The future of cities electrification

ABB Ability™ building tomorrow’s smart cities
<table>
<thead>
<tr>
<th>Year</th>
<th>Industry</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1712</td>
<td>Industry 1.0</td>
<td>Thomas Newcome builds the first steam engine</td>
</tr>
<tr>
<td>1870</td>
<td>Industry 2.0</td>
<td>Electricity is used for Industrial Production</td>
</tr>
<tr>
<td>1969</td>
<td>Industry 3.0</td>
<td>Programmable logic</td>
</tr>
<tr>
<td>Today</td>
<td>Industry 4.0</td>
<td>Communications between people, services, and things</td>
</tr>
</tbody>
</table>

**ABB Ability™ solutions for Industry 4.0**

- **Know more**
  - Visibility: assess, inform, measure
- **Do more**
  - Transparency: monitor, control, manage
- **Do better**
  - Predictability: optimize, predict, simulate
- **Together**
  - Adaptability: collaborate, advice, re-think

**ABB Ability™**

- Data collection
- Connectivity

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Smart cities

- Conventional generation
- Light Infrastructures (Shopping mall)
- Offices
- eMobility
- Infrastructures (hospital)
- Industry
- Residential
- Hydro generation
- Solar generation
- Data center
- Metro
- Wind generation
ABB Ability™ values for smart cities electrification

Digital cities of tomorrow

- Safety and asset availability
- Power reliability
- Sustainability
- Flexibility and security

Unlocking IT/OT convergence
Safety and Asset availability

People and equipment protection
Certified switchgear against internal electrical arc fault.
Fast acting and coordinated arc protection systems applicable also on existing switchgear, to increase safety and minimize downtime.

Condition monitoring
Sensors to detect possible failure causes.
Switchgear condition monitoring to support troubleshooting and drive service activities.

Predictive maintenance
Site and multi-site asset health analysis to predict and notify potential faults, minimizing maintenance, while increasing safety and asset lifetime.
Power reliability

Self healing network
Fault location and restoration to minimize power outages, with motorized and automated solutions. Automatic ring reconfiguration solution to guarantee power supply on critical infrastructure.

Stability
Advanced control of distributed energy resources, like renewables, and EV chargers. Energy Storage Modules for load shifting, peak shaving, renewable energy smoothing, voltage leveling.

Supervision
Sustainability

**Eco-efficiency**
Reduce environmental impact minimizing switchgear energy loss using sensors technology.
Low environmental impact with SF6 gas-free switchgear and components.

**Renewables**
Easy integration of renewables with automatic-synchronization protection function.
Energy Storage Module to optimize the distributed energy resources within the grid.

**E-mobility**
Easy to deploy e-mobility solution packaged with compact secondary substations.
Energy Storage Module for scalable deployment of EV chargers.
Flexibility and security

Digital switchgear
Easy to update during lifecycle.
Wide-range current and voltage sensors.
Wiring reduction up to 90% using digital bus communication.

Smart substation
All-in-one protection for any power distribution application, fully modular and upgradable software
Centralized substation protection and control, ready to follow the evolving grid, with extensive application coverage

Cyber security
Secure local and remote connectivity with network monitoring.
Cyber asset management with firmware updates, automatic devices backup and supervision.
IT/OT convergence

Energy and asset management

- Energy monitoring
- Infrastructure (e.g. hospital, airport, railway)
- Condition monitoring and Power management
- Critical infrastructure (e.g. Data center, Telecom)
- Energy management and Power continuity
- Substation and distribution automation
- Grid (substation, distribution)

Edge and cloud IT scalable platforms tailored to OT requirements
ABB Ability™ global and local support

- 10 Digital solution centers
- 40 Digital service centers
ABB Ability™ electrification offering

- **FLEXIBILITY**
  - Substation protection and control
    - SSC600, REX640
  - Automatic ring reconfiguration
    - LC1000
  - Condition and energy monitoring
    - MNS® Digital, NeoGear™ Digital

- **RELIABILITY**
  - Switchgear condition monitoring
    - SWICOM
  - Automatic transfer switch
    - Emax2, Relion®, SUE3000

- **AVAILABILITY**
  - Electrical system asset health
    - MyRemoteCare

- **EFFICIENCY**
  - Electrical control system
    - ABB Zenon

- **SAFETY**
  - Arc detection and suppression
    - REA, TVOC, UFES

- **FLEXIBILITY**
  - AIS / GIS, primary and secondary
    - UniGear/ZX/UniSec Digital

- **EFFICIENCY**
  - Energy monitoring
    - EDCS

Smart Utility

Smart Industry

Smart Building and Infrastructure