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Company websites

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



Innovation
for a Better Life

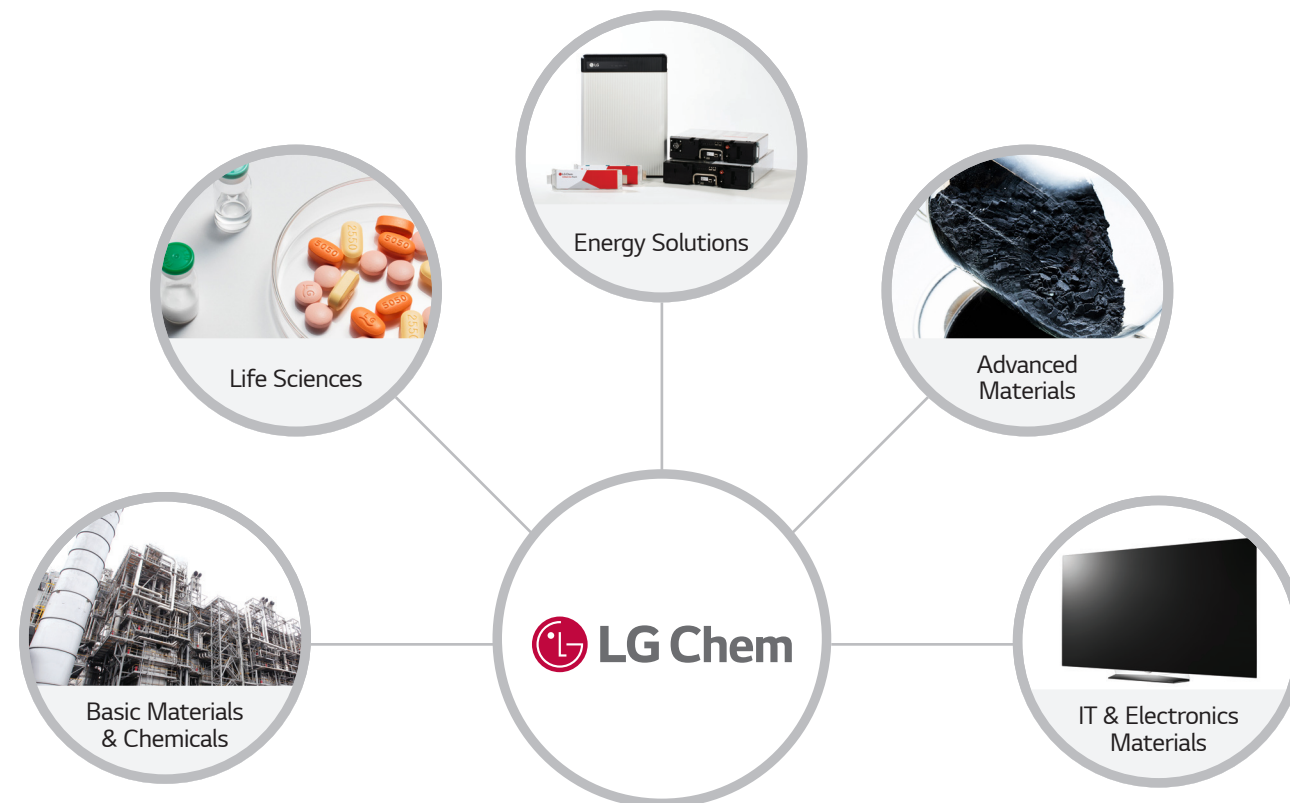


CHANGE YOUR ENERGY
CHARGE YOUR LIFE

ADVANCED BATTERIES
FOR ENERGY STORAGE

Introducing LG Chem

LG Chem at a Glance



Foundation	1947	Employees	26,660
Headquarters	Seoul, Korea	Sales Revenue	USD 17.8B

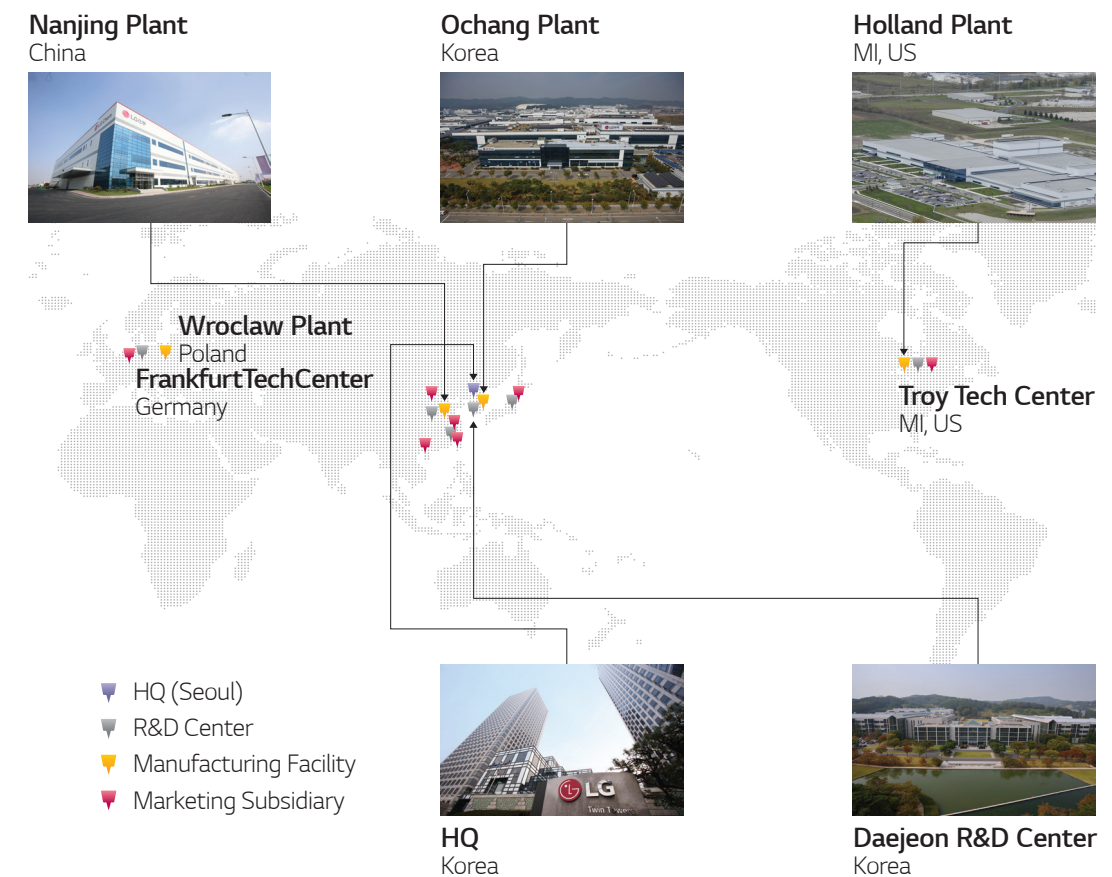
Energy Solutions

With 22 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 battery manufacturing.

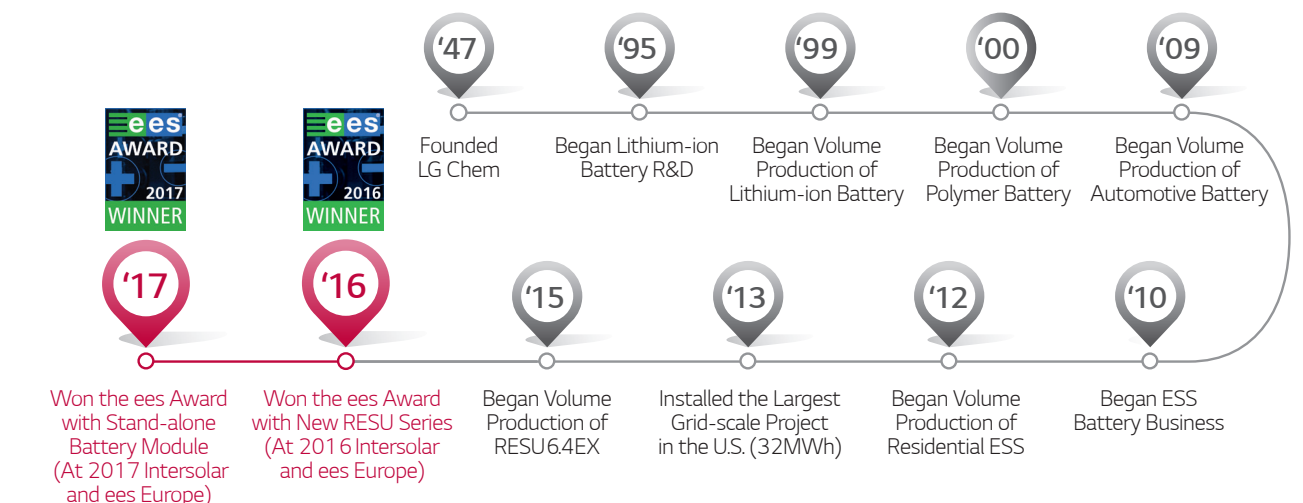


Global Operation of Energy Solutions

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



Business History of Energy Solutions

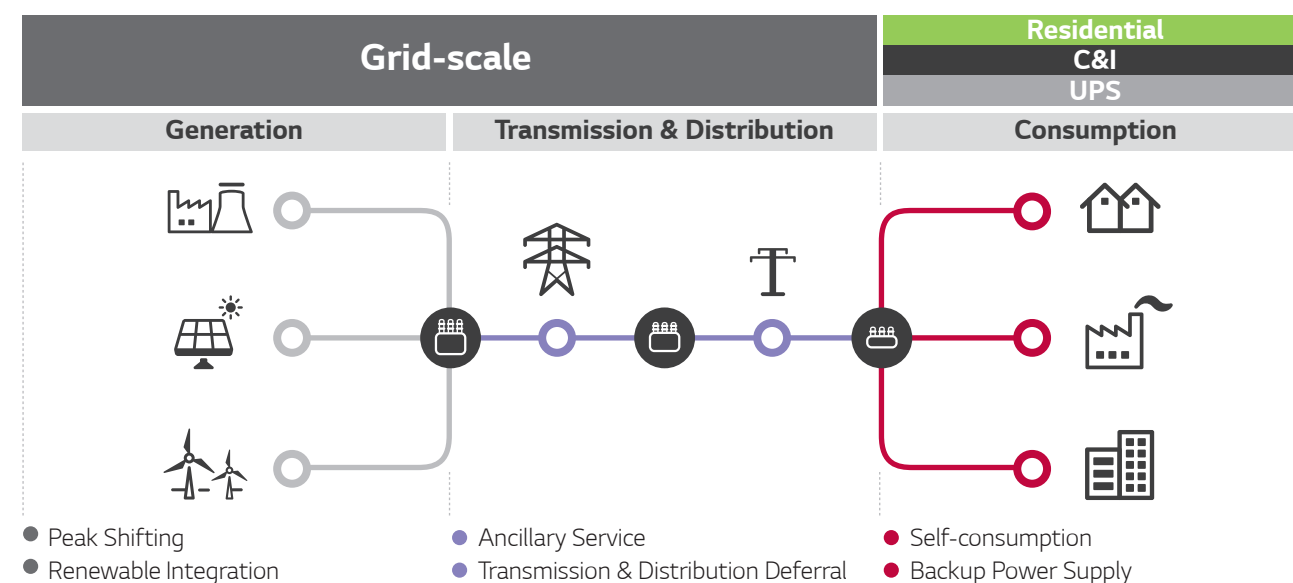


*The ees award is one of the most honorable awards presented annually at ees Europe, the largest exhibition for batteries and energy storage systems in Europe, with the purpose to pay tribute to pioneering products and solutions for energy storage system.

Total Solutions for ESS (Energy Storage System)

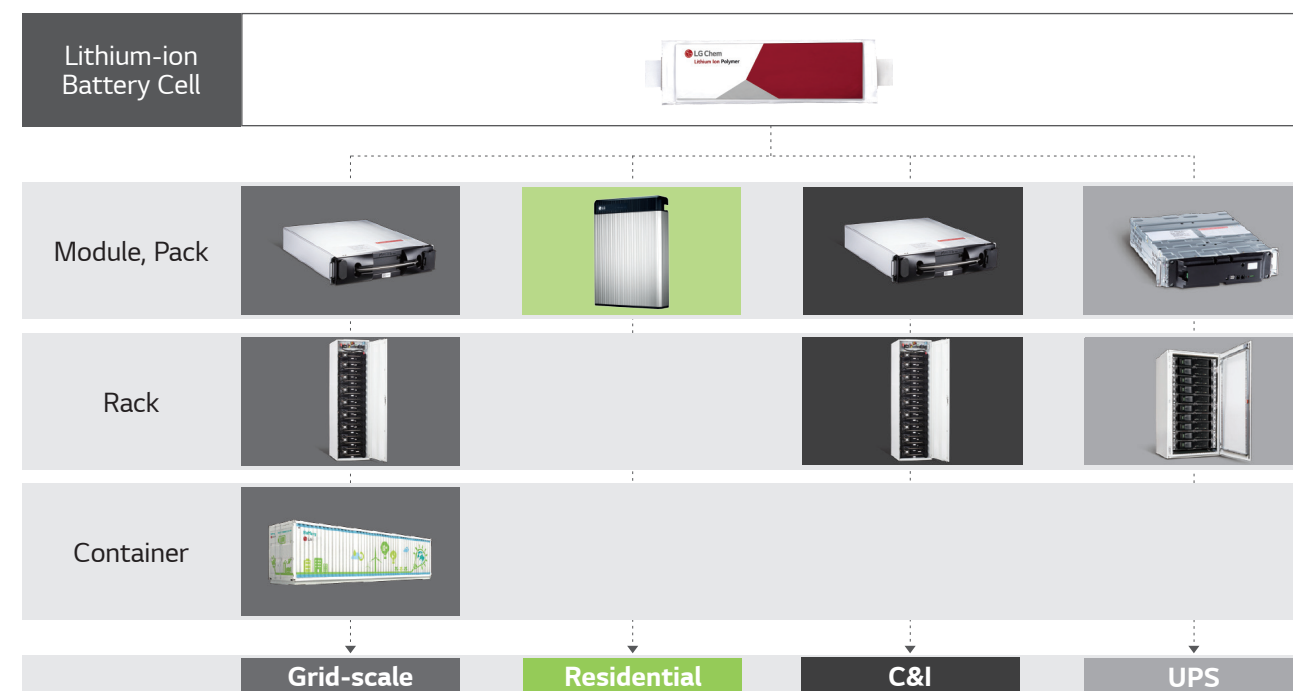
Applications of ESS

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 Cell, Module, Pack, Rack, and Container that allow our customers to source total battery solutions.

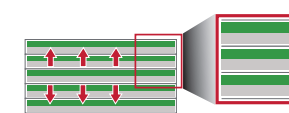


Technical Strengths

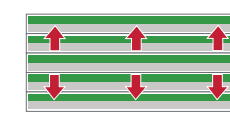
Lithium-ion Battery Cell

Compactness & Long Lifespan

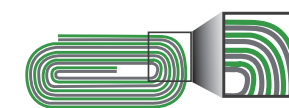
LG Chem's L&S (Lamination & Stacking) process minimizes dead space, enables higher energy density, and enhances the sustainability of cell structures.



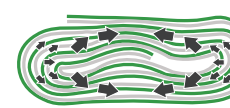
LG Chem : L&S
More active space



LG Chem : L&S
Stable cell structure after cycling



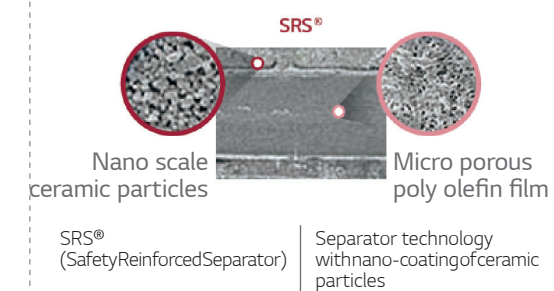
Others : Winding



Others : Winding

Safety

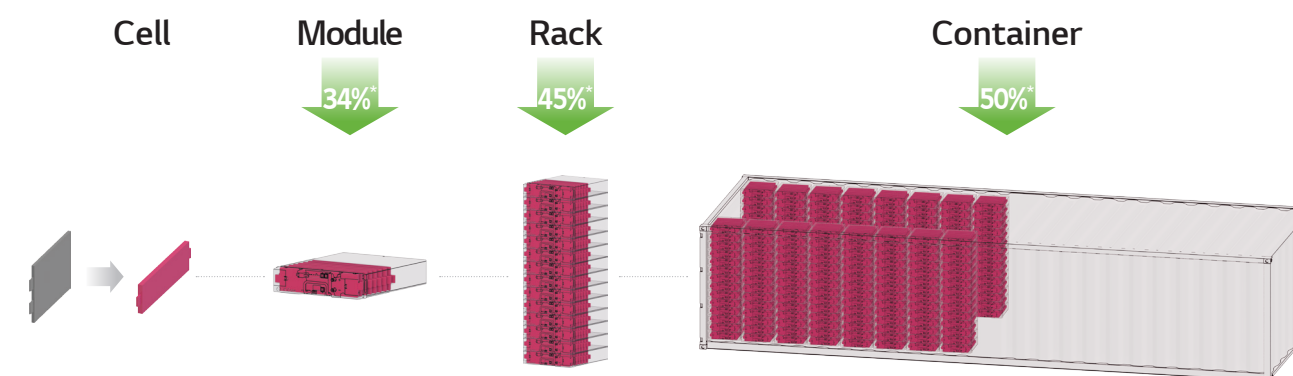
LG Chem's SRS® (Safety Reinforced Separator) increases the mechanical and thermal stability of battery cells.



Battery System

System Optimization

The high energy density and optimal dimensions of our new generation of Energy Cell (JH3) and Power Cell (JP3) have allowed us to radically improve the efficiency of pack design. In 2016, LG Chem has introduced this enhanced space efficiency in its Modules, Racks, and Containers.

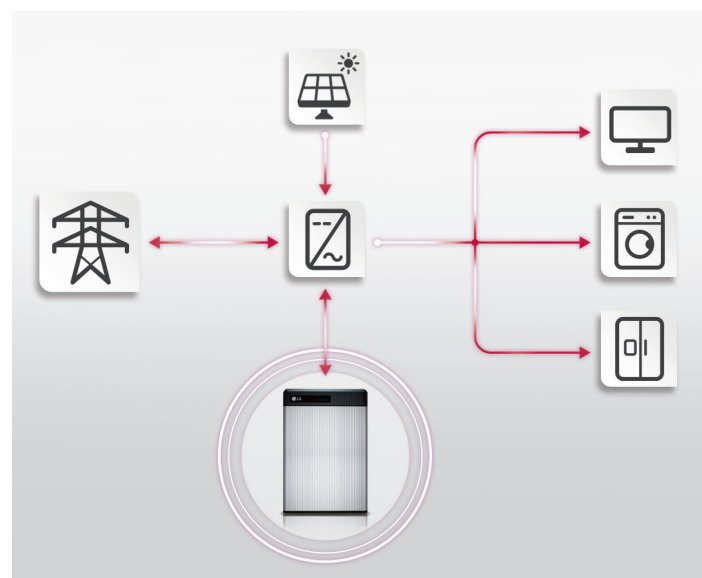


- High Energy Density 355Wh/ℓ → 410Wh/ℓ (15%↑)
- Optimized Dimension for 19-inch Standard Racks

* % of Space Reduction
(Comparison with former models)

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



RESU6.4EX (Former model)

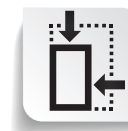
Slimmer & Lighter

RESU



RESU6.5

Key Features of New RESU Series



Compact Size & Easy Installation

The compact and lightweight nature of the RESU is world-class. It is designed to allow easy wall-mounted or floor-standing installation for both indoor and outdoor applications. The inverter connections have also been simplified, reducing installation time and costs.



Powerful Performance

The new RESU series features industry-leading continuous power (4.2kW for RESU6.5) and DC round-trip efficiency (95%, 0.3C). LG Chem's L&S (Lamination & Stacking) technology provides durability with long lifespan.



Proven Safety

LG Chem places the highest priority on safety and utilizes the same technology for its ESS products that has a proven safety record in its automotive battery. All products are fully certified in relevant global standards.



Diversity in Product & Capacity Options

A total of five different models are available to meet customers varying needs with respect to voltage and capacity. With the RESU Plus, all 48V models can be "cross-connected" with one other 48V unit of any capacity. This allows the RESU range to offer energy storage capacities from 3.3kWh to 19.6kWh.

48V

3.3kWh

6.5kWh

9.8kWh

400V

7.0kWh

9.8kWh

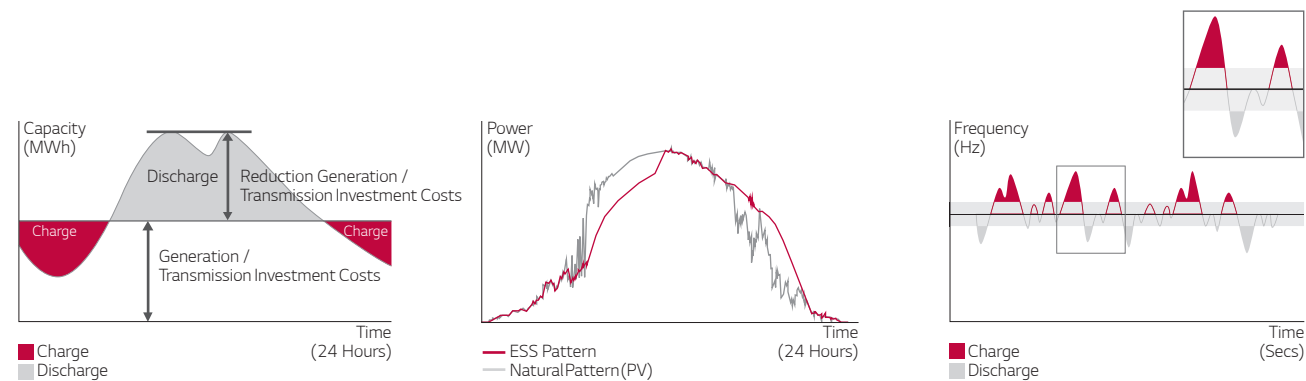
RESU PLUS

RESU Plus is an expansion kit specially designed for 48V models of new RESU series.
Number of expandable battery units: Up to 2EA

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 can offer an entire battery system for grid-scale ESS applications.



Peak Shifting

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

Renewable Integration

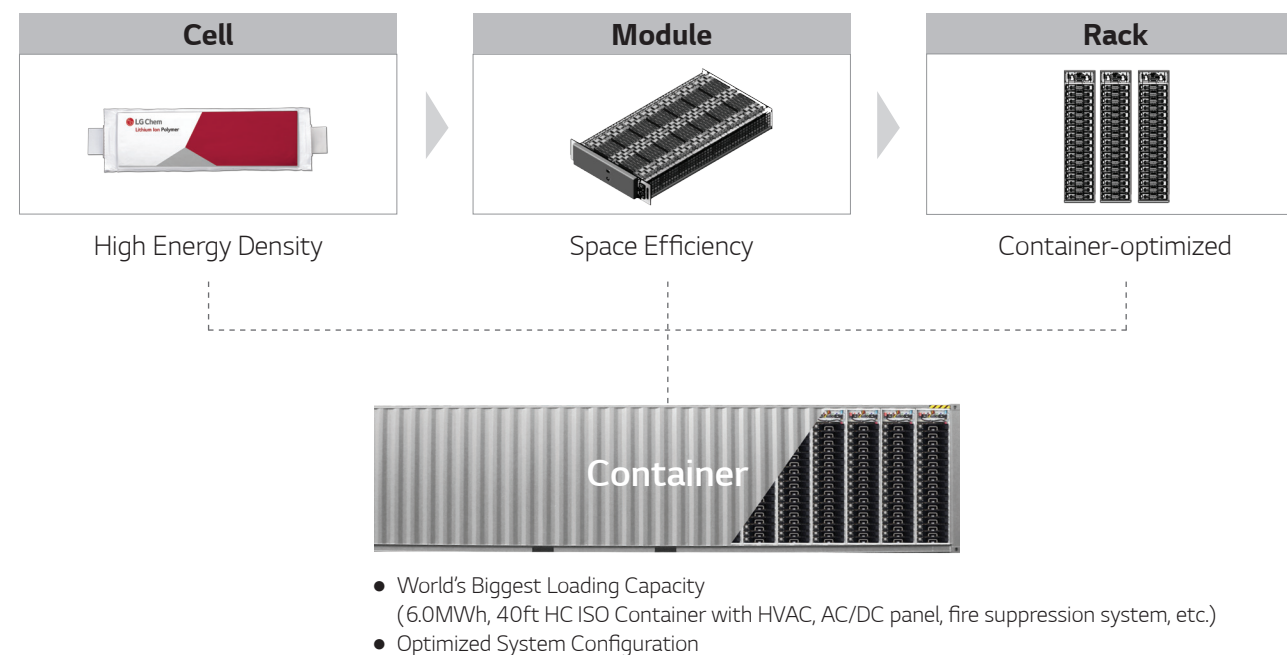
- Stabilize the intermittent renewable power by alternately charging and discharging

Frequency Regulation

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

Advanced Battery System of LG Chem

LG Chem focuses on supplying advanced battery systems, including Cell, Module, Rack, and Container.



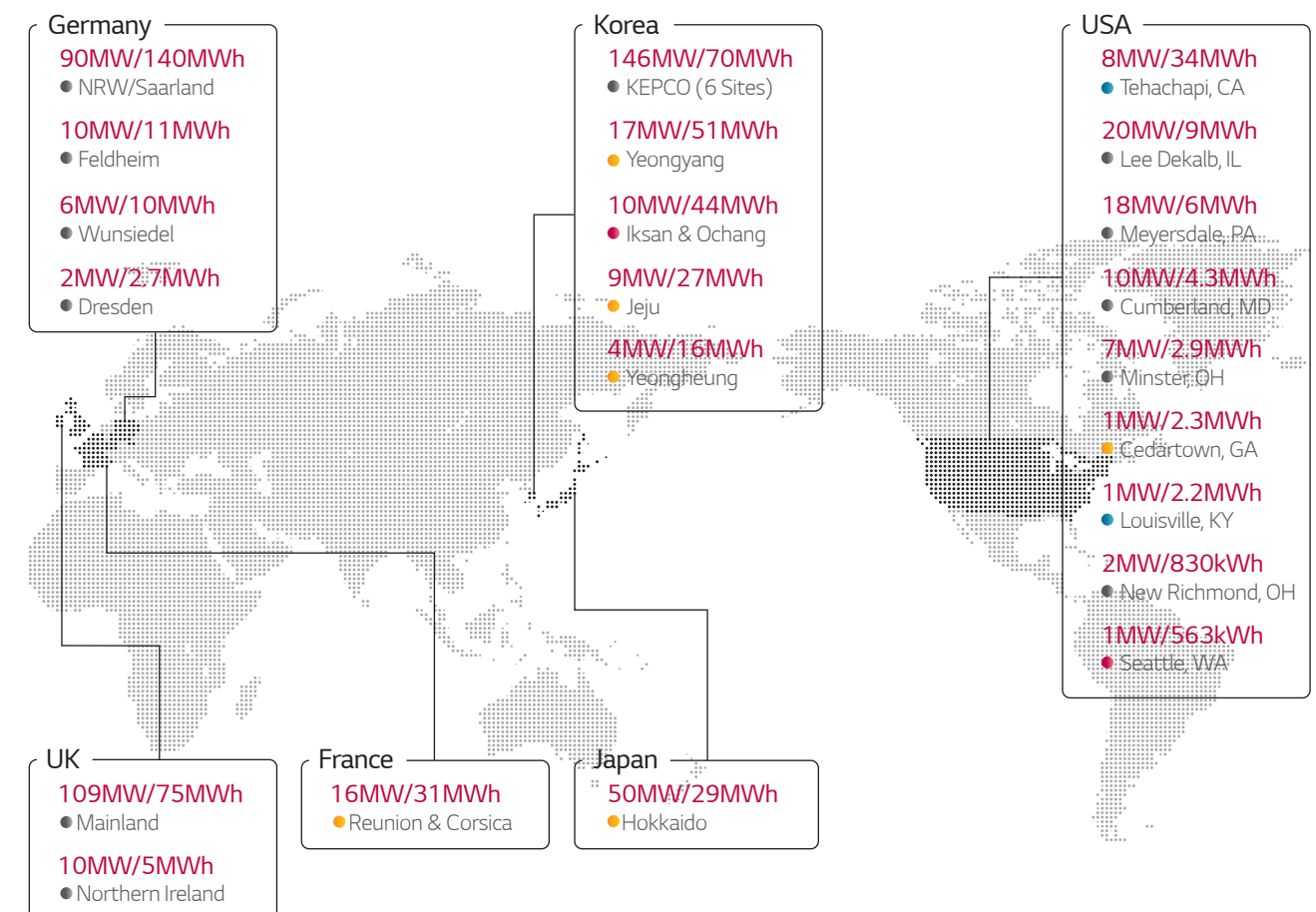
Global Reference

LG Chem has installed or been awarded approximately 2.9GWh of grid-scale projects since the launch of our ESS business.

2.9GWh
(As of June 2017)

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

* Cumulative amount of installed/awarded projects



- Peak Shifting
- Renewable Integration
- Frequency Regulation
- MultiPurpose*

* Consisting of two or more grid-scale applications

Specifications

Grid-scale ESS



Energy

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

Energy Module



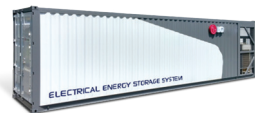
Models	M4863P3B	M48126P3B	M48189P3B
Energy [kWh]	3.3	6.5	9.8
Capacity [Ah]	63	126	189
Nominal Voltage [V]	51.8	51.8	51.8
Voltage Range [V]	42.0~58.8	42.0~58.8	42.0~58.8
Dimension [W x H x D, mm]	445 x 110 x 339	445 x 110 x 587	445 x 110 x 846
Weight [kg]	25	44	68

Energy Rack



Models	R800 (14 Modules)		
	M4863P3B	M48126P3B	M48189P3B
Energy [kWh]	45.7	91.3	137.0
Capacity [Ah]	63	126	189
Nominal Voltage [V]	725	725	725
Voltage Range [V]	588~823	588~823	588~823
Dimension [W x H x D, mm]	520 x 1,880 x 425	520 x 1,880 x 670	520 x 1,880 x 930
Weight [kg]	435	707	1,075
Models	R1000 (17 Modules)		
	M4863P3B	M48126P3B	M48189P3B
Energy [kWh]	55.5	110.9	166.4
Capacity [Ah]	63	126	189
Nominal Voltage [V]	881	881	881
Voltage Range [V]	714~1,000	714~1,000	714~1,000
Dimension [W x H x D, mm]	520 x 2,200 x 425	520 x 2,200 x 670	520 x 2,200 x 930
Weight [kg]	517	848	1,292

Energy Container



Models	40ft HC ISO Container	
	M48126P3B	M48189P3B
	Manned	Unmanned
Energy [MWh]	4.8	6.0
System Voltage [V dc]	714~1,000	714~1,000
Dimension [W x H x D, m]	12.2 x 2.9 x 2.5	12.2 x 2.9 x 2.5
Weight [ton] (with battery)	50	60
Ambient Temperature [°C]	-20~50	-20~50
Communication	CAN 2.0 B, Modbus TCP/IP	

(System design can be changed according to customer requirements)



Power

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

Power Module



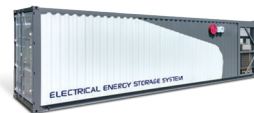
Models	M4864P6B	M48128P6B	M4860P7B
Energy [kWh]	3.3	6.6	3.1
Capacity [Ah]	64	128	60
Nominal Voltage [V]	51.5	51.5	51.8
Voltage Range [V]	42.0~58.8	42.0~58.8	42.0~58.8
Dimension [W x H x D, mm]	445 x 110 x 344	445 x 110 x 592	445 x 110 x 494
Weight [kg]	28	47	32

Power Rack



Models	R800 (14 Modules)	
	M4864P6B	M48128P6B
Energy [kWh]	46.2	92.3
Capacity [Ah]	64	128
Nominal Voltage [V]	721	721
Voltage Range [V]	588~823	588~823
Dimension [W x H x D, mm]	520 x 1,880 x 425	520 x 1,880 x 670
Weight [kg]	472	758
Models	R1000 (17 Modules)	
	M4864P6B	M48128P6B
Energy [kWh]	56.0	112.1
Capacity [Ah]	64	128
Nominal Voltage [V]	876	876
Voltage Range [V]	714~1,000	714~1,000
Dimension [W x H x D, mm]	520 x 2,200 x 425	520 x 2,200 x 670
Weight [kg]	562	909

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] (with battery)	50
Ambient Temperature [°C]	-20~50
Communication	CAN 2.0 B, Modbus TCP/IP

(System design can be changed according to customer requirements)

Residential ESS



48V



Models		RESU3.3	RESU6.5	RESU10
Total Energy [kWh] ¹⁾		3.3	6.5	9.8
Usable Energy [kWh] ²⁾		2.9	5.9	8.8
Capacity [Ah]		63	126	189
Nominal Voltage [V]		51.8	51.8	51.8
Voltage Range [V]		42.0~58.8	42.0~58.8	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
Weight [kg]		31	52	75
Enclosure Protection Rating		IP55		
Communication		CAN 2.0 B		
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 90% of Depth of Discharge (Battery cell only)

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



400V

Models	RESU7H	RESU10H	
	Type-R	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
Voltage Range [V]	350~450	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
Weight [kg]	75	97	99.8
Enclosure Protection Rating	IP55		
Communication	RS485	RS485	CAN 2.0 B
Certificates	Cell	UL 1642	
	Product	TUV (IEC 62619) / CE / FCC / 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 95% of Depth of Discharge (Battery cell only)

Compatible Inverter Brands : SMA (RESU10H) , SolarEdge (RESU7H, RESU10H) - More brands to be added

C&I ESS

Models	R400	R600	R800 Bi Polar	R800		R1000	
	M48126P3B	M48126P3B	M48126P3B	M48126P3B	M48189P3B	M48126P3B	M48189P3B
Energy [kWh]	45.7	65.2	91.3	91.3	137.0	110.9	166.4
Capacity [Ah]	126	126	126	126	189	126	189
Nominal Voltage [V]	363	518	±363	725	725	880	880
Voltage Range [V]	294~412	420~588	294~412 -294~-412	588~823	588~823	714~1,000	714~1,000
Dimension [WxHxD, mm]	520x1,200x 670	520x1,880x 670	520x2,200x 670	520x1,880x 670	520x1,880x 930	520x2,200x 670	520x2,200x 930
Weight [kg]	400	570	760	740	1,160	890	1,350
Certificates	UL 1973 (Listed), IEC 61000-6-2 / 61000-6-3, FCC Part15 Class A						



Telecom Backup Solution / Residential Module



Models	M4860P2S	M4863P3S	M48126P3S	M4830P2S1
Energy [kWh]	3.2	3.3	6.5	1.6
Capacity [Ah]	62	63	126	31.5
Nominal Voltage [V]	51.8	51.8	51.8	51.8
Voltage Range [V]	42.0~58.8	42.0~58.8	42.0~58.8	42.0~58.8
Dimension[WxHxD,mm]	445 x 122 x 600	445 x 110 x 339	445 x 110 x 587	182 x 212 x 278
Weight [kg]	35	26	44	14

UPS Backup Solution

Module

Models	M7830P7B	M4860P7B	M4864P6B
Energy [kWh]	2.3	3.1	3.3
Capacity [Ah]	30	60	64
Nominal Voltage [V]	77.7	51.8	51.5
Voltage Range [V]	69.3~87.1	42.0~58.8	42.0~58.8

Rack

Models	UPS Rack		
	12 Modules (6S2P)	9 Modules	9 Modules
	M7830P7B	M4860P7B	M4864P6B
Energy [kWh]	27.9	27.9	29.6
Continuous Power [kW]	250	112	89
Nominal Voltage [V]	466	466	464
Voltage Range [V]	415.8~522.9	378~529.2	378~529.2
Dimension[WxHxD,mm]	520 x 2,292 x 500	600 x 1,800 x 600	600 x 1,800 x 600
Weight [kg]	480	428	388