Cardno is a specialist electrical engineering consultancy providing professional services to the mining, utilities, materials handling, oil and gas, industrial and petrochemical industries.

**Power Systems**
Cardno can carry out all grid connection services for new plant and facilities, as well as network planning for utility infrastructure upgrades. We make it our business to stay abreast of technological change and this is reflected in our system designs, which routinely set industry standards.

**Utility Connection Planning Design and Implementation**
- Utility and supply authority negotiation
- Capital and operational cost comparison and feasibility studies
- Network stability and generation optimisation
- Network SCADA management systems

**Complete Electrical Power System Design for Generation, Transmission and Distribution**
- Transmission and distribution system design
- Substation design and construction
- Protection system design

**Energy Management**
- Current system structure and capacity assessments
- Power delivery system efficiency assessment and optimisation strategies
- Power factor correction
- Automation systems for enhanced equipment management investigation and design
- Load flow studies and energy management strategy development

**Power System Fault Analysis**
- Fault studies and assessments
- Critical failures emergency response
- Harmonic distortion analysis
- Electrical safety audits
- Insurance and accident investigations
- Earthing system audits and design
- Fault rectification

**Radio Link Planning**
Cardno can provide specialist VHF/UHF, microwave, VSAT and satellite link planning, design and implementation. Our staff are experienced in multiple industry software packages and can design backhaul networks, point to multipoint networks, single point to point links or satellite links. Our diverse experience across multiple industry sectors means we are well equipped to provide the following services:
- Option and feasibility studies;
- Business case development;
- Technology reviews and equipment selection;
- Tender, installation, commissioning and implementation documentation;
- Detailed design documentation and drafting;
- Network management design;
- Line of sight assessments;
- Radio field surveys;
- Site selection, site surveys and site assessments; and
- Radio spectrum license applications

**Power Generation**
Whether you need to increase power capacity, maximise efficiency or design a new power station, even in the most remote location, Cardno has the expertise and the personnel to deliver a solution for you.

We have an enviable record on power station projects for mining companies and regional centres throughout Australia and around the world.

Contacting us early in the conceptual stage can provide significant benefits and cost savings. Let us carry out your feasibility study to identify the simplest, most effective solutions.

**Power Station Audits**
- Performance assessments and equipment and monitoring
- Efficiency reviews with regard to fuel, load profiling and load management
- Compliance reviews of operating procedures in line with statutory requirements

**Generation Asset Planning**
- Review and planning generation capacity
- Design and implementation of power stations
- Determine capacity for generation expansion
**North Mara Power Supply Upgrade Project**  
**Tanzania, Africa**

Cardno was engaged by Barrick Gold to undertake conceptual design and project management for the installation of 80 kilometres of 132 kV powerline, and TANESCO substations and the feeder to the North Mara mine including the site substation and integration of the embedded diesel power station into a cogeneration scheme.

The North Mara project involved modification of the existing 220kV Shinyanga Substation, 220 kV, 100 kilometre power line with lattice towers, a new Buzwagi Substation, 33 kV power line with lattice tower, and a new 33 kV Substation.

We completed the relocation of a 220kV SVC from Iringa in the south to Singida in the north, including project management and commissioning. Cardno BEC also supervised the construction of a 220kV series compensator at Dodoma.

Our scope included:

- project management;
- feasibility studies and conceptual designs for power lines;
- detailed discussion with country grid authority (TANESCO) for design concept, environment study, land compensation, right of way for the power line, project implementation agreement, power supply agreement;
- consultancy design and project management services for overhead power lines and substations;
- technical management, document control, project management, contract management, construction management, testing and commissioning and project close-out services;
- powerline and switchgear construction management;
- testing and commissioning; and
- handing-over the power line and substation to the grid authority.

**Fremantle Port HV Submission and Design for ZPMC Crane CF09**  
**Fremantle, WA, Australia**

Cardno provided HV systems design and auditing, power system modelling, and HV submission work for a new container crane for Patrick Terminals including:

- an audit of existing systems;
- power system modelling;
- load flow studies;
- transient analysis;
- HV submission;
- a feasibility study;
- design documentation for cable schedules, equipment lists, specifications, etc; and
- site commissioning.

**Baralaba South Coal HV Design and Feasibility**  
**Baralaba, QLD, Australia**

We have undertaken the HV reticulation design for the mine expansion and feasibility study of the coal handling preparation plant at Cockatoo Coal’s Baralaba Coal Mine.

Our scope included:

- load flow simulations and fault level investigations;
- high voltage/power system layout and reticulation;
- electrical load calculations and maximum demand calculations;
- plant and equipment selection;
- protection coordination;
- design of protection systems and overall control philosophy;
- design of primary and secondary distribution centres;
- CHPP feasibility study documentation and estimates;
- equipment specification and procurement; and
- production of detailed engineering drawings for construction.

**About Cardno**

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno’s team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange (ASX: CDD).

[www.cardno.com](http://www.cardno.com)