

**Battery Innovation 2021 |
18 March 2021**

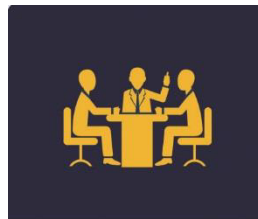
**« EUROBAT 2030
Battery Innovation Roadmap »**

Rene Schroeder, EUROBAT Executive Director



Introduction EUROBAT

- **EUROBAT** represents industry- **manufacturers and supply chain** of automotive and industrial **batteries** - at **EU** and **national** levels
- All battery technologies – lead, lithium, sodium, nickel



MORE THAN

50

Manufacturers
and Associate
members from
across the
value chain



MORE THAN

30

battery
manufacturing
plants



OVER €

6.5

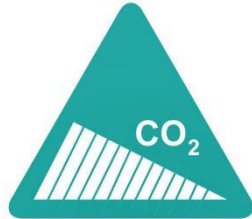
BN annual
turnover



16

research
centers

What drives battery manufacturers?



- Batteries are the cornerstone for **decarbonising power and mobility.**

- Automotive and industrial battery market worth **€ 15 bn in Europe and € 75 bn worldwide** (2019). Forecasted to rise to **€ 35 bn and € 130 bn respectively by 2030.**



- Today's key battery technologies – **lead-based and lithium-ion** – will remain the most important and will both undergo growth as we head towards 2030.

- Changes to the legislative framework on batteries required and under preparation – need to deliver fast on the new framework **of Batteries Regulation, ELV Directive and REACH.**



Battery Innovation Roadmap 2030: Purpose & Scope

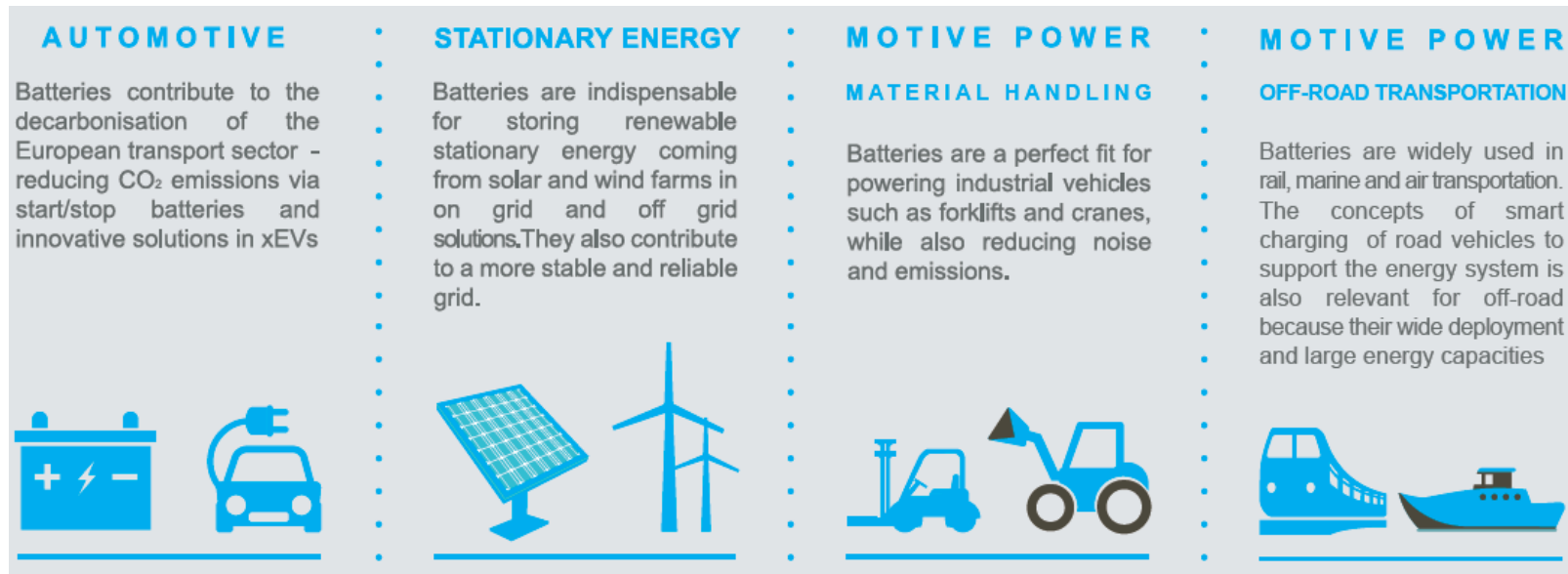
Purpose

- Highlights the **strong innovation potential** of all battery technologies, looking forward to 2030.
- Shows how different technologies **contribute to EU decarbonisation** and « **Green Recovery** » net-zero pollution targets.
- Makes **recommendations to EU policy-makers** on the **Batteries Regulation**, based on the **EUROBAT Election Manifesto**, aiming to:
 - ✓ Secure future **EU investment**
 - ✓ Enhance **growth, skills and jobs in the EU**
 - ✓ Create a **level playing field for all technologies**



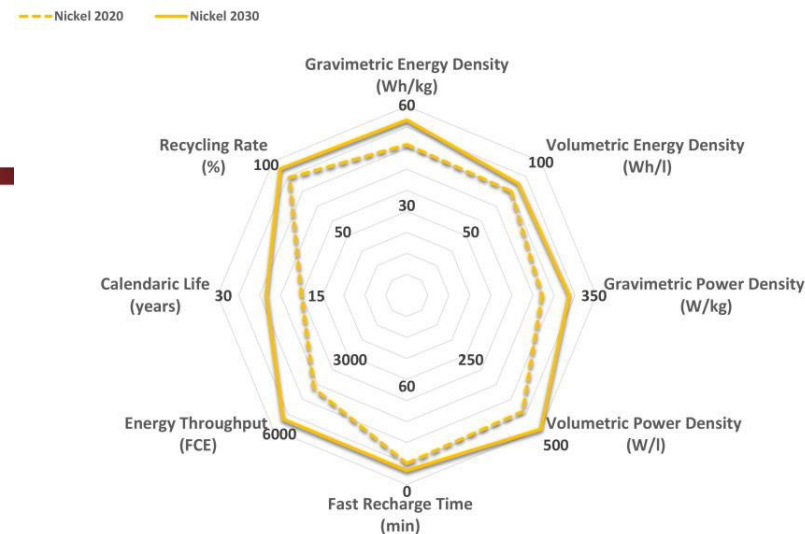
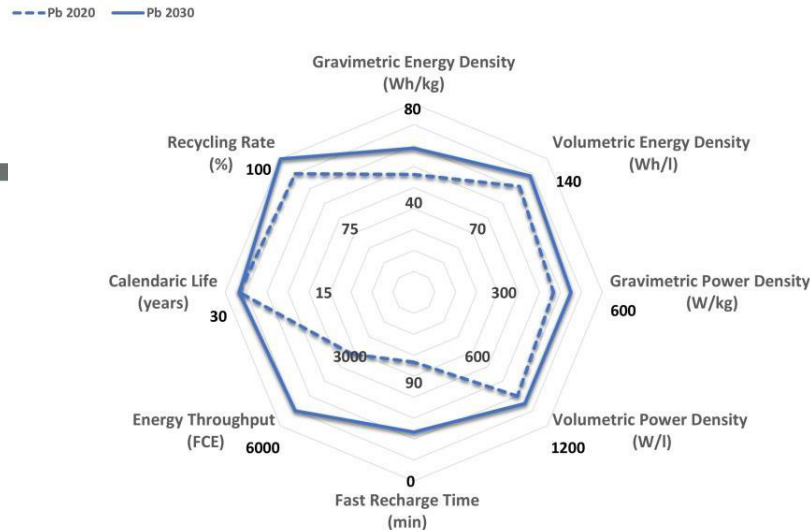
EUROBAT Battery Innovation Roadmap: Purpose & Scope

Scope: 4 Areas – 12 Battery Applications



- **No one-size-fits-all battery technology**
- **Battery Innovation is an ongoing process**, driven by the **requirements of applications**
- **Europe's battery sector has for decades had a market-driven innovation approach** to meet new demands

Battery technologies: performance targets 2020 - 2030 Key Performance Indicators, Lead- and Nickel based



Lead-based batteries

Strengths:

- + Recycling efficiency
- + Calenderic life (stationary)
- + Functional safety

Development potential :

- Rechargeability (automotive)
- Cycle life time (stationary)

Nickel-based batteries

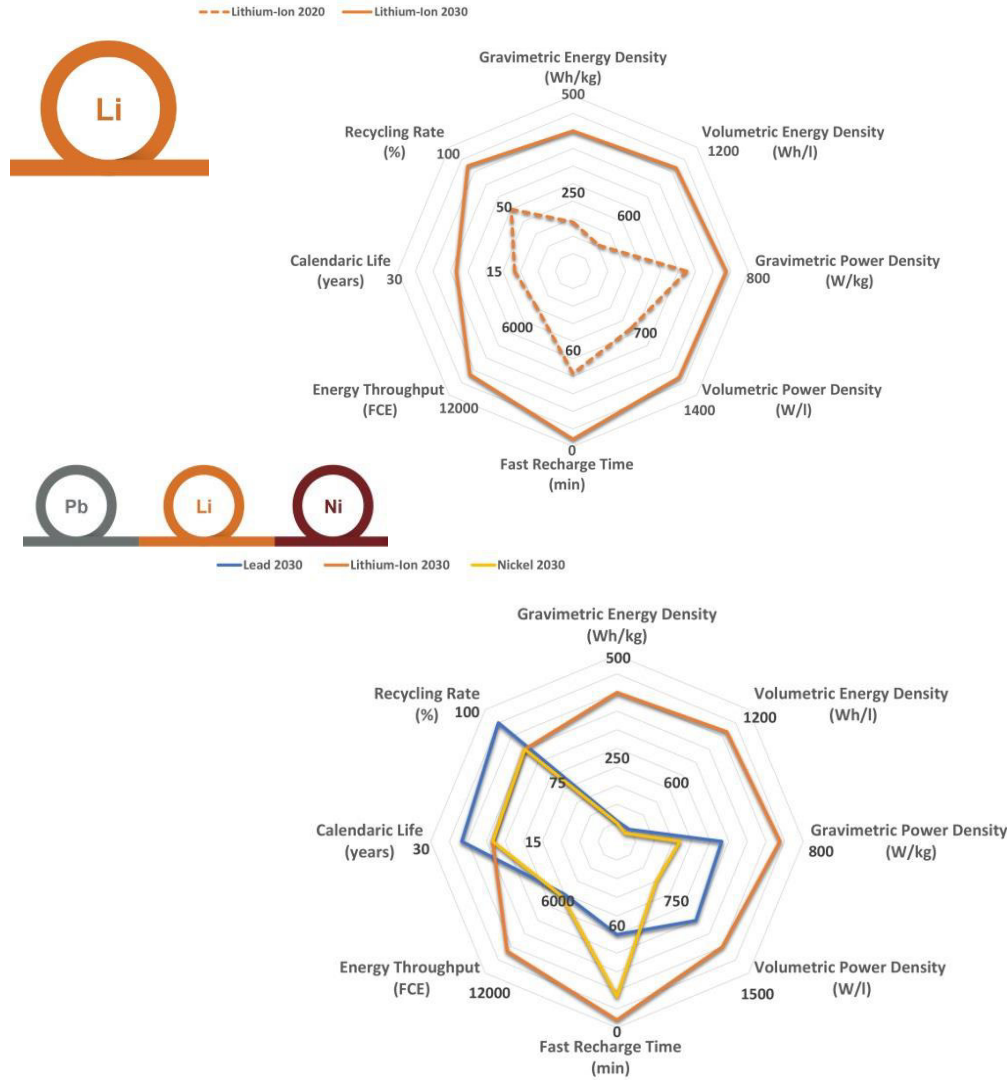
Strengths:

- + Cold temperature performance (NiCad)
- + Fast recharge time

Development potential:

- Cycle life
- Calenderic life

Battery technologies: performance targets 20 – 30 Lithium and summary



Lithium-based batteries :

Strengths:

- + Specific energy density
- + Specific power density
- + High cycle life

Development potential:

- Recycling efficiency (and material sourcing)
- Calenderic life

Comparing the 2030 outlook:

- Li-ion: newest chemistry with highest development potential for coming 10 years
- The established chemistries prove their right of existence due to:
 - Affordability
 - Proven and reliable functionality
 - Circular economy aspects

EUROBAT Battery Innovation Roadmap Area 1: Automotive Mobility



- **Micro-and Mild Hybrid Vehicles** use 12V Start-Light-Ignition batteries and 12V Start-Stop batteries (> 80% new vehicles in 2019). **99% of new cars utilise Pb-batteries.**
- **Key areas of development:** capture **regenerative braking energy**, improve **dynamic charge acceptance**, **better temperature robustness**
- Dominant technology by 2030: Pb-based, Lithium to penetrate with few percentages



- **PHEV and EV traction batteries:** mainly Li-on, LFP or NMC
- **Key areas of development:** **volumetric energy density** and **preventing thermal runaway**
- Solid state will help to increase the energy content and the security aspects in case of an accident or other high physical stress
- Dominant technology by 2030: Lithium-based



- **12V Auxiliary Batteries** are used in ICEs and x-EVs to support the 12V on-board net, majority lead-based as an affordable and reliable energy source.
- **Key areas of development:** increase **cycling life**, **energy efficiencies**
- Dominant technology by 2030: Pb-based, lithium to penetrate with small percentage



- **Heavy Duty Commercial Vehicles:** Total cost of ownership is KPI for fleet operators
- **Key areas of development:** support **hotelling functions** through better energy supply and deep-discharge capability.
- Dominant technology by 2030: Pb-based

EUROBAT Battery Innovation Roadmap

Area 2: Motive Power – Material Handling & logistics



- **Material handling & logistics market:** mainly Pb batteries in forklifts (+/- 90% market share).
 - ✓ **Noise and emissions legislation:** battery forklifts replace ICE (73GWh by 2030).
 - ✓ **Lead** to remain dominant (2030: 80% market share vs 15-30% for Li).
 - ✓ **Key advantages for Pb:** counterweight and standardisation
- **Key areas of development:**
 - ✓ Cycle life, charge efficiency, fast charge in a wide temp range and PSOC cyclability.
- **Dominant technology in 2030:**



- **Automated Guided Vehicles and Carts (AGV/AGCs):** transport systems operating without direct human interaction and powered by lead, NiCd and lithium batteries.
- **Key areas of development:** high volumetric energy and power density, broad operation temp range and cyclability.

- **Dominant technology in 2030:**



EUROBAT Battery Innovation Roadmap Area 3: Motive Power – Off-Road Transportation



- **Railway batteries and railway standby:** used in various applications today; mainstream technologies: NiCd, lead and lithium.
- **New applications for battery systems:** hybridisation and electrification of rail power traction. High energy, power density and cyclability suit **lithium systems** best and fastest growing battery segment for railway applications.
- **Key areas of development:** volumetric energy density, lifetime and operation temp range.
- **Dominant technology in 2030 traction:**



- **Marine sector** strong contributor to CO2 emissions and pollution. Lithium used for hybrid/pure electric propulsion, lead for on-board auxiliary services.
- **Key areas of development:** gravimetric/volumetric energy density and cyclability
- **Dominant technology in 2030 traction:**



EUROBAT Battery Innovation Roadmap

Area 4: Stationary Energy Storage Batteries Telecom/UPS

Global Telecom and industry (UPS): biggest segments in “stationary” market with highest volume and growth in EU. UPS: data centres and commercial/industrial/health facilities; security, emergency lighting.



- **Uninterrupted power supply (UPS):** lead is the dominant technology providing instant power if the main power source fails. Existing market with new requirements where **Lithium** will have 7-18% market share by 2030.
- **Key areas of development:** power density, charge acceptance, high temperature float life and fast rechargeability
- **Dominant technology in 2030**



- **Telecom:** largest income stream for lead batteries. Technical enhancement of 4G, 5G, and better telecom infrastructure key drivers for lead. Telecom batteries are cells or blocks supplying power to ITC or telecom sites if the main power source is unavailable/insufficient.
- **Key areas of development:** energy and power density, energy throughput, charge acceptance and high temp operation.
- **Dominant technology in 2030**



EUROBAT Battery Innovation Roadmap

Area 4: Stationary Energy Storage Batteries RES behind the meter/ESS batteries

RES behind meter



- **Renewable Energy Storage batteries behind the meter:** supply load when electricity costs are high or renewable power output low.
Main drivers: increased self-consumption and need for power continuity. Both **lead and lithium** compete in this market, each with their own features.
- **Key areas of development:** design life and cyclability
- **Dominant technology in 2030**



ESS batteries



- **Utility grid-scale energy storage (ESS batteries):** batteries provide grid stability in multiple ways - store energy quickly or feed in for grid compensation and supply energy to an island power. Depending on requirements and grid-functionalities, **all battery technologies** to be used.
- **Key areas of development:** cycle life, PSOC operation, power density, high power discharge capability, and round-trip efficiency.
- **Dominant technology in 2030**



EUROBAT Battery Innovation Roadmap: Concluding remarks



- Our Battery Innovation Roadmap 2030 demonstrates that:
 - ✓ **All battery technologies are complementary**, each have specific features and **significant development potential**
 - ✓ Different **battery chemistries powering numerous applications** will continue to evolve according to specific requirements
 - ✓ **Developing all battery** chemistries will maximize the contribution of our Industry to meet the zero-pollution targets **of Europe's Green Deal by 2050**
 - ✓ If the EU battery industry is to meet future demand – anticipated at 3x today's volume by 2030 – **all 4 chemistries have to be able to play their role**
 - ✓ Having different manufacturing chemistries in our portfolio also **provides strategic advantages** with regard to **Europe's competitiveness** and **self-sufficient sourcing and manufacturing**

More information on our website

For the full report, please consult the
EUROBAT website – www.eurobat.org :

1. **Executive Summary**
2. **EUROBAT Battery Innovation Roadmap 2030**
3. **Technical Annex**



EUROBAT

Overview of the Batteries Regulation proposal

Francesco Gattiglio
Director EU Affairs & Policy, EUROBAT

Each decision at EU level must be agreed by the 3 institutions of the EU



- European Commission: the “Federal government” of the EU, with power on energy, environment and internal market policy



- European Parliament: 705 Members elected in the 27 Member States every 5 years, divided into 7 multinational political groups



- European Council: represents the member states

Types of acts:

Directive: it sets the principles and the targets, leaving relative freedom to member states on how to achieve them. It needs to be translated into national law.

Regulation: it is a detailed legislative act, immediately applicable in the entire EU without need for translation into national law.

Secondary legislation (delegated/implementing acts): they define how a given measure shall be implemented, or specify certain aspects of the primary acts (for instance, formulas). The Commission has more power on these acts.

	2020	2021				2022	
	Dec	Q1	Q2	Q3	Q4	H1	H2
Institutional Batteries Regulation milestones							
Publication proposal on a new batteries regulation	10						
Public consultation on the Batteries Regulation (deadline: 1 March)							
Development of Council position							
Development of Parliament position							
Negotiations Commission - Council- Parliament on the Batteries Regulation							
Publication on the new Batteries Regulation							

The **Council** is already discussing the proposal – meetings every 2 weeks, the representatives are well aware of the key provisions and are already developing their individual positions

The **Parliament** is more delayed – conflict of competences between 3 committees (environment, energy and internal market)

- The Batteries Directive is outdated (2006) and it does not consider new technologies and recent developments
- The Directive leaves too much room for interpretation to the Member States – preferable to move to a Regulation
- Batteries (and specifically li-ion batteries for electric mobility) are of strategic importance – Europe must produce them! Link with the European Battery Alliance
- Production needs to be sustainable: competitiveness through sustainability along the entire value chain (raw materials, production, performances, reuse, recycling)

1. Good approach in general: considers the interaction between chemicals management, environmental protection and industrial strategy. But high administrative burden and issue of compliance.
2. Approach on hazardous substances: new process duplicating REACH. Duplications must be avoided!
3. EV batteries and industrial batteries with capacity above 2KWh will have to comply with minimum requirements on due diligence, performance, durability, recycled content and carbon footprint to be placed on the EU market → basically, a ban of batteries which are not « green »

Carbon footprint (Art 7, Annex 2)

Scope: Electric vehicle batteries and rechargeable industrial batteries with internal storage and a capacity above 2 kWh

Timeline	Measure
July 2024	<u>Carbon footprint declaration requirement</u> enters into force
January 2026	Batteries shall bear a <u>label indicating their carbon footprint performance class</u>
July 2027	Batteries with values higher than the <u>threshold for maximum carbon footprint performance values</u> cannot be placed on the market

- The criteria for the methodology are tailored on lithium batteries – need to develop coherent methodologies also for other chemistries
- According to the Commission, performance classes and thresholds will be chemistry-specific: the point is to compare lithium with lithium and lead with lead, not to compare different chemistries

Performance and durability requirements (art 10, Annex 4)

Scope: Electric vehicle batteries and rechargeable industrial batteries with internal storage and a capacity above 2 kWh

Timeline	Measure
1y after entry into force	<p><u>Obligation to declare</u> values of electrochemical performance and durability parameters:</p> <ol style="list-style-type: none"> 1. Rated capacity (in Ah) and capacity fade (in %). 2. Power (in W) and power fade (in %). 3. Internal resistance (in Ω) and internal resistance increase (in %). 4. Energy round trip efficiency and its fade (in %). 5. An indication of their expected life-time under the conditions for which they have been designed.
January 2026	Batteries shall meet the <u>minimum values to be placed in the EU market</u> (developed by the EC by 2024)

- The criteria for the methodology are tailored on lithium batteries – need to develop coherent methodologies also for other chemistries
- According to the Commission, thresholds will be chemistry-specific: the point is to compare lithium with lithium and lead with lead, not to compare different chemistries

Recycled content (art 8)

Scope: Industrial batteries, electric vehicle batteries and automotive batteries with internal storage and a capacity above 2 kWh

Metals: Lead, cobalt, lithium and nickel

Timeline	Measure
January 2027	<u>Obligation to declare</u> the amount of cobalt, lead, lithium or nickel recovered from waste present in active materials in each battery model and batch per manufacturing plant. Methodology for calculation and verification of recycled content developed by EC by 2025
January 2030	Minimum share: (a) 12% cobalt; (b) 85% lead; (c) 4% lithium; (d) 4% nickel
January 2035	Minimum share: (a) 20% cobalt; (b) 85 % lead; (c) 10% lithium; (d) 12% nickel.

Labelling (art 13, 15-20, Annex 6)

Timeline	Label	Battery
Entry into force	CE marking + label on special risk, use or other danger linked to the use, storage, treatment or transport + identification number of the notified body that has carried out the conformity assessment	Unclear – portable and industrial only?
Entry into force	QR code, including all information below, plus carbon footprint, due diligence, recycled content, EU declaration of conformity, end of life information	All batteries
2027	Unique identifier for each individual battery (battery passport)	industrial batteries and electric vehicle batteries with internal storage and a capacity above 2 kWh
2023	Separate collection (wheeled bin)	All batteries
2023	Chemical symbol for Cd and Pb	Batteries containing more than 0,002 % cadmium or more than 0,004 % lead
2027	Label with 1. the manufacturer's name, registered trade name or trade mark; 2. the battery type, batch or serial number of the battery or other element allowing its unequivocal identification; 3. battery model identifier; 4. date of manufacture; 5. date of placing on the market; 6. chemistry; 7. hazardous substances contained in the battery other than mercury, cadmium or lead; 8. critical raw materials contained in the battery	All batteries
2027	Capacity label	Automotive and rechargeable portable

To be included in the QR code AND as a printed or engraved label on the battery

Labelling & Battery passport (art 64-65)

- By 1 January 2026, the Commission shall set up the electronic exchange system for battery information with the information and data on **rechargeable industrial batteries and electric vehicle batteries with internal storage and a capacity above 2 kWh** as laid down in Annex XIII.
- 3 access levels: public, accredited economic operators and the Commission, Market surveillance authorities
- By 1 January 2026, each industrial battery and electric vehicle battery placed on the market or put into service and whose capacity is higher than 2 kWh shall have an electronic record (“battery passport”).
- The battery passport shall be unique for each individual battery and shall be identified through a unique identifier printed or engraved on the battery.

EUROBAT consideration:

- Duplication? Label + QR code system + battery passport, information is often the same

Due diligence (art 39)

- Obligations on due diligence laid down in Art 39 – extremely detailed!
- **Scope:** rechargeable industrial batteries and electric-vehicle batteries with internal storage and a capacity above 2 kWh
- Raw materials covered by due diligence obligations (listed in Annex 10):
 - (a) cobalt;
 - (b) natural graphite;
 - (c) lithium;
 - (d) nickel;
 - (e) chemical compounds based on the raw materials listed in points (a) to (f) which are necessary for the manufacturing of the active materials of batteries.

EUROBAT considerations:

- Automotive batteries not in the scope
- Lead not included

EUROBAT position

1. **Streamline administrative processes** for industry and national authorities
2. Similar sustainability requirements should also be developed for **products directly competing with electrochemical batteries**, to correctly inform the user and support them in making the most sustainable choice
3. Adjust the **number of secondary acts** to where it is really impactful and propose **adequate timelines** to develop robust methodologies (e.g. on carbon footprint)
4. **Re-assess the numerical targets** once the methodologies have been developed
5. Clarify how the market access criteria on batteries will be tested and enforced, especially for those **batteries imported into the EU**
6. **Make use of the well-established REACH and OSH Regulations** when regulating hazardous substances in batteries and **refrain from creating a new parallel process** in the Batteries Regulation
7. Focus the **scope** of sustainability criteria on “electric vehicle batteries” and “stationary energy storage batteries”
8. Consider the **specificities of each battery technology and application** when developing these sustainability methodologies

EUROBAT position

9. **Standards should be developed by Standardisation Committees**, not by the Commission; hence, we strongly recommend removing Article 16
10. Adopt a **careful approach on recycled content**, assessing the possibility of establishing targets only after a detailed methodology has been adopted
11. **Avoid duplication of labelling and information systems**, and clarify the purpose and audience of the information and information systems
12. EUROBAT supports the **obligation to establish supply chain due diligence policies**
13. Clarify unequivocally which actor must be considered as the producer in view of the application of the **extended producer responsibility**
14. Include a **grandfather clause** to avoid the retroactive application of the regulation

Full position paper available [here](#)

EUROBAT advocacy plan – lobbying activities

Network of contacts with Commission, Parliament and Council already developed in the past 2 years, and supported by Charge The Future

January-February 2021:

- 2 joint meeting with Commission officials in charge of the proposal
- Meetings with 26 permanent representations
- Meetings with 15 members of the European Parliament
- Regular exchange with other Brussels-based stakeholders and associations

Meetings will take place with all relevant legislators and stakeholders in the course of 2021 and 2022. When possible/relevant, EUROBAT members directly involved in the meetings/site visits.

11 March: EUROBAT webinar to discuss the proposal

- Keynote speech of EUROBAT President and the Portuguese presidency
- Presentation on the battery market from C. Pillot (Avicenne)
- Panel discussion with 2 EUROBAT members, OEM and one member of the European Parliament

Thank You

For more information
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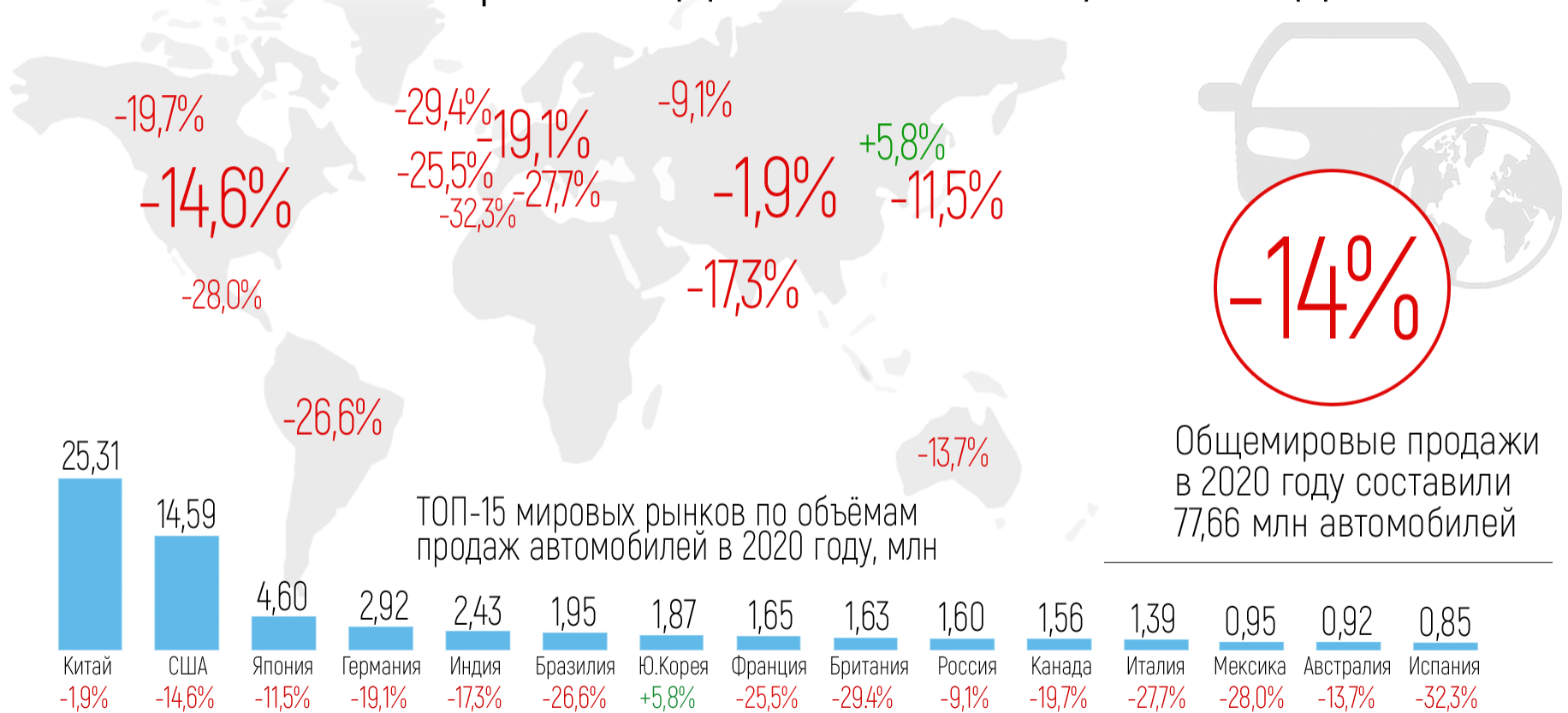


ОБЗОР АВТОМОБИЛЬНОГО РЫНКА

основные тренды и сценарии развития

Сергей ЦЕЛИКОВ, директор

Глобальный авторынок. Динамика 2020/2019 годов



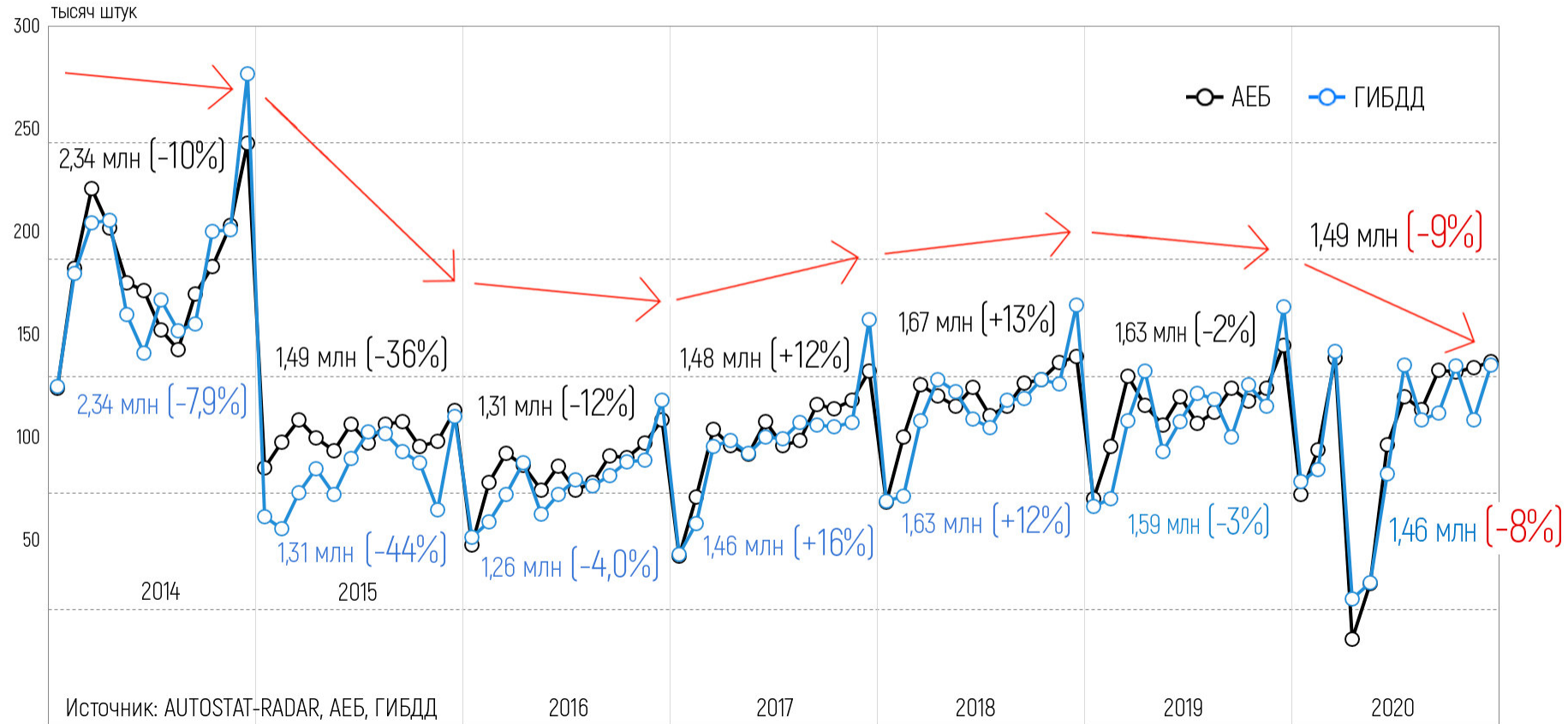
Автомобильный рынок России по сегментам

	продажи						тысяч штук	
	2015	2016	2017	2018	2019	2020	20/19	
РС ЛЕГКОВЫЕ	1 494	1 314	1 476	1 672	1 632	1 487	-9%	↓
LCV ЛЁГКИЕ КОММЕРЧЕСКИЕ	93	93	109	112	112	104	-7%	↓
CV СРЕДНЕТОННАЖНЫЕ ГРУЗОВЫЕ	18	17	19	20	19	18	-9%	↓
HCV КРУПНОТОННАЖНЫЕ ГРУЗОВЫЕ	33	36	61	62	61	57	-7%	↓
BUS АВТОБУСЫ	9	10	12	13	14	13	-7%	↓
ИТОГО	1 647	1 470	1 677	1 879	1 839	1 679	-9%	↓

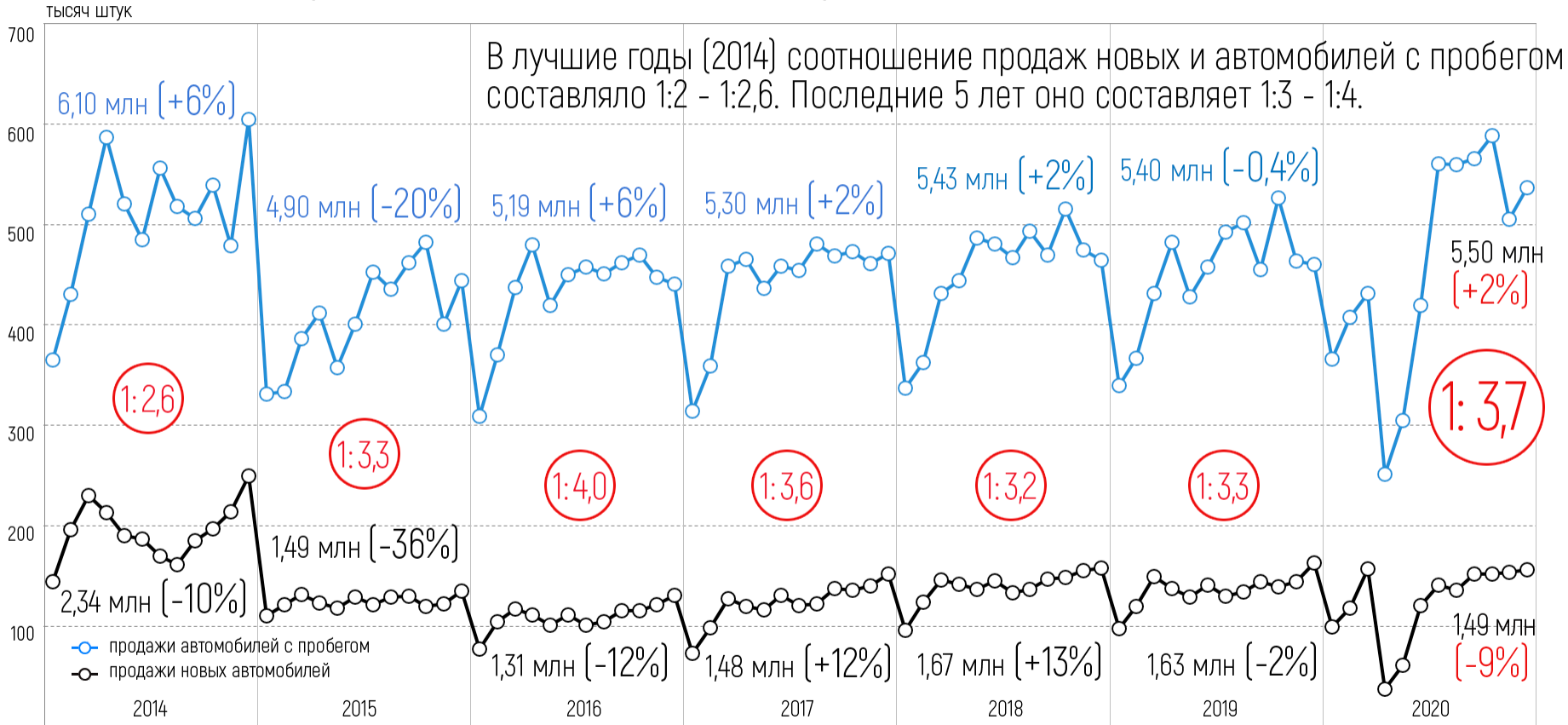
Источник: АЕБ, АВТОСТАТ

По результатам 2020 года продажи всех типов транспортных средств снизились. Самый большое снижение показали сегменты РС [-9%] и CV [-9%].

Российский автомобильный рынок. Динамика продаж

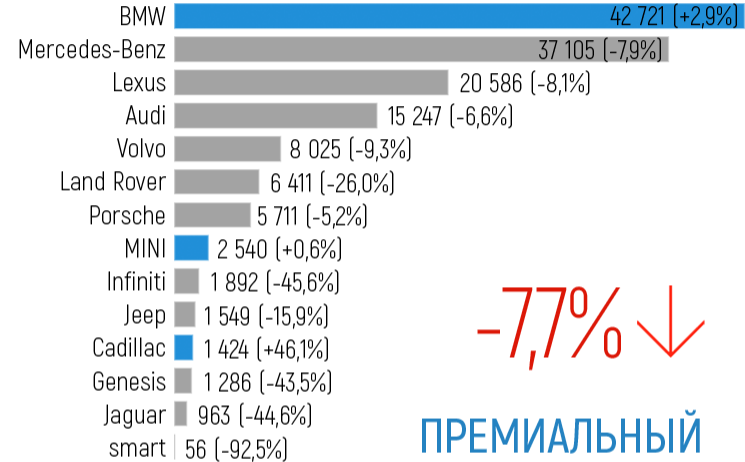
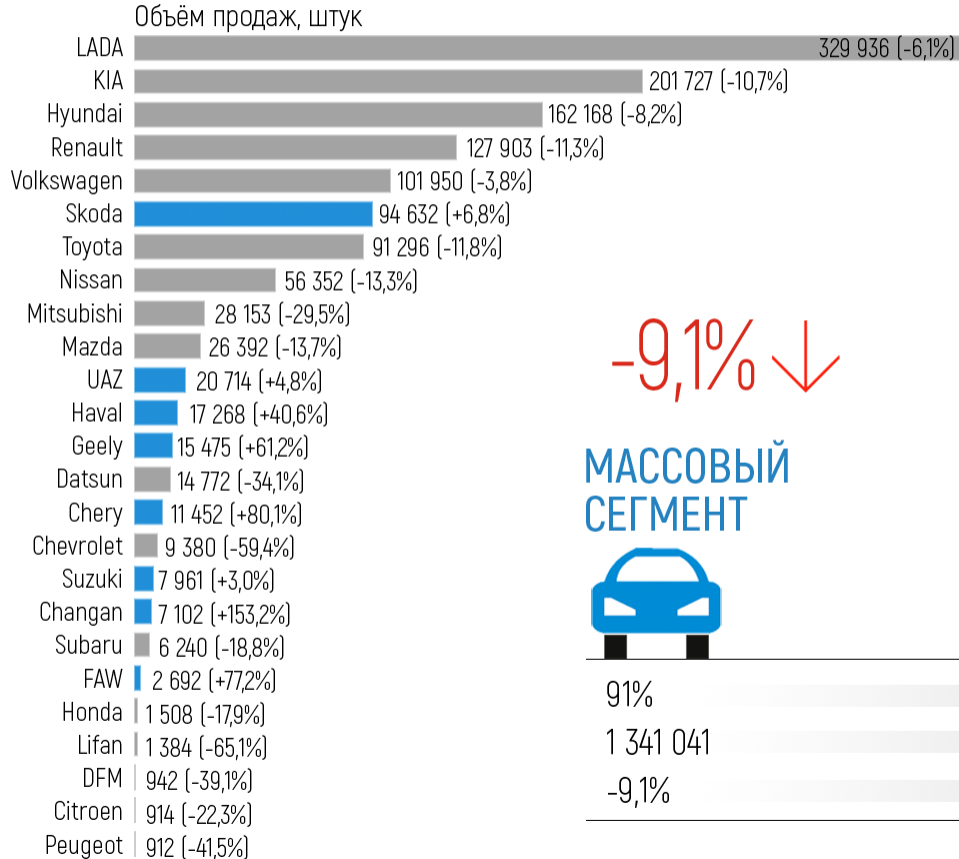


Российский рынок автомобилей с пробегом. Динамика



Источник: AUTOSTAT-RADAR, АЕБ

Новые легковые автомобили. Структура рынка по сегментам



2020 год		
91%	доля, %	9%
1 341 041	объём продаж, шт.	145 516
-9,1%	динамика, %	-7,7%

Источник: AUTOSTAT-RADAR, данные за 2020 год

Структура автомобильного рынка России по классам в 2020 году

A 5 | 2,4 тыс. | 0,2%

B 20 | 558,9 тыс. | 37,6%

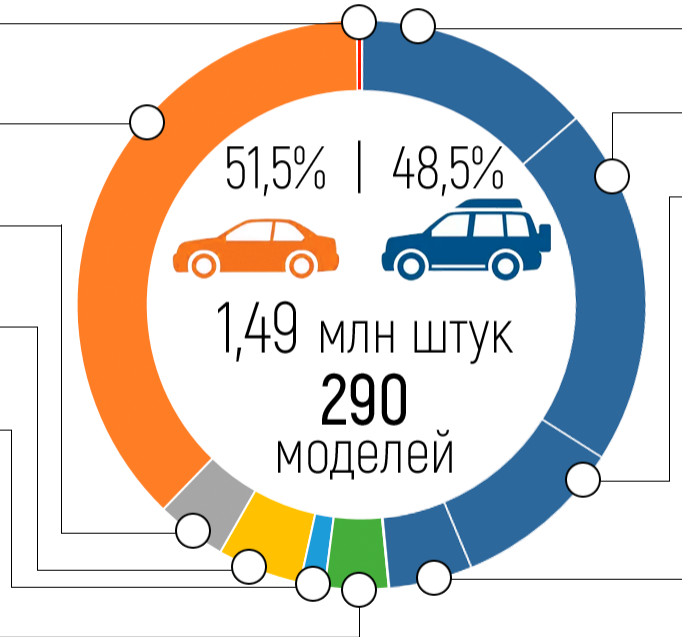
C 23 | 59,6 тыс. | 4,0%

D 25 | 71,3 тыс. | 4,8%

E/F 26 | 20,7 тыс. | 1,4%

ОСТАЛЬНЫЕ

LAV/MPV 7 | 39,6 тыс. | 2,7% ■ PickUp 8 | 8,8 тыс. | 0,6% ■ Coupe/Cabriolet 25 | 4,5 тыс. | 0,3%



SUV B 24 | 204,9 тыс. | 13,8%

SUV C 51 | 316,3 тыс. | 21,3%

SUV D 37 | 131,5 тыс. | 8,8%

SUV E 39 | 68,1 тыс. | 4,6%

ВСЕГО SUV:
151 | 720,8 тыс. | 48,5%

Сегмент SUV вырос до 48,5% рынка

сегмент	модели	2019	2020	20/19	доля	модели / лидеры сегмента
SUV (B)	24	208 356	204 886	-2%	28%	Hyundai Creta Renault Duster LADA 4x4
SUV (C)	51	317 334	316 270	0%	42%	Toyota RAV4 Volkswagen Tiguan KIA Sportage
SUV (D)	37	152 851	131 526	-14%	20%	Skoda Kodiaq UAZ Patriot Toyota LC Prado
SUV (E)	39	72 334	68 113	-6%	10%	BMW X5 Mercedes GLE/Coupe BMW X6
ВСЕГО	151	750 875	720 795	-4%	100%	



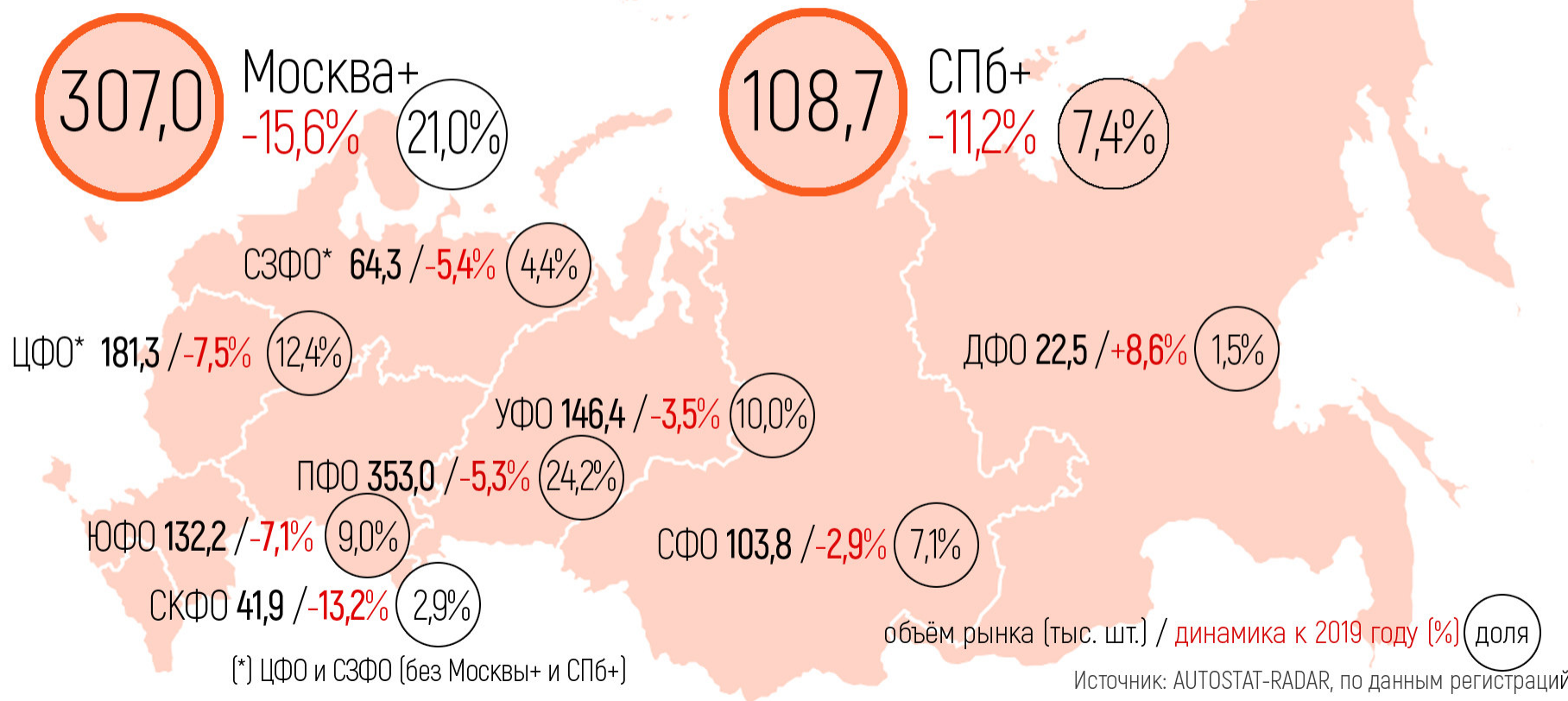
МАССОВЫЙ → 86%

ПРЕМИУМ → 14%

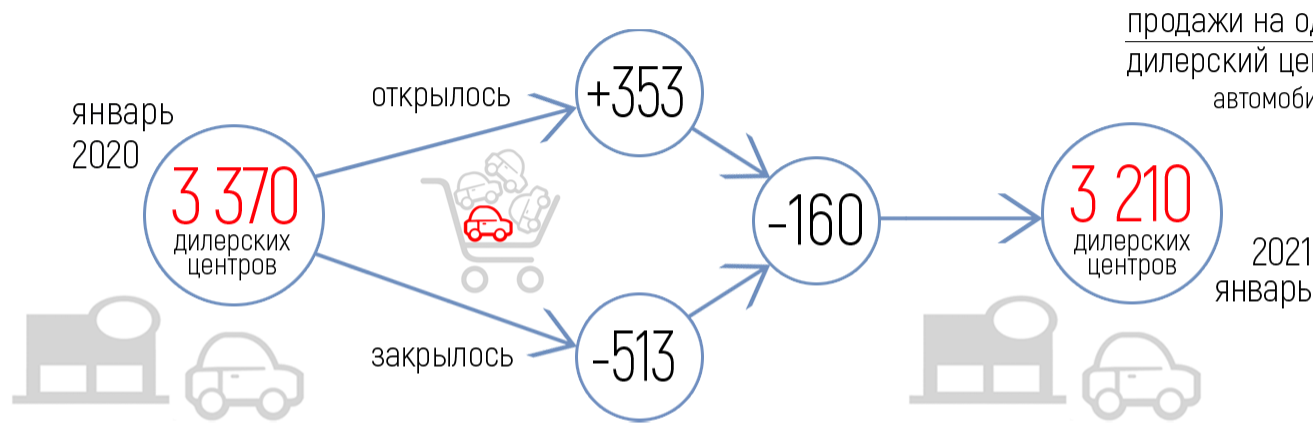
4 WD → 68%

2 WD → 32%

Региональная структура рынка новых легковых автомобилей



Дилерские сети легковых автомобилей в 2020 году




продажи на один
дилерский центр,
автомобилей


	2019	2020
массовый	523	498
премиальный	286	283
всего	484	463

на российском рынке
представлено **56** марок


самые большие дилерские сети

LADA	299	
KIA	199	
Hyundai	190	
Renault	152	
Volkswagen	128	

самый большой рост

Chery	+34	
Changan	+34	
Geely	+20	
Haval	+18	
FAW	+18	

самое большое сокращение

Chevrolet (Niva)	-122	
Hawtai	-38	
Lifan	-35	
Ravon	-31	
Datsun	-23	

Источник: АВТОСТАТ, данные за 2020 год

Продажи новых автомобилей на 1000 жителей по федеральным округам

48
10 / 38

средние продажи
на 1000 жителей
по России
(новые/с пробегом)



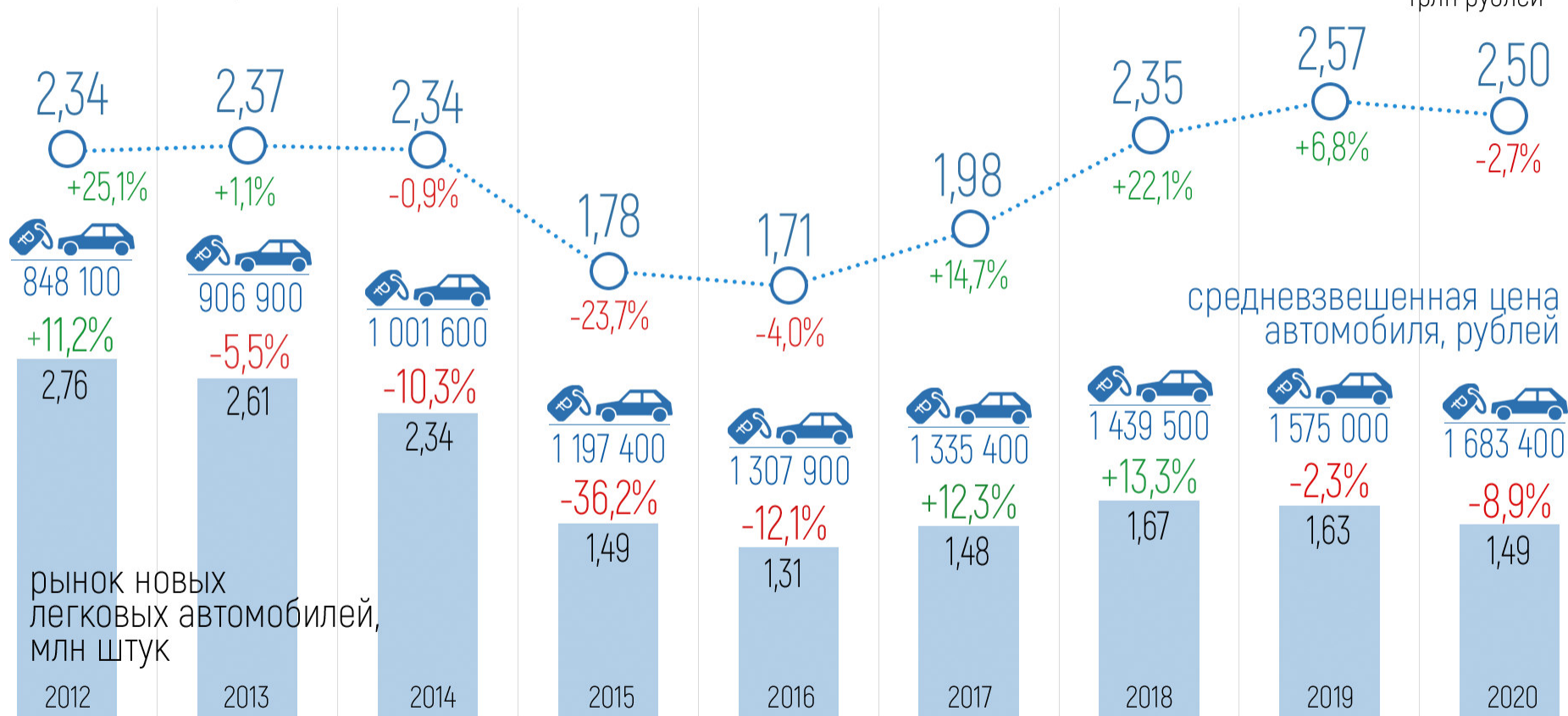
округ	население млн чел.	продажи автомобилей, тыс. штук			
		новые	20/19	с пробегом	20/19
Москва	12,7	196,4	-17%	270,0	0%
СПб	5,4	86,2	-10%	156,9	+4%
ПФО	29,3	353,0	-5%	1 080,9	+4%
ЦФО*	12,4	291,8	-9%	1 048,8	0%
СФО	26,8	103,8	-3%	764,7	+2%
ЮФО	8,6	132,2	-7%	571,6	0%
УФО	14,1	146,4	-3%	506,5	+2%
СЗФО*	17,1	86,9	-8%	340,5	+1%
ДФО	9,9	22,5	+9%	392,6	+5%
СКФО	8,2	41,9	-13%	363,8	-1%
ИТОГО	144,4	1 461,0	-8%	5 496,5	+2%

* без учёта Москвы

** без учёта Санкт-Петербурга

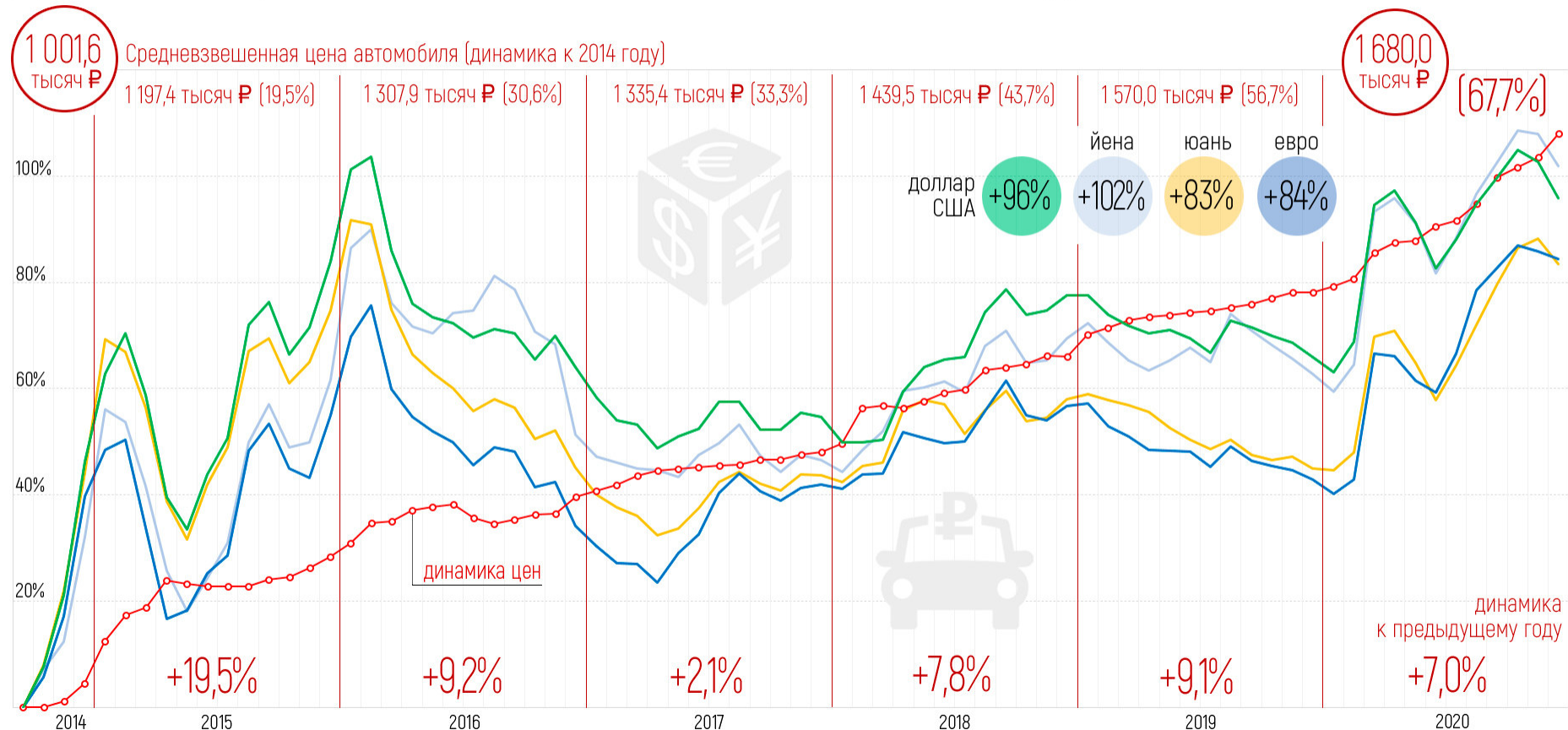
Ёмкость рынка легковых автомобилей в России

трлн рублей



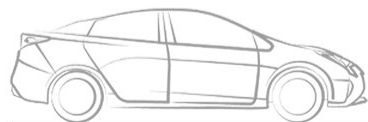
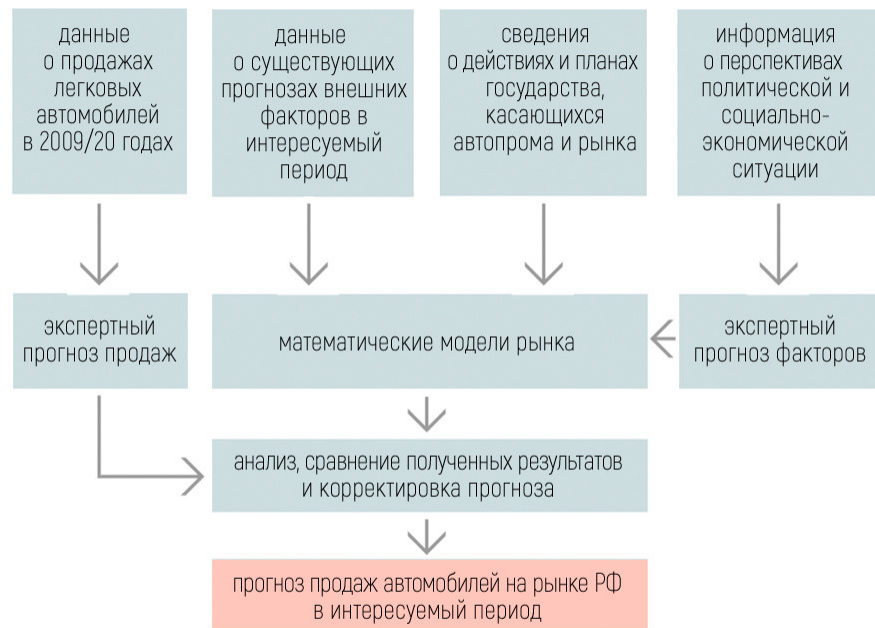
Источник: оценка АВТОСТАТ, по данным за 2020 год

Динамика цен новых легковых автомобилей и курсов валют



Источник: данные по ценам - АВТОСТАТ, динамика курсов валют к рублю - ЦБ РФ, данные за 2020 год

Методология прогнозирования автомобильного рынка



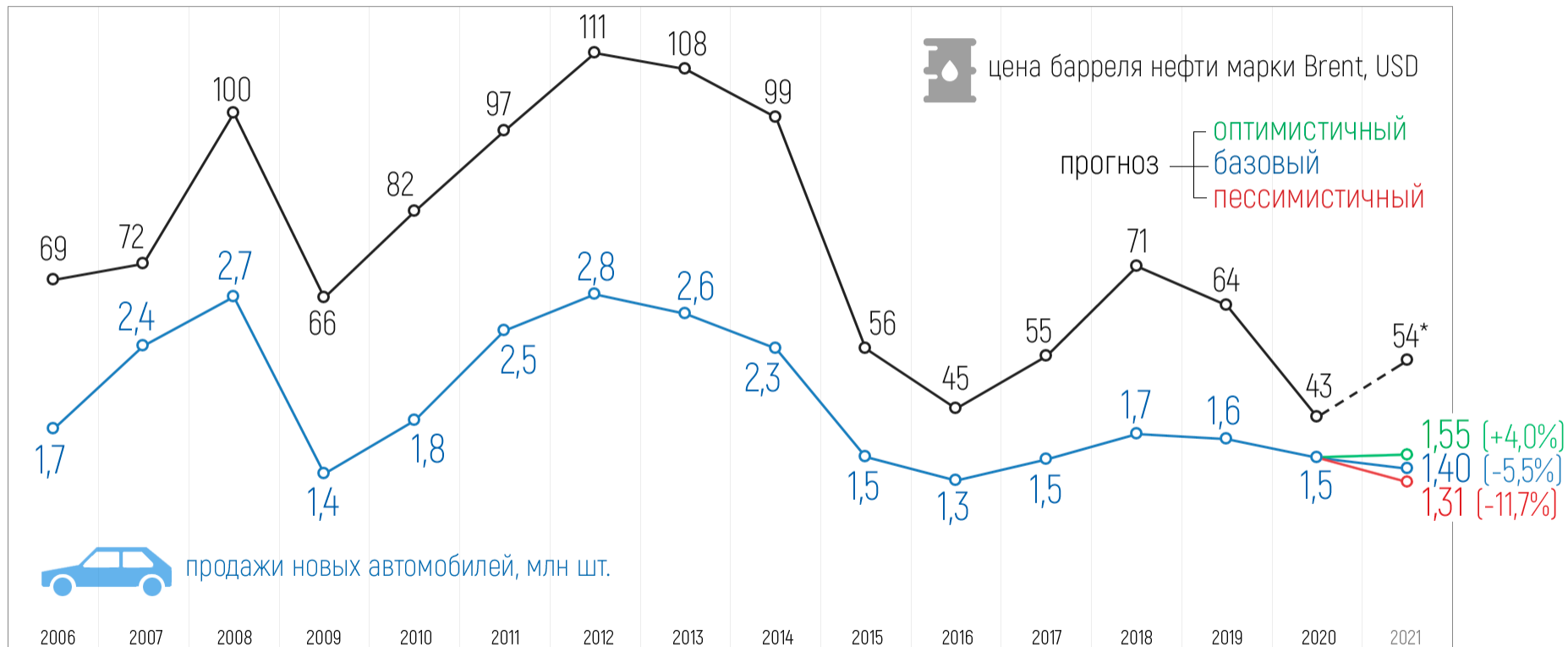
① Математические методы и модели

② Экспертные оценки

Примеры корреляции факторов, влияющих на рынок автомобилей, с объёмом продаж

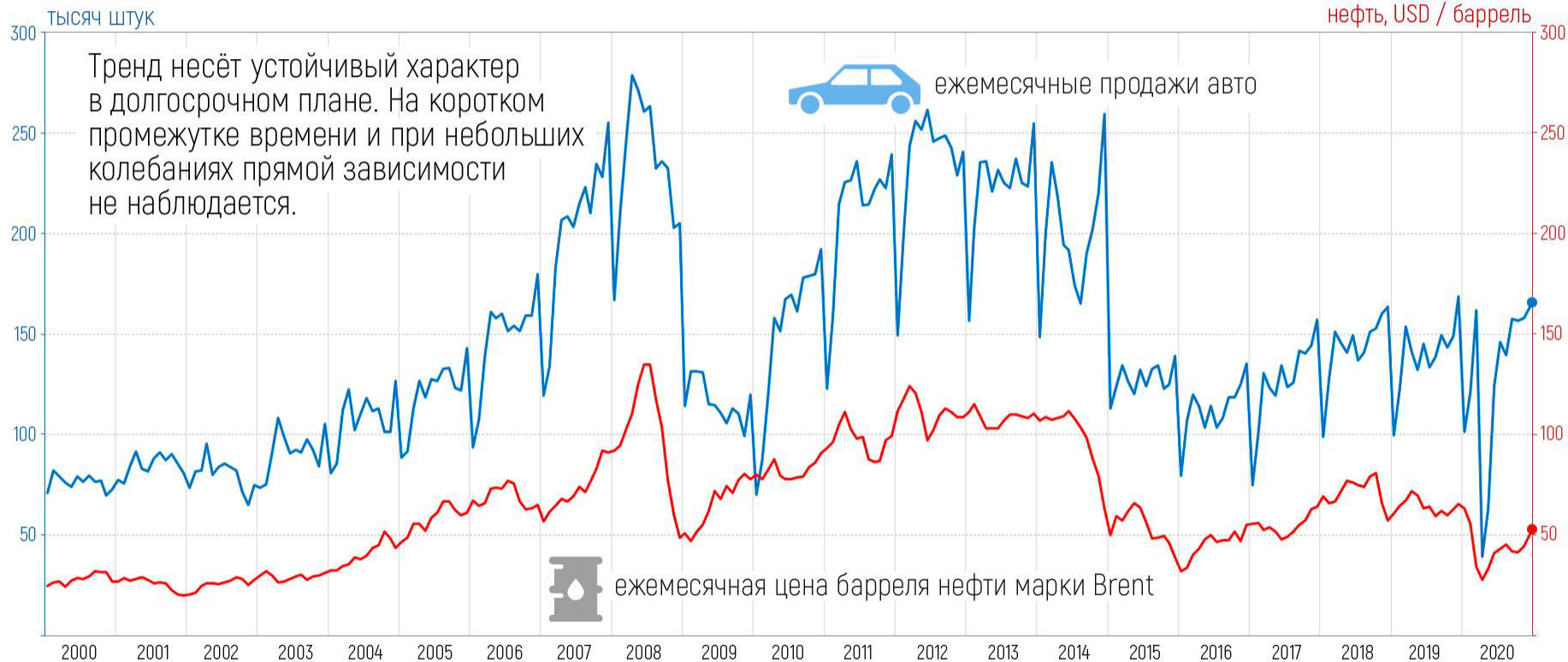
ф а к т о р	размерность показателя	коэффициент корреляции фактора с годовым объёмом продаж новых автомобилей [период 2009/20]
Среднегодовая цена нефти марки Brent	долл. США/баррель	0,97
Годовой объём экспорта	млрд долл. США	0,9
Индекс оборота розничной торговли	%	0,7
Средневзвешенная годовая цена автомобиля	тысяч рублей	0,5
Соотношение средневзвешенной цены автомобиля и среднемесячной начисленной зарплаты	тыс. рублей/тыс. рублей	-0,8

Прогноз рынка новых легковых автомобилей на 2021 год






Источник: Яндекс, АВТОСТАТ, (*) прогноз АВТОСТАТ

Корреляция цен на нефть и продаж автомобилей сохраняется



Источник: Яндекс, АВТОСТАТ

Спрос на автомобили в зависимости от доходов населения

	4% богатые	«олигархи» очень богатые богатые	<ul style="list-style-type: none"> ○ Дорогие новые иномарки для себя ○ Иномарки «попроще» в качестве 2-3 автомобиля «в семью» ○ Подержанные (3-5 лет) иномарки люксовых брендов в хорошем состоянии 	<div> <div>↓</div> <div>население</div> <div>20%</div> <div>80%</div> <div>↑</div> <div>потребление</div> </div>
	36% средний класс	хорошо обеспеченные обеспеченные чуть ниже среднего	<ul style="list-style-type: none"> ○ Новые иномарки среднего класса ○ Новые «бюджетные» иномарки ○ Подержанные (3-7 лет) в хорошем состоянии ○ Новые отечественные автомобили ○ Подержанные российские (3-7 лет) и иномарки (5-10 лет) 	
	60% бедные	мало обеспеченные бедные нищие	<ul style="list-style-type: none"> ○ Подержанные российские (от 7 лет) и иномарки (от 10 лет) ○ Автохлам (стоимостью до 100 тыс. руб.) ... общественный транспорт ... 	

Источник: Росстат, оценка АВТОСТАТ



ПРОГНОЗ

РОССИЙСКОГО РЫНКА НОВЫХ ЛЕГКОВЫХ АВТОМОБИЛЕЙ НА 2021 ГОД

(ЕЖЕМЕСЯЧНЫЙ МОНИТОРИНГ)

Главной отличительной особенностью отчета является **ежемесячный мониторинг** ситуации в экономике и на авторынке, **анализ** реальных показателей и **оценка** соответствия их сценариям прогноза.





СПАСИБО ЗА ВНИМАНИЕ!

Сергей ЦЕЛИКОВ
директор

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e-mail: lol@autostat.ru

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

Togliatti. March 18th, 2021

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

DMITRY KOZYLBASHEV

**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



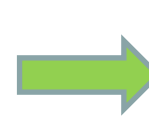
2016



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%

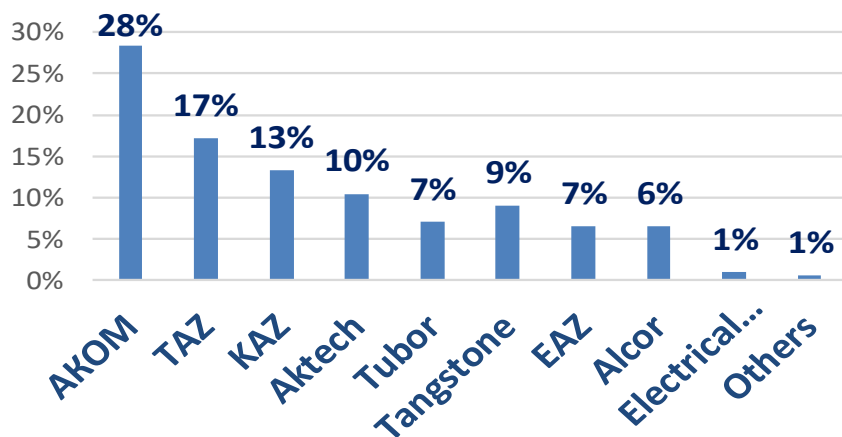


Export

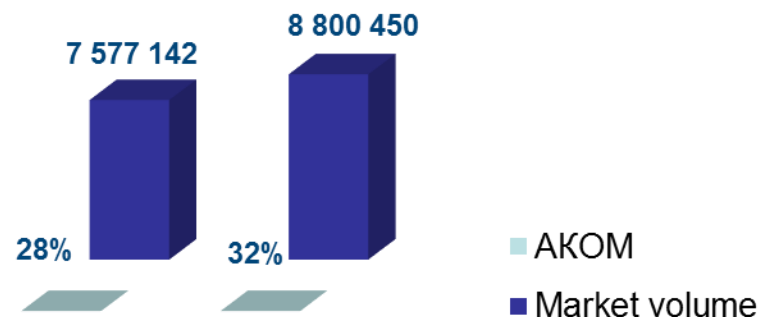
Export Share –
66,6%

AM OVERVIEW

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

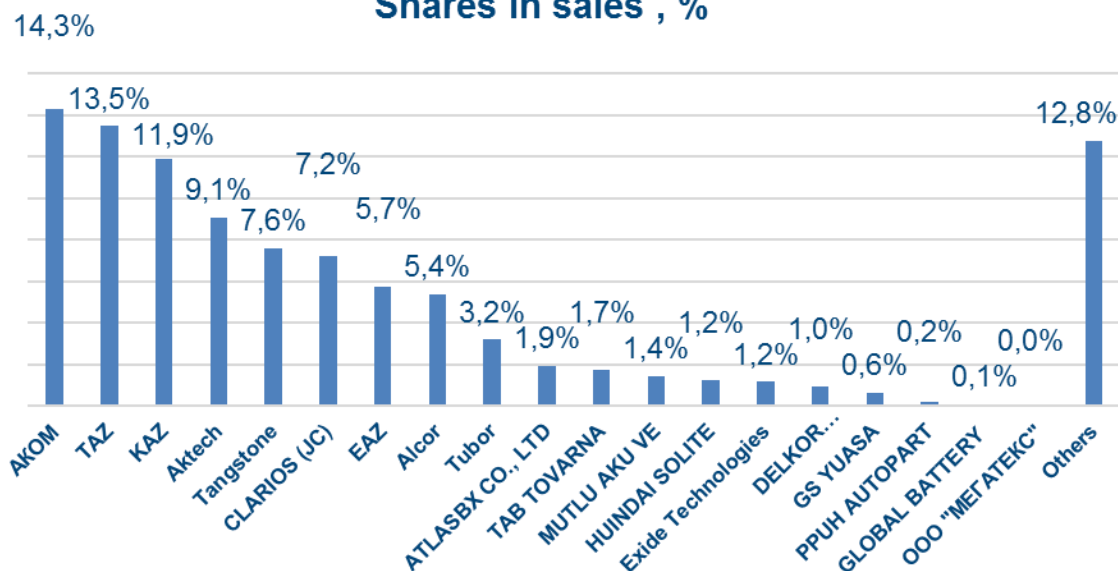


AKOM share in a production in 2020 & forecast 2021

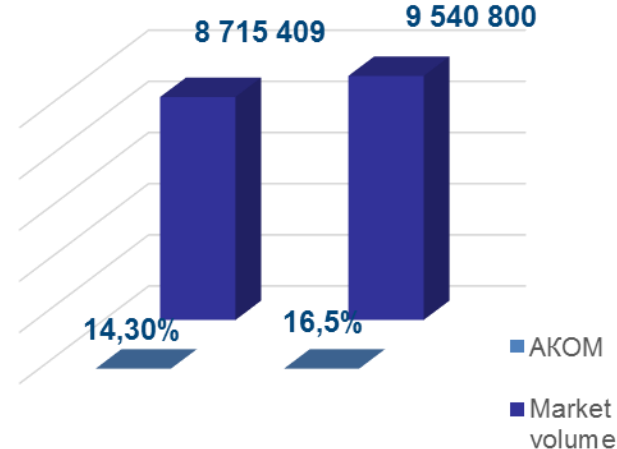


Market capacity in 2020 is 8 715 409 - 6,2% VS 2019

Shares in sales , %

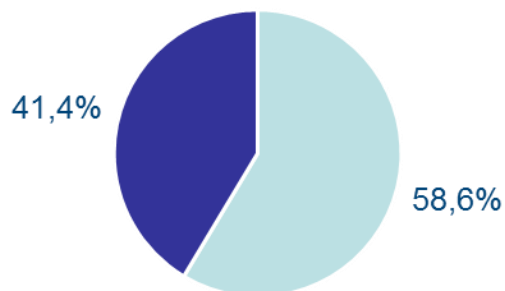


AKOM share in sales & forecast, %



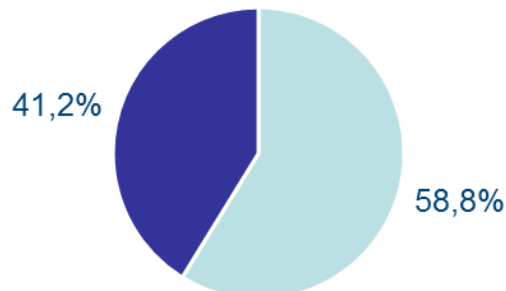
OEM OVERVIEW (CKD)

2020



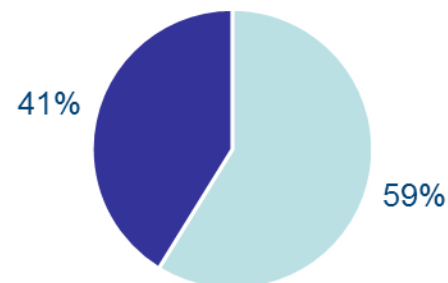
AKOM Others

2021



AKOM Others

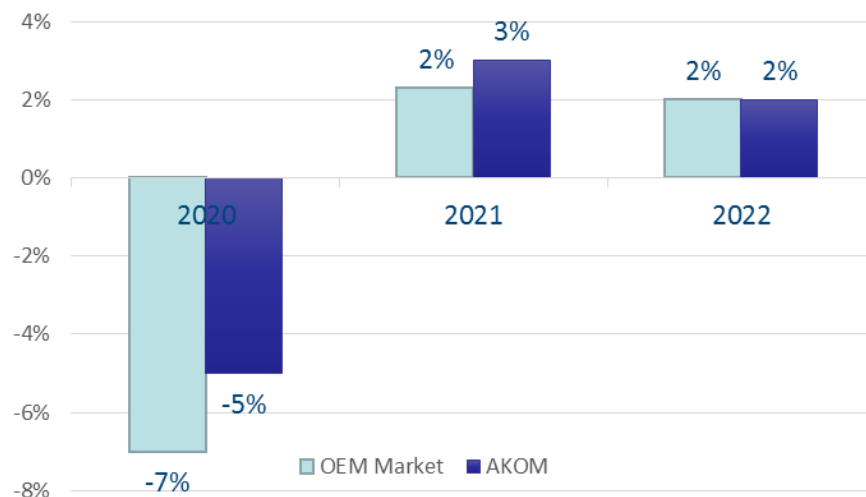
2022



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

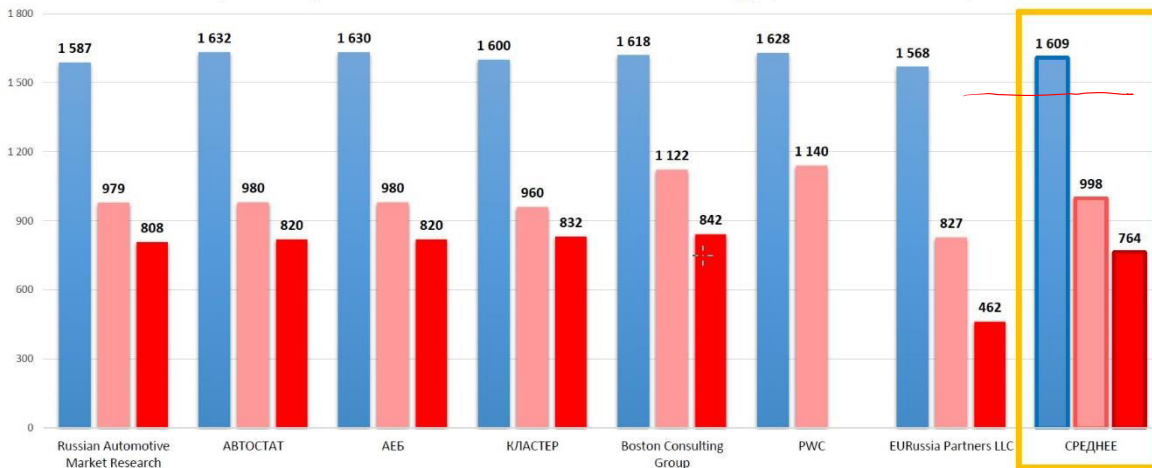
- Energy converter with top level BMS system
- TESVOLT BMS system with charge/discharge and condition monitoring, temperature control
- Battery modules with Samsung prismatic NMC Li-ion cells
- Software technical complex for control of accumulation/tractive supply schedule of locomotives

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

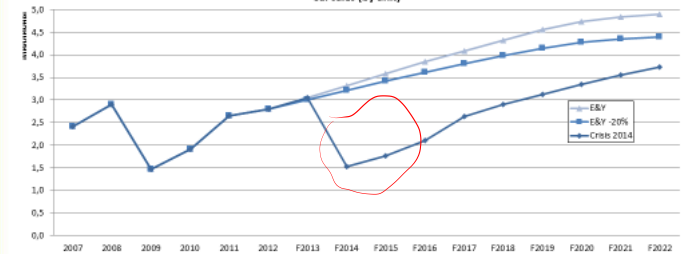
- 31.08.2020 - ESS simulation at the actual schedule of Kuybyshevskaya Railway traffic
- 09.09.2020 - feasibility study
- November, 2021 - development and manufacture of the first prototype

?

PAST FORECAST ANALYSIS



Forecast of Russian vehicle sales based on different market scenarios
Cars sales (by unit)

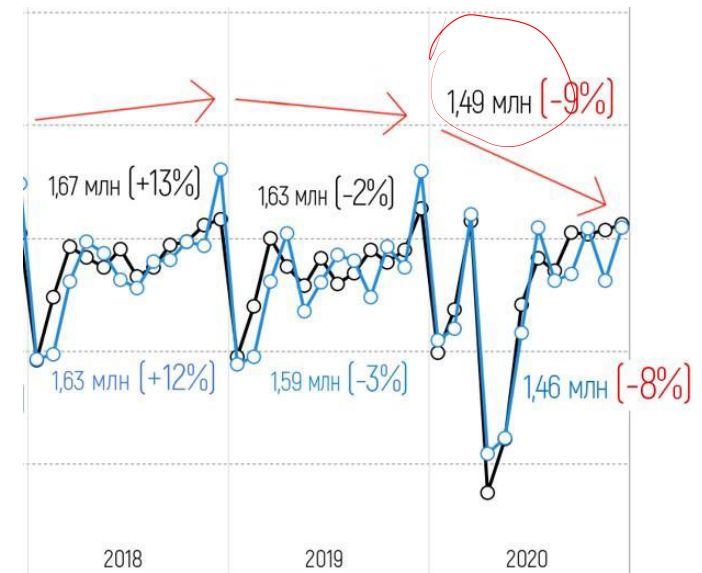
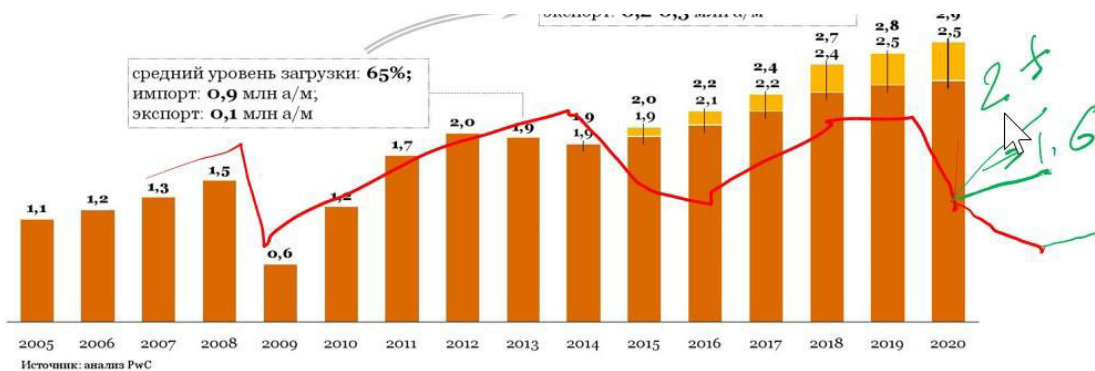


3 Market scenarios

- 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

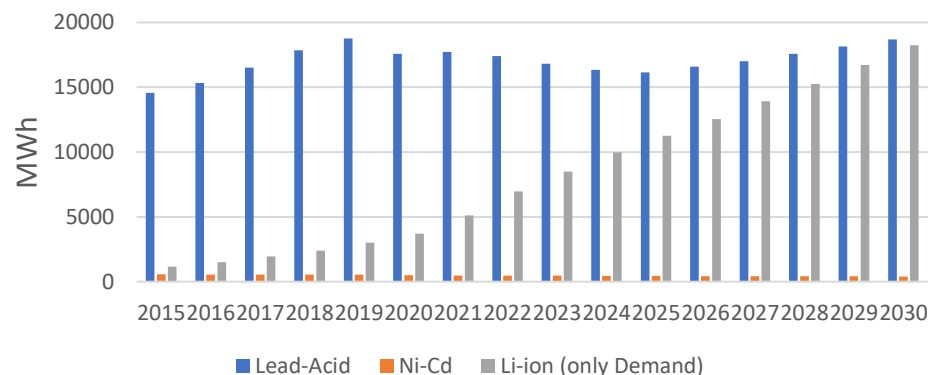


www.autostat.ru

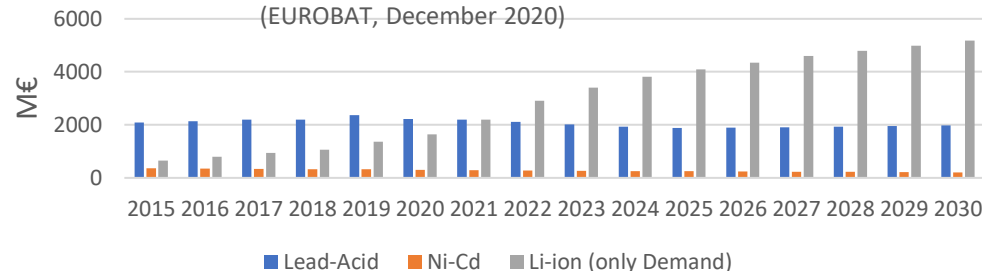
FORECAST FROM THE LEADER

- 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 ?

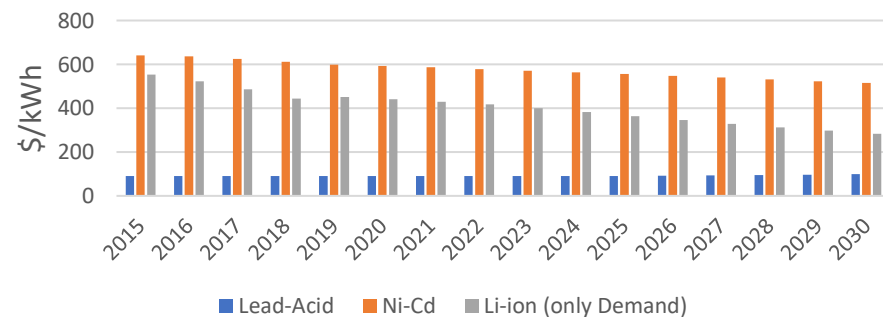
EU motive&stationary battery demand and supply, MWh
(EUROBAT, December 2020)



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



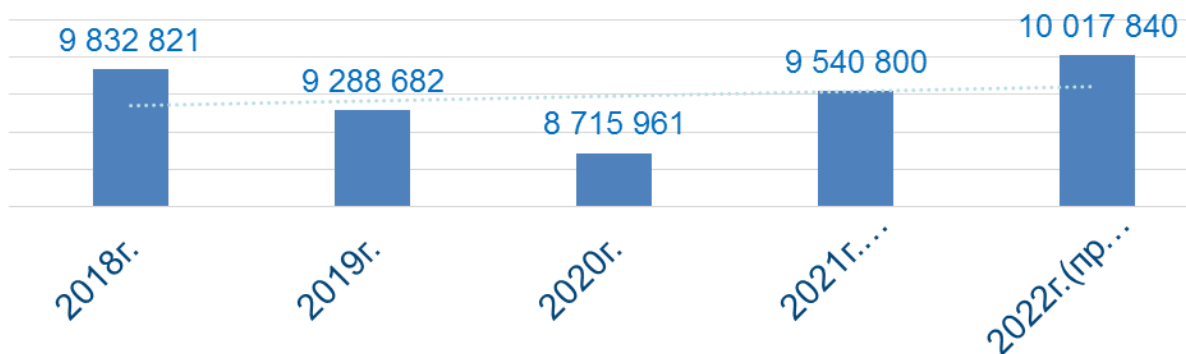
EU motive&stationary battery demand and supply, \$/kWh
(EUROBAT, December 2020)



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!

Date
Company: Group of Companies AKOM
Address: _____
Cell Phone +79178246279
WEB: WWW.AKOM.RU
Speaker
Ph.: _____
E-mail: kozhilbashevdi@akom.su

**Третья международная
научно-техническая конференция
«Battery Innovation 2021»**

г. о. Тольятти, 18 марта 2021 г.

**«РЕШЕНИЕ ВОПРОСОВ ИМПОРТОЗАМЕЩЕНИЯ,
СОВРЕМЕННЫЕ ТЕХНОЛОГИИ И ИННОВАЦИИ
В ПРОИЗВОДСТВЕ АКБ
на АО «ТЮМЕНСКИЙ АККУМУЛЯТОРНЫЙ ЗАВОД»**

**Толмачёв
Олег Дмитриевич**

И.О. Главного инженера
АО «Тюменский аккумуляторный завод»

ООО «ЭКОРЕСУРС»



Линия механизированной разделки аккумуляторного лома



Готовая продукция
(свинец и свинцовые сплавы)



Роторная короткобарабанная печь ПРКС-12

Линия для производства РЕ сепаратора из ультравысокомолекулярного полиэтилена для всех типов свинцово-кислотных АКБ



Линия для производства сепарации из абсорбирующего стекловолокна для всех типов свинцово-кислотных АКБ изготавливаемых по технологии «AGM» (AbsorbentGlass Matt)



ООО «РАСАВИТ»



ООО «Аккумуляторные моноблоки»



Приготовление расширителя и флюса для пайки

Сухой расширитель марки «ДЕ-12» предназначен для использования в качестве добавки в отрицательную пасту при производстве свинцово-кислотных аккумуляторов

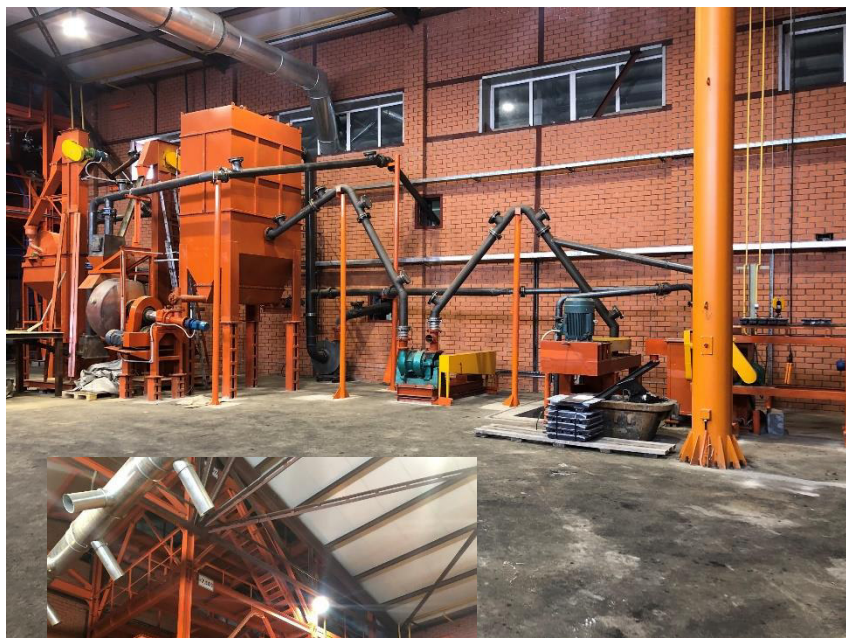


Показатель	Значение
Внешний вид	Порошок черного цвета
Насыпная масса, г/см ³ , не более	700
Влажность, % не более	3
Ph водной суспензии	10 ± 0,05
Массовая доля железа (Fe), % не более	0,02
Массовая доля хлор-ионов (Cl-), % не более	0,01
Содержание золы, %	57 - 61

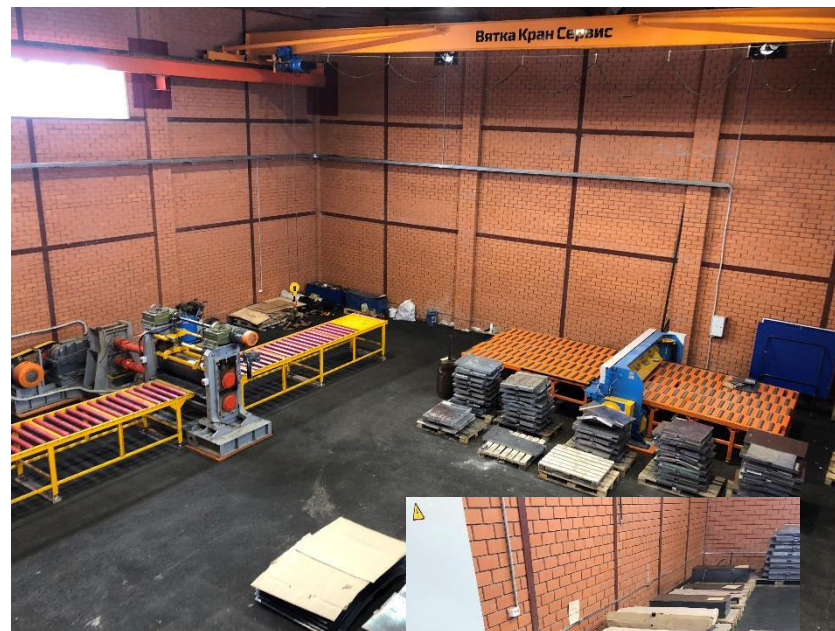
Флюс марки FTA-12 обеспечивает защиту от окисления очищенных перед пайкой металлов и способствует лучшему растеканию припоя при пайке.



Комплекс по производству свинцового сурика



Установка по производству свинцового проката

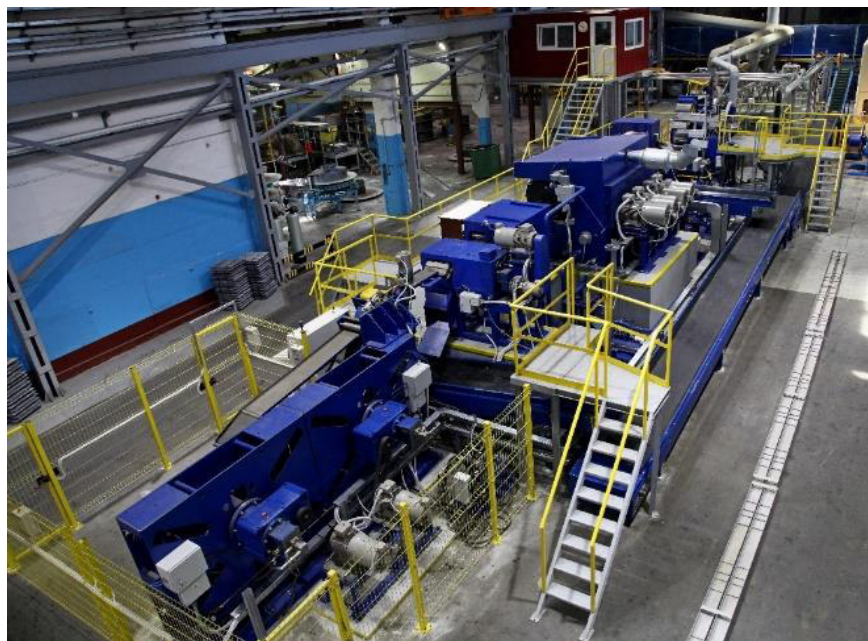


Производство токоотводов методом штамповки «Continius Properzi» + «Samdo»



Линия непрерывного литья и
проката свинцовой ленты
«Continius Properzi»(Италия)

Автоматизированная линия
штамповки «Samdo» (Корея)

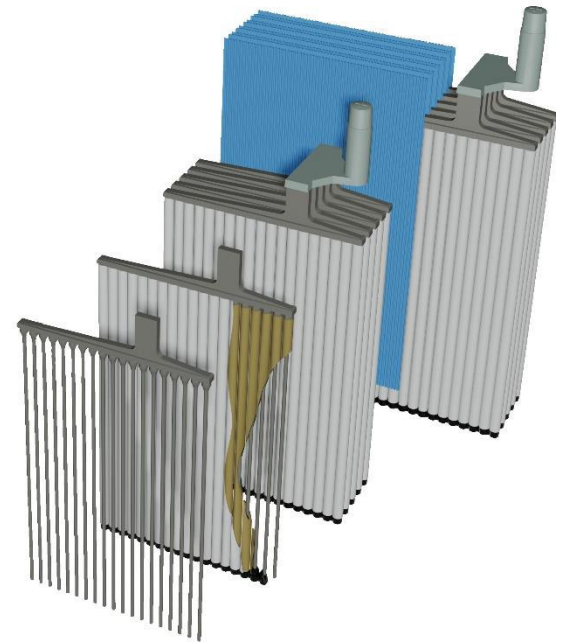


Производство электродов панцирного типа для промышленных АКБ

Установка по изготовлению электродов панцирного типа «HADI Accumaschinen» (Австрия)



Электрод панцирного типа



БЛАГОДАРЮ ЗА ВНИМАНИЕ!

Контактные данные

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Телефон: 8 (3452) 43-49-58

Сайта: www.tyumen-battery.ru

Докладчик

Телефон: 8 (3452) 43-46-53

E-mail: olegtolm@mail.ru

**Third Annual International Science and
Technology Conference
"Battery Innovation-2021"**

Togliatty, March 18, 2021.

**MICROPOROUS TECHNICAL SOLUTIONS
DIVYA TIWARI**

**TECHNICAL MANAGER
MICROPOROUS LLC**

OUTLINE

- MICROPOROUS R&D ROADMAP
- VRLA
 - GLASSFORCE® AGM
- FLOODED & EFB
 - CELLFORCE® ULR
 - MAXIWIK™

MICROPOROUS R&D ROADMAP



Source Consortium for Battery
Innovation (2020)

GLASSFORCE® AGM

IG

- PowerSports, Motorcycles, E-mobility
- BET Surface Area: 0.9 – 1.3 m²/g; 160 – 420 g/m²

GE

- Automotive, Start-Stop, Heavy-duty Trucks
- BET Surface Area: 1.3 – 1.6 m²/g; 160 – 420 g/m²

EB

- Energy Storage, Telecom, Premium Products, Aviation
- BET Surface Area: 1.6 – 2.2 m²/g; 160 – 420 g/m²

AUTOMOTIVE AND STATIONARY APPLICATIONS



Cars



Other Automotive



UPS



Telecom



ESS



AUTOMOTIVE
GlassForce™ IG



AUTOMOTIVE
GlassForce™ GE



STATIONARY & SPECIALTY
GlassForce™ EB

QUALITY CONTROL THROUGH VERTICAL INTEGRATION

SAND

- Low Impurity Raw Materials
- C - Glass Chemistry

FIBERS

- Rotary Fibers (2.6 – 4.5 μm)
- Flame Attenuated Fibers (0.1 – 1.5 μm)

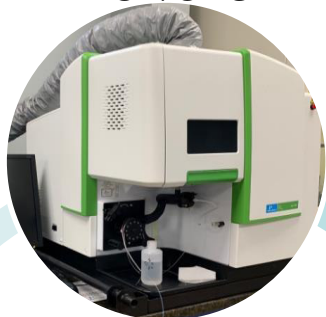
AGM

- Flotation Drying
- Inline or Offline Slitting
- Winding Thickness Control

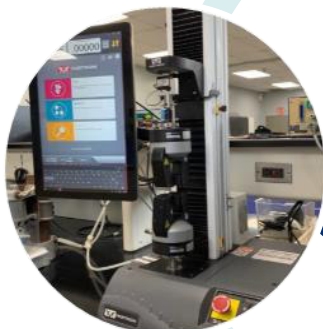


BCI COMPLIANCE & QUALITY ASSURANCE

PERKIN ELMER
ICP/OES



INSTRON
3343



MICROMERITICS
GEMINI BET



**ADVANCED
ANALYTICAL
LAB**

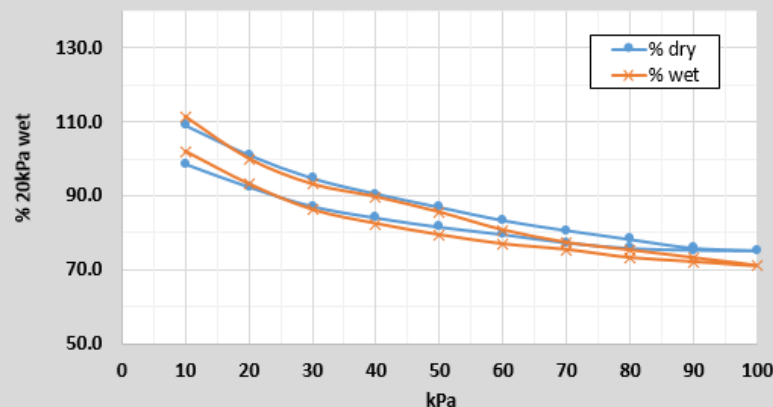


PROGAGE200

GlassForce® G-250FZ AGM Separator Certificate of Analysis				
Specification	Unit	Target Value	Tested Value	Test Method
Specific surface Area	m ² /g	1.45 ± 0.15	1.42	BCI 3A
Overall Thickness	mm (@ 20 kPa)	1.45 ± .07	1.40	BCI 3A
Grammage	g/m ²	254 ± 12	254	BCI 3A
Roll Width	mm	160 ± 1	160.0	--
Bulk Density	g/mm	170 ± 17	181	T-500
Tensile strength, MD	N/mm ²	> 0.40	0.55	BCI 3A
Elongation, MD	%	3	5	BCI 3A
Tensile Strength, CD	N/mm ²	> 0.15	0.31	BCI 3A
Elongation, CD	%	5	7	BCI 3A
Maximum pore size	µm	< 20	19.7	BCI 3A
Capillary Rise	mm/min	> 40	56	BCI 3A
Acid Absorption under 20 kPa	g/g	> 6	6.35	BCI 3A
LOI	%	< 1	0.35	BCI 3A
Moisture	%	< 0.5	0.1	BCI 3A
Al (Aluminum)	ppm	< 500	130	BCI 3A
Fe (Iron)	ppm	< 100	32	BCI 3A
Cl (Chloride)	ppm	< 50	6	BCI 3B
Cr (Chromium)	ppm	< 5	1	BCI 3A
Ni (Nickel)	ppm	< 2	< 1	BCI 3A
Cu (Copper)	ppm	< 10	< 1	BCI 3A
Mn (Manganese)	ppm	< 5	< 1	BCI 3A
Zn (Zinc)	ppm	< 100	3	BCI 3A

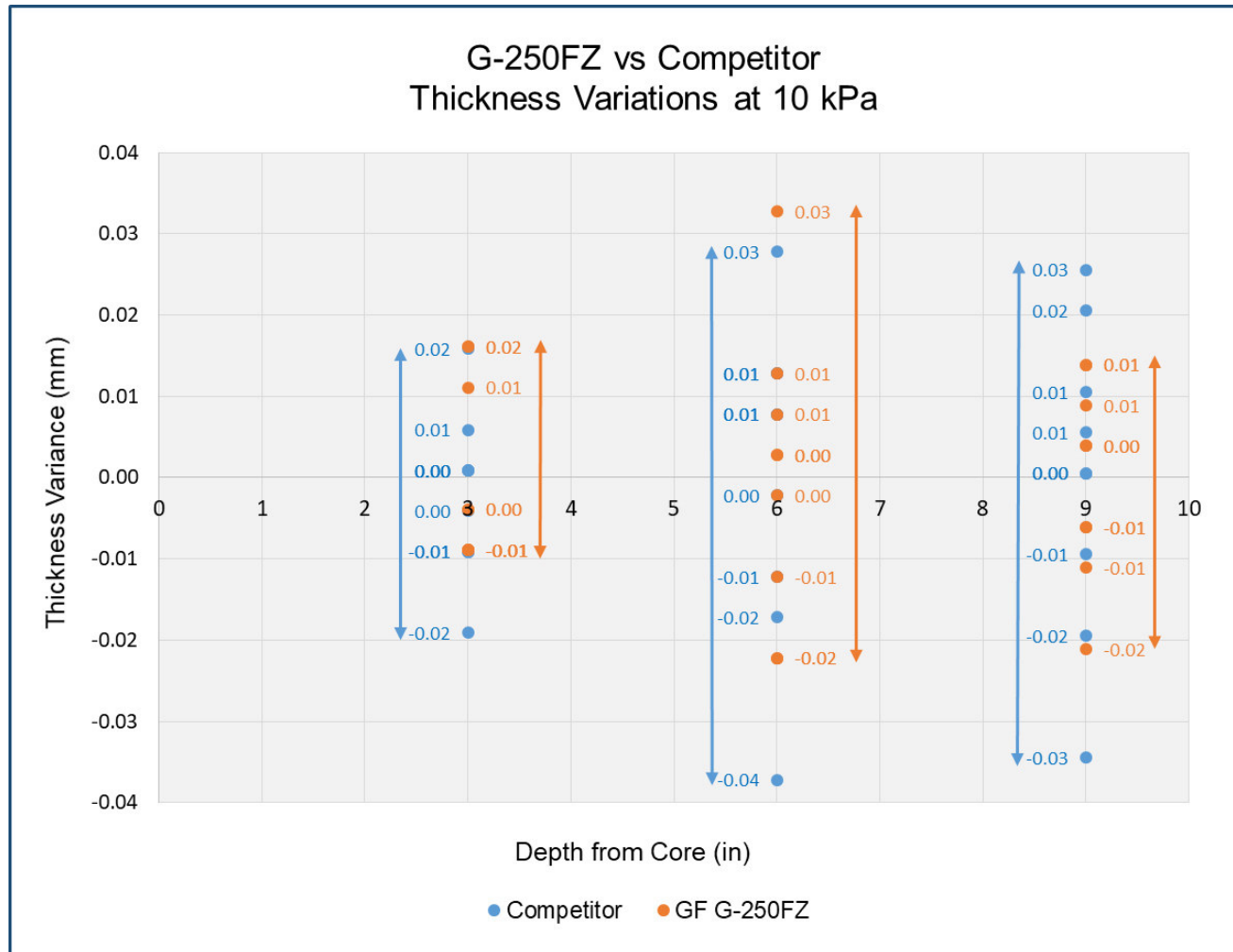
Compression Curves

Relative thickness standardized @ 20kPa wet



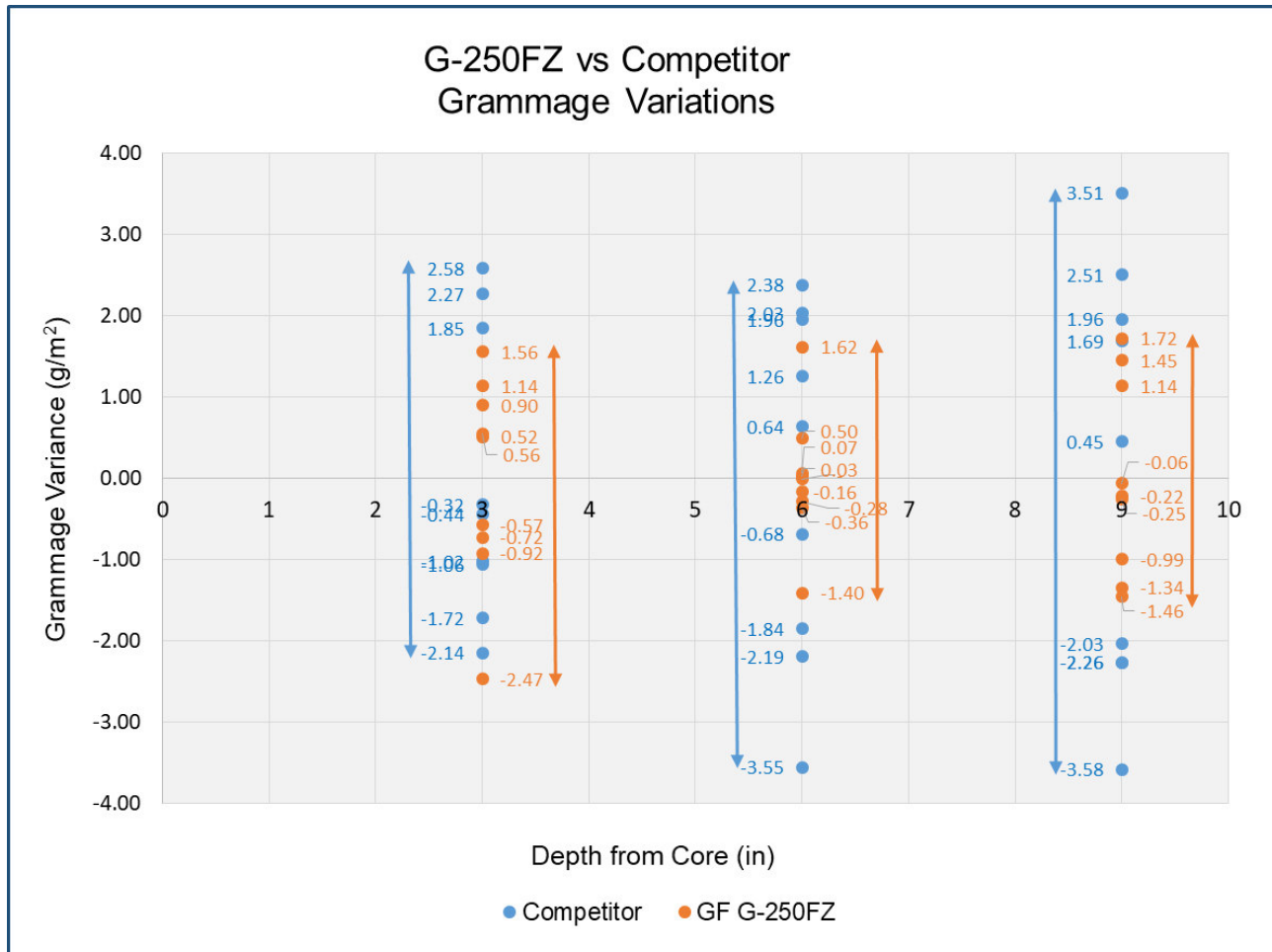
GLASSFORCE® THICKNESS VARIANCE

Minimal thickness variations throughout the 750 mm wide roll



GLASSFORCE® GRAMMAGE VARIANCE

Low Grammage variations throughout the 750 mm wide roll

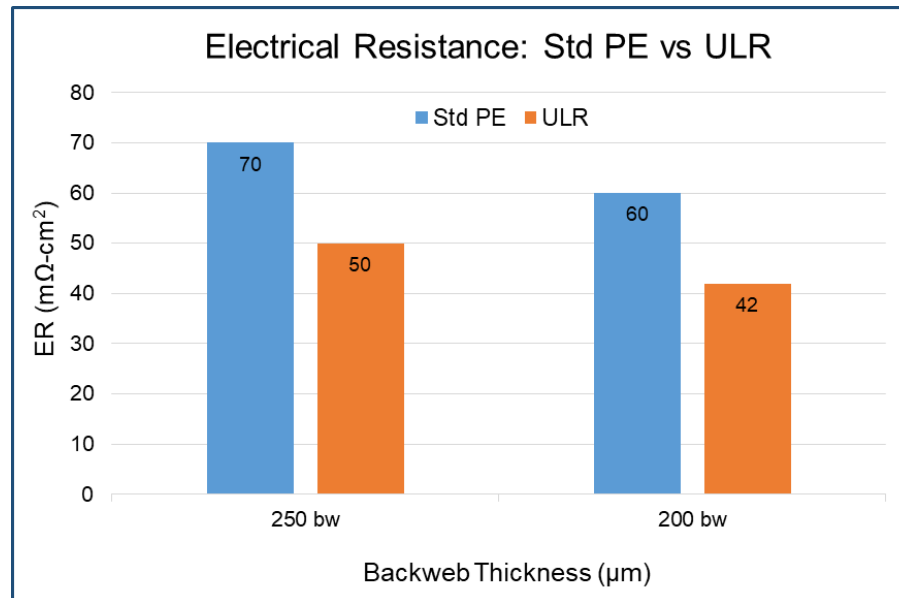


CELLFORCE® ULR

Ultra Low Resistance Separator for Fast Charging in EFB, Golf Carts and Forklifts

30% Reduction in ER compared to Std PE separator

High Perox Stability through novel formula

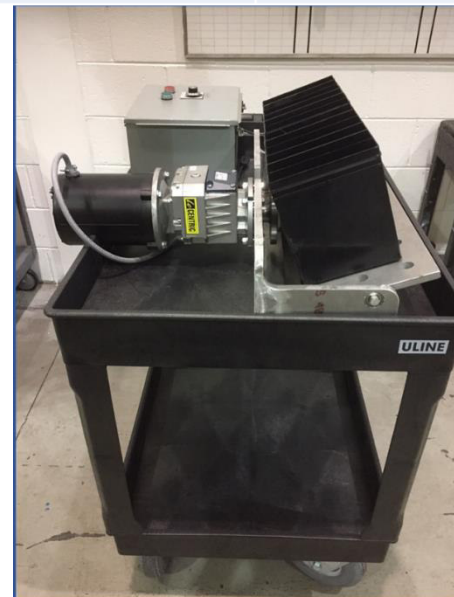
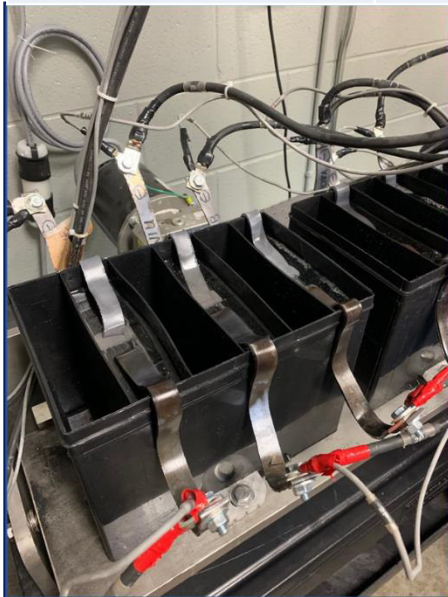


MAXIWIK™

Reducing acid stratification in Start-Stop and PSoC applications

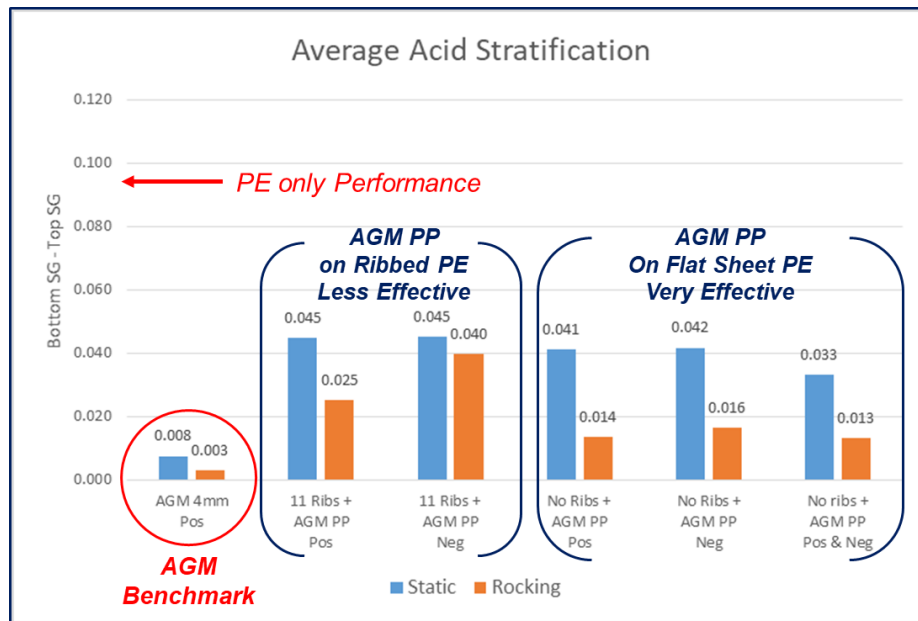
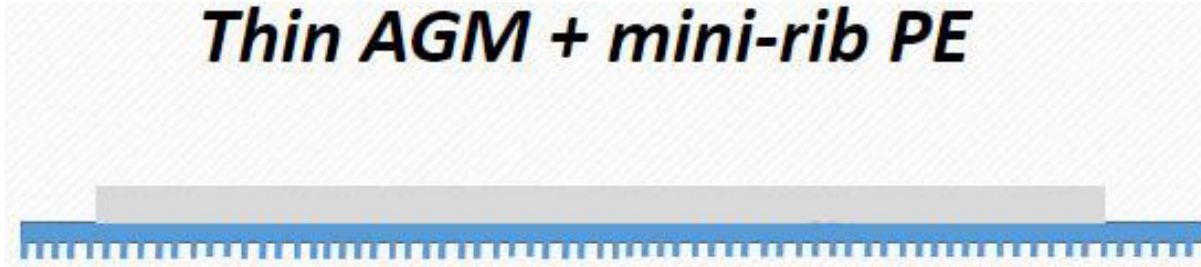
Test Standard: EN 50342-6 17.5%DoD Continuous Cycle Test

Step	Time	Current	Percent
1 – Rest	30 min	0A	
2 – Discharge	2.5 hours	6A	- 37.5%
3 – Charge	40 min	10.5A (2.4vpc max)	+17.5%
4 – Discharge	30 min	10.5A (1.0 vpc min)	+13.1%
5 – Repeat 3-4			
6 – Stop after 20 cyclers	~26 hours		



MAXIWIK™

Thin AGM + mini-rib PE



**THANK YOU FOR YOUR
ATTENTION!**

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