

Substation Reliability Management Services

An innovative approach in meeting power
availability and resource optimization targets

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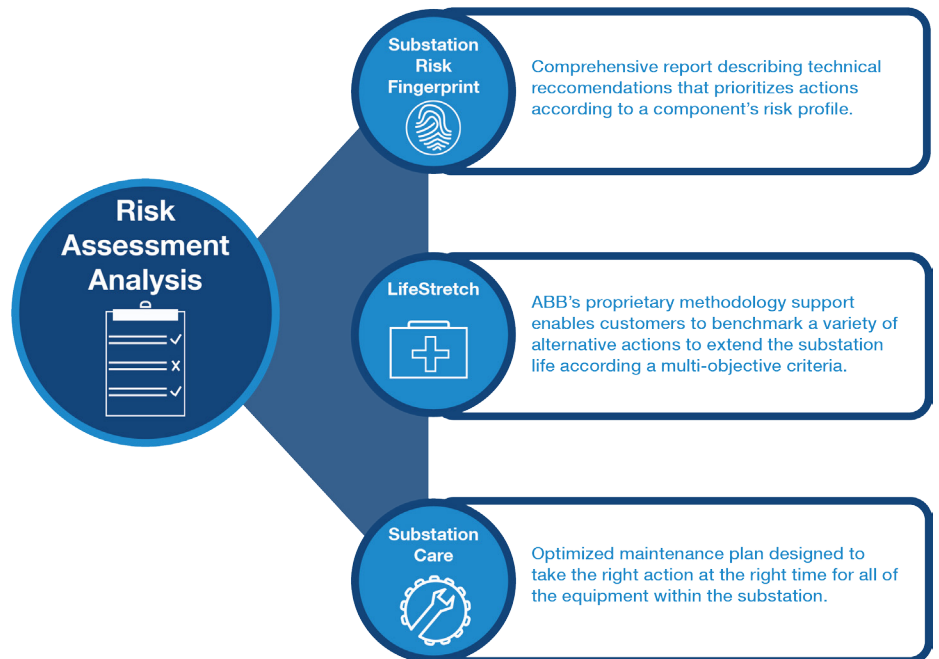
A complete range of innovative service offerings for effective asset management and investment planning

Utilities, grid operators and industrial power consumers are facing unprecedented challenges. With increasingly aging infrastructure combined with cost-cutting pressures to operate into today's competitive environment, prioritizing investment has never been so important.

Using proprietary software, algorithms and analysis techniques, ABB has developed reliability management services to provide substation owners with the right insights to make optimal investments to improve system performance.

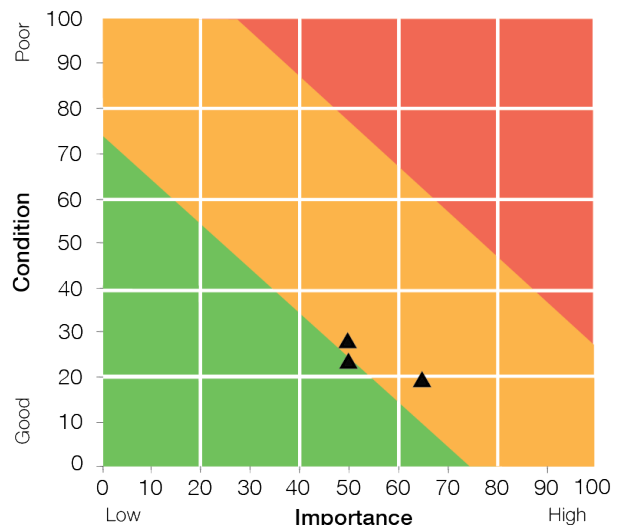
Risk Assessment

ABB's assessment services support customers in gaining a comprehensive overview of the substation's risk profile. The foundation of the advanced offering is an initial substation risk assessment to evaluate the condition of the substation and its current performance. Once the substation risk assessment is performed, the customer can decide the appropriate next steps to take action.



Risk Assessment

ABB can provide a more in-depth assessment which will require an in person inspection, as the ABB Assessment Team will visit the facility and carry out a thorough visual inspection. During this site inspection, the findings are documented, photographed and inventoried. Results are presented in a technical report that contains detailed recommendations for further study or action, along with chronological priorities.



Component Ranking

Component ID	Model	Manufacturer	Year	Condition	Importance	Risk
T1E1-Q0	ELK-S02	BBC	1984	28,06	50,67	55,37
T2E4-Q0	ELK-S02	BBC	1984	23,87	50,64	47,14
T3E7-Q0	ELK-S02	BBC	1984	19,68	64,05	30,07

Substation LifeStretch™

When the substation life cycle reaches the design limits, it is time to make a decision about its future. Multiple technical solutions can be considered to extend the substation life by keeping and even improving reliability of the power supply.

ABB has developed Substation LifeStretch methodology to address this challenge.

Substation LifeStretch is based on a collaboration process that allows customers to:

- Evaluate existing level of substation reliability based on the equipment condition assessment and reliability statistics such as SAIDI, CAIDI and SAIFI (from open sources).
- Identify different technical alternatives based on the current substation condition and customers' specific needs
- Compare the potential solutions according to multi-objective criteria focused on the customer's decision making process (financial, technical and reliability KPIs).

Substation LifeStretch Approach

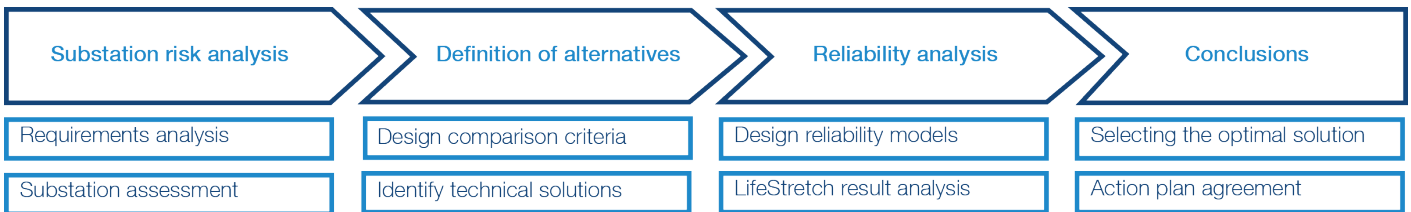


ABB default reliability library is based on public sources that can be reviewed by the LifeStretch team and the customer. It is also possible to build a customized reliability library for the project based on the customers own reliability records or other available sources such as IEEE, CIGRE, and others.

LifeStretch Results & Conclusions

Once the system modelling phase is finished, the ABB service team will perform the calculation of the technical alternatives. The evaluation of technical alternatives includes a comparison of the target objectives and criteria designed by the LifeStretch team. The results of the analysis are presented in a comprehensive report giving a solid technical background for the decision making process.



Substation Care Maintenance Agreements

By choosing the most appropriate maintenance strategy, the financial risks can be minimized. The challenge lies in implementing the right action at the right time. Hence, maintenance managers are moving from traditional time-based maintenance (TBM) to condition-based maintenance (CBM) or even reliability centered maintenance (RCM).

To offer the best care for customers' substation needs, ABB offers a variety of maintenance strategies:

Time Based Maintenance (TBM)

The more traditional approach where time is the main trigger for maintenance. This strategy will place priority on components based on time in service, rather than the changing condition of the assets. Easy to implement, this strategy ensures that manufacturer warranties are met, including provision of wear and tear parts, consumables and replacement of components or systems at the end of service life.

Importance Based Maintenance strategy (IBM)

Maintenance schedule based on the importance of the equipment. Importance is calculated based on the failure mode and effects analysis (FMEA) of the installation. Prerequisite is a detailed risk modeling of the substation. Applicable to optimize maintenance investment into new substations.

Keeping things simple helps the customer make decisions faster on what a business requires to stay ahead. ABB offers a variety of services agreements to help the customer make informed decisions. Different levels of support are available to match specific needs.

Condition Based Maintenance (CBM)

The maintenance planning is designed according to the condition of the equipment. Prerequisite is a detailed condition evaluation of the installed equipment. This option can also include an installation of condition-based monitoring equipment to continuously track the ongoing condition of key assets between maintenance and inspection visits.

Reliability Centered Maintenance strategy (RCM)

Substation reliability modelling enables ABB to understand the risk associated to each of the substation's components. Reliability centered maintenance conjoins IBM and CBM in a way that utilizes all available information to provide the highest level of reliability. This evaluation includes FMEA, condition through periodical evaluation and task analysis.

Services	Support Meet asset management partner	Base Set-up maintenance plan	Plus The right action at the right time	Proactive Assure substation availability
Substation Risk Assessment Based on failure modes and effects analysis (FMEA), is, condition and importance components evaluation	●	●	●	●
Active maintenance plan design Optimized maintenance investment	●	●	●	●
Performance follow-up Monitoring and evaluation of the effectiveness	●	●	●	●
Priority technical support (24/7) The knowledge you need when it's needed the most		Select at least one of the services	●	●
Inspections and preventive maintenance Keep the substation condition at its optimal level			●	●
Predictive maintenance Understand potential risks and take action			●	●
Spare parts Mitigate the downtime risk by assuring the shortest delivery time		optional	optional	●
Substation remote monitoring Comprehensive information for faster decisions		optional	optional	●
Substation performance support Operational excellence to protect critical assets			optional	●
Training Plan Tailor-made based on a competencies assessment	optional	optional	optional	optional

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