



Energy Solutions Company
ESS Battery Division

Headquarters

Korea LG Twin Towers, 128, Yeoui-daero, Yeongdeungpo-gu, Seoul
Tel. : +82-2-6924-3690
e-mail : jadenlee@lgchem.com

Local Contacts

USA 1857 Technology Drive, Troy, MI 48083, USA
Peter Gibson
Tel. : +1-248-205-9066
e-mail : pgibson@lgchem.com

Europe Otto-Volger-str. 7C, 65843 Sulzbach (Taunus), Germany
Joern Juergens
Tel. : +49-6196-5719-617
e-mail : jjjuergens@lgchem.com

Japan 14F, Kyobashi Trust Tower, 2-1-3, Kyobashi, Chuo-ku, Tokyo, 104-0031, Japan
Hideki Morita
Tel. : +81-3-6369-8580
e-mail : jpmorita@lgchem.com

China Room 33C, Time Fortune Building, No.88 Fuhua RD 3th, Futian District, Shenzhen.P.R.C
Nanhao Song
Tel. : +86-755-2396-0202-132, +86-13823769794
e-mail : songnanhao@lgchem.com

India 5th Floor, Building No. 8, Tower C, DLF Cyber City, Phase II, Gurgaon-122002 (Haryana), India
Prashant Kumar
Tel. : +91-124-469-2600, Direct : +91-124-4692639,
e-mail : prashant@lgchem.com

Australia Unit 12, 35 Dunlop Rd, Mulgrave, Victoria, Australia, 3170
Jamie Allen
Tel. : +61-1300-178-064
e-mail : esssalesau@lgchem.com

Company Websites

LG Chem Website : <http://www.lgchem.com>
LG Chem ESS Partner Portal : <http://www.lgesspartner.com>

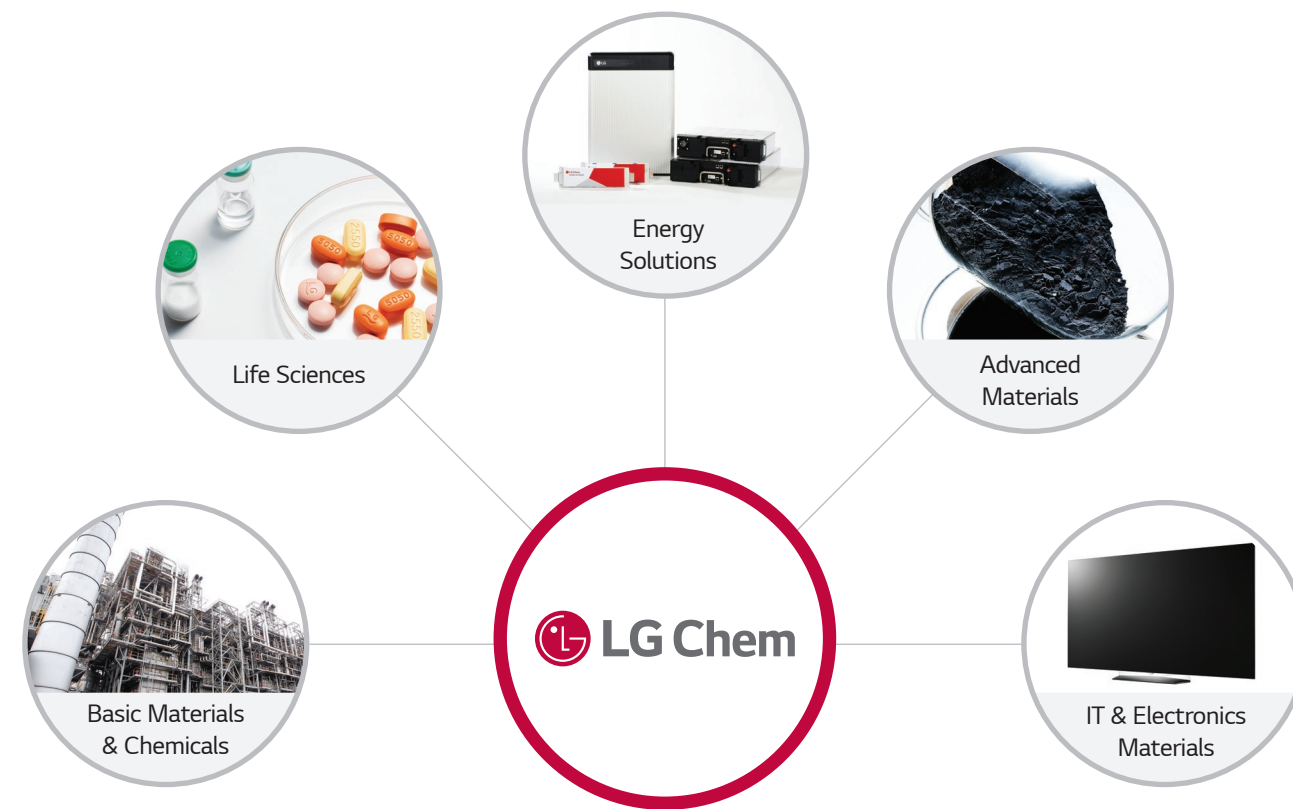


**CHANGE YOUR ENERGY
CHARGE YOUR LIFE**

**ADVANCED BATTERIES
FOR ENERGY STORAGE**

Introducing LG Chem

LG Chem at a Glance



| | | | |
|--------------|--------------|---------------|------------------|
| Foundation | 1947 | Employees | 33,694 |
| Headquarters | Seoul, Korea | Sales Revenue | USD 25B (FY2018) |

Energy Solutions

With 24 years of experience in successfully delivering products and solutions to customers in the global energy sector, LG Chem is recognized as the industry leader in Lithium-ion batteries.

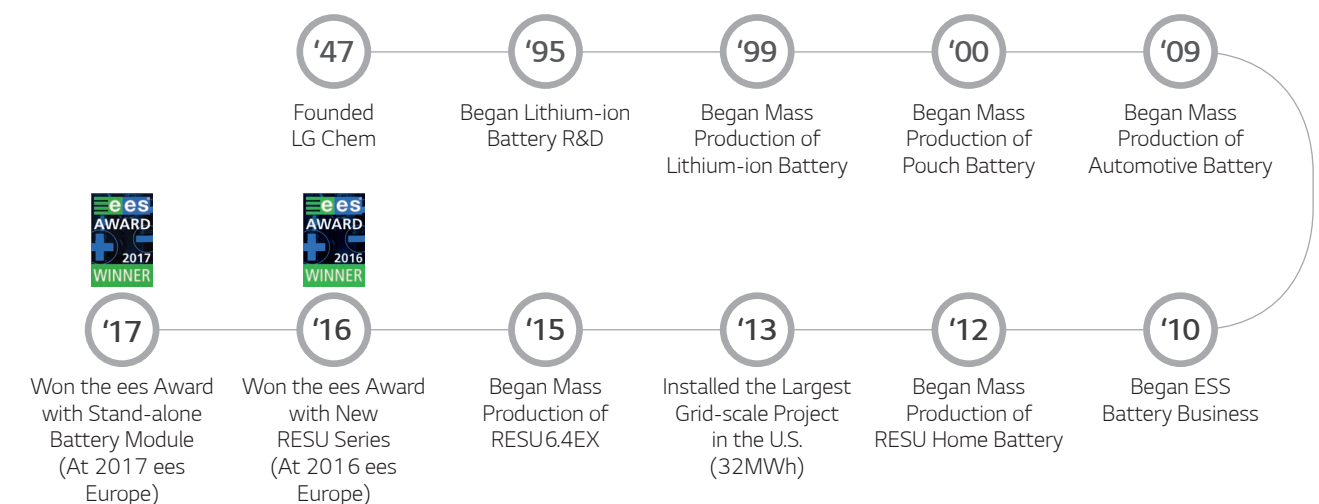


Global Operation of Energy Solutions

LG Chem is successfully implementing rapid go-to-market strategies across its wide range of global networks. By locating manufacturing plants in four strategic locations of Korea, China, the U.S., and Poland, LG Chem supplies batteries to meet the needs of local customers in the most efficient and timely manner.



Business History of Energy Solutions



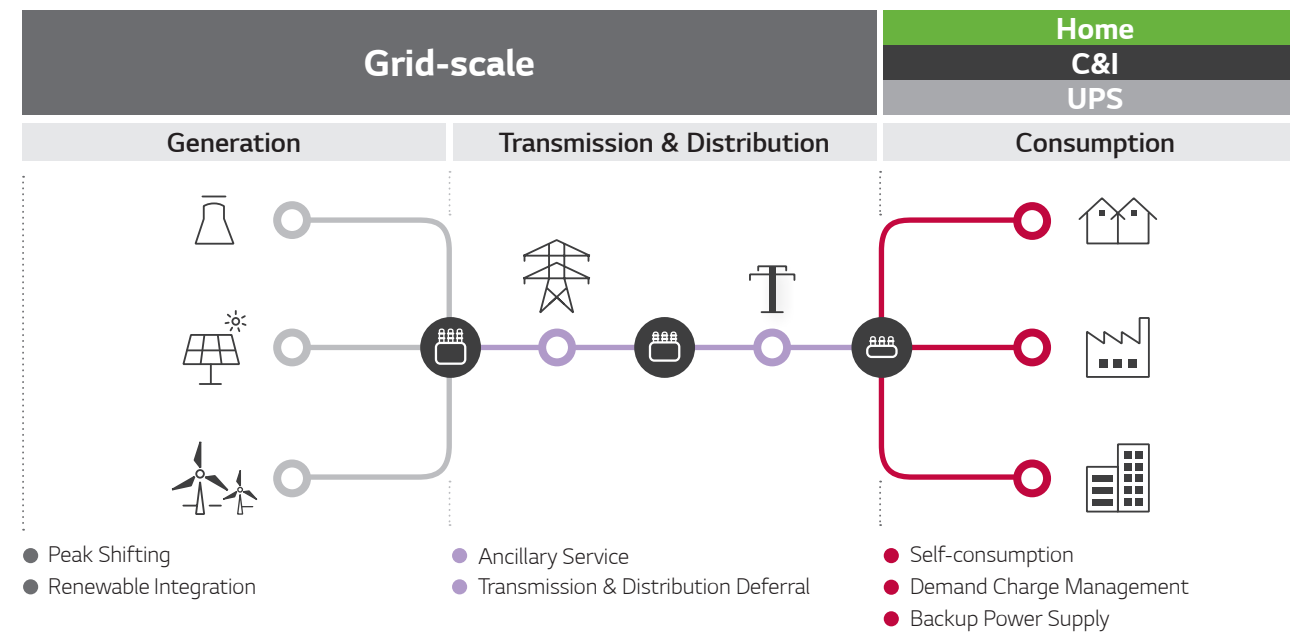
* The ees Award is one of the most prestigious awards presented annually at ees Europe, the largest exhibition for batteries and energy storage systems in Europe, with the purpose to pay tribute to pioneering products and solutions for energy storage system.

LG Chem ESS Solutions

Total Solutions for ESS (Energy Storage System)

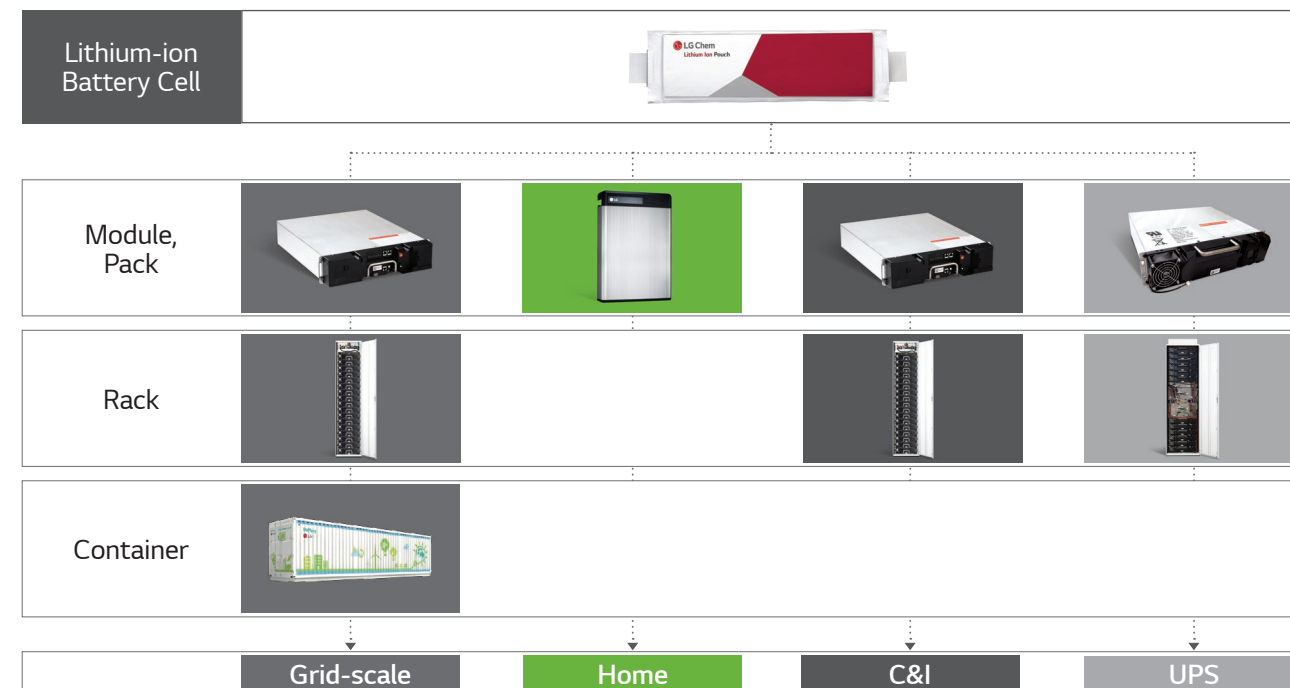
Applications of ESS

ESS (Energy Storage System) provides solutions for applications throughout power supply systems including Grid-scale, Home, C&I (Commercial and Industrial), and UPS (Uninterruptible Power Supply).



Product Portfolio

LG Chem offers a wide variety of products, such as Battery Module, Pack, Rack, and Container that allow our customers to source total battery solutions.

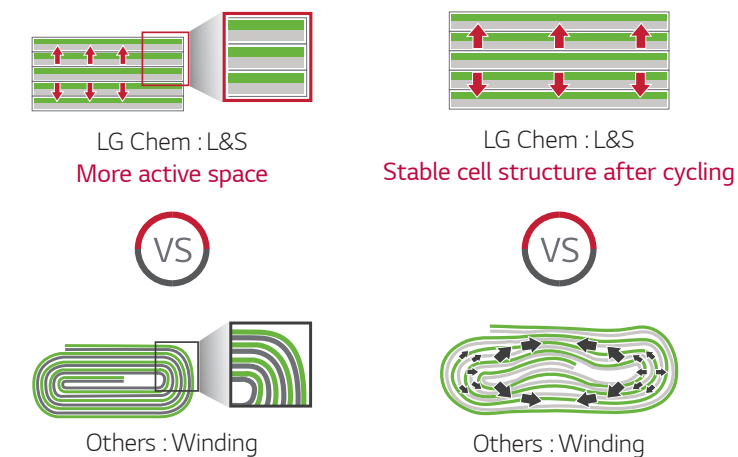


Key Strengths

Lithium-ion Battery Cell

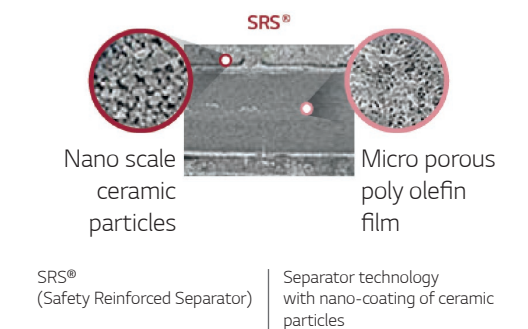
Compactness & Long Lifespan

LG Chem's L&S (Lamination & Stacking) process minimizes dead space, enables higher energy density, and enhances the sustainability of cell structures.



Safety

LG Chem's SRS® (Safety Reinforced Separator) increases the mechanical and thermal stability of battery cells.

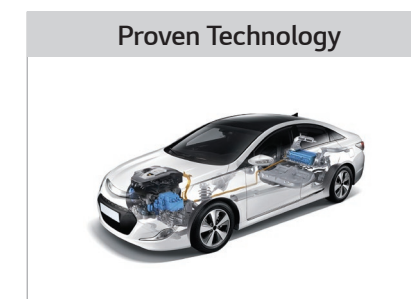


Unsurpassed Experience and Expertise

LG Chem is a reliable battery solution partner with extensive field experience and technical expertise.



LG Chem features world class battery technology, made possible by 70 years of expertise in chemicals.



LG Chem is the global leading supplier of Lithium-ion batteries for electric vehicles.

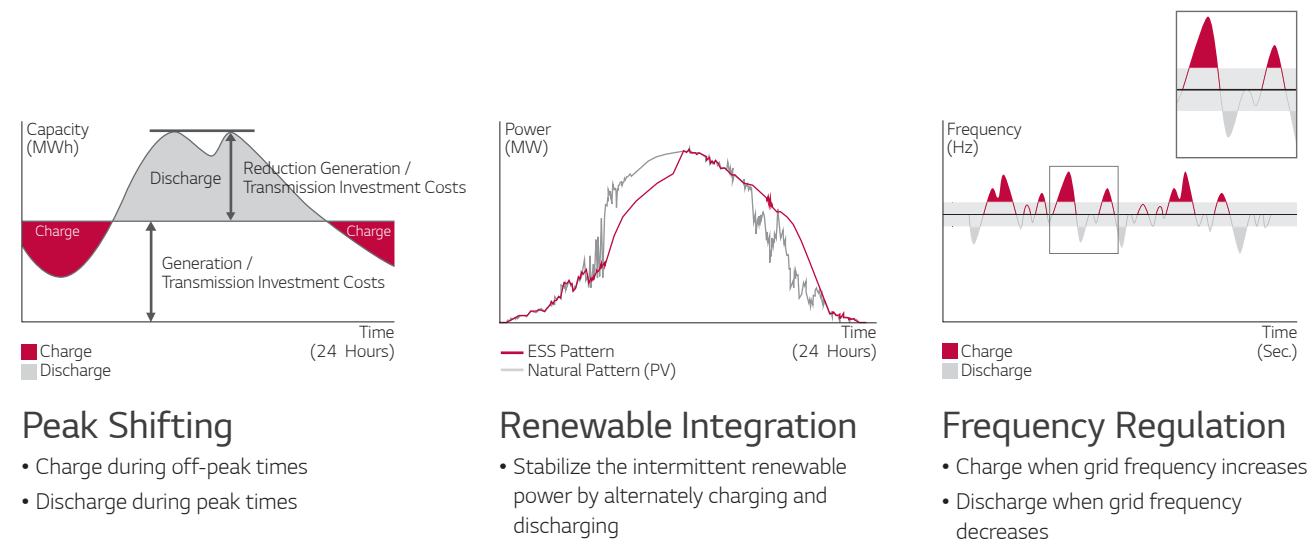


Since 2010, LG Chem has installed or been awarded ESS projects for a wide range of applications.

LG Chem ESS Solutions

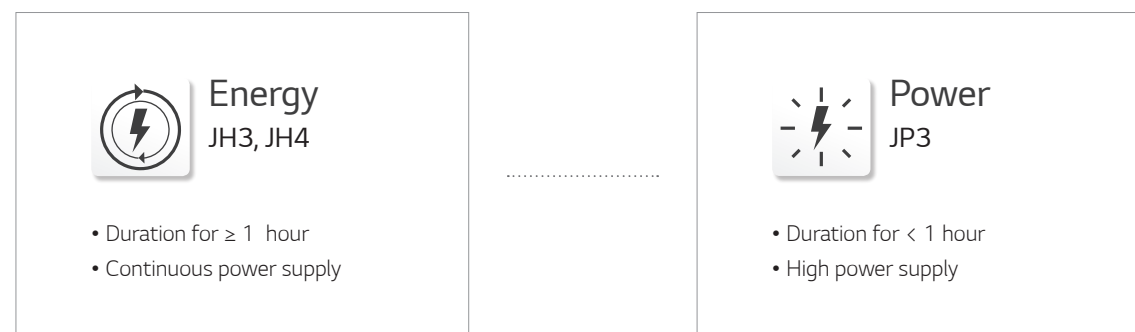
Grid-scale Battery

For stabilizing the grid, a grid-scale battery provides capabilities such as peak shifting, renewable integration, and frequency regulation. With our world-leading Lithium-ion battery technology, LG Chem offers advanced battery systems for grid-scale ESS applications.



Product Lineup

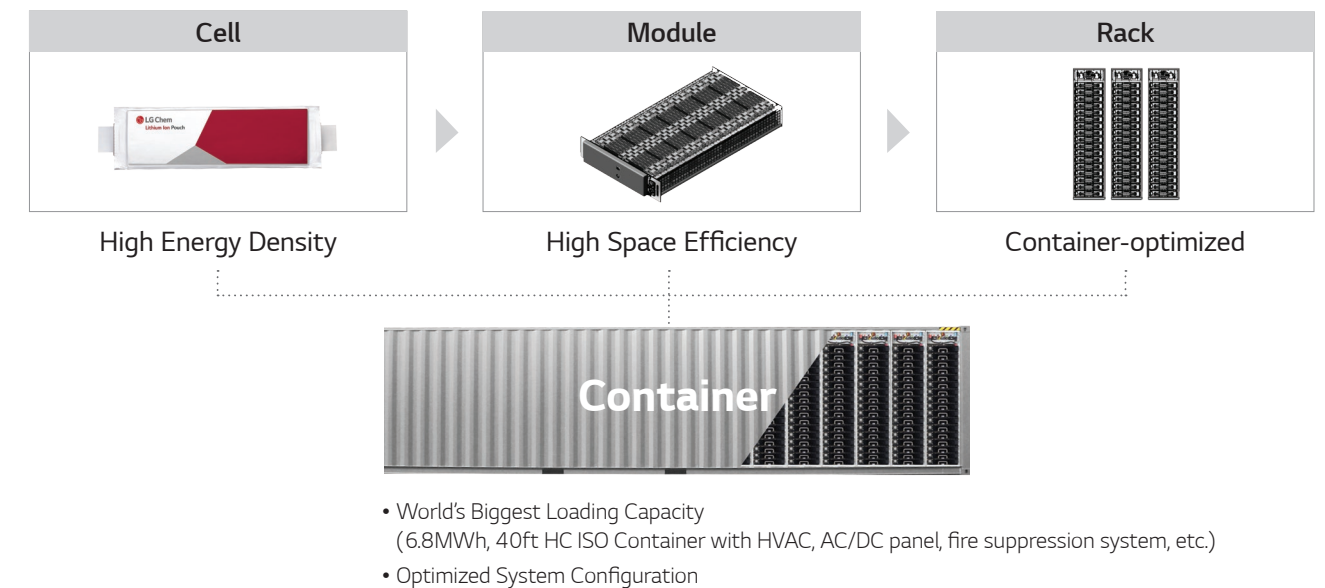
LG Chem offers two product lineups highly optimized for grid-scale customers' requirements.



Key Features

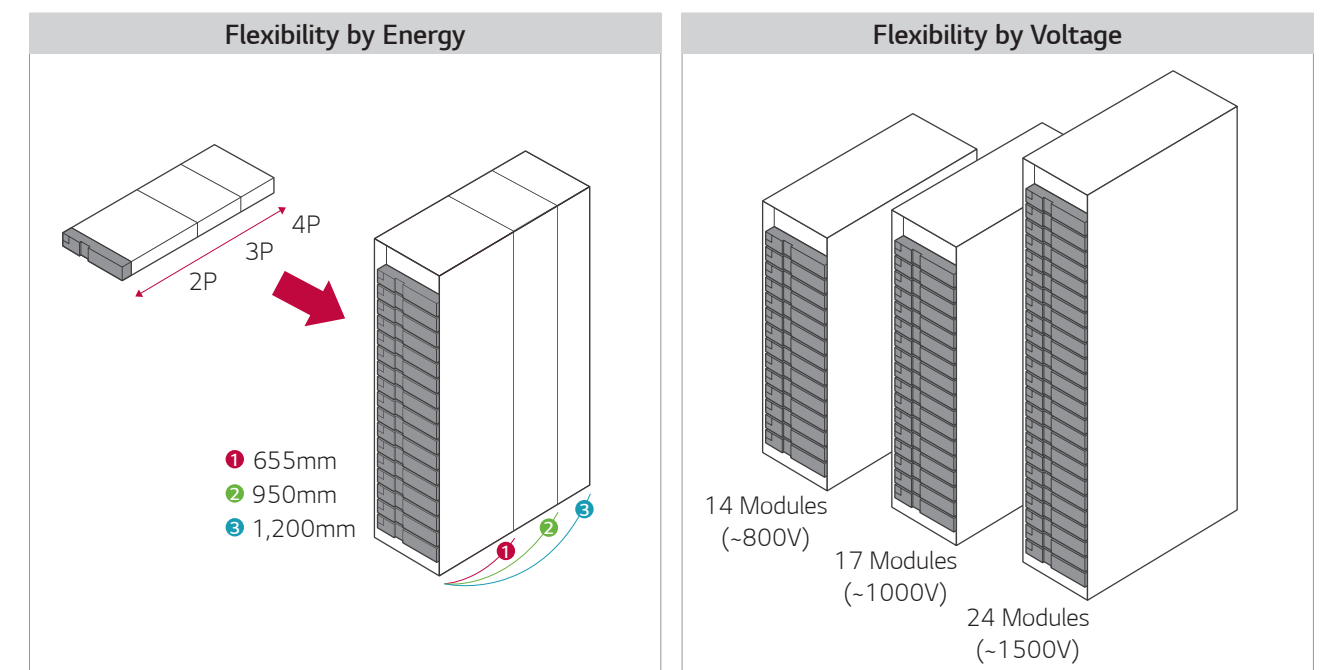
System Optimization

LG Chem features a highly optimized battery system design which enables high energy density.



Diverse Product Options

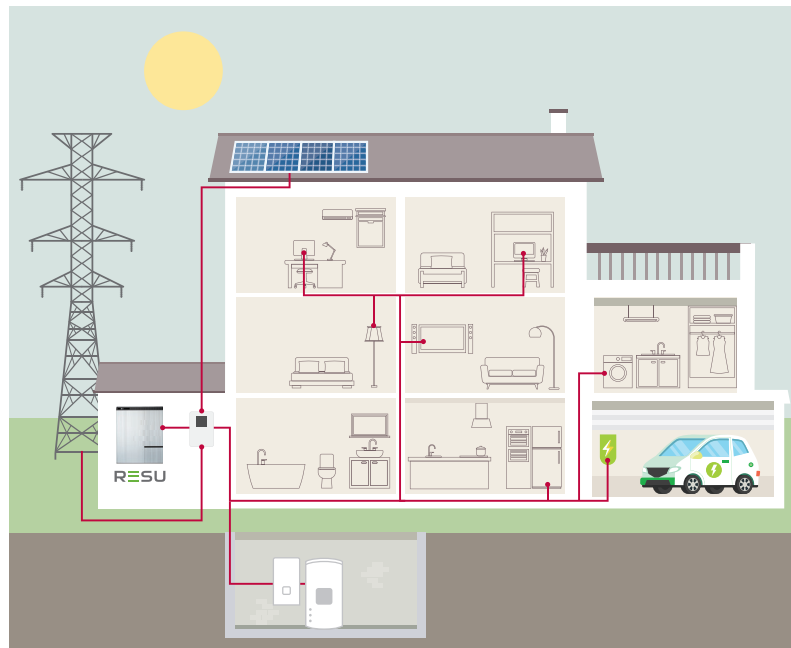
LG Chem offers a range of product options to optimally meet our customers' needs for energy, footprint and voltage.



LG Chem ESS Solutions

Home Battery

A home battery can store surplus energy generated from rooftop photovoltaic panels for use when needed. When the sun has set, energy demand is high, or there is a black-out, you can use the energy stored in your home battery to meet your energy needs at no extra cost. In addition, a home battery helps you pursue the goal of energy self-consumption and ultimately energy-independence.



Electricity Bill Saving

- Charge during off-peak times
- Discharge during peak times

Self-consumption

- Store solar energy generated from photovoltaic panels for the future use

Emergency Power Backup

- Discharge during a black-out, functioning as backup power

Key Features



Compact Size & Space Saving

The compact and sleek design of the RESU allows you to place it anywhere you want, both indoors and outdoors.



Reliable Performance

The RESU provides reliability for your home with its industry leading longevity.



Proven Safety

The safety of LG Chem's lithium-ion battery is proven in the automotive and ESS markets.



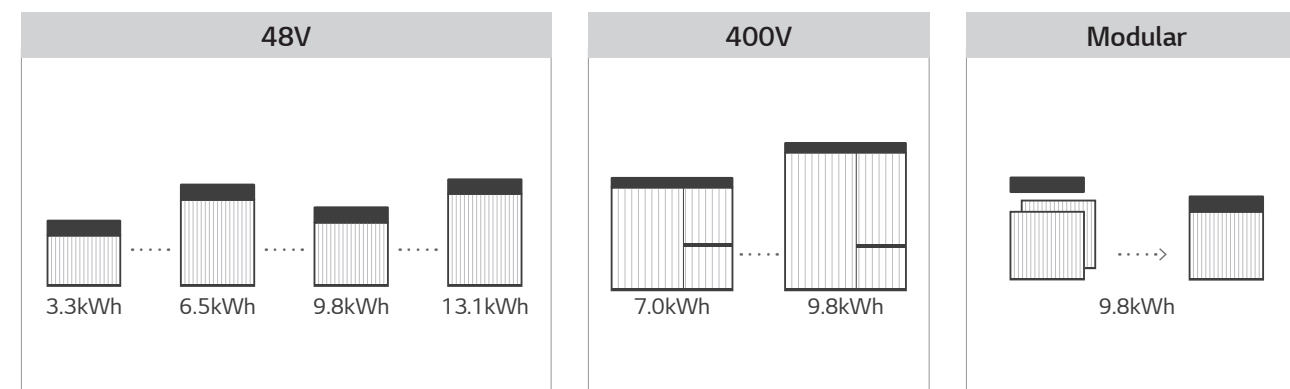
Expandable at Need

The RESU models can be combined up to 2 units to increase energy capacity.

Product Lineup

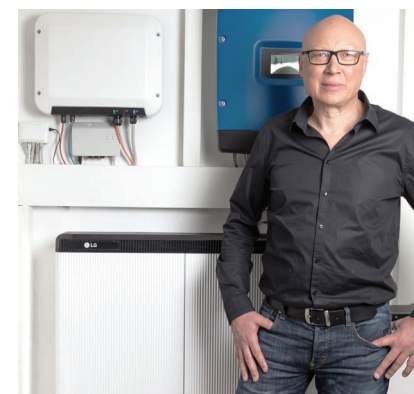
LG Chem offers seven home battery models in three product lineups to fulfill diverse capacity and voltage needs of homeowners.

RESU



RESU Plus is an expansion kit specially designed for 48V models of the RESU series.
With RESU Plus, RESU3.3/6.5/10 are cross-connected with each other, and RESU13 is connected with the same model.
(Number of expandable battery units : Up to 2EA)

Customer Testimonials



Remarkable Self-sufficiency

"The remarkable result one year after completion and move-in :
up to 90 percent self-sufficiency"
- Jörg Erstling, Germany



Simple Installation & Sleek Design

"The LG Chem RESU10H was easy to install and looks good.
It's not overly intrusive, and it is a real conversation starter"
- Stephen Young, Australia

Specifications

Grid-scale Battery



Energy

Long-duration application
with continuous power supply (≥ 1 hour)

Energy Module



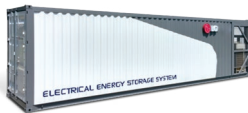
| Models | M48145P5B (2P) | M48218P5B (3P) | M48290P5B (4P) |
|---------------------------|-----------------|-----------------|-------------------|
| Energy [kWh] | 7.4 | 11.2 | 14.9 |
| Capacity [Ah] | 145 | 218 | 290 |
| Nominal Voltage [V] | 51.4 | | |
| Voltage Range [V] | 42.0-58.8 | | |
| Dimension [W x H x D, mm] | 445 x 110 x 620 | 445 x 110 x 915 | 445 x 110 x 1,162 |
| Weight [kg] | 46 | 68 | 89 |

Energy Rack



| Models | R800 (14 Modules) | | | |
|---------------------------|--------------------|-------------------|---------------------|--------------------|
| | M48145P5B | M48218P5B | M48290P5B | |
| Energy [kWh] | 104.3 | 156.4 | 208.5 | |
| Capacity [Ah] | 145 | 218 | 290 | |
| Nominal Voltage [V] | 719 | | | |
| Voltage Range [V] | 588-823 | | | |
| Dimension [W x H x D, mm] | 520 x 1,880 x 655 | 520 x 1,880 x 950 | 520 x 1,880 x 1,200 | |
| Weight [kg] | 760 | 1,097 | 1,396 | |
| Models | R1000 (17 Modules) | | | R1500 (24 Modules) |
| | M48145P5B | M48218P5B | M48290P5B | M48290P5B |
| Energy [kWh] | 126.6 | 189.9 | 253.2 | 357.5 |
| Capacity [Ah] | 145 | 218 | 290 | 290 |
| Nominal Voltage [V] | 873 | | | 1,233 |
| Voltage Range [V] | 714~1,000 | | | 1,008~1,411 |
| Dimension [W x H x D, mm] | 520x2,200x655 | 520x2,200x950 | 520x2,200x1,200 | 520x3,150x1,200 |
| Weight [kg] | 905 | 1,305 | 1,680 | 2,407 |

Energy Container



| Models | 40ft HC ISO Container | |
|------------------------------|------------------------|-----------|
| | M48145P5B | M48218P5B |
| | Manned | Unmanned |
| Energy [MWh] | 5.4 | 6.8 |
| System Voltage [V dc] | 714-1,000 | |
| Dimension [W x H x D, m] | 12.2 x 2.9 x 2.5 | |
| Weight [ton] (incl. battery) | 50 | 60 |
| Ambient Temperature [°C] | -20~50 | |
| Communication | CAN2.0B, Modbus TCP/IP | |

(Container system design can be changed according to customer requirements)

Energy Module



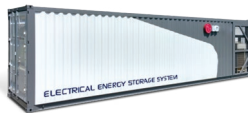
| Models | M48126P3B(2P) | M48189P3B(3P) | M48252P3B(4P) |
|---------------------------|-----------------|-----------------|-------------------|
| Energy [kWh] | 6.5 | 9.8 | 13 |
| Capacity [Ah] | 126 | 189 | 252 |
| Nominal Voltage [V] | 51.8 | | |
| Voltage Range [V] | 42.0-58.8 | | |
| Dimension [W x H x D, mm] | 445 x 110 x 620 | 445 x 110 x 915 | 445 x 110 x 1,162 |
| Weight [kg] | 46 | 68 | 89 |

Energy Rack



| Models | R800 (14 Modules) | | |
|---------------------------|-------------------|-------------------|---------------------|
| | M48126P3B | M48189P3B | M48252P3B |
| Energy [kWh] | 91.3 | 137.0 | 182.7 |
| Capacity [Ah] | 126 | 189 | 252 |
| Nominal Voltage [V] | 725 | | |
| Voltage Range [V] | 588-823 | | |
| Dimension [W x H x D, mm] | 520 x 1,880 x 655 | 520 x 1,880 x 950 | 520 x 1,880 x 1,200 |
| Weight [kg] | 766 | 1,104 | 1,402 |
| Models | R1000(17 Modules) | | |
| | M48126P3B | M48189P3B | M48252P3B |
| Energy [kWh] | 110.9 | 166.4 | 221.8 |
| Capacity [Ah] | 126 | 189 | 252 |
| Nominal Voltage [V] | 881 | | |
| Voltage Range [V] | 714-1,000 | | |
| Dimension [W x H x D, mm] | 520 x 2,200 x 655 | 520 x 2,200 x 950 | 520 x 2,200 x 1,200 |
| Weight [kg] | 912 | 1,314 | 1,687 |

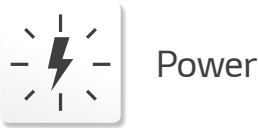
Energy Container



| Models | 40ft HC ISO Container | |
|------------------------------|------------------------|-----------|
| | M48126P3B | M48189P3B |
| | Manned | Unmanned |
| Energy [MWh] | 4.8 | 6.0 |
| System Voltage [V dc] | 714-1,000 | |
| Dimension [W x H x D, m] | 12.2 x 2.9 x 2.5 | |
| Weight [ton] (incl. battery) | 50 | 60 |
| Ambient Temperature [°C] | -20~50 | |
| Communication | CAN2.0B, Modbus TCP/IP | |

(Container system design can be changed according to customer requirements)

Grid-scale Battery



Power

Power Module



Short-duration applications with fast response, high power supply (< 1 hour)

| Models | M4864P6B (1P) | M48128P6B (2P) |
|---------------------------|-----------------|-----------------|
| Energy [kWh] | 3.3 | 6.6 |
| Capacity [Ah] | 64 | 128 |
| Nominal Voltage [V] | 51.5 | |
| Voltage Range [V] | 42.0-58.8 | |
| Dimension [W x H x D, mm] | 445 x 110 x 344 | 445 x 110 x 620 |
| Weight [kg] | 28 | 47 |

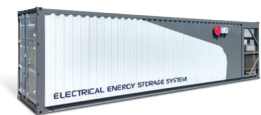
Power Rack



| Models | R800 (14 Modules) | |
|---------------------------|-------------------|-------------------|
| | M4864P6B | M48128P6B |
| Energy [kWh] | 46.2 | 92.3 |
| Capacity [Ah] | 64 | 128 |
| Nominal Voltage [V] | 721 | |
| Voltage Range [V] | 588-823 | |
| Dimension [W x H x D, mm] | 520 x 1,880 x 425 | 520 x 1,880 x 655 |
| Weight [kg] | 491 | 775 |

| Models | R1000 (17 Modules) | |
|---------------------------|--------------------|-------------------|
| | M4864P6B | M48128P6B |
| Energy [kWh] | 56.0 | 112.1 |
| Capacity [Ah] | 64 | 128 |
| Nominal Voltage [V] | 876 | |
| Voltage Range [V] | 714~1,000 | |
| Dimension [W x H x D, mm] | 520 x 2,200 x 425 | 520 x 2,200 x 655 |
| Weight [kg] | 584 | 924 |

Power Container



| Models | 40ft HC ISO Container | |
|------------------------------|------------------------|--|
| | M48128P6B | |
| Energy [MWh] | 4.0 | |
| System Voltage [V dc] | 714~1,000 | |
| Dimension [W x H x D, m] | 12.2 x 2.9 x 2.5 | |
| Weight [ton] (incl. battery) | 50 | |
| Ambient Temperature [°C] | -20~50 | |
| Communication | CAN2.0B, Modbus TCP/IP | |

(Container system design can be changed according to customer requirements)

Home Battery



| Models | 48V | | | |
|-----------------------------------|-----------------|---|-----------------|-----------------|
| | RESU3.3 | RESU6.5 | RESU10 | RESU13 |
| Total Energy [kWh] ¹⁾ | 3.3 | 6.5 | 9.8 | 13.1 |
| Usable Energy [kWh] ²⁾ | 2.9 | 5.9 | 8.8 | 12.4 |
| Capacity [Ah] | 63 | 126 | 189 | 252 |
| Nominal Voltage [V] | 51.8 | | | |
| Voltage Range [V] | 42.0-58.8 | | | |
| Dimension [W x H x D, mm] | 452 x 403 x 120 | 452 x 656 x 120 | 452 x 484 x 227 | 452 x 626 x 227 |
| Weight [kg] | 31 | 52 | 75 | 99 |
| Enclosure Protection Rating | IP55 | | | |
| Communication | CAN2.0B | | | |
| Certificates | Cell | UL1642 | | |
| | Product | UL1973 / TUV (IEC 62619) / CE / FCC / RCM | | |

1) Total Energy is measured at the initial stage of battery life under the condition as follows : Temperature 25°C

2) Usable Energy is based on battery cell only

Compatible Inverter Brands : SMA, Ingeteam, GoodWe, Sungrow, Victron Energy, Selectronic - More brands to be added



| Models | | 400V | | | | Modular |
|-----------------------------------|---------|-------------------------------------|-------------------------------|--|-----------------|------------------------------------|
| | | RESU7H | | RESU10H | | RESU10M (White Color) |
| | | Type-R | Type-C | Type-R | Type-C | |
| Total Energy [kWh] ¹⁾ | | 7.0 | | 9.8 | | 9.8 |
| Usable Energy [kWh] ²⁾ | | 6.6 | | 9.3 | | 9.3 |
| Capacity [Ah] | | 63 | | 63 | | 63 |
| Nominal Voltage [V] | | - | | - | | 155 |
| Voltage Range [V] | | 350~450 | 430~550 | 350~450 | 430~550 | 126~176 |
| Dimension [W x H x D, mm] | | 744 x 692 x 206 | 744 x 907 x 206 | 744 x 907 x 206 | 744 x 907 x 206 | 452 x 511 x 240 |
| Weight [kg] | | 75 | 87 | 97 | 99.8 | 82 |
| Enclosure Protection Rating | | IP55 | | | | IP55 |
| Communication | | RS485 | CAN2.0B | RS485 | CAN2.0B | CAN2.0B |
| Certificates | Cell | UL1642 | | | | UL1642 |
| | Product | TUV (IEC 62619) / CE / FCC / RCM | TUV (IEC 62619) / CE / RCM | UL1973 / TUV (IEC 62619) / CE / FCC / RCM | | IEC 62619 / IEC 60950(LVD) / CE |

1) Total Energy is measured at the initial stage of battery life under the condition as follows : Temperature 25°C

2) Usable Energy is based on battery cell only

• Noise Level : < 40dBA

Compatible Inverter Brands (More brands to be added)

- 400V : SMA, SolarEdge, Fronius, Huawei

- Modular : SMA

C&I Battery



| Models | R800 | | R1000 | |
|---------------------------|---|-------------------|-------------------|-------------------|
| | M48126P3B | M48189P3B | M48126P3B | M48189P3B |
| Energy [kWh] | 91.3 | 137.0 | 110.9 | 166.4 |
| Capacity [Ah] | 126 | 189 | 126 | 189 |
| Nominal Voltage [V] | 725 | | 881 | |
| Voltage Range [V] | 588~823 | | 714~1,000 | |
| Dimension [W x H x D, mm] | 520 x 1,880 x 655 | 520 x 1,880 x 950 | 520 x 2,200 x 655 | 520 x 2,200 x 950 |
| Weight [kg] | 766 | 1,104 | 912 | 1,314 |
| Certificates | UL 1973 (Listed), IEC 61000-6-2 / 61000-6-3, FCC Part15 Class A | | | |

Telecom Backup Solution / Residential Module



| Models | M4863P3S | M48126P3S |
|---------------------------|-----------------|-----------------|
| | | |
| Energy [kWh] | 3.3 | 6.5 |
| Capacity [Ah] | 63 | 126 |
| Nominal Voltage [V] | 51.8 | 51.8 |
| Voltage Range [V] | 42.0~58.8 | 42.0~58.8 |
| Dimension [W x H x D, mm] | 445 x 110 x 339 | 445 x 110 x 587 |
| Weight [kg] | 24 | 44 |

UPS Backup Solution



| Models | UPS Rack | | |
|---------------------------|-------------------|-------------------|-------------------|
| | 12 Modules (6S2P) | 10 Modules | 10 Modules |
| | M7830P7B | M4864P6B | M48128P6B |
| Energy [kWh] | 28.0 | 33.0 | 65.9 |
| Continuous Power [kW] | 250 | 115 | 132 |
| Nominal Voltage [V] | 466 | 515 | 515 |
| Voltage Range [V] | 397~523 | 420~588 | 420~588 |
| Dimension [W x H x D, mm] | 520 x 2,292 x 500 | 600 x 2,000 x 650 | 600 x 2,000 x 800 |
| Weight [kg] | 480 | 390 | 625 |

Global Reference (Grid-scale)

LG Chem has installed or been awarded over 7.5GWh of grid-scale projects since the launch of our ESS business.

> 7.5GWh
(As of July 2019)

World-leading Grid-scale battery supplier with extensive experience and proven reference projects

* Cumulative amount of installed/awarded projects

