

# ITRI

Industrial Technology  
Research Institute

## Observation and Forecast for Lead–Acid Battery Applications and Markets in a Pandemic Era

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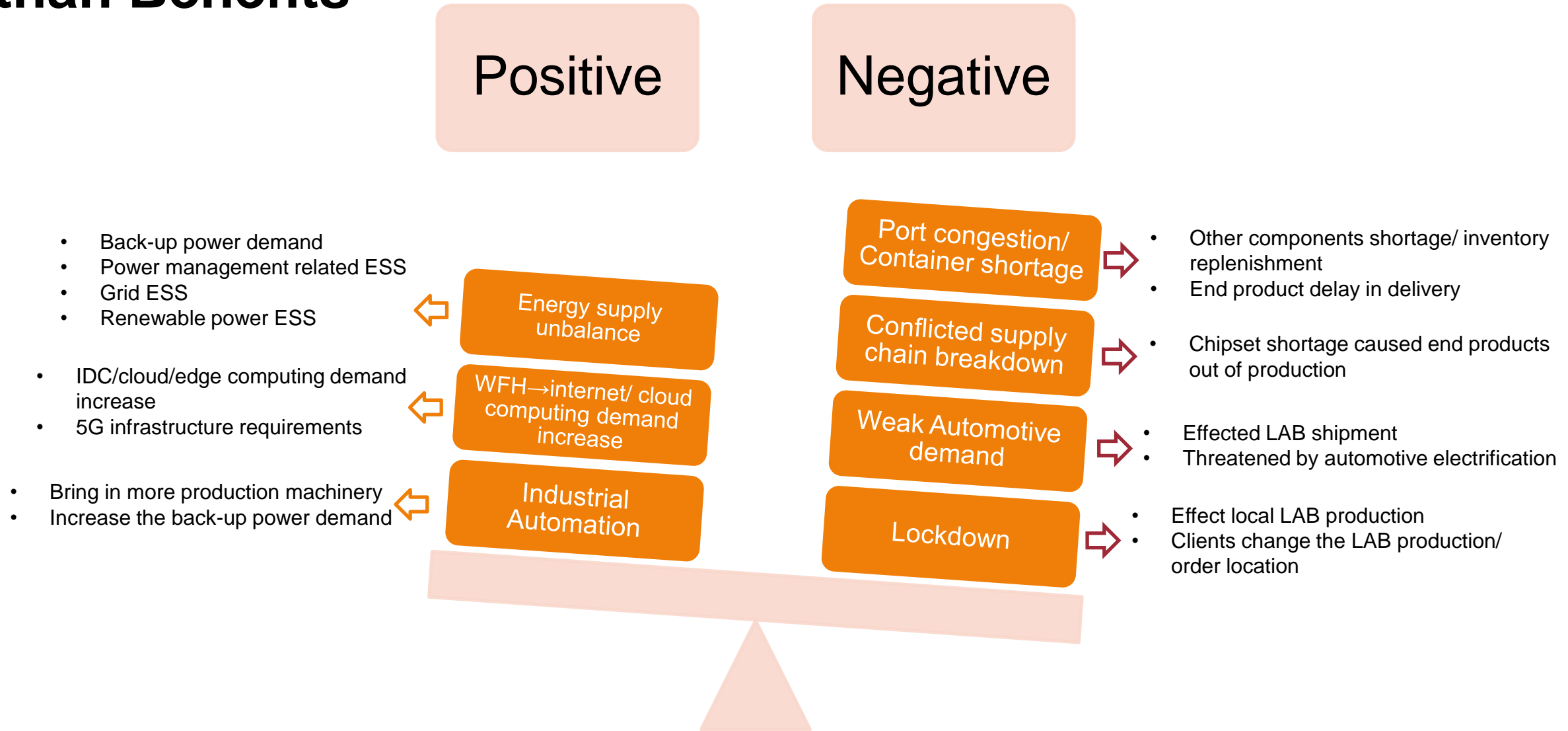
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Industry, Science and Technology International Strategy Center (ISTI)

Nov., 2021



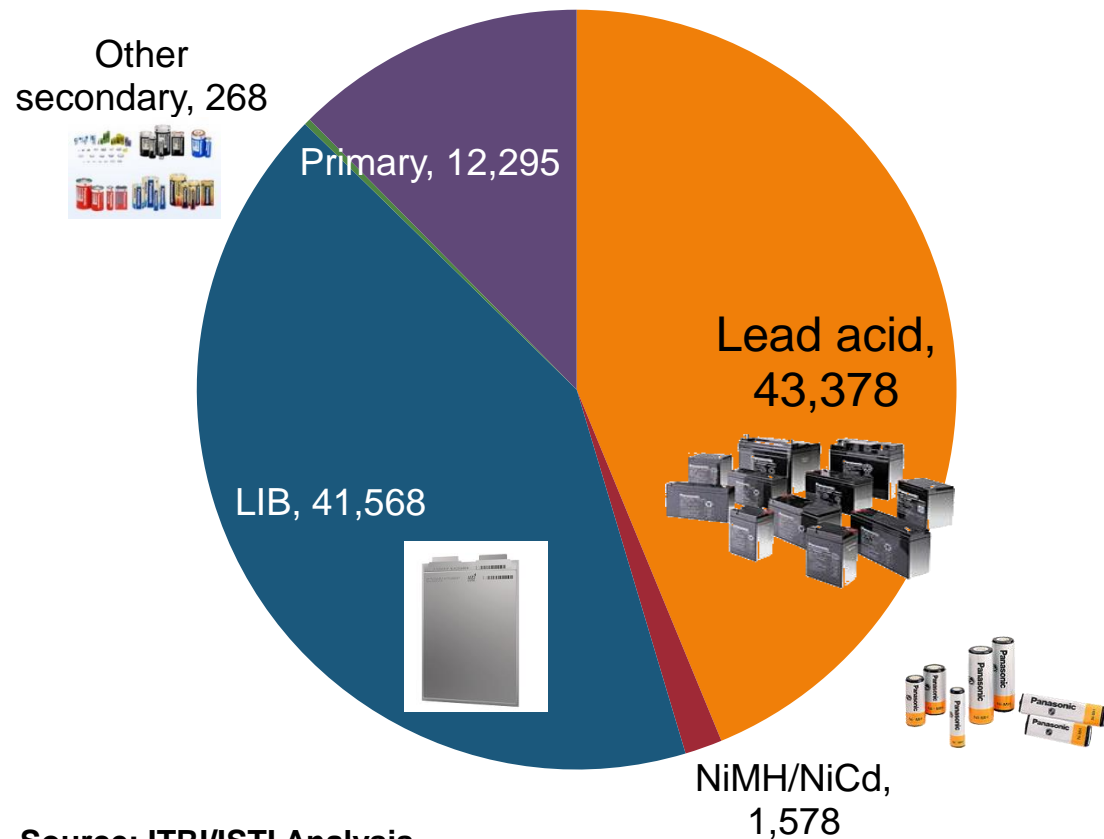
# Unbalanced Pandemic Years for LAB: Impacts More than Benefits



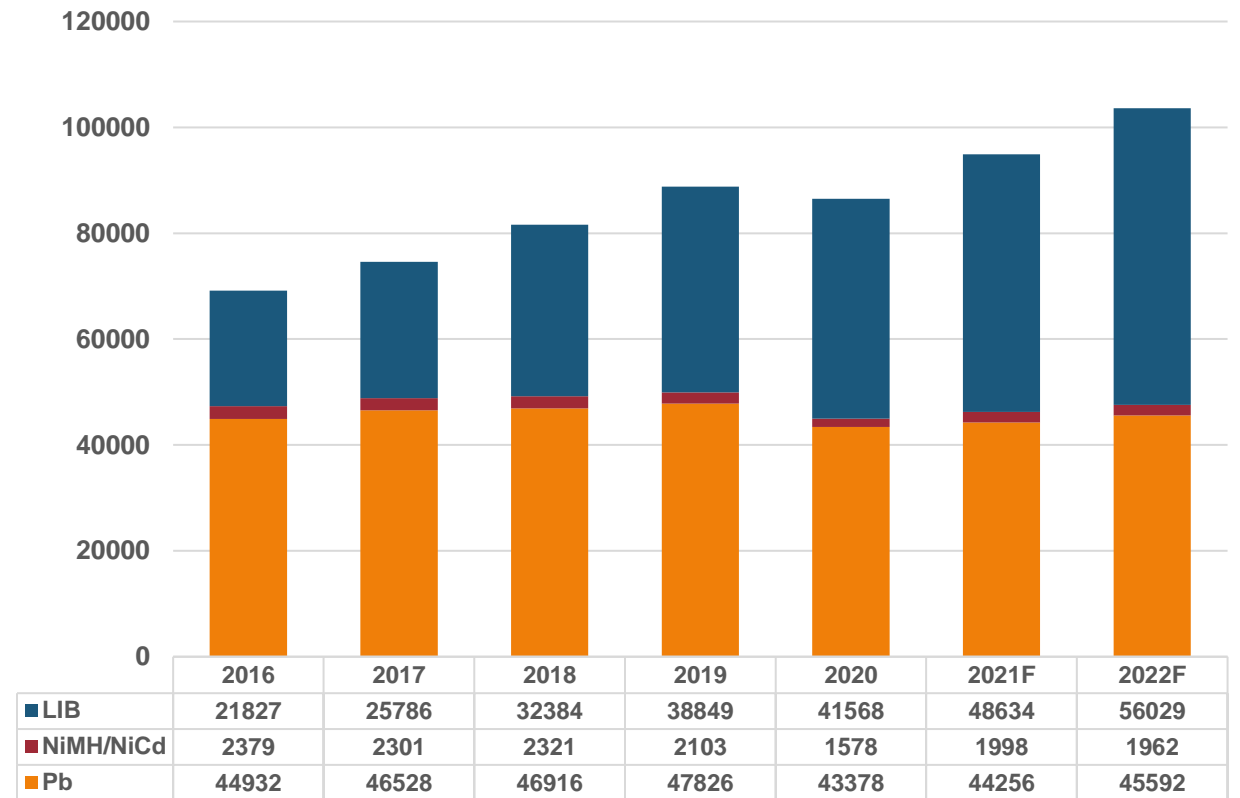
# LAB in 2020: Still the Main Tech in WW Rechargeable Battery Market

- The biggest market is still lead acid (43.38 bn) which are still used in car starters, industry/ UPS & E-bikes
- LIB cell market scope in 2020 was 41.57 bn USD, keeps 2-digit growth strength, will overcome LAB in 2021

2020 Worldwide Batteries Market Size by Product (Unit: Million USD\$)



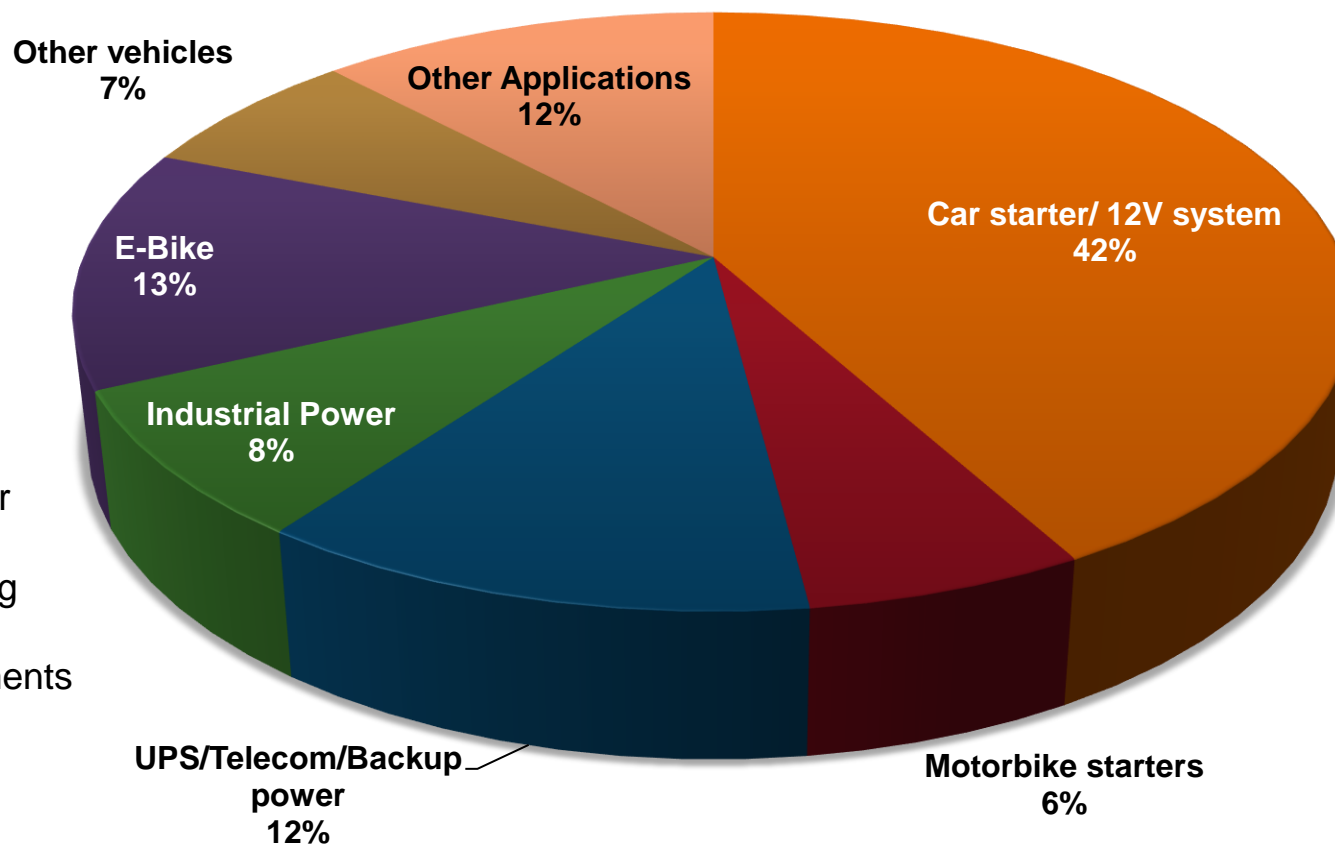
WW Secondary Batteries Market Forecast by Product (Unit: Million USD\$/yr)



# Car/ Motorbike Starters are Still the Biggest Application, but others are Growing

- In 2020, starters for vehicles/ motorbikes occupied 48% of the world lead-acid battery applications

2020 Worldwide Lead-acid Batteries Shipment by Application (Million USD)

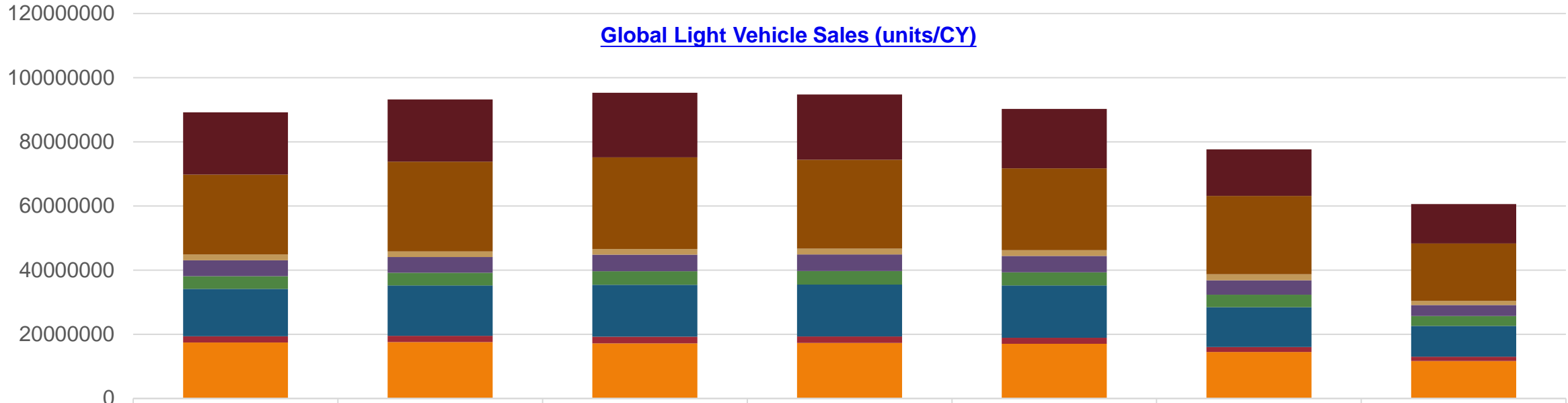


- 5% decrease in 2020
- May recover in 2021, but not more than 2019

- Growing by back-up power demand
- IDC/cloud/edge computing demand increase
- 5G infrastructure requirements

# Automotive Market in 2021: Still Effectuated by Pandemic & Shortage, but it should Better than 2020

- Major disruptions to the automotive supply chain continue to hold back the potential of the relatively brighter economic backdrop.
- Semiconductor shortage has left vehicle inventories low, leading to increased waiting times for new vehicles in many regions.
- Continued to tumble till 2022, amid the chip shortage and the lack of inventory.



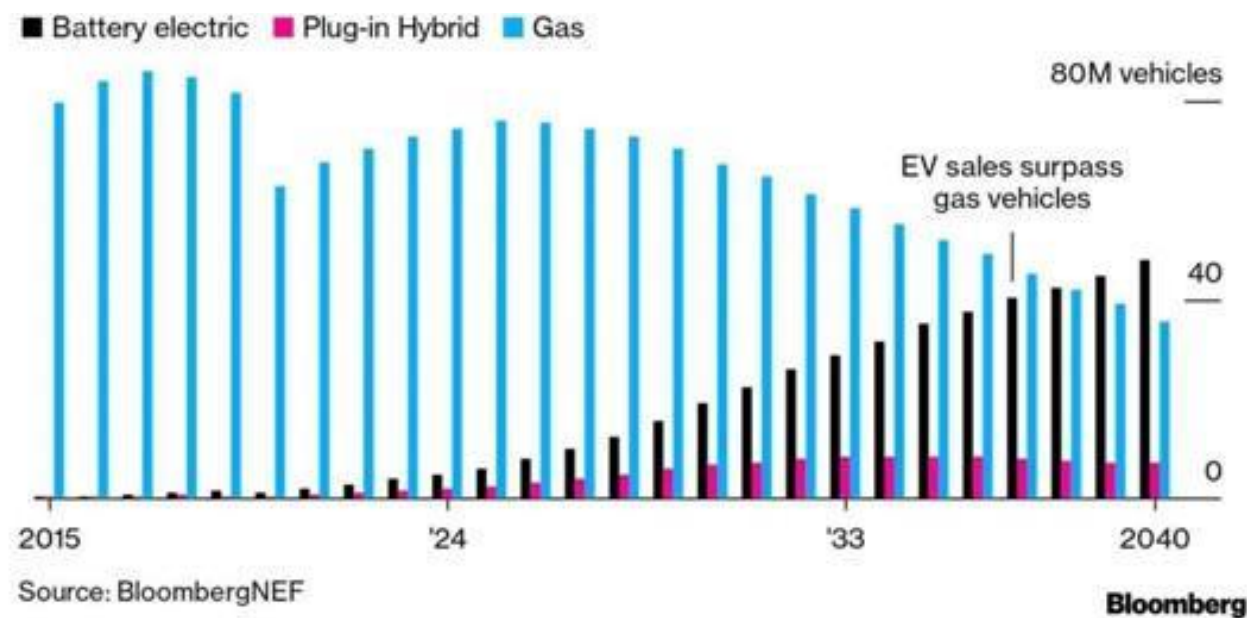
	2015	2016	2017	2018	2019	2020	2021 to date
Others	19400169	19441931	20111985	20372904	18552913	14500178	12286625
CN	24893417	27951086	28608998	27732352	25530948	24459100	17907633
KR	1797565	1785474	1751938	1776642	1750320	1855249	1277370
JP	5001057	4906321	5164249	5203234	5128473	4540860	3438807
East EU	3918559	3913736	4222523	4243124	4119161	3891300	3062719
West EU	14832880	15762991	16206595	16152953	16285193	12395066	9629729
Canada	1897444	1948135	2042737	2017852	1927656	1548983	1316364
US	17446907	17539008	17189409	17291599	16991330	14470064	11654248

ISTI Source: Marklines, ITRI/ISTI Analysis

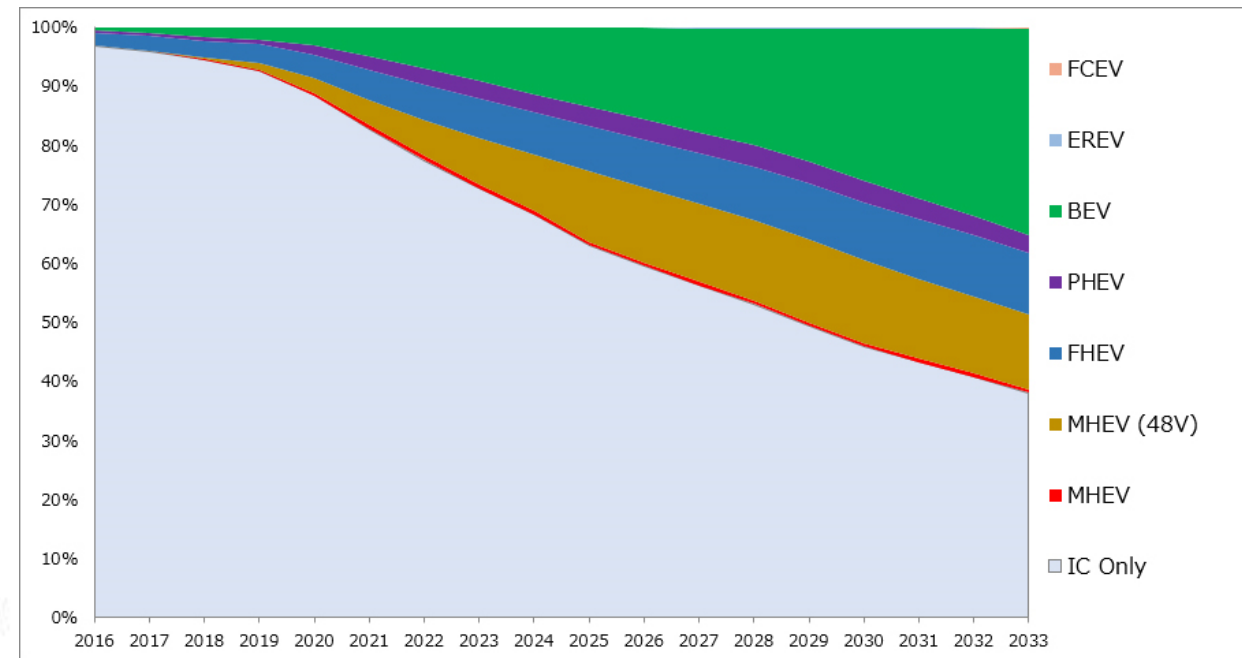


# Automotive Market: Keep Going to Electrification

- BNEF: By 2036, new electric vehicle sales will account for 54% of the global new car market (more than ICE) and electric vehicles will account for 33% of all vehicles on the road
- LMC Automotive: IC only may keep more than 50% before 2028
- May affect both the new light vehicle shipment related LAB decrease, and the retain number of ICE replaced LAB demand decrease

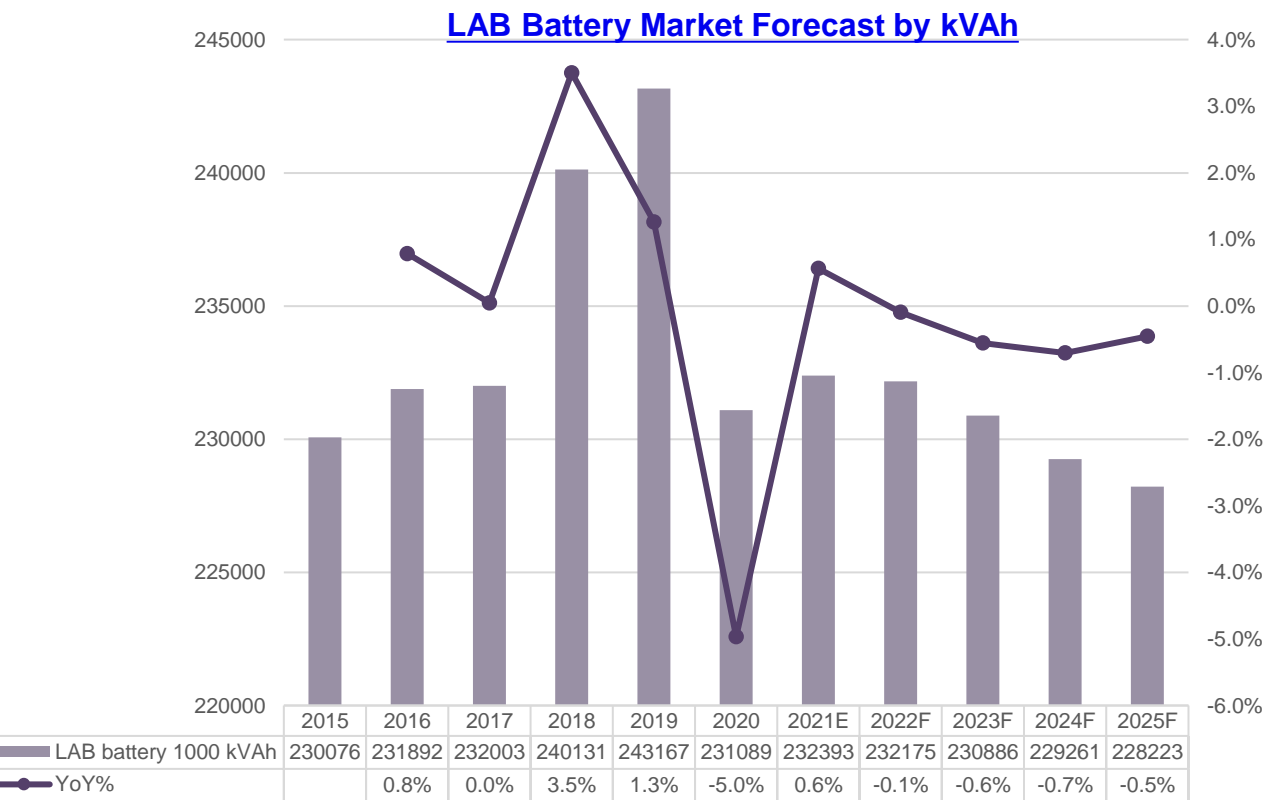
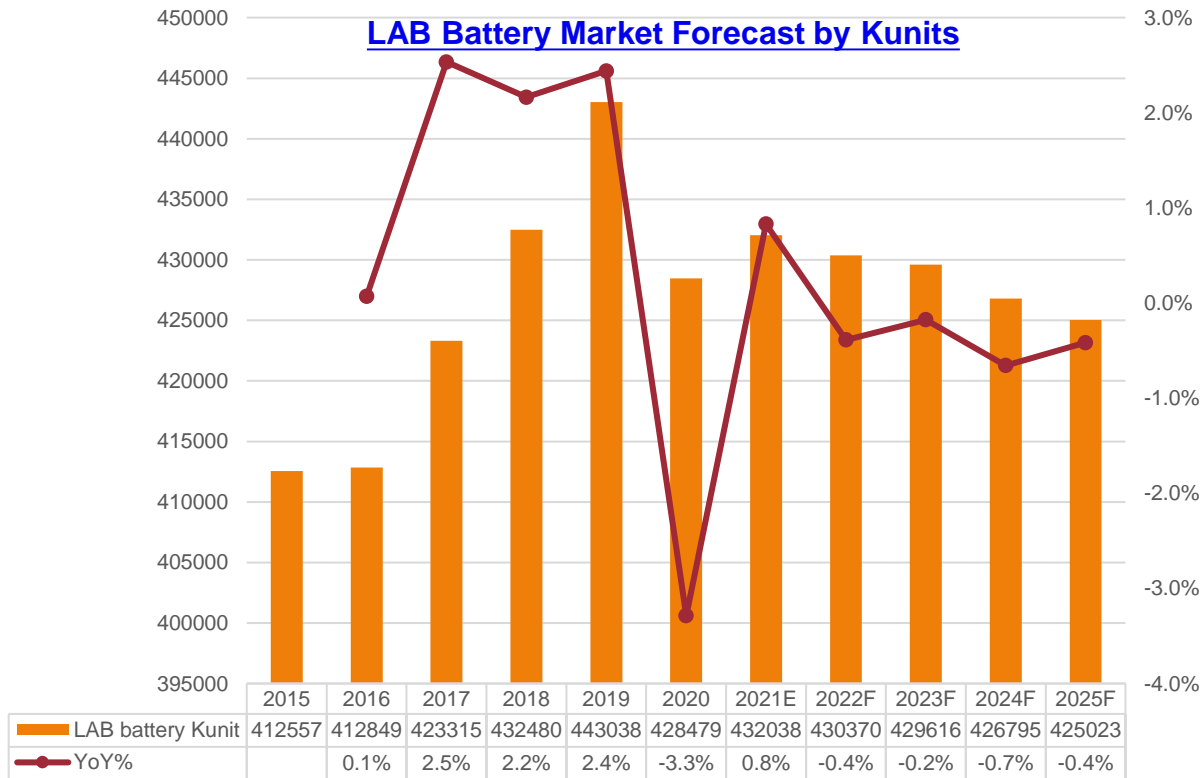


LMC Automotive: Global Hybrid and EV Forecast



# SLI/12V/ISSV LAB: Still the Main Solution in SLI & 12V

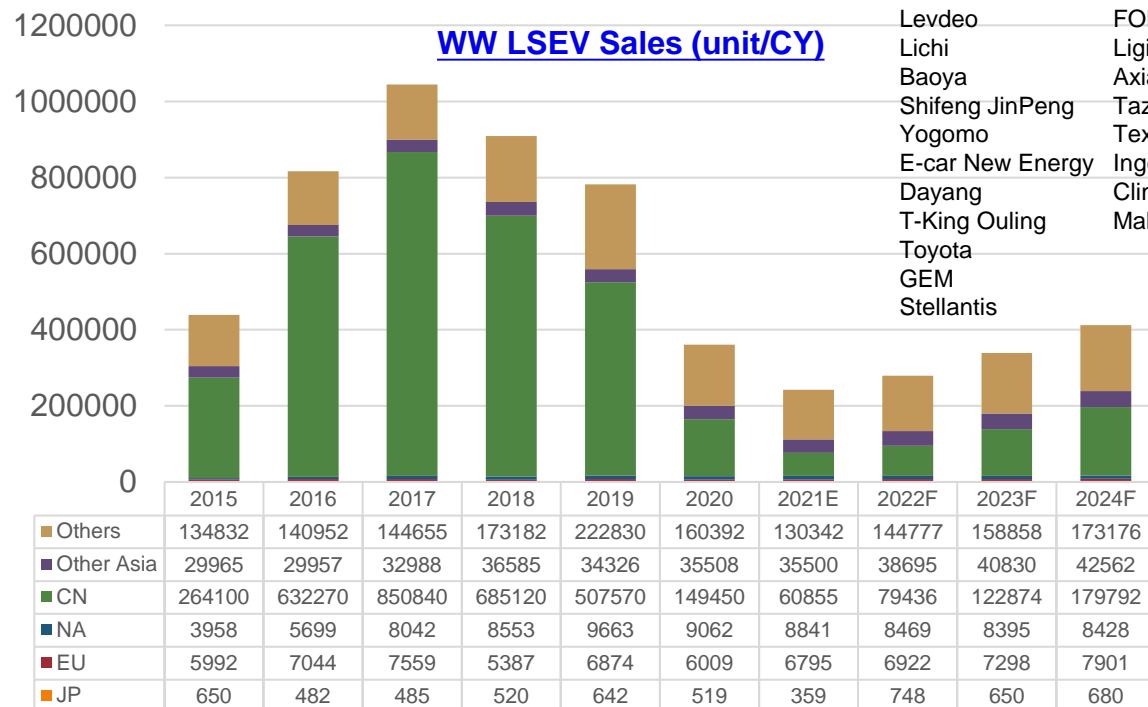
- ICE passengers: from around 95% in 2018 to around 55% in 2032.
- In terms of light vehicles, 12V LAB still the main solution, 12V LIB is coming to adopted by luxury/high class level
- BEVs and MHEVs equipped with 48V systems have increased significantly, and PHEVs and FHEVs are expected to increase gradually.
- Considering the pandemic challenges faced by the industry at present, though results are uneven across the globe.



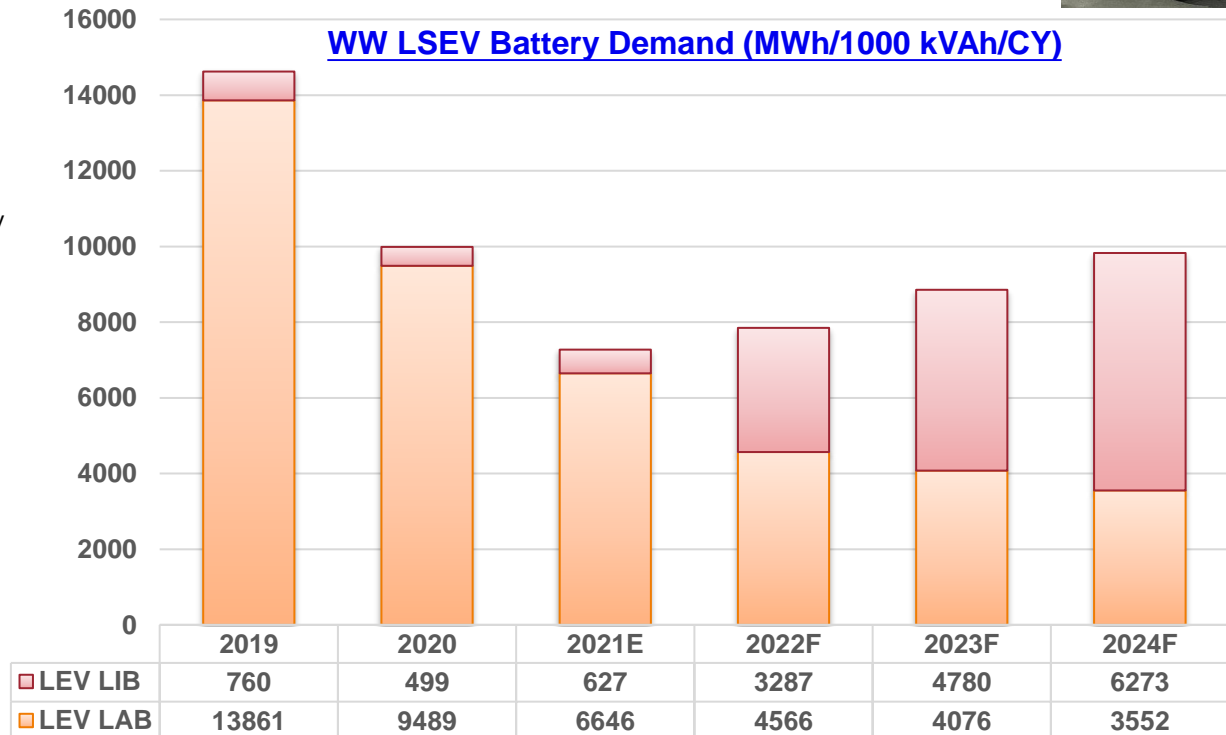
# Low Speed EV LAB: Critical Ban in China may Coming Soon

- **Features: Miniature, Light-weight, Short-distance, Economical**
- **Motor output<30kW, Max. Speed=70~80km/h (L6e, L7e in EU, Neighborhood electric vehicle in NA)**
- **Chinese market may ban LAB usage (GB/T 28382 draft version), combining the Chinese xEV subsidies cover A000, used LFP LIB, conservative for the LSEV future in CN, grow in other Asia and developing countries**
- **Battery mainstream is still Absorbed Glass Mat battery (AGM), Cy LIB adoption increases**
  - **Previous AGM venders involved in LIB and provided 18650 Cy cell in new car models**
  - **5~8kVAh/unit**

Wuling mini: 4 seats,  
USD\$4,200 after subsidies



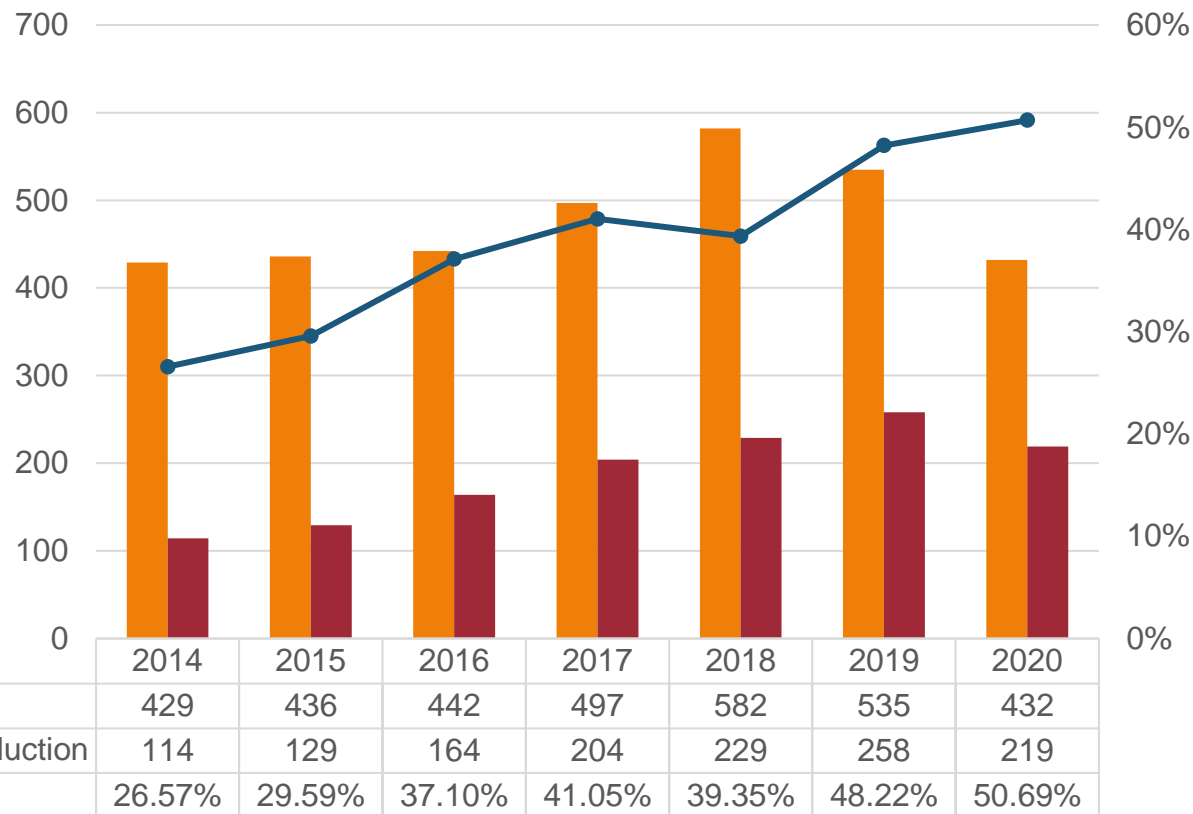
- Levdeo
- Lichi
- Baoya
- Shifeng JinPeng
- Yogomo
- E-car New Energy
- Dayang
- T-King Ouling
- Toyota
- GEM
- Stellantis
- FOMM
- Ligier
- Axiam
- Tazzari
- Textron
- Ingersoll
- Clima Mobility
- Mahindra



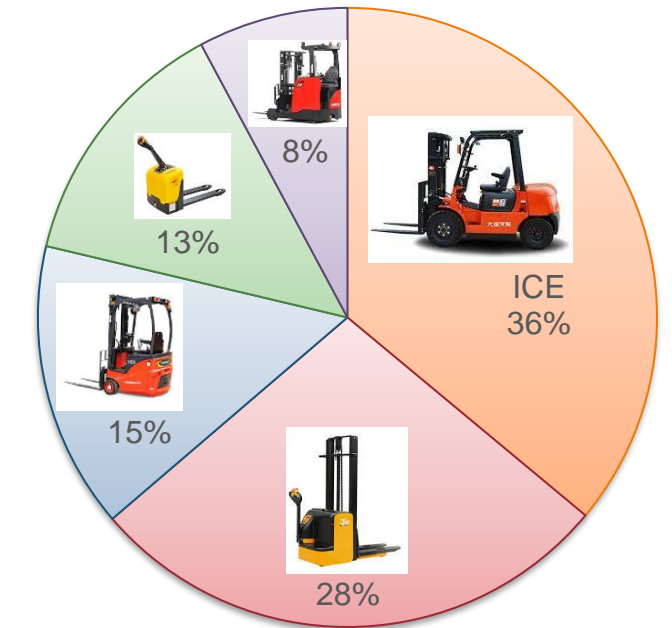


# E-Forklift/ AGV LAB: Back to Growing and Positive

- WITS: WW forklift=1,582,605 units in 2020, E-forklift=1,012,075, 64% penetration
  - Penetration in 2020: EU=87%, US=68%, Australia=56%, China=51%
  - Prefer to use LAB mainly, but LFP LIB also be provided



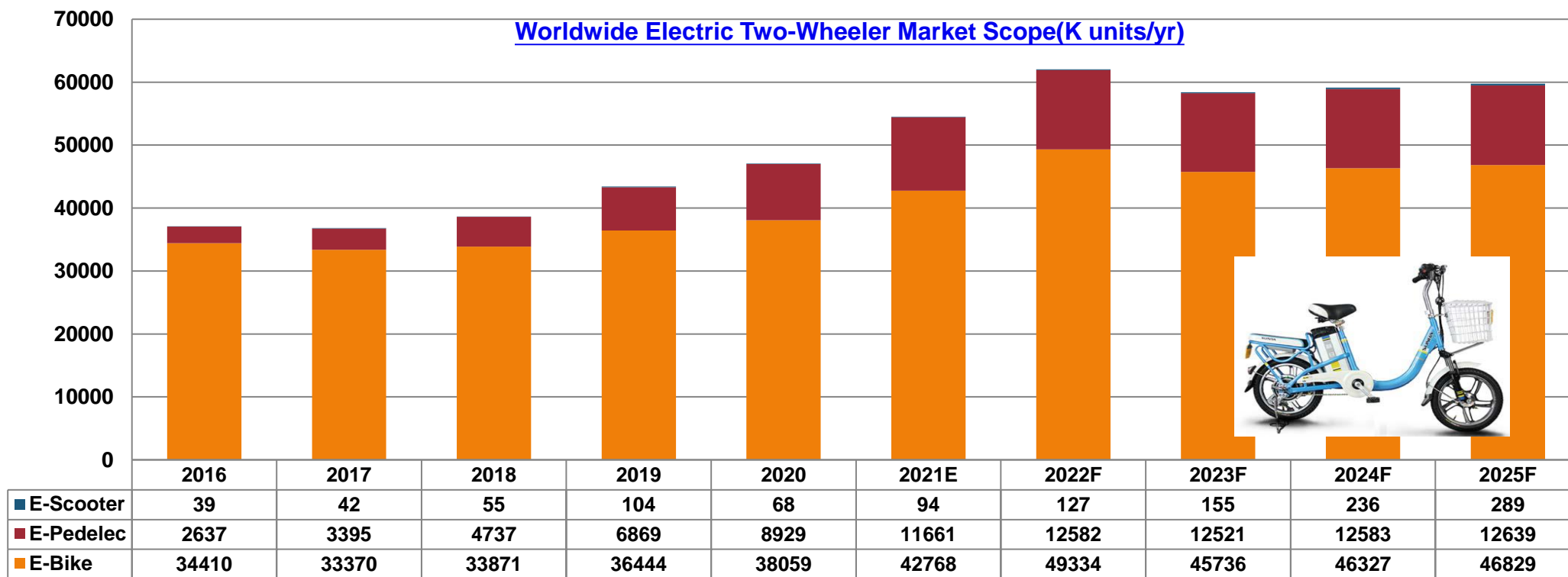
2020 WW Forklift Sales by Type (unit/CY)



ISTI Source: WITS, CNCMA, ITRI/ISTI Analysis

# First Chinese Lead-acid Battery Application: E-Bike

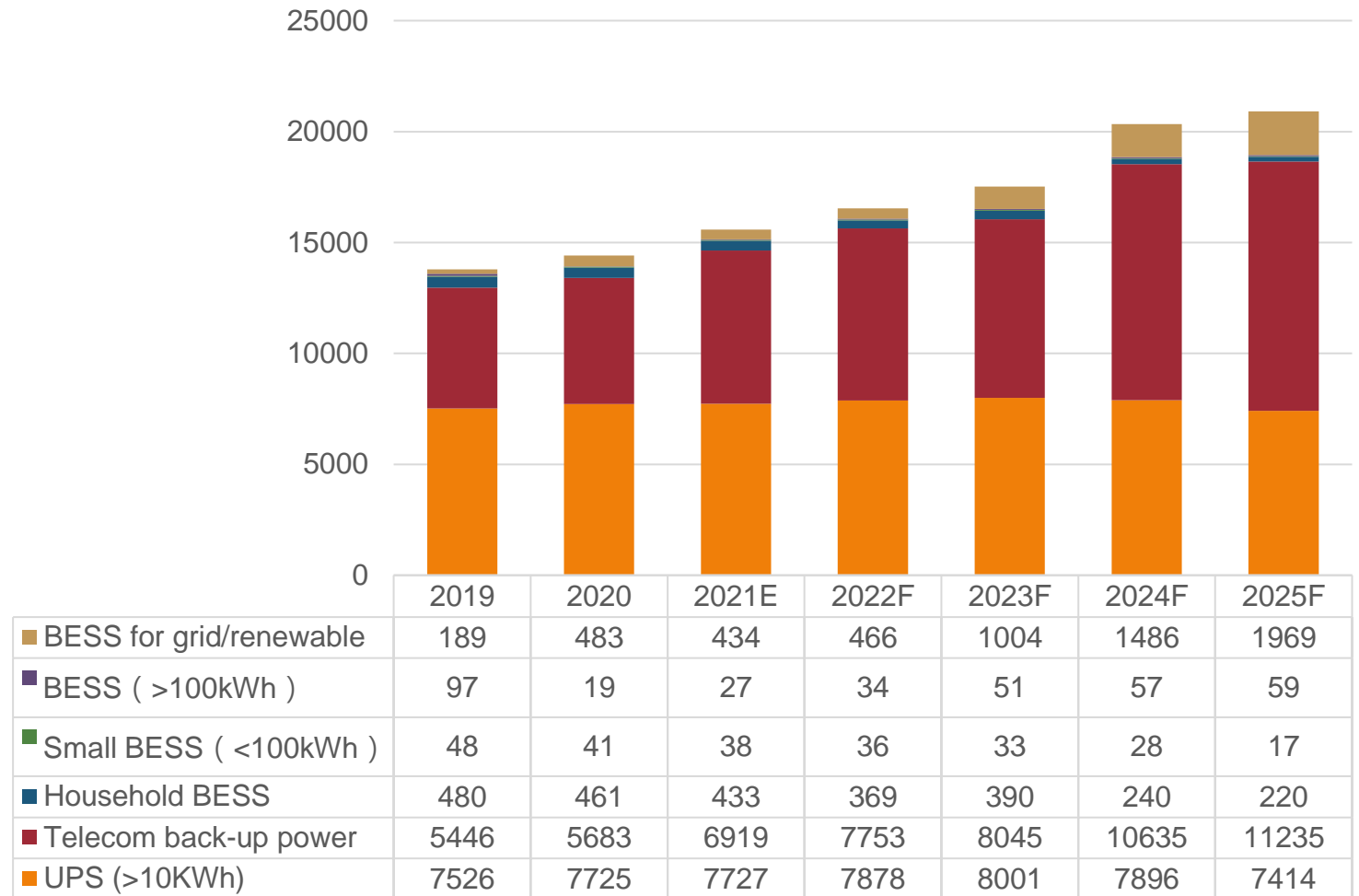
- Worldwide electric two-wheeler sales: 45.15 millions in 2020, 98% belongs to E-Bike,
- 29.66M in Chinese market, battery supply dominated by local LAB makers before 2020
- GB regulation (GB17761-2018) will forced out after Apr., 2022: bike weight <55kg, battery included, makes pressure for the LAB models (retain weight >55kg E-bike are not allowed on the road)
- In Chinese E-bike market 2020: 23% of the E-bike shipment equipped with LIB, occupied more than 50% of new E-bike models



# Stationary Battery Demand: Growing as Usual, but Change is Happening

- **UPS: demand change upon the economic situation, expenditure for IT investment**
- **Telecom back-up power: affected by the 5G penetration and the choices of the network structure (small cell or macro cell)**
- **Battery ESS: market is emerging, but LIB attracted almost all the recent project consideration**
- **USD\$110/KWh of the LFP pack price is usual, spec and requests are all the same but triple-times of the calendar life**
- **If the LIB safety issue can be controlled, the shifting movement may speed up**

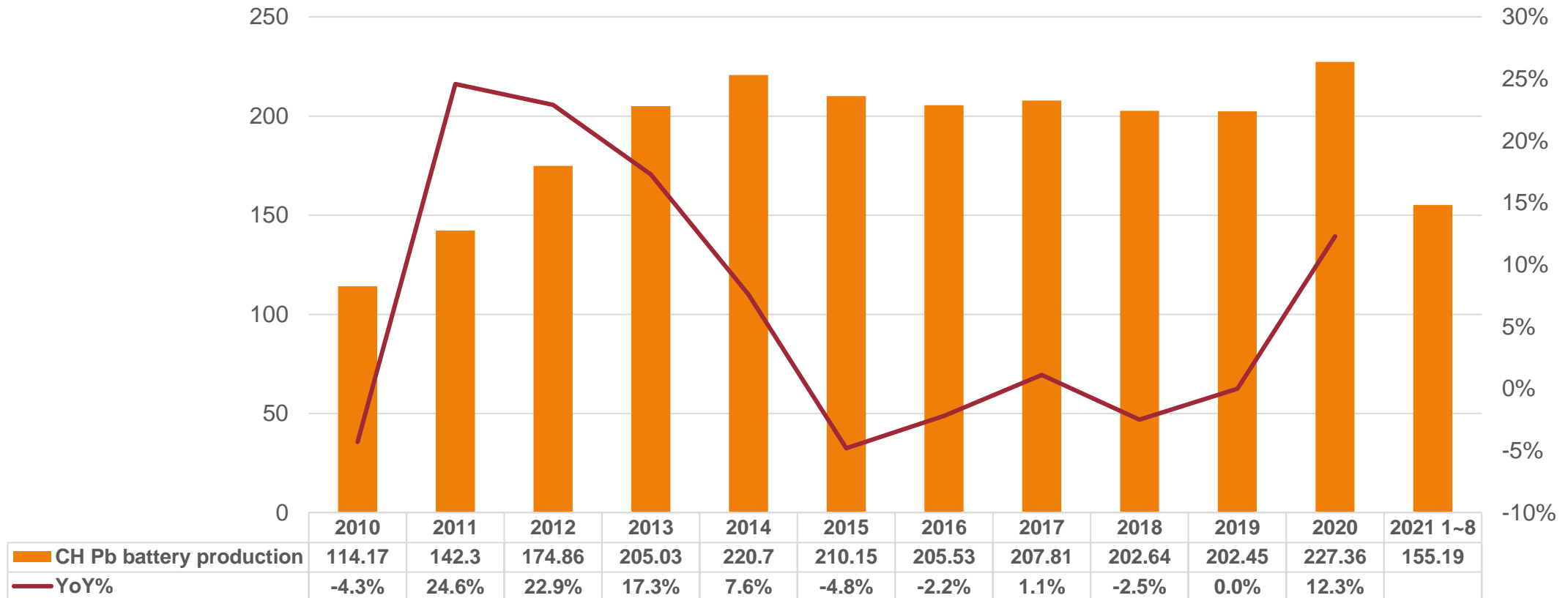
Worldwide Stationary LAB Market Shipments by Applications (1000 kVAh/yr)



# Chinese Lead-acid Battery Production: The biggest in the World and Benefited by COV-19

- Occupies over 45% production in the world (include the foreign company manufacturers in China)
- Mature products like Flooded, VRLA & AGM are popular into major applications and customers, also involved into EFB

2010-2020 Chinese Lead-acid Batteries Production (Unit: million KVAh)

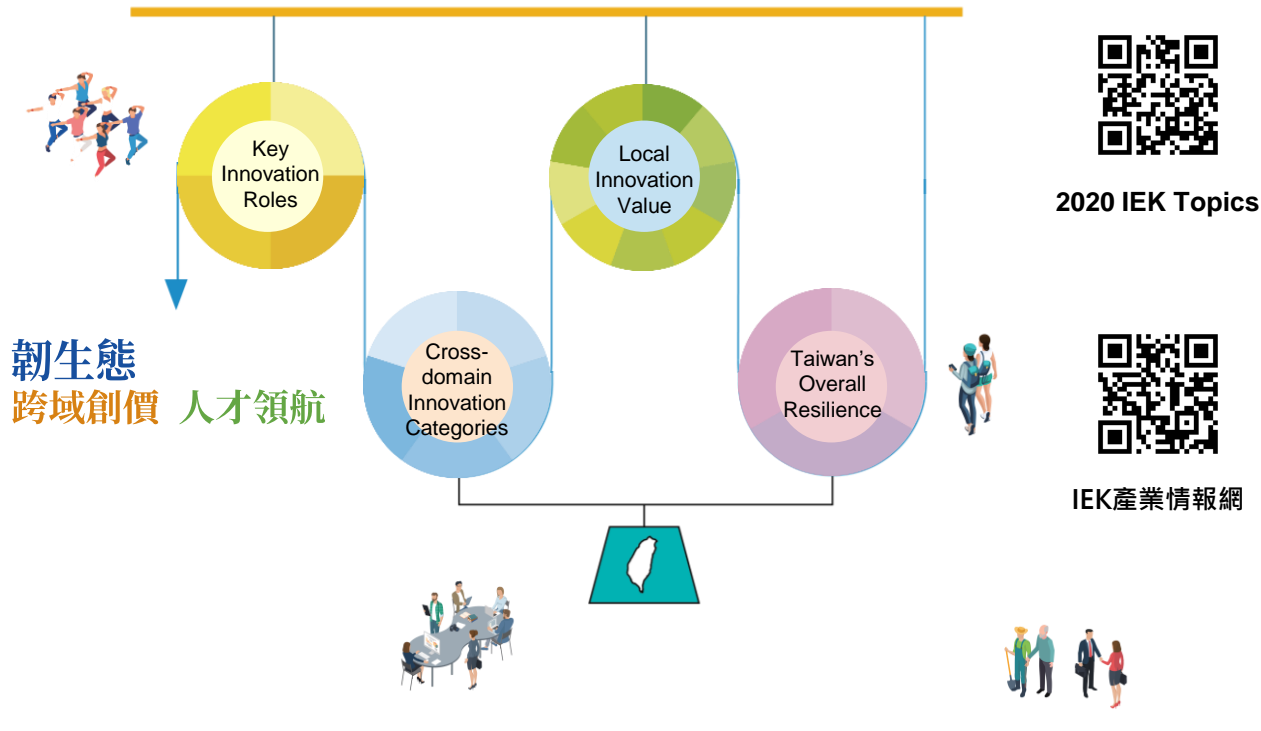


ISTI Source: National Bureau of Statistics of China

# Conclusion: There is a Neutral Future for Lead-acid Battery

- Lead-acid batteries to remain the dominant technology for decades to come
- Replaced by other technologies: not as soon as opponent want, and the “opponent” is focusing on the “new” market
- Only market leaders and law-abiding companies may survive
- The operation strategy needs mega-scope thinking: from company base to the eco-system base
- The main challenge is the judgement and strategy for business operation and cost controlling
  - Pb price and the effect for cost
  - Environment protection
  - Production process requests





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# THANK YOU

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