PROJECTS PORTFOLIO

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ESAC

ESAC Inc.

OUR APPROACH

Our projects form the basis of our reputation. As a leader in the industry, ESAC has come to earn a reputation for excellence based on open and ongoing communication with clients, quality craftsmanship in every component of our finished products, a no-nonsense approach to projects, and incredible value for our customers. What truly sets us apart is the ongoing support that our clients enjoy; remote assistance, software package updates, and valuable add-ons to developed applications keep our clients ahead of the curve.

Our work is innovative, but our approach is simple: we treat each of our clients' individual projects as our own.

OUR PROJECTS

Our expertise spans five main areas: Electrical & Process, Modular Controls, Power Systems, Software & Graphics, and Project Administration. We bring our skills in these areas to a wide variety of projects, including renewables, EPC (Engineering, Procurement, and Construction), and critical supply. This portfolio only provides an overview for a few of the many projects entrusted to us, and we are proud of our work on every single one. We invite you to explore the details of these projects to get a sense of how we do things around here, and how we can make your project a success too.

OUR PARTNERS/AFFILIATIONS

Critical Supply - Sault Area Hospital

Background

This system consists of dual 27.6kV utility supply, main 4.16kV distribution, and numerous unit substations with essential and non-essential circuits (requiring two 4.16kV emergency generators for full load capacity). Loss of either 27.6kV utility supply results in limited capacity relative to facility total loading. Utility supply status, each 4.16kV generator, and low voltage protection and metering are integrated for EPLU loads management to ensure building essential supply. Reliable system operation is necessary for patient care, and this system ensures just that.

Approach and Methodology

The EPLU with central PC is in the emergency generator switchgear room and is UPS supplied. Schneider power monitor software integrates EPLU, switchgear protections and metering. As well, distributed fiber communications are designed for central and switchgear interface panels that are UPS supplied. Building non-essential circuits are tripped for loss of dual 27.6kV utility supply or total normal power failure prior to transfer to emergency generator(s) supply to ensure no overloading. Pending current loading, single utility supply or emergency generators, non-essential loads are added or subtracted based on designated priorities.

Key Challenges

A key challenge we encountered was the application of non-essential load based on available source supply. Additional challenges included emergency generators synchronizing load application and EPLU to reliably not overload the available supply, ensuring critical loads.

Ongoing Support

ESAC offers ongoing technical support and service with operations staff assistance accessing loading and power quality reports.

Critical Supply – E.C. Drury School

Background

An original “non-functional” system existed and ESAC utilized existing field wiring to minimize costing. The facility has numerous unit substations with essential and non-essential loads. The emergency generator impacts essential loading and add or subtracts non-essential loads with automatic management, monitoring frequency with capacity. The project has resulted in a reliable system with strategic power supply prioritization to ensure residents' and staff safety.

Approach and Methodology

The EPLU is in the main power house and is supplied from a switchgear DC battery bank. This monitors emergency generator frequency, voltage, and loading, and interfaces with 4.16kV breakers transfer scheme with distribution circuits. Upon a loss of normal power, the existing transfer scheme starts the emergency generator, and is frequency and voltage supervised prior to loading. To ensure minimal impact loading, each 4.16kV feeder is closed, which in turn permits load pickup to subside prior to next feeder energization and all non-essential loads tripped off. Pending current emergency power loading, non-essential circuits are added or subtracted as per designated priorities.

Key Challenges

We encountered challenges in field research and checks, including main 4.16kV switchgear to defining existing system for EPLU design. The available field wiring was defined, and design interface rework was performed. Upgrading occurred while the facility was occupied and in-service, requiring scheduling to be done in a way to minimize interruptions. Additionally, ESAC ensured EPLU system reliability for transfer to emergency power with no overload conditions including under frequency and overcurrent trips.

Ongoing Support

Hardware failures have resulted in further upgrades (i.e. replacing IOC relays and analog/transducer metering to digital protection relays). ESAC assists facility staff with operational understanding, offers ongoing technical support and system service.

Critical Supply – Cadillac Fairview, RBC Centre

Background

A focal point of Toronto's landscape, this 1.2 million square-foot building meets LEED NC Gold Standards. ESAC worked as a subcontractor during the development of this building. The installed system consists of main 13.8kV distribution and unit substations with essential and non-essential circuits requiring three 13.8kV emergency generators for full load capacity. Each 13.8kV and low voltage breakers protection and metering are integrated for EPLU loads management to ensure building essential supply. The project resulted in reliable system operation which is critical for banking data centre integrity.

Approach and Methodology

The EPLU is located in the switchgear room, close to building central control. Schneider power monitor software integrates EPLU, switchgear protections and metering. Distributed fiber communications design for central and switchgear interface panels that are UPS supplied. Building non-essential circuits are tripped on loss of normal power prior to transfer to emergency generator(s) supply to ensure no overloading. Pending current emergency generator(s) loading, non-essential circuits are added or subtracted based on designated priorities.

Key Challenges

Encountered challenges included non-essential load application relative to number of 13.8kV generators synchronized as sequence is 1st unit immediately, then 2nd followed by 3rd units synchronizing. Loading was applied in a manner to not impact the staged generators synchronizing process that would fluctuate current bus voltage and frequency prolonging, if not failing, to have all 3 units connected in minimal time.

Ongoing Support

ESAC provides ongoing technical support and service with scheduled load testing programs. Additionally, ESAC assists operations staff in accessing loading and power quality reports.

Utilities – Hydro One Brampton

Background

This project is a large critical transformer station integrated protection, control and metering system developed by ESAC, completed in 2002. It was developed in tandem with a similar project for Vaughn Hydro [Now PowerStream completed in 2001]. The management of each location saw the monetary benefits of automation. With an ESAC system, management acquired the reliability and accuracy they needed in their new electrical distribution systems.

Approach and Methodology

With over 20 IEDs in the system, reliable communications are necessary. Powered with ESAC self-healing communications, each of the IEDs successfully communicates important information such as breaker position status, voltage, current, and protection status to the operator. Screens inform the operator of the current system state and allow control if authorized to do so. SER (Sequence of Events Reporting) and loading reports created by the ESAC as a key source of important operational information. The data from the reports is used to generate appropriate operational guidelines, maintenance schedules, and load growth assessments.

Key Challenges

In order to monitor their various locations closely, management requested a channel reaching each of the existing and future SCADA locations in Brampton. This channel would communicate audio, video and data signals to their central offices. Since the scalability and reliability of the system was of utmost importance, ESAC utilized a self-healing fiber-ring communication system to link all such locations around the city.

Ongoing Support

Considering maturing technologies (Software & Hardware) and changing owner's staff, ESAC has addressed system migration with additions and training. ESAC completes small projects and maintenance visits as requested with pre-assistance for technical details and budgeting.

Utilities – Toronto Hydro

Background

Since the early 1990s, ESAC has worked with organizations that would become part of the amalgamated Toronto Hydro. Being the largest energy consuming city in Canada, Toronto requires exceptional monitoring and control to ensure that energy needs are being met. ESAC was contracted to supply over 300 pole-top RTUs communicating on 900MHz radio, and design/implement a redundant central interface with central SCADA upgrade protocol driver technical support.

Approach and Methodology

Each pole-top RTU is linked via radio communications for interface to a central monitoring station. When originally developed, Etobicoke Hydro had expressed a need for high reliability, so the system was provided in a manner to yield a high degree of fault-tolerance. Failure of any unit will not cause loss of communication for any other in the field. This design also allows for easy expansion; necessary due to the increasing energy needs of the Metropolitan Toronto area.

Key Challenges

A pre-existing SCADA station was incorporated into ESAC's solution to keep the project as economical as possible. All the desired features were provided to the client while eliminating a substantial additional investment. Additionally, drawings, fabrication/testing and reporting process were standardized to ensure quality deliverables at the most economical cost.

Ongoing Support

Fortunately, over approximately 20 years there have been no unit failures resulting in replacement parts or service. Maturing product components have required revised solutions and technical support with migration options for engineering project with budget planning. ESAC continues to support changing staff training as well as radio traffic optimization due to increased radio traffic.

Utilities – Grimsby Power Inc.

Background
Kitchener-Wilmot Hydro (now Grimsby Power Inc.) required an existing system upgrade as well as new system projects for large transformer stations. ESAC worked with the client's engineering, P&C and SCADA departments in a combined effort to design and implement integrated protection, control and metering systems. Throughout the project, there was an emphasis to develop a current solution standard that addresses the upgrades of both existing and any new transformer stations in order to achieve management's monetary benefits of automation and system reliability.

Approach and Methodology
ESAC took existing central controlled RTU with integrated protection relays on self-healing LAN, HONI (Hydro One Networks Inc.) and IESO (Independent Electricity System Operator) remote SCADAs. The design included soft control of feeder breakers open/close, block/reclose and low set block with RTU "watch dog" logic for operation fail alarming. ESAC implemented the project with minimal field wiring, design drawings and RTU/relays software logic standard models. Throughout the project design, development and implementation, ESAC worked with client technical staff to ensure technology transfer. Standard products with a consistent solution allowed for focused training to achieve system P&C support and maintenance.

Key Challenges
An "over build" approach was taken in order to perform upgrades on in-service existing products to have minimal outage time. As well, transferring integrated solution expertise into design and implementation groups ensured the technical understanding to achieve a reliable system, capitalizing on applied technology.

Ongoing Support
ESAC provides engineering and P&C technical support as required, as well as budget development assistance for upcoming projects. ESAC is able to advise on products and solutions market direction for long term planning.

Renewables – Silvercreek Solar Park Inc.

Background

Located in the Township of Malahide, Silvercreek Solar Park is a 10 MW site. ESAC supplied integrated protection and control system to provide Operations real-time information with alarming, control operating functions, historian and performance-based reporting.

Approach and Methodology

The project comprised of a 115kV transformer station, 17km tap line, collection station and solar farm with the entire system SCADA integrated. The communications system is distributed as zones, each station interconnected on fiber with solar inverters as a self-healing fiber ring. Inter-station protection uses the same fiber communications to ensure the entire system is continuously covered. Station RTUs address supply authority interfacing and solar inverters PF/VAR management. SCADA remote smart-phone alarming and user interfacing provides 24/7 operation's coverage. Operators use the production performance historian trending and reporting to quickly identify issues in optimizing equipment operation.

Key Challenges

Utility main and backup supplies are requiring transfer trip schemes and dual protection relay settings groups. RTU algorithm integrated control of solar inverter PF/VAR management system is compensating for the 17km tap line. As a subcontractor to the general contractor, ESAC is working with the different project groups (i.e. Transformer station, tap line, collection station and solar farm) and the overall project engineer, ensuring designed solution requirements are addressed as per supply authorities.

Ongoing Support

ESAC is providing multi-year technical support and maintenance since project completion. Program will involve technical interfacing with supply authority including trip/event analysis, system tuning as a result of system performance SCADA historian reports and required maintenance testing.

Renewables – Veresen Grand Valley(s)

Background

ESAC worked on the Ferndale project which was somewhat ground breaking in HONI interfacing as standards were not defined as they are today. Later projects have been designed in accordance with HONI requirements at that time. Two projects with the same HONI feeder and transfer trip are cascaded applications sharing both transfer trip and SCADA interfaces. Unmanned wind farms have auto-reclose for system/grid faults re-energization and utilize WTG SCADA systems.

Approach and Methodology

With technical adherence to HONI requirements, cost conscious protection and control standards were standardized for improved quality assurance with operational staff consistency. The protection and control differentiate external HONI system/grid (auto-reclose energization) and internal faults (lockout). Main RTU integrates protection relays with hardwired points providing SER (Sequence of Events Recording), HONI and WTG SCADA interfaces. DSL VPN interfaces are used for both WTG users SCADA interfacing and protection technical support.

Key Challenges

Achieving an accurate project budget and schedule with an evolving HONI interface and system communications, involving multiple organizations required adequate foresight and risk analysis. A priority was to develop a standard design that supports flexibility for the finite changes encountered. Additionally, defining a WTG short circuit model contribution to ensure accurate protective device implementation and Arc Flash conditions.

Support

ESAC offers technical support to address protection trips, communications failures, HONI and IESO technical interfacing. Maintenance and upgrades are performed as required with assistance of planning technical details and budgeting. New projects' technical reviews are performed for standard designs with budgeting and submissions (i.e. Form-B, Philosophy, Pathloss study).

Renewables – Oxley Wind Project

Background

As an EPC (Engineering, Procurement & Construction) provider, ESAC designs and develops the RFP and manage electrical subcontractor. System studies are provided to ensure wireless transfer trip, system losses, protection and ESA requirements are met. Project management involves schedules with suppliers and subcontractors, quality assurance, site specific environmental with health and safety programs. The project spans from initial Form-B submission to design and budgeting for owner's business planning.

Approach and Methodology

Project design addresses connection authority standards for minimal cost of a reliable "unmanned" system. Civil easements exist for power and communications underground cabling adherence. Primary electrical equipment and installation details follow technical specifications. Shop fabricated protection and integration panels with E-House installation are fully tested prior to site shipping. Testing and commissioning procedures are extended from shop testing to include 3rd party primary equipment testing.

Key Challenges

The design is such that RFP details are rigid enough for required deliverables and aggressive project scheduling. WTG requirements of primary equipment and communications with impact of system short circuit. This project involves the coordination of civil, mechanical, WTG project groups, electrical scope as well as supplier and sub-contractor management.

Ongoing Support

ESAC will enter into a multi-year technical support and maintenance support plan upon project completion. The program will involve technical interfacing with supply authority including trip/event analysis, system performance and required maintenance testing.

EPC – Renfrew Power Generation

Background

As an EPC (Engineering, Procurement & Construction) provider, ESAC was responsible for the overall electrical as a design-build contractor, with electrical subcontractor design/develop RFP and management. Studies were provided to ensure a system with unit protection and ESA requirements. Project management involved scheduling with suppliers and subcontractors, quality assurance, and implementing site-specific Health, Safety, and Environmental programs. Proper management during construction ensured that Renfrew Power Generation will be contributing to Ontario's power production in a safe and efficient manner for years to come.

Approach and Methodology

Original plants 1 and 2 were upgraded (including the switchgear, exciters, integrated protection and control) in the early 1990s. TLGS integrated system products/solution were used for the upgrade of existing plants. Capitalizing on current technology for protection, synchronizing and unit controls, TLGS optimized production capabilities for available water, also ensuring connection authority grid compliance. SCADA remote smart-phone alarming and user interfacing provides continual operations' coverage. Production performance, as well as historian trending and reporting, quickly and continually identify issues in optimizing equipment operation.

Key Challenges

Orchestrating and ensuring design adherence to ESA and unit supplier requirements with electrical subcontractor RFP details for required deliverables and project scheduling. Existing plants, having much older units operating similarly to the new TLGS, were given cost effective upgrades for an overall integrated system. The turbine and unit supplier specifications and civil consultant geographic were used to define MW productions efficiency profile. Multiple subcontractors required a keen focus on project coordination scheduling.

Ongoing Support

ESAC has provided technical support and services since the existing plants' upgrade for over 20 years. ESAC will continue to provide support and maintenance for technical interfacing with supply authority including trip/event analysis, system performance and required maintenance testing.

EPC – Otter Rapids Generating Station

Background

This hydro-electric plant located on the Abitibi River, required an integrated protection and control system including generators condition monitoring. With the generating station in a remote location, reliable central integrated control (i.e. quick high-water conditions requiring spill way operations) is essential.

Approach and Methodology

As an EPC (Engineering, Procurement & Construction) project, which ESAC designed/developed the RFP and managed the electrical subcontractor. An older in-service generating station, the upgrades required an “over-build” design solution to minimize plant and unit downtime by deploying in zones. Existing were multiple areas/equipment distributed system with redundant master communications for system reliability and plant SCADA that is ported directly to central SCADA to ensure operations consistency. ESAC established design standards in evolving OPG staff and system documentation ensuring plant-to-plant common understanding and skills requirement. Generator modes, select-check-confirm control process, water to energy including losses reporting for efficient operations and management of large geographically placed generating stations.

Key Challenges

Encountered challenges include existing drawings, custom fitting of condition monitoring unit mechanical monitoring sensors and safely deploying an “over-build” solution. Additionally, generator systems tuning and interfaces for new digital control operating modes. Managing changeovers and level of detailed cross checking with transferring control on a per zone basis. With a constant focus on project longevity, long term planning for upgraded system scalability was considered.

Ongoing Support

Ongoing support has been provided for system changes such as new dam safety sluice gate operations and remote-controlled gates addition. Additional support includes hardware/software upgrades and system troubleshooting plant group P&C technical support.

EPC – Lower Notch Generating Station

Background

This hydroelectric plant located on Lake Timiskaming required a transfer trip system and power line carrier communications system coordinated with Hydro One. Existing was mature products difficult to service and maintain. A redundant new system ensures the ability to maintain while in-service and grid protection interface reliability.

Approach and Methodology

As an EPC (Engineering, Procurement & Construction) project, which ESAC designed/developed RFP and managed the electrical subcontractor. An older in-service generating station with upgrades that required an “over-build” design solution minimizing plant downtime. The solution had to be reasonably checked and tested prior to scheduling final changeover. Central operations were ensured reliability with redundant system distinct annunciation. The new system was bench tested including panel's functional operation prior to site installation.

Key Challenges

Encountered challengers include existing drawings, existing protection relays interface and safely deploying an “over-build” solution. The applied technology had a high level of complexity and additional effort was put forth for project implementation with numerous groups and detailed technical interfacing. Existing conditions found during project phases required “on the spot” assessment, design/implementation impact to maintain changeover schedule (i.e. a grid impacting project).

Ongoing Support

ESAC offers service and “refresher understanding” plant group P&C technical support as well as solution support for planned protection and SCADA upgrades.