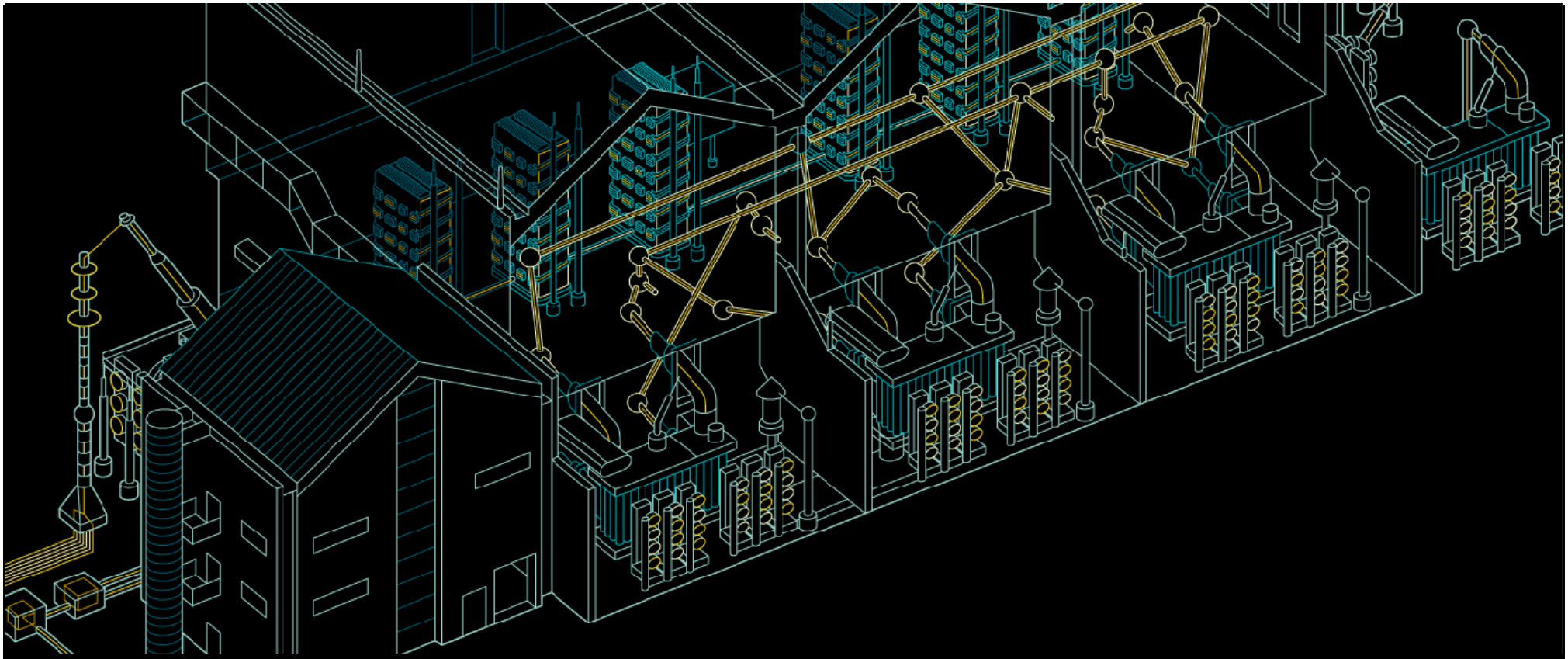


PPMV Modular Systems - PG3435, October 2010

E-House Presentation
BU Medium Voltage Products
PG3435 - Modular Systems

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Power and productivity for a better world™

Introduction







- **Welcome to the E-house presentation!**
- **Modular Systems is a Product Group that belongs to the Business Unit of Medium Voltage Equipment**
- **We hope you enjoy the presentation and learn about the features, benefits and values of the Electrical Houses.**

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Contents

- Product Overview
- Applications
- Technical Information
- Value for Customers

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Contents

- **Product Overview**
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Product Overview
Definition



E-House / Electrical House or Power House

- Electrical House (E-House) **is a prefabricated walk-in modular enclosure** to house a medium and low voltage switchgear as well as auxiliary equipment.
- Custom-engineered, walk-in metal enclosure specifically built to protect critical electrical equipment in the power distribution network.

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Product Overview
Objective



E-House / Electrical House or Power House

- The intent of the E-House is to provide medium and low voltage equipment along with an outdoor enclosure, skid or wheel mounted ready to operate in the field with minimum installation, commissioning and start up time.
- Alternative to traditional on-site building construction (concrete block, brick construction or similar)

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Product Overview
General Scope





E-Houses have the flexibility to accommodate virtually any type of power distribution equipment.

- The main equipment is medium voltage switchgear mainly at 12, 15, 24, 27 or 36 kV and low voltage switchgear below 1kV.
- Low voltage switchboard and motor control canters can be installed as part of the power distribution equipment.
- Typically the E-House is provided with station electric service that includes a panel board, lighting, power outlets, battery banks, transformer for auxiliary services, safety equipment and air conditioning system.

Product Overview
Modular Systems Portfolio



- Electrical Houses (E-Houses)
- Mobile Substations
- Secondary Substations (Medium Voltage Switchgear, Transformer, and Low voltage Switchboard)
- Railway Application Modules

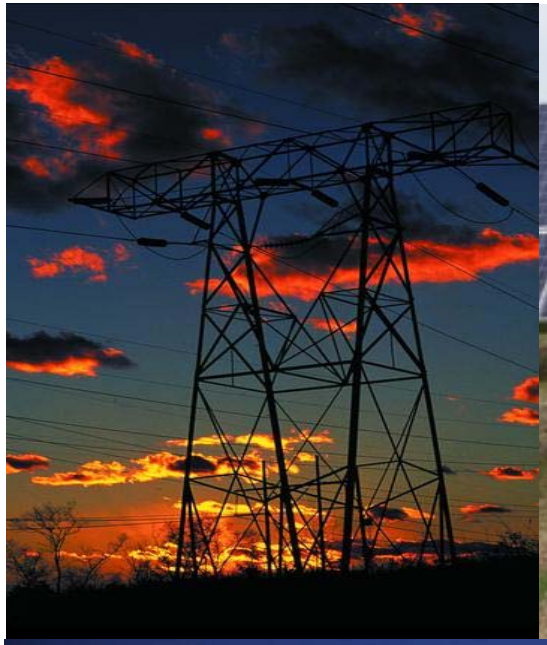
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- Sales Arguments

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Applications







1) **Industrial**
2) **Utilities**
3) **Renewable Energy**
4) **Outdoor Switchgear**
5) **Moveable or Mobile Substations**

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Applications





1) Industrial

- The E-House's are widely used in the Oil and Gas and Mining Industry.
- In these applications the E-Houses contains the Medium and Low Voltage switchgear and the main low voltage load control as well as auxiliary equipment.
- In the se applications the E-House practically is the control center for the medium voltage power supply.

© ABB Group

Applications





2) Utilities

- Instead of building a conventional housing for the control, metering, auxiliary and low and medium voltage equipment of the substation some utilities order an E-House with the necessary equipment to control and operate the substation as well as distribute the energy out of the secondary side of the transformer.

- Power Plants – for upgrading power plants or adding scrubbers, E-Houses are an ideal solution, since they can be built, assembled and tested off-site and quickly dropped into place when needed.

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Applications



3) Renewable Energy

E-House can be customized to meet the needs of

- Wind energy applications
- Solar energy applications
- Distributed Energy Storage applications
- Many others.

© ABB Group

Applications





4) Outdoor MV Switchgear

- The E-House is an excellent alternative to house the MV switchgear for outdoor installation.
- Indoor MV switchgear within an E-House brings the following advantages over the Outdoor Switchgear:
  - Easy to expand and modify
  - Lower installation and commissioning cost
  - Easy to relocate because is transportable as a unit, it does not require extensive disassembly like the outdoor switchgear

© ABB Group

Applications



4) Outdoor MV Switchgear

- Installation of the MV switchgear inside an E-House

© ABB Group

Applications



5) Movable (Dragged) Substations

- An E-House mounted on skids and coupled to a transformer is a good option for a complete movable substation – typical application dragging through an open mining pit.

© ABB Group

Applications





5) Mobile Substations

- E-House mounted on wheels can be used for emergency power in various locations
- Can also be used for temporary power
- Easy to move and relocate

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- Product Overview
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  - **Main Components**
  - **Medium Voltage Switchgear-Correct Installation**
  - **Weather Proof Design**
  - **Layout Optimization**
  - **Fire Rated Walls/Doors**
  - **Container Size E-House**
  - **SAMP Building**
- Competitors
- Value for Customers
- Test

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Technical Information

Main Components of E-House

Transformer with bus duct connection makes the E-House an excellent choice for enclosed unit substation



Protection Panels

Motor Control Center



MV Switchgear

Battery Banks

UPS

Low Voltage Switchboard

Drives

- **Power Monitoring and Control System (PMCS)**
- **Inverters for wind or solar connections**
- **Distributed Power Storage equipment – e.g. batteries and chargers**

Interior and Exterior Light; Power outlets; Air Conditioning; **Emergency and Safety equipment** (eyewash fountains, fire suppression systems), **Convenience Facilities** (work areas, desks, toilets); **Fixtures and Connections**

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Main Components Building





Let’s start with the Metal Building

- The building is typically made out of galvanized steel.
- It is built according to international standards like ASTM, ANSI, IEC, Australian, JEC, GOST, etc.
- It is built to successfully perform under end user requirements like seismic, climate and duty conditions.
- Insulated walls, doors and ceiling protect the equipment lengthening it’s life

© ABB Group

Main Components
MV Switchgear





Main Components of the E-House

- The main equipment in the E-House is the Medium Voltage (MV) Switchgear.
- The MV Switchgear can be Air or Gas Insulated.
- Typical voltage levels are 5, 12, 15, 24, 27 and 33 kV. Available up to 52 kV.
- ANSI or IEC. Other Standards available upon request.
- The knowledge and experience of ABB Medium Voltage guarantees and optimal product selection as well as safe and reliable installation inside of the E-House.

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Main Components
Protection Panels



Protection Panels

- Some users specify the relays mounted in a separate panels instead of installed in the MV switchgear.
- Theses panels are called Protection Panels.
- The Protection Panels are installed inside of the E-House and tested to guarantee the operation in conjunction with the MV Breakers and the control system.
- If the end user specifies a Power Monitoring and Control System the communication wiring and communication devices installation is done inside of the E-House.

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Main Components Auxiliary Equipment



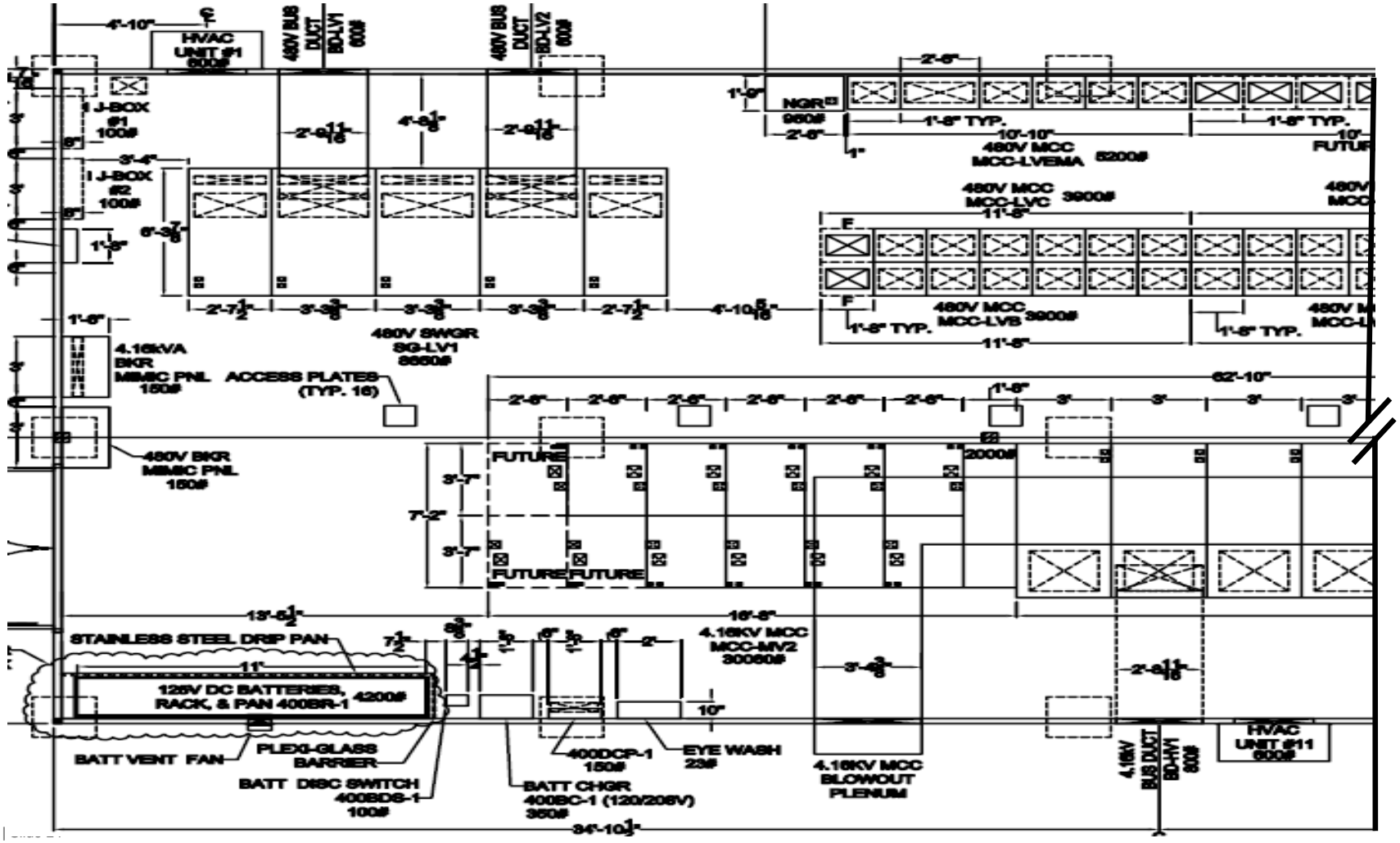


Battery Banks, UPS, Chargers

- The MV Switchgear needs a reliable DC supply to operate. Auxiliary equipment such as battery banks and transformers are installed and tested.
- One of the advantages of the E-Houses is that customer does not have to place orders to different providers for MV switchgear and Auxiliary Equipment. ABB E-House team will manage the proper product selection in order to provide an integrated Medium Voltage solution.

Main Components
Low Voltage Switchboard, Motor Control Center, Drives

- Some specifications call for the installation of the main low voltage equipment. ABB E-House team prepares a layout with the equipment in order to optimize the size of the building and the performance of the equipment



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Main Components
HVAC-Air Conditioning System





- E-Houses are designed and fabricated with industrial air conditioning systems to handle anticipated heat loads from both the environment and the electrical equipment housed within.

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Main Components
Building Equipment







The building equipment includes:

- Interior and Exterior Lighting
- Fixtures and Connections
- Power outlets
- Transformers for auxiliary services and lighting
- **Emergency and Safety equipment:**

  Eyewash fountains

  Fire suppression systems

  Alarms

  Specific equipment upon request

☛ **Upon request the E-House can be provided with work areas, desks, toilets, among others.**

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Technical Information

Medium Voltage Switchgear-Correct Installation

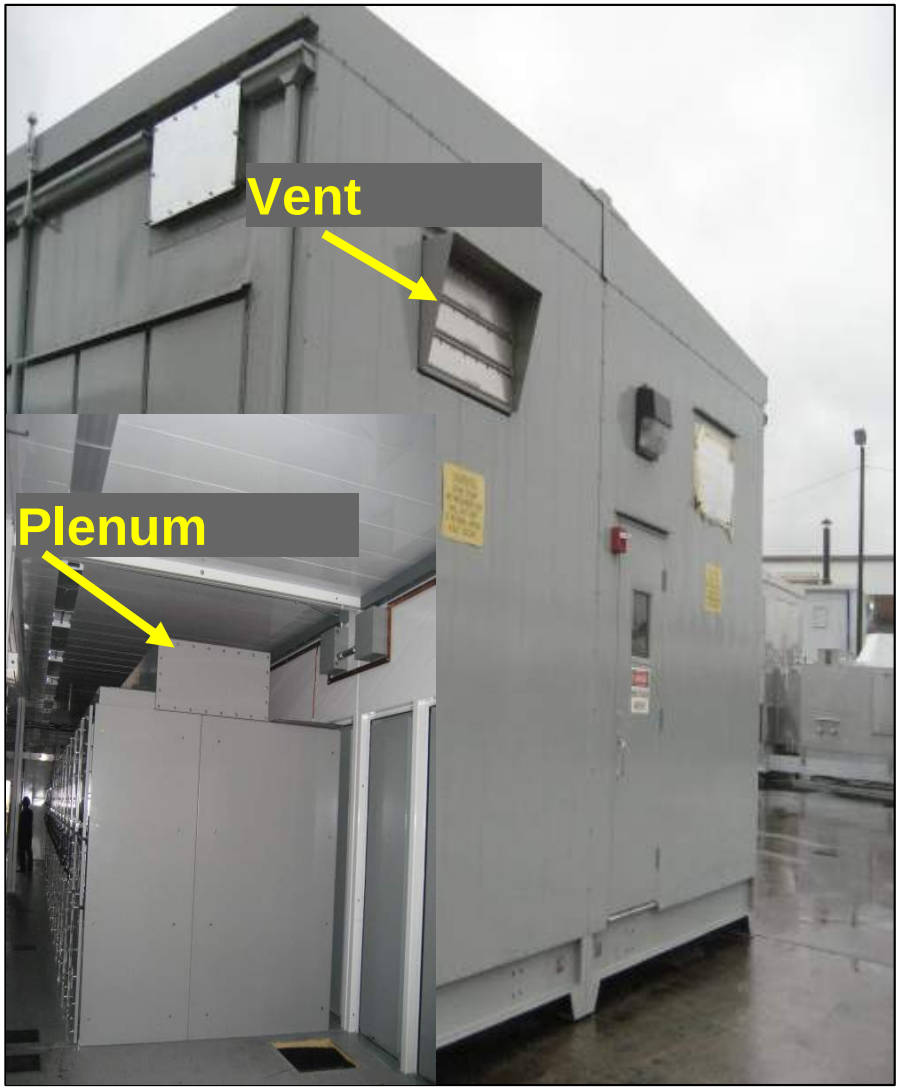


- Equipment operation depends on proper handling, installation, and maintenance. Neglecting fundamental requirements may lead to personal injury, failure of the equipment and property damage.
- The E-House team has thorough knowledge and vast experience to guarantee the correct installation and testing of the Medium Voltage Switchgear.
- One of the key issues for the safety of the operating personnel and building is to channel the gases out of the E-Houses in case of an internal arc fault in the switchgear.

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Technical Information

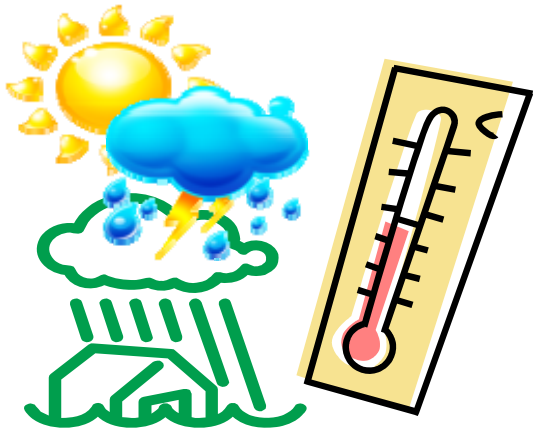
Medium Voltage Switchgear-Correct Installation



- A common way to expel the gases (in case of an internal arc fault) is to use a plenum.
- The plenum is a sealed duct across the top of the switchgear, covering all vent flaps.
- The plenum channels gases safely out of the building, through wall vents.
- Sized and shaped to minimize turbulence and back-pressure.
- Allows room for cable trays and conduit entry.
- Once the plenum is installed across the length of the switchgear line up it is connected to an external vent through wall penetration

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Technical Information
Weather Proof Design





E-Houses are designed and manufactured to operate virtually in any type of weather

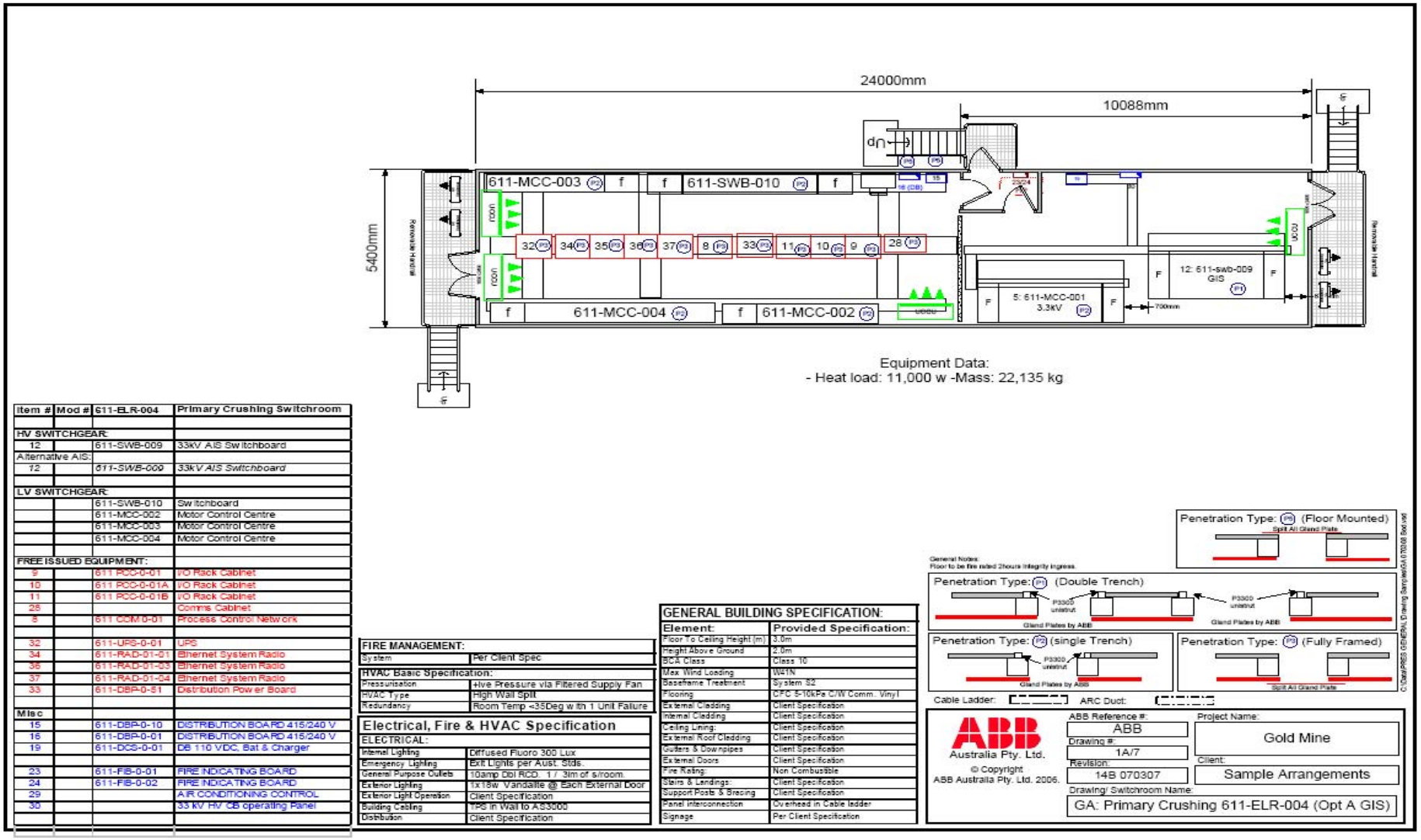
- E-Houses are designed and fabricated with industrial air conditioning system to handle anticipated heat loads from both the environment and the electrical equipment housed within.
- The E-House is built with insulation which allows sensitive electrical equipment to operate in adverse environmental conditions.
- Upon request the E-House can be provided with a pressurization system in order to have a controlled atmosphere.
- Upon request the E-House can be provided blast proof.

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Technical Information

Layout Optimization

The E-House is designed to optimized the space inside through: product selection, 1 way access, building wall access, smaller footprint products, among others.



Item #	Mod #	611-ELR-004	Primary Crushing Switchroom
HV SWITCHGEAR:			
12		611-SWB-009	33kV AIS Switchboard
Alternative AIS:			
12		*611-SWB-009*	*33kV AIS Switchboard*
LV SWITCHGEAR:			
		611-SWB-010	Switchboard
		611-MCC-002	Motor Control Centre
		611-MCC-003	Motor Control Centre
		611-MCC-004	Motor Control Centre
FREE ISSUED EQUIPMENT:			
9		611 PCC-0-01	I/O Rack Cabinet
10		611 PCC-0-01A	I/O Rack Cabinet
11		611 PCC-0-01B	I/O Rack Cabinet
28			Comms Cabinet
8		611 COM 0-01	Process Control Network
32		611-UPS-0-01	UPS
34		611-RAD-01-01	Ethernet System Radio
35		611-RAD-01-03	Ethernet System Radio
37		611-RAD-01-04	Ethernet System Radio
33		611-DBP-0-51	Distribution Power Board
Misc			
15		611-DBP-0-10	DISTRIBUTION BOARD 415/240 V
16		611-DBP-0-01	DISTRIBUTION BOARD 415/240 V
19		611-DCS-0-01	DB 110 VDC, Bat & Charger
23		611-FIB-0-01	FIRE INDICATING BOARD
24		611-FIB-0-02	FIRE INDICATING BOARD
29			AIR CONDITIONING CONTROL
30			33 kV HV CB operating Panel

FIRE MANAGEMENT:	
System	Per Client Spec

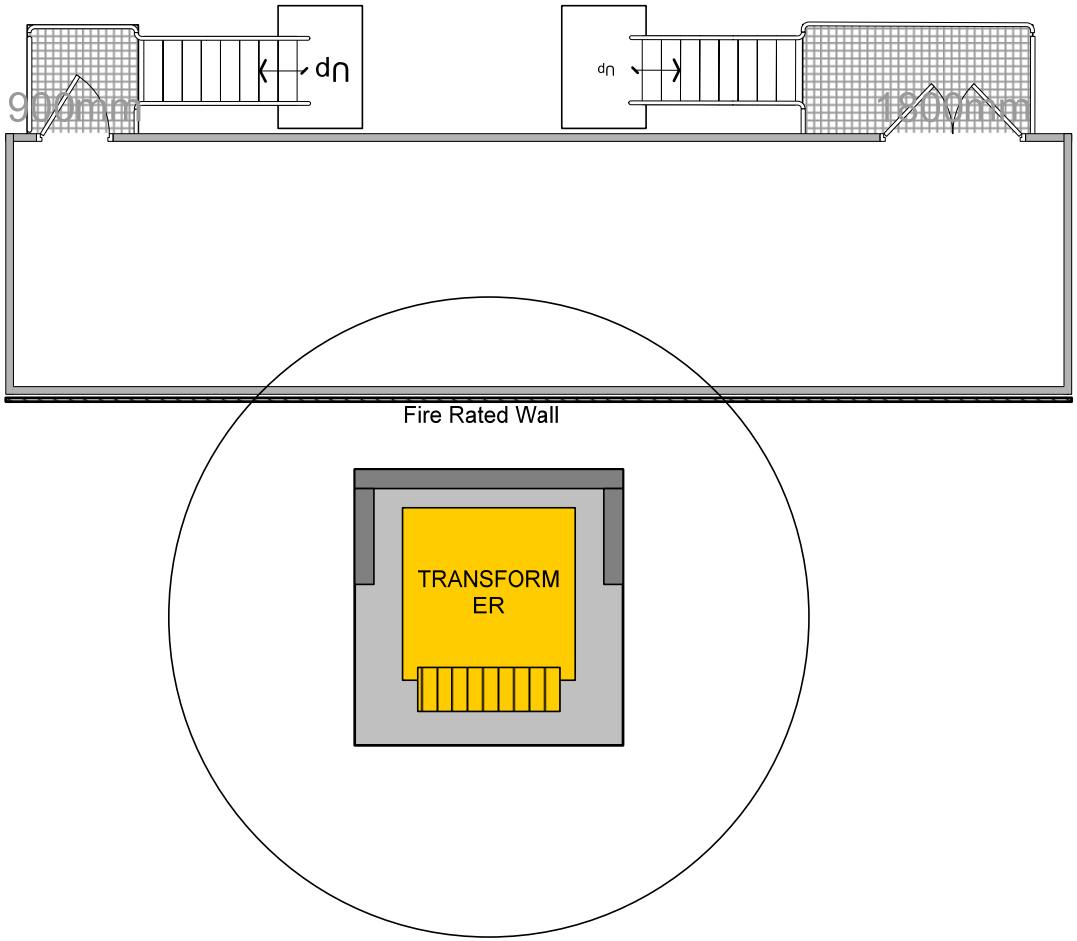
HVAC Basic Specification:	
Pressurisation	+Ive Pressure via Filtered Supply Fan
HVAC Type	High Wall Split
Redundancy	Room Temp <35Deg w ith 1 Unit Failure

Electrical, Fire & HVAC Specification	
ELECTRICAL:	
Internal Lighting	Diffused Fluoro 300 Lux
Emergency Lighting	Exit Lights per Aust. Stds.
General Purpose Outlets	10amp Dbl RCD. 1 / 3lm of s/room.
Exterior Lighting	1x18W Vandalite @ Each External Door
Exterior Light Operation	Client Specification
Building Cabling	TPS in Wall to AS3000
Distribution	Client Specification

GENERAL BUILDING SPECIFICATION:	
Element:	Provided Specification:
Floor To Ceiling Height (m)	3.0m
Height Above Ground	2.0m
BCA Class	Class 10
Max Wind Loading	W41N
Baseframe Treatment	System S2
Flooring	CFC 5-10kPa C/W Comm. Vinyl
External Cladding	Client Specification
Internal Cladding	Client Specification
Ceiling Lining	Client Specification
External Roof Cladding	Client Specification
Gutters & Downpipes	Client Specification
External Doors	Client Specification
Fire Rating	Non Combustible
Stairs & Landings	Client Specification
Support Posts & Bracing	Client Specification
Panel Interconnection	Overhead in Cable ladder
Signage	Per Client Specification

Technical Information

Fire Rated Walls/Doors



- Some specifications call for fire rated Walls and Doors especially if the E-House is installed in a special environment – e.g. close to an oil transformer.

Fire resistance rating and label shall be 1.5 hour minimum rating.

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Technical Information

Container Size E-House

Benefits: Easy transportation, handling and installation of the MV Switchgear



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Value for Customers

Why an E-House?





☑**From design to delivery - single point of contact for all equipment.**

☑**Cost effective supply and project management**

☑ **Shorter startup/commissioning time**:

- ☛ Prepare site and build equipment simultaneously
- ☛ The E-House is tested before shipping including all its components = Minimize risk in the field
- ☛Reduced labor at remote locations (where skilled labor is sometimes not available and all labor is expensive and difficult to manage)
- ☛Decreased specific skills and equipment needed at site (e.g. testing)
- ☛Low cost for start up and commissioning

☑ **Proximity to major suppliers during design/construction makes the changes and integration easier**

© ABB Group

Value for Customers

Why an E-House?





☑The mobility of the E-House makes the installation in the field easier.

☑E-House can be relocated if needed. Cost effective relocation.

☑E-House can be installed close to the main loads which reduces the power and control cable size and length. By being close to the loads the energy cost is lower:

Shorter cables=lower losses $i^2 R$

☑Optimal building size covering the present needs and expandable in the future

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Value for Customers
Why an E-house from ABB?



1) Complete ABB portfolio of medium and low voltage switchgear
2) Deep Technical analysis of the request by the E-House quotation team
3) Project Management: from design to delivery - single point of contact for all equipment.
4) Engineered Building to satisfy end user requirements
5) Supply management for ABB and third party equipment
6) Global leader with huge installed base, global service coverage and high level of engineering capabilities

© ABB Group

Value for Customers

Why should the customer buy from ABB?

1) Complete ABB portfolio of medium voltage switchgear

- ☑ ABB is a global leader in Medium Voltage Switchgear with Air Insulated and Gas Insulated state of the art switchgear. Several standard designs like IEC, ANSI among others.
- ☑ Medium Voltage factories around the world guarantee the closeness to the end user.
- ☑ ABB offers a wide range of options for the end user in order to satisfy all possible requirements
- ☑ ABB offers LV switchgear, transformers, protective equipment, control equipment, inverters, etc to satisfy many application requirements

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Value for Customers

Why should the customer buy from ABB?

2) Deep Technical analysis of the request by the E-House quotation team

- ☑ The E-House quotation team deeply analyze the request to select the most appropriated medium voltage equipment to satisfy the customer specifications.
- ☑ Optimization of the E-House layout in order to offer a cost effective building.
- ☑ Selection of third party equipment according to the specification of the end user.
- ☑ Preparation of professional proposal and availability to meet with the customer to discuss the proposal.

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Value for Customers

Why should the customer buy from ABB?

3) Project Management: from design to delivery - single point of contact for all equipment.



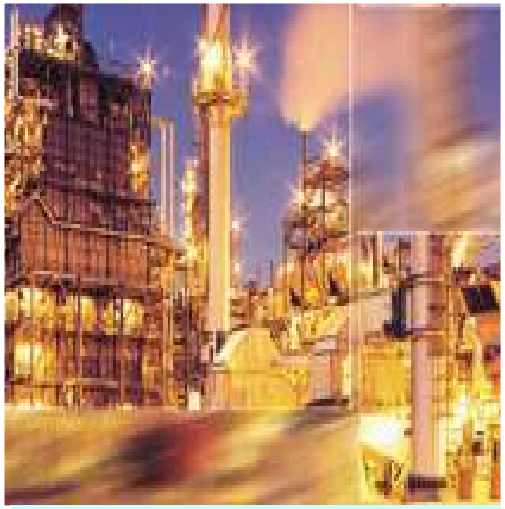


Coordinated delivery schedules avoid delays and increase value for the end users

Early visibility of problems and predictability in project execution

Project management from the beginning to the end: Order entry, Issue PO's to ABB and Third party products, Change-orders, Scheduling, Document control, Invoicing, Logistics.

E-House Team



Customers



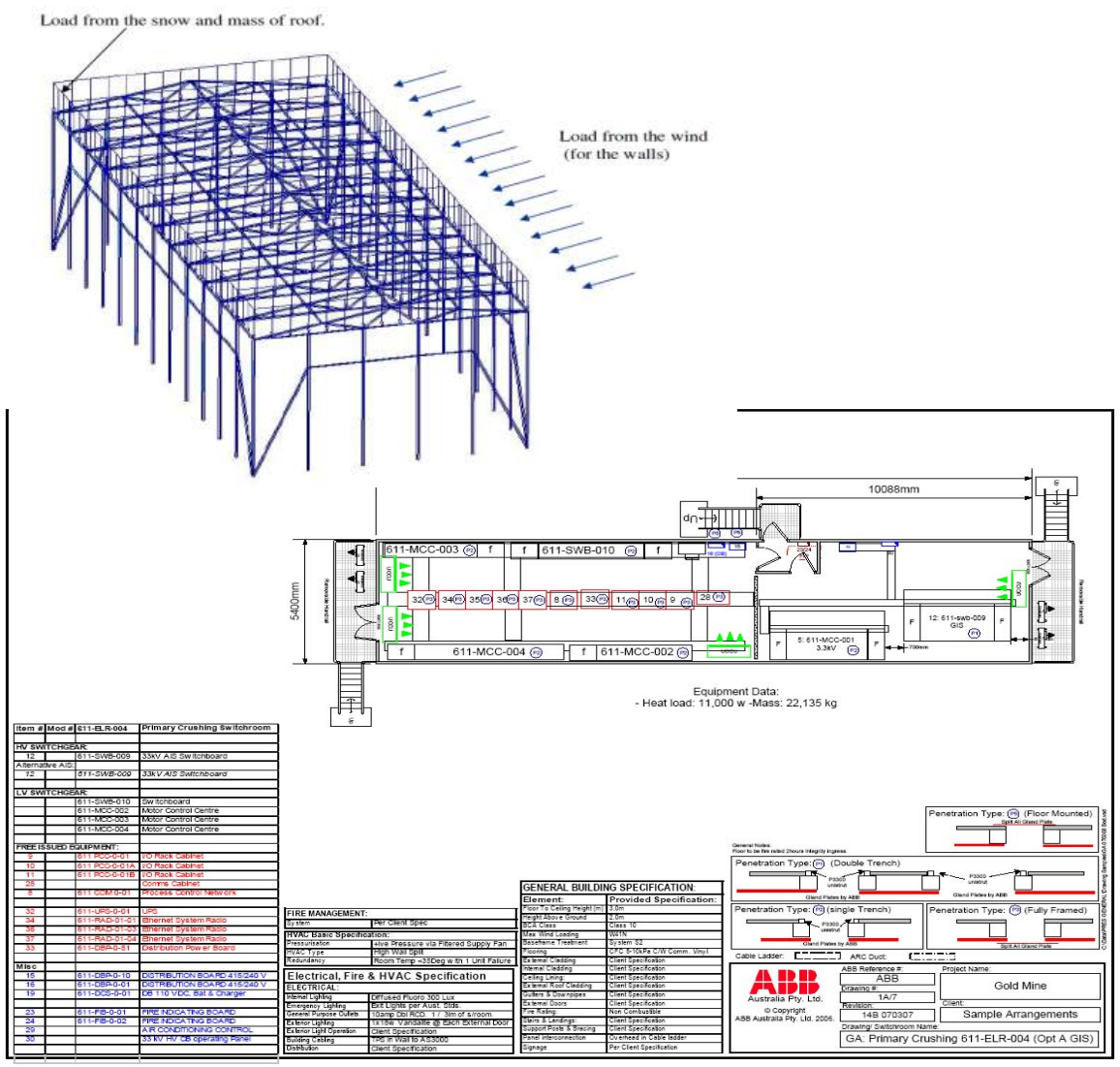




Value for Customers

Why should the customer buy from ABB?

4) Engineered Building to satisfy end user requirements.



- Design of the building and layout to meet the customer specifications and guarantee high performance
- High quality materials and integration to guarantee a long life in the building

Value for Customers

Why should the customer buy from ABB?

5) Supply management for ABB and third party equipment



- Selection of the third party equipment according to customer specifications.
- Guarantee the best value for the customer.
- Selection and Evaluation of the suppliers.
- Coordination from purchasing to installation in the E-House.

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Value for Customers

Why should the customer buy from ABB?

6) Global leader with huge installed base, global service coverage and high level of engineering capabilities.

- ☑ Continuous **innovation through Research and Development programs** as well as Global Product management.
- ☑ **Design and engineering capabilities** to adapt the E-House to the modern needs like solar or wind applications.
- ☑ **Local service operations in most countries to support installation and future needs.**
- ☑ **E-House teams around the world to be close to the customer and end user.**

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Value for Customers

Why should the customer buy from ABB?

6) Global E-House teams:



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Some References

Tar Sands Area:
Syncrude Canada
Suncor Energy
Albian Oil Sands
Canadian Natural Resources Ltd.

Mines:
Luscar Coal
Cardinal River Coal
Highland Valley Copper
Elk Valley Coal
Wabush Mines
Iron Ore Co. of Canada
Western Energy

Industries:
Crown Industries
Patton and Cooke

Oil and Gas Related:
Shell (Canada)
Kumtor (Kyrgyzstan)
AEC Pipelines
Westcoast Energy
Imperial Resources
BP
Gulf Midstream
Irving Oil
EnCana Oil and Gas
Exxon Mobil
PetroCanada
Union Carbide
Express Pipelines
Nexen Petroleum
PetroKazakstan
LNG (Angola)
Ambatovy (Madaghasker)
Co. Minera Zaldivar (South America)
Zhungeer Coal (China)
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Power and productivity
for a better world™

