

ELECTRICAL CONSULTANTS, INC.



Engineering and EPC Construction Services with Distinction



ECI Company Overview

Electrical Consultants Inc. (ECI) was incorporated in 1985. Our in-house portfolio of services, including overhead and underground transmission engineering, substation and switchyard design, industrial power systems design, land survey and construction staking, right-of-way services, environmental planning, project management, construction management, and procurement services have provided a key resource for hundreds of utilities. ECI ranks among the largest power delivery engineering firms in North America. We bring extensive experience in power delivery services through 500 kV to our clients.



ECI's history of unique achievements has demonstrated we are an optimal partner for electrical power delivery engineering and project support services. The firm's corporate culture emphasizes innovation and drive for cost savings in our engineering solutions. Our motto of "**Engineering with Distinction**" is a living practice. Our extensive background and experience in the utility industry, applied by our principals through our execution team levels of the firm, provide innovative solutions unmatched by our competitors.



Our cross-disciplined engineering approach has resulted in millions of dollars of savings for our clients. Our employee-owned structure ensures the personal ownership and commitment that are the foundation of all successful projects.

ECI's services are provided by offices regionally located throughout the United States; contact information is located on the back of this portfolio.

www.electricalconsultantsinc.com



EPC Services Company Overview

EPCS was established in 2000 as a wholly-owned subsidiary of ECI. Since that time, EPCS has become one of the largest vertically integrated EPC companies in the U.S., providing full EPC execution, electrical testing and maintenance services for utilities and the energy industry.

***EPCS Electrical Testing Services** is staffed by engineers and technicians having the knowledge and experience with electrical apparatus needed to ensure expected levels of quality assurance. We utilize state of the art test equipment to ensure accurate and repeatable operation. All testing and maintenance functions adhere to NETA, IEC, ANSI, IEEE and NEMA standards to ensure optimum system availability, safety and reliability.*

Complete Engineering, Procurement and Construction Services including:



Construction Management - EPC Services Company integrates senior engineers and project managers to provide construction coordination and quality assurance for individual projects or on a program basis.



Procurement - With extensive experience in large electrical infrastructure projects and a network of strategic alliances, EPC Services Company can meet Owner's preference for all-inclusive procurement or "EC" contracts including Owner furnished material.

Testing - As a Doble Client with a highly skilled staff of engineers and technicians, EPC Services Company offers a complete array of testing services for power delivery facilities.

Maintenance - The highly experienced testing and engineering staff of EPC Services Company can provide ongoing maintenance, inspection and testing for all types of electrical equipment.



Safety Management - With a full complement of trained safety professionals, EPCS implements an aggressive safety program to ensure the health and wellbeing of employees, subcontractors and site visitors.



- National Alliance Relationships
- Prime Electrical Responsibility & Construction Management
- Wind Energy & Power Delivery
- Electrical Commissioning & Testing
- Apparatus Testing/Doble® Testing
- Preventative & Corrective Maintenance

ELECTRICAL CONSULTANTS, INC.



Founded in 1985, Electrical Consultants, Inc. is one of the nation's leading engineering consulting firms, specializing in power delivery and telecommunications. Headquartered in Billings, MT, ECI offers a wide range of utility/industrial power system designs from 600 volt through 500 kV, as well as communication system designs. ECI employs hundreds of experienced engineers, designers, project managers, technicians, field personnel and support staff with offices located from coast to coast.

ECI ranks among the largest of U.S. firms specializing in substations, transmission and distribution engineering services. Our team has designed hundreds of substations and thousands of miles of overhead and underground transmission lines for a variety of clients. ECI's Electrical Planning, Land Services, Survey and Environmental groups are an integral part of ECI's whole-team approach in providing a seamless transition to the planning, design, permitting and construction phases of our engineering projects.

PROFESSIONAL DESIGN ENGINEERING SERVICES

POWER DELIVERY STATION ENGINEERING

- Generation & Transmission Switchyards & Tie Substations
- Transmission & Distribution Substations
- Gas Insulated & Line Comp & SVC Stations

TRANSMISSION & DISTRIBUTION ENGINEERING

- Overhead & Underground Line Design
- Wood, Steel, Concrete & Hybrid Pole Design
- Lattice Tower Analysis & Application

SYSTEM ANALYSIS and STUDIES

- Feasibility & Economic Studies
- Construction & Long Range Studies
- Transmission Load Flow/Stability/EMTP/Special Studies

POWER SYSTEM PROTECTION

- Modeling
- Fault & Coordination Studies
- Protective Relay Specifications & Settings
- High Impedance Ground Fault Protection
- Remedial Action Schemes
- Custom Protection Schemes
- Fault Analysis
- NERC PRC Calculations & Support

GENERATION DEVELOPMENT & INDUSTRIAL FACILITIES

- Owner Engineer Services for Plant Development
- Gas & Steam Turbine Specifications
- Plant Construction QA Services
- Automation Engineering & Information Management
- Industrial Substations, Switchgear & Motors
- Self Generation & Distributed Generation
- Power Monitoring & Control Systems
- Arc Flash Hazard Analysis & Remediation

COMMUNICATIONS & AUTOMATION

- Teleprotection & Telemetry
- SCADA Specification, Design & Integration
- Telecommunications Site Development
- Substation Relay Networking
- IEC 61850 GOOSE Designs
- Integration & Control Scheme Validation
- Load Tap Changer Controls
- Transformer Monitoring
- System Restoration Schemes

ENVIRONMENTAL SERVICES

- Siting and Permitting
- Environmental Studies, Mitigation & Compliance
- Public Process Services
- Mapping & GIS System Development

LAND & SURVEY SERVICES

- Initial Ownership Research & Due Diligence
- Right-of-Way Feasibility Studies
- Permitting & Acquisition
- Corridor Acquisition Support
- Lattice Tower Layout & Transmission Line Staking
- Aerial, LiDAR & 3D Scanning

RENEWABLE ENERGY (Wind, Solar, BESS)

- Project Development
- Feasibility Studies, System Impact & Studies
- Collection System Design
- Wind Turbine Grounding
- Utility Scale Battery Storage

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Battery Energy Storage Systems



For over 10 years, ECI has designed over 1,350 MW worth of Battery Energy Storage Systems (BESS). Our work experience in the field includes nearly every conceivable scenario, such as complete system design, to substation interconnection, all the way to the battery itself. Our battery installation experience includes installation of racks and batteries in containers and buildings.

BESS projects require close coordination with the battery supplier to coordinate their often proprietary and unique battery management system, energy management system, power conversion system (inverter) and communications / SCADA requirements.

ECI has coordinated our designs with the industry's top battery and inverter suppliers including Samsung, Tesla, BYD, XtremePower, CATL, Sumitomo, Powin Energy, Power Electronics, Enerport, General Electric, Mitsubishi and Panasonic.

ECI's experience in other technical areas often associated with BESS projects includes power system studies, system protection, arc flash studies, CAISO's New Resource Integration (NRI) process and microgrids.



BESS Interconnect Applications

BESS System Integration

BESS Layout Design (General Arrangement)

SCADA / Control / Communication Design

Protection & Control Design (Schematics and Wiring)

Medium and Low Voltage Design (AC and DC Components)

Grading, Steel and Foundation Design

Grounding and Surge Protection Design

Communications/SCADA System Engineering



ECI's experienced staff can provide guidance and direction for the development of new SCADA systems, as well as mitigation of existing systems to new platforms. ECI provides a complete solution for SCADA integration from indication, control and network diagrams through protocol conversion and custom automation logic. ECI works with all parties involved with SCADA and communications related planning, infrastructure, devices, protocols, ISO requirements, networking and overall integration. Based upon ECI's varied experience with SCADA systems and vendors, an optimum system can be developed to meet a utility's performance specifications and cost containment objectives.

ECI has a wide background in all common types of communication system applications such as tone, power line carrier, microwave, satellite, radio and fiber optics utilizing technologies such as Automatic Meter Reading (AMR), Trouble Call Analysis (TCA) and Distribution Automation (DA). ECI's staff can provide the design of communication sites such as regeneration, cellular, microwave or satellite. Our firm has completed numerous regeneration and amplifier site development projects nationwide. ECI's experience in outside plant design includes a variety of underground cable projects as well as ADSS and OPGW overhead systems. ECI has installed fiber optic cable systems for various private telecommunication firms with responsibilities ranging from routing to construction management.



SCADA & Communications Systems

Routing Assessment

Central Office Systems/Electronics

Wireless Communications

Overhead & Underground Outside Plant, Wire & Fiber Optics

Construction Management Services



ECI/EPCS provides complete Construction Management services for the power delivery industry. Our experienced staff is available for on-site management of QA/QC and surveillance of all transmission and substation construction projects. ECI/EPCS can provide a complete construction management team for a project or individual personnel for staffing arrangements.

Material Management

In combination with the development of specifications for transmission and substation material and equipment, ECI/EPCS can perform a complete range of procurement services. We can serve as owners' agent in soliciting and evaluating bids. We also perform supplier monitoring and expediting, including factory inspections, quality control reviews and test witnessing.



*Construction Material Management
Documentation Material Management
Material Procurement
Safety Management*

Safety Management

ECI/EPCS's safety staff are knowledgeable in Contractual Safety Requirements, ECI Company Health, Safety and Environmental Safety Policies, OSHA Regulations, ANSI, NIOSH Regulations, NFPA Codes, EPA Regulations, Federal, State and Local Laws. A safety professional will conduct "Site-Specific Safety Orientation" with all hands to qualify them for work on the job site. An ECI safety professional has full authority to Stop Work if imminent danger exists and discuss corrective action with all workers via a tailboard meeting. Our ultimate goal is zero incident for every project.



ECI's distribution line design philosophy is based upon experience spanning three decades in the industry utilizing Rural Utility Service standards for technical line design and utility design standards & requirements based on current National Electric Safety Codes (NESC) as well as applicable local codes. As a customer oriented company, ECI can tailor its design to conform to any client's specific utility construction standards using preferred utility standard material items.

ECI is capable of handling large or small overhead distribution line design projects in rural environments as well as underground distribution cable installations in urban settings. ECI's internal quality control methods and procedures provide our clients the highest level of efficiency in the performance of engineering services.

ECI's distribution design team project approach emphasizes innovation and cost savings that make ECI an ideal partner for any distribution design project.

Distribution Design (OH, UG, reinforcement, protection devices)

Line Routing ROW Studies (design, survey, staking, permitting)

Mapping, Drafting, Inspection & Inventory

PLS-CADD™ Line Design (pole strength & structure analysis)

Vault, Bus Room Design

Re-Conductoring Design (OH, UG)

Smart Grid Design & Communications Interface

Cable Replacement Design & Failure Analysis

Wire Replacement Design (size, sag, tension, ampacity)

Relay & Protection (study, design, testing, commissioning)

Network Systems (design, maintenance, duct bank, manhole, inspection)

Conversion Design (voltage, 4 kV to 13 kV & OH to UG construction)

Circuit Reliability Improvement (system, estimating, design, outage review)

Storm Damage Field Investigation & Design

Studies & Calculations



At ECI, our strategic whole-team approach to environmental planning and compliance provides our clients with the unique opportunity to integrate all environmental planning with engineering, land & survey components of a project.

All ECI projects are managed with the goal of exceeding our client's expectations. Our team seeks to provide a seamless transition from the environmental planning to the design phase of a project and on to permitting, right-of-way acquisition and construction. This approach provides our clients with the highest degree of efficiency and value possible. ECI's experienced environmental planning staff provides a comprehensive scope of environmental services including siting and feasibility studies, all facets of facility permitting, environmental compliance and monitoring.



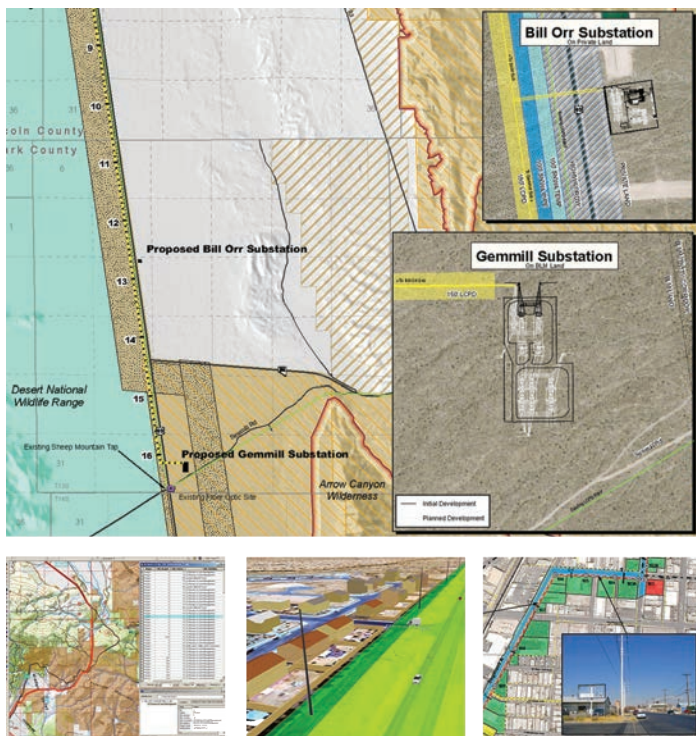
Our Environmental Services Group also understands the intricacies of providing environmental services for a project with sensitive or controversial issues. ECI's Environmental Services Group coordinates with our Lands Group and engineering design staff to provide the utmost of design compatibility to address any issues of public concern.

Planning

*Line Routing & Siting Studies
Federal (NEPA) & State Environmental Reports
State & Federal Permitting Requirements
Environmental Monitoring & Inspections
Oil Containment & SPCC Plans
Permitting*

Public Coordination

*Public Involvement Plans
Project Information Sheets & Newsletters
Toll-Free Telephone Comment Line
Open House Information Meetings
News Releases/Websites*



ECI's Geographical Information Systems (GIS) Team was established to meet the growing need for GIS services and to aid clients with project scoping analysis, site identification, permitting and environmental assessment. The team successfully provides visual representations of data and its spatial relationship to development sites, places of interest and project areas.

The GIS/Mapping Services Team is comprised of experienced professionals with the knowledge to implement GIS solutions for electric transmission network assets, right-of-way management, site planning, land/vegetation management and legacy data updates.

ECI's GIS/Mapping Services Team is adept in combining spatial data from a variety of sources including aerial imagery, CADD, GPS Survey field data and existing legacy maps to assist in reaching efficient decision-making procedures through GIS analysis. ECI utilizes an extensive database of existing transmission, distribution and substation facilities across the U.S. from which to create intricate mapping resources for use in the siting, planning and permitting of major utility facilities. Mobile GIS solutions are used to support optimized routing, facilities location, field data collection and field design.

ECI's GIS/Mapping Services Team provides professional, effective and affordable solutions for engineering, environmental and GIS requirements.

*Legacy Data Updating
Data Migration
Data Collection*

*Mapping Software Programming
Siting Analysis & Documentation
Asset Mapping*

Constraint Mapping

Database Creation & Management

Project Simulation

Federal (NEPA) & State Environmental Mapping

Local Permit Mapping

Industrial & Generation Facilities



ECI has been providing engineering services to industrial clients since 1985. During this time period, ECI has won the confidence of many repeat industrial clients with our commitment to long-term client support and our ability to offer a broad range of industrial electrical engineering, civil and structural services throughout the U.S. and worldwide. Many projects are unique to a particular facility, while others share similarities that are based on standards published by NEMA, ANSI, IEC, API, OSHA and NFPA.

Industrial projects that ECI has completed are as varied as the clients themselves, which include power generation, petrochemical, mining, milling and smelting, pipelines and terminals and water pumping/wastewater treatment facilities. ECI's Industrial Systems staff has extensive experience in the design of a wide range of industrial power systems through 69 kV. ECI utilizes the latest in software and technology for industrial power systems, control systems, instrumentation, plant automation and communications.

ECI maintains strategic alliances with numerous engineering firms that may be required on certain projects that involve special requirements or knowledge outside ECI's scope of industrial and utility systems design. ECI's strong relationship with our alliance partners allows us to supply complete, multi-disciplined design services that yield key benefits to our clients.

Industrial & Municipal Water & Wastewater Plant Design
Motor Installation & Controls
Substations & Transformers
Switchgear, Switchboards & Panelboards
Electrical System Evaluation
Electrical Systems - Arc Flash, Fault & Coordination Studies
Motor Control Centers & Starters
All Plant Instrumentation - Analog & Digital
PLC's, RTU's & DCS's - Design, Integration, Programming & Startup
VFD's & VSD's
Indoor & Outdoor Lighting
Emergency & Standby Power Generation and UPS Design
Power Generation, Monitoring & Control
Grounding Systems
Lightning and Surge Protection
Control Room, Office and Facility Design
Telephone, Radio, Network & Microwave Communication Systems
Security Systems



The focus of ECI's Land Services Group is to provide electric utility and energy clients with a complete range of Land Services (ROW, Surveying & Environmental) with the added advantage of ECI's complete design, engineering, construction and commissioning services for construction projects. We provide wireless communication facility site acquisition through building permit processing, electrical transmission and distribution easement acquisition, gas pipeline easement acquisition and substation site acquisition, as well as pipeline easement and compression station site acquisition. Additional services include initial ownership investigation, title research and appraisal work in addition to the deployment of on-site negotiation representatives.

ECI's Land Agents have worked in combined development and construction engineering capacities on a wide range of projects, including gas pipeline, long haul fiber optics and electric transmission. We have experienced permitting specialists, project managers, telecommunication facility site specialists and acquisition agents needed for any size project. Our internal services include substation design, transmission and distribution siting and design, electric system planning, and environmental services. EPC Services Company, our construction subsidiary, together with our Land Services Department, provides our clients an integrated project approach that offers optimal value in power delivery consulting services.

ECI believes that an honest and open personal relationship with each landowner is essential for success in negotiations. ECI continues to be at the forefront in the preparation of right-of-way cost analysis for linear projects, identification of pertinent permitting requirements and handling of sensitive landowner issues. We have personnel with the tenured experience to identify route recommendations having fewer anticipated landowner issues or political conflicts. ECI's Land Services Group can manage intricate and complex projects providing due diligence services, review of existing ownership records and curative work as required to serve our clients needs. We will prepare all documentation necessary to review land ownership issues, present offers and execute the agreements necessary to assure a timely and successful project.

Initial Ownership & Due Diligence
Title Research
Rights of Entry
Right-of-Way Feasibility Studies
Certificates of Survey & Document Preparation Appraisals
Permitting
Negotiation
Escrow Processing & Closing Condemnation
Support/Eminent Domain Relocation
Planning Assistance
Project Management
Easement/Fee Acquisition
Construction Damage Resolution

Urban Municipalities/PUD Services



ECI has built an extensive resume of service to electric municipalities and public utility districts throughout the U.S. ECI offers a wide range of engineering services in substation design, transmission/distribution, electrical system studies, system protection, communications and technical services. These services are provided utilizing the latest in industry technology and standards together with the most current technical tools and software available.

ECI strives to maintain a reputation of quality and service in providing our clients with the most cost efficient engineering solutions available. ECI's unique project approach assures your company of prompt and complete services that result in lower installed cost of facilities, which are provided on schedule and under budget.



*Power Delivery Station Engineering
Transmission Engineering
Distribution Engineering
System Analysis & Studies
Communications
Environmental Services
Land & Survey Services
Construction Management*

Power Supply Interconnection Services



*Feasibility & Economic Studies
Impact Studies & Facility Studies
NT and PTP Transmission Service Agreements
Coordination & Procurement of Ancillary Services
Scheduling Services
LGIA Agreement Support*

ECI provides Wind and Solar Energy Developers with a complete portfolio of cradle-to-grave services for project development involving the following project support functions:

Electric Feasibility Support

ECI supports Energy & Wind Energy Developers through the development of conceptual one-line diagrams and general layouts for projects as a basis for economic evaluation and financing. Additional support is provided through budgetary cost estimates for our subsidiary, EPC Services Company, to function as the prime electrical contractor for generation projects.

Queue Applications & Interconnection Agreements

ECI can assist Energy & Wind Energy Developers with evaluation of the best strategy to achieve needed system transmission service in our present "constrained U.S. market". ECI provides astute technical support needed for transmission and generation queue applications. We regularly provide guidance in the negotiation of large and small Generation Interconnection Agreements. Our superior experience and expertise avoids unnecessary costs of ECI's clients through defensible utility grade studies and negotiation of reasonable requirements for flicker, low voltage ride through and dynamic VAR support.

Interconnection Studies

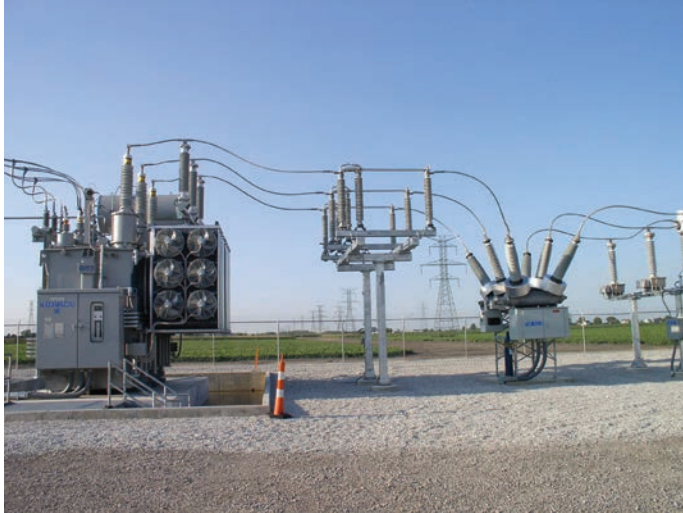
ECI's extensive resume of past utility studies that have been accepted by IOU utilities, Western Area Power, Bonneville Power and electric cooperatives ensures that Energy & Wind Energy Developers will not be burdened with inappropriate or excessive transmission interconnect charges.

Alliance Approach

ECI's success is built upon strategic alliance relationships with energy companies and world-wide electric T&D manufacturers. ECI is also interested in opportunities to participate as an alliance partner with firms seeking outside investment and ownership.

Power System Planning & Design Studies

for Utilities, Transmission Owners and Power Producers



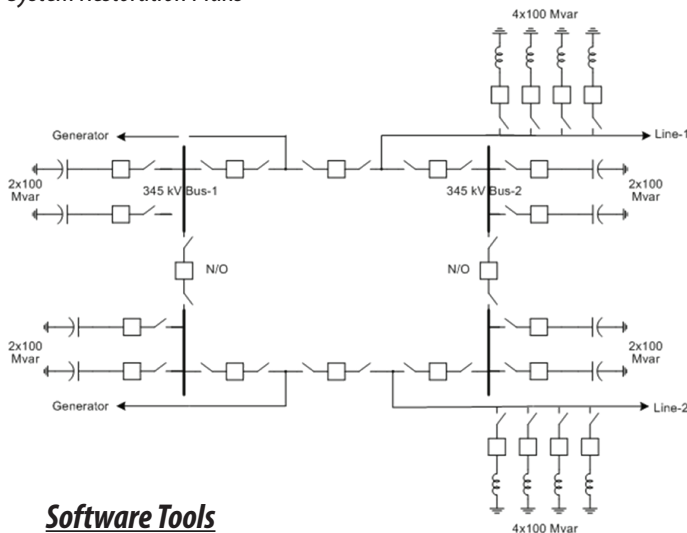
Operating Studies

System Operating Limits, Constraints, Guidelines & Means of Upgrading to Raise Technical Limits

Performance Studies: Identification of System Weak Conditions & Preparedness for Worst Conditions

Transmission System Adequacy for Higher Order Contingencies

System Restoration Plans



Software Tools

PSCAD®
PSS®E
GE PSLF™
Aspen™
ETAP®
MathCad®

ECI provides a comprehensive range of services, from limited assistance to highly complex and specialized system studies ranging from conceptual development to design and operating studies to support project implementation.

While there is a wide diversity in the type and amount of expertise provided on projects, ECI's focus remains singular on providing the highest value solutions for our clients.



Power System Planning

Long/Short Range System Plans

Reliability Enhancement by Inter-Regional Transmission Interconnections

Reactive Power Planning & Voltage Control

Conceptual Planning-Interconnection Proposals & Need Documents

Facilities Condition Assessment & Improvement

Appraisal of System Adequacy & Configuration
Development of Planning Database

Standardization of Facilities

Standard Equipment Ratings: Transformers, Switchgear etc.

System Database Cases Development & Updates

Techno-Economic Analysis, Data Requirements & Guidelines

Project Life Cycle Costing

Nerc Compliance

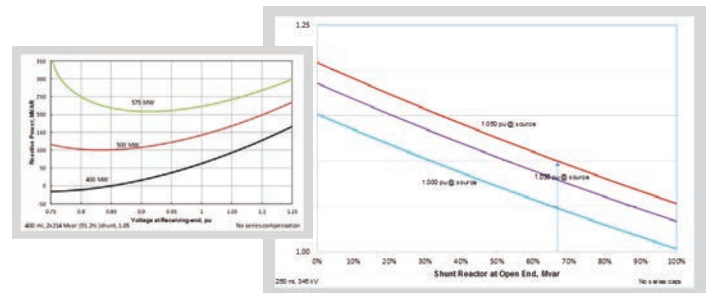
Load/Capacity Analysis

System Impact Assessment

Evaluation of System Configurations

System Performance Requirements for HVDC Integration

Short Circuit Studies



Renewable Energy



Preventative Maintenance

Monthly Inspections
Annual & Triennial Services
Calibration & Testing
Remote Monitoring

Corrective Maintenance

Circuit Breakers/Switchers
Transformer Problems
Other Apparatus
Equipment Replacement

Emergency Maintenance

Equipment Failure
Repair & Restoration
Guaranteed Response Time
24/7 Hot Line

Engineering Services

Feasibility Studies
Project Development
Substation Design
Transmission Design
Equipment Specifications
Collection System Design
Power Supply Coordination

Construction Services

Utility Interconnections
Generation Step-Up Stations
Transmission Lines
Collection Systems
Grounding & Tower Wiring
Construction Management
Commissioning & Testing

Renewable Energy markets are projected to grow steadily in the coming decades. Wind and Solar energy are emerging as some of the best alternatives in meeting the growing demand for renewable power with its competitive costs and environmental advantages.

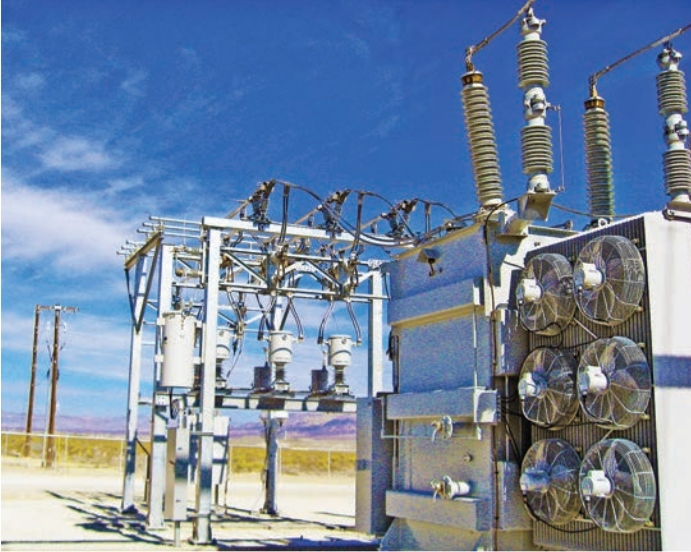
Development & Studies

ECI and our subsidiary, EPC Services Company, have an extensive resume of providing engineering, procurement and construction management services for a variety of Wind and Solar energy developers and projects throughout the U.S. ECI's engineering staff has the expertise to address major items related to renewable projects including Project Siting & Environmental Permitting, Transmission Routing & Design, Collection System Design, Cable Ampacity, Losses, Power Factor, Dynamic Response, Fault Currents, Grounding Bank & Arrester Evaluation and Steady State Transmission Load Flows, Facility Optimization Studies, Feasibility Reports, Load Flow and Short Circuit Studies, Interconnection Studies and Application Support, Distribution and Communications System Design as well as Detailed Substation Design.

Maintenance Services

EPC Services Company's experienced Testing and Engineering staff can assist renewable energy developers in providing ongoing maintenance, inspection and testing for all types of electrical equipment. From commissioning equipment to setting and testing of protective relays, EPC Services Company can handle all your facility startup and preventative maintenance needs. Services are available on a project or annual testing basis. Service plans offer the advantage of immediate dispatch of personnel & equipment for critical problems.

Rural Cooperative Services



Rural Cooperatives operate on one guiding principle: the delivery of a safe, reliable and constant supply of electric energy to its consumers at the lowest possible cost.

ECI has built an extensive resume of service to electric cooperatives throughout the U.S. We offer a wide range of engineering services in Substation Design, Transmission/Distribution, Electrical System Studies, System Protection, Communications and Technical Services.

ECI strives to maintain a reputation of quality and service in providing our clients with the most cost efficient engineering solutions available which are compliant with USDA rural utility loan standards and requirements. ECI's unique project approach together with our highly trained staff, assures your cooperative of prompt and complete services that result in lower installed cost of facilities, which are provided on schedule and under budget.



RUS Construction Codes

- 100 New Line Extensions
- 200 New Tie Lines
- 300 Conversions and Line Changes
- 400 New Substations, Switching Stations, Metering Points
- 500 Substation Changes, Switching Stations, Metering Points
- 600 Miscellaneous Distribution Equipment
 - 601 Transformers & Meters
 - 602 Service Capacity Increases
 - 603 Sectionalizing Equipment
 - 604 Voltage Regulators
 - 605 Capacitors
 - 606 Ordinary Replacements
- 700 Other Distribution Items
 - 701 Engineering Fees
 - 702 Security Lights
 - 703 Reimbursement of General Funds

Substation & Switchyard Engineering



ECI works with every client to fully understand the needs and expectations for their substation or switchyard projects. ECI's station design team has over 35 years' experience on several hundred design projects throughout the U.S.

We provide design services to a wide variety of electric utilities including municipal, cooperative and investor-owned, as well as independent power producers. Projects range from small facility additions to major 500 kV switchyards and generation interconnect stations. ECI's staff remains dedicated to maintaining a high level of technical knowledge, incorporating leading edge concepts and solutions for all facets of substation design while utilizing state-of-the-art technical tools and software.

ECI has acquired and developed a myriad of design programs for use in substation bus & foundation design, grounding, short circuit, lighting, lighting protection and structural loading. Our engineers are experienced in almost every conceivable bus arrangement scheme utilized, including radial, ring, modified ring, paired element, main & transfer, breaker and one-half and double-bus/double breaker. ECI is experienced in the application of phase-shifting transformers, EHV series capacitor banks, multi-stage back-to-back shunt capacitors and energy storage systems in addition to possessing extensive knowledge and experience in the field of system protection philosophy.

Generation & Transmission Switchyards and Tie Substations

Transmission & Distribution Substations

GIS, Series Compensation & Stations

Conceptual Design

Physical Design

Schematics & Wiring

Equipment Specifications

Protection & Control/SCADA/Communication Design

Civil Design/Grading, Foundations & Steel

Construction Management & Startup Services

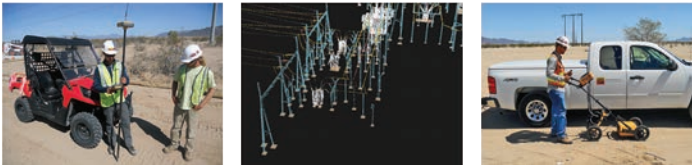
Survey & 3D Imagery Services



ECL's Survey Department is comprised of professional licensed surveyors having a wide range of field experience in all types of surveying.

ECL incorporates various 3D imagery equipment into our full service Survey Department. These include a 360 degree terrestrial laser scanner and a survey grade ground penetrating radar antenna. ECL utilizes this state-of-the-art equipment along with robotic surveying and global positioning systems (GPS) to provide the most accurate and dense survey data available. Our surveyors have provided above and below ground scanning and imagery of transmission lines, substations, regulator stations and gas lines.

ECL's Survey staff experience includes thousands of miles of telecommunication lines, gas or electric T&D facilities, and hundreds of telecommunication sites throughout the U.S. Our Survey Department provides all manner of land services for design, right-of-way acquisition, engineering support, construction staking, and as-built surveying for power and gas facilities. Our processes provide a single source for engineering and construction related imagery with the precision and accuracy expected from a survey firm.



*Boundary Surveys
Topographical Surveys
ALTA Surveys
Control Surveys
Route Surveys
Quantity Surveys
Construction Layout
Plot Plans
Right-of-Way Plans
Easement Exhibits
Laser Scanning
Ground Penetrating Radar*



ECI's planning personnel are intimately familiar with the requirements for system planning studies for utility and industrial power systems. Our clients range from small rural utilities to large multi-state generation and transmission entities. Our planning philosophy is predicated on evaluating all prime alternatives for service with emphasis on system efficiency and economical system design. The scope of our past studies has included Utility System Planning for two, three or four year construction periods, Intermediate Range Planning and Long Range System Plans. ECI's studies provide comprehensive services necessary to ensure a complete, accurate and usable system plan.

ECI has also prepared numerous Regional Load Flow Analyses for systems and integrators to determine impacts of new generation, growing loads or system improvements required to meet contractual demands while improving system reliability. Our studies are developed using the most current tools and software available to ensure the in-depth engineering and analysis required for your company's electrical system evaluation. Our experience in Protective Coordination is equally varied, including highly complex Transmission Line Relaying and Isolated Generation Systems, Distribution Protective Coordination Studies and modeling a wide variety of Specialized Relay Applications. ECI's planning staff is adept at providing Insulation Coordination and Arrester Studies. We have the required knowledge and experience in the preparation of studies relating to wind energy, mining, petrochemical, pulp & paper plants as well as other industrial company applications. Our in-depth industrial studies include Large Plant Load Flow Analysis, Transmission System Loss Studies, Motor Starting Impacts and Technologies, Harmonics Analysis and Power Quality, Feasibility Studies for industrial project development, Evaluation of Operating Configurations as well as Cyclic Load Effects associated with mining drag-lines and shovels.



Feasibility Studies for Conceptual Power Systems
Limited System and Regional Load Flow Studies
Long Range System Studies
Construction Work Plans
Short Circuit/Relay Protection Studies
Cost of Service/Rate Studies
Specialized Studies of System Losses/Power Factor
Protective Coordination Studies
Arc Flash Analysis
EMF Analysis
Dynamic Stability Studies

ECI has prepared numerous Interconnect Studies from small distributed generation to large wind farms consisting of 200-300 MW in size. Additionally, ECI has significant insight and experience in preparing Evaluations for Competitive Power Supply and its impact on rates, wheeling and NUG/IPP interconnections.

Testing Services



Unexpected and costly outages and downtime impact the ability to achieve safe and reliable levels of operation. Preventative maintenance to identify and eliminate potential trouble areas in systems ensures optimum system availability and service levels. ECI's subsidiary, EPC Services Company, provides testing and commissioning services to a wide variety of electric utilities, (municipal, cooperative, investor-owned, and independent power producers) and industrial clients.

EPCS Electrical Testing Services is staffed by engineers and technicians having the experience with electrical apparatus needed to meet expected levels of quality assurance. Our technicians utilize the most modern testing equipment available to ensure accurate and repeatable operation. Services include troubleshooting of equipment and resolving operational problems, infra-red thermography, and testing and maintenance functions that adhere to NETA, IEC, ANSI, IEEE and NEMA standards.



Commissioning Plan Development
Electrical System Troubleshooting
Preventative Maintenance
Acceptance & Commissioning Testing
Time-Travel Analysis
Insulation Resistance Testing
High-Potential Testing
VLF Power Cable Testing
Fault Locating
Doble™ Power Factor Testing
Doble™ Sweep Frequency Response Analysis
Winding Resistance & Turns Ratio
Relay Testing using Enoserv & Protest
Relay Upgrades/Retrofits
Infrared & Ultrasonic Detection
Fiber Optic Testing
Line Disturbance Analysis
Harmonic & Power Quality Measurements
Magnetic Field (EMF) Testing & Mitigation
Oil Analysis



*Conceptual Planning & Routing
Overhead HV/EHV PLS-CADD™ Transmission Design
Underground Transmission thru 345 kV
Wood, Steel, Concrete and Hybrid Pole Design
Lattice Tower Analysis & Application
Overhead & Underground Distribution Line Design & Staking
Work Order Inspections
Optimized Structure Spotting w/PLS-CADD™ & TL-CADD™
Conventional and GPS Survey/Staking
Construction Management & Documentation*

Utilities need competent services from their engineering partner to plan, design, procure and construct facilities that are safe, reliable and economical while satisfying public and environmental concerns. ECI's transmission design teams have vast experience in a wide variety of project types, which combined with creative thinking and exceptional engineering judgment, lead to the development of innovative and efficient design solutions.

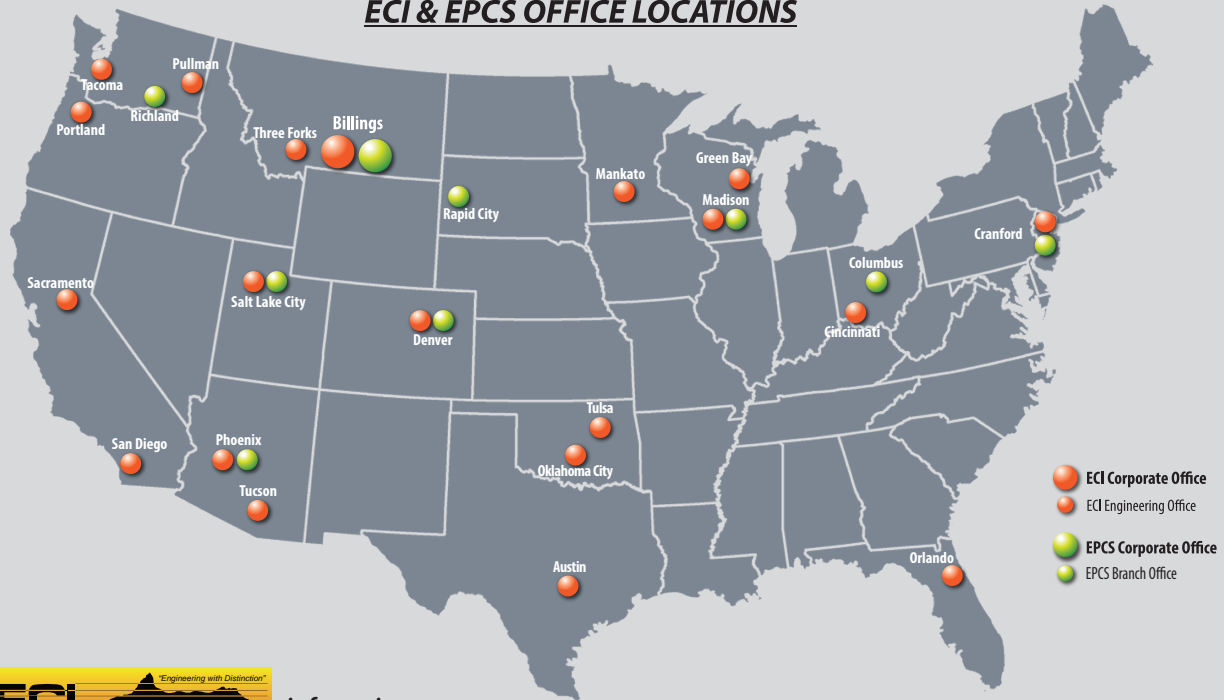
ECI ranks among the largest of U.S. firms specializing in Transmission & Distribution engineering services. Our engineering staff has designed and analyzed thousands of miles of overhead transmission lines for a variety of energy clients including investor owned utilities, public utilities, municipalities and rural cooperatives. ECI provides Transmission and Distribution services for lines with voltages ranging from 12 kV to 765 kV, including new installations, upgrading of existing facilities, reconductoring and line re-rating. From long-haul greenfield transmission lines to single pole replacements, ECI provides the same commitment to quality and efficiency on every project.

ECI's project design execution utilizes the latest in technical tools and computer automated programs for conductor and line design, structure modeling and spotting and detailed drawing development.

ECI is well versed in several commercial software programs to augment the engineering analysis and design, and has developed several proprietary software programs and engineering tools in order to provide clients with innovative and efficient design solutions. ECI is committed to utilizing and becoming proficient with the latest, proven engineering design tools and programs to provide clients with the highest quality services and products.

The combination of experience, exceptional engineering knowledge, creativity and teamwork enables our design teams to meet or exceed client expectations, making ECI the engineering consultant of choice.

ECI & EPCS OFFICE LOCATIONS



info@eciusa.com

Corporate Headquarters: 3521 Gabel Road, Billings, MT 59102 406.259.9933 Fax: 406.259.3441

Arizona

10851 N. Black Canyon Hwy.
Suite 660
Phoenix, AZ 85029
Phone: 602.997.9933

490 W. Magee Road
Tucson, AZ 85704
Phone: 520.219.9933

California

5030 Camino De La Siesta
Suite 407
San Diego, CA 92108
Phone: 619.398.9370

11000 Olson Drive
Suite 105
Rancho Cordova, CA 95670
Phone: 916.366.1028

Colorado

7042 S. Revere Parkway
Suite 460
Centennial, CO 80112
Phone: 720.536.5707

Florida

1051 Winderley Place
Suite 101
Maitland, FL 32751
Phone: 407.960.1796

Minnesota

220 E. Main Street
Suite 200
Mankato, MN 56001
Phone: 507.388.9933

Montana

3521 Gabel Road
Billings, MT 59102
Phone: 406.259.9933

123 Main Street
Three Forks, MT 59752
Phone: 406.285.4627

New Jersey

25 Commerce Drive
Suite 230
Cranford, NJ 07016
Phone: 908.967.6363

Ohio

6120 S. Gilmore Road
Suite 101
Fairfield, OH 45014
Phone: 513.714.4921

Oklahoma

117 S. 7th Street
Jenks, OK 74037
Phone: 918.296.7911

100 NW 150th Street
Bldg B, Suite 2
Edmond, OK 73013
Phone: 405.608.5045

Oregon

5000 Meadows Road
Suite 240
Lake Oswego, OR 97035
Phone: 503.747.2235

Texas

5113 Southwest Parkway
Suite 115
Austin, TX 78735
Phone: 512.284.9380

Utah

660 West 700 South
Woods Cross, UT 84087
Phone: 801.292.9954

Washington

895 SE Clearwater Drive
Pullman, WA 99163
Phone: 509.334.9138

2607 Bridgeport Way West
Suite 2M
University Place, WA 98466
Phone: 253.564.1590

Wisconsin

2800 Royal Avenue
Suite 300
Madison, WI 53713
Phone: 608.240.9933

375 AMS Ct.
Suite 200
Green Bay, WI 54313
Phone: 920.393.1814



info@epcs.com

Corporate Headquarters: 1241 South 31st Street West, Billings, MT 59102 406.294.8544 Fax: 406.869.2199

Arizona

10851 N. Black Canyon Hwy.
Suite 660
Phoenix, AZ. 85029
Phone: 602.997.9933

Colorado

7042 S. Revere Parkway
Suite 460
Centennial, CO 80112
Phone: 720.536.5707

Montana

1241 S. 31st Street West
Billings, MT 59102
Phone: 406.294.8544

New Jersey

25 Commerce Drive
Suite 230
Cranford, NJ 07016
Phone: 908.967.6363

Ohio

630 Morrison Road
Suite 320
Gahanna, OH 43230
Phone: 614.604.6112

South Dakota

2218 Jackson Blvd.
Suite 6
Rapid City, SD 57702
Phone: 605.716.9938

Texas

12000 Aerospace Avenue
Suite 100
Houston, TX 77034
Phone: 832.767.1190

Utah

687 West 700 South
Suite F
Woods Cross, UT 84087
Phone: 801.292.9954

Washington

309 Bradley Blvd.
Suite 103
Richland, WA 99352
Phone: 509.578.1638

Wisconsin

2800 Royal Avenue
Suite 300
Madison, WI 53713
Phone: 608.240.9933