

Derwent
Top 100
Global
Innovator
2020

FACTS

Flexible AC Transmission System

GridSol SVC

GridSol STATCOM

Opening the future of smart energy.

LS[▲]**ELECTRIC**

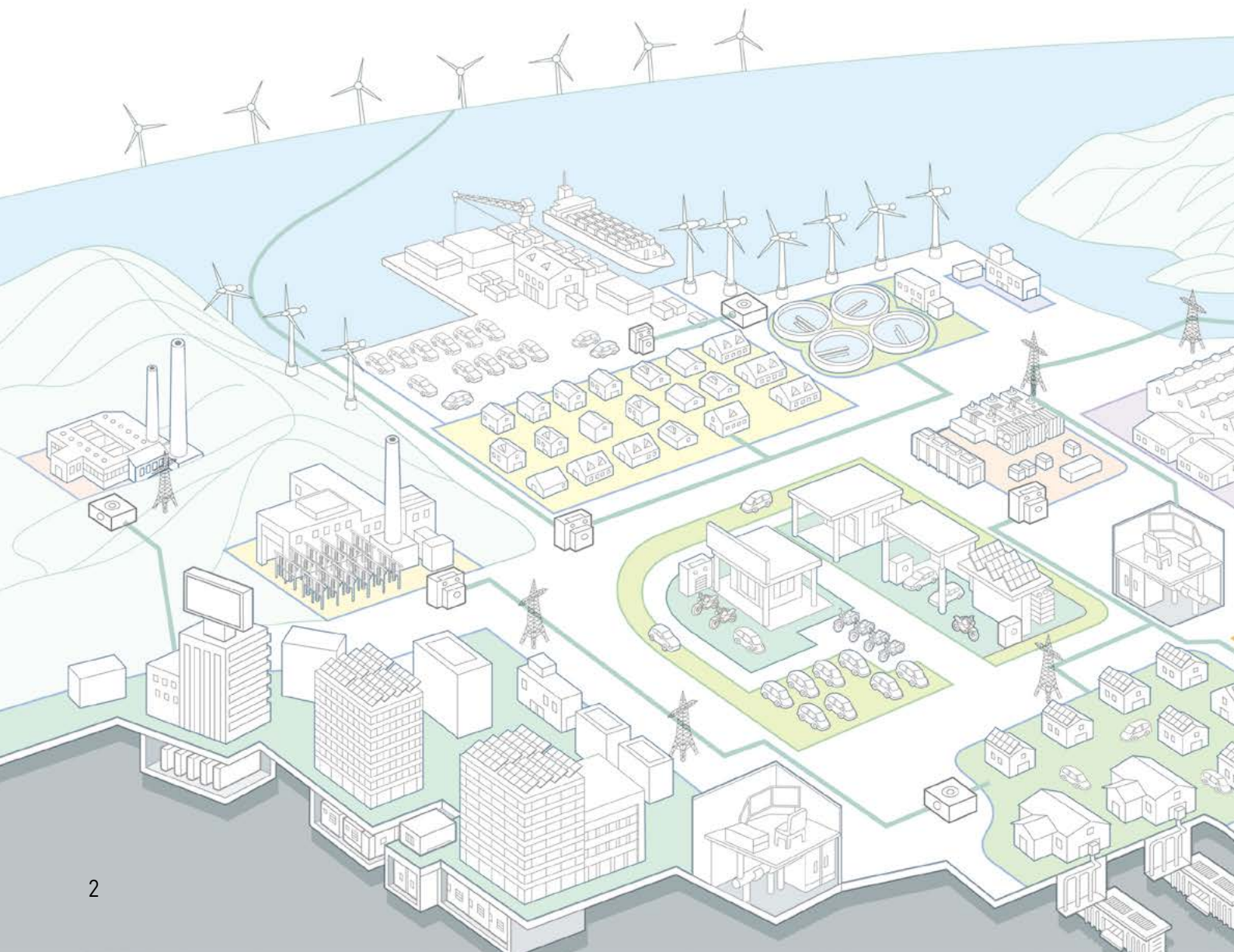
FACTS

Flexible

AC

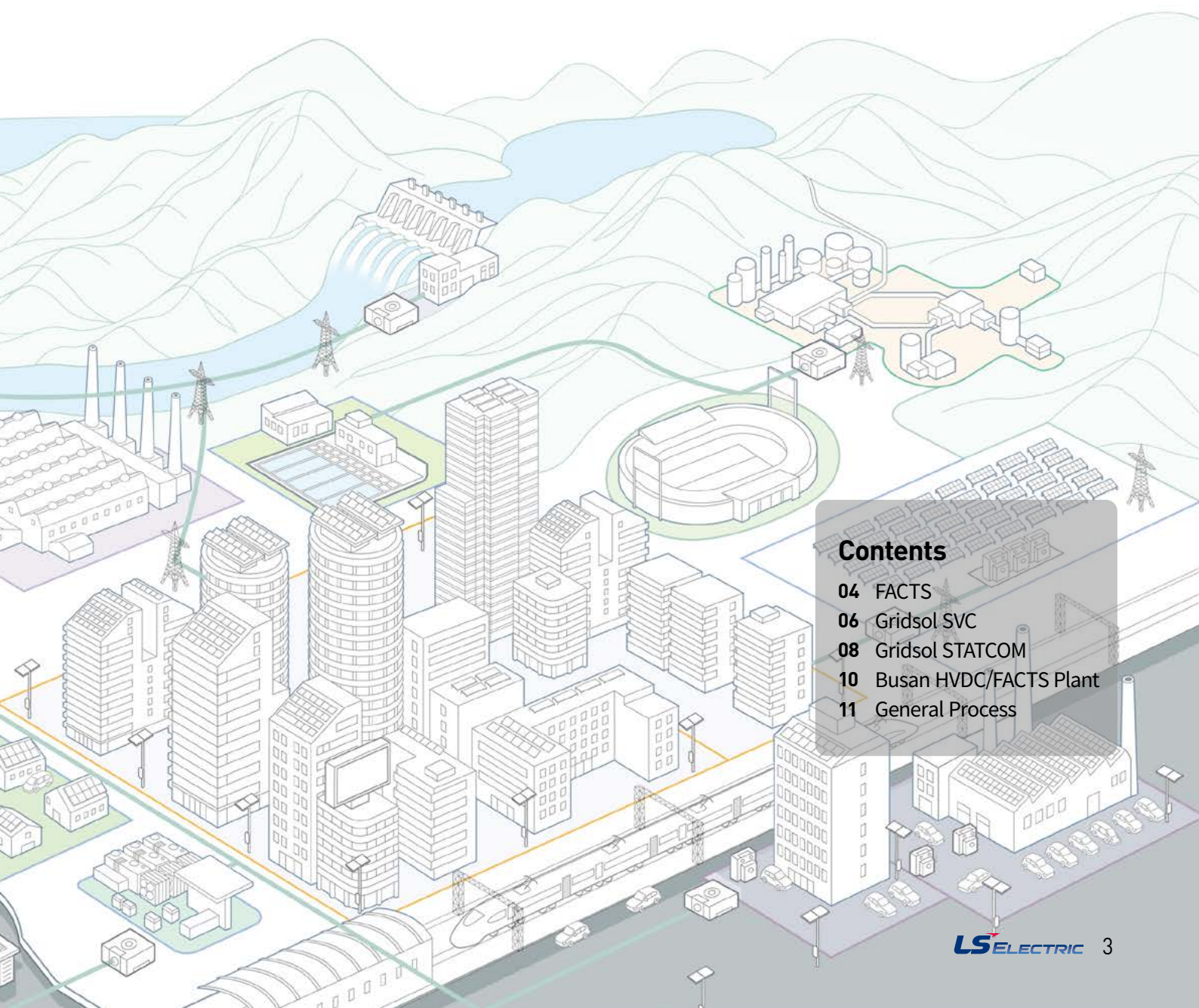
Transmission

System



Closer Than You Imagine

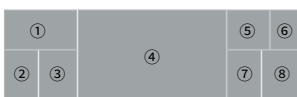
Where there is a light to brighten the planet
and energy to move the world,
behind every place with a power supply,
from homes and offices to factories and airports,
LS ELECTRIC is there.



Contents

- 04 FACTS
- 06 Gridsol SVC
- 08 Gridsol STATCOM
- 10 Busan HVDC/FACTS Plant
- 11 General Process

FACTS



- ① Thyristor Valve
- ② Valve Cooling System
- ③ Control & Protection System
- ④ SVC Substation
- ⑤ SVC Transformer(1Ph. 250MVA)
- ⑥ Harmonic Filter
- ⑦ Reactor Bank
- ⑧ Capacitor Bank

FACTS

Flexible AC Transmission System

FACTS consists of power electronics and other static components to increase controllability and power transfer ability of AC network.

GridSol SVC

SVC is the most widely employed FACTS device around the world. This system can provide or consume reactive power to stabilize AC grid's electrical quality.

GridSol STATCOM

Like an SVC, the STATCOM enhances the stability of grid voltage, yet introducing the voltage-sourced MMC technology. LS ELECTRIC' most advanced "SVC Compact" provides high-performance in remarkably compact footprint.

FACTS Applications & Benefit



Power

- Utility Company
- IPP (Independent Power Plant)
- Wind & Solar Farm



Steel

- Steel Company
- Smelting Company
- Special Steel Company



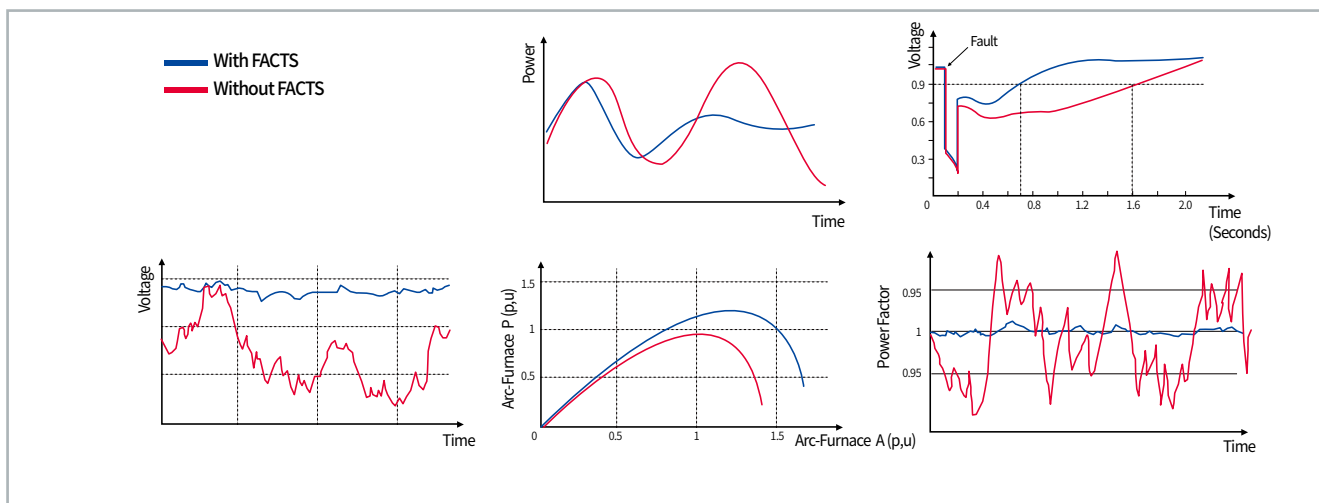
SVC Substation, Korea | The largest capacity in a single SVC Substation, rated at -225/+675 Mvar

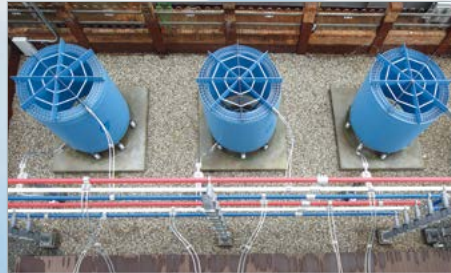
Electrical Grid Management

In transmission applications, SVC regulates grid's reactive power to maintain the voltage in normal range.

Power Quality Stabilization

In industrial applications, SVC can smooth flicker voltage generated by rapidly varying loads (Such as furnaces).

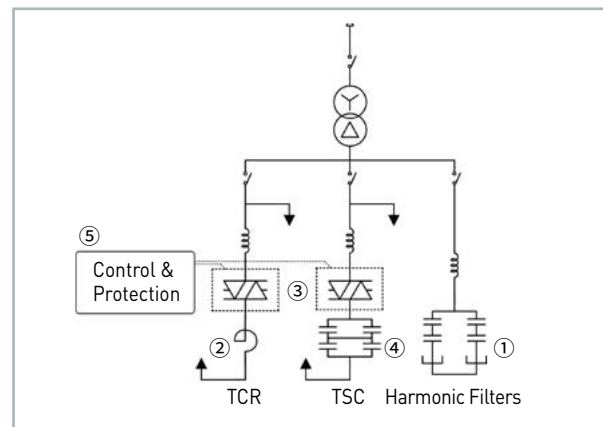




- ① Harmonic Filters
- ② TCR Reactors
- ③ SVC Thyristor Valve
- ④ Capacitor Banks
- ⑤ Control & Protection System

SVC Main Components

- SVC Transformers
- Circuit Breaker
- Thyristor Valve
 - Thyristor Controlled Reactors (TCR)
 - Thyristor Switched Capacitors (TSC)
- Cooling System
- Harmonic Filters
- Control & Protection



SVC Control & Protection System

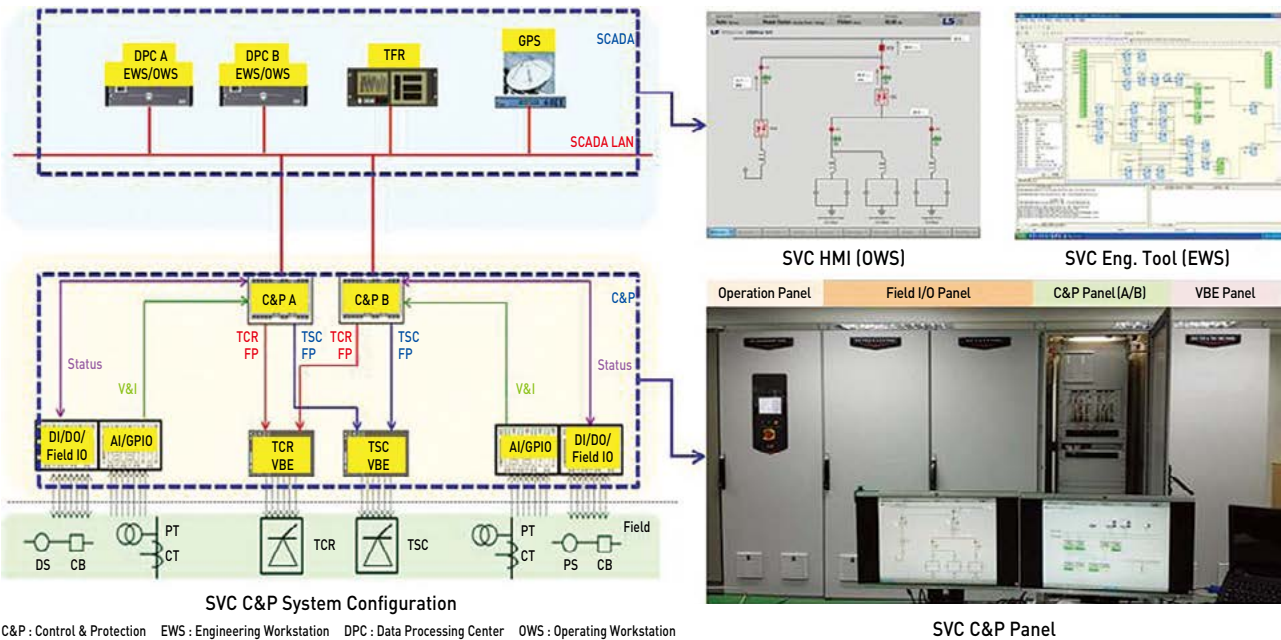
Standard equipment for closed-loop and open loop control is commercially available and in use for multiple applications. Programming and customization of control functions are simplified by the use of a graphical programming interface. (LS ELECTRIC' OPAS : Open Process Automation System)

- Multiple control modes can meet the requirements of different industry fields
 - Voltage Control
 - Unbalance Control
 - Power Factor Control
 - Flicker Compensation
 - Reactive Power Control
 - Negative Sequence Control
 - Manual Susceptance Regulation
- High accurate control angle(0.01°), large control range(95°-175°)
- Full redundancy system(optional)
- User optimized HMI(Human Machine Interface)
- Reliable protection scheme
- Fast response time



Smart SVC Center in ulsan, Korea

Configuration of C&P System



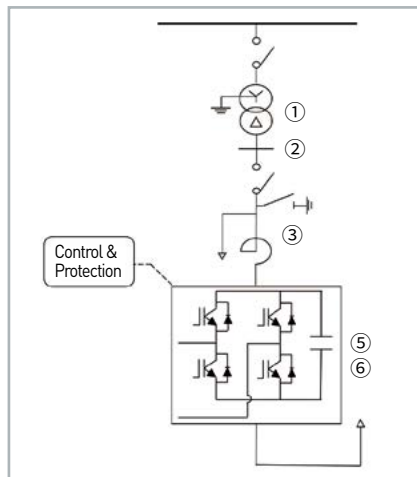


- ① STATCOM Transformer(1Ph, 100MVA)
- ② Disconnector Switch
- ③ Phase Reactor
- ④ STATCOM Substation

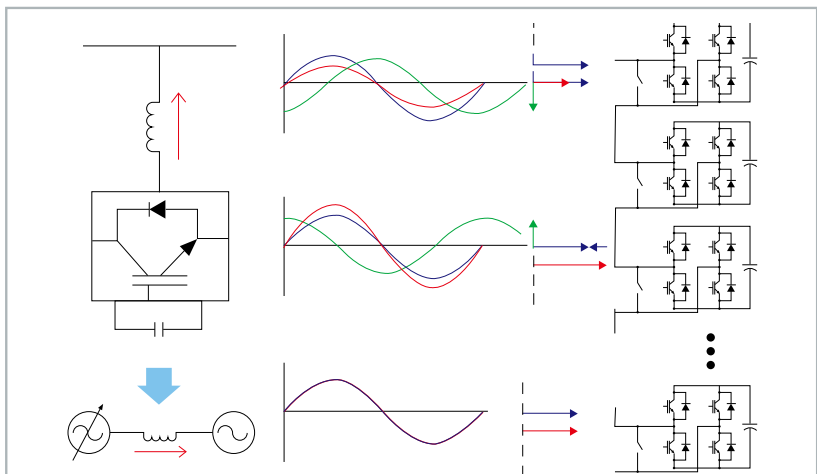
- ⑤ MMC Valve
- ⑥ Valve Cooling System

STATCOM Main Components

- STATCOM Transformers
- Circuit Breaker
- MMC Valve
- Cooling System
- Control & Protection



The latest MMC technology has a STATCOM system that outputs true phase and ground reactive current through voltage control and operates like a variable voltage source and is tested under customer specific conditions to provide the best performance.





Application & Line Up

The MMC STATCOM facility with LS ELECTRIC's proprietary technology consists of a building type that can compensate for high-voltage and large-capacity depending on the characteristics of the applied system, a container type that has the advantage of minimized land area, and a panel type for stabilizing power in the distribution system. These types can provide optimal solutions for power companies, renewable generation facility, steel, and general factories.



Building Type

LS ELECTRIC had installed up to 345kV based on PCC.
It is possible to generate maximum of 150Mvar per 1 bank.
It is suitable for system compensation and flicker reduction that require high voltage and high capacity system application.



Container Type

Container type : For 45ft container, the 1 Bank can produce the maximum of 50Mvar. The phase reactor is installed inside the container so that it can be apply to the mobile solution using trailer. It can be applied to E-House solution that includes seismic design and fire extinguishing equipment. It has the benefit of small area and connection of renewable energy resources.



Panel Type

Panel type: Direct connection at 380V, 440V is possible and connection up to 12kV is possible when using a transformer.
Each system unit has the capacity of 90kvar to the 2Mvar.
It can also produce the maximum of 24Mvar if 12 units are connected in parallel.

Busan HVDC/FACTS Plant



LS ELECTRIC Busan HVDC plant, established in 2011, is the first HVCD/FACTS facility in Korea. It contains all the equipment necessary for a comprehensive test for HVDC & FACTS valve development, production and C&P (Control & Protection).



- ① DC Dielectric Test
- ② Impulse Test
- ③ C&P Test
- ④ Synthetic Test
- ⑤ AC Dielectric Test



Main Test Scene



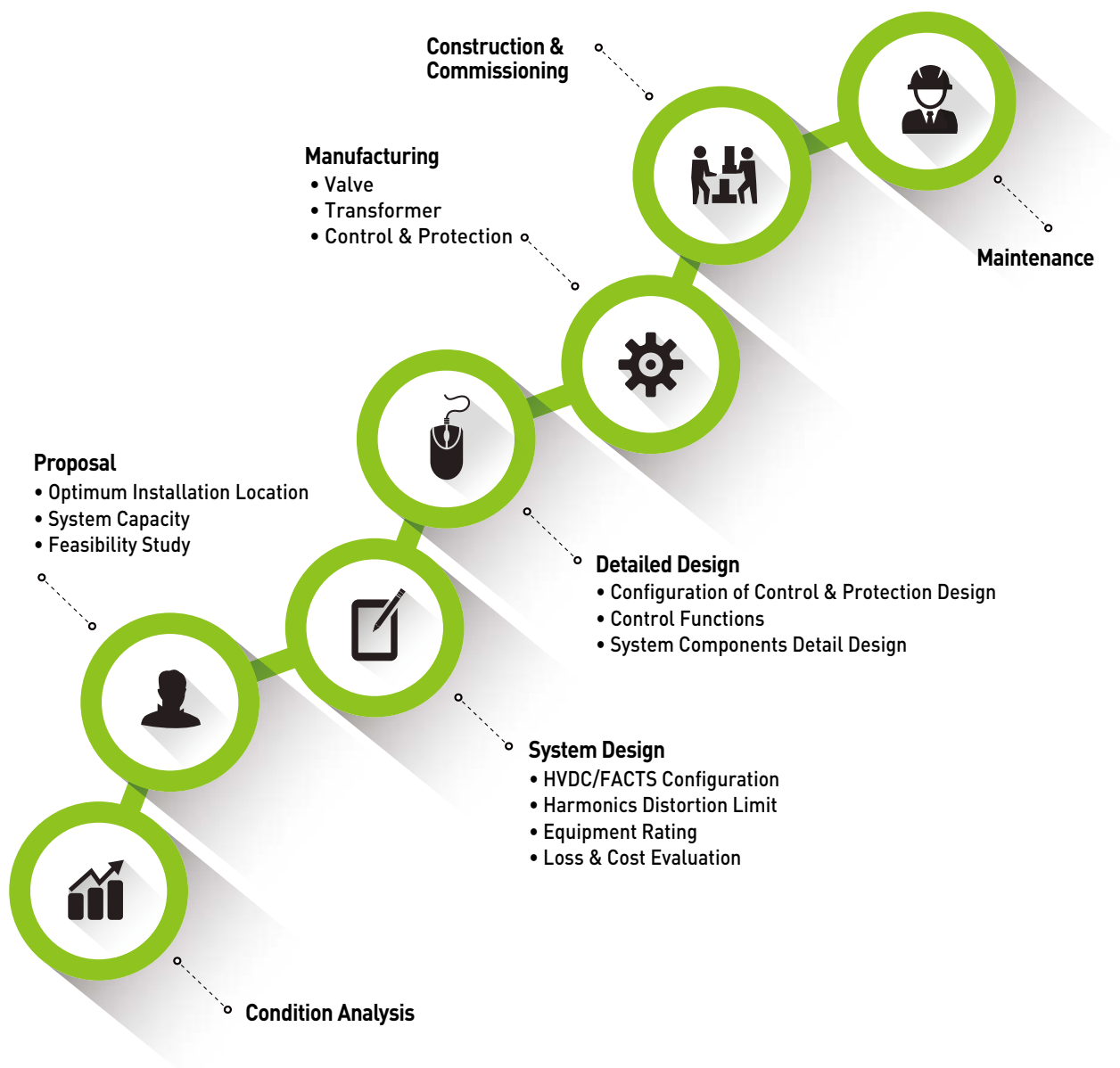
- ① Valve Dielectric Test
- ② Valve Synthetic Test





Total Solution Provider

Provides total HVDC & FACTS solution from system design, equipment design, manufacturing & tests, commissioning, and maintenance. Proposal is optimized by customer's needs, use condition and location.





LS Tower, Anyang
LS-ro 127(Hogye-dong) Dongan-gu,
Anyang-si, Gyeonggi-Do, 14119, Korea



Global R&D Campus, Anyang
LS-ro 116beongil 40, Dongan-gu,
Anyang-si, Gyeonggi-Do, 14118, Korea



Power TR Plant, Busan
1-19 Block Hwajeon-dong, Gangseo-gu,
Busan, 46735, Korea



HVDC / FACTS Plant, Busan
Hwajeon-sandan2ro 9, Gangseo-gu Busan,
46739, Korea



Ulleungdo

Dokdo



Smart SVC Center, Ulsan



HVDC Smart Center, Jeju



**STATCOM System for the
Godeok Substation ($\pm 300\text{Mvar}$)**



**Sin-Jecheon
SVC System for the
Sinjecheon Substation ($-225 \sim +675\text{Mvar}$)**



www.lselectric.co.kr

Headquarter

LS-ro 127(Hogye-dong) Dongan-gu, Anyang-si, Gyeonggi-Do, 14119, Korea

Seoul Office

LS Yongsan Tower, 92, Hangang-daero, Yongsan-gu, Seoul, 04386, Korea
Tel: 82-2-2034-4809, 4920

Overseas Subsidiaries

- **LS ELECTRIC Japan Co., Ltd. (Tokyo, Japan)**
Tel: 81-3-6268-8241 E-Mail: jschuna@lselectric.biz
- **LS ELECTRIC (Dalian) Co., Ltd. (Dalian, China)**
Tel: 86-411-8730-5872 E-Mail: jiheo@lselectric.com.cn
- **LS ELECTRIC (Wuxi) Co., Ltd. (Wuxi, China)**
Tel: 86-510-6851-6666 E-Mail: sblee@lselectric.co.kr
- **LS ELECTRIC Vietnam Co., Ltd.**
Tel: 84-93-631-4099 E-Mail: jhchoi4@lselectric.biz (Hanoi)
Tel: 84-28-3823-7890 E-Mail: sjbaik@lselectric.biz (Hochiminh)
- **LS ELECTRIC Middle East FZE (Dubai, U.A.E.)**
Tel: 971-4-886-5360 E-Mail: hschoib@lselectric.biz
- **LS ELECTRIC Europe B.V. (Hoofddorp, Netherlands)**
Tel: 31-20-654-1424 E-Mail: europartner@lselectric.biz
- **LS ELECTRIC America Inc. (Chicago, USA)**
Tel: 1-800-891-2941 E-Mail: sales.us@lselectricamerica.com



Technical Question or After-sales Service

Customer Center-Quick Responsive
Service, Excellent technical support

82-1644-5481



According to The WEEE Directive,
please do not discard the device with your household waste.