

Shaping
energy solutions

to empower

sustainable
connectivity

linxon

A HITACHI ABB POWER GRIDS
& SNC-LAVALIN COMPANY

Linxon combines Hitachi ABB Power Grids (former ABB Power Grids) deep technological knowledge with SNC-Lavalin's project management expertise into a company dedicated to substations.

We work to shape energy solutions to empower sustainable connectivity.

Linxon is a joint venture company set up by SNC-Lavalin and ABB* in September 2018, to take over from ABB the business of delivering turnkey electrical AC substation projects.

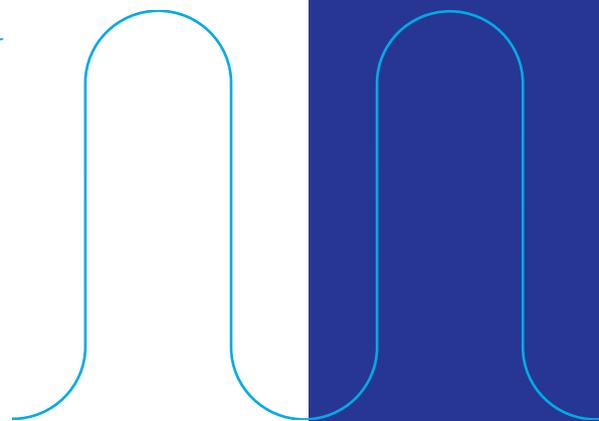
Linxon undertakes turnkey electrical alternating current substation projects related to renewable and conventional power generation, power transmission and transportation solutions. Turnkey solutions includes project design, engineering, procurement, construction, management, commissioning and after-sales support.

Parent Partners

Hitachi ABB Power Grids is a global technology leader with a combined heritage of almost 250 years, employing around 36,000 people in 90 countries. The business serves utility, industry and infrastructure customers across the value chain, and emerging areas like sustainable mobility, smart cities, energy storage and data centers. With a proven track record, global footprint and unparalleled installed base, Hitachi ABB Power Grids balances social, environmental and economic values. It is committed to powering good for a sustainable energy future, with pioneering and digital technologies, as the partner of choice for enabling a stronger, smarter and greener grid.

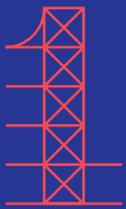
Founded in 1911, SNC-Lavalin is a fully integrated global professional services and project management company and a major player in the ownership of infrastructure. From offices around the world, SNC-Lavalin provides comprehensive end-to-end project solutions to expertly manage project risk and ensure customer return on investment in oil and gas, mining and metallurgy, infrastructure, clean power, nuclear and EDPM (engineering design and project management), improving lives around the world.

* ABB separated the Power Grids business and formed in July 1, 2020 a Joint Venture with Hitachi, named Hitachi ABB Power Grids. The interest in Linxon is now carried on by Hitachi ABB Power Grids.



Adaptable future-ready energy solutions

We deliver sustainable energy solutions and act as a true partner to facilitate the digital transformation for those who depend on consistent reliability.



Act as a business partner

- Single source of responsibility which minimizes risk and reduces project complexity for our customers
- Transparent and open communication which prioritizes our customers' requirements
- Collaborative approach to deliver complete projects according to schedule



Offer dedicated domain expertise

- An unwavering commitment to the highest safety and quality standards
- Linxon brings unrivalled technology and application knowhow
- Proven track record of delivering end to end, grid compliant solutions in multiple regions
- Ability to manage complexity as demonstrated by extensive global references



Bring long-term value

- Combining world class power technologies and project delivery
- Enabling stronger, smarter and greener solutions
- Future proofed project execution that help our customers to be ready for the next grid generation
- Predictable and cost-efficient lifecycle solutions

Values

Our values are the essence of our company's identity. They represent how we act, speak and behave together, and how we engage with our clients and stakeholders.

Safety

We put safety at the heart of everything we do, to safeguard people, assets and the environment.

Integrity

We do the right thing, no matter what, and are accountable for our actions.

Collaboration

We work together and embrace each other's unique contribution to deliver amazing results for all.

Innovation

We redefine engineering by thinking boldly, proudly and differently.

References

Linxon can, thanks to the unique combination of Hitachi ABB Power Grids and SNC-Lavalin, deliver large, complex AC power substations building on experience:

- 1,000 references;
- over 100 years of technology expertise; and
- 60 years of substation and electrification project experience worldwide.

Our global presence



HSE, quality and sustainability

Linxon strives to deliver engineering, procurement, design/delivery projects with zero defects and zero harm to people and the environment.

Our core values embrace Quality, Health, Safety, Security and Environmental Protection.

It is our responsibility to protect the health and safety of our employees, contractors and clients in all of our activities, and to continually improve the environmental performance and quality of our activities to ensure customer satisfaction and trust.

Linxon commits to:

- comply with relevant safety laws, regulations and industry standards to ensure all employees, contractors and clients return home safely at the end of each working day
- protect our people, physical and digital assets against unplanned events
- embed corporate social responsibility and ethics principles into our business practices
- improve quality management to guarantee project safety, prevent quality incidents and ensure compliance at every stage of the EPC process
- identify and understand customer expectations, and work relentlessly to meet or exceed them by motivating, training and developing our people, and leveraging our partners' and suppliers' strengths

Linxon commitments include:

- encouraging Q&S responsibilities in employees and third parties via standards, education, training and coaching, supervision and effective communication
- setting measurable annual objectives and targets to continually improve our performance, and vigilantly guard against complacency in company-related activities
- transparency and communications with stakeholders regarding Q&S performance
- working with our supply chain to achieve Q&S performance excellence



ZERO

defects



and

ZERO

harm
approach



Quality,
health,
safety,
security



and
environmental
protection



are our core
priorities

Our expertise

Deep technological knowledge, digital know-how and project management expertise make Linxon a true partner for reliable, sustainable substation solutions.

Linxon substation application experience includes:

Boosting capacity, enhancing reliability and increasing availability of the transmission and distribution network for utility customers with proven substation designs and innovative grid technologies



Creating reliable supplies of power that support efficient use and management of electricity, while enhancing operational performance facility-wide for our customers

Integrating and interconnecting cleaner energy while helping to maintain grid reliability and secure power supplies for the renewable energy sector



With a global footprint and local presence that ensures complete support over the life of a substation, Linxon is a partner customers can rely on

Advanced design and engineering tools

Engineering delivered by Linxon takes advantage of the latest generation of CAD. The benefits of 3D modelling software tools:

- Change at any stage of the project seen to all other parts of the project documentation
- Automatic checking of safety features – e.g. escape routes – and immediate evaluation of potential conflict areas
- Up to 30% savings on the mounting material thanks to the precise design in 3D model and thus minimization of waste
- Reduced delivery time by reducing unnecessary revisions
Choice of the most effective cable way path and list of cables and cableways for later maintenance
- The 3D model of main electrical equipment is further used for the design of lighting, air conditioning or fire extinguishing system

Our portfolio

Substations for power transmission and power generation

Linxon offers engineering, procurement, management and construction services for execution of large, complex AC power substations and expansions in four main applications:

1. Utilities (transmission and distribution)

- Upfront planning and systems studies
- Design for optimization & full project execution
- Full system maintenance / Life extension services
- Expertise in cutovers and sequencing to work within site limitations
- Ensure optimal solutions for our clients

2. Conventional generation

- Flexible and reliable solutions for effective integration of power from conventional generation plants
- Efficient transmission and distribution to residential, commercial and industrial consumers
- Comprehensive domain knowledge, global experience, continuous innovation and funding solutions
- Optimized turnkey substation solutions that support local grid code compliance
- Customer support throughout the lifecycle of the substation including brownfield upgrades and rehabilitation
- Interconnections with existing utility switchyards



3. Renewable generation

- Completed several onshore and offshore wind substation projects – leveraging our experience from around the globe in this area
- Supporting our customers to achieve return on investment with competitive and optimized solutions as the costs of wind and solar energy come down
- Significant experience in delivering grid connection substations for solar plants combined with complementary electrical BOP competence
- Addressing demand for grid stabilization and energy storage with innovative solutions
- Consistent and clear focus on maintaining project schedule to ensure our customers meet their commercial generation obligations

4. Transportation

- Traction power substations (built in place and containerized solutions)
- Switching and paralleling stations
- AC & DC applications
- Wayside energy storage systems
- Feasibility and reliability studies – RAMS
- System studies and traction power simulations
- SCADA systems for railway applications
- Design, erection, testing and commissioning of Third Rails and Power Rails from 750vDC to 3000vDC consisting
- High Speed, Metro, Light rail and Monorail applications



Digital substations – advancing the state-of-the-art

- Enhances controllability and reliability while optimizing operating costs
- Reduced risk of electrical shock
- Predictive maintenance capabilities
- ‘Future proof’ remote control via IEC 61850 international standards
- Savings:



Conventional generation

Substation innovations connecting conventional generation



We design and deliver turnkey solutions that help our customers fulfil their plans exactly, providing the highest lifecycle value and the lowest possible risk.

Connecting critical loads to the electricity grid and expanding power system infrastructure demands significant planning and engineering to ensure a constant, dependable supply of power. Linxon delivers optimized EPC substation solutions that help cities to grow, industries to expand, utilities to operate reliably and communities to connect.

Our global footprint and local presence ensures complete support over the lifetime of a substation. Regardless of size or scope, making projects easier for customers is our specialty. From ultra-high transmission substations to industrial electrification, Linxon is a partner customers can rely on.

Fadhili Middle East & Africa

Linxon has supplied a 380-kV gas-insulated switchgear (GIS) substation to Fadhili Plant Cogeneration Company (FPCC). The substation will help boost transmission capacity and ensure reliable power supply at a new 1,549-megawatt (MW) combined cycle power plant in the Al Fadhili area near Jubail in eastern Saudi Arabia.

About 400-MW of electricity as well as around 1550 tons of steam per hour from the power plant's output will be used to operate the adjacent Fadhili gas processing complex, which will in turn supply natural gas for the plant's five generating turbines. The balance of electricity output will be delivered to the Saudi state grid, and is enough to supply electricity to about 1.1 million Saudi households nationwide.

The state oil company, Saudi Aramco, is developing the Fadhili project, which is a key part of a master plan to boost production and supply of clean-burning natural gas in the Kingdom of Saudi Arabia in order to reduce its dependency on oil as power generating fuel, in line with Saudi Vision 2030.

The supply for the Fadhili project covers construction of a new 36-bay indoor 380-kV GIS substation including protection, metering, control, communication and SCADA equipment, as well as modification of associated existing substations. The substation's automation system enables it to be remotely controlled from the Load Despatch Center (LDC) via the SCADA and communication system, and gateway. In addition to an IEC 61850-based Control and Protection system, Linxon also provided all related civil design and construction, security, and mechanical works according to Saudi Electricity Company (SEC) specifications.

Main data

Customer: Doosan Heavy Industries

Location: Saudi Arabia

Year of award: 2016

Year of commissioning: 2018

Application: Conventional generation

Voltage rating: 220 kV - 400 kV

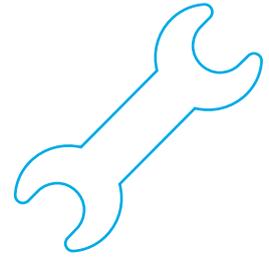


The fast-track project required partial energization within 18 months of the contract award to meet an early steam operation milestone. Linxon/ABB achieved full energization of the complete substation in August 2018, three months ahead of schedule. It is important to note that the pilot class 1 HCIS 2017 security standards were implemented at the substation within the same period.

Operationally, the power plant substation is important because the Fadhili gas plant complex is expected to process up to 2.5 billion standard cubic feet per day (SCFD) of natural gas from offshore and onshore fields. This processing plant will help to boost Saudi Arabia's natural gas supply by 2020, and deliver new opportunities for steel, aluminium and downstream value-added industries within the country.

Utilities

Serving utilities with engineering and program efficiency



Linxon's knowledge of utility standards and procedures, and its unique ability to integrate and implement equipment innovations, are key to meeting the needs of our customers.

Linxon solutions combine state-of-the-art technology, such as compact GIS systems, and proven project management capability including complex phased schemes. Linxon customers can rely on the prompt delivery of robust, reliable and efficient electrical systems that make the best possible use of an available substation site.

Our turnkey solutions incorporate the following works:

- design, manufacture, supply, delivery, installation & commissioning of established ABB Power Products
- an advanced range of ABB Substation Automation & Protection Systems
- a considered approach to demolition/removal of redundant substation assets
- carefully planned site remediation and temporary/permanent service provision
- an optimized civil and GIS building solution

Waterfront North America

Waterfront is an advanced new 230-kilovolt (kV) electricity substation supporting existing customers and planned development in the Capitol Riverfront and Southwest Waterfront areas of Washington, DC. As well as supporting planned development in the U.S. capital, it replaces aging infrastructure and enhances transmission network reliability and efficiency for existing customers of Pepco, an Exelon company and public utility supplying energy to the capital and surrounding communities in Maryland.

Linxon (former ABB) provided full engineering and project execution for the Waterfront substation project, in which environmental conditions were key and included special focus on detailed city architectural requirements. Matching the substation's architectural features with the design of adjacent buildings helps it to blend seamlessly into the surrounding landscaping and environment.

The Waterfront substation accommodates ABB gas-insulated switchgear (GIS), along other high- and medium-voltage products, such as power transformers, breakers, capacitor banks, inductors and surge arresters.

The substation also contains cutting-edge communication and control technology, including SCADA, SF₆ gas density monitoring system and other Intelligent Electronic Devices (IEDs) for substation protection and control. About 1,860 m² (20,000 ft²) of photovoltaic panels were installed on the substation roof to ensure a supply of green energy for substation electrical services.

Linxon provided design & civil and structural construction services for site work, foundations, and erection of the building.

Main data

Customer: Pepco

Location: Washington DC, U.S.

Year of award: 2015

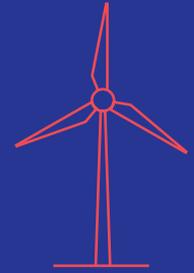
Year of commissioning: 2018

Application: Utilities

Voltage rating: 230 kV



Renewable generation



For renewable generation, substations that meet the demands of tomorrow

We support our customers in the creation of stronger, smarter and greener grids that are adapted to meet the changing needs of an evolving power landscape.

For power and water systems, Linxon solutions enhance the capacity, reliability and availability of transmission and distribution networks with proven substation designs and innovative grid technologies. Linxon solutions facilitate the integration and interconnection of cleaner energy supplies, and help to maintain grid reliability and secure power supplies. We are focused on grid stability, reliability and code compliance.

We challenge ourselves to deliver technical solutions that help our renewable energy customers meet their commitments. We have also implemented innovative delivery solution for both civil and demolition works by minimizing the use of non-sustainable materials.

Storfinnforsen Europe

Linxon will deliver a turnkey upgrade for an electrical substation for E.ON Energy Networks in Sweden. The order is consisting of an extension of the 130 kV and the 400 kV air insulated switchgears (AIS) substations as well as civil works.

E.ON Energy Networks intends to connect increased wind power from several surrounding wind parks into the grid of Storfinnforsen in northern Sweden. This entails that the existing 130 kV substation needs to be extended by one bay AIS 400 kV, three bays of AIS 130 kV and a new capacitor bank to stabilize the grid.

The construction work is planned to start in September 2019. The energizing of the refurbished substation is planned for July 2020.

The distant site location up north at Storfinnforsen power station, close to Ramsele in Västernorrlands län, presents its challenges. Since the site will be energized during the entire project to enable consumers to have reliable access to power, times for outages are limited. In addition, erection works during winter period will be necessary.

Main data

Customer: E.ON Energy Networks

Location: Sweden

Year of award: 2019

Year of commissioning: 2020

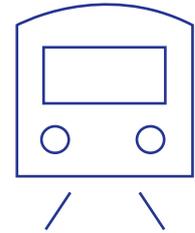
Application: Renewable generation

Voltage rating: 132 kV - 220 kV



Transportation

For rail substation applications and mass transit transmission



Linxon substations for rail ensure reliable power delivery to the line and vehicles so main line trains, metros and mass transit networks stay on track. Optimized rail electrification solutions ensure reliable supplies of AC and DC power are available to support high performance and efficiency.

We design, construct, test and commission complete traction power supply systems for both long distance rail and mass transit applications.

We specialize in high-voltage, traction and auxiliary power for:

- light/metro lines
- high-speed lines
- main lines and freight lines

We provide design, engineering, surveying, as well as grid compliance and approvals:

- EMC, earthing & bonding
- RAMS
- stray currents
- braking energy recovery solutions
- power quality solutions

Linxon provides not only complete end-to-end solutions, but also extended support during initial operation.

Mass rapid transit monorail lines Asia Pacific

Linxon, an ABB and SNC-Lavalin company, is doing the design supply, install, test and commissioning, complete power supply which includes bulk, auxiliary and traction substations as well as critical power equipment to ensure a vital supply of reliable power for the first of Bangkok's extensive new monorail transport systems serving the Greater Bangkok area. These projects are part of the Mass Rapid Transit (MRT) Master Plan, a government initiative to create an urban rail commuter network comprising multiple lines, serving different parts of the city to cater to Bangkok's burgeoning population which is expected to overtake the 10 million mark by 2030.

The Mass Rapid Transit Authority of Thailand (MRTA) responsible for the new Khae Rai-MinBuri (Pink) and Phrao-Samrong (Yellow) Lines, monorail lines, is working to build a transportation system that will encourage a shift from road transport to urban rail. Once constructed, these lines will ease Bangkok's road traffic congestion and reduce air pollution.

Main data

Customer: Bombardier Transportation

Owner: Mass Rapid Transit Authority of Thailand

Location: Bangkok, Thailand

Year of award: 2017

Year of commissioning: 2021

Application: Mass rapid transit

Voltage rating: 115 kV AC/22 kV AC/750 kV DC



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