Why Substations Are Important

What is a Substation?
Substations take power from high voltage transmission lines and lower the voltage level so it can be sent in multiple directions to homes or businesses via smaller distribution lines.

How Does a Substation Work?
A typical MEA substation contains transformers that reduce the voltage, and a ‘bus’ infrastructure and circuit breakers to direct power into the distribution lines. Circuit breakers and switches route power for reliability and redundancy to better serve our members. Each MEA substation must not only meet its own load, but also the load of an adjacent substation. This redundant design serves to restore power rapidly during outages or routine maintenance because power can be re-routed.

Why Upgrade a Substation?
Substations must be upgraded periodically to meet increased demand from our members and their communities. If systematic and planned upgrades are not made, too much electricity attempts to move through the system to meet demand, which compromises equipment, causes outages, and reduces the reliability of the entire MEA system. This could result in expensive equipment failures and outages.

If problems persist, the utility may be forced to respond to overloads by a technique called ‘load shedding’ or cutting off a group of users on a distribution circuit to bring down the power to a level within the capability of the substation. Substation upgrades alleviate the need to load shed and allows utilities to accommodate increased customer demand from new users like homes or subdivisions, grocery stores, water treatment facilities and other high-use industries.

Matanuska Electric Association, Inc., Alaska’s oldest and second-largest electric cooperative, is owned and operated by over 47,000 members. MEA’s service area covers more than 4,200 miles of power lines in Southcentral Alaska and serves approximately 59,000 accounts.
The Bigger Picture
The entire Railbelt grid functions as one system, with generators operating in sync to constantly balance the load needs with the corresponding power produced. Each utility is responsible for operating and maintaining their piece of the system so there are no system-wide vulnerabilities. Substations play a significant role in grid stability. MEA not only has a duty to our members to keep our systems running well, but also to the entire Railbelt.

What happens during a Substation upgrade?
Upgrading a substation is an expensive, inconvenient and time-consuming process. MEA will only upgrade a substation when it is essential and proves to be in our members’ best interest. When MEA upgrades a substation, we are typically either adding higher-capacity transformers or more distribution lines to handle the increased load. Either process typically requires that the footprint of the substation be expanded to accommodate the larger or additional transformers, additional bus structures or multiple circuits. During this process, the substation must be shut down from time to time to ensure our workers are safe during the renovation. The power from corresponding distribution and transmission lines must also occasionally be rerouted through adjacent substations during construction.

The reliability of our substations is paramount to the reliability of our entire power system. Vegetation management must also be considered when upgrading a substation to ensure that snow-loaded trees, wind blown branches, or the animals and birds that live around the substation are not harmed or allowed to damage equipment and impact your power delivery.

Can a substation be moved?
Each substation must be located in specific areas that require large amounts of power or near a group of users that need lower voltage electricity to power homes or businesses. While people may resist having a substation near their home or business, the existence of those homes or businesses along with their corresponding energy needs requires that it be there. Moving a substation away from the demand center decreases our ability to serve our members and requires substantial rerouting of distribution and transmission lines and right of way acquisition that carries consequences and escalated costs. Moving a substation simply moves the issue into someone else’s backyard.

More importantly, hundreds of miles of distribution and transmission lines as well as other infrastructure was built in conjunction with adjacent substations so they can work effectively as a system. The expenses associated with decommissioning a substation, permitting and building a new one then rebuilding the entire new network of power lines to accommodate it increases costs exponentially and requires a significant amount of time. Those costs must be passed along to our members.

MEA must carefully balance cost considerations with our members’ current and future power needs in making decisions about infrastructure upgrades. As a cooperative that serves our members, it is our job to utilize economic and technical facts to ensure we have a positive impact on the quality of life and economic vitality of our service area.

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