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Upgrading Substations: Cost Comparison

A Clear Comparison between Upgrade Techniques

Earlier this year, NOJA Power released a press item covering the deployment of Reclosers in Substations instead of traditional substation circuit breakers. This press release highlighted how substation circuit breakers are often over-qualified for the application, and by using an integrated solution such as a modern pole mounted recloser system instead could save major capital investment, integration and commissioning costs. Subsequent to this release, a major utility in the South American region has published an article demonstrating their findings in deploying this technique in practice. Obviously, there are benefits and drawbacks to using both traditional substation equipment and reclosers, but it's worth considering the application as utilities are operating under greater capital expenditure scrutiny from regulatory bodies.

Reclosers can be used in substations, provided that the maximum fault current rating doesn't exceed the required rating of the substation. The primary advantage of using reclosers is the substantial reduction in costs. Argentinian utility ENERSA have released a paper documenting their experience in terms of cost comparison. Their comparison is between using Reclosers in an outdoor substation environment versus a traditional indoor substation with indoor substation circuit breakers. The table of cost outcomes is as follows:

Table 1: Cost Comparison

Description	Indoor with CBs	Outdoor with Reclosers
13.2kV Substation equipment	1 Per Unit (reference value)	0.82 Per Unit
33kV Substation equipment	1 Per Unit (reference value)	0.61 Per Unit
Cost Breakdown: Civil	1 Per Unit (reference value)	0.34 Per Unit
Cost Breakdown: Electromechanical	1 Per Unit (reference value)	0.79 Per Unit

Evidently, the cost of deploying reclosers in an outdoor environment vs indoor with CBs on a capital expenditure basis saves substantial investment. The higher the voltage rating, the greater the saving, as 38kV Reclosers are significantly cheaper than corresponding Substation Circuit Breaker equivalents. The reduction in civil costs is also a major consideration, as the need for substation buildings is greatly reduced, rather than a comprehensive enclosure of all associated switchgear. The study doesn't include a cost for total land area, but Reclosers are generally more viable as a substation alternative in rural locations, which evidently reduces the cost of land.

Either option provides advantages and disadvantages, as listed below.

Table 2: Advantage Disadvantage Matrix

	Indoor Substation with Circuit Breakers	Outdoor Sub with Reclosers
Advantages	<ul style="list-style-type: none"> • Reduction in site dimensions • Reduced visual impact • Maintenance repair works immune from weather • Limited vandalism exposure 	<ul style="list-style-type: none"> • Facilitates fast response in emergencies • Easy maintenance • Lower project cost
Disadvantages	<ul style="list-style-type: none"> • Increase in maintenance complexity • Increased part supplies and critical spares requirements • Increased project cost 	<ul style="list-style-type: none"> • Increased site dimensions • Greater visual impact • Increase in maintenance complexity • Maintenance in poor ambient conditions • Exposure to vandalism

Ultimately, each design has its merits. In highly urbanised regions where land cost is high, it may not be feasible to deploy an outdoor substation arrangement. However, using this arrangement is clearly more economical, particularly in regional environments and especially at higher voltages.

“In rural and semi-rural areas where land is readily available outdoor substations can often be far more economically built than indoor substations,” says NOJA Power Group Managing Director Neil O’Sullivan. “The study conducted by ENERSA clearly indicates reclosers can be used far more cost effectively than indoor substation switchgear or even outdoor substation circuit breaker to build economic zone substations.”

NOJA Power has experience in applications of OSM Reclosers in substation environments. The OSM Recloser is supplied standard with a myriad of functionality designed for deployment in substations. If you have a project in mind or require further information, visit www.nojapower.com or contact

your local NOJA Power Distributor.

By Martin van der Linde – Marketing Manager NOJA Power

Sources: Beber, D., Maxit, A., Moyano, M., ©2011, "Use of Reclosers in

Substations 132/33/13,2 kV", CIREN 21st International Conference on Electricity

Distribution, Frankfurt 6-9 June 2011