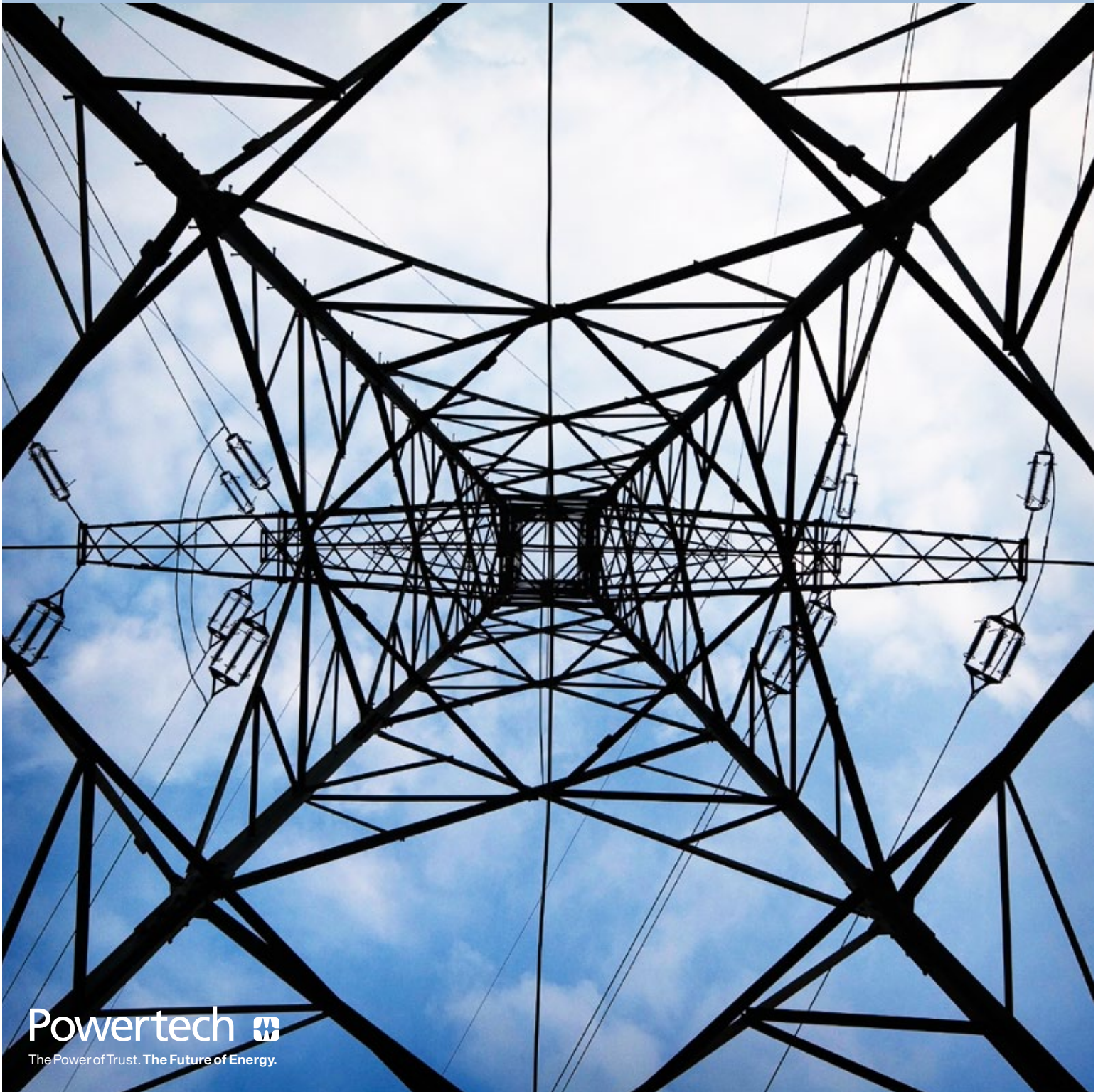


Powertech provides power system studies, software development, and other consulting services with advanced technology and tools to improve the system performance, security, and reliability of power generation, transmission to distribution.

# smart **UTILITIES**

**Providing industry with trusted solutions:  
Software, Studies, and Testing**



**Powertech's portfolio of Smart Utility consulting services, software applications, and testing services brings added intelligence to power generation, transmission, and distribution grid management that enables you to improve power grid performance, security, and reliability.**

**As Smart Utilities experts, we have the technical capabilities to provide you with independent testing and power systems analysis to support the power grid of today and the Smart Grid of tomorrow.**

## SYSTEM STUDIES

Powertech specializes in the assessment of system performance, computing system stability or transfer limits, design remedial measures and control setting studies for various types of generating machines. Using advanced methods, Powertech can help optimize your system or plant performance, and provide comprehensive solutions to technical challenges encountered in electric power system planning, design and operation.

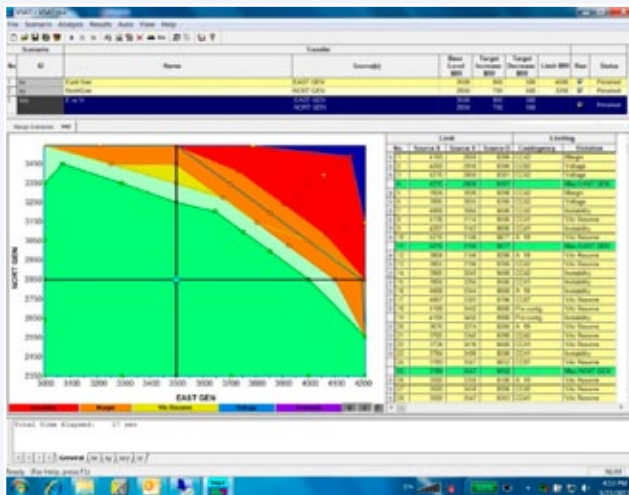
Within the System Studies Group, we provide power system study consulting services, generator testing and control tuning, simulation model development, as well as a full range of technical training on power system analysis.

### Comprehensive Study Capabilities:

- ↳ Comprehensive stability assessment for transient, small-signal, voltage and frequency stability
- ↳ Evaluation of transfer capability and security limits
- ↳ Post-mortem analysis of system disturbances
- ↳ Frequency control assessment
- ↳ Development and assessment of system design alternatives
- ↳ IPP integration impact studies
- ↳ System control analysis
- ↳ Load characteristic measurement and model development
- ↳ Electromagnetic transients studies
- ↳ Generator parameter measurement and model development
- ↳ Power system simulation model development

### Integration of Renewables

The integration of wind energy and other renewable resources into the grid requires a significant amount of analysis to ensure reliable operations. Powertech has extensive experience in advanced power system analysis and field testing on conventional and renewable resources.



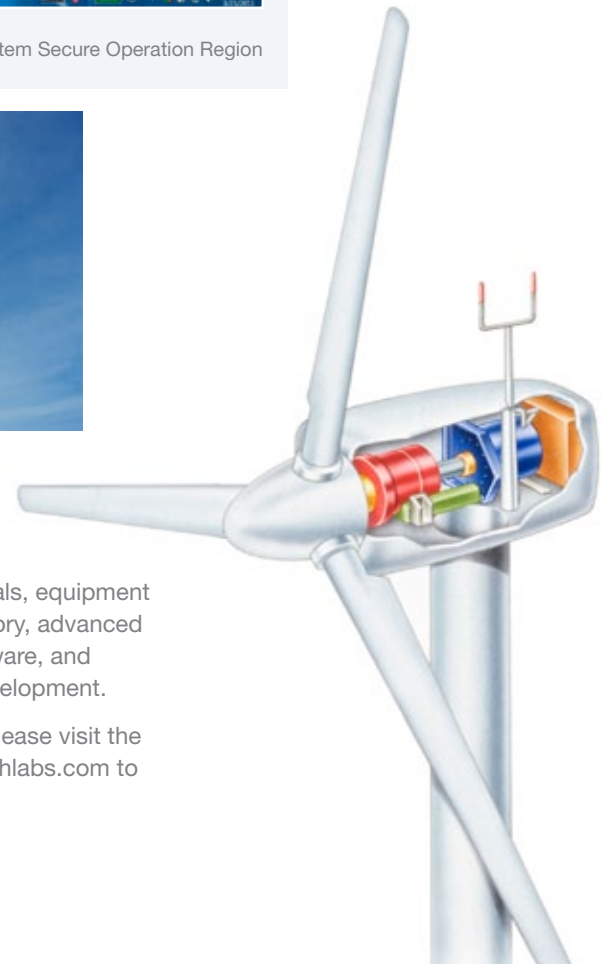
System Secure Operation Region



### Power System Analysis Training:

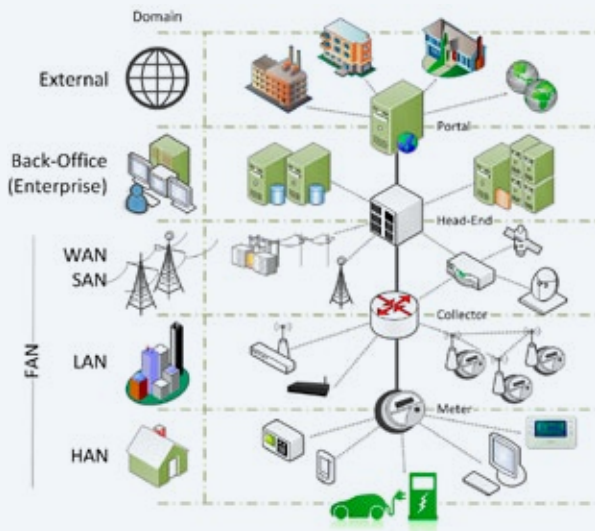
We provide power system analysis training on power system fundamentals, equipment modeling, power system stability theory, advanced methods of analysis, DSATools™ software, and generator field testing and model development.

To attend our next training session, please visit the Powertech website at [www.powertechlabs.com](http://www.powertechlabs.com) to register today.



# SMART UTILITIES LAB

## Smart Grid High Level Overview.



Adapted from: Gunter, E.W., Snyder, A., Gilchrist, G., & Highfill, D.R. (2009). Smart Grid Standards Assessment and Recommendations for Adoption and Development. EnerNex Corporation. (p.10).

Powertech offers an integrated test lab facility to simulate the current and future utility environment. The Smart Utility Lab test environment promotes capability development in control and automation, advanced telecom, management systems, advanced power systems components, and smart grid interoperability.

The Smart Utility Lab provides an environment to support the development of standards, operating orders, and familiarity training for field personnel prior to deploying new devices in the field. Additionally, it acts as a centralized location for performance testing of vendor devices and systems in a simulated utility environment reducing the risks associated to on-line operations.

## Smart Sensing for a Smart Grid

Central to the grid of future is the ability to sense the condition of the grid, and its components at appropriate points in real-time. Powertech leads the industry in the development of sensors and instruments capable of assessing and interpreting the on-line health of key primary equipment in substations. Our oil and gas (SF6) sensors and instruments are capable of providing accurate, real-time assessments of these critical components. By coupling these sensors and instruments to other on-line conditions such as load, network configuration, such as our DSATools™ software, operators of the grid of the future will be able to take proactive and ultimately automated actions to ensure a reliable grid. The Powertech smart utilities laboratory will incorporate these trials, and other similar real-time asset health and management systems.

# SOFTWARE TECHNOLOGIES

Powertech offers power system assessment software for on-line (connected to EMS system) and off-line (system planning and operation planning) applications. Using our world renowned DSATools™ software suite, we provide software capabilities to support powerflow and short circuit analysis, voltage security assessment, transient security assessment, and small signal stability analysis, as well as on-line dynamic security assessment (on-line DSA).



On-line DSA system training

## TSAT – Transient Security Assessment

- ↳ Identifies transient security limits, critical contingencies, critical generators, and transient voltage/frequency/damping violations

## SSAT – Small Signal Analysis Tool

- ↳ Provides small signal stability analysis of large systems, identifies critical oscillations modes, participation factors, etc. Helps tuning power system controllers.

## On-line DSA – On line application of DSATools™

- ↳ Connected to the EMS system, continuously performs dynamic security assessments using real-time system snapshots. Calculate near real-time stability limits
- ↳ Monitoring and assessment of systems with high renewable penetration
- ↳ Over 30 on-line DSA installations worldwide

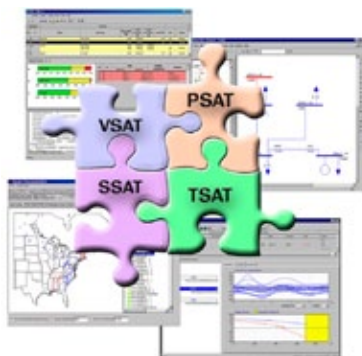
## Dynamic Security Software (DSATools™) Capabilities:

### PSAT – Powerflow & Short Circuit Analysis

- ↳ Advanced powerflow solvers, single line diagram, and contour

### VSAT – Voltage Security Assessment

- ↳ P-V, Q-V, modal analysis, determines voltage security limits, secure region, and limiting factors



**DSATools™**  
Dynamic Security Assessment Software

# smart UTILITIES

Providing industry with trusted solutions: Software, Studies, and Testing

## ELECTRIC VEHICLE INFRASTRUCTURE

Powertech's Smart Utilities Lab is designed to support efforts to establish a sustainable transportation sector, while at the same time, ensuring that each project creates value for station hosts.

Smart EV infrastructure is a critical part of future grid operations and utility technology implementation. Powertech's services are aligned with supporting the commercial interests of technology developers, vendors and utilities.

To support EV infrastructure deployment, Powertech provides project management and design services. Our turnkey approach provides an easy way to deploy, personalize, and future-proof infrastructure solutions to support the growing demand for clean energy solutions.

### Turnkey EV Infrastructure Deployment Services:

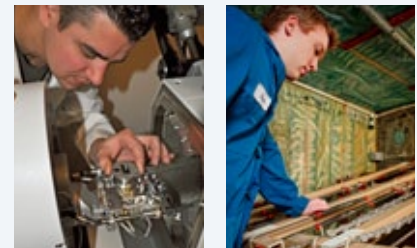
- ↳ Turnkey project service bundles
- ↳ Station site planning
- ↳ Project requirement specifications
- ↳ Charger hardware and operability selection
- ↳ Future-proofing infrastructure investments
- ↳ Overall project design and planning
- ↳ Project and construction management
- ↳ System integration and data management
- ↳ Maintenance, service and support



**Top.** Edible Canada EVSE Installation, BC, Canada

**Above.** City of Surrey EVSE Installation, BC, Canada

### The Powertech Advantage:



Powertech specializes in clean energy consulting, independent testing and power system solutions. Since our inception in 1979, we have served electrical utilities, oil and gas companies, and automotive and electrical equipment manufacturers to meet the complex and changing needs of our customers.

Our professional engineers provide advisory and testing services to global power utilities, large industrial operations, electrical equipment manufacturers, and automotive OEMs. In addition to these services, we offer industry proven expertise in software for power system security assessment, system studies for power grid and clean energy applications.

Innovation and quality are paramount in delivering these services.

