At ABB, we understand that SDGs 9 and 11 are interlocking and mutually supporting goals. Sustainable and resilient cities not only need buildings, transportation options and infrastructure that minimize emissions and conserve energy and non-renewable resources, but also need local industries that can provide residents with economic opportunities and an accessible supply of essential goods. Cities that are cleaner, safer and less polluted improve the quality of inhabitants' lives, and are thus in everyone's interest.

ABB supplies many of the products, solutions, services and systems that serve these needs. In fact, a large part of ABB's technologies relate directly to matters of sustainability, so it would not be practical to provide a comprehensive listing of them in this report. Nonetheless, in this chapter we highlight some of the key technologies that contributed in 2019 to achieving the targets associated with SDGs 9 and 11. These include smart and sustainable technologies for buildings, electric vehicles, water, power, and waste infrastructure, data centers and factories.

Underpinning nearly all of these solutions is our comprehensive digital offering, ABB Ability™, which drives substantial gains in efficiency. Solutions under the ABB Ability™ brand collect and analyze data from across the industrial internet and provide our customers with automated insights into their processes and equipment in order to increase the uptime, speed and yield of their operations. ABB Ability™ connects one of the world's largest installed bases of industrial devices – around 70 million of them – to industry-leading digital solutions in a wide range of sectors, including utilities, transportation, energy, construction and industry.

But while ABB Ability™ ties together many of our company's innovations through connectivity and

the digital cloud, it represents just one aspect of what can be done to make the future a brighter place for us all. We recognize that policy is just as important as technology in paving the way for successful smart cities, infrastructure and industries.

Accordingly, ABB collaborates with policymakers around the world to realize a collective vision for modern smart cities that can combine data, people and technology. ABB is also working towards inclusive and sustainable solutions as an Associate Partner of the <u>Smart Cities Council</u>, a collaboration among technology companies that is developing a policy framework for the future, including the <u>Smart Cities Readiness Guide</u>.

To help further develop smart infrastructure and industry, ABB is closely cooperating with other leading, global companies. ABB has entered into strategic partnerships with digital market leaders Dassault Systèmes, Ericsson, Hewlett Packard Enterprise, Huawei, IBM and Microsoft to drive the digital transformation and enable customers to unlock unprecedented improvements in performance and productivity. Each strategic partnership brings ABB together with a worldclass organization to create an unmatchable combination of technological expertise and domain knowledge focused on developing enhanced digital solutions.

Smart buildings

ABB remains firmly committed to SDG 11 – making cities and human settlements inclusive, safe, resilient and sustainable. We recognize that cities are facing unprecedented challenges that threaten their ability to achieve SDG 11. According to the United Nations, one in eight of the world's 7.6 billion inhabitants lives in a megacity today – 33 sprawling urban areas with populations of more Case study Upgrade of landmark buildings for smart city project in Zaragoza, Spain

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than 10 million. By 2030, it is predicted that there will be 43 megacities, and the global population will surge to 8.6 billion.

As they expand, cities are in need of smarter, more eco-efficient technologies. In providing them with digital sensors, devices, solutions and services that enable them to run in cleaner and more sustainable ways, ABB has become a partner of choice for cities around the world.

One of the ways that we are helping cities to become more sustainable is through our ABB Ability[™]-branded digital offering, which supports smart buildings with integrated solutions that achieve energy efficiency and cut electric consumption and costs in industrial, commercial and residential environments. When fully implemented, these solutions typically deliver a 30 percent reduction in energy costs for heating, lighting and appliances. For example, ABB's energy-efficient motors and drives can radically enhance the performance of the heating, ventilation and air conditioning systems used for heating and cooling, reducing energy consumption by up to 50 percent.

For smart homes, our offering is centered on the ABB-free@home® platform. This complete automation platform enables occupants to centrally manage power consumption and cut costs. With up to 60 functions, ABB-free@home® can integrate up to 150 devices per system. Via a touch control panel, smartphone or wall-mounted switch and motion sensors, one can control everything from blinds, heating and air conditioning, to door communication and lighting.

Critically, this system is flexible. It can be easily integrated not only with ABB's video door entry system, but also with third-party products and services, such as smart home appliances, smart lighting systems, door entry systems, home entertainment devices and cloud-based voice services, not to mention a variety of solar-thermal and photovoltaic energy systems. This smart home solution leverages the Microsoft Azure cloud computing platform.

For smart buildings, ABB's offering is based on the widely used KNX open standard. Our ABB i-bus® KNX system gives occupants and building managers the ability to control lights, window shades and heating/cooling systems for improved temperature management and to program strategies that will optimize a building's energy demand and deliver maximum levels of comfort and safety.

ABB research and development paves the way for cities and industries of the future to become more sustainable, efficient, productive, cleaner, safer, resilient and less resource intensive.

Bazmi Husain – Chief Technology Officer

ABB technology is also being deployed in support of the Netherlands 2019 National Climate Agreement, in which the Dutch government committed to sustainably transforming the Netherlands' existing built environment and adapting the country's 7 million homes and 1 million buildings so that they are all well insulated and use or even generate clean energy. ABB is working together with Factory Zero, a company that builds homes that incur zero energy bills, to help the country create some of the 1.5 million zero-emission homes the Netherlands aims to construct by 2030. Each of the new structures will use one of our smart energy management modules (SEMs) to coordinate and balance their energy demand and use, controlling a heat pump, ventilation and an ABB solar panel converter and reading energy meters. Energy generated by a home's solar panels and heat pump is monitored, kept within the home and optimally adjusted to consumption. This innovative solution uses data generation and visualization to provide residents with insights into their energy consumption. By continuously measuring and adjusting the amount of energy consumed by a home, SEMs reduce energy costs.

Smart mobility

In an effort to be more sustainable, cities today are looking for ways to get polluting internal combustion engines off the streets without disrupting the daily flow of people and goods. Going forward, e-mobility is the clear, clean choice. That is why ABB is active across the entire e-mobility value chain, offering a complete range of solutions for the electrification of buses, commercial vehicles, trucks, autonomous vehicles, automobiles, ships and railways. We have rapidly become a world leader in fast charging solutions, which are increasingly in demand as urban areas shift away from fossil fuels.

According to the International Energy Agency, the number of electric and plug-in hybrid electric cars on the road reached 5.6 million at the beginning of 2019 and is expected to rise to 125 million by 2030. ABB is supporting this trend in sustainable mobility by providing not only electric vehicle (EV) charging stations, but also critical EV charging network components, such as substations, energy storage systems and eco-friendly switchgear. These technologies are designed so that EV charging stations, once erected, will be both future-proof and scalable.