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WHITE PAPER / **POWER SYSTEM PERFORMANCE**

BEYOND EPC: A TURNKEY APPROACH TO INDUSTRIAL ELECTRICAL SERVICES

BY Tim Darr AND **Mike Zakar**

Because keeping a facility online directly impacts profitability, electrical systems can play an outsized role in the success of industrial, refinery and petrochemical operations. A turnkey approach to electrical system planning, engineering, procurement, construction and maintenance is ideally suited to deliver the reliability, resiliency and availability these systems demand.

Even a brief disruption in electrical service at a petrochemical facility or industrial plant can result in significant production declines and economic losses. A full range of potential power issues must therefore be factored into electrical system planning; addressed during the engineering, procurement and construction phases; and then continuously monitored and managed throughout long-term operation.

Given their criticality, electrical systems reap wide-ranging benefits when facility owners give them focused attention. That typically involves partnering with electrical infrastructure specialists who become intimately familiar with these systems and deliver the full suite of services associated with their design, construction and maintenance.

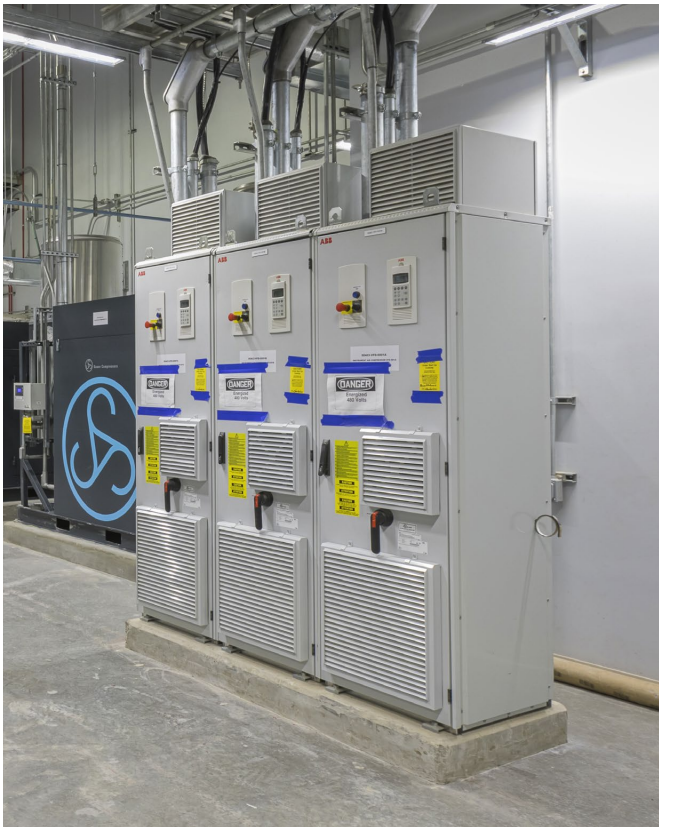
Once limited to the engineer-procure-construct (EPC) services commonly associated with new construction, these partnerships have evolved to include cradle-to-grave power distribution and control services that optimize uptime and performance throughout the service life of the electrical systems.

EVOLUTION OF TURNKEY SOLUTIONS

Today's turnkey services often begin with master planning. At this early phase, an integrated, full-service firm can take a holistic view to make recommendations that have a significant impact on an electrical system's long-term reliability and maintainability.

Turnkey services often continue with multiple phases of front-end loading (FEL), which typically include conceptual development, feasibility studies and total installed cost estimating of potential projects. As system plans take shape, turnkey firms can transition into detailed electrical and structural engineering of all electrical assets, including switchgear, transformers, telecom, power control centers, cable routing, plant distribution, utility interconnections and automation. If not completed with FEL activities, they may also perform system studies and modeling of load flow, relay coordination and other critical processes.

At startup, the baton is passed to the turnkey firm's testing and commissioning teams for relay testing,



function testing and commissioning. Later, technicians may be called upon to provide 24/7 emergency response, troubleshoot and repair existing systems, identify and address code noncompliance, and perform preventive maintenance. Field support can also include construction, maintenance, modifications to relay replacements and other existing systems, and turnaround support.

Delivering this comprehensive set of services requires an electrical services team composed of technical specialists in every facet of power distribution and control. It takes an experienced, integrated team of engineering, construction, commissioning and management professionals to provide the breadth of services necessary to support and maintain a reliable plant electrical system.

To the owner, the entire process is — or should be — largely seamless, with any issue that might arise requiring a phone call or text to a single source of responsibility, who coordinates the necessary response.

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EVALUATING INTEGRATED, TURNKEY ELECTRICAL SERVICE PROVIDERS

Many industrial plants, petrochemical manufacturers and refineries are already realizing the benefits of an integrated, turnkey approach to their electrical systems. As the capabilities of electrical service providers continue to expand, owners might reconsider the criteria by which they evaluate prospective partners. Among the essential questions to ask:

1. **Does the turnkey electrical services provider pursue projects of all sizes?**
   Some EPC firms prefer to work primarily on large-scale projects and programs. Rather than pigeonhole its suppliers by project type, industrial, refinery and petrochemical operators typically benefit from partnering with turnkey electrical services providers that are invested in the success of their electrical infrastructure and will address everything from troubleshooting an electrical system or changing out a small breaker to constructing a new 500-kV substation.
2. **Is the electrical services team integrated?**
   Some organizations may have many of the pieces and parts needed to provide turnkey electrical services support. But the staff may be decentralized and work independently, with minimal communication and coordination among engineers, construction crew, testing and commissioning, and other professionals. Operators are better served when they have a single source on an integrated team who can serve as their primary contact for any size or type of project. Firms that take an integrated approach, assigning project management roles to electrical engineers and involving engineers in construction meetings and construction managers in design meetings, are well-positioned for these assignments and well-equipped to meet schedule and budget parameters as they provide a safe, well-executed project.
3. **What is the electrical service provider's safety record?**
   Industrial environments pose constant safety risks. For peace of mind, top-tier safety performance, with Experience Modifier Rate (EMR) metrics in the top 1%, is the gold standard among industry-leading contractors that self-perform tens of millions of hours of construction each year.
4. **Can the electrical services provider deliver rapid response to emergency needs?**
   In industrial and petrochemical facilities, virtually every power disruption or failure requires an emergency response. Integrated, turnkey electrical services teams should aim to provide 24/7 support and be able to respond quickly, whether a relay needs testing or a motor starter requires a 2 a.m. repair.
5. **Is the provider's electrical service experience comprehensive?**
   A turnkey team should be expected to have wide-ranging electrical system capabilities and experience with deep bench strength in construction, relay testing, commissioning and maintenance, among other services. Partners should know how to keep a facility's electrical system reliable, resilient and available, while also minimizing costs. A big-picture view that keeps the entire facility and its upkeep at heart is key.
6. **Do the turnkey provider's capabilities and experience extend beyond electrical services?**
   Electrical systems are part of large industrial ecosystems. Multidisciplinary turnkey firms with experience in environmental, energy and other fields can bring a wealth of knowledge and experience that benefits both electrical systems and the larger plant environment.

7. **What ancillary services does the electrical services provider offer that can add value to a project?**
   Because projects are construction-driven, primary focus is rightfully placed on a potential partner's electrical construction and project management experience. But hidden value also often can be found in its engineering and other related capabilities. Front-end activities such as value engineering, for example, can unearth cost-saving alternatives that can only be capitalized upon when implemented early in a project. Likewise, 3D modeling performed during the proposal phase may identify tight spaces that could impact equipment placement. Experienced regulatory teams can inform decisions on everything from firewall to high-voltage design.
8. **Does the electrical services provider offer fabrication services?**
   When a turnkey provider has in-house fabrication capabilities, it need not coordinate between multiple suppliers, which otherwise could drive up costs and risk delays. An experienced in-house fabrication team can self-perform this work, with potential savings of both time and money. This can be an added advantage when downtime must be minimized.

CONCLUSION

Critical electrical systems demand power that is reliable, available and resilient. The same qualities should also be present in the electrical services teams responsible for planning, design, construction and long-term performance of those systems. By seeking partners with integrated electrical teams and broad cradle-to-grave power distribution and control services, petrochemical and industrial plant operators can optimize electrical systems' uptime and performance throughout their service life.

BIOGRAPHIES

TIM DARR, REF-CHEM, part of Burns & McDonnell, is manager of transmission and distribution. He has more than 35 years of experience, including a construction background with an emphasis on overhead and underground high-voltage work. He also has extensive supervisory experience in the construction of power plants, chemical plants and substations, working with equipment from numerous manufacturers.

MIKE ZAKAR, BURNS & McDONNELL, is an industrial electrical solutions department manager in the firm's Transmission & Distribution Group. In his more than 25 years in the industry, Zakar has worked with North America's largest utility, renewable energy and industrial companies on a range of complex power delivery projects. He is a licensed electrical engineer.

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