

# **Chris Dedeurwaerder, P.Eng., P.E.**

## **EDUCATION**

1998 - University of Alberta, Edmonton, Electrical Engineering Co-op, B.Sc.

## **PROFESSIONAL AFFILIATIONS**

- Member of IEEE, ISA, APEGBC, APEGA, APEGS, APEGM and PEO
- Registered Professional Engineer in the States of Arizona, Colorado, Wyoming, Missouri, West Virginia, Pennsylvania, Ohio, Iowa, Minnesota, Texas, North Dakota, Nebraska, Nevada, Michigan, Kentucky, Louisiana, Illinois, Indiana, California, Utah, Arkansas, Alabama, Washington, New Mexico, Tennessee and Provinces of Alberta, British Columbia, Saskatchewan, Manitoba, New Brunswick and Ontario
- TUV certified Functional Safety Engineer, ID: 1582/09
- TUV certified Functional Safety Expert, ID: 152/10
- Technical Committee Chair for the 2016/2018/2020/2022/2024/2026 IEEE Electrical Safety, Technical and Maintenance Projects Workshop
- Authored and presented a technical presentation for the IEEE Electrical Safety, Technical and Mega-Projects workshop in 2005, 2014, 2022, 2024 and 2026
- Co-authored and published a technical paper for the IEEE Petroleum and Chemical Industry Conference in 2000

## **EXPERIENCE AND CAPABILITIES**

Extensive, first-hand experience with operations, maintenance, technical support, design, construction, and commissioning activities for petrochemical facilities, oil and gas facilities, power generation and pipelines in the electrical, instrumentation, controls and functional process safety disciplines as an Owner's Engineer.

**Significant experience with utility interconnections on behalf of the end user, including new load connections, modifications to existing connections, additions of gas fired generation and renewable (solar and wind) connections.**

My strong leadership skills include the ability to prioritize, plan, lead, organize and control teams in a cross-functional organization.

I have provided a strong commitment to behavioral based safety programs to ensure incident and injury free work conditions, while coordinating work and interfacing with many stakeholders in multiple locations and disciplines for a successful project completion.

**CAPTUS GENERATION**

138kV and 240kV Substation Design and Interconnection - Datacenter

**EMIRATES GLOBAL ALUMINUM - (ERM)**

Utility Interconnection Guidance  
Oklahoma PCO/SPP for Aluminum Smelter

**EDP RENEWABLES (ERM)**

IESO System Impact Assessment (SIA)  
Applications for BESS

**DEEP SKY CLIMATE (JUNO)**

240kV Substation FEED and Design

**VERMILION ENERGY**

Mica Station Electrification (Owner's Engineer)

**VARME ENERGY**

Waste to Energy Station (Owner's Engineer)

**IESO (JUNO)**

Indigenous Energy Support Program  
(Independent Evaluator)

**HYDROGEN CANADA CORPORATION**

Ammonia Facility Pre-FEED including a  
240kV Substation Pre-FEED

**XTO PIPELINE (CONNECT)**

James Ranch Compressor Station (New Mexico)

**AIR PRODUCTS (CONNECT)**

MV Distribution, Cogen and E-house  
Coordination for the Edmonton Net Zero  
Hydrogen Energy Complex (ENZHEC)

**TORCH ENERGY (ERM)**

160MW Solar and BESS Generation, with 345kV  
transmission line connection  
Independent Engineer Review (Arizona)

**CARBON UPCYCLING (CONNECT)**

Carbon Slag Processing Facility FEED for Ash  
Grove Cement Plant in Mississauga

**DUNMORE SOLAR INC. – (METSCO)**

216 MW Solar Power Station FEED (Owner's  
Engineer)

**EDF RENEWABLE ENERGY – (METSCO)**

247 MW Wind Power Cypress 1 & 2 (Owner's  
Engineer Authentication)

**EXHIBITION PLACE – (METSCO)**

TWX 13.8kV Substation Relocation

**SURF LAKES – (DJA)**

Surf Park Feasibility Study and Guidance

**CANADA-KUWAIT PETROCHEMICAL  
CORPORATION (CKPC)**

Petrochemical Facility FEED, including 40MW  
motor and VFD  
240kV Substation FEED

**PEMBINA PIPELINE CORP**

138kV Substation Expansion  
Legacy DCS Upgrade FEED and Implementation  
Heartland Ethane Facility FEED  
Sustainable Aviation Fuel FEED  
Low Carbon Complex Feasibility  
Redwater 138kV Substation Addition FEED  
Heartland 138kV Substation FEED  
Flare Gas Utilization Project FEED  
Redwater RFS3 De-Eth FEED  
Ammonia Facility Pre-FEED  
Kaybob Reciprocating Cogen Units  
5kV Switchgear/MCC Replacement  
Solar Generation FEED  
Duvernay Cogeneration FEED  
Brine Pond 6 FEED/Detailed Design  
Butane Splitter FEED  
RFS4 FEED/Detailed Design  
Siemens DCS Upgrade Detailed Design Empress  
Frac and Rail Expansion  
Younger Substation & Switchgear Upgrade  
Younger 15kV VFD and Motor Upgrade  
Prince Rupert Propane Export Terminal  
Empress Cogeneration Detailed Design  
Redwater Cogeneration Facility  
138KV Scoria Substation  
25kV Infrastructure  
RFSII/ RFS3 Fractionation Plant  
Multiple Cavern Storage Projects  
Brine Pond 5 Detailed Design

**UNOGAS KC8– (EQUINOX)**

Carbon Capture Facility in Alabama

**ARCHAEA RENEWABLES – (EQUINOX)**

Renewable Gas Facilities in Zion IL, Forest Lawn MI, Sycamore Ridge IN

**BTG MIDSTREAM – (JUNO)**

34 MW Reciprocating Engine/Generator Peaking Station FEED

**TERIC POWER – (JUNO)**

16MW Battery Energy Storage System for Irrican Hydro Facility

**OBSIDIAN ENERGY (GRD)**

MV MCC Upgrade

**MCGREGOR PARK HYDROGEN FACILITY – (CATCH)**

Hydrogen Facility in Ohio  
Area Classification Studies  
Electrical Design and Authentication

**VOLTAGRID CNG FACILITY – (CATCH)**

Compressed Natural Gas Facility in Arizona  
Area Classification Studies  
Electrical Design and Authentication

**COLAS RAIL – (BBA)**

Light Rail Transit Functional Safety Evaluation and SCADA system for Passenger Rail Cars

**NWT POWER CORPORATION – (JUNO)**

Taltson Hydro Generation Station – Electrical Equipment Evaluation

**SHELL RECHARGE SOLUTIONS (CATCH ENGINEERING)**

Electric Vehicle Charging Station Design (Ohio, Texas, Missouri)

**INEOS OLIGOMERS**

13.8kV Auto Transfer Upgrade

**PLAINS MIDSTREAM**

Merox Addition  
Josephburg Pump Station

**TREMCO PAINTS (MAC)**

Process Safety Guidance for Control System Upgrade (Texas)

**LEPRINO FOODS - (GRD)**

Coordination and Arc Flash Studies -New Mexico

**WESTERN MIDSTREAM - TEXAS & WYOMING – (GRD)**

Sabre Compressor Station Additions  
Avalon 1, Avalon 4 Central Gas Facility  
HiLight HIPPS System  
Block 2 Compressor Station Additions  
SWD Pump Skid Additions

**ANADARKO - COLORADO – (GRD)**

Design and calculations of medium voltage switchgear single line diagrams, control circuits, cable sizing, cable schedules, grounding and HAC for the following compressor stations:  
St Vrain, Dougan Phase IV, Tri Town Phase IV, Mead Phase III/IV, Powars, Dacono, COSF Product Cooling, Coal Ridge, Johnstown and Frederick Compressor Station

**LARICINA ENERGY LTD**

Salewski 10.7 SAGD FEED  
Germain SAGD Project  
Germain Communications Tower  
Electrical Specifications

**TECK RESOURCES - BC – (GRD)**

Line Creek MCC and Ehouse Upgrade FEED  
Green Hills MV VFD Upgrade FEED

**ACCESS PIPELINE**

Jackfish 1 Expansion  
MEG LACT Expansion  
Viscosity Control Optimization  
Expansion Power System Analysis  
LLB VFD Upgrade  
Jackfish 2 Commissioning  
MEG2B LACT Expansion  
SL/LLB Pumpstations, including 138kV substations  
Jackfish 3 and Pipeline Expansion

## **BRUCE NUCLEAR POWER**

Generator AVR Upgrade  
Excitation System Upgrade

## **NUTRIEN AMMONIA FACILITIES**

SIL Verification Studies  
SRS Documents and SIL Design

## **NOVA CHEMICALS**

Joffe 2000 Utilities and Infrastructure  
Expansion including Cogeneration  
138kV Substation and Transmission  
E1 Cooling Tower Medium Voltage Relay  
Upgrade  
PE1 15 kV Substation Expansion  
PE1 Catalyst Metering Upgrade  
MI Main Substation Relay Upgrade  
Protective Relay Application Guidelines  
Critical Motor Ride Through Capability Study  
ETAP Reference Model

## **NOVA CHEMICALS - PIPELINE**

Joffe and Didsbury Pump Station Smoke, F&G  
Detector Upgrade  
BV-8 and BV-2500 PLC Upgrade  
BV Sites UPS & Rotophase Upgrade  
Didsbury Pump Station Upgrade  
Brightview PS MOV & MCC Upgrade  
Joffe Site Flow Computer Upgrade

## **EQUITRANS (W. VIRGINIA) – (EQUINOX)**

Skin Creek Pump Station

## **PETRO-CANADA**

Hanlan Robb Gas Plant 5 kV Coordination and  
Arc Flash Study

## **RED DEER HOSPITAL**

25 kV Switchgear Upgrade

## **ATCO ELECTRIC**

25 kV Overhead Distribution Upgrade

## **SHAW CONFERENCE CENTRE**

15 kV Switchgear Upgrade

## **CANEXUS, ENCANA, SUNCOR, HUSKY, NOVA CHEMICALS, SPECTRA ENERGY**

Functional Process Safety Lifecycle Guidance

## **CELANESE**

Refrigeration system electrical and PLC control  
system design

## **RESPONSIBILITIES**

- Owner's Engineer
- Lead Electrical Engineer for Projects in charge of technical design, execution, construction support and commissioning
- Interface management with operations, maintenance, IT, SCADA, facility, external engineering, automation integrators, senior management and others as required;
- Technical support to operations and maintenance
- FEED (Front End Engineering and Design)
- Project management and controls (capital and maintenance projects)
- Functional Safety Advisor
- Stewardship of MOC (Management of Change) for brownfield and greenfield facilities;
- Specifications
- Conceptual Studies
- Scoping Studies
- Schedules / Cost Estimates
- Detailed Design Review & Guidance
- Construction & Commissioning Support
- Project Management

## **EXPERTISE**

### **UTILITY INTERCONNECTIONS**

#### **AESO & AUC REGULATORY PROCESS**

#### **BC HYDRO REGULATORY PROCESS**

#### **ISO REGULATORY PROCESS**

#### **PSO/SPP REGULATORY PROCESS**

- Completed transmission interconnection applications for the following:

- New load connections
- Additions to existing loads
- Applications for gas fired generation, solar and wind

- Familiar with BCHydro, Altalink, Atco and Hydro One utility processes

- Operating Agreements/Supply Contracts/PPA's/vPPA's

- Technical review of electrical grid studies to understand capacity and upgrade needs including feasibility, system impact and facilities studies.

- A deep understanding of the Independent System Operator (ISO) regulatory process, including:

- Stage 0 through 6;
- Schedule Constraints;
- System Constraints;
- Documentation for each stage;
- Tariff rules;

- Reliability and Compliance Requirements

- WECC/NERC/CIP /

Requirements;

- BC Hydro/AESO Independent Engineer Review and Sign-off

### **LEGAL – TECHNICAL EXPERT**

#### **CATCH ENGINEERING**

Insurance technical expert wrt functional process safety

### **KGC CONSULTING**

Houle vs. BC Hydro Arbitration

### **ALBERTA UTILITIES COMMISSION**

Technical Expert – Confidential Project

### **MCLEAN & ARMSTRONG**

Technical Expert – Confidential Project

### **ELECTRICAL APPARATUS**

- HV 240kV, 138kV and 69kV

Switchgear/Substations, including switches, breakers, CT's/PT's, metering, grounding and protection/control;

- MV Switchgear up to 25 kV

including GIS indoor Switchgear, MCCs, Fused disconnects, vacuum contactors, vacuum circuit breakers, and air magnetic breakers;

- LV switchgear including switchgear, MCCs, power circuit breakers, and PDCs (Power Distribution Centers);

- VFD's up to 15kV;

- Load interrupter switches, power fuses, segregated phase and isolated phase bus duct;

- Transformers up to 240 MVA, 240kV, including 138kV, 69kV, 25kV;

### **ROTATING MACHINES**

- Induction motors up to 50,000 HP, 11 kV

- Synchronous motors up to 24,000 HP, 13.8 kV

### **FUNCTIONAL PROCESS SAFETY**

- Functional Safety lifecycle guidance and leadership

- SIL Determination and Verification studies

- HAZOP, HAZID, SILD, SILV, LOPA procedures and standards;

- Project Management and technical expertise for various clients;

- SIS implementation in facilities;

- Course instruction for SIS systems;

### **EMERGENCY AND UPS POWER SYSTEMS**

- Inverters, battery chargers, static transfer switches;

- Emergency diesel generators up to 2.5 MW;

### **BATTERY ENERGY STORAGE SYSTEMS**

- Tesla Mega-Packs

## **DC SYSTEMS**

- DC distribution systems- Switchgear DC battery bank sizing;

## **GENERATION**

- GE LM6000 45MW Aeroderivative GTG, including;
- FEED, detailed engineering, construction support, commissioning and startup
- Responsible for electrical and controls design, including substation interconnection, GTG, Balance of Plant;
- FEED on multiple Aero-derivative machines;
- Siemens SGen Industrial Generators FEED
- Joffre Cogen, including 501F gas turbine with HRSG
- Extensive experience with AESO for cogeneration applications
- Generator and protection relay upgrade at hydro stations
- Hydro station electrical equipment upgrade evaluation
- Excitation system evaluations, engineering, trouble-shooting and upgrades
- Major generator maintenance including re-wedging of rotor and stator at a thermal generation station
- Upgrade of slip ring excitation system

## **OVERHEAD DISTRIBUTION**

- 3 phase 240kV, 138kV overhead transmission design;
- Three phase and single phase 25kV 14.4/8kV overhead distribution design;
- Fiber and OPGW systems with transmission lines;
- System planning including system reviews, evaluations and future loading;
- Construction design standards;
- Fusing coordination and protection;
- Rural subdivision design including both overhead and underground cabling;
- Overhead to underground power line road crossing design.

## **ELECTRICAL PROTECTION**

- Protection and Control schemes for all electrical apparatus;
- Lightning (surge) protection including insulation coordination;
- Schweitzer, Multilin, Basler, and Areva protection relay applications including settings files, IRIG-B, Ethernet, RS-485, and RS-232 communications.
- Restricted earth fault, differential (transformer, bus and generator)
- Automatic Voltage Regulators
- Generator Excitation system

## **POWER MANAGEMENT SYSTEMS**

- PMS for industrial generation and load sites;
- GE MultiLin and SEL systems;
- architecture and I/O list development, design, testing and commissioning;

## **INSTRUMENTATION AND CONTROL**

- Control narratives;
- Shutdown keys;
- Pipeline Pump Control;
- PLC's (Allen-Bradley & Modicon);
- DCS (Honeywell, DeltaV, Siemens);
- Closed loop PID control;
- Fire, gas vibration, density, pressure, temperature, level and flow instrumentation;
- Modbus, ControlNet, Profibus and Ethernet communications;
- Control valves and MOV's;
- Fire detections and protection systems;
- Catalyst metering;
- Control systems electrical design, and P&ID development;
- Pump and Compressor Control;
- SCADA Telecommunications;
- RTU's;
- Leak Detection Systems;

## **MEASUREMENT**

- Custody transfer flow computers;
- Omni, Accuload and ROC;
- Flow meters;
- Truck/Rail Loading/Unloading;
- Measurement Canada requirements;

## **ELECTRIC HEAT TRACE**

- EHT Distribution Skids
- SR and MI trace design
- Tank EHT design

## **MISCELLANEOUS**

- Front End Engineering Design
- Technical specifications;
- Performance specifications;
- Cost estimates;
- Schedules;
- Tender documents;
- Bid evaluations;
- Contract strategies and execution;
- CWPs (Constructions Work Packages);
- FAT, construction procedures;
- CSA/API hazardous area classifications

## **PROJECT MANAGEMENT**

- Leadership of design and owners' team including:
- Scope definition;
- Schedule creation for design, construction and commissioning;
- Cost control;
- Management of multiple simultaneous projects;
- A proven ability to plan, lead, prioritize, organize and manage work and teams in a cross-functional organization;
- Experience leading teams, coordinating work and interfacing with many stakeholders in multiple locations and disciplines
- Risk reviews of schedules and cost estimates, critical path determination



## **COMMISSIONING**

### **- Commissioning Management including:**

- Detailed execution plans;
- Integrated schedules;
- Consolidated budgets;
- OEM FAT's
- E-house FAT's;
- Procedures;
- Vendor scopes and coordination;
- RASCI charts;
- Integration of various disparate groups for successful completion;
- Daily update meetings;
- Reporting;
- RFI's;

### **- Electrical Equipment including:**

- 138kV substation equipment such as breakers, disconnects, transformers, relays, measurement, control;
- 25kV GIS switchgear
- 5kV and 600V switchgear
- up to 15kV VFD's such as Siemens, Toshiba and Yaskawa;
- All voltages of transformers and cabling;
- Motors up to 50,000 horsepower;
- Electrical Protection relays;
- UPS and batteries;

### **- Controls including:**

- DCS including DeltaV, ABB, Honeywell and Siemens;
- PLC's including Modicon and Rockwell;
- Shutdown Key testing;
- Control narrative testing;
- Alarm and trip setpoints testing;
- Communications systems;

### **- Communications Systems including:**

- RS-485/232
- Modbus TCP/IP;
- Ethernet IP;
- ProfiNet;
- ControlNet and DeviceNet;
- Radio Communications Systems;
- SCADA and Leak Detection Systems
- RTU's, SCADAPack;

### **- Mechanical Equipment including:**

- Piping;
- Pumps, including centrifugal and reciprocating;
- Compressors, including reciprocating and screw compressors;
- Turbines including gas and steam;
- Auxiliary systems including lubrication, vibration and temperature monitoring;
- Control strategies for pumps, compressors and turbines;
- Industrial Heaters, Boilers and fuel gas trains including B149 certification;

### **- Instrumentation including:**

- Pressure, temperature, flow transmitters;
- Densitometers and viscometers;
- Level transmitters
- gas and oxygen detection;
- Flow computers;
- Mercaptan injection;
- Rail loading and unloading;
- Truck loading and unloading;
- Rail management systems;

### **- Power Generation including:**

- Aero-derivative gas turbine generators;
- Stability, AESO and WECC testing;
- generator response testing;
- excitation systems;
- control system integration;

### **- Safety Instrumented Systems (SIS)**

including:

- 61511 compliant configuration, testing, field verifications and documentation