

aleees



立凱電

# Investor Conference

This is a translation version, and this version is intended for reference only.  
The Chinese version shall govern all matters stated herein.

## Safe Harbor Statement

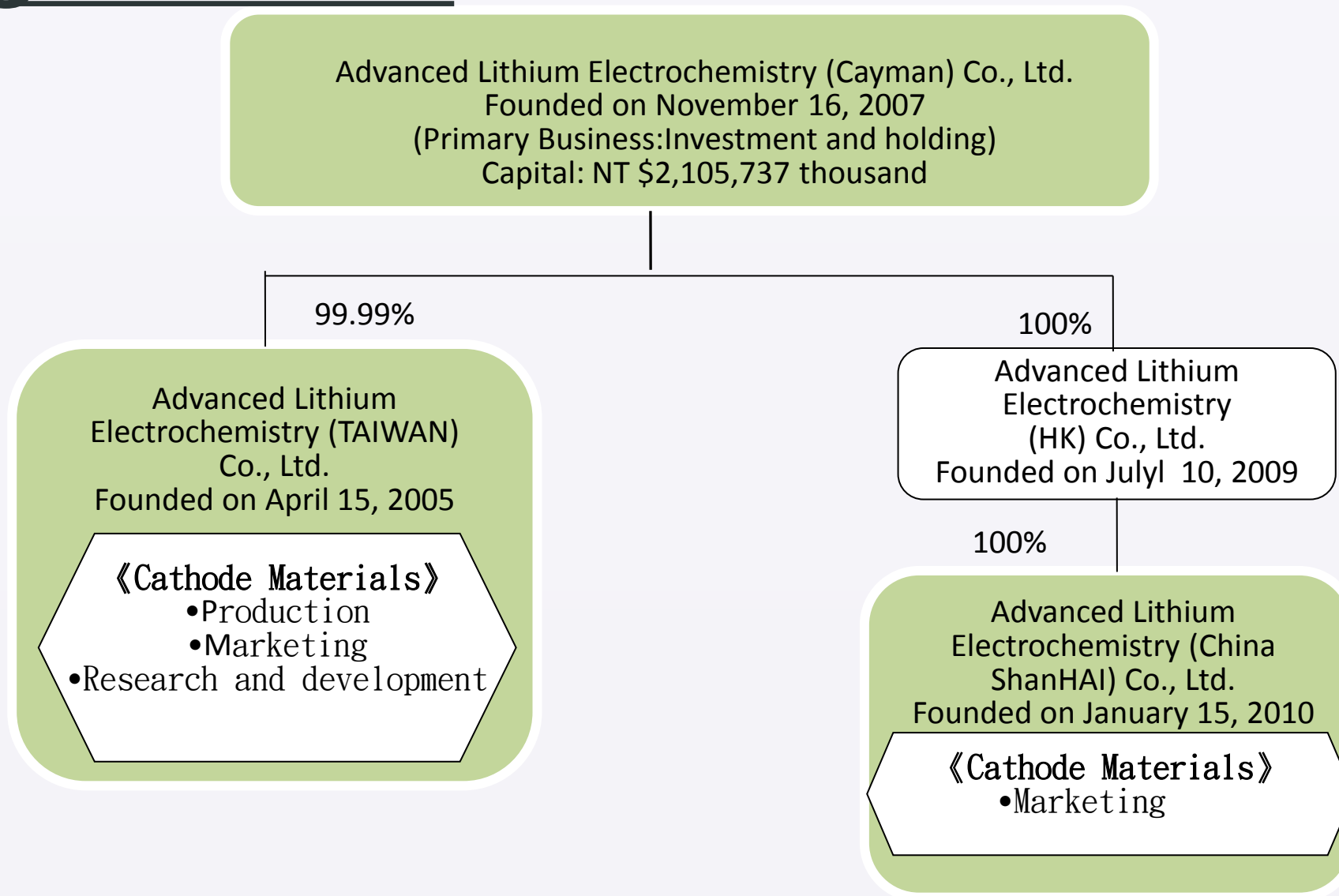
This following presentation may include predictions, estimates or other information that might be considered forward-looking. These forward-looking statements are based on information available to Aleees as of the date of this conference and current expectations, forecasts and assumptions, and involve a number of risks and uncertainties that could cause actual results to differ materially from those anticipated by these forward-looking statements. You are cautioned not to place undue reliance on these forward-looking statements and please keep in mind that except as required by law, we are not obligating ourselves to revise or publicly release the results of any revision to these forward-looking statements.



# Company Profile



# Organization





# Products

Positive-electrode materials -- Lithium-ion battery 、 ternary lithium-ion battery

State-of-the-art carbon packaging **Cathode with the longest cycle**



## Advantages

Long cycle, high quality and consistency, customized specifications offered.

192 global patents: 107 internally developed, acquisition of 85 globally licensed patents from the headquarters of the licensors

## Applications

NEV battery cells, storage systems, start/stop systems in replacement of lead acid batteries

## International Clientele

Certified by customers from China, Japan, Korea, Europe and the U.S.





# Company History

- LFP Nano-Co-crystalline Olivine Technology announced
- positive-electrode materials for Lithium-ion battery mass production

2005

- Inception of Aleees

2007~8

- Acquisition of patent licensing from Goodenough for carbon packaging and manufacturing processes, among its seven global licensees

2011

- Aleees listed on Taipei Stock Exchange

2013

- Awarded Top 50 Sustainability in Taiwan for three consecutive years

2016

- Sales of positive-electrode materials for Lithium-ion battery over 12,360 tonnes globally
- Top 5% among companies listed on Taipei Stock Exchange for four consecutive years
- Expansion into the global ESS market from the Chinese EV battery market

2018

- Officially delivering small amount of lithium-ion batteries in replacement of lead-acid battery market
- Signing of MOU with Japanese battery company GS YUASA in using aleees-made lithium batteries

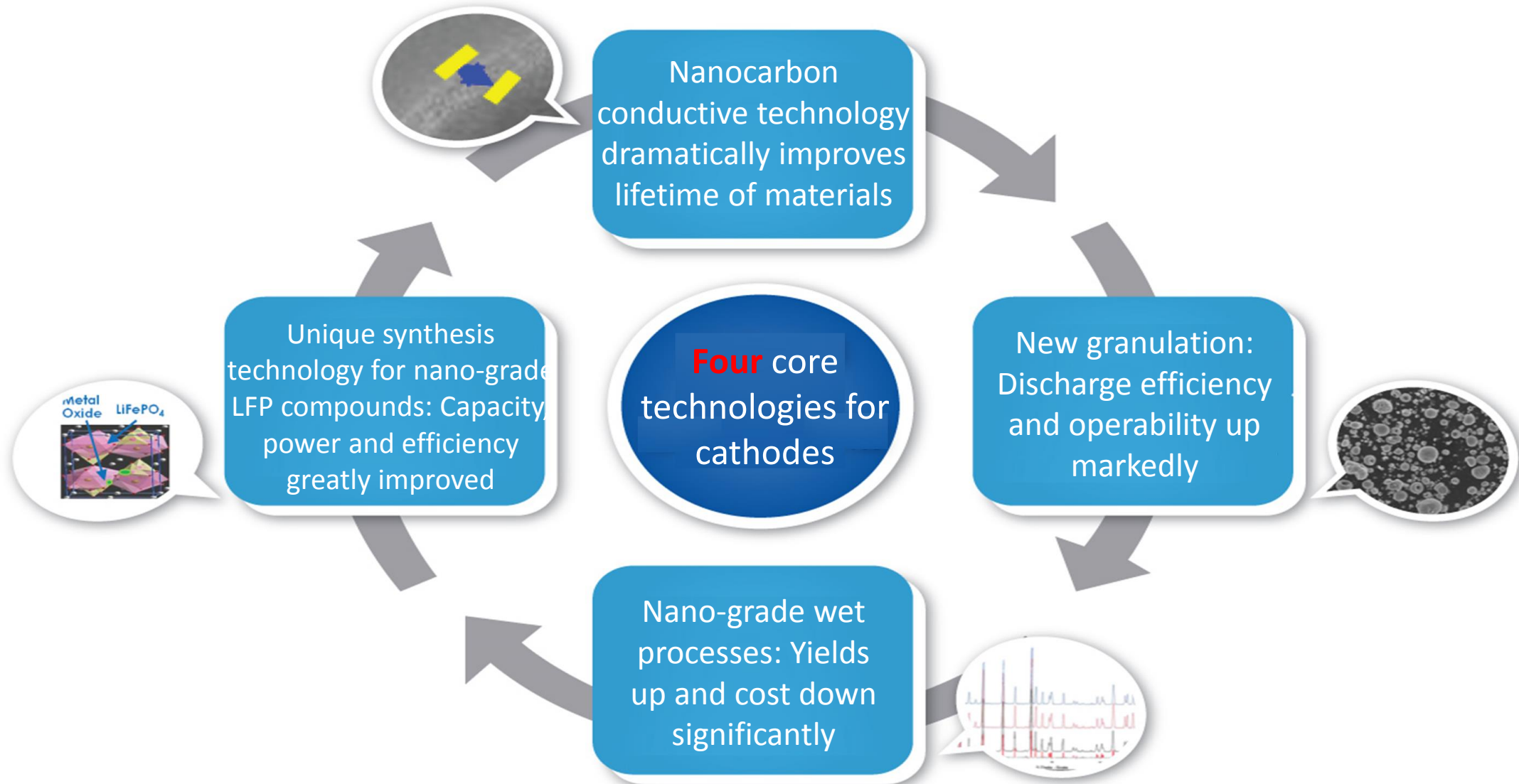
2019



# Competitive Advantages



# Aleees' Core Competence







# Aleees' advantages



## Long cycle

- Cycle life is 10000 times.
- The batch is good in consistency, eliminating adjustment cost in the workshop.
- Conductive speed enhanced one million times.
- Add metallic oxide to contain education of iron lithium.

## High Cost-Effectiveness

- The performance that is 10%-48% higher than the peers, Increasing the clients' revenue by 20%.
- The materials price is 35% higher than average of the industry.
- Specific Capacity is 155-160 mAh/g.

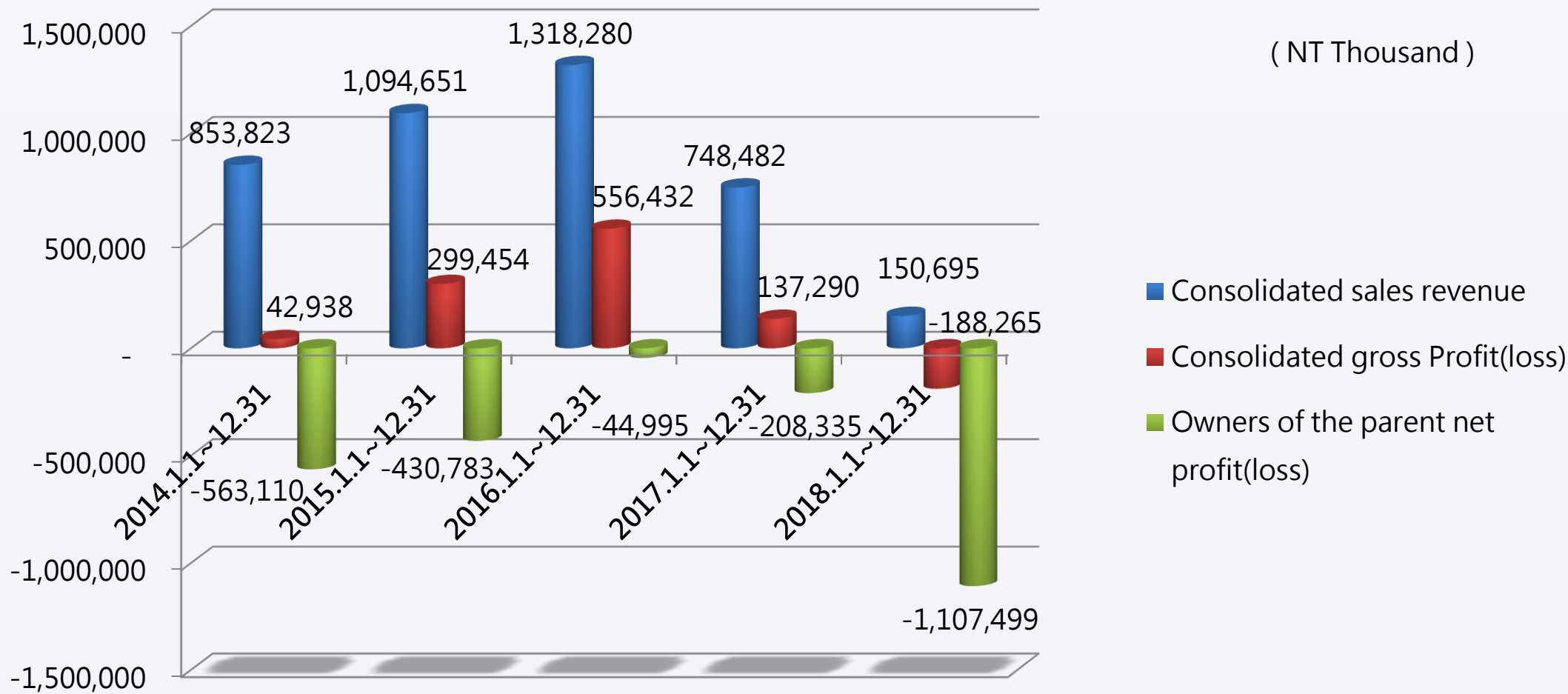
## High Reputation

- 179 global patent: 86 self-owned patents, and 93 global patents licensed from HQ.
- The cumulative sales volume in 2018 reached 12,360 tons.



# Operational Profile

# Recent annual changes of revenue and profit (loss)



# Changes of net loss in 2018

- Chinese new energy market subsidy experienced a growing decrease and longer approval process due to new subsidy policy → the power battery industry is facing serious shortage in funding and the immediate challenge of the supply chain bubble.
- The company adopted a safer sales strategy and practice billing guaranty and payment to delivery policy.
- Decrease in revenue had triggered inadequacy in capacity utilization and resulted in a net loss.

**Sales revenue  
decreases**

**Gross loss  
increases**

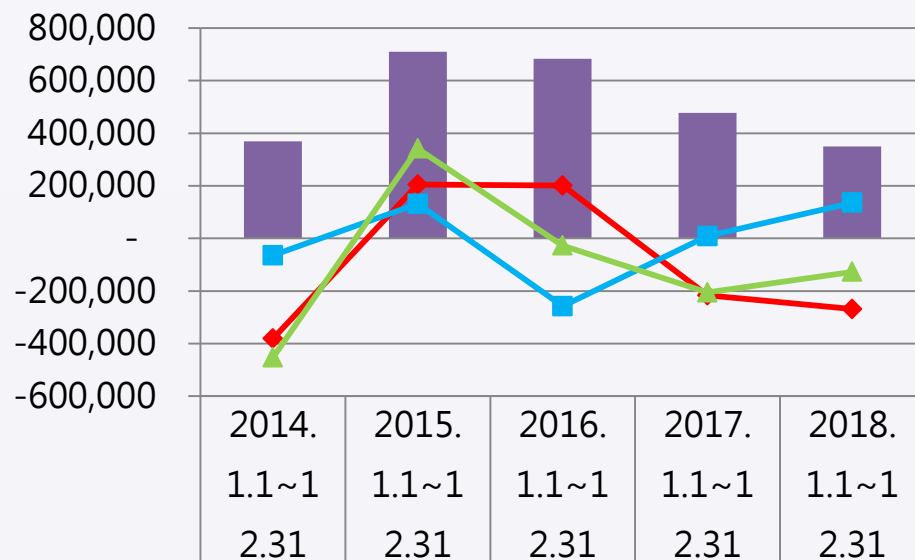
- Reorganizing the low-revenue projects and listing those project as asset impairments were carried out to ensure the balance of profit and loss.
- The fair value of the convertible bond investment issued by FDG Electric Vehicles Ltd. had decreased therefore considering it a loss in financial asset assessment.
- Increase in the reporting of expected financial losses was made according to the newly issued IFRS 9 regulations.

**Asset impairment  
increases**

**(does not affect  
company's cash flow)**

# Recent annual changes of cash flows

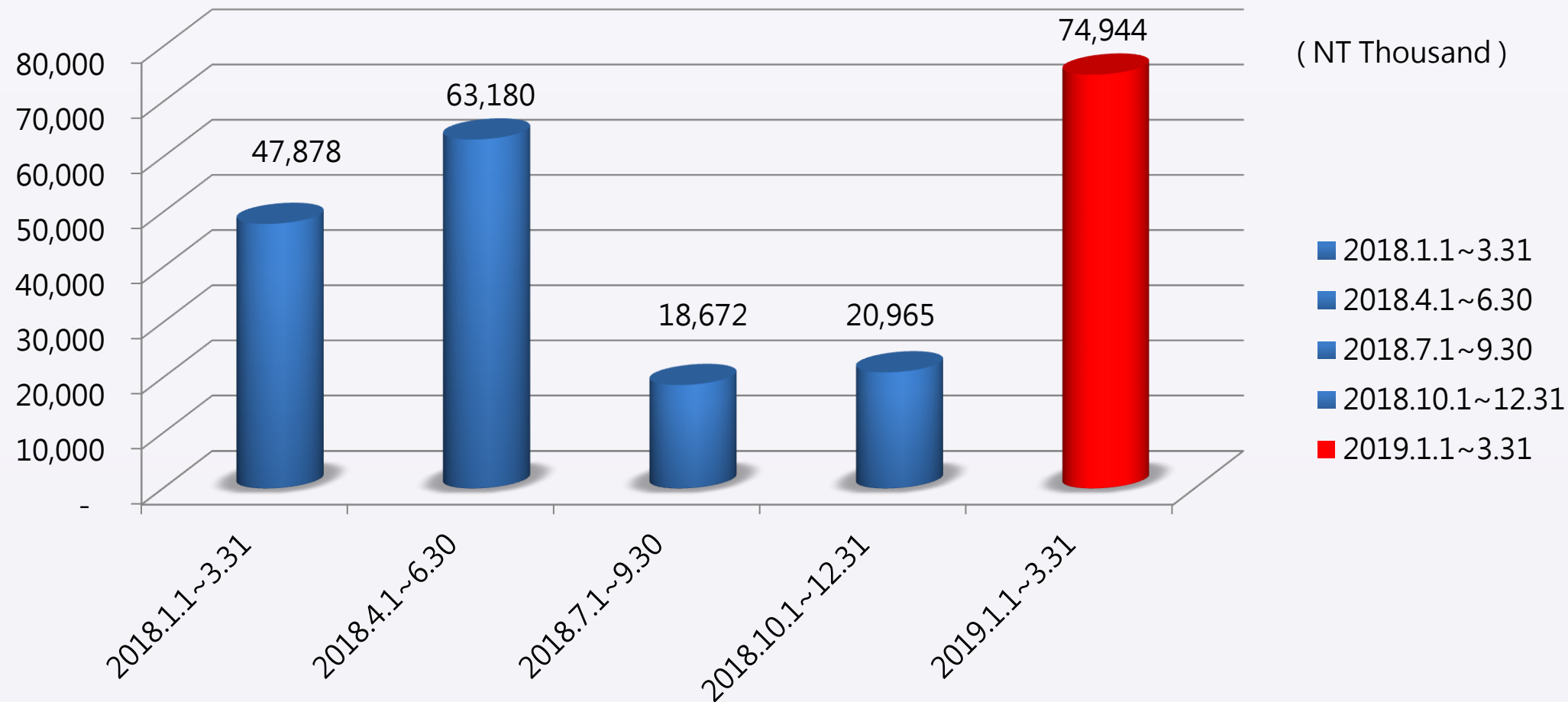
(NT Thousand )



cash and cash equivalents balance at the end of the period	369,113	710,165	682,964	477,258	349,928
Net cash flows (used in) from operating activities	-380,595	204,188	200,680	-216,212	-268,781
Net cash flows from (used in) investing and financing activities	-64,591	131,578	-257,821	8,616	135,449
Net increase(decrease) in cash and cash equivalents	-452,654	341,052	-27,201	-205,706	-127,330

- cash and cash equivalents balance at the end of the period
- Net cash flows (used in) from operating activities
- Net cash flows from (used in) investing and financing activities
- Net increase(decrease) in cash and cash equivalents

# 2018~2019Q1 every season changes of revenue







# Strategic Updates

# Adjustment on operational strategy and focus



**1. Tap into the global energy storage market and the niche market of replacing lead-acid vehicle battery with lithium-ion battery**

**2. Active development of European, American, Japanese and Korean market**



**Adjust the revenue proportion generated from Chinese new energy vehicle market**



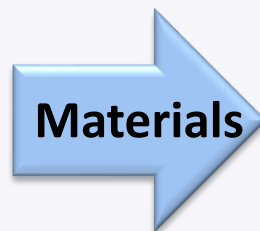
# Household energy storage markets



- Reportlinker.com, an international market research institute, recently published a research report on household battery energy storage market and stated that by 2022, global household battery energy storage market scale will reach 3.6 billion dollars.
- Germany, the U.S., Japan, Australia and others have implemented policies offering incentive subsidies, encouraged an integration between new energy power generation and development and application of energy storage technology. Energy storage manufacturers include Panasonic, Kyocera-Nichicon, Sharp, Samsung, LG, Sonnen, Tesla, and Byd.
- **Advanced Lithium Electrochemistry Co., Ltd. has entered into cooperation with a certain leading Japanese manufacturer of electronic parts and consumer goods. The two parties have ventured into high-end household energy storage market. The former has thus laid a pivotal foundation for future exploration of other overseas energy storage clients.**



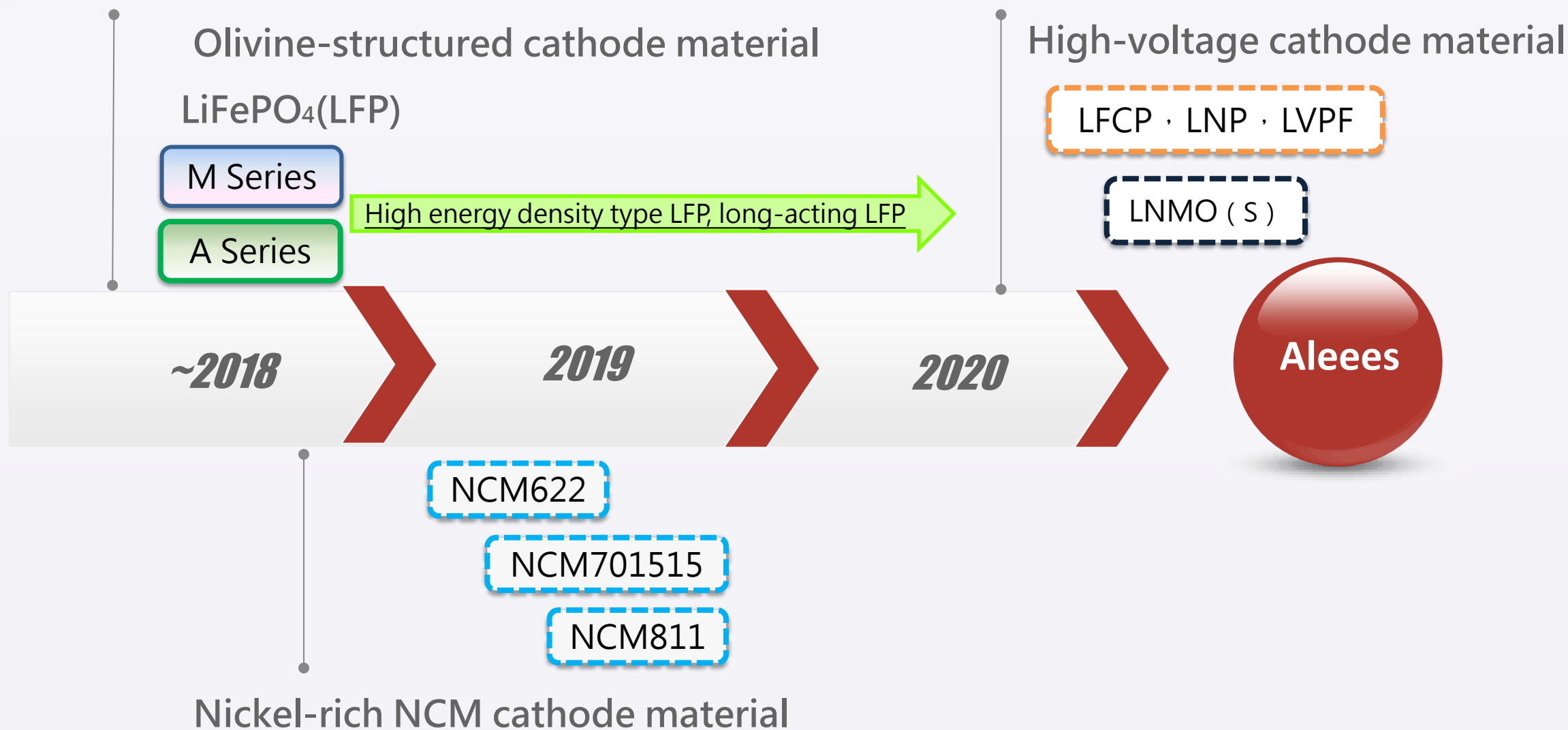
# Lithium to Replace Lead Acid



**Applications**  
**By OEMs from Japan,**  
**Korea, Europe and the US**

- In response to the tighter standards on carbon emission adopted globally, the automobile manufacturers had developed the stop& start system for micro hybrid drive vehicle. This can increase the fuel efficiency by 4~15%. Yole had projected that the stop& start vehicle units can reach 49.16 million globally in 2020 and go up to 65.43 million units in 2013.
- Global vehicle brands have been providing the lead-acid battery for its new vehicles from Johnson controls, GS YUASA, Exide Technologies, Shin-Kobe, Furukawa Batteries and Panasonic. The main 12/48V lithium battery providers for the vehicle manufacturers are Toshiba, Samsung and LG.
- Aleees had successfully received the material approval sheet from international renowned car brand and will become the only distributor of positive-electrode materials for lithium-ion batteries with 10-year-warranty. Under the collaboration between Aleees and international battery corporations, we can tap into the niche market of replacing lead-acid battery with lithium-ion batteries.

# Development and Manufacturing of High Cost-Performance Products





# Applications of Final Products



# Main Applications of Lithium Batteries around the World



Lithium battery packs



Lead acid batteries

Replacement  
for auto  
applications

Stationary ESS



Cars, EV, and vehicles



# Lithium Battery Replaces Lead-acid Battery in Market

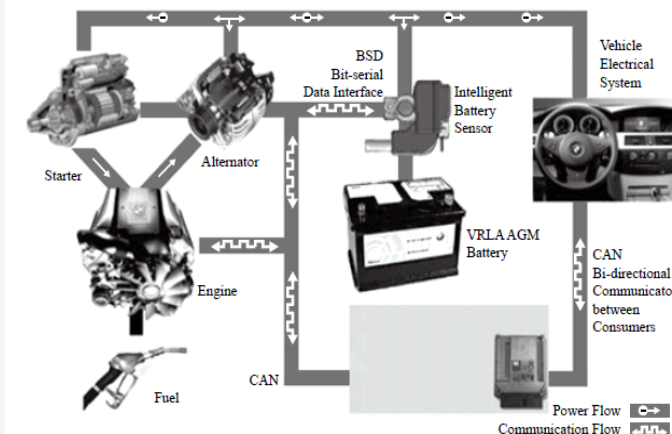
- In response to tighter energy-saving, carbon-reduction and environmental protection restrictions, automobile manufactures have developed the micro-hybrid systems, including start & stop system and regenerative braking function to improve fuel efficiency and reduce carbon emissions.
- The battery of a mild hybrid vehicle is required to have: 1) long expected life cycle with shallow discharge/charge nature; 2) good instantaneous charging efficiency.
- The secondary battery for vehicles is mainly lead-acid batteries. However, through the consideration of environmental impact, lower instantaneous charging efficiency and shallow discharge/charge cycle had made lithium batteries gradually replaced lead-acid batteries as starter power sources for automobiles.

## Lithium battery yield higher performance results compare to lead-acid battery

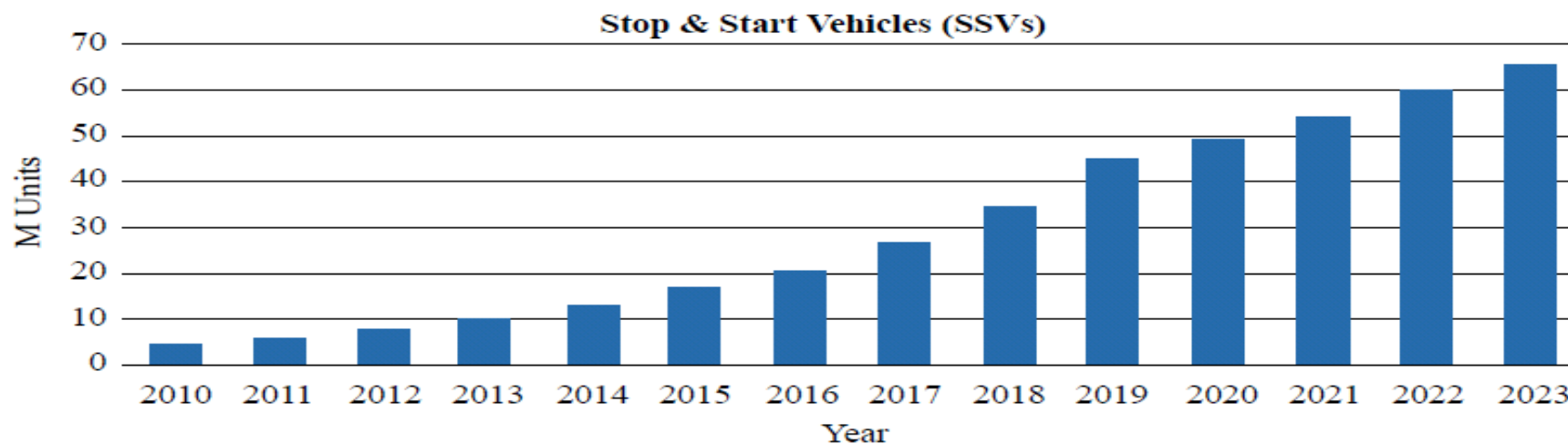
<b>Lighter in weight:</b> Lithium-ion battery only weight 33% of the lead-acid battery with the same specification	<b>Better instantaneous discharge/charging efficiency:</b> Maintain high-rate discharge and stable supply of higher current capacity, faster charging speed	<b>Longer life cycle:</b> Thousands of charge/discharge cycles, with opportunity to reach life cycle equivalent to the total life of 5 lead-acid batteries	<b>Resistance to high and low temperature environment:</b> The temperature range advertised by the industry normally falls between-20~70°C.	<b>Low self-discharge rate:</b> The occurrence of self-discharge is low, vehicle can start smoothly after it has not been used for a long time.	<b>Improvement for the automotive power system:</b> The functions of automotive electronic systems continue to increase, and the discharge and storage capacity of lead-acid batteries have begin to limit design functions.	<b>Environmental factors:</b> Lead is one of the most poisonous metals and is considered as heavy metal, while lithium-ion batteries fit the requirements in the Environmental Protection Act.
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# Global Stop & Start vehicle market trend

- Mild hybrid system has both engine and electrical starter (as shown in figure 1). The engine is the main source of power and the starter assist the starting of the engine. When the engine stops working, the battery provides electrical power to supply the use of vehicle apparatus, so called stop & start system.
- Through the installation of stop & start system, it can save up to 8% of fuel. It also provides a low-cost solution for the manufacturers on automobile emission reduction. Automobile manufacturers such as BMW, Mazda, Kia, Suzuki and many others had introduced this system into their vehicles.

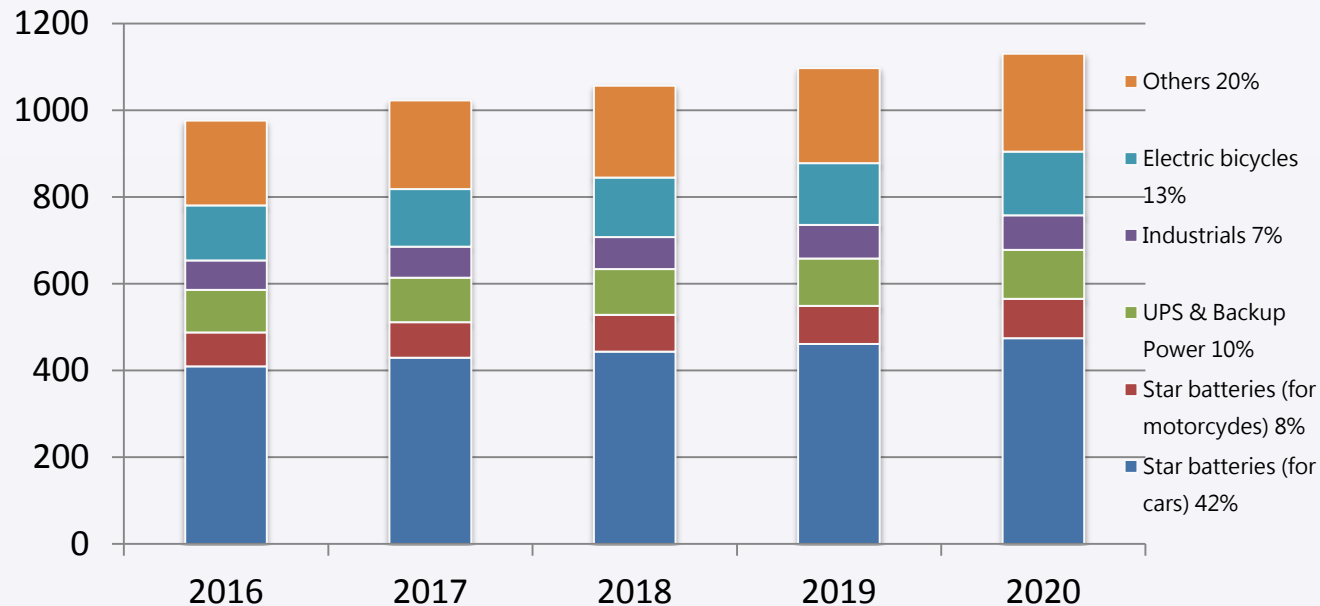


as shown in figure 1 :the operation of a mild hybrid system



Source: Yole (2015/10)

# Market Forecast for Replacement of Lead Acids with LFP



Unit: K (ton)

Start batteries (for cars)	410.1	429.8	443.8	461.1	475
Start batteries (for motorcycles)	78.1	81.9	84.5	87.8	90.5
UPS & Backup Power	97.6	102.3	105.7	109.8	113.1
Industrials	68.4	71.6	74	76.9	79.2
Electric bicycles	126.9	133	137.4	142.7	147
Others	195.3	204.7	211.4	219.6	226.2
Total	976.5	1023.4	1056.8	1097.9	1131

A 10% replacement of the auto lead acid market p.a. is translated into the demand of 40,000 tons of positive-electrode materials for Lithium-ion battery .



Aleees and Sumitomo Osaka Cement are the only two companies with a global portfolio of patents, over 10 years of experience in mass production, products of long cycles and high quality





































# Global vehicle brands and the battery supply system on its new vehicles

Global vehicle brands and the lead-acid battery supply system on its new vehicles

	Johnson Controls	FIAMM	Exide	GS YUASA	Hitachi 新神戸	古河電池	Panasonic
Toyota			●	●	●	●	●
GM	●						
VW Group	●						
Hyundai/KIA							
Ford	●						
Nissan/Renault	●			●	●		●
PSA Peugeot	●	●					
Honda				●		●	●
Subaru				●		●	
Fiat/Chrysler			●				
Daimler	●						
BMW	●						
Mazda				●	●		●
Mitsubishi				●	●		




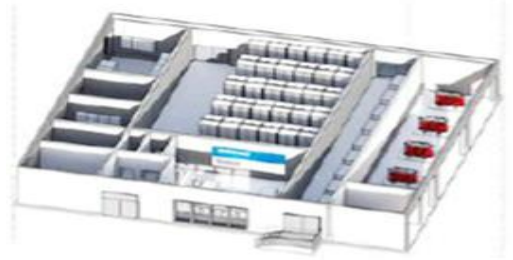
Source: Industrial Technology Research Institute Industry, Science and Technology International Strategy Center (2014)

Global vehicle brands and the lithium battery supply system on its new vehicles

	12V/48V	HEV	Notes
		 Panasonic	NiMH: average 200V/1.4kWh, only Prius 4th & Prius α adopt LIB
		 Hitachi	Pouch/245.6V/1.4kWh from AESC & Cy/144V/0.7kWh from Hitachi
			
		 TOSHIBA	Pr/ 144~259.2V/0.68~1.3kWh LIB mainly
		TOSHIBA 	
	TOSHIBA	Hitachi	
		Hitachi	115V/0.5~1.5kWh Cy & Pr LIB
		Panasonic 	280V/1.4kWh/Pr
		Panasonic	Parts from 288V/1.7kWh/Cy NiMH, Others are 266V/1.3kWh/Pr LIB
	 	Panasonic	
	 Johnson Controls 	 中国万向 CHINA WUJIANG	317V/1.35kWh/Cy LIB
DAIMLER		Johnson Controls 	126V/0.82kWh/Cy LIB
			270V/1.43kWh/Po LIB
	 		
			

Source: Industrial Technology Research Institute Industry, Science and Technology International Strategy Center (2016)

# Stationary Storage Systems

			
Small-scale indoor energy storage	Energy storage Chest	Energy storage container	Permanent energy storage power plant
<ul style="list-style-type: none"> <li>Mainly providing such functions as matching it with indoor power regulation, making efficient use of renewable power sources, and offering backup power</li> </ul>	<ul style="list-style-type: none"> <li>Medium-sized indoor power regulating facilities</li> <li>Basic modularized patterns of Energy storage container and energy storage battery</li> </ul>	<ul style="list-style-type: none"> <li>Mainly used outdoor</li> <li>Matched with operation of (renewable) power plant or power grid regulation</li> </ul>	<ul style="list-style-type: none"> <li>Regional permanent power plant facilities</li> <li>Mainly regulating operation of regional power grid</li> </ul>

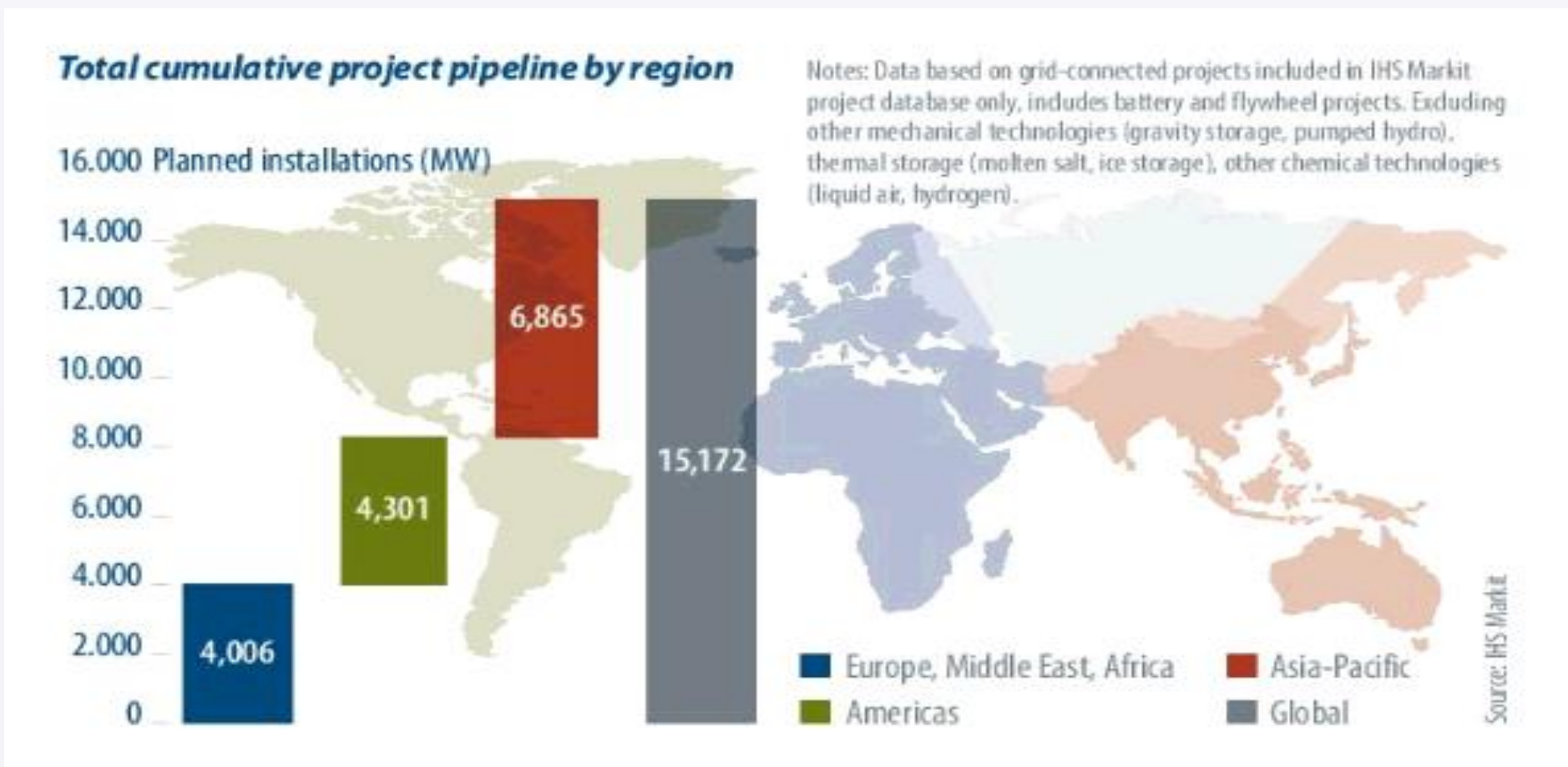
Source: compiled by IEK under Industrial Technology Research Institute

The growing demand from the renewable energy industry for grid-connected storage systems is driving for the need for lithium technology and continued cost reduction of lithium batteries. According to most recent forecasts by MarketsandMarkets, the global market for ESS batteries will grow at a CAGR of 33.9% from \$1.98bn in 2018 to \$8.54bn in 2023. Asia Pacific is the highest growing region.



# Global stationary battery energy storage market experiences strong developments

HIS Markit's recent report indicated that the global stationary battery energy storage market made significant development with 83% more completed projects than in 2017, which translates to a total cumulative project pipeline of 15GW.



# BNEF: The 2018 future prospects of global energy storage market

- The decreasing of battery prices promotes the application of energy storage in the renewable energy penetration in electricity distribution system, and further assists in resolving the instability and intermittency issues of wind and solar energy sources.
- BNEF forecasted the global cumulative storage deployment may be up to a total of 942GW/2857GWh in 2040.

