LG Home Battery

Introducing - RESU HOME

George Elovaris
Business Development Manager - Residential

LG Energy Solution

July 2021

LG Energy Solution

LG Energy Solution

Certificate

Zertifikat • Certificate • Attestation • Certificato • Certificat

LG Energy Solution

RESU

LG Chem Europe GmbH herewith confirms that

Stefan Krokowski
LG Chem Europe GmbH

has attended the product installation training sessions for the product families

RESU Low Voltage (**RESU 3.3, RESU 6.5, RESU 10**) and RESU High Voltage (**RESU 7H, RESU 10H**)

and successfully passed the certification exam.

CERTIFICATE OF ACHIEVEMENT

This certificate has been issued by LG Chem Europe GmbH under the registration number EG2A180420000.
It expires 12 months after it's creation date.

Sulzbach am Taunus, April 26th 2018

i.A.

Stefan Krokowski
Head of Sales & Marketing - Residential ESS EMEA

LG Chem Europe GmbH · Otto-Volger-Str. 7C · 65843 Sulzbach · Deutschland

“

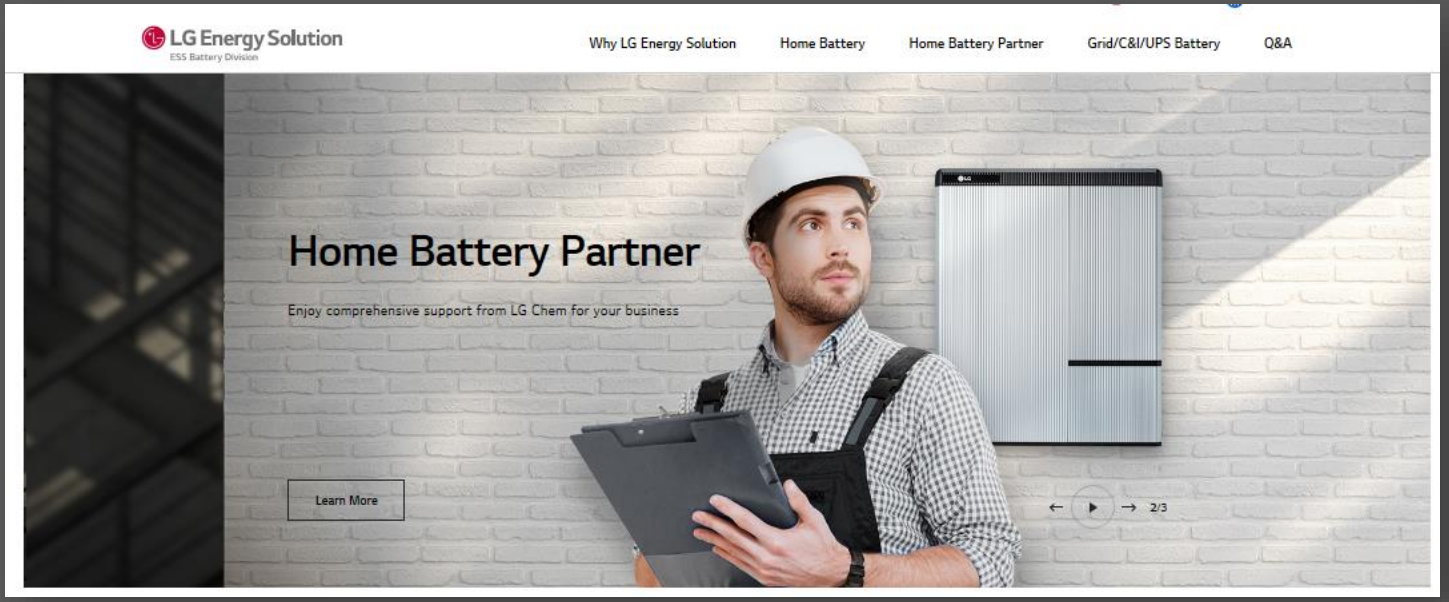
WARRANTY *DOES NOT* APPLY TO PRODUCTS
When the Products are *NOT* purchased, installed and/or serviced by an LG Energy Solution *'certified installer'*

As Certified Installers, you can experience

- Positive reference during sales talks
- Listing within the Installer Search (LG ESS - AU Battery Website)
- Improved Customer Satisfaction through reducing recurring mistakes
- Warranty registration and tech support.

LG ESS AU Battery Website

www.lgessbattery.com/au



Your Connection to LG Energy Solution

- Lead generation, customers will find you and your offer
- Access to Marketing Documents, Updated Data Sheets, certificates & press releases
- Download of Product Pictures / Background Info, for your own website and marketing
- Warranty registration and tech support.

Contents

Be Prepared with LG RESU

LG Energy Solution

01

LG Energy Solution, your long-term business partner

Why install the LG Energy Solution

Bankability, Solution Partner, Optimal design for customer

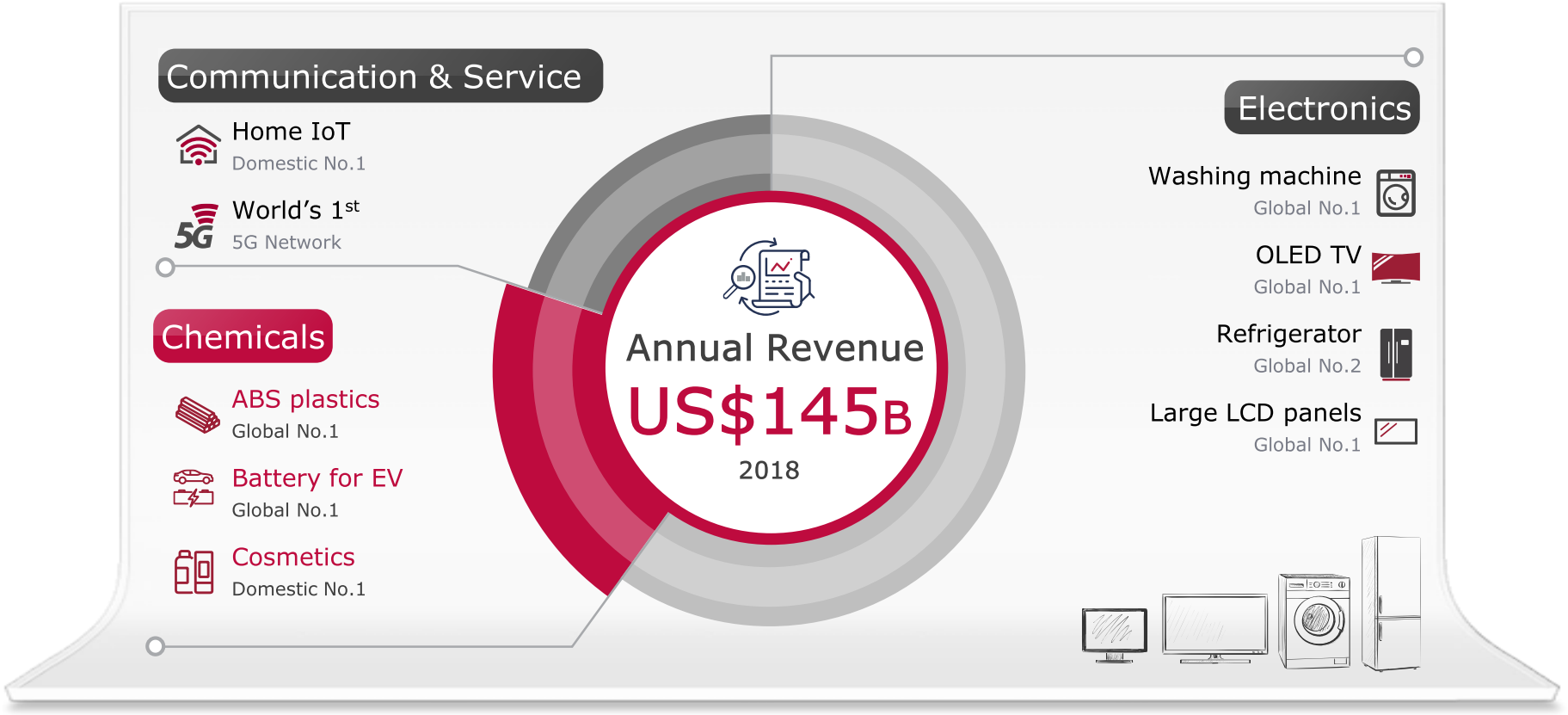
LG Energy Solution

LG Group – Consumer Product Overview

LG Home Battery RESU

LG Group is..

- A global brand with more than US$ 145B annual revenue across electronics / chemicals / communication & service area.



Employees
234,700
(Unit : person)

R&D Bases
39

Production Bases
124

Sales Bases
211

LG Energy Solution

LG Group is..

- A **reliable brand** with 73 years of history, with a track record of delivering safe, quality consumer products.
- A **financially stable** and profitable company **who can** fully support longstanding product warranties.
- A **globally recognised market leader** for multiple home technologies used in our everyday lives.

2003 Established as LG Co.

1996 Established as LG Telecom now LG U+

1995 Established as New Corporate Identity Lucky Goldstar LG

1958 Established as Goldstar Co. now LG Electronics

1947 Established as Lucky Chemical Industrial Co. now LG Energy Solution

LG Energy Solution – Spin off

LG Home Battery RESU

" LG Chem cleared to spin off battery business"

- Korea Times

Why Split-off?

To expand existing battery business

In response to rapidly growing storage market.

Split-off effect

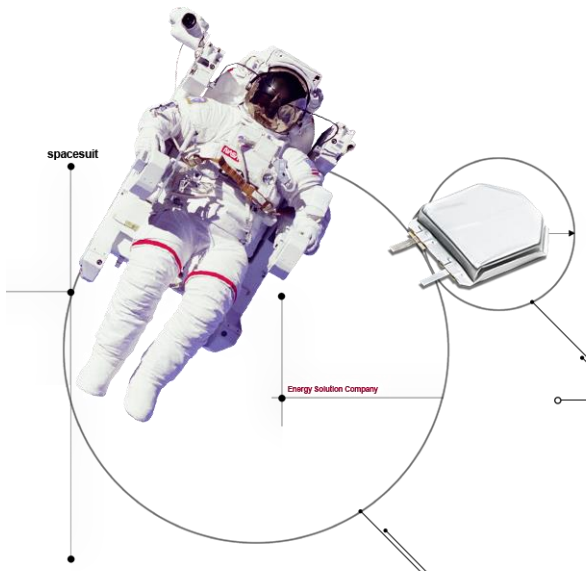
Faster decision-making

to respond to rapidly growing storage

LG Energy Solution – History

LG Home Battery RESU

With 26+ years of experience of in successfully delivering products and solutions to customers in the global market, LG Energy Solution is recognized as the unparalleled industry leader in Lithium-ion battery.



'95 Started development of lithium-ion batteries

'99 Began to produce lithium-ion batteries for consumer applications

'00 Started development of lithium-ion batteries for Automotive

'04 Completed construction of the plants in Korea and China

'09 Supplied the world's first lithium-ion batteries for HEV

'10 Supplied lithium-ion batteries for PHEV

'13 Developed the world's first hexagon-typed pouch battery for smart watches

'15 Signed on the long-term supply agreement of 1GWh with AES

'16 Supplied lithium-ion batteries for spacesuit of NASA

'18 Developed the world's first Freeform battery

'20 Established LG Energy Solution corporation

LG Energy Solution is..

- A preferred **Tier 1** supplier to world's leading manufactures
- Known for **safety** and **reliability** of its cell technology

Automotive Customers

3.5 Million Hybrid and Electric Vehicles

ESS Customers

Deployed > **11 GWh of capacity**

IT & New Applications Customers

Global top tier customers

LG Energy Solution

LG Energy Solution is..

- A global chemical company with **yearly revenue of more than US$ 26B**
- Comprised of 5 business units including **Energy Solution Company** leading the lithium-ion battery market in the world

Revenue (USD Billion.)

Basic Materials & Chemicals	Energy Solution	IT & Electronics Materials	Advanced Materials	Life Sciences
16.7B	5.8B	2.1B	0.8B	1.1B
62%	23%	8%	3%	4%





1947 Established as Lucky Chemical Industrial Corporation

1995 Established as New Corporate Identity (Lucky Goldstar → LG)

2004 Established LG Energy Solution (China) Investment Co., Ltd

2007 Merged with LG Petrochemicals Co., Ltd

2010 Started construction of automotive battery plant in Michigan, USA

LG Energy Solution

LG Energy Solution has..

- >14k battery related patents (9,282 registered Overseas +4,854 registered in Korea)
- Capabilities to develop their **own** core technology
- Their own **in-house manufacturing** plant for quality control, core IP

L&S (Lamination & Stacking) Technology

Winding | Lamination & Stacking

▸▸▸ High-loading electrode structure

Limitations in electrode thickness

Increase in electrode thickness

▸▸▸ Minimize dead space, higher energy density

High Energy Density

▸▸▸ Stable cell structure for extended live

500 Cycles

500 Cycles

longer life

SRS ®(safety Reinforced Separator) Technology

SRS Layer

Nano scale Ceramic particles

Micro porous Polyolefin film

Conventional Winding VS Lamination & stacking

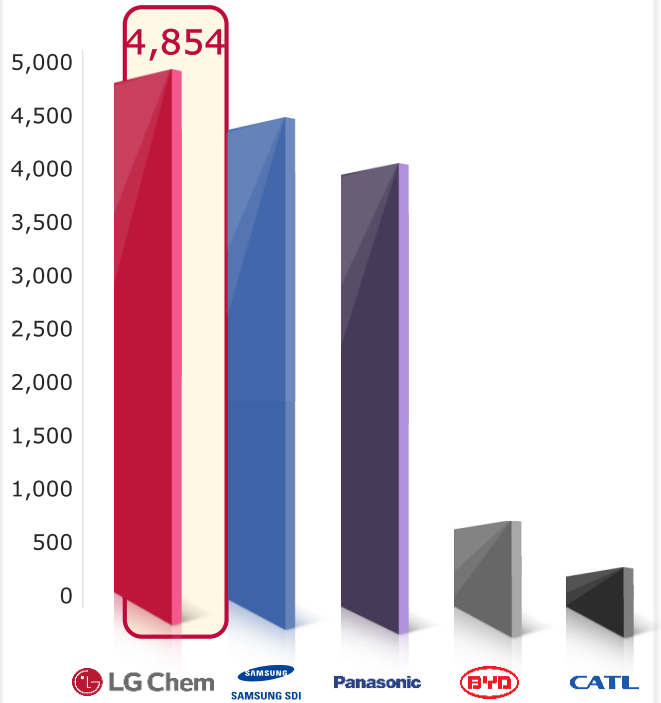
Cathode

Separator

Anode

Comparison of Patent Status

of Patents Registered in its 'Country of Origin'

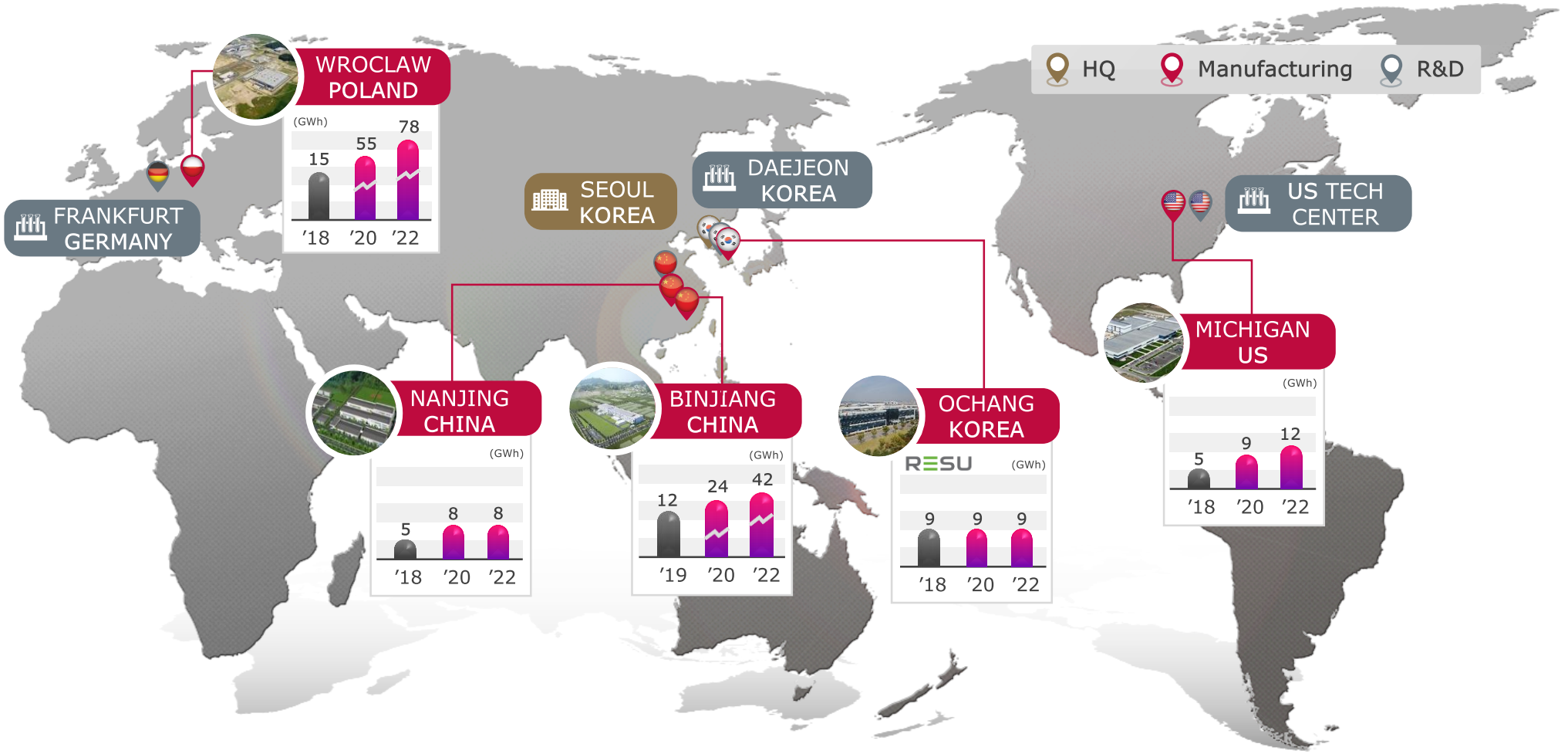


Source : WIPS Databese(May 2019)

LG Energy Solution

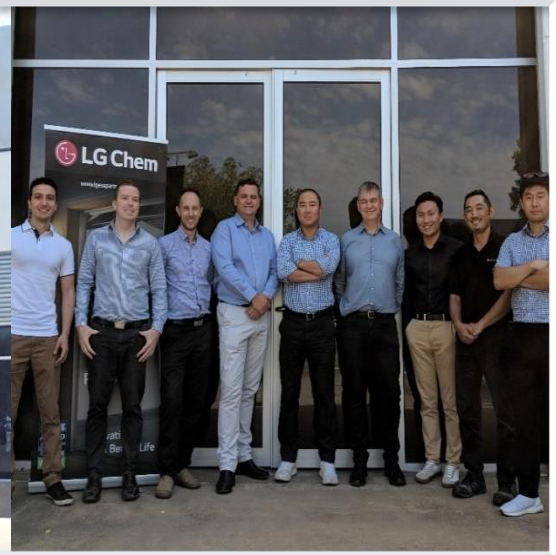
LG Energy Solution has..

- Global manufacturing capacity of **150 GWh by 2020** and continues to invest in cell manufacturing to meet all of our customers' future needs



LG Energy Solution is near you

Your local *Solution Partner* who is based in Mulgrave, Melbourne.



SMART ENERGY COUNCIL MEMBER

CLEAN ENERGY COUNCIL MEMBER

australian energy storage alliance

ENVIROSTREAM Innovative Resource Recovery

LG Energy Solution


SECURITY
Always Matters,
Even in ENERGY USE
LG Energy Solution

Blackouts are everywhere

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The increasing uncertainty caused by natural disasters and aged grid systems are threatening reliable energy use and raising the risk of blackouts. It means more consumer demand for backup power.

25,281 blackout events
- US, 2019 (23% up from 2018)

Approx. 120,000 Melbourne customers
lost electricity for 4 hours, 5,000 customers for 4 days due to storms
- Australia, 2020

Power outage lasted
over 30 hours, leaving 30,000
households without electricity
- Germany, 2019

7,000 households remain without power, with the worst-affected in the Dandenong Ranges expected to be off the grid until 10 July.
Australia 9th June - July 2021

Increasing Uncertainty

Five of 11 major bushfires
were caused by failed
electricity assets
- Australia

Increasing Risk of Blackouts

During Hurricane Maria,
Puerto Rico was into a
total blackout
- US, 2017

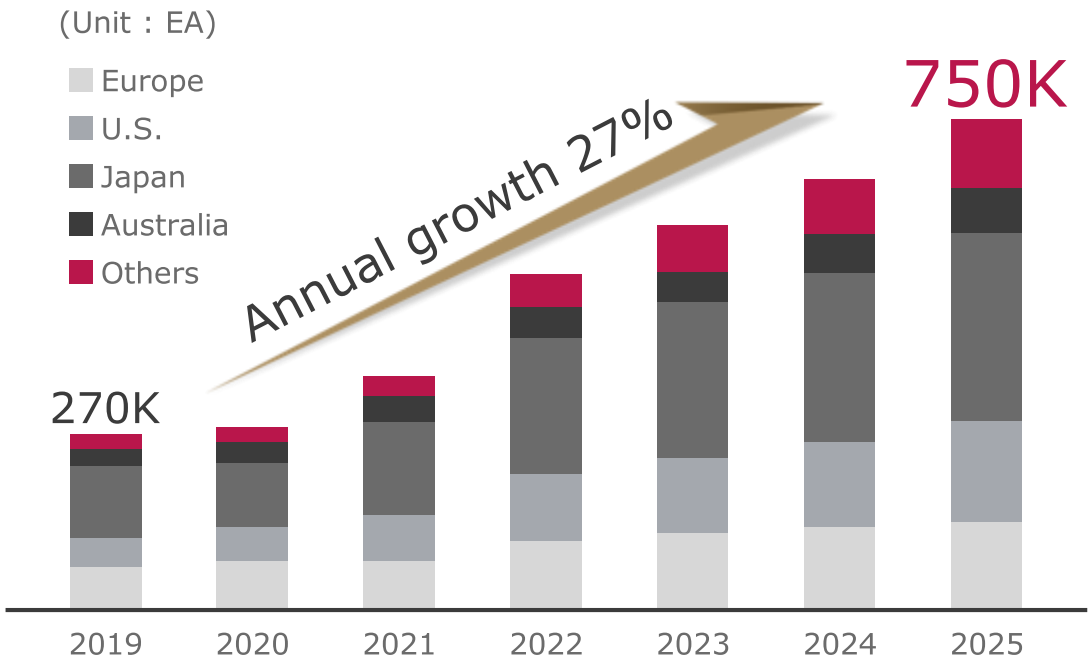
More than 900,000 homes
left without power after
Typhoon Faxai
- Japan, 2019

Growing demands for home batteries

LG Home Battery RESU

Global market research indicates year over year growth for home batteries, notably with a growing need for larger battery capacities for increased energy resiliency.

Home battery market is growing



Customers want more energy

Growing needs for energy self-reliancy

- Increasing energy bills
- Unreliable grid power services
- Need for backup capabilities with higher power limits

More people are scaling up their systems

- 52.7% of current home battery users would like the option to increase their energy capacity

(Source : LG Chem Global Customer Research, 2019)

Customer Voices

'We are seeing a clear trend towards larger capacity batteries'

'Customers want to leave open the possibility of expanding their batteries in the future, especially those who have experienced the benefits of having batteries'

COVID19 is the new normal

LG Home Battery RESU

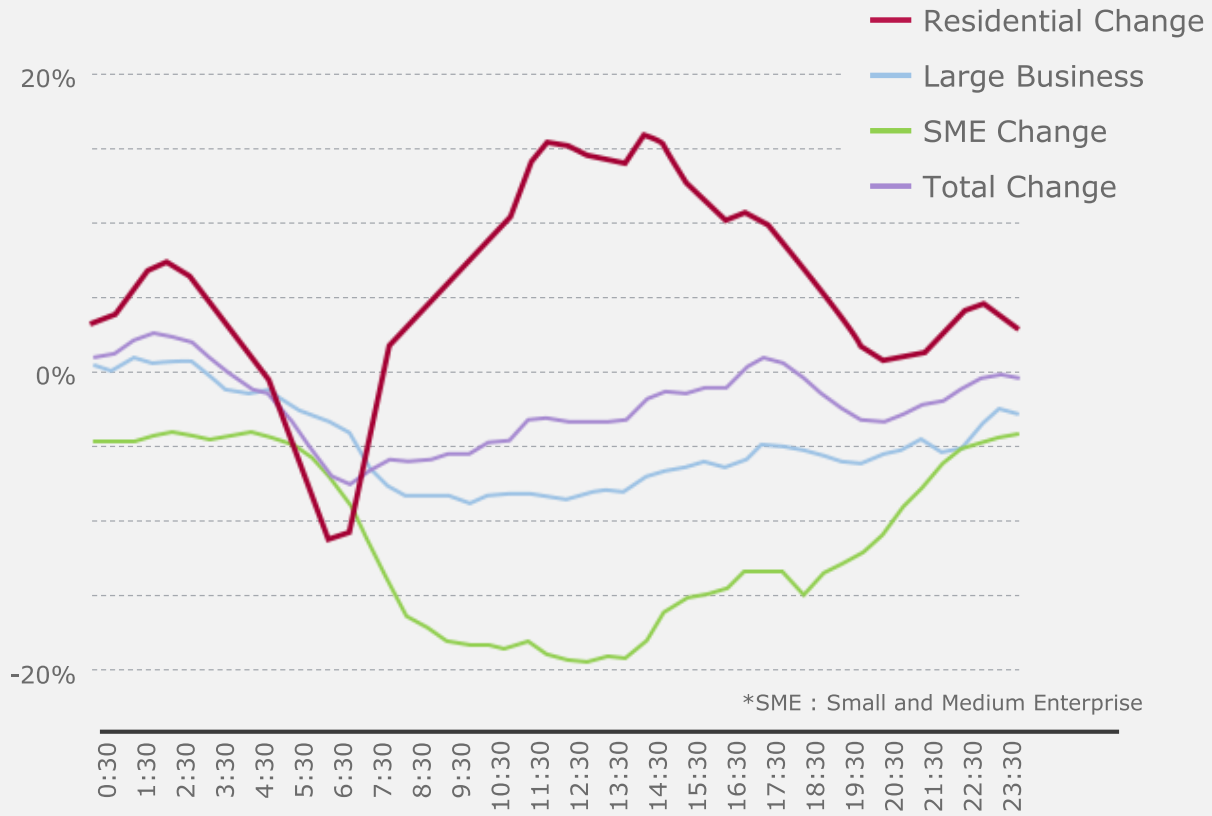
COVID19 ignited a worldwide ‘Stay Home/Work from Home’ way of life. Indoor activities are increasing and how we use time at home is more critical now than ever.

More Time at Home, More Use of Energy

LG Home Battery RESU

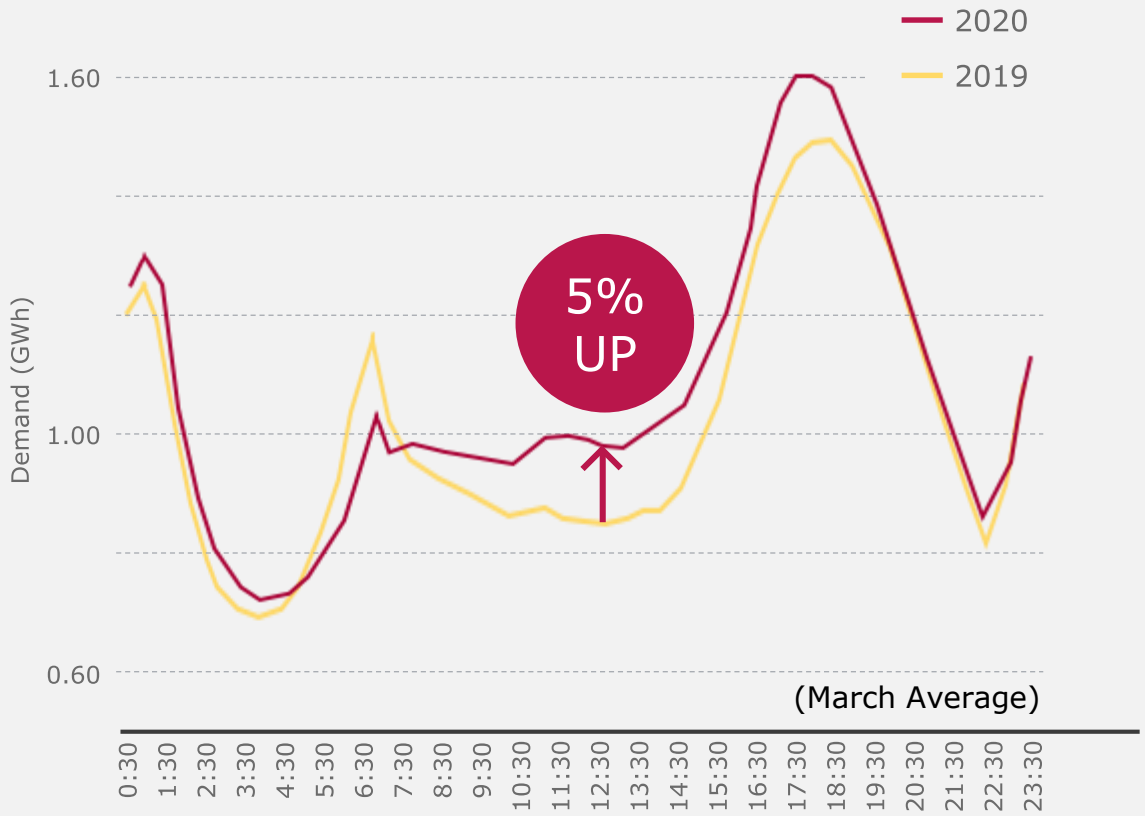
During the lockdown caused by COVID19, the energy demand for residential sector increased significantly while the demand for industry and commercial sectors deeply decreased.
As people spend more time staying at home, the amount of electricity used at home increased and the energy usage patterns somewhat changed.

Change in Daily Energy Use by Sector



(Source: AusNet)

Increase in Residential Daily Demand



(Source : AusNet)

02

Introducing the

LGES-5048 Hybrid Inverter

The ‘RESU HOME’ inverter+battery package from LG Energy Solution

LG Energy Solution

Introducing the LGES-5048 RESU HOME

RESU6.5 RESU10 RESU12/13

- One home battery package from LG Energy Solution
- 10 Year Warranty provided by LG Energy Solution
- VPP functionality
- PV oversizing to 7.5kW with STCs
- Single point of Technical Support through LG Energy Solution Australia

	LGES-5048
Nominal AC Power Output	5.0 kW
Back-up circuit (10ms UPS)	20A
Max PV input (with battery)	7.5kW
Dimension [W x H x D] / Weight	516 x 440 x 184mm / 30kg
Installation Type	Hybrid & AC-coupled

LG Energy Solution

Specifications & Characteristics

Specification

	LGES-5048
Nominal AC Power Output	5.0 kW
Back-up circuit (10ms UPS)	20A
Max PV input (with battery)	7.5kW
Dimension [W x H x D] / Weight	516 x 440 x 184mm / 30kg
Installation Type	Hybrid & AC-coupled

	RESU10	RESU13
Total Energy	9.8 kWh	13 kWh
Usable Energy	8.8 kWh	12.4 kWh
Nominal Voltage	51.8 V	51.8 V
Max. Continuous Power	5.0 kW	5.0 kW
Dimension [W x H x D] / Weight	450 x 480 x 230mm / 75kg	450 x 630 x 230mm / 99kg

Characteristics

LGES-5048	RESU
AC-coupled or DC-coupled	5kW discharge power
Can add to 1 phase or a 3-phase system using optional 3-phase meter.	Can be expanded using RESU Plus combiner
97% Efficiency	5-year proven record of 48V design
Single phase smart meter included, (3-phase meter optional)	IP55 for installation indoors or outdoor (shaded)
Proven and reliable fan-less design	Floor or wall mounted
Wi-Fi or LAN	Small form factor
Export control	Single installer installation
2 MPPTS	10 year warranty
Up to 7.5 kW PV (STC claimable)	
30 kgs	
Low noise emission of 25 dB	
Compatible with Tigo Optimisers	
10 year warranty	

LGES-5048 Technical specifications

LG Home Battery RESU

4.4 Technical Parameters

Technical Data	LGES- 5048
Battery Input Data	
Supported Battery Type	Li-Ion
Nominal Battery Voltage (V)	48
Max. Charge Voltage (V)	⩽60 (Confi gurable)
Max. Charge Current (A)	100
Max. Discharge Current (A)	100
Battery Capacity (Ah)	100~500
Charge Pattern for Li-Ion battery	Self-adaption to BMS
PV String Input Data	
Max. DC Input Power (W) – without battery	6500
Max. DC Input Power (W) – with battery	7500
Max. DC Input Voltage (V)	580
Max DC Input Voltage for battery charging	500
MPPT Voltage Range (V)	125~550
Start-up Voltage (V)	125
Min. Feed-in Voltage(V) **[1]**	150
MPPT Voltage Range for Full Load (V)	215~500
Norminal DC Input Voltage (V)	360
Max. Input Current (A)	11/11
Max. Short Current (A)	13.8/13.8
PV Over-current Protection (A)	21
PV Back-feed Current (A)	0
No. of MPP Tracker	2
String No. per MPP Tracker	1
DC Overvoltage Category	II
AC Output Data (Back-Up)	
Max. Output Apparent Power (VA)	4600
Peak Output Apparent Power (VA) **[2]**	6900(3S)
Max. Output Current (A)	20
Nominal Output Voltage (V)	230 (+/-2%) single phase
Nominal Output Frequency (Hz)	50/60 (+/-0.2%)
Back-Up Over Current Protection (A)	30A
Output Inrush Current (Peak / Duration)	55A, 2μs
Automatic Switch Time (ms)	10

Technical Data	LGES-5048
AC Output Data (On-Grid)	
Nominal Power Output Grid (W)	5000
Max. Apparent Power Output Grid (VA)	4950
Max. Apparent Power From Grid (VA)	9200
Nominal Output Voltage (Hz)	230 single phase
Nominal Output Frequency (Hz)	50/60
Max. AC Output Current to Grid (A)	21.7
Max. AC Current from Grid (A) **[3]**	40
AC Back-feed Current (A)	0
Max. Output Fault Current (Peak / Duration)	43A, 0.2s
Output Inrush Current (Peak / Duration)	55A, 5μs
Output Inrush Current (Peak / Duration)	60A, 3μs
Output Power Factor	~(Adjustable from 0.8 leading to 0.8 Lagging)
Output THDi (@Nominal Output)	<3%
AC Overvoltage Category	III
Efficiency	
Max. Effi ciency	97.6%
Max. Battery to Load Effi ciency	94.0%
Europe Effi ciency	97.0%
MPPT Effi ciency	99.9%
General Data	
Operation Temperature Range (°C)	-25~60
Storage Temperature Range (°C)	-30~65
Relative Humidity	0~95%
Moisture Location Category	4K4H
External Environment Pollute Degree	Grade 1,2,3
Environment Category	Outdoor & Indoor
Operation Altitude (m)	⩽ 4000
Cooling system	Nature Convection
Noise (dB)	<25
User Interface	LED, APP
Communication With BMS	CAN

Technical Data	LGES-5048
General Data	
Communication With SmartMeter	RS485
Communication With Portal	Wi-Fi
Weight (kg)	30
Size (Width*Height*Depth mm)	516*440*184
Mounting	Wall Bracket
IP Rating	IP65
Protective Class	I
Standby Self-Consumption (W)	<13
Topology	Battery Isolation
Protection	
Anti-islanding Protection	Integrated (AFD)
PV String Input Polarity Reverse Protection	Integrated
Isolation Resistor Detection	Integrated
Residual Current Monitoring Unit	Integrated
Output Over-current Protection	Integrated
Output Short Protection	Integrated
Output Over-Voltage Protection	Integrated
Certifi cation & Standards	
Grid Regulaton	VDE-AR-N 4105; VDE 0126-1-1 EN 50549-1; G99, G100; CEI 0-21; AS/NZS4777.2; NRS 097-2-1;
Safety Regulation	IEC/EN62109-1 & 2
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN61000-4-16, EN61000-4-18, EN61000-4-29

[1] If there is no battery connected, inverter starts feeding into grid only if PV voltage > 200V.

[2] On condition of battery and PV power being enough.

[3] 40A to inverter and backup, maximum 21.5A to inverter.

LG Energy Solution

RESU LV - Technical specifications

LG Home Battery RESU

Electrical Characteristics	RESU6.5	RESU10	RESU13
Total Energy Capacity	6.5 kWh	9.8 kWh	13 kWh
Usable Energy Capacity1)	5.9 kWh	8.8 kWh	12.4 kWh
Warranty 10 years or throughput	**20**MWh	**30**MWh	**39**MWh
Voltage Range	42.0 to 58.8 V DC	42.0 to 58.8 V DC	42.0 to 58.8 V DC
Nominal Voltage	51.8 V DC	51.8 V DC	51.8 V DC
Max. Charge/Discharge Current	100A	119A	119A
Peak Current2)	109.5A for 3 sec.	166.7A for 3 sec.	166.7A for 3 sec.
Max. Charge/Discharge Power3)	4.2kW	5.0kW	5.0kW
Peak Power2)	4.6kW for 3 sec.	7.0kW for 3 sec.	7.0kW for 3 sec. 11.0kW for 3 sec (for backup mode)
Battery Pack Round-Trip Efficiency	>95% (under specific condition)	>95% (under specific condition)	>95% (under specific condition)
Communication Interface	CAN 2.0B	CAN 2.0B	CAN 2.0B
DC Disconnect	Circuit Breaker, Contactor, Fuse	Circuit Breaker, Contactor, Fuse	Circuit Breaker, Contactor, Fuse
Operating Conditions			
Installation Location	Indoor / Outdoor (Stand / Wall-Mounted)		
Operating Temperature	-10 to 50°C		
Operating Temperature (Recommended)	15 to 30°C		
Storage Temperature	-30 to 60°C : ~7 days -20 to 45°C : ~ 6 months		
Humidity	5% to 95%		
Cooling Strategy	Natural Convection		

※ Test Conditions - Temperature 25°C, at the beginning of life
※ Total Energy is measured under specific condition from LGES(0.3CCCV/0.3CC)

1) Value for Battery Cell Only (Depth of Discharge 95%). Actual usable energy at the AC output may vary by condition, such as the battery converter, inverter efficiency and temperature.
2) LGES recommends 3.3kW for maximum battery lifetime
3) Peak Current excludes repeated short duration (less than 10 sec. of current pattern).

Life changes at times, but LG Energy Solution RESU will stand by you and your family

Be Prepared with LG RESU

LG Energy Solution

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www.lghomebattery.com.au

LG Home Battery RESU

LG Energy Solution

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