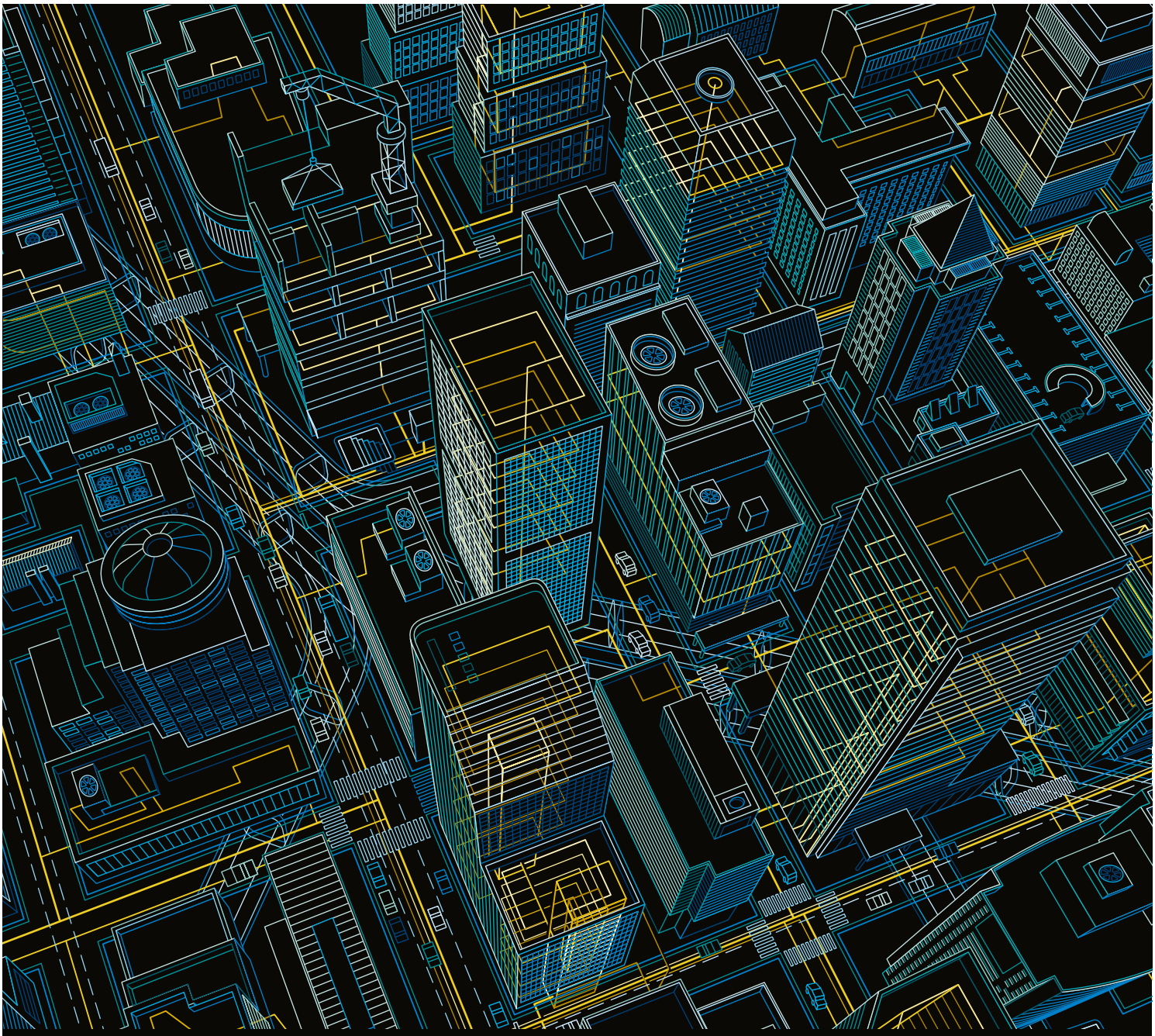


White paper

ABB Power and Automation: Solid Foundations for Smart Cities

Power and productivity
for a better world™

Contents

1. Smart Cities Overview

Cities today are home to over 50 percent of the world's population and account for 80 percent of global GDP.[i] By 2050, an additional 2.9 billion people will be living in cities, and urban dwellers will represent 70 percent of the world's population. About 90 percent of this growth will be in developing economies as people are drawn to urban areas by the perceived economic advantages.[ii] These cities will need new and intelligent infrastructure to meet the needs of their citizens and businesses.[iii]

Other cities that are not facing dramatic population increases are setting goals to ensure their long-term prosperity. With businesses and workforce becoming increasingly mobile, they are shaping their futures around competitiveness, liveability and sustainability.

An effective way to support these city goals is by using technology to more intelligently monitor, optimize and control key systems and infrastructure. In other words, to operate as a 'smart city'.

Intelligent ABB products and solutions are at the heart of a city's critical infrastructure, relied upon for everything from the supply of power, water and heat, to the automation of factories and the buildings we live and work in.

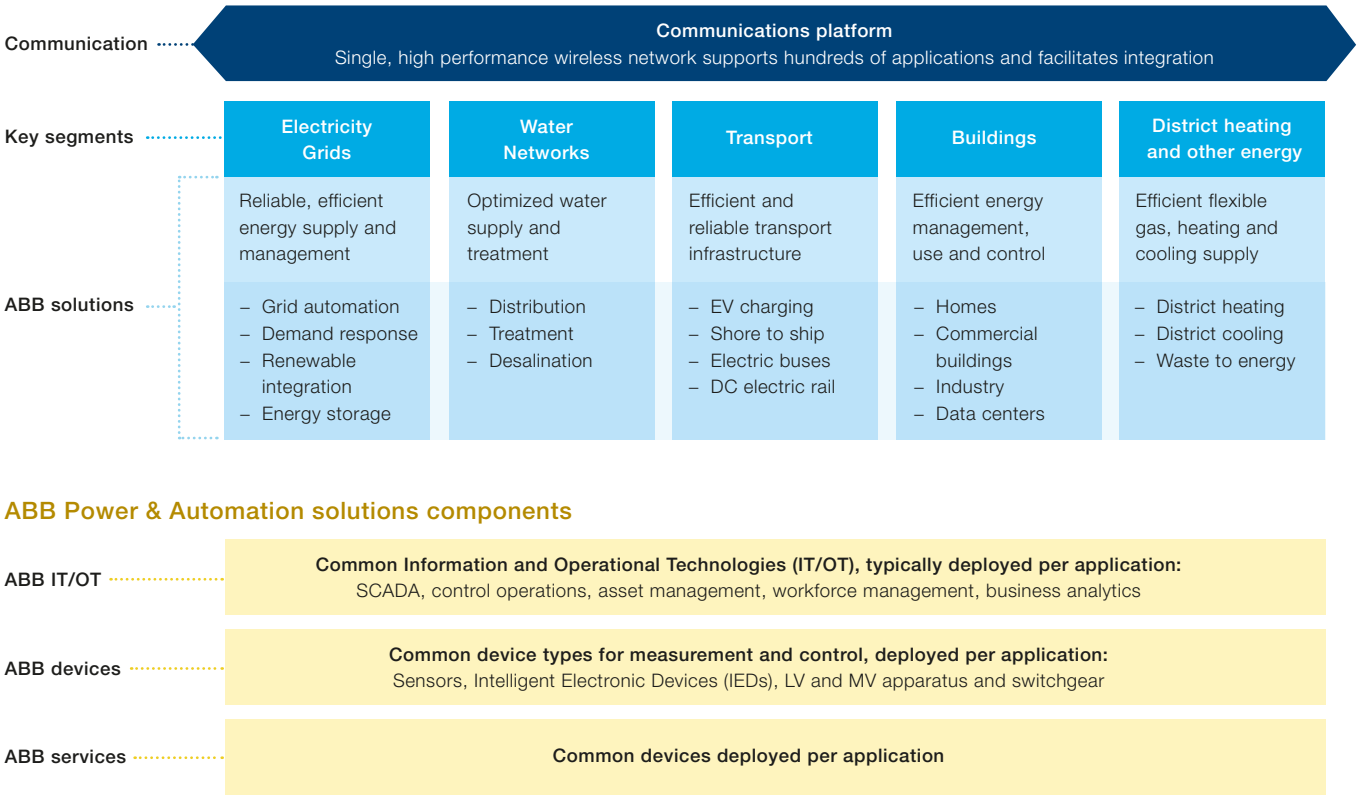
In this paper we explore how intelligent technology can enable smarter solutions in the following areas:

- City Communications Platforms
- Electricity Grids
- Water Networks
- Transport
- Buildings
- District Heating and Cooling

2. Intelligent technology for Smart Cities

ABB offers power and automation products and solutions throughout the technology value chain. This includes supporting essential city services with reliable, high bandwidth communications, enabling utilities to deliver reliable electric, water, heating and cooling services to their customers. It also offers more sustainable solutions for transportation providers.

Power and automation for critical city infrastructure



2.1. Power Technologies

Today, there is increased strain on city distribution networks as our reliance on electricity for economic output increases (e.g. more heat pumps, data centers) and as distribution assets age. This strain will only increase as more electric vehicles and increased distributed generation are added. To meet these needs, ABB offers key technologies that, operated together, enable utilities to offer reliable power to their customers and industry to reliably distribute power throughout their sites:

Technology area	Purpose	Examples
Primary equipment	Transforming and safely distributing electricity	Transformers, switch gear, switches, breakers, reclosers, power electronics
Distribution automation equipment	Monitoring, control, measurement and protection of primary equipment	Fault indicators, sensors, intelligent electronic devices, remote terminal units
Communications	Connection between the field and the control center	Fiber optics, cellular, meshed WiFi
Operational technology (OT)	Real-time monitoring and control of the network	SCADA (supervisory control and data acquisition), advanced distribution management systems
Information technology (IT)	Efficient management of resources	Outage, workforce, asset management, virtual power plant, business intelligence, condition based predictive maintenance

2.1.1. Distribution automation + communications = greater insight and control

New loads, aging grid assets and in due course more electric vehicles and distributed generation, increase the challenge of managing distribution grids, and create a need for greater visibility and control. ABB is working with utilities to extend monitoring and control deeper into the medium and low voltage networks to provide the insight and control mechanisms needed to cope with these new challenges.

2.1.2. Power IT + OT = reliability, efficiency, capacity deferral and customer engagement

ABB integrates operational technologies (OT), which control the networks, with information technologies (IT), which manage resources, to deliver additional benefits to utilities and customers in terms of reliability, efficiency, capacity deferral and customer engagement.

For example when there is an outage, OT can provide information on where the outage is and quickly isolate it to minimize the number of customers affected, while IT systems can be used to notify affected customers of the outage and to dispatch the crew most able to address the issue in a timely manner.

2. Intelligent technology for Smart Cities

2.2. Automation Technologies

Industry, building and home owners can achieve their desired goals through the use of automation. ABB offers key products and solutions throughout the automation technology value chain, as shown in the table below:

Technology area	Purpose	Examples
Building Automation	Control of buildings for security, comfort and energy efficiency	Sensors for lighting, occupancy Controls for lighting, climate, blinds Motors and drives for air conditioning
Industrial Automation	Efficient transformation of electrical to mechanical energy	Sub-metering and measurement Motors, pumps, drives for process plants
Operational Technology (OT)	Control over electrical and production plant	Platforms that integrate process control and electrical network management
Information Technology (IT)	Scheduling and control of limited resources	Production planning and management Energy monitoring, targeting and forecasting Asset and workforce management

2.2.1. Building Automation = energy savings + comfort + security

Building automation technologies can be used to generate considerable energy savings while still delivering desired levels of comfort and security, as will be described in section 3.5.1.

2.2.2. Motors + variable speed drives = energy savings + lower emissions

About two-thirds of all the electrical energy produced in the world is converted into mechanical energy by electric motors. Most of these motors are used to power fans, pumps and compressors and are operated at constant speed all the time, even when not needed, using throttles or valves to control the flow of fluids or gases. Adding variable speed drives (VSDs) can achieve large energy savings of the order of 50 percent or more and reduce emissions accordingly.

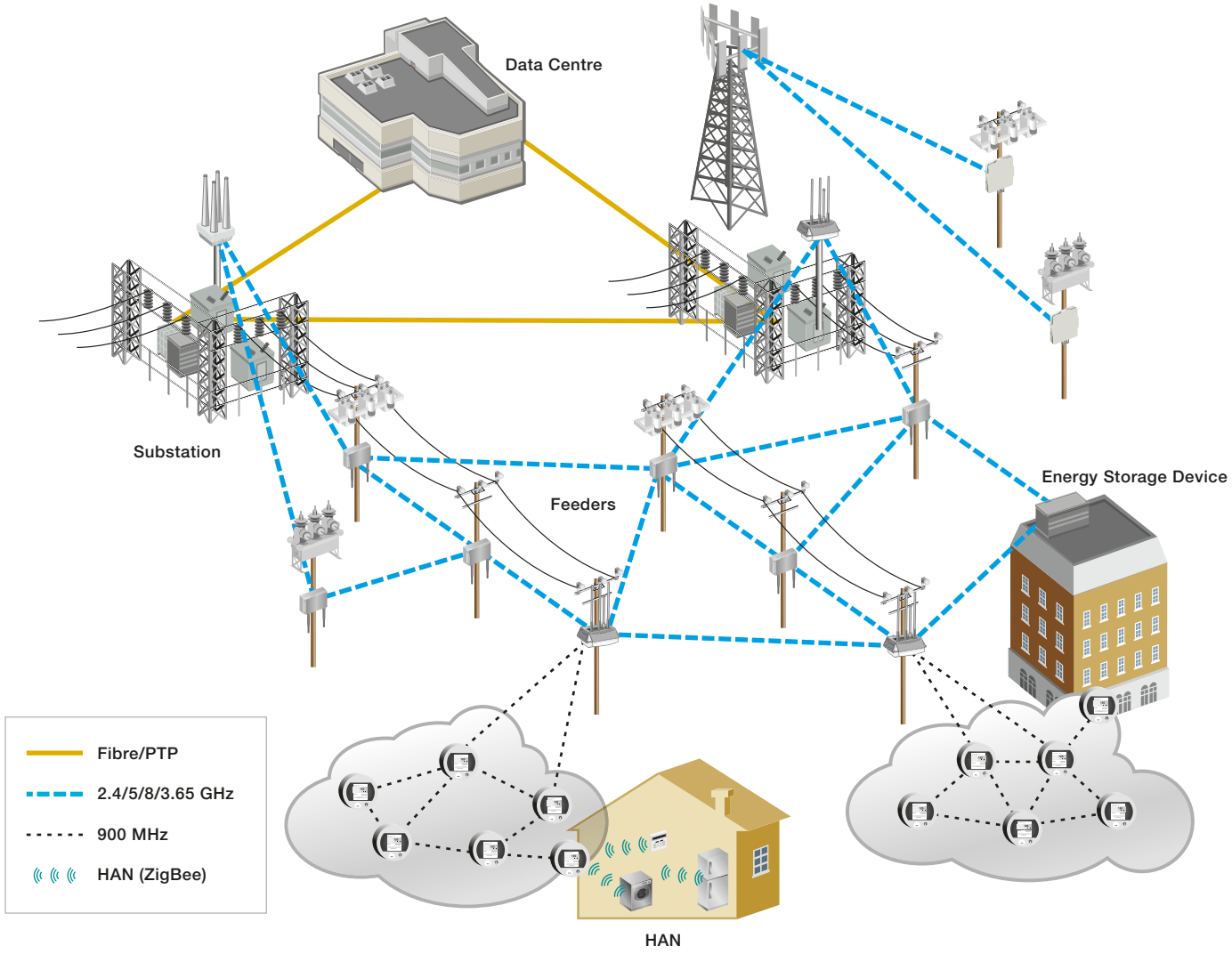
2.2.3. Industrial IT + OT = improved visibility and management capabilities

ABB provides the IT and OT systems for industry to work more effectively. Automated and fully integrated control solutions such as ABB's System 800xA Extended Automation platform provide the collaborative environment necessary for various organizations and departments to work as one. IT solutions for advanced energy and power management enable industry and commercial building owners to improve the efficiency of their operations and participate as a more active player in the grid system by adjusting load and self-generation in response to changes in energy pricing.

3. ABB Smart Cities Solutions

3.1. City Communications Platform

3.1.1. Leveraging a common wireless platform for economy and performance



On average, 50-70 percent of municipal workers are mobile. They include police, fire and emergency medical personnel, building inspectors, animal control officers, parks and recreation workers, maintenance crews, restaurant and health inspectors, parking enforcement officers, transit workers and many more. Providing them with broadband access in the field has been proven to increase worker efficiency, deliver cost savings and reduce vehicle emissions.

In addition, broadband in the field can be used for machine-to-machine (M2M) applications that improve operational efficiency. These applications include:

- Municipal utility (water/gas/electric): distribution automation, advanced metering infrastructure and SCADA
- Intelligent transportation systems: traffic signal management, transit signal priority, variable message signs and red light enforcement cameras
- Video surveillance: safety as well as crime prevention and prosecution

3. ABB Smart Cities Solutions

3.1.1. Leverage continued...

A wireless broadband network can also be used to provide public internet access, offering a valued amenity to the community and its visitors as well as fostering economic development.

ABB's Tropos wireless communications networks can deliver broadband for all of these city services on the same platform. It offers a fast, secure, reliable and easily scalable platform, securely partitioned to enable differentiated quality of service standards for different users. As a result, communications for vital services such as fire, police and ambulance can reliably run on the same network as smart metering monitoring and data backhaul, mobile municipal work forces, public lighting and a host of other services. This makes the communications infrastructure more cost efficient and easier to manage. Additionally, new revenue streams such as the provision of public wireless internet and variable rate parking metering can be delivered.

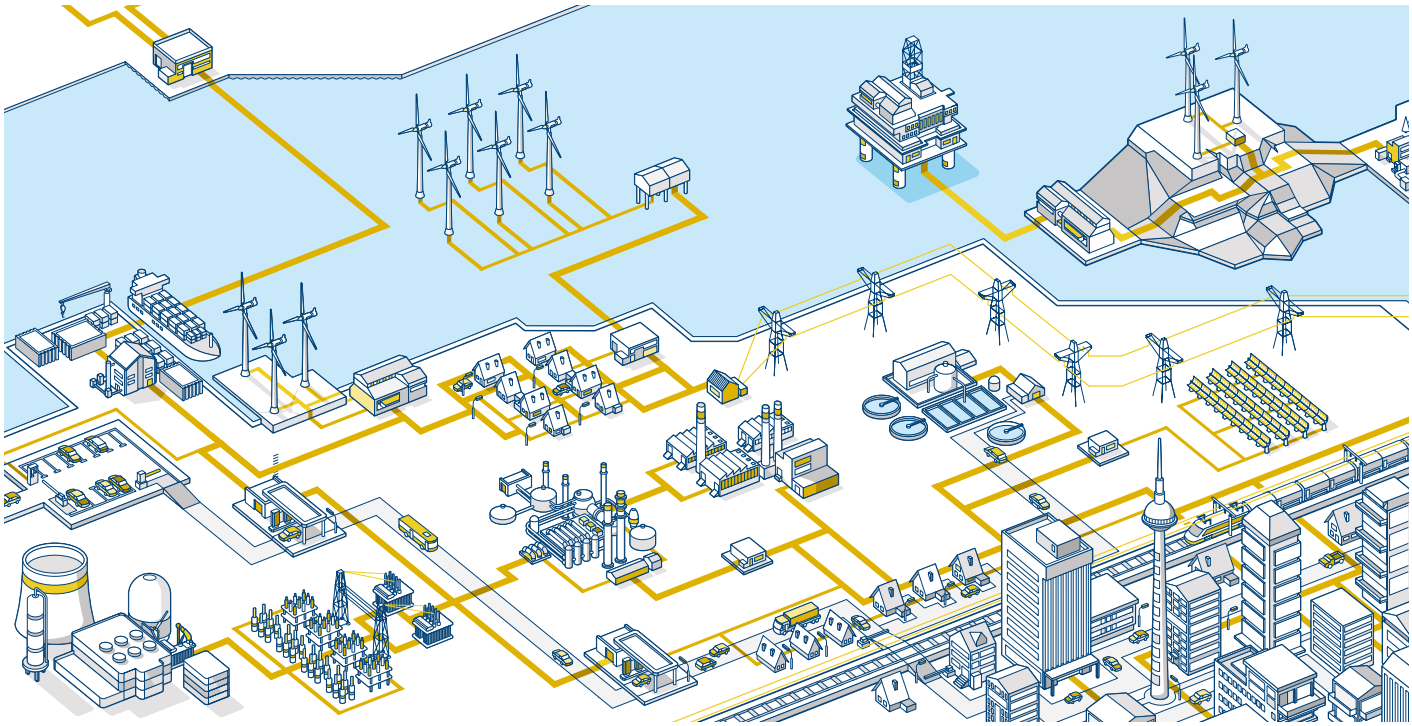
Example 1: The city of Rock Hill, USA, is using an ABB Tropos wireless communications platform to achieve more efficient meter reading and faster information for emergency services. "With our high-speed wireless broadband network, we now have the capacity to deliver many different kinds of city services — all on the same low cost, reliable network." James G. Bagley Jr., CIO, City of Rock Hill.

Example 2: The Tropos wireless broadband network in Oklahoma City, USA was designed as an extension of the City's IT infrastructure with the initial goal to improve the City's public safety information system, enable new applications, reduce costs and improve services to the community. Today it is used by mobile workers including police, fire, building inspectors and public works personnel. Additional city services and high-value applications are gradually being added. The network covers 555 square miles of the City making it the world's largest contiguous metro-scale Wi-Fi deployment in the world and operates more than 200 municipal applications.

Example 3: Ponca City, Oklahoma's Tropos network transfers 1 TB of data daily supporting public safety, mobile workforce and intelligent transportation applications as well as free public Wi-Fi service.

Example 4: Across the United Arab Emirates (UAE), a Tropos wireless mesh network provides communications for:

- Meter reading for 1.5 million power and water meters in urban, suburban and rural areas
- Smart Grid applications: real-time SCADA substation control, distribution automation
- City services: street light control, broadband for mobile workers, substation video security



3.2. Electricity Grids

3.2.1. Preventing outages on aging grids

While electricity becomes ever more important in our cities to support economic output (data centers, heating/cooling, etc.), the increasing component failure rates of our aging grids and difficulty to locate, travel to and repair faults, present a significant challenge to reliability of supply. The best way to address this challenge is to prevent outages before they occur.

ABB solutions can help in a couple of ways:

- Evolving faults can be detected and prevented before they cause outages. By monitoring voltage and current for transient earth faults, which are present for only milliseconds at a time, approaching faults on the underground grid can be detected using advanced algorithms, and power can be rerouted while the failing components are repaired or replaced.
- Condition monitoring data from grid nodes such as transformer substations can be collected and analyzed. Based on the results, maintenance actions can be initiated and unplanned supply interruptions avoided.

Example 5: ABB and Vattenfall, a leading generator and distributor of electricity in Northern Europe, ran field tests on a novel earth-fault protection algorithm. This algorithm detects both traditional earth faults and restriking fault transients which appear for only milliseconds at a time and are precursors of permanent faults. The tests took place in a 10 kV HV/MV-substation owned by Vattenfall in Sweden on a large cable network with central and distributed compensation. The novel algorithm provided correct operation in all 51 test cases for different permanent and restriking faults and represented a significant improvement compared with the traditional restriking earth-fault protection functions.

3. ABB Smart Cities Solutions

3.2.2. Bringing power back online faster

Traditionally, utility companies first learn about faults on the low voltage part of their network when customers call them up to say they have no power. The utility then has to estimate where the fault is based on these calls and send a repair crew to find the fault location. All customers without power have to wait until the repair is made and the power reconnected.

An ABB Distribution Management System (DMS) provides insight and control over the electrical distribution network and can allow for faster and more reliable responses to system disturbances. In combination with an Outage Management System and Workforce Management System, automation equipment and communications, it can deliver improved fault detection, isolation and restoration. Here, the system automatically detects the faults and isolates them, rerouting power to customers who can be reached on alternative, healthy feeder lines, and directing the repair crew to the fault site sooner and with more accuracy.

The result is a significant reduction in the duration of outages, particularly for those who can be quickly brought back on line by the early detection and rerouting of power, but also for those impacted by the faulted section through the faster arrival of the repair crew. The benefit is shared by customers and city authorities, but also by utilities which in many countries are fined for poor system reliability.

Example 6: ABB helped CenterPoint Energy from Houston, Texas in the US to connect field switching and monitoring devices on over 200 distribution circuits to its advanced distribution management system, achieving a 21% improvement in outage responses in 2012 and reducing some outage durations to a few minutes for 70% of affected customers.

3.2.3. Strengthening city grids

Some cities that experience rapid growth can end up with grids that are ill equipped to meet the growing electricity load from business and citizens. Cities based on islands have sometimes found it particularly difficult to increase their electrical supply.

ABB offers high voltage submarine cable systems for traversing channels and harbors to bring additional power to space constrained cities.

Example 7: New York City chose to supply an additional 512 MW of power to Brooklyn from a new high-efficiency natural-gas fired power plant in Bayonne, New Jersey, across the New York Harbor. ABB completed the delivery and energization of the world's first cross-linked polyethylene (XLPE) insulated 345 kV AC submarine cable system. Extruded in a single continuous length without factory joints, the new cable system brings vital additional power generation capacity to the critical wholesale power market in New York City.

3.2.4. Using grid automation to reliably integrate new loads and cope with aging grids

In the future, cities might experience significant concentrations of electric vehicles and renewables in certain city districts. Left unmanaged, new loads can dramatically increase load on the system at certain times of the day and cause circuit breakers or fuses to trip with resulting outages. The traditional response would be to resize substations or strengthen distribution lines and equipment. Grid automation can be used to defer some of these upgrades.

While city grids are generally strong enough to integrate renewables without significant capacity or voltage challenges, additional power system protection is required to cope with bi-directional fault currents. With distributed renewables, at certain times renewable generation could exceed consumption, resulting in power flowing from the customer into the grid. New protection schemes are required to cope with these situations safely and isolate only those parts of the grids experiencing problems.

ABB offers a range of grid automation solutions to help integrate renewables and load in cities:

- Equipment to selectively protect and isolate grid sections
- Algorithms to predict bottlenecks several hours ahead of time, enabling preventative action
- Network reconfiguration to change the network before problems occur
- Demand response management to incentivize load shifting from peak periods to off-peak

Example 8: ABB is involved in several projects related to distribution automation in Germany and Italy which are at the forefront of adapting grids to accommodate significant levels of distributed solar PV and increased electric loads.

The objective of the project MeRegio in Germany is to create a minimum emissions region in an area characterized by high solar PV penetration and grid capacity constraints. It addresses the capacity challenges by forecasting grid constraints and using proactive network reconfiguration and demand response to alleviate them before they occur.

Example 9: Baltimore Gas & Electric in the US uses a demand response management system from Ventyx, an ABB company, to contribute to the State of Maryland's goal to reduce energy & demand by 15% per capita by 2015. The solution integrates data from load control technology (OT) and the customer information system (IT) to forecast and manage load reduction programs. In addition to delivering reductions in demand, the solution decreased costs related to wholesale energy & capacity, reduced capital expenditures for new distribution infrastructure and helped reduce emissions.

Example 10: Energy service provider E.ON selected a comprehensive set of software solutions from Ventyx, an ABB company, to underpin its new smart grid control center in Sweden to cope with increased variation in generation and consumption. The solution builds on E.ON's existing deployment of Ventyx's SCADA (supervisory control and data acquisition) system by adding business analytics, network optimization, load forecasting, demand response and distributed resource management.

Combining information (IT) and operational technologies (OT) in E.ON's smart grid control center will deliver a higher degree of grid automation, sensing and visibility, achieve greater control of distributed generation and further support regulatory compliance.

3. ABB Smart Cities Solutions

3.3. Water Networks

3.3.1. Improving the performance of water plants and networks

As the global population grows from 7 billion in 2012 to 9.1 billion by 2050, access to clean water will become critical. This challenge can be met only by paying more attention to the complete water cycle for domestic, industrial and agricultural uses. We must transport water in the most efficient way, reduce energy consumption, reduce losses and improve treatment quality and efficacy before and after use.

ABB offers electrical and automation products and systems for the following water segments to ensure reliable city water supplies:

- Desalination plants, which create new sources of fresh water
- Transmission systems and pumping stations, to reliably transport water to cities
- Distribution networks, to efficiently distribute water to end consumers within cities, quickly detecting leakages to avoid water losses
- Municipal water and wastewater treatment, to ensure appropriate qualities of water before use and before release into the environment

ABB products and solutions are designed to improve the performance of water plants and networks:

- Scalable control systems such as Symphony Plus seamlessly integrate into the existing system landscape and maximize plant efficiency and reliability through adapted automation and optimization solutions
- High efficiency motors and variable speed drives reduce energy consumption of pumps by up to 60%
- Securely integrated water infrastructure monitoring, based on TaKaDu's software-as-a-service solution, detects and locates in real-time water leakages, pipe bursts and other faults or inefficiencies

Example 11: Hong Kong government has an ongoing initiative to improve water quality in Victoria Harbour by collecting and treating all the wastewater produced in the urban areas of Kowloon and Hong Kong Island. Central to the solution is the Stonecutters Island Sewage Treatment Works which will serve five million people and treat up to 2.45 million cubic meters of wastewater a day. ABB was selected to provide a total plant automation system which will control and consist of two integrated parts: an upgrade of the existing automation system, and a new automation system for the sewage works expansion and new main pumping station, both using the latest generation of ABB's Symphony family of total plant automation offering.

3.4. Transportation

Transportation can account for 20 to 40 percent of total city emissions. Cities can reduce emissions by electrifying metro trains, buses, cars and even berthed ships.

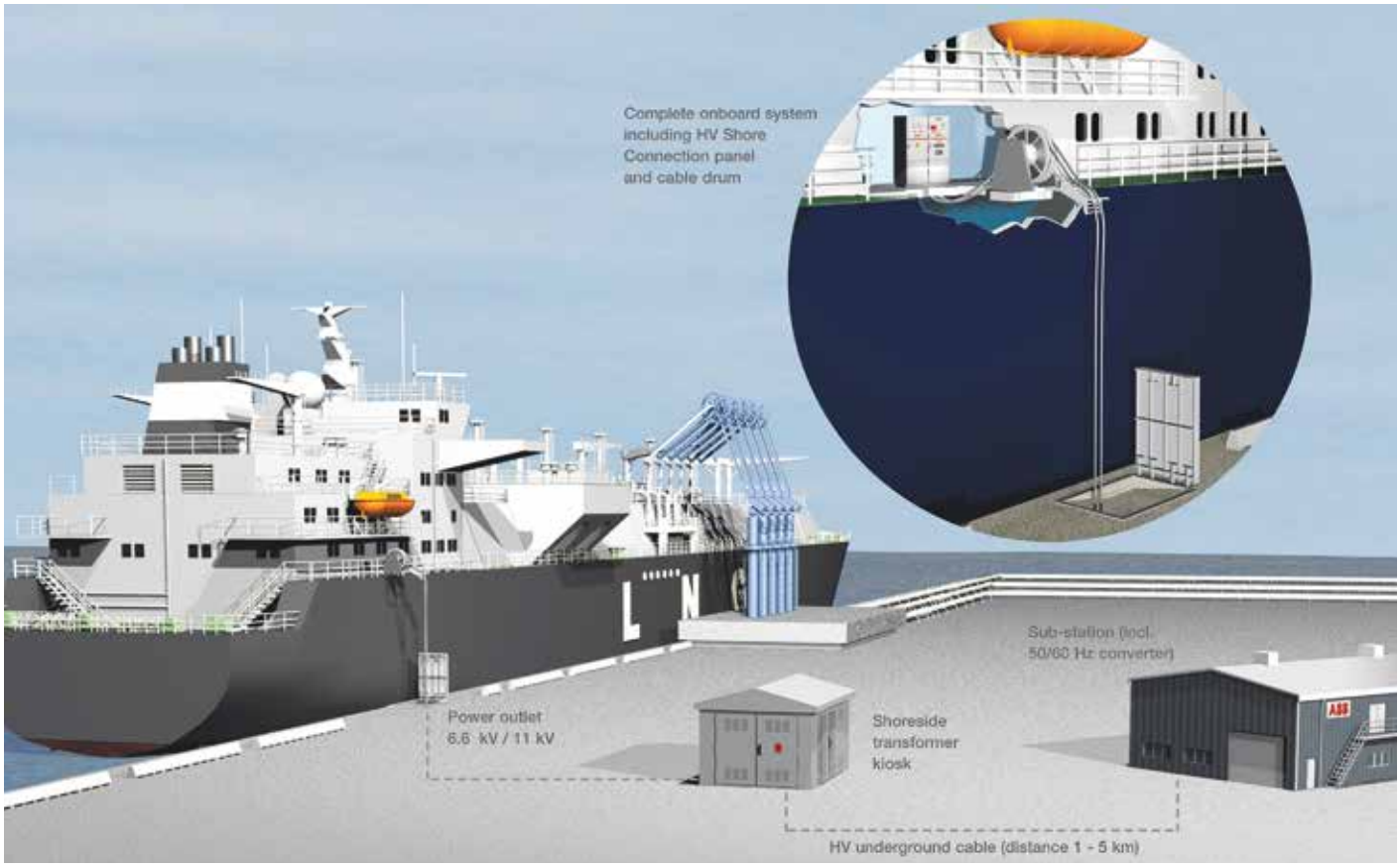
3.4.1. Reducing port emissions by powering berthed ships from the shore

A large cruise vessel, running its auxiliary engines to power its hotel loads while in port, emits the equivalent amount of CO_2 in 8 hours as 10,000 cars driving from Zurich to London (~1000 km) as well as making a lot of noise and vibration that disturbs local residents.

ABB's solution to power ships with electricity supplied from the shore can largely eliminate these undesirable features. Special substations, where necessary equipped with frequency converters to connect 60 Hz ship networks with 50 Hz port networks, together with on-board connections and automation panels, enable ships, while berthed, to plug in to an onshore power source and shut down their auxiliary engines without disrupting on-board services.

This solution eliminates 98 percent of emissions and all the noise and vibrations, making it possible to have ports in the middle of cities and people enjoying living right on the water's edge. And from the ship owner's perspective, it reduces maintenance and operating costs.

Example 12: ABB has implemented systems for customers around the world, including for Stena Line and the Port of Rotterdam, providing connections for several large ferries to be docked simultaneously.



3. ABB Smart Cities Solutions

3.4.2. Paving the way to cleaner personal transport with electric vehicles

Cities are particularly good environments for electric vehicle (EV) use since most journeys are local, so drivers need never be far from a charging station. Even so, charging infrastructure needs to be built, sometimes with grid upgrades, to accommodate the different needs of EV drivers and to maintain electric grid reliability.

ABB offers an effective EV charging infrastructure to accommodate the differing needs of drivers and providers in terms of charge time and business models. Charging infrastructure options available today can charge in 5-6 minutes - the equivalent of a gas station refill, for a couple of hours while owners work or shop, or overnight. An online charging network management system enables operators to see the status of their chargers and to manage them accordingly.

For cities wanting to seed a low emission future, strategically deploying charging infrastructure helps car buyers become more comfortable with making an EV purchase and makes municipal EV fleets possible. Furthermore, appropriate network management of the charging infrastructure can charge EVs when renewable energy is available or prices are low.

Example 13: ABB is deploying EV charging infrastructure in cities around the world. In the Netherlands, ABB helped install 23 fast chargers to support 550 fast charge cars on the road in 2011. And in Estonia, ABB has installed 200 DC fast chargers and 507 AC chargers at office locations in a fully turnkey project.

3. ABB Smart Cities Solutions

3.4.3. Making electric buses possible without overhead wires

Ultrafast charging at selected bus stops enables next generation silent, flexible, zero-emission urban mass transportation without interruption to customer journeys and without unsightly overhead lines.

ABB has developed a new technology that helps to power the world's first flash charging electric bus system. The new charging technology can be deployed on a large capacity electric bus carrying as many as 135 passengers. The battery on the bus is charged at selected stops with a 15-second energy boost from a new type of automatic fast charger. This happens while passengers board and disembark. At the end of the bus line a 3 to 4 minute boost enables the full recharge of the batteries.

Example 14: TOSA (Trolleybus Optimization Système Alimentation) is a project in Geneva which is demonstrating this new technology on a real bus line between Geneva airport and the city's international exhibition center.

3.4.4. Regenerative braking

Recovery of the braking energy of a moving train is no longer a luxury. Rail transit authorities must meet the challenges of increasing the energy efficiency of rail transportation and reducing its environmental impact. ABB's ENVILINE™ energy management solutions offer up to 30 percent energy savings for direct current (DC) rail transportation.

The kinetic (movement) energy of a train can represent up to 80 percent of the total energy consumption of a rail transportation system. Whenever a train brakes at a station, its kinetic energy is converted into electricity and returned on the traction power line. Where there is no connection to the AC network, onboard loads and other trains take a small portion of this energy and the surplus is dissipated by the onboard braking resistors.

3. ABB Smart Cities Solutions

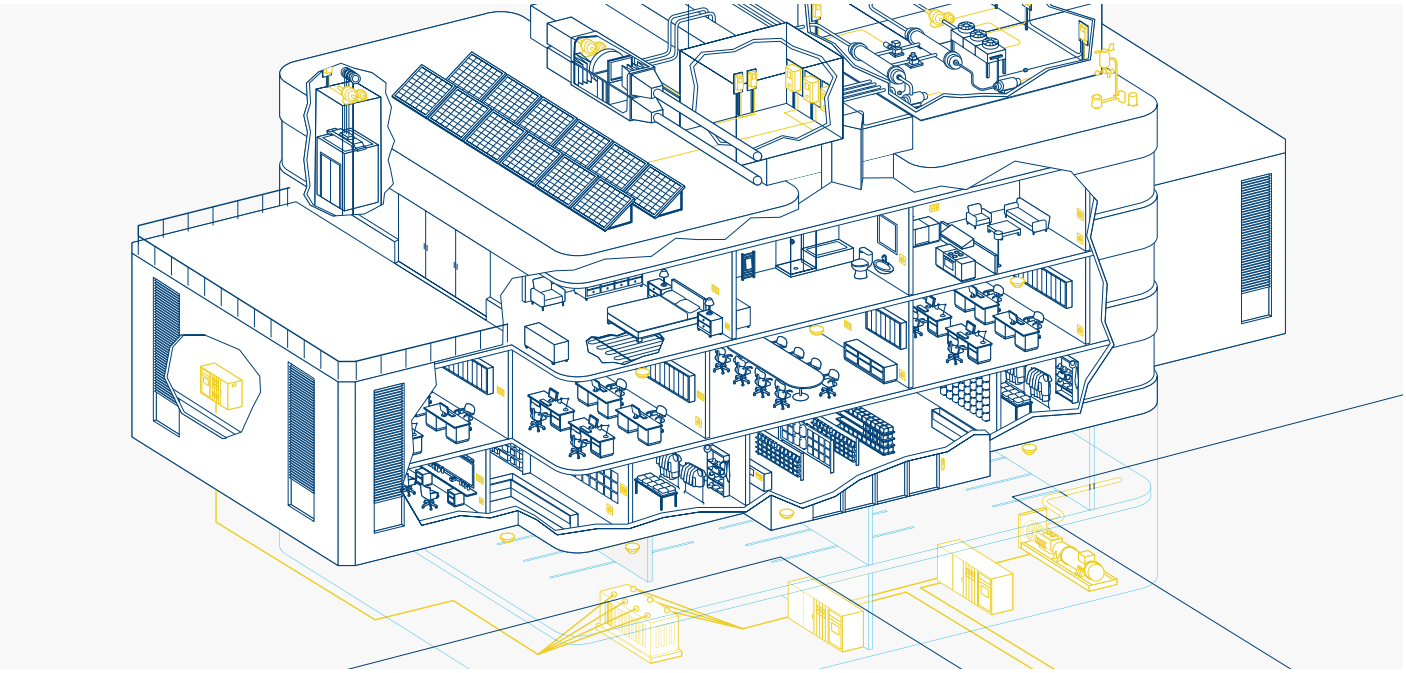
3.4.4. Regenerative braking continued...

To meet the demand for energy recovery in traction infrastructure, ABB has introduced the ENVILINE energy management suite of solutions:

- Where an AC network connection exists, the ENVILINE energy recovery system (ERS) recovers the braking energy of the train and feeds it back to the AC network or feeds local auxiliary systems like air-conditioning, ventilation, lighting etc. In the process, the ERS can improve the quality of the AC power network
- If connection to the AC grid is not available, the ENVILINE energy storage system (ESS) can store the surplus braking energy and feed it to the power line to assist the acceleration of the train.
- In both cases, the ENVILINE energy dissipation system (EDS) can dissipate all surplus energy not absorbed by other onboard loads, nearby trains, or recovered by the ERS or ESS. By deploying the wayside EDS instead of onboard resistors, the rail operator reduces the train's weight and energy consumption and also eliminates accumulation of heat caused by braking in tunnels and underground stations.

Example 15: Southeastern Pennsylvania Transit Authority (SEPTA) in USA has been using the ENVILINE energy storage system since April 2012. Equipped with lithium-ion batteries, the solution recycles the braking energy to reduce the energy consumption by as much as 10 percent while simultaneously providing frequency regulation services to the local Regional Transmission Organization (RTO). Overall, the system generates annual savings and revenues of up to $440,000 per year.

Example 16: One of the substations on the Warsaw metro line 2 in Poland, scheduled for completion in 2013, will be equipped with a 40 MJ (megajoule) energy storage system based on double-layer super-capacitors to exploit the recovered braking energy from the metro cars.



3.5. Buildings

3.5.1. Energy management and efficiency for buildings

Buildings account for the largest share of energy consumed in most cities. Opportunities exist to make them more efficient, as well as to control their energy use intelligently, for example through the automatic adjustment of window blinds when the sun is too intense and by linking lighting and air conditioning to occupancy. And since buildings have a considerable amount of thermal inertia (it takes time for their temperature to approach that of their surroundings), they can be pre-warmed or cooled in advance of higher electricity prices to reduce costs and help balance out energy demand.

ABB offers energy efficiency solutions such as variable speed drives which can dramatically reduce the energy required to run air conditioning. Variable speed drives can reduce HVAC costs by 20 to 50 percent.

ABB also offers full building automation solutions to intelligently control everything from window shutters to lighting, heating and cooling in response to weather, occupancy and energy prices. Lighting control systems can deliver power savings of up to 50 percent and building automation up to 60 percent.

In addition, building automation solutions cover building security and communications access.

Example 17: ABB is delivering reliable power and efficient climate control for the Burj Khalifa building, Dubai, UAE. The world's largest and tallest building is using ABB drives to ensure efficient air conditioning and intelligent control over the electricity network and building loads.

Example 18: Smart Hoche, a project in France, empowers residential consumers to manage energy and water consumption by providing them with real-time information on their consumption and tools with which to manage it. ABB is providing an energy gateway and communications for electricity, cold and hot water plus heating, linking to visualization over the internet and locally in the home.

3. ABB Smart Cities Solutions

3.6. District Heating and Cooling

3.6.1. Efficient and flexible heating and cooling for city districts

A major part of a building's energy consumption goes towards heating and cooling. The opportunity exists to heat or cool these buildings more efficiently at the district level, rather than generate the heat or cooling in each building. Each building is still individually metered for the heating or cooling energy it uses. This is a practice that has been successfully carried out for years in many cities in Europe and increasingly now in Asia and is not only more efficient, but also results in fewer emissions.

District heating and cooling can also be used as part of the solution to more effectively accommodate renewable energy. Since there is a lot of thermal storage capacity inherent in these systems, district heating and cooling utility companies can be incentivized through pricing to generate heat or cooling when there is more renewable energy available, while selling it to consumers when they need it. This would have benefits in terms of reducing the cost of energy and also deferring investment in additional generation to cope with peak power demand.

Example 19: District cooling, Singapore: Singapore has built the largest and most ambitious district cooling project to date for its Marina Bay, 60-hectare extension to its existing business district and downtown area. Singapore has a hot and humid equatorial climate, in which daytime temperatures are rarely below 30 degrees Celsius (86 degrees Fahrenheit), so district cooling was identified as the energy-efficient and cost-effective method to provide buildings in the area with an optimal indoor climate. ABB provides the technology to power, control and optimize this system.

Example 20: District heating, Shouzhou, China: ABB's Symphony Plus automation system will optimize the operation, management and maintenance of a new district heating system in the city of Shuozhou, reducing emissions and improving air quality for 1.7 million people.

4. Conclusions

Cities around the world must face the challenges of accommodating their increasing populations sustainably, or to become more sustainable, competitive and liveable.

Many intelligent power and automation solutions already exist to enable cities to automate their key public and industrial services in the areas of:

- City Communications Platforms
- Electricity Grids
- Water Networks
- Transport
- Buildings
- District Heating and Cooling

ABB's heritage in power and automation is one of continued innovation and delivery on behalf of our customers, spanning over 125 years. Our products and solutions are at the heart of a city's critical infrastructure, relied upon for everything from the supply of power, water and heat, to the automation of factories and the buildings we live and work in.

References

[i] Economist Intelligence Unit: Hot Spots, Benchmarking Global City Competitiveness, 2012

[ii] United Nations Population Division: AN OVERVIEW OF URBANIZATION, INTERNAL MIGRATION, POPULATION DISTRIBUTION AND DEVELOPMENT IN THE WORLD http://www.un.org/esa/population/meetings/EGM_PopDist/P01_UNPopDiv.pdf

[iii] C40Cities, http://www.c40cities.org/

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