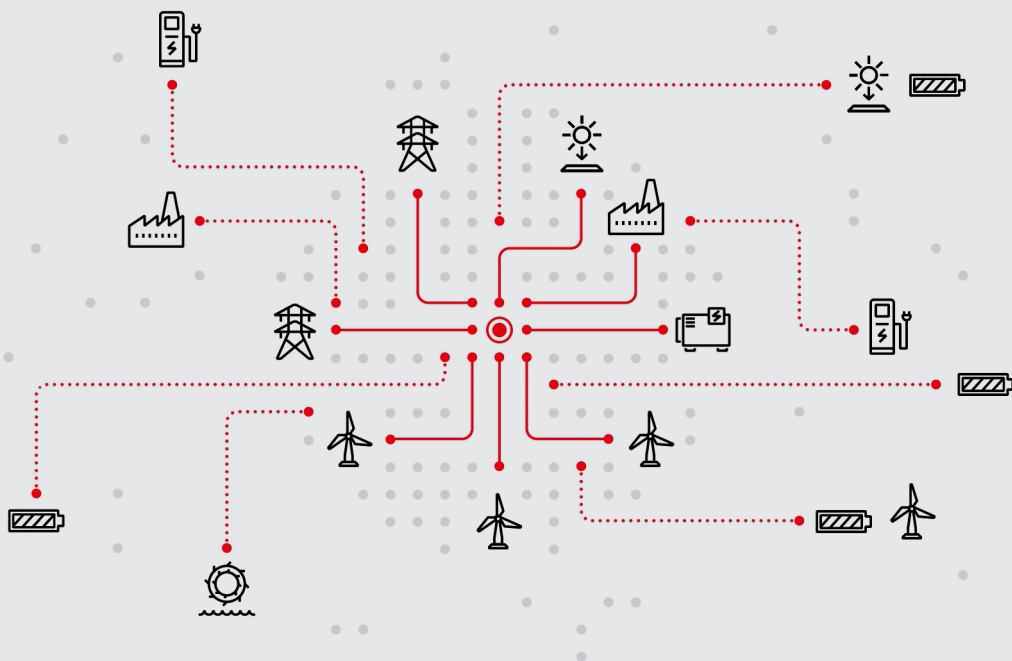




Power Digital Experience Center

Enabling a stronger, smarter,
greener grid



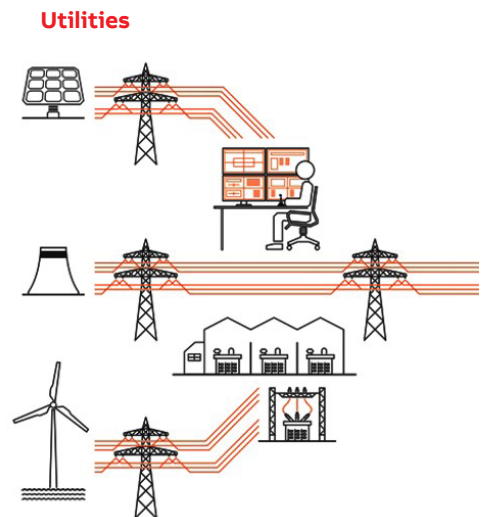
Digitalizing power systems

Over the next two decades, India may be the largest source of energy demand growth in the world. Rising population and rapid urbanization will drive a surge in consumption, necessitating alterations in the way power is produced, distributed and consumed in the country. Climate consciousness and the emergence of new demand centers will turn the power network malleable, with more and more renewables and hybrid power systems added into the central grid.

Without due changes in the power handling apparatus, this will pose a big challenge. Renewable energy is, by nature, unpredictable. Introduced through diverse channels for rapidly rising heavy-duty appliances, it can overload and damage the grid.

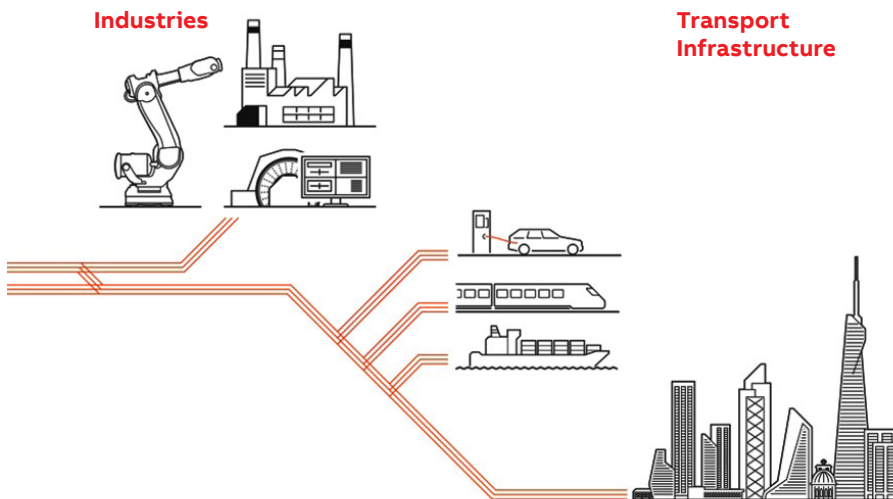
India is already the third largest generator of electricity. The government is striving to power every household, industry and commercial business through a wider transmission network and distributed energy resources such as solar and wind energy under its 'Power for All' scheme. It also aims to have 40 percent of its total installed power capacity to come from renewables in the next ten years. To achieve this goal and sustain it, we must tap into a variety of transmission, distribution, storage and energy management solutions.

ABB Power Grids is a pioneering technology leader in power products and systems that is serving customers in utilities, industry and transport and infrastructure globally. Continuing a history of innovation spanning more than 130 years, it is focused on the future of electrical power and energy with core and digital technologies such as digital substations, microgrids, renewable integration, intelligent transformers, control switching solutions, assets and software to facilitate a smart and agile grid.



- Shift to Renewables
- Digital Grid - Energy Internet
- Energy Revolution

India is aiming to become the third largest economy in the world by 2030 with 100 percent electricity and a small carbon footprint. The success of its vision will depend on its ability and speed of adapting to the rapidly evolving technologies and business models in the power sector. ABB Power Grid will act as a key change agent in this pursuit, enabling a stronger, smarter and greener grid.



Digitalization

- Industry 4.0
- Collaborative Flexible Manufacturing
- Real-time Optimization
- Smart Cities
- E-mobility
- Mobility-as-a-Service

PowerDEC

Power Digital Experience Center

PowerDEC combines the emerging Digital Enterprise concept and digital technologies with the conventional core technologies to demonstrate next level of enterprise performance. Be it smart sensors, cloud computing, big data analytics, artificial intelligence - machine learning (AI-ML), digital twin, augmented - virtual reality (AR-VR), or blockchain, PowerDEC provided use cases and experience with the value proposition.

Some of the key examples are:

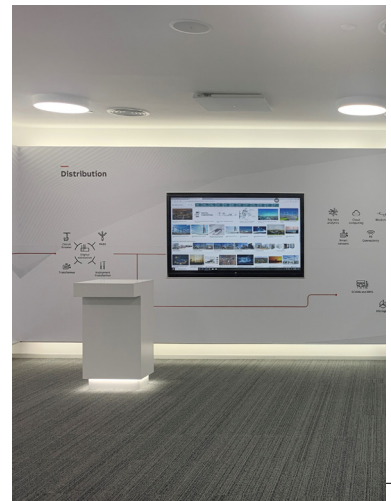
- Enhancing stability of power grid while maximizing penetration of renewables
- Simulating contingencies, black-outs to develop preventive measures with autonomous protection
- Improving performance of assets like transformer, switchgears and

systems with predictive maintenance, effective deployment of workforce and enterprise level engagement with service providers to reduce downtime.

- Enhancing reliability of power system with analysis and actions
- Creating an efficient operational system by integrating real-time control and protection, digital substations and network management in the enterprise level
- Experiencing virtual walk-through of a system installation (e.g. HVDC, FACTS systems)
- Exploring asset's holistic information and operational performance with augmented reality (AR)
- Planning and operating e-mobility, electric buses with flash charging technology with improved environmental footprint

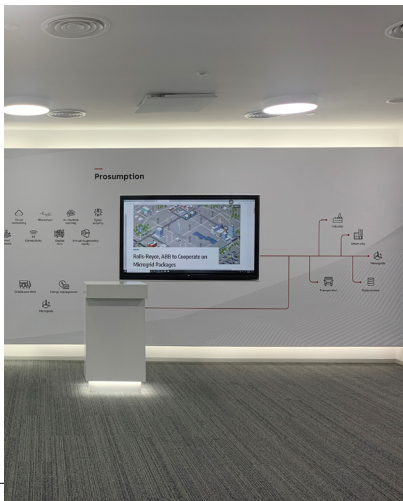
PowerDEC

Augmenting with the physical world



PowerDEC provides you a platform to:

- **Experience** digital technologies on top of conventional core technologies with real use cases, simulations and future scenarios
- **Be aware and get trained** on digital technology applications
- Get help to **identify opportunities** in your organization to use digitalization to improve enterprise, system and asset performance
- **Co-innovate** and **co-create** digital enterprise for sustainable growth



Digital Enterprise

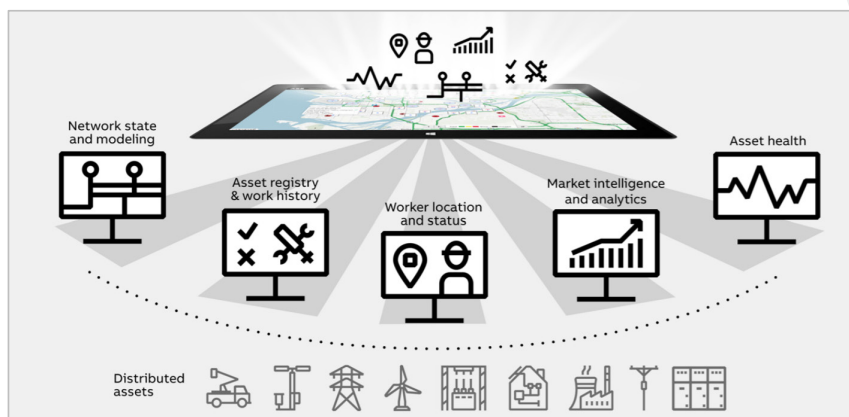
Taking the performance to the next level

Technology is advancing, the world is changing, the stakes are increasing...

With digital transformation comes the ability to rely more on intelligent systems in addition to specific individual expertise. It can lift the enterprise knowledge level as a whole to include the time-valued institutional knowledge and best practices of the most experienced employees. That's the value of ABB Digital Enterprise.

Make an organization more adaptive, collaborative and responsive with Digital Enterprise.

Digital Enterprise crosses enterprise-wide data and system silos to provide unprecedented, single-source access to information and action regarding the operations, assets, systems and the workforce that supports them. It enables faster outcomes by providing employees with comprehensive information derived from multiple operational systems, so they can weigh key decision factors and take immediate action. Whether in the field or the boardroom, no matter the role, everyone across the enterprise can have the information and action-ability they need at the precise moment and place it's needed.



Connected asset lifecycle management

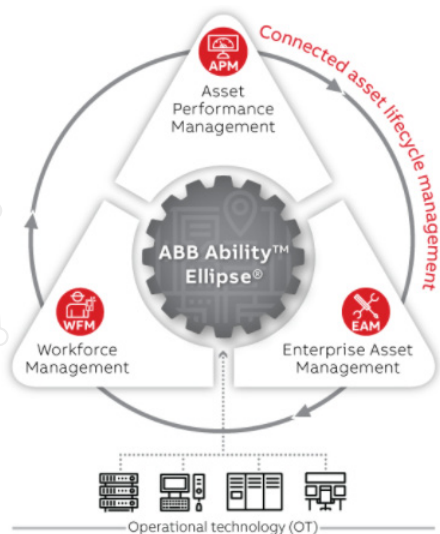
ABB Ability™ Ellipse®

ABB Ability Ellipse is ABB's connected asset lifecycle management solution that unifies world-class functionality for Enterprise Asset Management (EAM), Workforce Management (WFM) and Asset Performance Management (APM).

Ellipse facilitates the orchestration of priority, process and people across an organization, enabling the management of physical assets across the entire asset lifecycle. From strategy through execution, Ellipse is a robust and comprehensive business and technology solution.

Features and benefits:

- Reduced downtime and improved reliability
- Increased workforce productivity
- Cross-functional visibility
- Process standardization and maturity
- Out-of-the box integration and reporting
- Low total cost of ownership



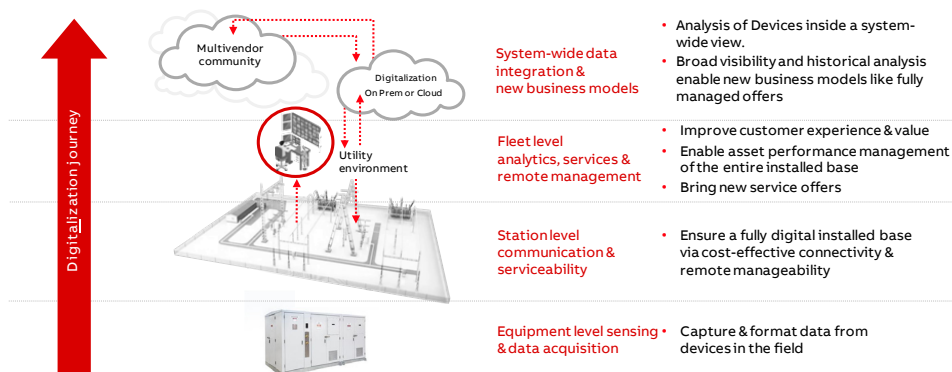
Digitalization across the hierarchy

Predictive maintenance from electrical assets, systems to enterprise

The values of digitalization can be best realized by connecting electrical assets, systems and operation across the hierarchy in the organization including technology and service providers. It helps in getting information about operational issues in near real-time

as well as discovering improvement opportunities faster. Provides platform for predictive maintenance and faster actions to achieve the benefits on a larger scale.

Increased visibility enables the migration from asset focus to system-level analysis



Virtual-Augmented Reality

A holistic approach for asset and system operation and maintenance

Sitting in an office environment one can make a tour of an electrical installation. Virtual reality technology makes it possible. Be it an HVDC, FACTS or substation installation, one can walk through the system to learn, understand and explore how it is designed, how it operates and how you can enhance its operation and maintenance performance.

Augmented reality helps operation and maintenance technicians at site to get all information about an asset from its design, manufacturing, testing, operation and maintenance history - connecting physical world with digital information. For example, a technician looking into operational issues of a critical transformer gets its specifications, instruction manual, digital twin info, 3D model, design

temperature and electro-magnetic profiles, thermal scan, on-line asset health condition/ index and maintenance history with few clicks on his/her tablet. Analyses the root cause and measures for improving performance. Connects to a remote expert in the factory or design center for discussing the topic and taking guidance. This helps in carrying out predictive maintenance of the transformer thereby reducing downtime and inefficiencies.

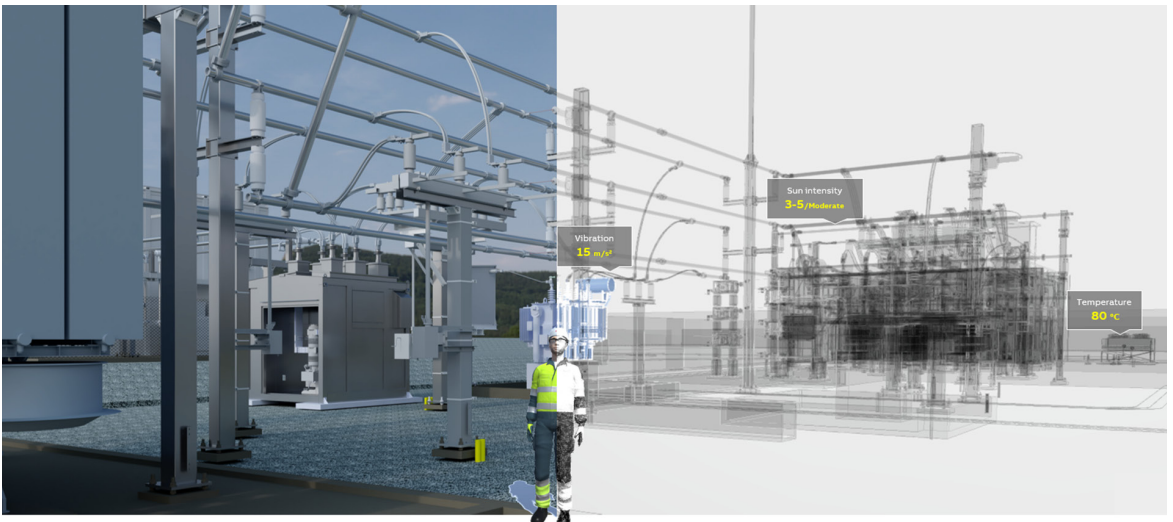
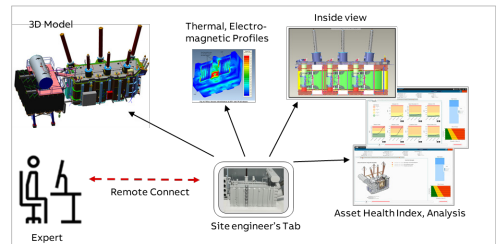


ABB Power Grids in India

In a few years from now, India's power grid will look very different. The pursuit of decentralization, decarbonization and digitalization will radically alter the way utilities produce power, distributors distribute it and consumers consume it. We will have hybrid power and power systems that will be cleaner, greener and smarter. But such a transition will not be easy. It will require due planning and expertise.

With its vast experience and knowledge in the area, ABB Power Grids has been helping customers in utilities, industry and transport and infrastructure globally to adapt and adjust to the changing energy landscape. It is helping them plan, build, operate and maintain their power infrastructure, sustainably, and make the fourth industrial revolution an ally in meeting the growing energy demand and combating climate change.

The Indian arm of ABB Power Grids, ABB Power Products and Systems India Ltd (APPSIL), is a global leader in power technologies, providing the most comprehensive grid portfolio across the entire power value chain. Our technologies facilitate the safe, reliable and efficient integration, transmission and distribution of bulk and distributed energy generated from conventional and renewable sources.

With 17 world-class factories across five locations in the country, we are working toward bringing power to all and extensively investing on R&D centers, academia, customer learning centers, employees and suppliers. We are committed to ensuring end-to-end support to customers and the power industry as a whole.



Celebrating a history of innovation spanning more than a century, we are marching forward, shaping the future

of sustainable energy in India and across, and enabling a stronger, smarter and greener grid.



16 manufacturing units across 5 locations



4,492 employees



17 sales offices



Global Engineering Center
Global Technology Center
ABB PowerTEC
India Development Center
India Operations Center
Global Business Services



ABB PowerDEC

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