

SDEE



SDEE

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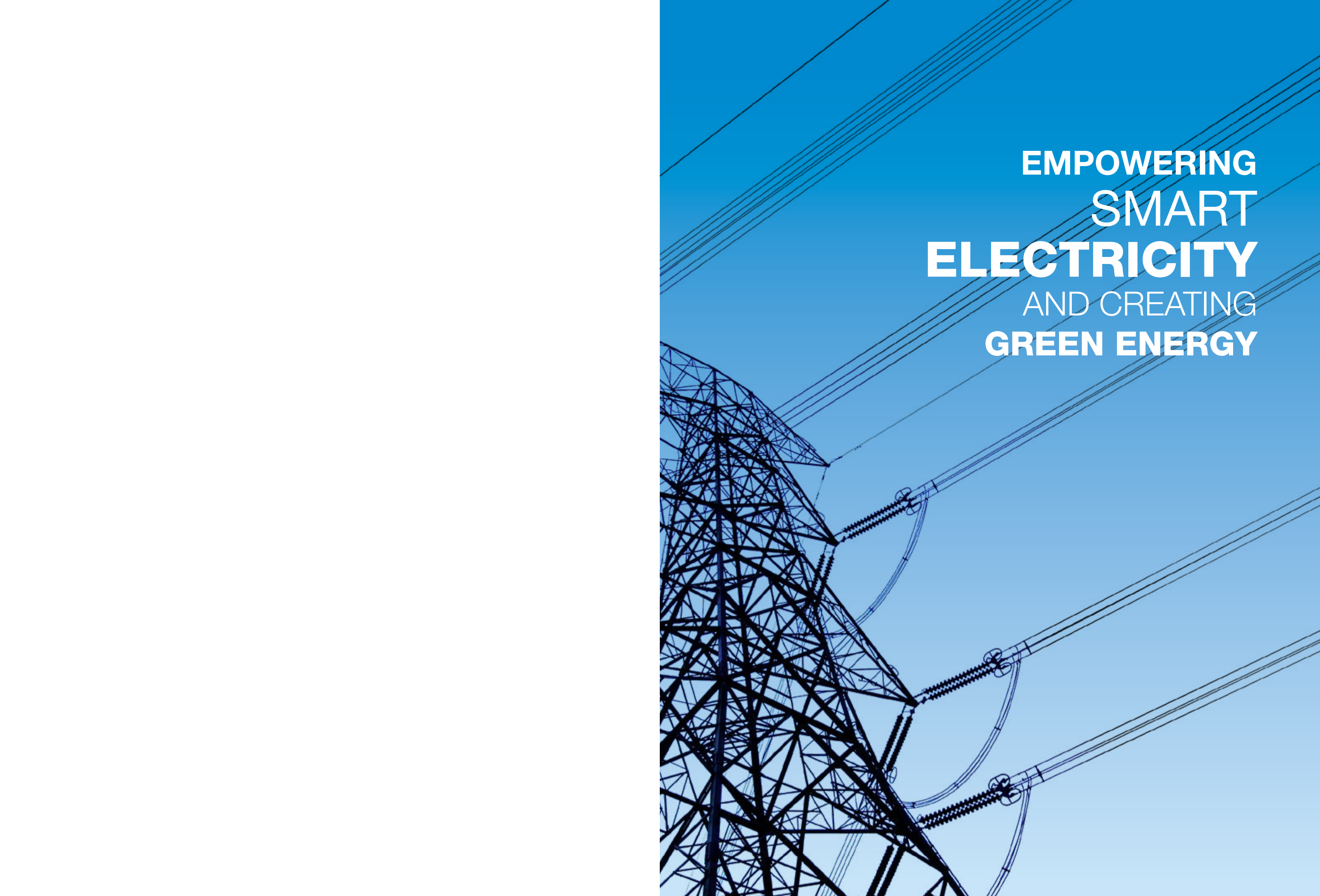
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SDEE

**SHANDONG ELECTRICAL
ENGINEERING & EQUIPMENT GROUP CO., LTD.**

TRANSFORMER / TOWER / CABLE & CONDUCTOR / GIS & GIL
ENERGY STORAGE SYSTEM / EV CHARGERS / INTELLIGENT BUSINESS / EPC BUSINESS



**EMPOWERING
SMART
ELECTRICITY
AND CREATING
GREEN ENERGY**

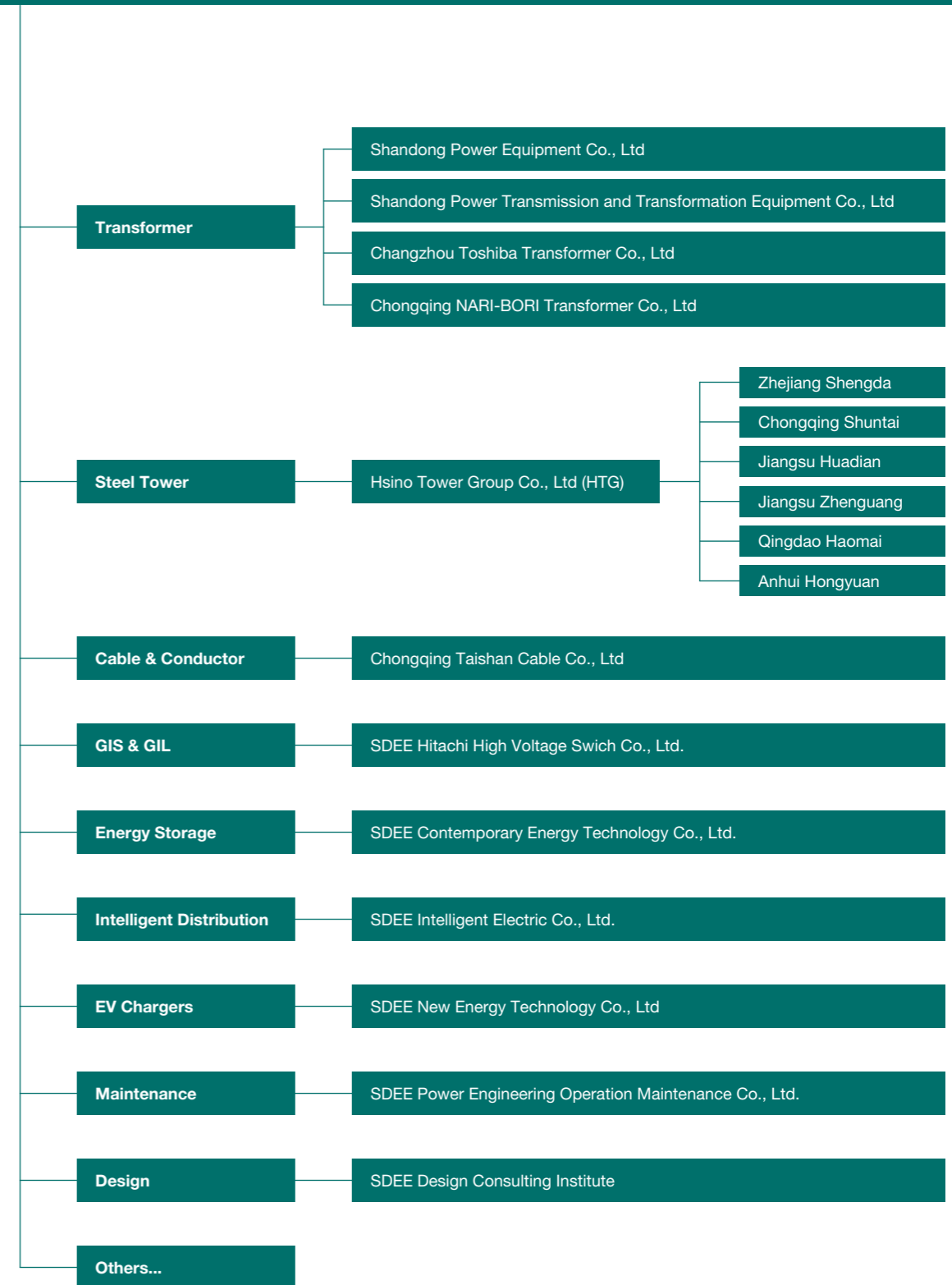


TECHNOLOGY
 QUALITY
 EFFICIENCY INNOVATION
 ENVIRONMENT

PROFILE

Shandong Electrical Engineering & Equipment Group Co., Ltd. (SDEE), a large state-owned enterprise affiliated to the China Electrical Equipment Group Co., Ltd (CEE). focuses on the services in energy and power industry, provides technology, products and services to global customers, and builds into

an international first-class power equipment manufacturer and integrated solutions service provider. SDEE operates service networks in nearly 90 countries and regions around the world, providing customers with better, faster, and more considerate services anytime and anywhere.



TECHNOLOGY

SDEE adheres to the principle of customer-centric and market-oriented, and has the advanced technology R&D platform, first-class test ability, perfect quality assurance system, mature product supporting and integration ability, and sound marketing service system. SDEE has successively provided power transmission and transformation equipment and materials for many key UHV projects put into operation and under construction in China.



R&D

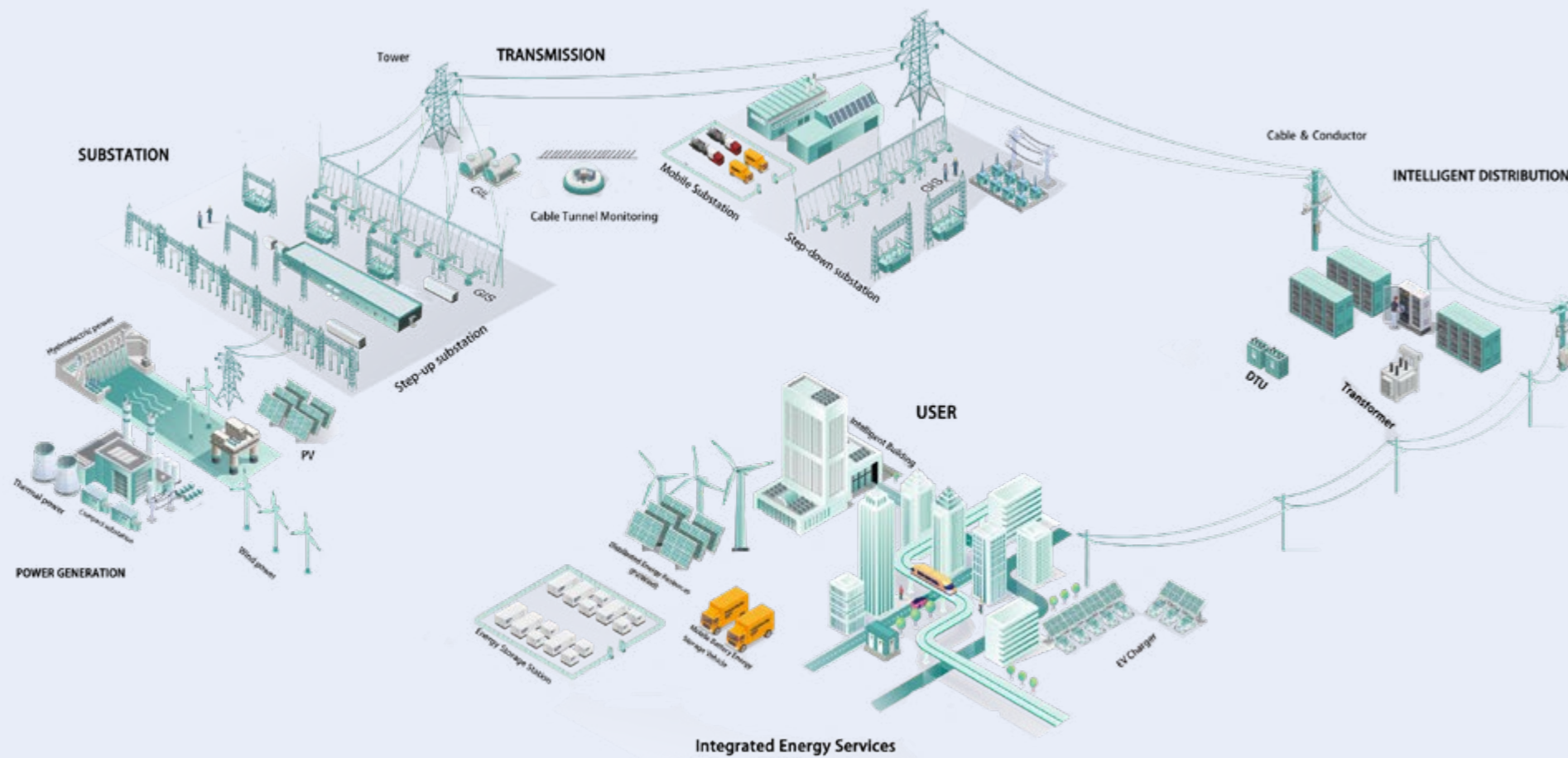
SDEE has created a highly sophisticated scientific research team, and established graduate training base, China National Accreditation Service for Conformity Assessment (CNAS) Accreditation Testing Center (CNAS L5886), provincial UHV GIS Engineering and Technology Research and Development Center and other scientific research platforms. SDEE relies on State Grid Smart Research and Institute to strengthen the cooperation with world famous universities and top class transformer research institutes, actively to develop the advanced basic research in electrical and engineering sector.

3.246 billion Yuan
R&D expenditure of RMB 3,246 billion Yuan

93 awards
93 provincial and ministerial science and technology awards

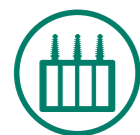
743 projects
743 scientific research projects

803 patents
Obtained 803 patents



PRODUCT SERIES

SDEE has formed a perfect production and sales service chain of **Transformers, Steel Towers, Conductors and Cables, combined electric and intelligent distribution network products**. SDEE is the leader in the industry with R&D and production capacity in AC / DC transformer with full voltage and full series, full series angle steel tower, steel tubular tower, frame support, 1,000 kV and below conductor, 500kV and below cable. SDEE has achieved the complete intelligence of equipment in GIS business.



• **01 Transformer**



• **02 Tower**



• **03 Cable & Conductor**



• **04 GIS & GIL**



• **05 Energy Storage System**



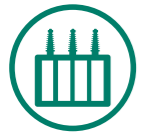
• **06 EV chargers**



• **07 Intelligent Business**



• **08 EPC Business**



Transformer

SDEE has independently developed **1000kV and below DC&AC transformers and reactors**, of which annual capacity reaches up to **185GVA**. SDEE is one of the four companies who can manufacture 1000kV UHV transformers in the world.

Research and development
1000 kV UHV

Annual capacity
185 GVA



▲ ±800kV Converter transformer for UHV DC from Lingzhou-Shaoxing Transmission Line Project, China

▲ 1000kV Transformer for Ximeng-Shandong UHV Project, China

► Power Transformer

01 500 kV



▲ 250MVA-500kV Transformer
Inga Substation
Ecuador



▲ 350MVA-500kV transformer
Olak substation
Malaysia

03 220 kV



▲ 170MVA-220kV Transformer Carregado Substation,
Portugal



▲ 230MVA-220kV Transformer
El Romero Substation
Chile

02 400 kV



▲ 280MVA-400kV Transformer
Koumoundourou Substation
Greece



▲ 315MVA-400kV Transformer
Holeta Substation
Ethiopia

04 132 kV



▲ 220MVA-132kV Transformer
Hussein Power Plant
Jordan



▲ 50MVA-132kV Transformer
Nyanga Substation
Zimbabwe

➤ Reactor Series



▲
400MVA/1100kV
UHV Shunt Reactor
is currently the largest capacity shunt reactor in the world.



▲
60MVar/500kV
Shunt Reactor
Tulum Substation, Russia



▲
50MVar/66kV
Shunt Reactor
Ecuador

➤ Power Distribution Equipment

The intelligent switches can achieve isolation and self-healing when the distribution network fails.



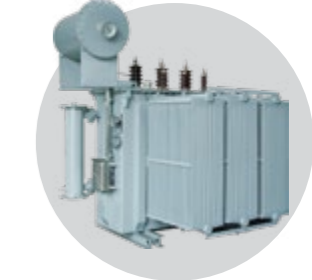
10kV Three Phase Oil Immersed Transformer



10kV Three-phase Oil Immersed Coil Core Transformer



Automatic Capacity and Voltage Regulating Transformer



35kV Three-phase Oil Immersed Power Transformer



Three Phase Epoxy Cast Dry Type Transformer



Combined Transformer for Wind Power Generation



10kV prefabricated substation (European box-type transformer)



Intelligent Packaged Substation

➤ Natural Ester Insulating Oil Transformer

- 01 Superior environmental performance
- 02 Favorable safety performance
- 03 Favorable economic benefit
- 04 Outstanding electrical performance
- 05 Super overload capability

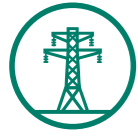
The natural ester insulating oil transformer can be used in some special fields with higher requirements to safety and environmental protection. Our natural Ester Insulating oil transformer can be up to **110kV/63MVA**.



110kV Natural Ester Insulating Oil Transformer



Natural Ester Insulating Oil Distribution Transformer



Tower

The annual capacity of tube towers and angle steel towers which can meet the requirements for all-voltage transmission lines is 1.2 million tons, and annual capacity of hot dip galvanizing is 700,000 tons.

SDEE has already completed many breaking towers projects in the world such as the world's highest tower--Fengcheng-Meili Continent Transmission Tower (**385 m**), the heaviest tower--Zhoushan Transmission Tower (**7,280 tons**), and the highest overseas tower--Amazon Long-Span Transmission Tower (**296 m**) in Brazil, etc.

Annual capacity

1,200,000 tons



The highest overseas tower
Brazil: **296 m**



The highest tower
Fengcheng-Meili: **385 m**



Heaviest tower
Zhoushan: **7,280 ton**



500 kV GDHA Project, Ethiopia



400 kV T-pylon Project in Somerset, United Kingdom





Cable & Conductor

The annual outputs of electrical cables and conductors reach up to 170,300 kilometers and 45,000 tons respectively. In particular the ACSR technology for EHV&UHV fills in the Chinese gap and reaches the world leading level. The 900 and 1000 sqmm ACSR are widely used in UHV Projects.



All Aluminum Alloy Conductor



1000kV ACSR



ACCC



10kV MV Cable



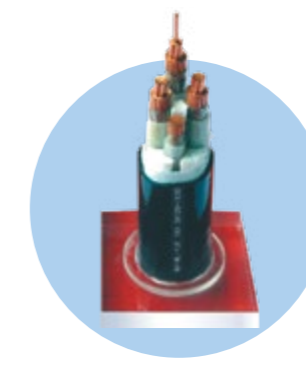
220kV XLPE Cable



500kV XLPE Cable



XLPE Insulated Steel Tape Armoured Cable



Flame Retardant XLPE Insulated PE Sheathed Cable



LV Cable



Cable & Conductor

SDEE has the production capacity of 1100kV and below conductors and 500kV and below cables, and has mastered many core technologies such as UHV conductors, composite core conductors, special cables, smart cables, submarine cables and 500kV and below AC and DC cables.

▼ Ecuador 220kV Transmission Line Project



Norway Kolbotn Transmission Project – Conductor



▲ Ecuador 230kV Hydropower Project-Cable

▼ Egypt EETC 500kV Transmission Project





GIS & GIL

SDEE's designed production capacity is 126kV GIS 1600 bays, 252kV GIS 840 bays, 550kV GIS 420 bays, 550kV HGIS 430 bays, 1100kV GIS 39 bays. The annual design and production of 550kV/1100kV GIL is about 50 kilometers.

1100KV

39 bays

550KV

850 bays



ZF51-1100(L)/Y8000-63(IFT) type SF6 GIS



550kV GIS



252kV GIS



126kV GIS



252kV GIS



252kV GIS

Up to now, SDEE has supplied 17,040 meters of 110kV GIL and 6,750 meters of 550kV GIL.

110kV
17,040 meters

550kV
6,750 meters



◀ 110kV Sutong GIL Pipe Gallery Project (under ground by tunnel, Crossing the Yangtze River), China

110kV GIL Live Test Field, Wuhan, China ▼





Energy Storage System

► Power-side Energy Storage Station

The battery of the project adopts a 1000-volt air-cooled solution, and SDEE has completed the R&D, design and supply of all 80 energy storage battery compartments, 40 variable-flow booster containers and EMS systems.

TOTAL CAPACITY
1003 MWh

The total capacity of the EPC
423 MWh

The total capacity of Complete Equipment
580 MWh



101MW/202MWh Battery Energy Storage System(BESS)

SDEE adopts 1500V liquid-cooled LiFePO4 battery solution to complete the system design and integration of all 32 variable-current booster compartments and 32 energy storage compartments. The single power of the variable-current booster container is 3.15MW, which is 26% higher than the traditional 1000V power density.



▲ Energy Storage Compartment

► Grid-side Energy Storage Station

- 01 Assist in the integration of new energy sources, promote smooth access of new energy sources, and reduce wind and light abandoning
- 02 Strengthen the grid stability, and participate in peak shaving, frequency modulation, voltage regulation, as well as demand side response
- 03 Improve the quality of power supplying / utilization
- 04 Increase the cost performance of power utilization
- 05 Provide stable electricity for remote areas and reduce grid construction costs
- 06 Improve the efficiency of energy utilization



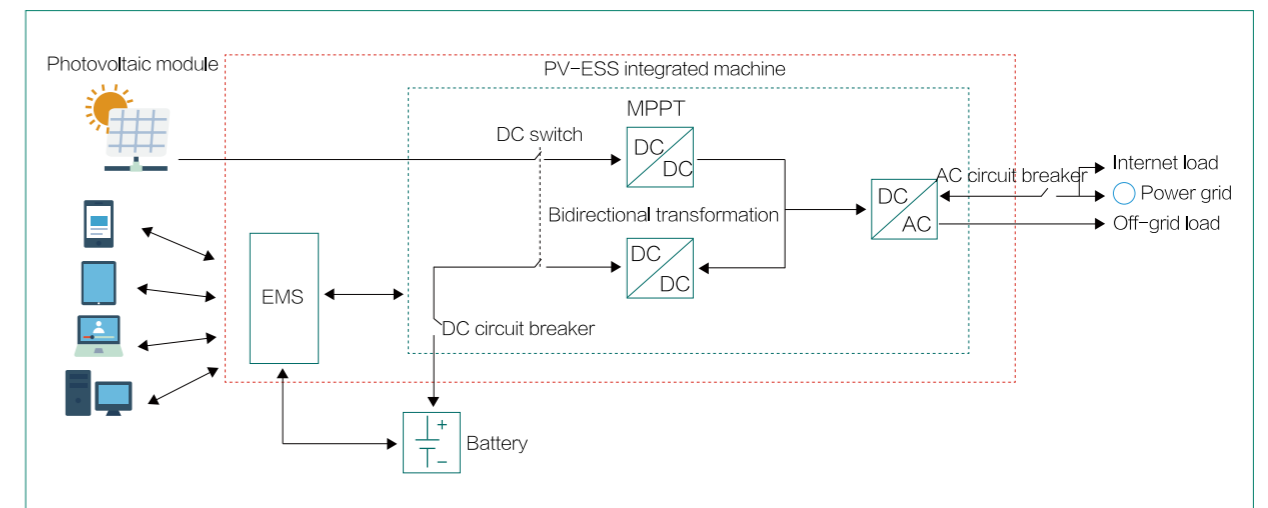
◀ 100MW/228MWh BESS

It is close to the 220 kV substation to improve the peak regulation and new energy consumption capacity of the power grid.



► Household Energy Storage System

Adopting high performance system design, the system integrates all subsystems such as photovoltaic power generation unit, control unit, energy storage unit and inverter unit. Among them, the energy storage unit adopts a standardized energy storage module composed of lithium ion batteries, and multiple energy storage modules are connected to the system in parallel, which is characterized by flexible expansion to meet users' needs. With the integrated design of photovoltaic and intelligent energy storage control facilitates, it can make use of sunlight and the peak and valley characteristics of grid to produce green value, reduce user expenditure, and improve the environment.



THE OPERATION OF HOUSEHOLD ENERGY STORAGE SYSTEM

► Mobile Energy Storage Vehicle

Achieving zero flashing during the process of power conservation, and participating in the interaction with grid, to strengthen the reliability of power supplying





EV chargers

SDEE's EV charger is a charging system that integrates rectification, charging management and charging guns, which is easy to install and flexible to deploy. It can work in a semi-enclosed environment (if the charging plug is sufficiently protected when working, it can be used completely outdoors).

➤ AC EV Charger



AC 22KW
EV Charger
(AC 003)



AC 22KW
EV Charger
(AC 006)



AC 2x22KW
EV Charger

➤ DC EV Charger



DC 40KW
EV Charger



DC 60KW+AC 22kw
EV Charger



DC 180KW/360KW
EV Charger



EV chargers



DC 180KWEV Charger

DC 360KW EV Charger

**IPTO Fast Charging Station Project
Athens, Greece**



PV-Energy Storage-Intelligent Charging Station

The small micro-grid system composed of distributed photovoltaics, energy storage, power transformation and distribution, AC and DC charging piles, loads, and detection and control systems can either be connected to the external power grid or run in isolation.





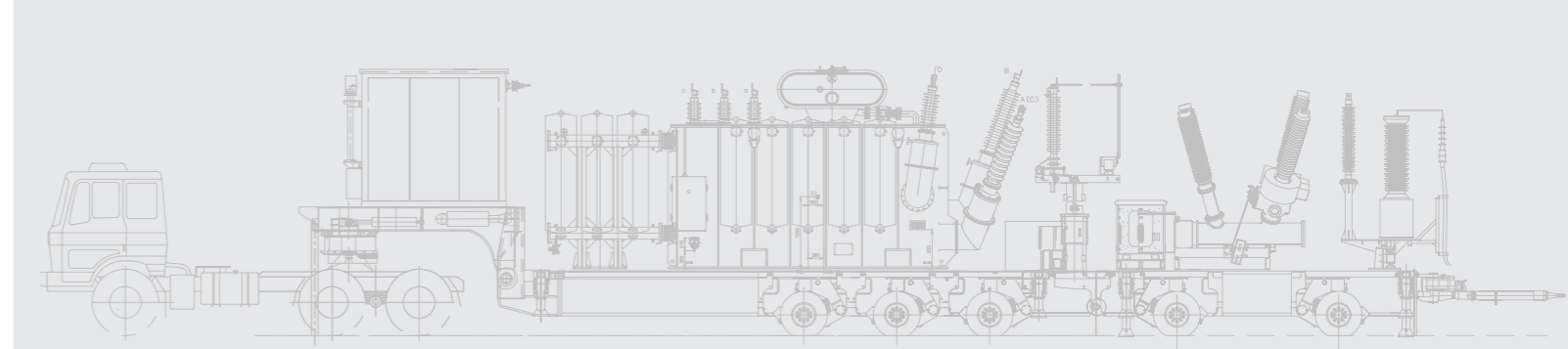
Intelligent Business

According to the construction requirements of the ubiquitous power Internet of things (IOT), SDEE provides multi-scene solutions in the fields of intelligent operation and inspection, power transmission, power transformation, power supply, etc. The intelligent analysis and control system for power grid operation and inspection, the transmission line and the power cable state monitoring system solution and the core assembly are widely applied. SDEE strives to build a system integration service provider in operation and maintenance, equipment leasing, integrated energy services, energy storage and other new businesses and new business types.

► Mobile Substation

COMPACT STRUCTURE	STRONG SEISMIC RESISTANCE	SMALL VOLUME	STRONG OVERLOAD CAPACITY
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▼ 110kV mobile substation



► Prefabricated Substation



- Save the cost and shorten the work period
- Green and environmental protection, no noise, and no radiation
- Fully sealed with small occupation
- Longer life with less maintenance





EPC Business

Focusing core business extension, enterprise transformation and upgrading and business model innovation, taking advantage of the group's brand and integration abilities, we have established strategic cooperation with well-known design institutes and construction units, and actively carried out EPC business overseas.



The successful operation of the 230kV substation project in San Esteban, Philippines, has earned the title of "Excellent EPC Contractor" awarded by the National Grid Corporation of the Philippines. Through EPC projects in Nigeria, Sudan and other countries, SDEE has established a good brand image.



MARKETING



SDEE went out along the “the Belt and Road Initiative” to promote business mode transformation from single sales to complete sets of equipment and EPC projects. Business layout was expanded from developing countries such as South Asia, West Africa, Southeast Asia, South America, Central Asia to emerging economy and developed countries such as Europe, North America, North Africa, Australia and more than 90 countries.

90+ Countries

● Sales Offices

● Foot Print



PROJECT PERFORMANCE



► Transformer

- 72.5kV/5MVar for Petro Iamazonas EP. CPF&SACHA Substation, Ecuador
- 132kV/50MVA Substation MT for Nyanga Substation Upgrade Project, Zimbabwe
- 132kV/220MVA GT for Zarqa CCGT Project, Jordan
- 150kV/50MVA MT for Naxos Island Substation, Greece
- 157.5kV/16MVar for Naxos substation, Greece
- 220kV/50MVA MT for EGP La Vega I II Substation, Spain
- 220kV/170MVA MT for Carregado Substation, Portugal
- 220kV/215MVA Substation MT for SAN GABRIEL Wind Power Project, Chile
- 220kV/250MVA 19 sets of MT for modernization of south-west transmission network (stage II) within Talimarjan Transmission Project, Uzbekistan
- 225kV/25Mvar for West Afira networking EPC Subject- LOT2, Liberia
- 330kV/75MVar for Katsina Substation, Nigeria
- 330kV/375MVA MT for TransGrid, Australia
- 400kV/170MVA MT for Alcochete Substation, Portugal
- 400kV/235MVA MT for Acciona San Carlos Wind Farm power plant, Mexico

- 400kV/280MVA 12 set MT for IPTO project, Greece
- 400kV/370MVA GT for LANCO Amarkantak Power Plant Phase-I GSUT, India
- 400kV/450MVA GT for Jerada 1x350MW coal power plant, Morocco
- 400kV/750MVA GT Sur S/S Maker Project, Oman
- 500kV/200MVA 10 sets of MT for Ecuador 500kV Power Transmission Line Inca Substation, Ecuador
- 500kV/250MVA 23 sets of Substation MT for Holeta Substation, Ethiopia Renaissance Dam Project, Ethiopia
- 500kV/300MVA 10 sets of GT for South Helwan 1x650MW Supercritical Power Plant –Power Transformers, Egypt
- 500kV/350MVA Substation MT for Olak Lempit Project, Malaysia
- 500kV/600MVA GT for Haunted Gully Terminal Station, Australia
- 525kV/1134MVA GT for Central Java Power Station, Indonesia
- 525kV/1330MVA GT for Java 7 Power Station, Indonesia
- 530kV/420MVA MT for Bayswater P/S, Australia
- ±800kV DC Converter Transformer for Zhahute-Qingzhou, China
- 1000kV/1000MVA Auto Transformer for UHV AC from Anhui to East Transmission Line Project Huxi Substation, China
- 1100kV/240Mvar for Western Neimeng to Southern Tianjin UHV AC Transmission Line Project Tianjin Substation, China





► GIS & GIL

- 126kV GIS Dongzhou substation, Shenzhen, China
- 252kV GIS Jinling substation, Changzhou, China
- 550kV GIS Xiangjiaba-Shanghai±800kV UHV DC transmission project Fengxian substation, China
- 1000kV GIS Huainan-Nanjing-Shanghai UHV AC Sutong GIL Pipe Gallery Project (Shanghai Part), China
- 550kV GIL for Shanghai Huangdu Project, China
- 1100kV GIL for Sutong GIL Pipe Gallery Project, China



► Cable & Conductor

- Supply AAC conductor for upper west regional electrification project, Ghana
- Supply ACAR1200MCM & GSW 3/8 for Ecuador Taday-Bomcoiza transmission line project, Ecuador
- Supply 9200km ACSR conductor for GDHA 500kV transmission line, Ethiopia
- Supply ACSR serials conductor for 380kV Transmission line, Germany
- Supply ABC cable and AAAC insulated conductors as well as its accessories for design, supply, installation/erection, testing and commissioning of 11/0.4 kV distribution system, Nepal
- Supply 110kV cables and its accessories for Thanh Cong-Thuong Dinh 110KV EPC Project, Vietnam

► Tower

- The 370-meter Zhoushan Crossing-Continent Transmission Tower- the highest tower in the world
- 1000kV Jindongnan-Nanyang-Jingmen UHV AC Demonstration Transmission Project, China
- Yangtze River Crossing Tower for 1000kV Huainan-Shanghai UHV AC Transmission Project, China
- 296m Brazilian Amazon River Cross River Tower - South America's tallest tower, Brazil
- 500kV double-circuit transmission line tube tower, with a maximum diameter of 3.3 meters, Canada
- EETC 500KV 1200km transmission line, Egypt
- Yacyreta-Ayolas-Villa Hayes 500kV transmission line, Paraguay
- Lattice steel towers for 400kV Olsztyn and Gdansk transmission Project, Poland





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F U T U R E

ESTABLISH
A **WORLD-CLASS** POWER
EQUIPMENT MANUFACTURER
AND SYSTEM
SERVICE PROVIDER