



SPRINGCITY

Capability & Expertise

About us

SpringCity was established in 2011 with the objective of providing high quality engineering, strategic consulting, project management and consulting services in the electricity and renewable energy industry.

We are a versatile and flexible business that is able to tailor processes to meet specific client requirements. At SpringCity, we deliver cost effective projects through lean business practice and low management overhead. Our track record for quality service at competitive prices is evidenced from long term relationships we have developed with a range of organisations. Our policy is to deliver well communicated, on time, on specification and on budget projects that exceed our client's expectations.

Our key personnel have been providing renewable energy engineering design, inspection, installation, management and commissioning services for more than ten years. Our personnel have successfully delivered projects and services for entities including the Clean Energy Regulator (CER), Independent Market Operator (now AEMO), Office of Energy (now Public Utilities Office), Economic Regulation Authority, Western Power, Fremantle Ports and various power producers.

Our delivery systems are third party certified to ISO9001 for quality management, ISO14001 for environmental management as well as AS4801 and ISO45001 for health and safety.

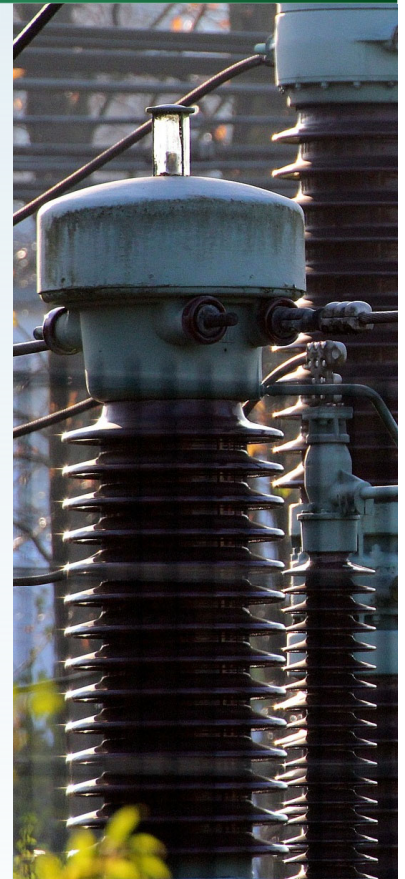
We have experience in providing renewable energy services ranging from designing PV systems and preparing independent expert reports for the certification of capacity credits right to carrying out inspections on PV systems for the Clean Energy Regulator (CER).

We have over 20 solar PV inspectors and each inspector has an average experience of installing about 1,000 kW of solar PV systems. Some inspectors have installed over 2,000 installations. Furthermore, each inspector has inspected approximately 200 to 300 systems each. In financial year 2016-2017 alone, SpringCity carried out inspections on over 600 installations across Australia.

We also have a Solar PV Operations & Maintenance team that provide preventative maintenance, corrective maintenance, vegetation control and panel cleaning services to solar PV farms located in remote areas.

We are involved in local small scale home solar installation, large national level programme of works inspections as well as the delivery of utility scale solar PV systems. This breadth of our experience and capability provides us with a thorough understanding of the market, suppliers, costs, engineering practices and risks.

SpringCity has a unique offering where it is able to provide solar PV engineering services for both small scale and large scale systems. We have the capability to deliver projects from concept to commissioning.



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Project Highlight

Utility Scale Solar PV Farm

SpringCity was engaged to provide professional engineering services and assistance in the network connection processes and the overall development of the power station.

In the ever-changing connection requirements, we worked with our client to achieve an applicant specific solution that includes a run-back scheme. This solution reduced the risk level of the project and enabled our client to connect to the network regardless of the other developments that were taking place in network .

The other services we provided in this project include:

1. Solar PV farm design services ranging from electrical design, site and infrastructure layout and zone diagram development
2. Energy yield studies
3. Capacity credit certification documentation
4. Development of a runback scheme and estimation of the impact of the scheme on the power station availability
5. Technical negotiations services in the engineering and construction contract.
6. Review of contractor design deliverables

Renewable Energy Project Services

SpringCity provides a range of services in the renewable energy industry. We are able to develop a project from concept through to commissioning.

Our consultants and engineers provide the following services which cater to each part of a project development cycle:

- Owners engineering services
- Site identification and selection
- High level design services including general arrangement and electrical system design
- Energy yield studies
- Power system modelling for network connection studies
- Network connection solutions
- Preparation of Development Approval (DA) deliverables

- Economic dispatch modelling
- Preparation of tender documentation
- Technical review of Power Purchase Agreement (PPA)
- Detail design services
- Project and construction management
- Testing and commissioning



Energy Yield Studies

SpringCity specialises in carrying out solar PV energy yield studies for fixed tilt, single axis tracking and double axis tracking systems. The types of studies we carry out range from high level to detailed assessments where subtleties such as inter-panel shading and impacts of different cable sizes and lengths are assessed. The commercial software packages we use include:

- PV Syst
- PV Sol

SpringCity also performs studies to optimize system size for no export generation and provide strategies to improve energy yield. Furthermore, we also use our internally developed SpringCity Solar PV Optimizer to assess and optimize systems we design.

Renewable Energy Installation Inspections

SpringCity has been appointed by the Australian Clean Energy Regulator as one of its few selected organisations to carry out inspections on small scale solar PV systems across Australia.

SpringCity has solar PV inspectors who are also installers with significant experience in each state and territory of Australia. Our subsidiary, SpringCity Power & Energy also has electrical licenses to operate and carry out electrical works in each state and territory of Australia.

Leveraging from this large pool of capability and experience, we are able to design, install and commission complex solar PV system's across the country.

Our engineers, consultants and inspectors are well versed with the relevant standards for solar PV installations which include:

- AS/NZS 5033
- AS/NZS 4509
- AS/NZS 4777

Energy Economics and Dispatch Studies

SpringCity carries out energy economic studies including development of new entrant pricing models, electricity price forecasts, cash flow modelling of power purchase agreements, sourcing of market pricing information and economic dispatch modelling. We use the following industry recognized software apart from our internally developed cash flow models and economic dispatch engine:

- PLEXOS Integrated Energy Model
- HOMER

We perform Monte Carlo, sensitivity and scenario analysis based on our client's specific requirements. We also carry out studies to assess the impact of changes to regulation, government policy, market, network and generation profile on the average and marginal cost of electricity as well as the availability of generation plant. We are also able to assess system reliability and quantify the amount of unserved energy based on planned and unplanned outages.

Our extensive capability and detailed approach provide our clients with information that can be used to reduce costs and increase revenue.



“Our extensive capability and detailed approach provide our clients with information that can be used to reduce costs and increase revenue ”

Energy Management and Metering Systems

Energy management systems today range from home systems to building management systems and enterprise wide energy management systems.

In the home energy management space, SpringCity works with clients to design and install solar PV systems with battery storage in order to maximize the return on investment for residential sized solar PV systems.

We also specialize in a range of “Smart Home” systems including C Bus and Fibaro and can retrofit existing homes with no smart wiring through the use of Z Wave technology.

In the building management systems space, we work with our clients in platforms such as Power StruxureWare Power Monitoring Expert and GreenSense.

SpringCity is able to deliver integrated energy management systems using equipment from a range of manufacturers. We work with and understand the intricacies of meters developed by manufacturers such as EDMI, ABB, Landis+Gyr and Schneider Electric. We also design, deploy, commission and monitor Advanced Metering Infrastructure (AMI).

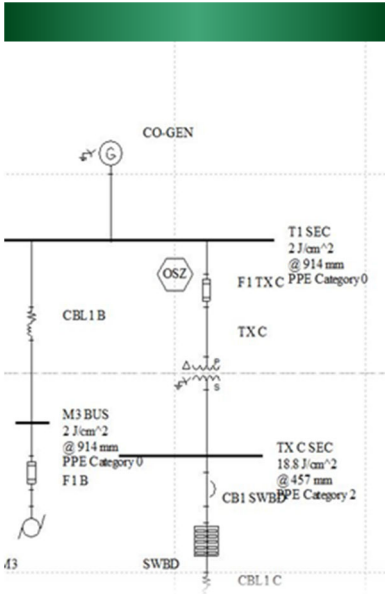
In the enterprise energy management systems space, we provide high level system development services to assist our clients in developing their Energy Management Systems in line with the requirements of ISO 50001:2011. The systems we develop with our clients lead them down the pathway of third party certification to this standard.

We also carry out Level 1, Level 2 and Level 3 Energy Audits in accordance to AS/NZS 3598:2000.

SpringCity also carries out electricity invoicing system reviews for clients that purchase electricity in bulk and on-sell them to their customers / tenants (typical for shopping malls and commercial buildings). The reviews include data reconciliation which is done to ensure the integrity of the meter data and to control/eliminate energy that is not being metered.

We also carries out reviews on electricity sales invoicing systems where the veracity of the interface between the metering, invoicing and accounting systems is confirmed.





Power System Studies & Model Development

SpringCity provides power system model development and power system studies services for a range of organisations. We have experience in developing power system models ranging from small industrial plants to utility scale networks.

Our capability includes both steady state and dynamic studies. Example analysis we perform include:

- Load flow for equipment loading
- Load flow for voltage regulation
- Fault level
- Power quality and harmonics
- Motor starting
- Transient stability

We use the following software packages to carry out these studies:

- Power Tools for Windows (PTW)
- PowerCAD
- DlgSILENT Power Factory
- ETAP
- PSS®E

The services we provide in this field allow our clients to effectively configure and size their equipment, infrastructure and system to meet their current and future requirements.

We also carry out studies on existing systems to further expand capacity and resolve any issues currently being experienced.

“We carry out steady state and dynamic modelling of power systems for power networks ranging from industrial plants to utilities.”

Project Highlight

Manjimup Biomass Power Station

SpringCity was engaged to develop a network connection solution on this project. Services we provided include:

1. Preparation of a network access application for a biomass power station
2. Design and configuration of network infrastructure
3. Negotiation of battery limits and scope responsibility
4. Requests for exemptions on from the Western Power Technical Rules
5. Project management and integration of a complex biomass power station power system model

Network Connection and HV Submissions

A key consideration during the development of a power station is site identification to allow for a cost effective connection to the power network. The electricity in the south west region of Western Australia is supplied through the South West Interconnected system (SWIS). Western Power is the sole distribution network service provider (DNSP) and transmission network service provider (TNSP) for this system. It has a thorough network connection process that both generators and large loads will have to go through in order to obtain a network connection.

Our engineers and consultants understand the network connection process well and have worked with a range of clients to obtain network connection. The services we provide include:

- Network connection site identification
- Network connection options and configuration development
- Network connection studies and identification of deep connection issues
- Development of generator power system models
- Cost benefit analysis of different options
- Runback scheme development
- Preparation of network access applications
- Technical checks for compliance to the Technical Rules of the relevant network
- Network access negotiations
- High voltage submissions (HV Submissions)
- Preparation of Technical Compliance Reports (TCRs)

We also carry out similar services for connections to the National Electricity Market (NEM).



Modern low voltage industrial switchboard and motor control centre

Power System Protection and Arc Flash Studies

Power system protection and arc flash risk mitigation are the two topics that are heavily discussed in today's electrical industry. We provide services in both these fields in the form of power system protection works and arc flash studies. Clients we have provided these services for include from commercial installations, mine sites, process plants and port operations.

The specific power system protection services we provide in this field include:

- Overcurrent protection coordination
- Earth fault protection coordination
- Development of time current curves
- Development of protection setting files
- Development of protection schematics and secondary drawings

We carry out arc flash assessment and analysis using both commercially available software and our internal tools. Arc flash calculations are carried out in line with the requirements of NFPA 70E, IEEE 1584, IEEE 1584.1 and ENA NENS 09:2014.

We also work with our clients to develop cost effective solutions to reduce arc flash incident energy and risk. Our thorough approach and innovative solutions have been recognized and commended upon by our clients.

As a complete concept to commissioning service, we are able to carry out a project from the development of a power system model down to commissioning equipment that help improve safety and reduce risk.

Project Highlight

Arc flash risk reduction

SpringCity has delivered brown-field power system upgrade projects from initial studies to physical implementation.

In this particular project, we were initially engaged to carry out the following scope of works for a bulk port operation:

1. Develop a power system model
2. Carry out load flow and fault level studies
3. Carry out protection coordination and arc flash studies

Upon completion of the above scope, SpringCity identified some protection coordination and arc flash related issues at the site. We were then engaged to carry out the following scope of works:

1. Identify and develop solutions to reduce arc flash risk
2. Carry out project engineering services to implement the identified solutions

Our holistic and efficient approach resulted in the overall project being delivered well within the planned timeframe and estimated cost. The end result was a site with significantly lower arc flash risk and potential incident energy levels.

Project Highlight

Assurance, advisory & compliance

Example engagements where our assurance, compliance and advisory consultants have provided value to our clients include:

1. A contracts review project which resulted in physical cash inflow of approximately \$4 million by enforcing a clause in the contract which was not previously enforced.
2. An assurance review on an upgrade project which identified cost savings of approximately \$800,000 by eliminating non-essential elements of the project.
3. An assurance review that identified a fraud issue.
4. An advisory project where data analytics was used to analyse the cost of purchases which identified instances where the supplier did not comply with the agreed part list. This resulted in significant cost savings during contract renegotiation.
5. An assurance project that identified overpayment due to incorrect rates and benefits being included in employee pay.
6. A compliance review that identified instances of non-compliance with the Dangerous Goods Safety Act that could have resulted in fines and penalties by regulators.

Assurance, Advisory and Compliance Services

SpringCity provides independent assurance, compliance and advisory services to assist clients in successfully balancing risk and control whilst adding stakeholder value and improving business performance.

Assurance

Our risk based audit methodology complies with the International Professional Practice Framework issued by the Global Institute of Internal Auditors. The aim of this service is to provide assurance on key processes and controls to mitigate potential loss and identify areas of potential improvement.

Advisory

Our advisory service assists our clients in identifying process improvements and cost reductions opportunities. We achieve this by providing our clients with knowledge and tools required to make informed decisions.

This includes performing research on industry trends and best practices, performing data analytics and presenting results in simple and meaningful formats.

Compliance

Our compliance service aims to provide clients with simple and flexible approaches to ensure compliance with applicable legal requirements, industry and internal codes of conduct as well as any other compliance obligations that may have an impact on operations. We also have experience in providing SOX 404 compliance testing.

Project Management and Control Services

SpringCity provides project management and project control services for studies and capital works projects. Examples of services we provide include:

- Project management
- Program of works management
- Procurement management
- Design management and co-ordination
- Contract administration
- Cost management



Management System Development (Quality, Environment and Health & Safety)

SpringCity strongly believes in keeping abreast with best practices when it comes to quality, environment and health & safety management. Our insight and knowledge gained in this field has led us down the path of providing consulting services in this area.

The administrative overhead burden associated with the development and maintenance of management systems are significant for small and medium sized businesses. Understanding this, we work closely with businesses to develop practical management systems that have minimal overhead burden. Key services we provide in this area include:

- Development of quality management systems (ISO 9001)
- Development of environmental management systems (ISO 14001)
- Development of health and safety management systems (OHSAS 18001 and AS 4801)
- Internal auditor services (quality, health & safety and environment)
- Consulting services and guidance to achieve certification
- Training and guidance for continual improvement of systems

Construction Management

SpringCity offers a proactive approach to construction management. This allows us to save on costs, improve deliverable quality and minimise risks. We offer tailored construction management services in the electrical and energy industry. Our construction managers, project controllers, engineers and inspectors bring in a breadth of experience. We also draw on environmental scientists, health and safety consultants and other technical specialists as required.

Services that we provide include:

- Cost control
- Scheduling
- Constructability assessment
- Contract management
- Quality management
- Safety and environmental management
- Construction coordination
- Labour relations



“Commissioning is not just turning up the day after construction is complete and pressing the big green button” (Killcross 2012)

Commissioning and Start-up Services

The riskiest phase of any engineering project is during commissioning and start-up. Even the most thorough design, procurement and construction will not prevent unforeseen challenges when equipment is first operated.

Strategy and Planning

We can fully develop the commissioning strategy for any facility. This includes:

- Designing a fit-for-purpose completions process and accompanying software tool
- Preparation of the commissioning and start-up plan including definition of the various phases and turnover/handover points
- Preparation of the commissioning permit to work procedures including selection of software or paper based forms
- Advising on contract strategy for commissioning teams to optimise quality, cost and schedule parameters
- Preparing commissioning & start-up logic
- Defining the systemisation of the facility to allow systems based turnover
- Preparing performance testing regime

Preparation

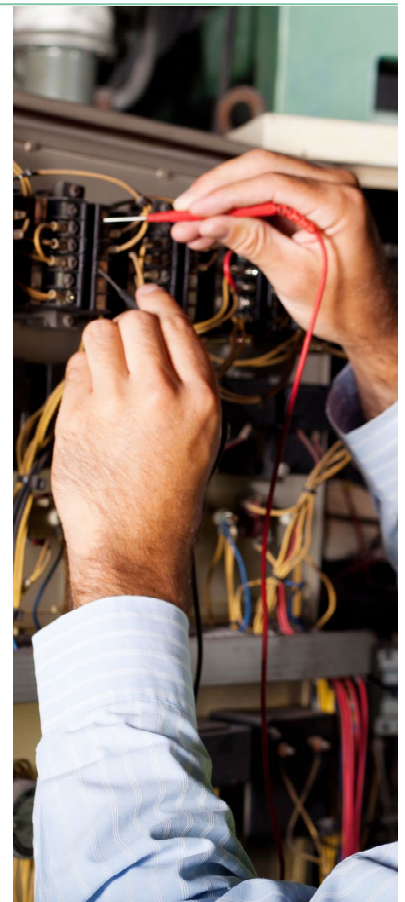
SpringCity work closely with clients to:

- Develop documentation including ITPs, ITRs, loop packs, pre-commissioning and commissioning procedures, etc.
- Identify required commissioning tooling, materials, workshop and test facilities
- Identify the need for specialist vendors or government representatives
- Develop the commissioning spares list

Execution

We execute all aspects of pre-commissioning, commissioning and start-up including:

- Punchlist walk down and acceptance of mechanical completions
- Supervising and executing the pre-commissioning and commissioning scope
- Providing support to the operations team during start-up
- Administering the permit to work system
- Certifying or arranging certification for performance testing of critical production and safety equipment





Lightning Risk Assessments and Protection

SpringCity carries out lightning protection design and lightning risk assessments in accordance to AS/NZS 1768. Our clients have at many times commended on the simple, practical and cost effective designs and recommendations we provide.

In our risk assessments, we consider direct and indirect strikes to the structure and the ground near the structure assessed. We work closely with our clients and understand their risk matrix when carrying out these assessments.

We prepare specifications and assist our clients in selecting suitable surge diverters for systems of all voltages ranging from ultra low voltage (5 V) to high voltage (330,000 V).

We also carry out earth resistance measurements and physical condition checks on lightning protection infrastructure.



“We provide specialised electrical risk and hazards related services ranging from protection coordination, arc flash assessments, lightning risk assessments, earthing system assessments and hazardous area classifications”

Project Highlight

Substation earthing assessment

We were engaged to carry out earthing assessments on a range of substations. The scope included:

1. Carrying out soil resistivity and earth resistance measurements
2. Assessing whether the installation met the requirements of the relevant standards
3. Developing and implementing recommendations to address identified issues
4. Implementing the solutions
5. Developing a maintenance program for the site

The effective delivery of the project was commended upon by the client’s management team.

Earthing System Assessment and Design

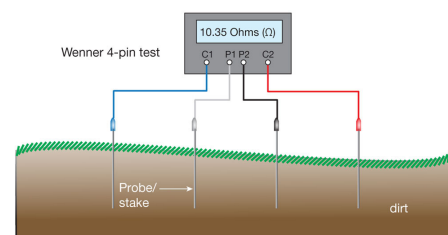
We carry out earthing system assessments, Our earthing assessments and designs are carried out using specialists software such as GroundMat and CDEGS to carry out the analysis. Furthermore, we verify simulation results using engineering first principles.

Services we carry out are in line with the requirements of the following standards:

- AS/NZS 3000
- AS/NZS 3007
- AS 2067
- IEEE Standard 80
- ENA EG1

Earthing system measurements, assessments and calculations we carry out include:

- Soil resistivity
- Earth resistance
- Earth potential rise
- Transfer voltages
- Step potential
- Touch potential





Hazardous Area Classifications, Designs and Studies

Designing facilities in hazardous areas typically start with classifying the area. This involves identifying explosive materials present and the extent of its propagation. At SpringCity, we have experienced hazardous area specialists who carry out these classifications. We also carry out peer reviews and assessments of classifications carried out by others.

Specifically, the hazardous area related services we provide includes:

- Classification and zone drawing preparation
- Solutions development
- Equipment selection (Ex classes)
- Installation design
- Dossier development
- Management system development
- Inspections



Our hazardous area capabilities include gas atmospheres, pressurized containers as well as dust atmospheres.

Our consultants have carried out hazardous area related works in the following types of facilities:

- Single user port
- Multiuser bulk materials port
- Mineral processing plants such as nickel refineries
- Gas production
- Power stations

Example standards and industry accepted criteria that we work with include:

- AS/NZS 60079 series of standards
- AS 3846
- AS 1940
- ANZEx scheme
- American Petroleum Institute RP 505
- UK Energy Institute IP 15

Project Highlight

Hazardous Area Classification for a Multiuser Bulk Port

SpringCity recently carried out hazardous area review at an existing bulk materials and liquid port. We were engaged to provide the following services:

1. Carry out a review of the existing classification and zone drawings
2. Carry out a review on areas with combustible dusts
3. Identify areas of concern and recommend improvement solutions
4. Carry out hazardous area inspections
5. Develop a management plan and update the hazardous area dossier

We identified a few areas of concern and developed cost effective solutions to address key issues identified.

A testimonial to the service we provided was us being engaged to carry out similar services for another port.

Project Highlight

Substation and Power Line Design

SpringCity carried out the front end design of an outdoor 132 kV substation and power line in the South West region of Western Australia for a power station connection to the utility network.

132 kV Substation Design

The substation design scope of services include:

1. Development of a single line diagram approved by the power utility for network connection purposes
2. Equipment selection
3. Development of a high level general arrangement and network interface drawings

132 Power Line Design

The hybrid overhead wood pole and underground 132 kV power line scope of services include:

1. Route selection and power line corridor development
2. Site walkthrough and pole spotting
3. Conductor selection
4. Sag and tension calculations
5. Pole top configuration and design
6. Line crossing design
7. Overhead to underground structure design
8. Underground cable route selection
9. Underground cable design

High Voltage System Design

Our high voltage engineering expertise includes both indoor and outdoor installations with voltages from 3.3 kV to 330 kV. Services we provide include:

- Preparation of high voltage (HV) submissions
- Preparation of equipment specifications (from insulators to transformers)
- Preparation of construction specifications
- Electrical primary design (including civil and structural)
- Electrical secondary systems design
- Packaged substation and switchyard design
- Development of operational procedures
- Development of switching programs
- Development of maintenance plans

- Insulation coordination
- Protection system coordination and design
- Development of commissioning and testing plans
- Safety inspections



Outdoor high voltage substation

Transmission and Distribution Line Design

SpringCity has prepared designs for transmission and distribution power lines for organisations ranging from mining companies to power utilities. Our experience includes underground cables, overhead power lines as well as hybrid lines that have both underground and overhead sections. In the overhead power line category, our capabilities range from wood pole to steel towers.

We provides services ranging from sag & tension calculations, route selection, pole configurations and full detail design. We also provide power line specific project engineering and construction management services.

Our consultants also have experience in carrying out power line incident investigations (i.e. pole top fires, conductor clashing incidents, etc.) and condition monitoring of wood poles.

Pumping Station and Diesel/Gas/Solar Hybrid Generation

Two common industrial electrical installations are portable / temporary power stations and pumping stations (potable water, bore, de-watering, slurry pumping, etc.).

We can specify, procure and supply packaged diesel and gas generators ranging from 6 kVA to 1,500 kVA. Working with our renewable energy and solar PV specialists, we also design and configure solar diesel power stations. Our solutions can be used as backup generators or as complete off-grid power supply solutions.

In the pumping station sector, we have the capability in carrying out full electrical design as well as supplying complete pumping stations. In carrying out the design and supply, we work closely with pipeline engineering specialists to deliver complete solutions. Projects we carry out range from slurry pump stations to water pump stations.

Electrical and Power Engineering for Mines & Industrial Plants

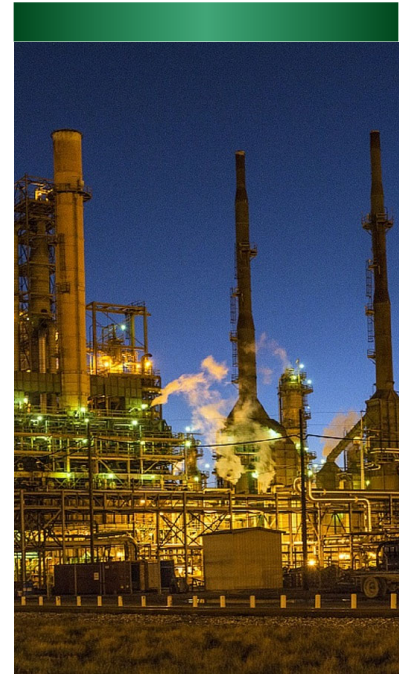
The power requirements and electrical design for mines and large industrial plants are different from those in residential and commercial buildings. The power supply to these remote loads are typically at high voltages with power network equipment or islanded generators capable of operating in harsh conditions.

Mines and industrial plants are characterized by large machines for activities such as excavation, overburden removal, ore transport and crushing. Typical loads include draglines, shovels, winders, conveyors and mills. These equipment are also typically supplemented by large pumps and compressors.

Key issues that surround power engineering in these plants include:

- Large power swings
- High fault currents due to motor fault contribution
- Power quality (harmonics) issues due from variable speed drives
- Voltage stability, fluctuations and flicker
- Generator stability issues

SpringCity has significant experience in preparing designs, carrying out studies and addressing the aforementioned issues.



“Mines, industrial plants and ports are characterized by large machines which are unique from commercial and residential electrical installations”

Electrical and Power Engineering for Ports

Seaports are a complex and unique facility when considered in the light of electricity and its hazards. These facilities typically include jetties, unloaders, loaders, crane containers, liquid pumps and gas facilities.

The complexity of these facilities require special consideration when being designed and worked on. Hazardous cargo, large loads and availability of shutdown windows are typical examples of issues to be considered.

Specific considerations need to be given to issues such as:

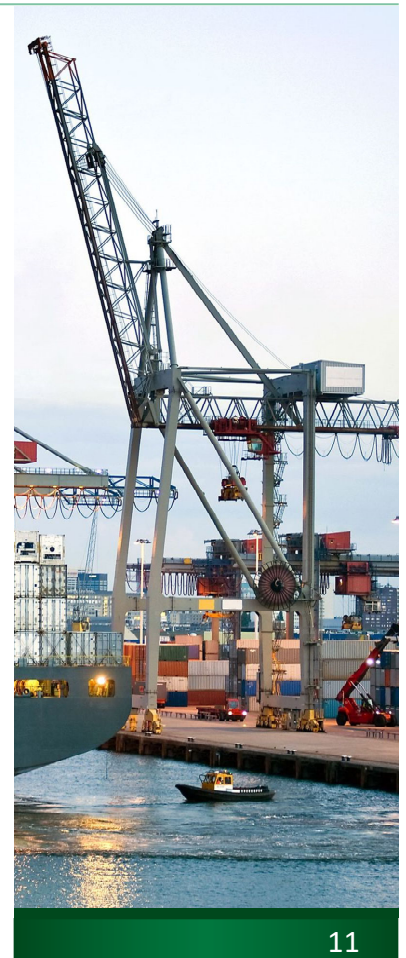
- Security and communication systems
- Energy charges for multiuser ports
- Power supply to vessels (also known as cold ironing or shore-to-ship power)
- Cathodic protection
- Dangerous goods requirements
- Hazardous area requirements
- Large power swings and motor inrush currents from unloaders and cranes
- Low power factor from refrigeration containers

SpringCity is a panel consultant to a number of ports in Australia. We have significant experience in preparing designs, carrying out studies and improving power systems in port environments.

Example projects we have carried out for various ports include:

- Power system analysis and studies
- Power quality studies
- Earthing assessments
- Hazardous area classifications
- Arc flash studies
- Power network utility design (substations, cables, transformers, etc.)
- Renewable energy integration studies

Our extensive and specialized experience give our clients a piece of mind and confidence that their facility is being handled by experienced consultants and engineers who understand their operations and environment they operate in.



Pre-Qualified Organisation

SpringCity is a pre-qualified service provider and/or a panel consultant to a range of private and public organisations such as:

- Australian Clean Energy Regulator
- Western Australia Department of Mines, Industry Regulation and Safety
- Kalgoorlie Consolidated Gold Mines (KCGM)
- St Barbara Limited
- Public Transport Authority
- Water Corporation
- Rottnest Island Authority

SpringCity's Management Systems

Our project delivery and management systems are focused on providing quality delivery of projects in a safe manner whilst maintaining a focus on being environmentally responsible.

We keep abreast of the latest developments in management systems and update our systems regularly. Our management systems are third party certified to the following standards:

- ISO 9001 for quality management
- ISO 14001 for environmental management
- OHSAS 18001 for health and safety management
- AS 4801 for health and safety management



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