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ESS Battery Division

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Company Websites

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

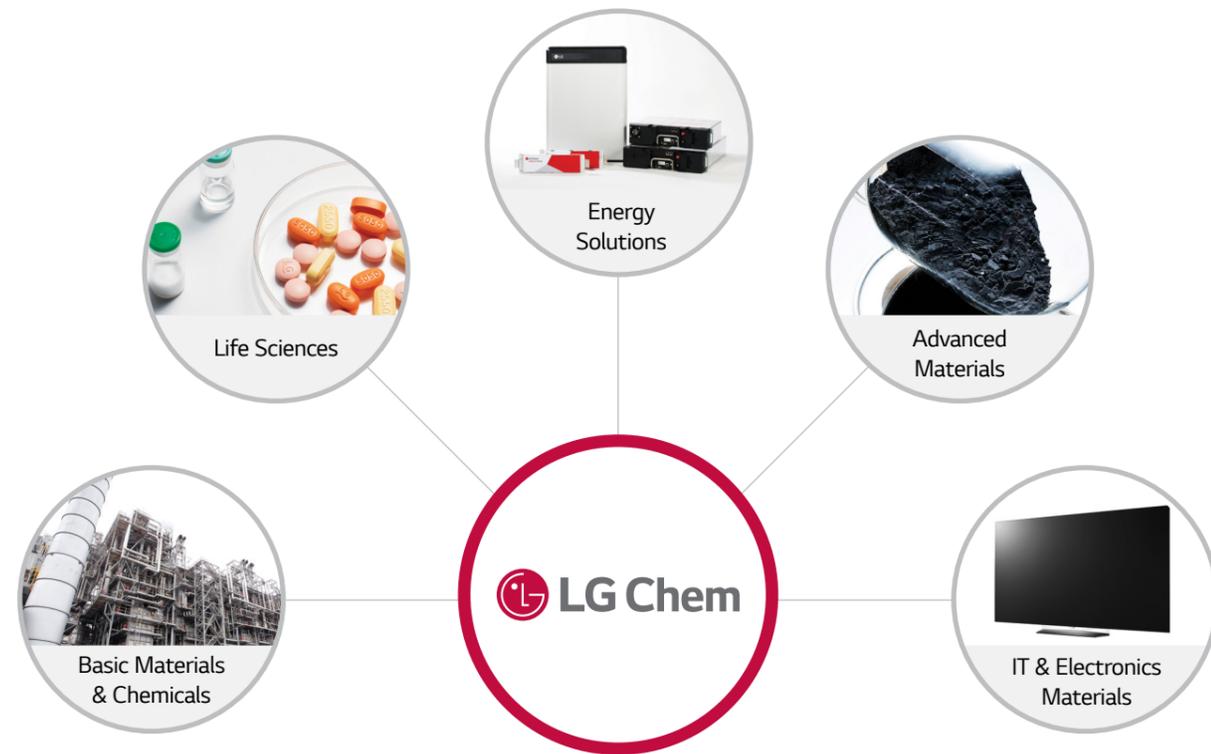


CHANGE YOUR ENERGY
CHARGE YOUR LIFE

ADVANCED BATTERIES
FOR ENERGY STORAGE

Introducing LG Chem

LG Chem at a Glance



Foundation	1947	Employees	29,573
Headquarters	Seoul, Korea	Sales Revenue	USD 24.1B (FY2017)

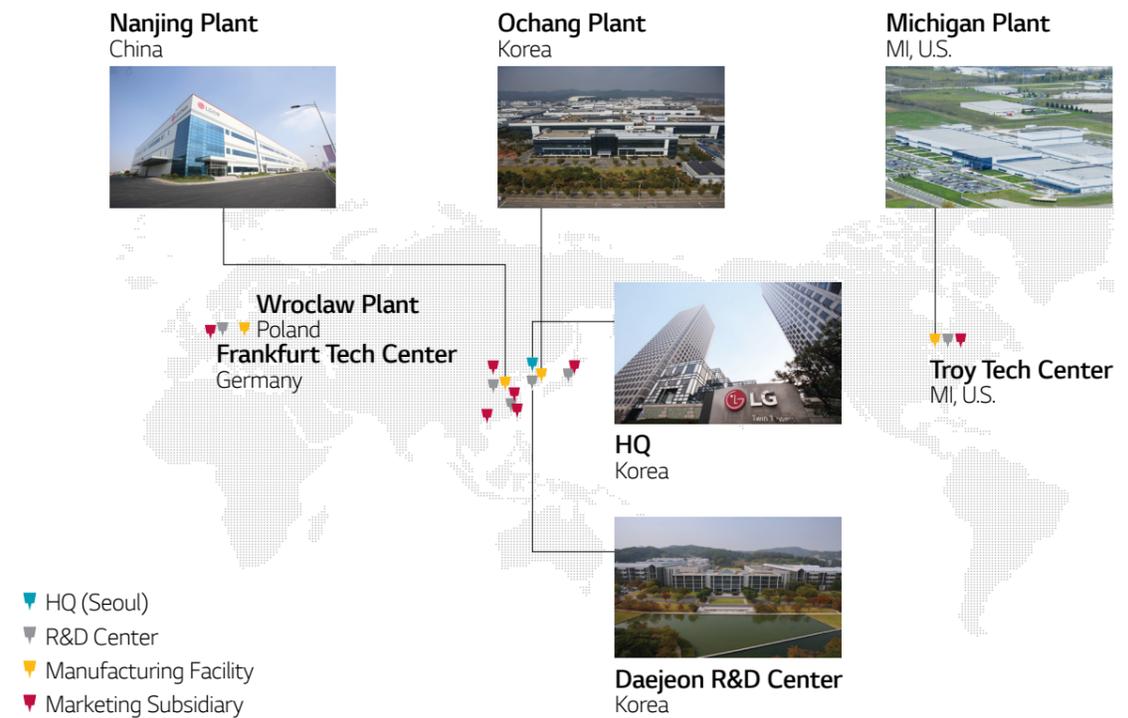
Energy Solutions

With 23 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.

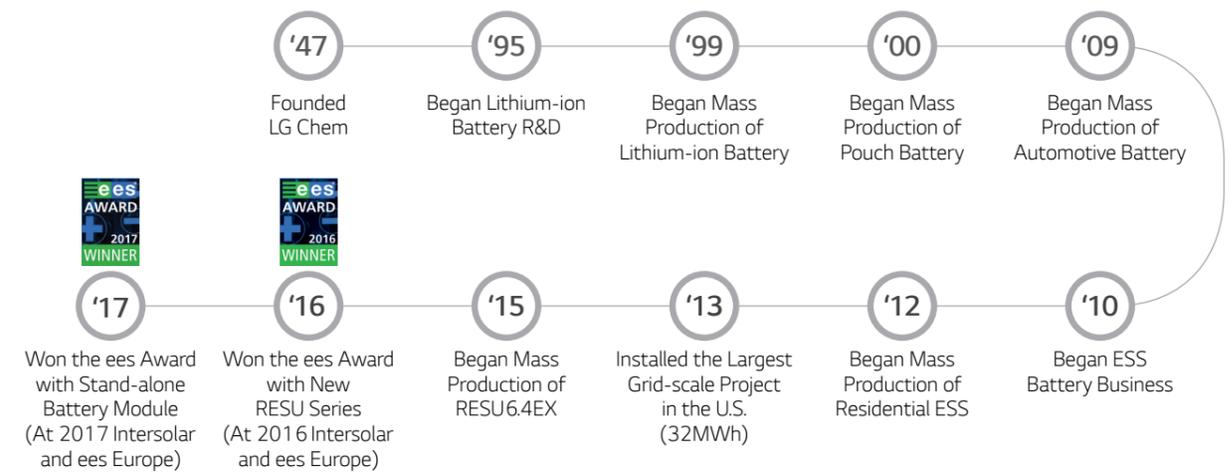


Global Operation of Energy Solutions

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



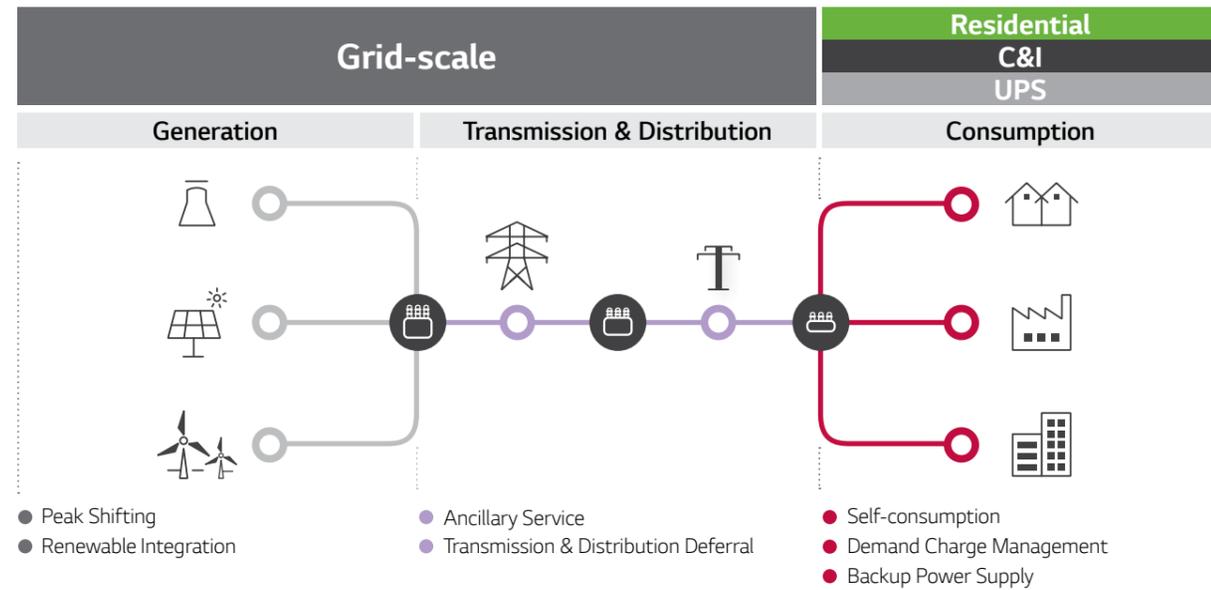
* The ees Award is one of the most prestigious awards presented annually at ees Europe, the largest exhibition for batteries and energy storage systems in Europe, with the purpose to pay tribute to pioneering products and solutions for energy storage system.

LG Chem ESS Solutions

Total Solutions for ESS (Energy Storage System)

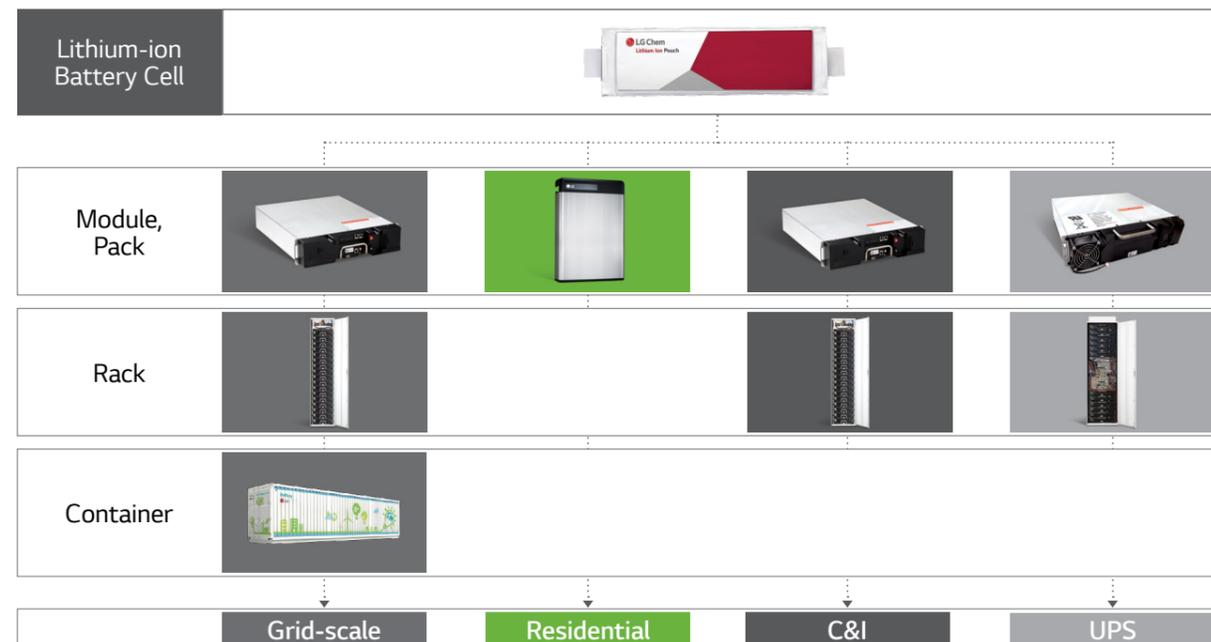
Applications of ESS

ESS (Energy Storage System) provides solutions for applications throughout power supply systems including Grid-scale, Residential, 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.

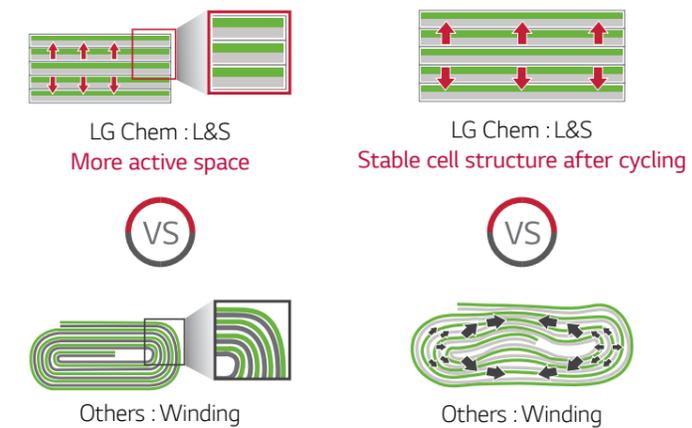


Key Strengths

Lithium-ion Battery Cell

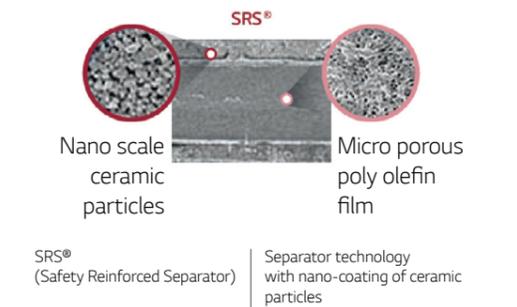
Compactness & Long Lifespan

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.



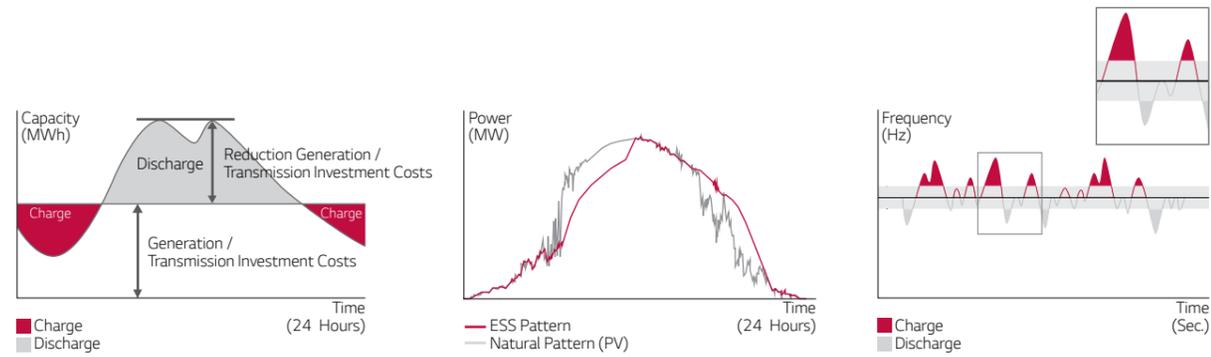
Unsurpassed Experience and Expertise

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

<h3>Chemical Expertise</h3> <p>LG Chem features world class battery technology, made possible by 70 years of expertise in chemicals.</p>	<h3>Proven Technology</h3> <p>LG Chem is the global leading supplier of Lithium-ion batteries for electric vehicles.</p>	<h3>ESS Track Record</h3> <p>Since 2010, LG Chem has installed or been awarded ESS projects for a wide range of applications.</p>
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LG Chem ESS Solutions Grid-scale ESS

For stabilizing the grid, an ESS 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.



Peak Shifting

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

Renewable Integration

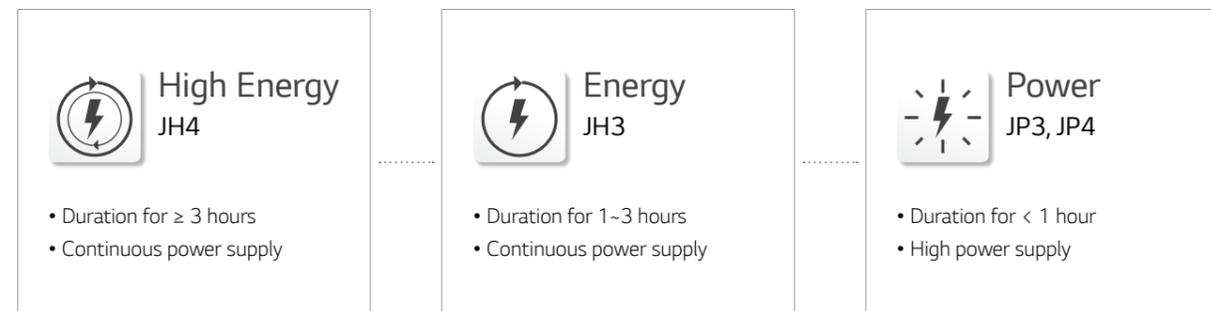
- Stabilize the intermittent renewable power by alternately charging and discharging

Frequency Regulation

- Charge when grid frequency increases
- Discharge when grid frequency decreases

Product Lineup

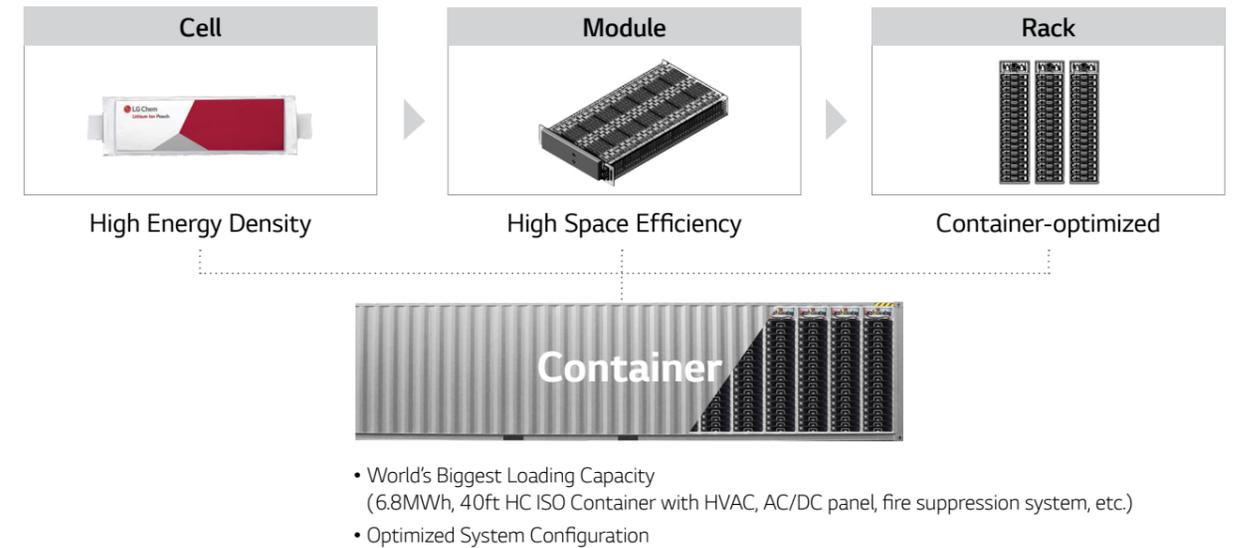
LG Chem offers three product lineups, which provide solutions to meet a broad range of application requirements.



Key Features

System Optimization

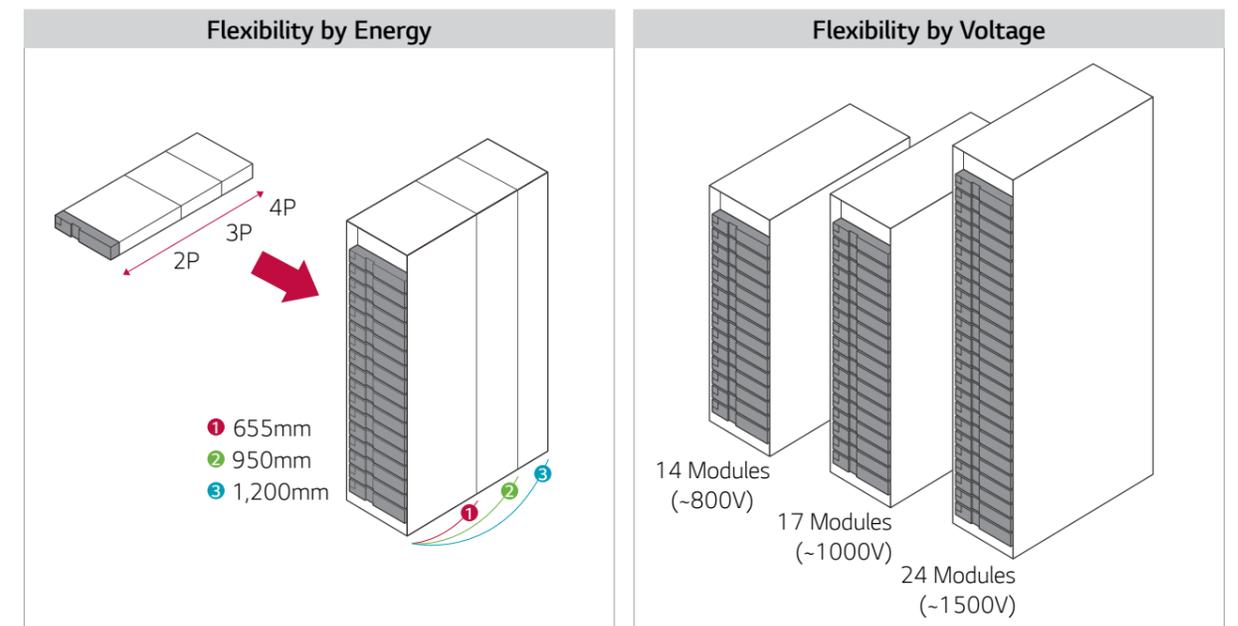
LG Chem features a highly optimized battery system design which enables high energy density.



- World's Biggest Loading Capacity (6.8MWh, 40ft HC ISO Container with HVAC, AC/DC panel, fire suppression system, etc.)
- Optimized System Configuration

Diverse Product Options

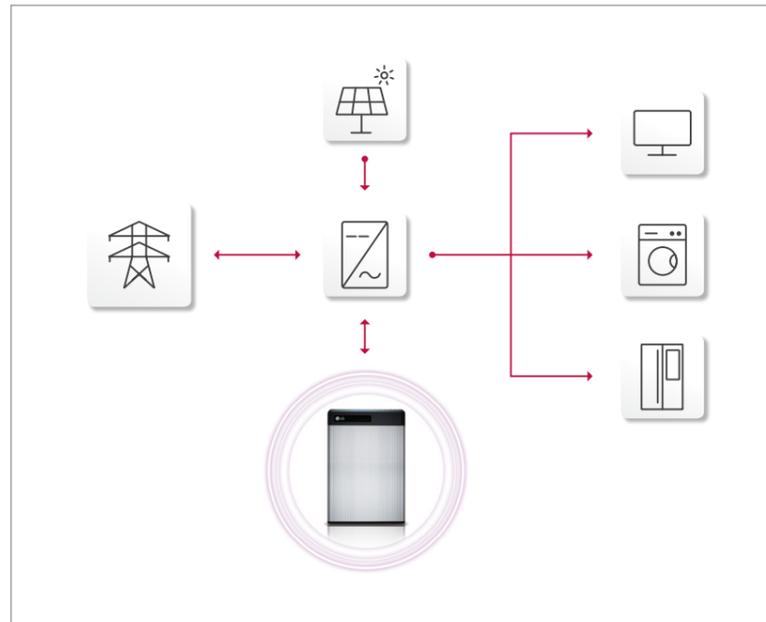
LG Chem offers a range of product options to optimally meet our customers' needs for energy, footprint and voltage.



LG Chem ESS Solutions

Residential ESS

An ESS 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 ESS to meet your energy needs at no extra cost. In addition, an ESS 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 & Easy Installation

The compact and lightweight nature of the RESU allows easier and faster installation both indoor and outdoor.



Proven Safety

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



Easy to Scale Up

All models of the RESU 48V lineup are easily connected to each other with RESU plus.



Diverse Product Options

The RESU series offers diverse product options ranging from 3.3kWh to 13.1kWh.



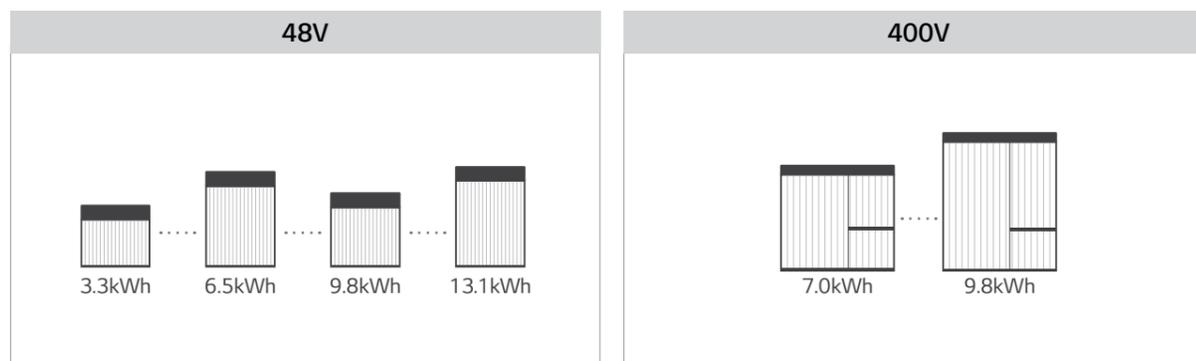
High Compatibility

The RESU series is compatible with a wide range of inverters.

Product Lineup

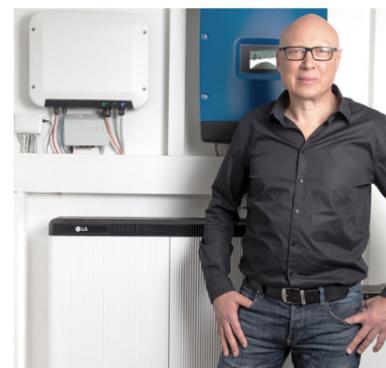
LG Chem offers six residential products in two product lineups to fulfill diverse capacity and voltage needs of homeowners.

RESU



RESU Plus is an expansion kit specially designed for 48V models of the RESU series.
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 ESS



High Energy

Long-duration applications with continuous power supply (≥ 3 hours)

High 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

High Energy Rack



Models	R800 (14 Modules)			
	M48145P5B	M48218P5B	M48290P5B	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]	520 x 2,200 x 655	520 x 2,200 x 950	520 x 2,200 x 1,200	520 x 3,150 x 1,200
Weight [kg]	905	1,305	1,680	2,407

High 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

Long-duration applications with continuous power supply (1~3 hours)

Energy Module



Models	M48126P3B (2P)	M48189P3B (3P)	M48252P3B (4P)
Energy [kWh]	6.5	9.8	13.0
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 ESS



Power

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

Power Module



Models	M4864P6B (1P)	M48128P6B (2P)	M4860P7B (2P)
Energy [kWh]	3.3	6.6	3.1
Capacity [Ah]	64	128	60
Nominal Voltage [V]	51.5		51.8
Voltage Range [V]	42.0-58.8		
Dimension [W x H x D, mm]	445 x 110 x 344	445 x 110 x 620	445 x 110 x 494
Weight [kg]	28	47	31

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	M4860P7B
Energy [kWh]	56.0	112.1	52.8
Capacity [Ah]	64	128	60
Nominal Voltage [V]	876		881
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	520 x 2,200 x 540
Weight [kg]	584	924	645

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)

Residential ESS



48V

Models	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		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, SolaX, Ingeteam, GoodWe, Sungrow, Victron Energy, Selectronic - More brands to be added

400V



Models	RESU7H		RESU10H	
	Type-R	Type-C	Type-R	Type-C
Total Energy [kWh] ¹⁾	7.0		9.8	
Usable Energy [kWh] ²⁾	6.6		9.3	
Capacity [Ah]	63		63	
Voltage Range [V]	350-450	430-550	350-450	430-550
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
Weight [kg]	75	87	97	99.8
Enclosure Protection Rating	IP55			
Communication	RS485	CAN2.0B	RS485	CAN2.0B
Certificates	Cell	UL1642		
	Product	TUV (IEC 62619) / CE / FCC / RCM	TUV (IEC 62619) / CE / RCM	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, SolarEdge, Fronius, Huawei - More brands to be added

C&I ESS



Models	R400		R600		R800		R1000	
	M48126P3B	M48126P3B	M48126P3B	M48189P3B	M48126P3B	M48189P3B	M48126P3B	M48189P3B
Energy [kWh]	45.7	65.2	91.3	137.0	110.9	166.4		
Capacity [Ah]	126	126	126	189	126	189		
Nominal Voltage [V]	363	518	725		881			
Voltage Range [V]	294-412	420-588	588-823		714-1,000			
Dimension [W x H x D, mm]	520 x 1,300 x 655	520 x 1,880 x 655	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]	423	582	766	1,104	912	1,314		
Certificates	UL 1973 (Listed), IEC 61000-6-2 / 61000-6-3, FCC Part 15 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) M7830P7B	10 Modules M4864P6B	10 Modules 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

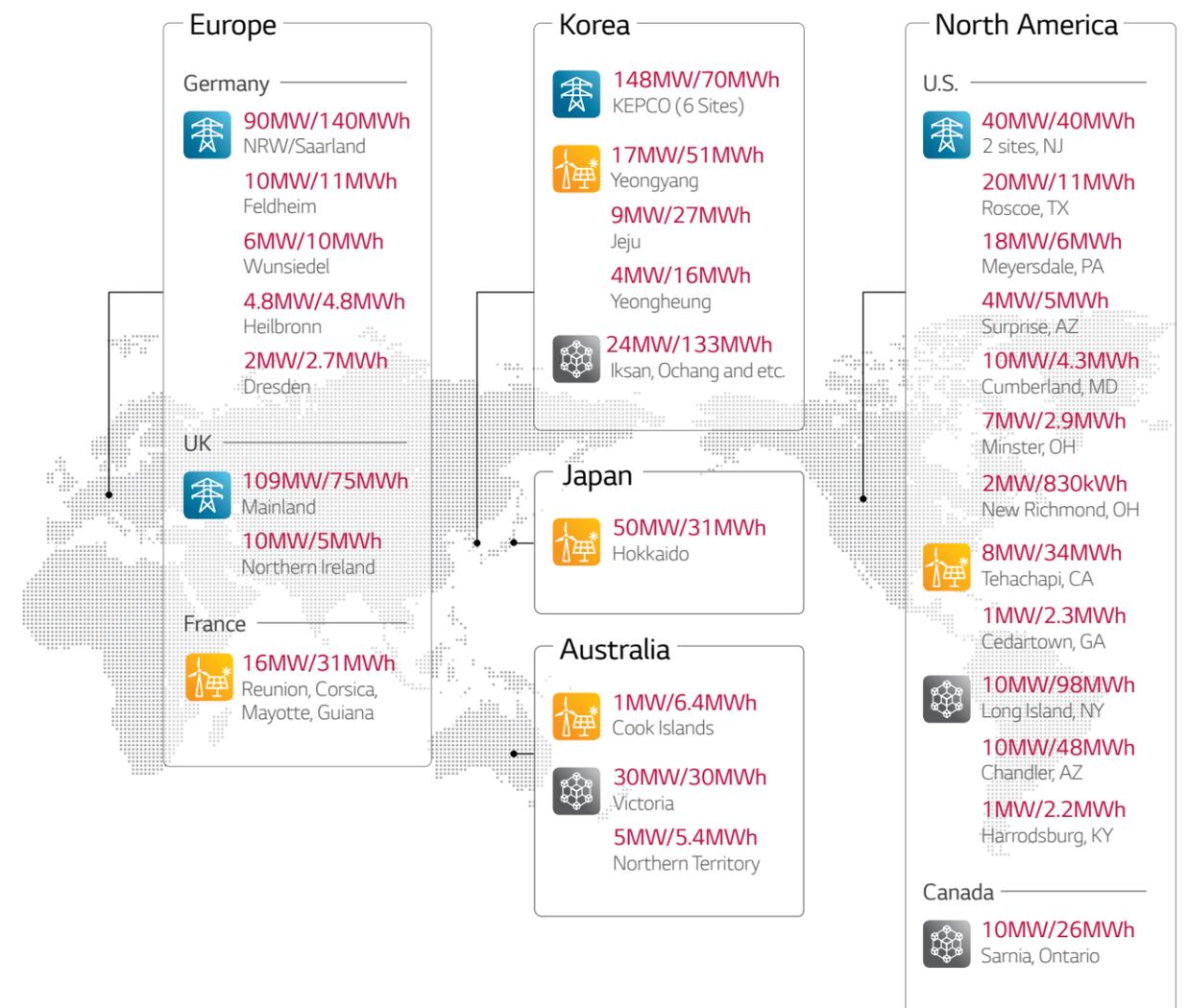
Global Reference (Grid-scale)

LG Chem has installed or been awarded over 4GWh of grid-scale projects since the launch of our ESS business.

> 4GWh
(As of July 2018)

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

* Cumulative amount of installed/awarded projects



Frequency Regulation



Renewable Integration



Peak Shifting & Multi Purpose