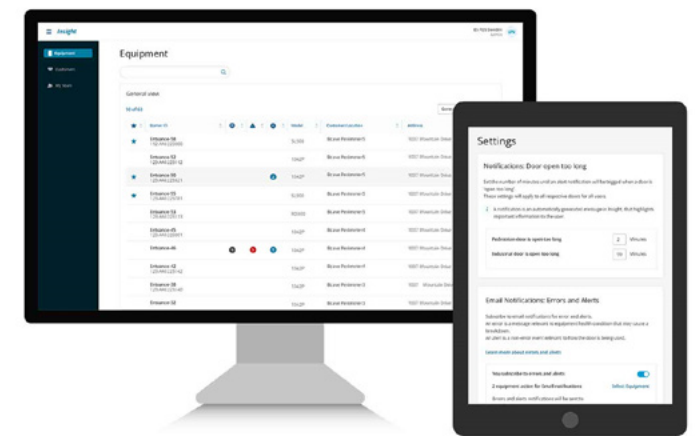
As an entrance system provider, we are breaking new ground in researching innovative solutions and embracing sustainable technology. The sector is a hot-bed for technological advancement and designers are relishing the challenge of marrying convenience with energy performance.

We have developed Insight, a suite of applications that make it easier to manage, monitor, control, and configure your entrance system. It allows you to perform preventative maintenance and remote service of your door system. Being

connected also gives you the opportunity to collect data, statistics and diagnostics on your entrance solution in real time, whenever and whenever you choose.

The sector will continue to make exciting advancement in developing more sustainable automatic door systems. The key challenge is to educate those involved in building design of the benefits of automatic doors.

The future lies in greater building automation and sophisticated management systems which monitor and track energy usage. The key is to ensure that no more energy is consumed than is necessary and that wastage is minimized. Sustainable entrance systems will continue to prove pivotal in boosting building performance and helping everyone involved in the sector make informed choices on the road to net zero.



[See how IoT can support you on your road to Net Zero](#)

Caring for the future together

On 16 November, 2022 ASSA ABLOY has received validation by the Science Based Targets initiative (SBTi) for the company's emission reduction targets.

We believe that science-based targets will be beneficial for our business on several levels. By setting a net-zero target in line with a 1.5°C future, we are making a critical contribution to limiting the worst impacts of climate change.

- We will halve Scope 1 and Scope 2 emissions in our own operations by 2030
- We will reduce the footprint of our wider value chain, including raw materials, logistics and products by 28% by 2030, thereby addressing our Scope 3 footprint
- We commit to net zero emissions across the whole value chain no later than 2050

When a door saves energy, the whole building saves energy

We have a comprehensive range of automatic swing, sliding, and revolving doors that help reduce the cost and energy consumption of commercial buildings.



See the video on our [YouTube channel](#)



The ASSA ABLOY Group is the global leader in access solutions.
Every day, we help billions of people to experience a more open world.

ASSA ABLOY Entrance Systems provides solutions for efficient and safe flow of goods and people. Our offering includes a wide range of automated pedestrian, industrial and residential doors, loading dock equipment, perimeter fencing and service.

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