

**The Third International Scientific and  
Technical Conference  
«Battery Innovation 2021»**

**Togliatti. March 18<sup>th</sup>, 2021**

# **AKOM goals and achievements in the markets. The business prospects in Russia after COVID-19**

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**CHIEF BUSINESS OFFICER  
AKOM GROUP**

- Transfer of technologies to Russia & AKOM history
- OEM, AM markets in Russia & AKOM performance
- New directions of the business (generally)
- The business prospects in Russia after COVID-19

## OUR PRESENCE AT THE GLOBAL MARKET



# TRANSFER OF TECHNOLOGIES



2002



Assembly and formation  
technologies



since 2003



2005



Plate technologies



since 2008



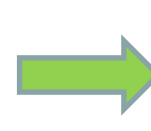
2016



EFB, AGM, GEL technologies



since 2017



AM



2018



ESS Li-ion NMC systems in  
Russia



since 2020



2019



Panzer electrode  
technology and  
formation with acid  
circulation



since 2020



# EXECUTIVE SUMMARY

## AM-market

- ✓ 45 PARTNERS IN 33 RUSSIAN REGIONS
- ✓ 26 PARTNERS IN 18 COUNTRIES
- ✓ 3 PARTNERS IN European Union
- ✓ NEW PARTNERS IN THE MIDDLE EAST AND EU COUNTRIES

Share – 14,6%

## OEM-market



## New OEM 2021



Share – 59,6%



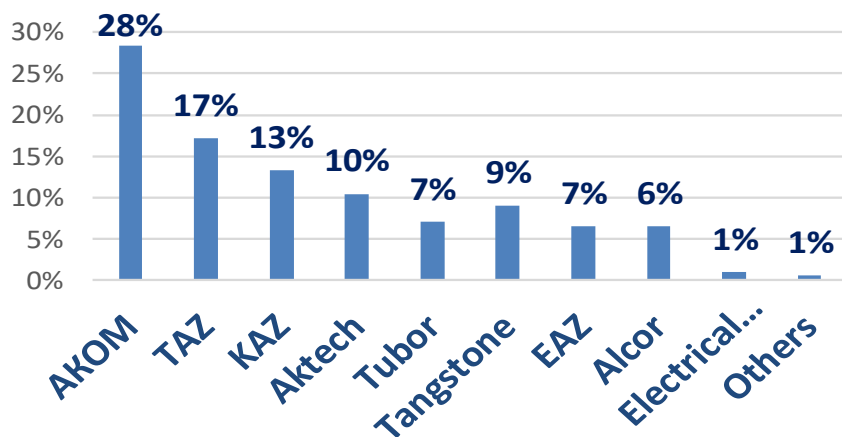
## Export



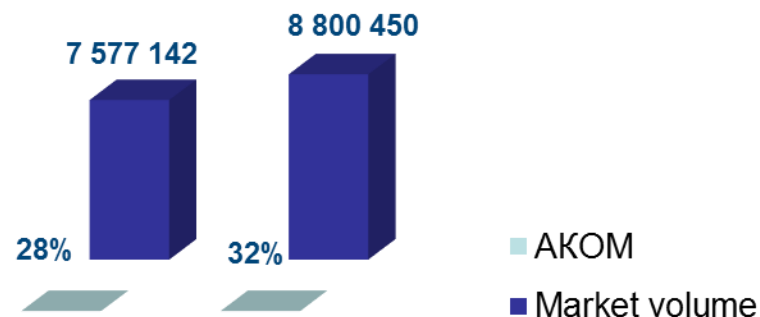
Export Share –  
66,6%

# AM OVERVIEW

**Production in 2020 is 7 577 142 parts - 5,7% VS 2019**

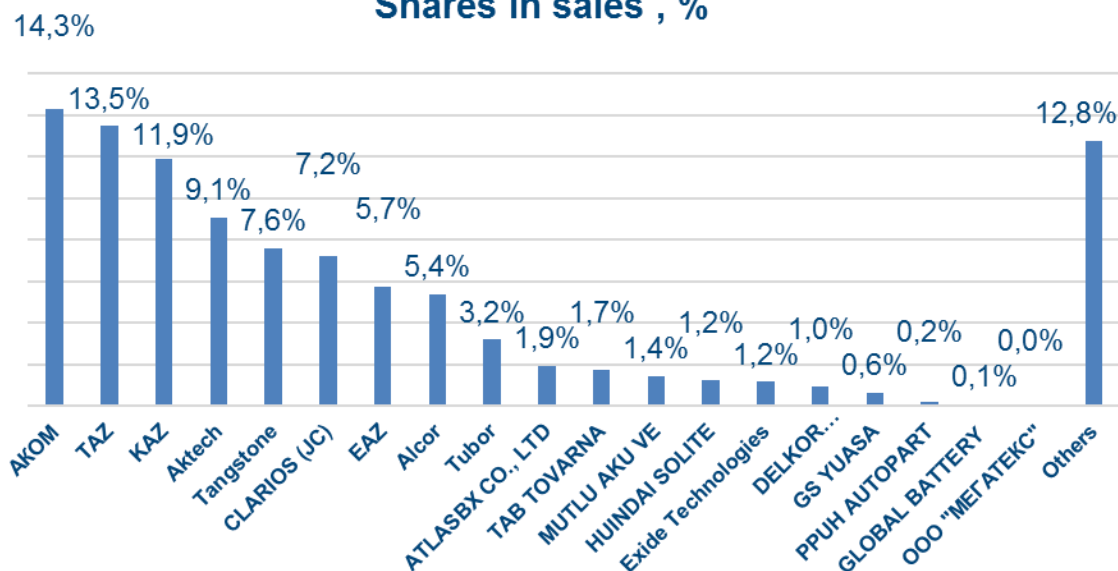


**AKOM share in a production in 2020 & forecast 2021**

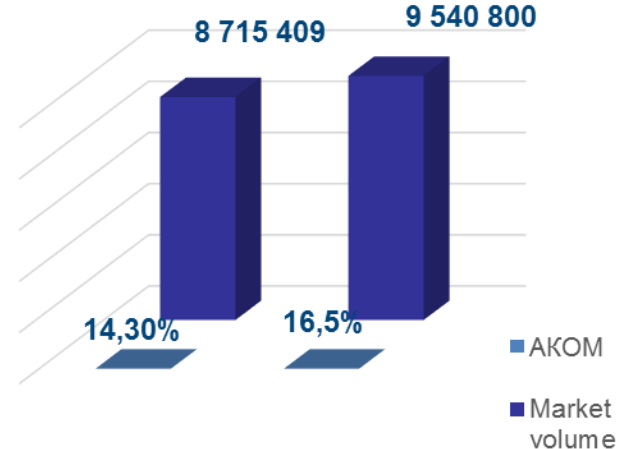


**Market capacity in 2020 is 8 715 409 - 6,2% VS 2019**

**Shares in sales , %**



**AKOM share in sales & forecast, %**



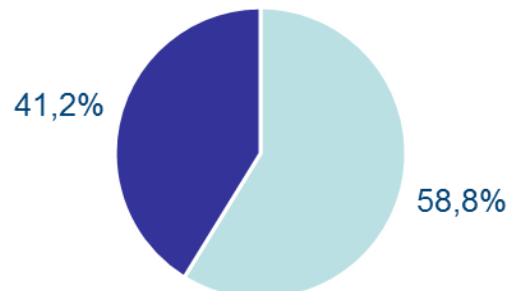
# OEM OVERVIEW (CKD)

2020



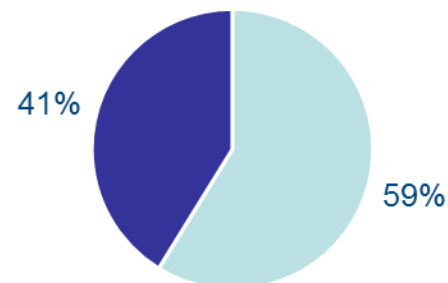
AKOM Others

2021



AKOM Others

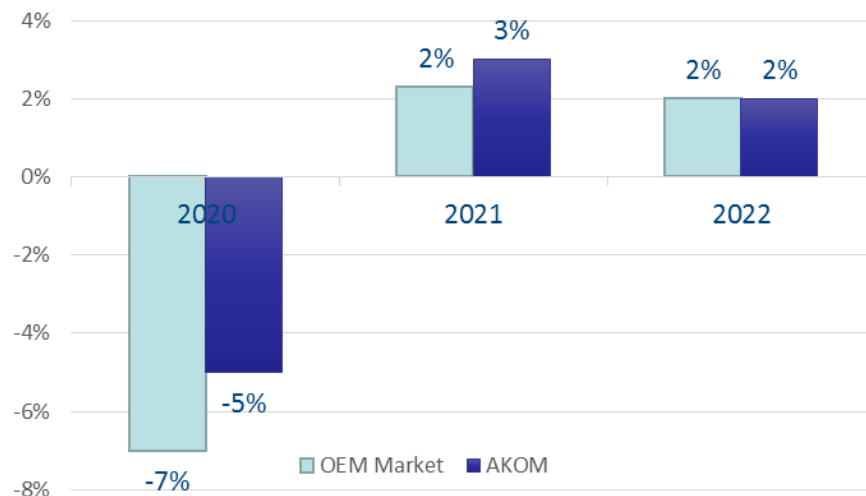
2022



AKOM Others

CKD OEM Automotive in Russia has accomplished much better in 2019 VS forecast (has been done by many famous agencies)

AKOM was even better than market and plan continue as well with the share of ~60%





## What's that?

- ESS based on maintenance-free PzV battery cells

## Operational system

- OES market - ED-4M electric train cars
- OEM - EP2D/EP3D electric train cars
- OEM – subway cars 81-775/776/777 series

## Key positions

- Eliminates the need for battery maintenance
- Increases the battery service life from 3 years to 7 years (OES)
- Remote monitor the status of the battery (ESS)

## What's inside?

- Inverter unit with charge/discharge control system, battery condition monitoring, temperature control, with monitoring system (analogue to BMS in ESS Li-ion)
- Battery of lead-acid PzV cells with gel-type electrolyte

## Economy

- Payback period in OES market when changing over to AKOM power unit is 3 years
- Consumer OpEx savings are about \$100/electric train unit per year (during the declared lifetime)

## Timeline

- 05.08.2020 - design developed, factory tests passed
- 20.08.2020 - start of the controlled operation of 2 samples in OES market (Kuybyshevskaya Railway)
- 25.04.2021 - completion of controlled operation
- 04.10.2021 - start of series production for OES market



# AKOM in the Railway Market. Development

## What's that?

### Passenger transport (ET UAE project partner)

- PzS, PzV type lead-acid batteries, modules and carriage batteries

## Operational system

- OES market - single-deck passenger railway cars built by TVZ (TMHolding) RF and Germany
- OEM - 61-44 and 61-45 series single-deck and double-deck passenger railway cars built by TVZ RF (TMHolding)

## Key positions

- Increased energy capacity - 36W/kg (validated analogues - 32W/kg)
- Maintenance interval (for liquid batteries) - reduced by 2.5 times

## What's inside?

- Special design of the Panzer electrodes (stationary OPzS, OPzV technology)
- Pure alloys and original formulation (water consumption reduced)

## Economics

- The cost of the battery set is 7÷9% lower than imported lead analogues and 1÷2% lower than alkaline local ones
- AKOM logistics solutions (geo-positioning)

## Timeline

- 25.06.2020 - design developed, production tests completed
- 20.10.2020 – start of the controlled operation of 5 battery sets
- 01.11.2020 - start of serial production

### Tractive ESS

(project partners -TESVOLT Germany and Samara State Transport University)

- Tractive electric energy storage system based on Li-ion modules with NMC technology cells

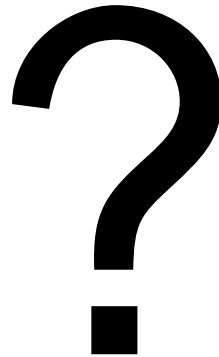
- OES market - system for energy storage from regeneration of locomotive braking and tractive power supply for acceleration (tractive power supply system for electrified railways)

- Improving the reliability of tractive power supply and increasing the capacity of railways
- Extending the service life of electrical equipment of tractive substations
- Mobile system for railway transport

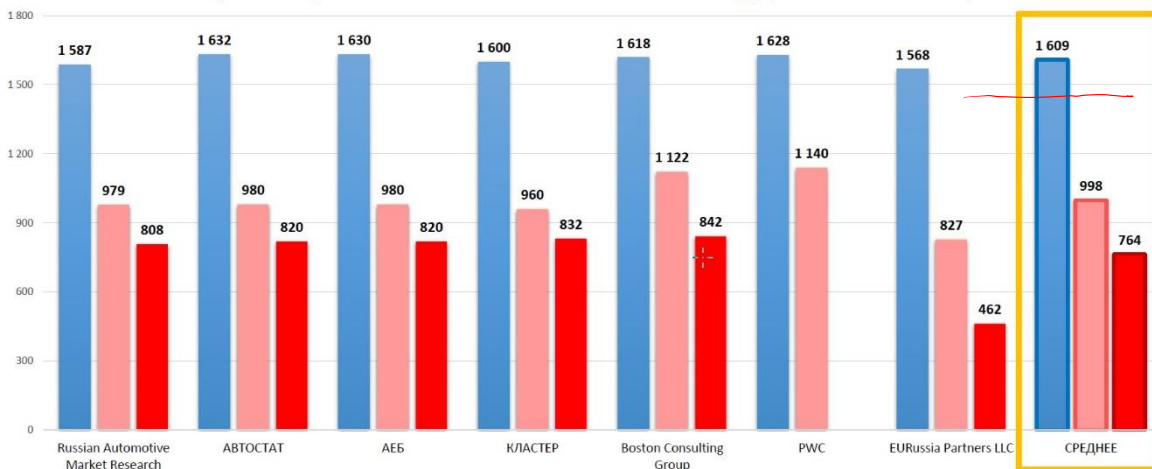
- Energy converter with top level BMS system
- TESVOLT BMS system with charge/discharge and condition monitoring, temperature control
- Battery modules with Samsung prismatic NMC Li-ion cells
- Software technical complex for control of accumulation/tractive supply schedule of locomotives

- Energy savings for train pulling – over \$225,000/year
- Payback period for 1 ESS - 3.8 years

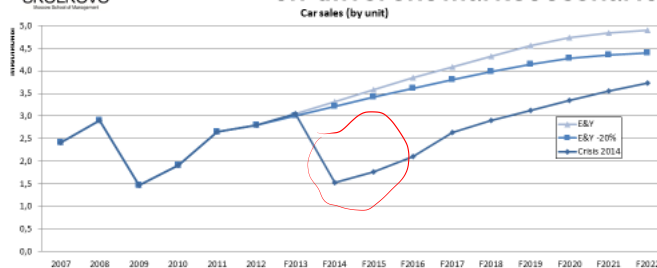
- 31.08.2020 - ESS simulation at the actual schedule of Kuybyshevskaya Railway traffic
- 09.09.2020 - feasibility study
- November, 2021 - development and manufacture of the first prototype



# PAST FORECAST ANALYSIS



## Forecast of Russian vehicle sales based on different market scenarios

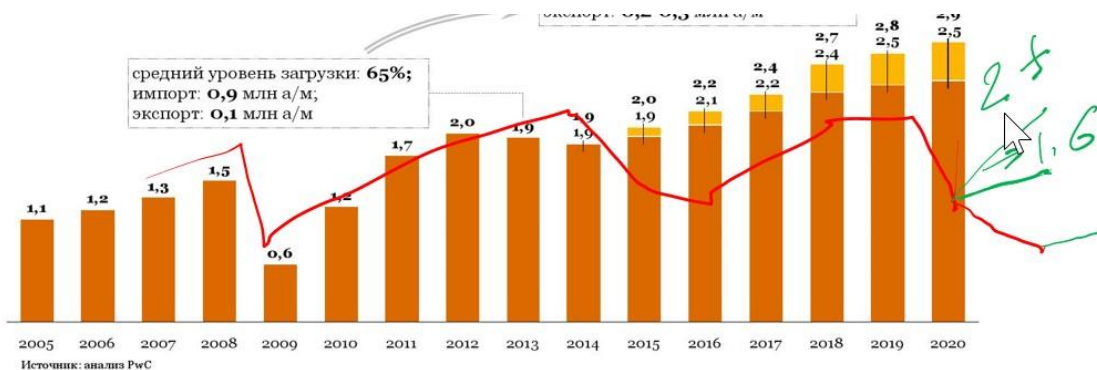


### 3 Market scenarios

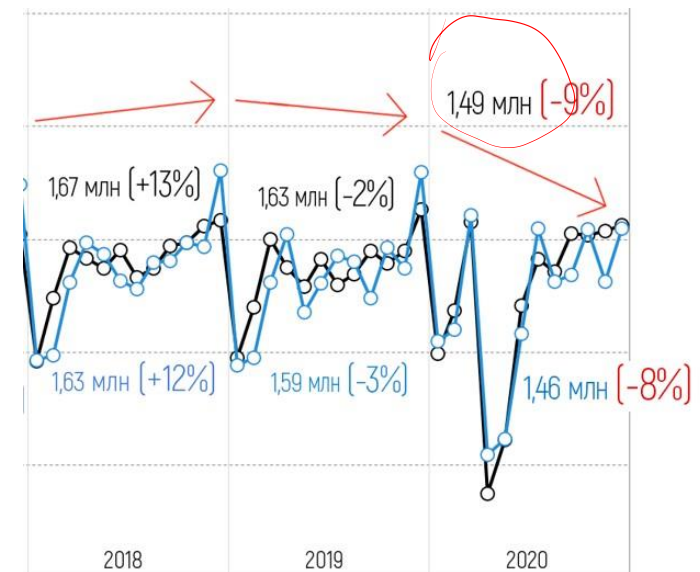
- Scenario 1: Vehicle sales increase as per forecast of E&Y report of 2012.
- Scenario 2: Vehicle sales increase as per forecast of E&Y report of 2012 with -20% growth\*.
- Scenario 3: Vehicle sales hit a crisis in 2014, recover in 3 years (as in 2009) and steady growth.

Moscow School of Management SKOLKOVO

\* Interview with tiers



Источник: анализ РвС

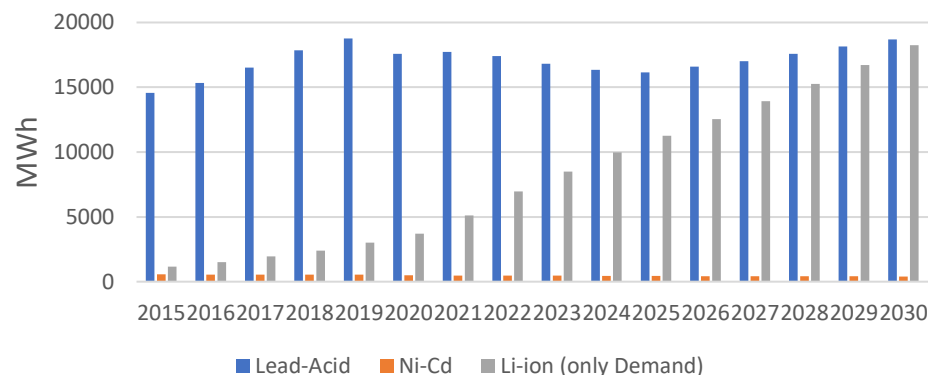


www.autostat.ru

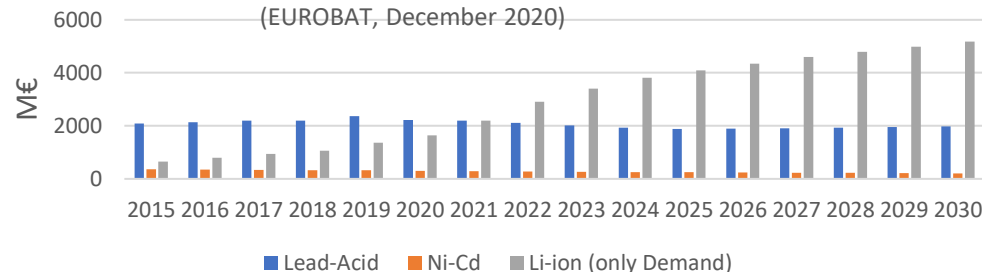
# FORECAST FROM THE LEADER

- In Europe lead-acid batteries demand in the COVID period dropped and will recover finally by 2030
- Ni Cd demand in Europe will not recover at all as Li Ion is taking the position
- Lead-acid batteries remain chipper VS others in term of the \$/KWh
- In Russia we may get the same quite deep research to understand trends in the industrial market
- Currently we may use European forecast, however, with a delay of 5 years at least ?

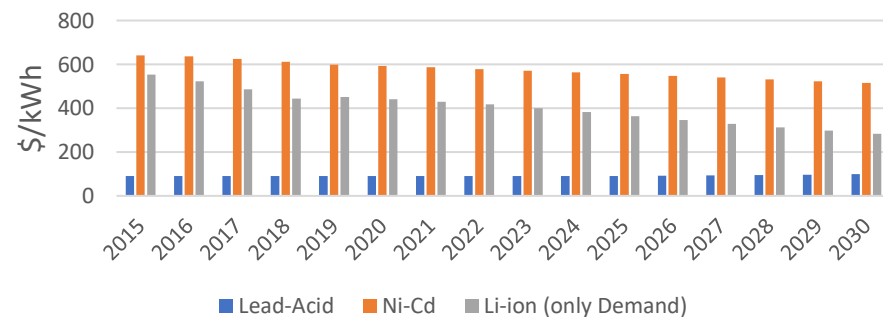
EU motive&stationary battery demand and supply, MWh  
(EUROBAT, December 2020)



EU motive&stationary battery demand and supply, M€  
(EUROBAT, December 2020)



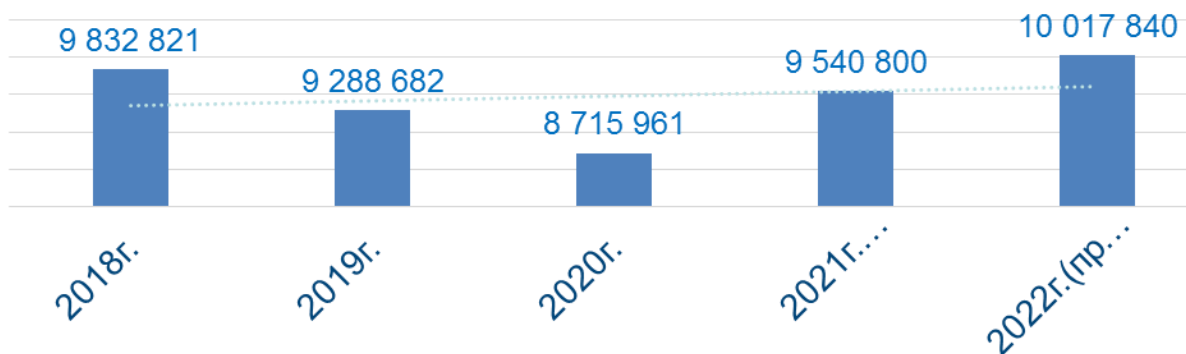
EU motive&stationary battery demand and supply, \$/kWh  
(EUROBAT, December 2020)



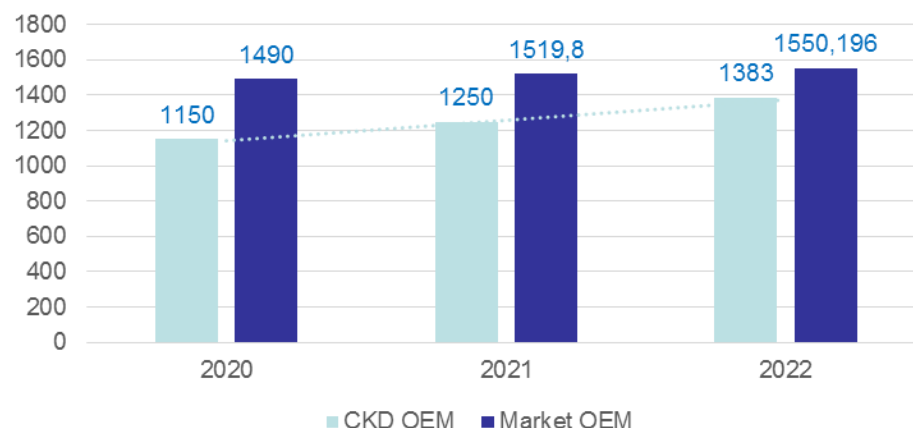
# FORECAST short term

- Import has dropped
- High prices of import will remain (logistic cost, \$/Euro/Rub )
- OEM Automotive will be fluctuated a little bit in 2021-2022
- AGM& EFB batteries demand will be growing
- Russian Railway business: passengers cars service and production ?

Forecast of batteries market 2021-2022.



OEM Automotive in Russia short term forecast, thousand



**THANK YOU!**

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