

RUSAL DIRECTORATE OF NEW PROJECTS

QUALITY, PARTNERSHIP, SUCCESS

UC Rusal

November 2017

RUSAL IN BRIEF

GLOBAL SCALE

- One of the largest integrated aluminium producers with smelting capacity concentrated in Russia and raw materials base diversified across the world
 - 6.7% of global production of aluminium
- Assets in 13 countries across 5 continents
 - 14 aluminium smelters (5 of which are currently mothballed)
 - 11 alumina refineries (4 of which are mothballed)
 - 8 bauxite mines (1 of which is mothballed)
 - 4 foil mills

LOWEST COST GLOBAL PRODUCER

- 1st quartile of the global aluminum production cost curve

GREEN ALUMINIUM PRODUCER

- ~90% of electricity consumed sourced from hydro-power stations

HIGH LEVEL OF AN UPSTREAM VERTICAL INTEGRATION

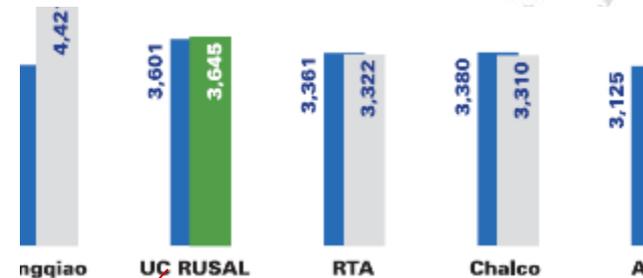
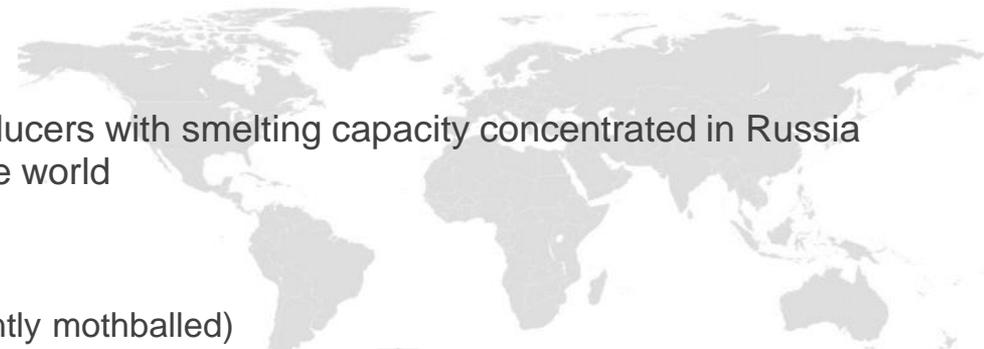
- 100% self-sufficiency in alumina; ~80% self-sufficiency in bauxites

FOCUS ON A HIGH MARGIN UPSTREAM AND SELECTED DOWNSTREAM BUSINESS (foil, silica and powders)

- Primary aluminium production with focus on alloys and value-added products (VAPs)

SOLID R&D AND EPCM IN-HOUSE PLATFORM

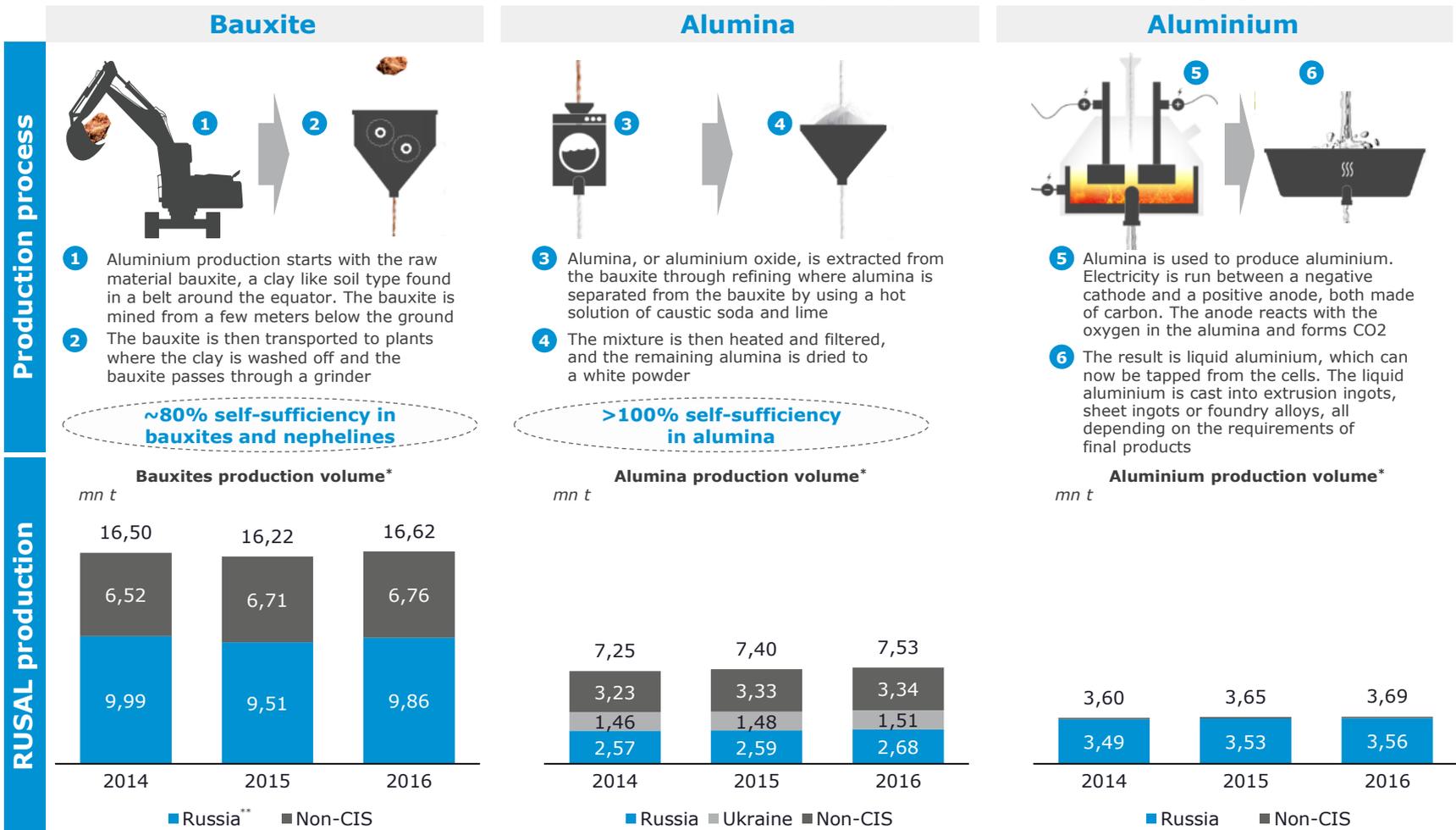
- CAPEX control and optimization. Utilization of advanced technologies



Core aluminium producing facilities are located in Siberia enjoying access to clean environmentally friendly hydro power

HIGH DEGREE OF VERTICAL INTEGRATION

- Captive raw materials supplies: ~80% self-sufficiency in bauxites and >100% self-sufficiency in alumina
- Efficient midstream: 95% of the smelting assets located in Russia, Siberia, the region rich of HP generation
- Diversified sales mix with ~43% share of value added products (VAPs) and diversified sales by geography



Source: Company data

* Bauxites and alumina are mainly delivered to Group companies and minor portion goes to third parties **Bauxites production in Russia including nepheline ore volumes

INDUSTRY LEADERSHIP THROUGH INNOVATION FOCUS ON ADVANCES VIA IN-HOUSE R&D



SMELTING TECHNOLOGIES R&D

- RUSAL's R&D unit continues development of the existing smelting technology based on pre-baked anodes. The Tier1 RA-550 technology that was mastered in 2016 has outstanding efficiency indicators and the Company now has the option to implement it into existing and new RUSAL facilities

	RA-300	RA-400	RA-550
Launch date	2003	2005	2016
Cell capacity (tonnes / day)	2.4	3.4	3.9
Current rate (kA)	320	450	520
Power consumption (MW*h / tonne)	13.5	13.1	12.9



RA-550 smelter picture

- New type of smelting inert anode has **zero environmental impact**. The ongoing project

- RUSAL is actively developing a groundbreaking inert anode technology
 - Complete elimination of greenhouse gas and polyaromatic hydrocarbon emissions**
 - Over a 10% cut in operational costs through reducing anc and energy consumption and over a 30% cut in Greenfield projects expenditure costs
- Current status of the project:
 - A material required for a cut in operational costs as compared to the coal anode technology already developed
 - Relevant tests are conducted at Krasnoyarsk smelter
 - Retrofitting pots structure works to fit the new technology are underway



Inert anode project picture

R&D IN NEW ALUMINIUM ALLOYS

- Ongoing R&D in aluminium alloys helps to discover new applications of aluminium in consuming industries and strengthens aluminium positions in the competition with other materials

Innovative high Fe alloys:

- New alloys, such as Elas™, with superior mechanical properties
- Designed for various applications in the automotive industry
- Developed together with leading automotive industry companies

Alloys for the electrical industry:

- Aluminium-zirconium and aluminium-silicon-magnesium alloys 8176 and 8030
- Designed to boost electrical conductivity, improve durability, and reduce weight of aluminium wire rods
- Used to replace expensive and heavy copper wires

Aluminium-scandium alloys (Al-Sc):

- Traded at highest premiums among the aluminium alloys
- Designed for ship-building and aerospace applications
- Slabs made out of Al-Sc alloys are currently being tested

- Aluminium-scandium alloys are traded at highest premiums among the aluminium alloys. Scandium is the most expensive component in the alloy production. RUSAL has certain progress in R&D project dedicated to scandium extraction from the so called "red mud"

New unique carbonization technology for scandium extraction from the red mud

- No negative effect on alumina production
- Environmentally friendly technology: no acid wastes or other contaminants
- Cost efficient: easily competes with major current technologies on the cost basis
- Enormous resource base: > 30 k tons in Ural region only, enough to cover global demand
- Current stage of development:
 - Pilot unit installed at the Urals aluminium smelter



Pictures of scandium produced at pilot unit

Source: Company data

Directorate of New Projects

Powder Metallurgy Division

3 Plants
40kMT
 Capacity

Silicon Metal Division

2 Plants*
2 mines
59kMT
 Capacity

Secondary Aluminium Division

3 Plants
>100kMT
 Capacity

New Projects

3 JVs
>30 projects
 pipeline

Focus on Innovations

- New products for additive technology
- Development of matrix alloy
- R&D of new materials and properties
- Wet milling process and products

- Silica fume
- Solar applications
- High silicon alloys
- High purity silicon
- Innovative technologies in char coal production

- Development of HPDC expertise
- Radiators
- Automotive Components
- Extrusion of Aluminium bottles
- Boats

- Innovative applications of Gallium
- Heat resistant wires
- Catalyzers
- Aluminium-based heating cables
- Conductors

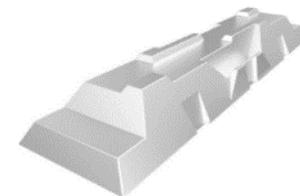
* Plus own char coal facility .

Secondary aluminium division

Volgograd aluminium plant Capacity 66 kMT per year

Key products

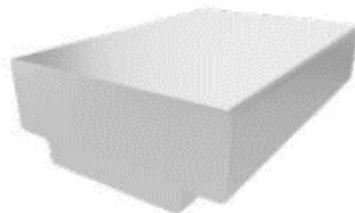
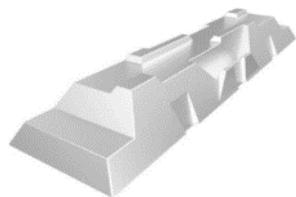
- Al alloy cylinders (1xxx, 6xxx)
Diameter - 127,145, 152, 178, 190, 203 mm
Length - 5800 mm
- Al ingots technical purity (A7Э)
Ingots- 15 kg



Nadvoitsy Al planta, Karjala – 12 kMT per year

Производство:

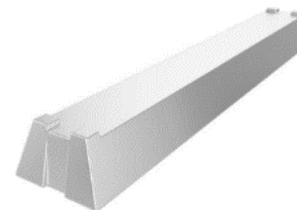
- Al ingots technical purity (A7, A7Э, A85) and special alloys (A85Si, Si≤0,034%)
Ingots - 15 kg
- T-bon Al ingots (A356.2, A356.2Sr)
Ingots – 750 kg



Rusal Resal, Samara Secondary Aluminium Capacity 25 kMT

Key products:

- SOW ingots, Weight – 300 кг, 750 кг.
- ADC12, AlSi9Cu, A333, A380.1, Din226 ingots, 6 kg



Downstream focus:



Radiators



Al wires



Al can, bottles



Autocomponents



Al boats



Processing of laminated foil



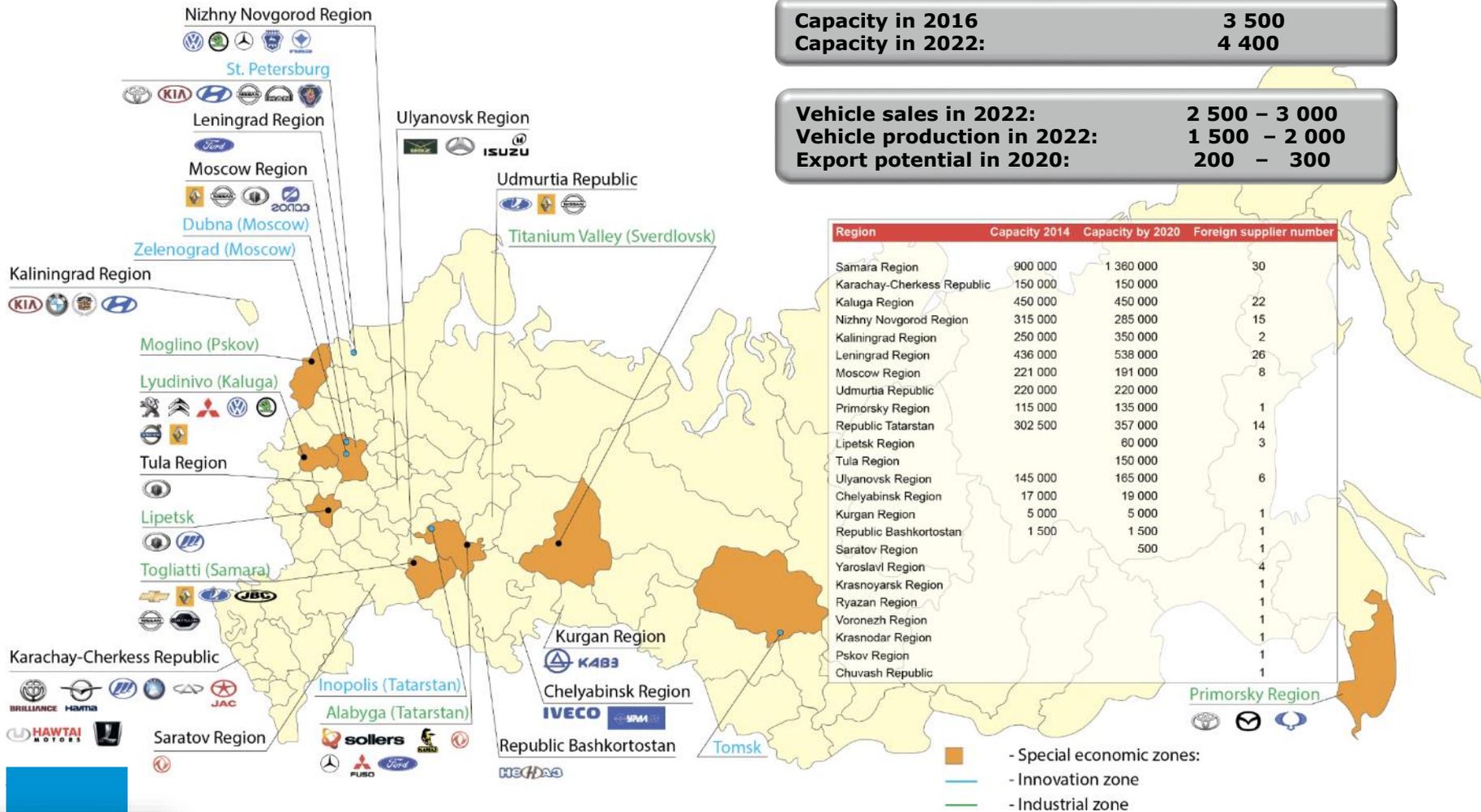
Technical purity Al products

Automotive clusters in Russia

Vehicle sales in 2016*: 1 570
Vehicle production in 2016: 1 350

Capacity in 2016 3 500
Capacity in 2022: 4 400

Vehicle sales in 2022: 2 500 – 3 000
Vehicle production in 2022: 1 500 – 2 000
Export potential in 2020: 200 – 300

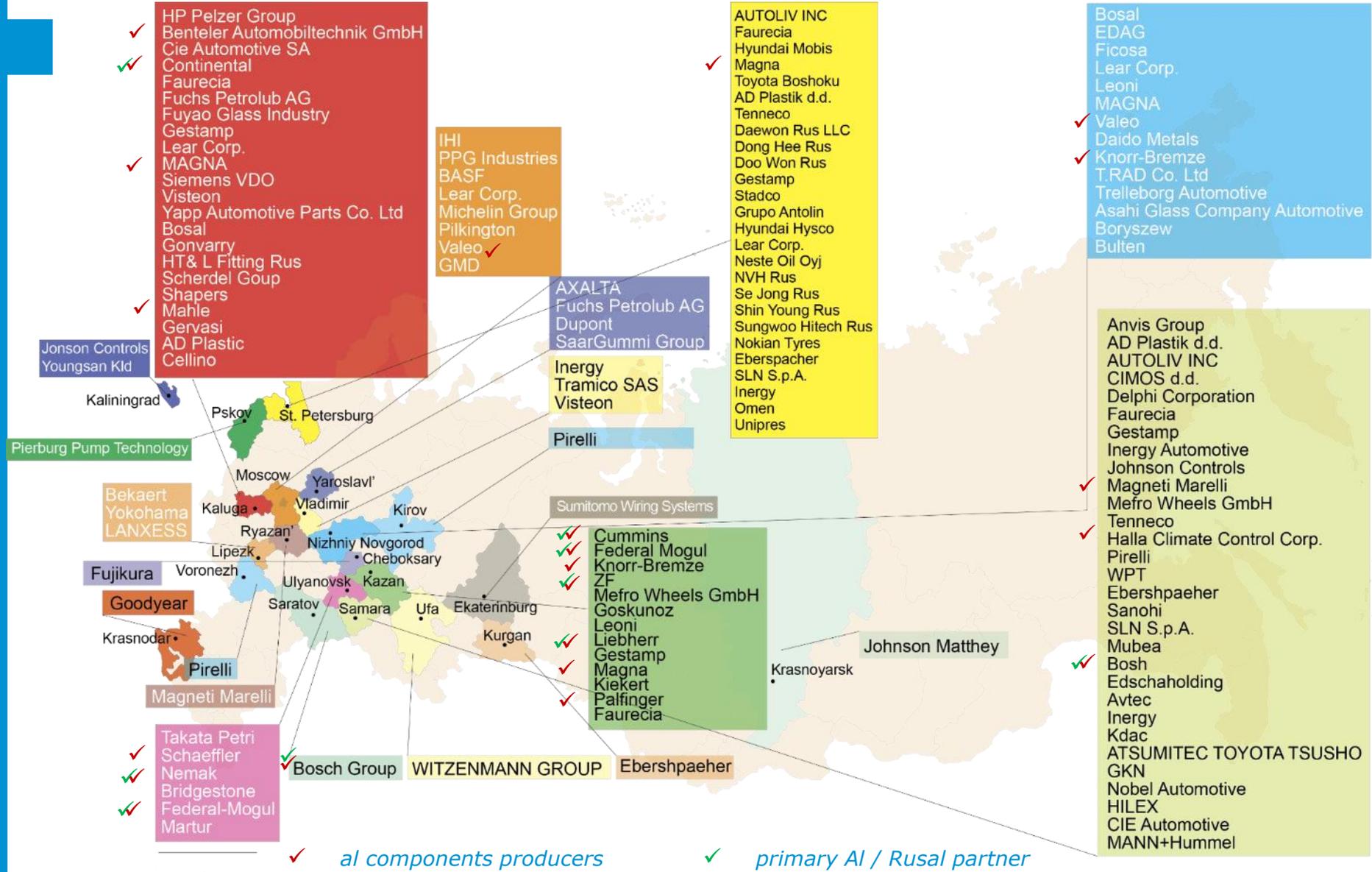


Region	Capacity 2014	Capacity by 2020	Foreign supplier number
Samara Region	900 000	1 360 000	30
Karachay-Cherkess Republic	150 000	150 000	
Kaluga Region	450 000	450 000	22
Nizhny Novgorod Region	315 000	285 000	15
Kaliningrad Region	250 000	350 000	2
Leningrad Region	436 000	538 000	26
Moscow Region	221 000	191 000	8
Udmurtia Republic	220 000	220 000	
Primorsky Region	115 000	135 000	1
Republic Tatarstan	302 500	357 000	14
Lipetsk Region		60 000	3
Tula Region		150 000	
Ulyanovsk Region	145 000	165 000	6
Chelyabinsk Region	17 000	19 000	
Kurgan Region	5 000	5 000	1
Republic Bashkortostan	1 500	1 500	1
Saratov Region		500	1
Yaroslavl Region			4
Krasnoyarsk Region			1
Ryazan Region			1
Voronezh Region			1
Krasnodar Region			1
Pskov Region			1
Chuvash Republic			1

■ - Special economic zones:
— - Innovation zone
— - Industrial zone

* - thou units

Foreign suppliers in Russia



Components market transformation

Key trends

Internal factors

Aftermarket – driver of growth

Vehicle production in midterm future – not evident growth up to the pre-crisis level

Key drivers of midterm future – government regulation (localizations, incentives for investors, tariff/non-tariff import barriers, mode regimes), gas fuel, ADAS, telematics, connected vehicles, big data analysis

AD – long-term future driver

Big share of foreign car production - vague prospects of innovative companies

High entry barriers in innovation segments

High competition in innovation segments (IT, software companies etc.)

Lack of domestic large-size Tier 1 suppliers

Most SME suppliers don't export, don't have production abroad

Most SME suppliers have a lack of new technology access, financial access, lack of global cooperation experience (knowledge)

M&A – is not key factor for Russian suppliers

External factors

Market volatility in domestic market and around the world

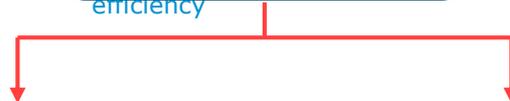
M&A – important role of Chinese companies, focus on technology

Export limitations: national standardization systems, revision of current customs unions, alliances, localization requirements tariffs/non-tariffs barriers

ADAS/Telematics influence

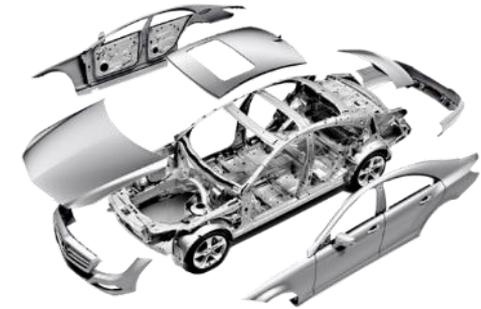
Midterm future

- Preventive maintenance
- Decrease in road accident
- Improvement of fleet efficiency



Restraint of service and spare parts growth Decrease in fleet vehicles number

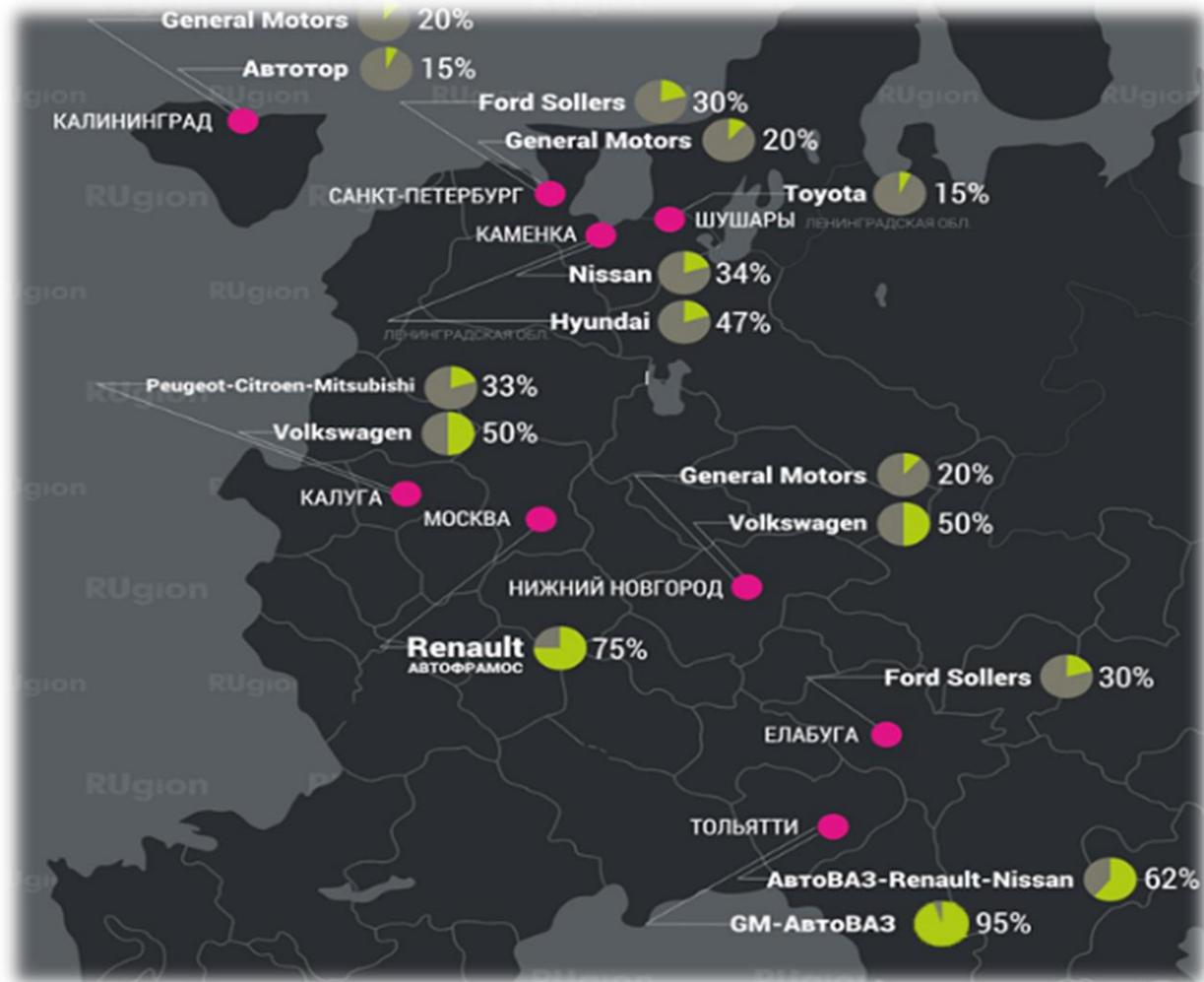
Individuals – high demand for In-vehicle entertainment, social network access



Conclusion

- Key factor to suppliers' success - flexibility, tight cost management, constant monitor of product portfolio, business diversification, contingency plan to withdraw from the automotive segment

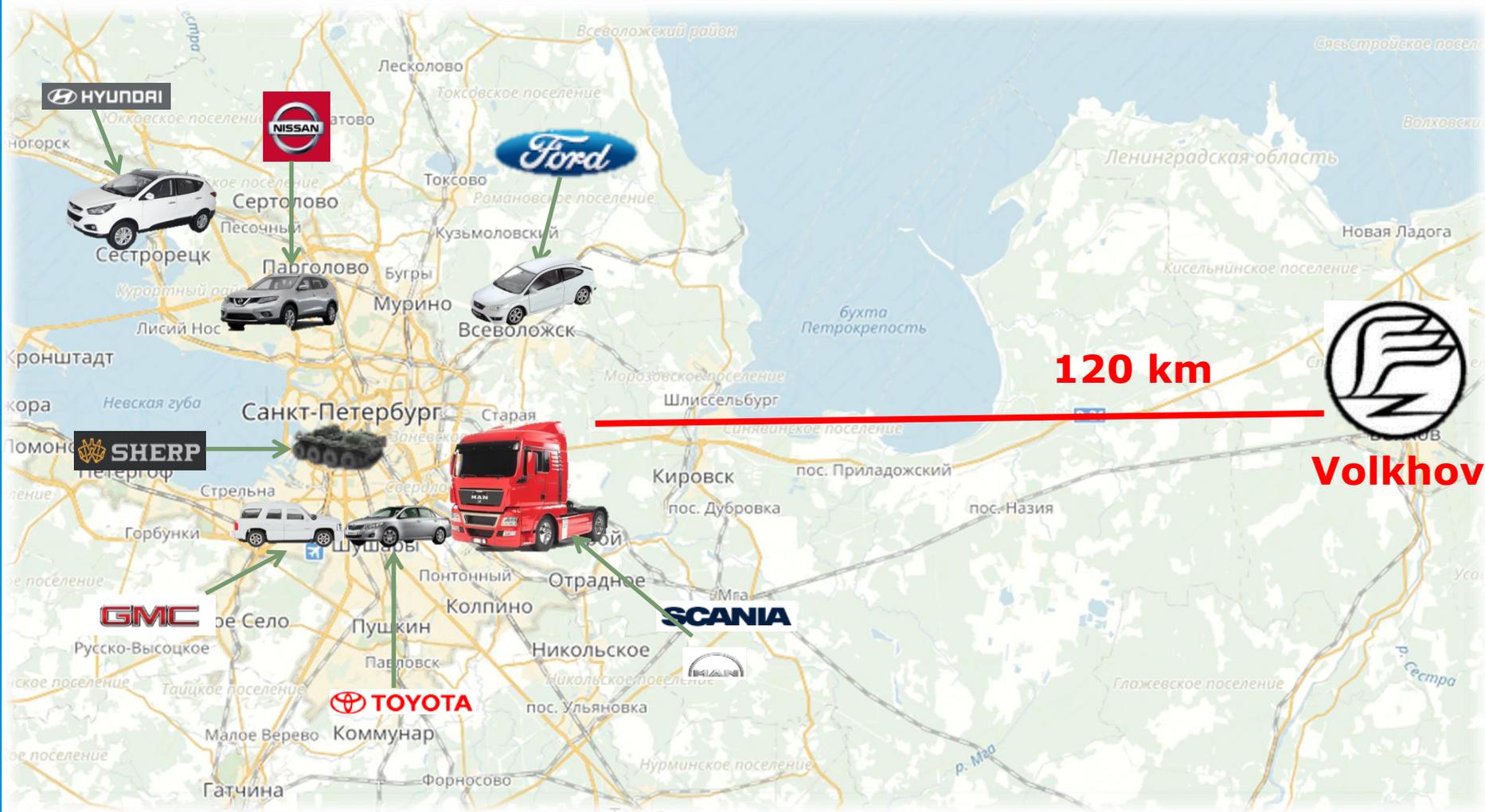
Map of the localization of foreign car makers in Russia



Brief description of the HPDC Project

- This project envisions the manufacture of automotive parts and other industrial components on the VAZ production site, including:
 - production of parts using the tilt gravity die casting method;
 - production of parts using the high pressure die casting method;
 - production of parts using the low pressure die casting method;
 - heat treatment
 - mechanical processing of parts.
- Preliminary set of equipment
 - 8 high pressure die casting machines.
 - 2 furnaces for preparing molten aluminium alloys.
 - 8 high precision automated complexes for mechanical processing.
 - Heat treatment facilities.
 - The production shop, a tools shop, the packaging area, a finished products warehouse, a laboratory.

Manufacture of motor vehicles in Saint Petersburg and Leningrad Oblast



Proposed site location

Volkhov is located 120 km from Saint Petersburg, north west, at an intersection of motorways and railways running in the following directions*:

- Saint Petersburg: 120 km,
- Veliky Novgorod: 350 km,
- Kaluga: 850 km,
- Naberezhnye Chelny: 1,760 km,
- Elabuga: 1,740 km,
- Togliatti: 1,780 km,
- Ulyanovsk: 1,540 km
- Izhevsk: 1,820 km

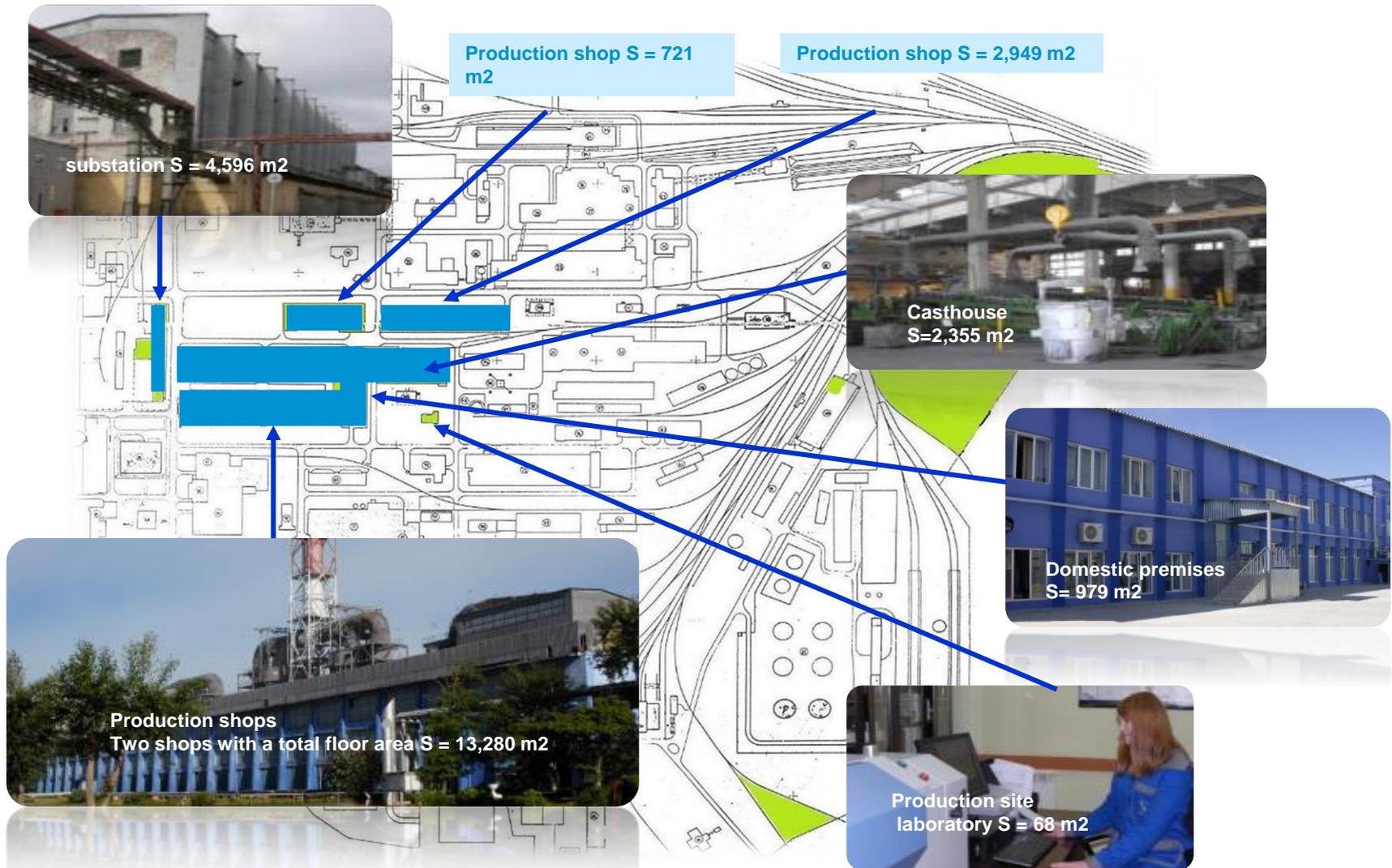
VAZ-SUAL

- There are two major rail lines crossing the territory of the production site
- There are 110 KV power transmission lines to ensure power supply,
- There are connections to the water supply system and the Volkhov river is just 300 meters from the production site
- The production site can be connected to the gas distribution substation location on the premises if there is a need for natural gas



* Locations of automotive manufacturers

Brief description of VAZ-SUAL branch production site

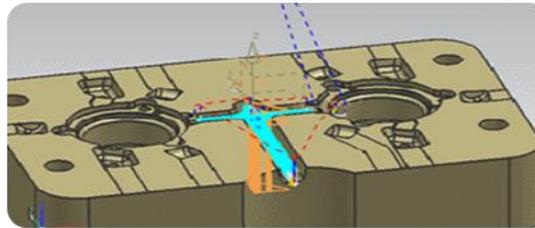


Contribution of partners to the joint venture

Expectations from a partner



Launch a high tech competitive product



Available technical solutions and know-how for an arranged production



Ability to arrange trainings and workshops for new personnel at an operating production site



Available compliance certificates from operating customers



Available client base in Russia, the CIS and far abroad



50 % of investments

Contribution of partners to the joint venture

RUSAL is ready to provide



Production sites



Energy resources



Qualified personnel



Aluminium and alloys

**Purchase of other raw materials
at competitive prices**



Legal support to the project

**Technical audit from
state controllers**



50 % of investments

Summary

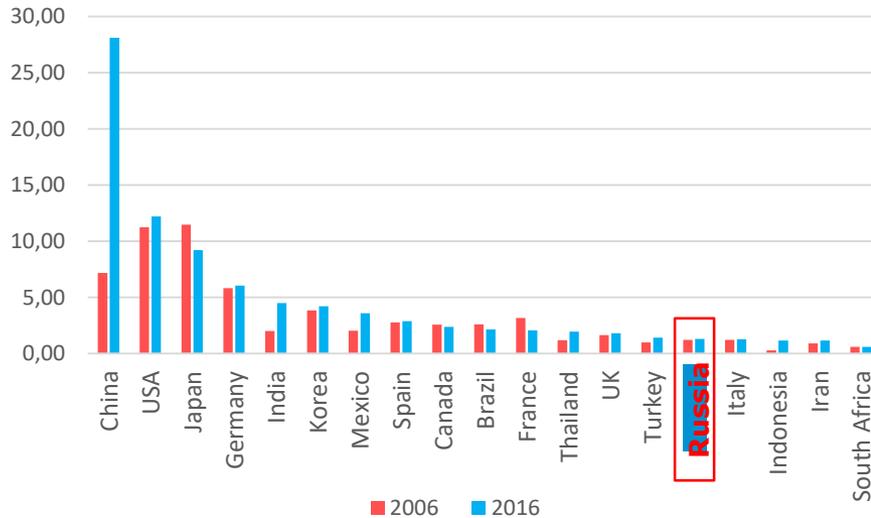
- Russian market of automotive components promises stable growth in the future
- There is a stable demand for high-quality products in the sector
- RUSAL invites strategic partners for partnership
- Business in Russia is profitable and accessible

We are ready to meet immediately after the presentation to discuss possible partnership in Russia

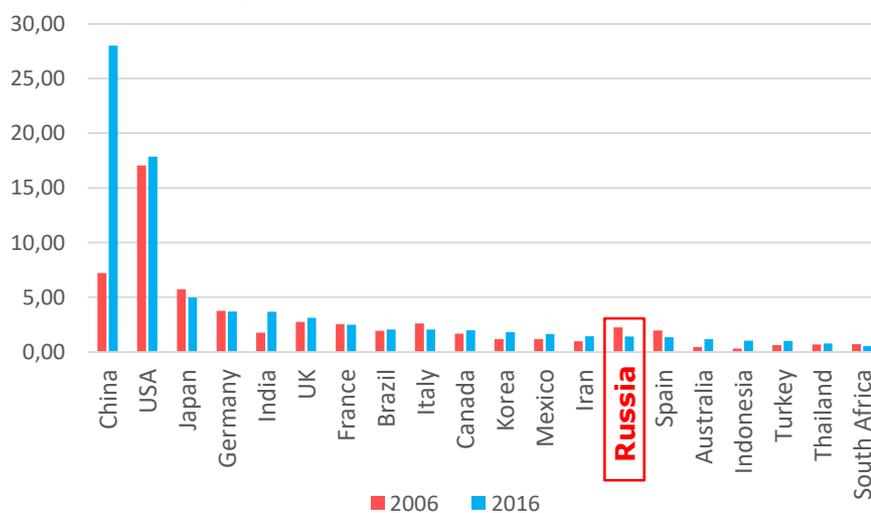
Appendix

Largest automotive markets

Vehicle production, mln units



Vehicle sales, mln units



2022* Russia

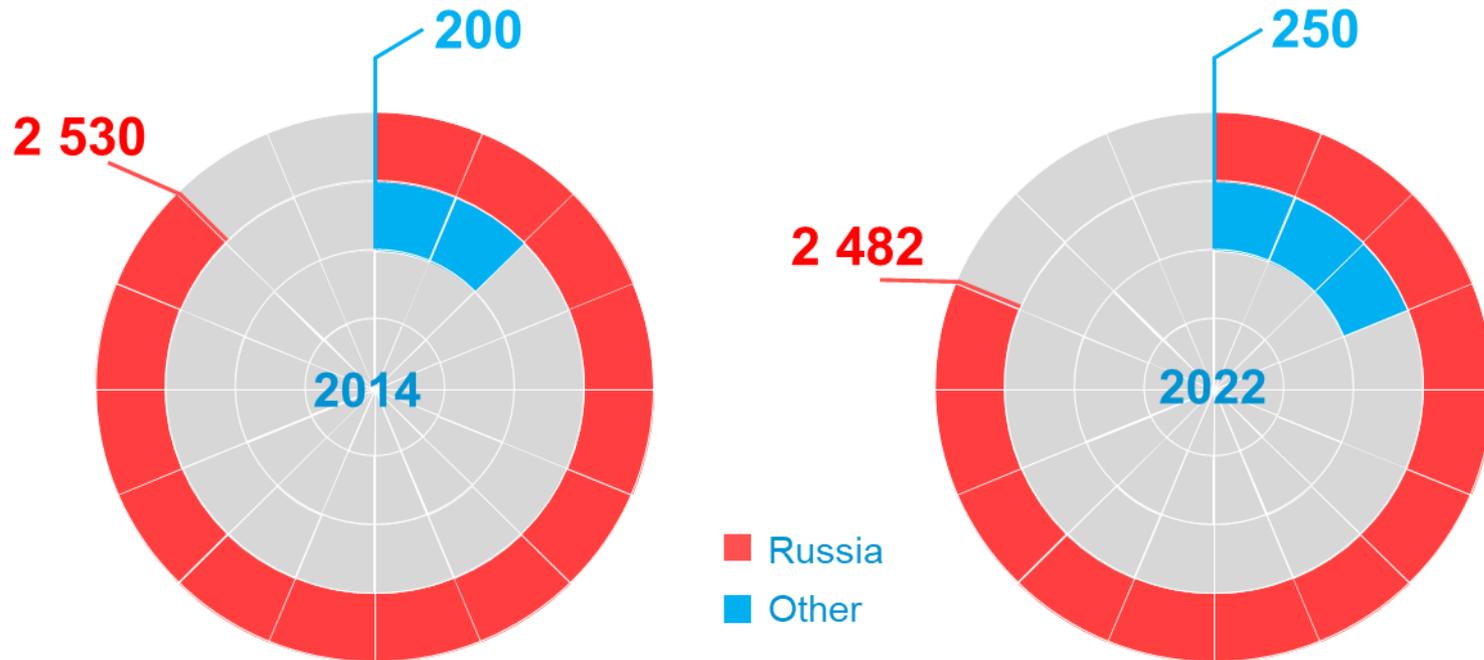
Automotive sales - 2 482 thousand units

Automotive production - 1 898 thousand units

The market size is more important than growth rate. A considerable growth rate is demonstrated by small markets

If foreign car manufacturers stop production in Russia:	All brands	Some brands
Production	700 thousand units	1,4 mln units
Foreign car component manufacturers will leave the market	90%	10 %
Result	Russia will no longer be part of the global automotive chain	Russia will remain part of the global automotive chain

Eurasian Economic Union (EAEU) market, all vehicle types, thousand units



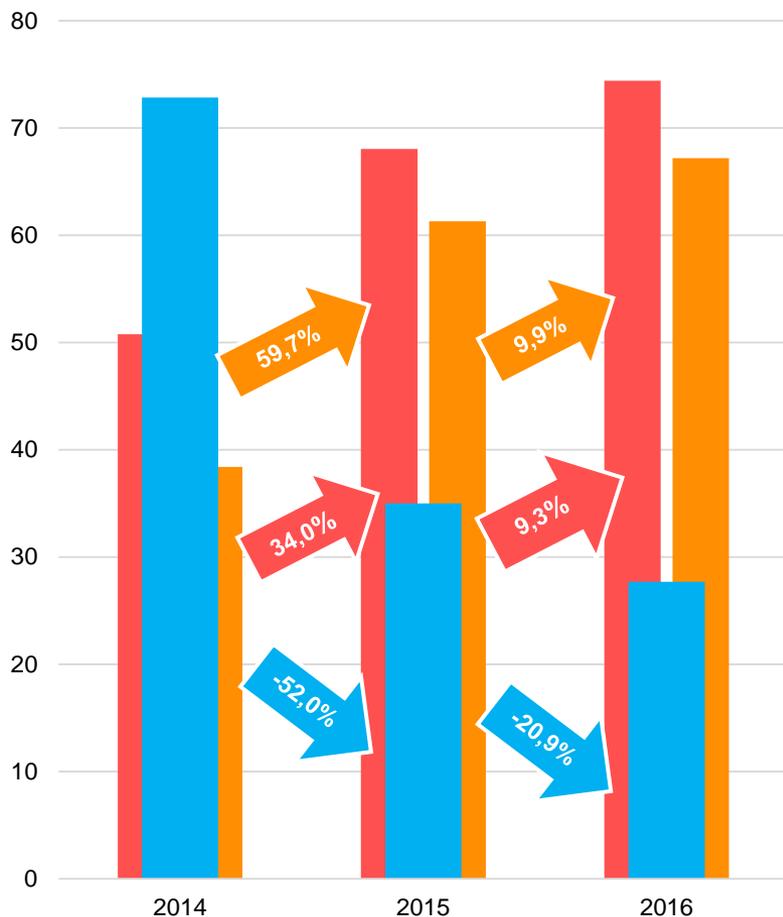
Vehicle export from Russia to the EAEU in 2016 - 56% of the EAEU automotive market
 Vehicle import from the EAEU to Russia in 2016 - 1% of the Russian automotive market

Localization level in the EAEU beginning 01.07.2018 - 50%
 Localization problems in other EAEU countries
 Conditions for investors in EAEU countries

Conclusion: Russia looks more attractive in terms of opening production, if investors are provided with favourable conditions.

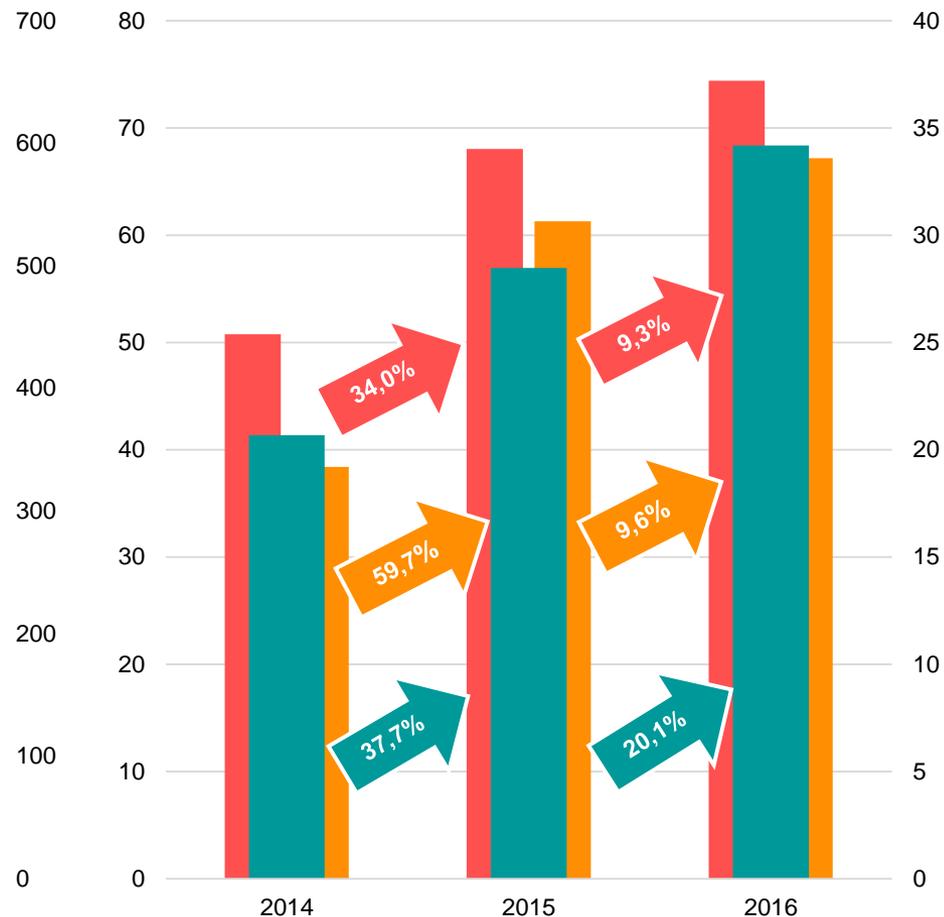
Vehicle export/import, exchange rate, 2014-2016

Import



- Euro exchange rate, Rub/EUR
- US dollar exchange rate, Rub/USD
- Vehicle import, thousand units (right-hand scale)

Export



- Euro exchange rate, Rub/EUR
- US dollar exchange rate, Rub/USD
- Vehicle export, thousand units (right-hand scale)

Car market transformation

Key trends

- Russian market – nearly saturated
 The market is restrained by: slow growth in the number of new owners, increase in the length of ownership/ longer car lifetime, lack of parking, traffic jams, development of public transport in megacities, development of «modern» used car market.



Production

Import tariff reduction – 15% in 2019
 Industrial assembly agreements expire in 2020
 75% of cars manufactured in Russia are foreign brands

Export

Severe competition with global and Chinese OEMs, Localization requirements in foreign markets
 National standardization systems, Adopting a EU emission standard in emerging markets
 Revision of current customs unions, alliances
 Tariff/non-tariff barriers
 Cost of each market penetration/ market size

Market

70% of cars sold are medium-price segment
 Petrol cars
 Megacities – slower demand in private cars:
 - consumers will need not cars, but transport solutions
 - solution for each case instead of «all-purpose» car – new car segments
 Small towns, rural areas:
 - Bigger demand in private cars
 - Low penetration of shared mobility, e-hailing
 - «Good enough», reliable car, high utilization, high mileage, low-cost TCO, fuel efficiency, high demand for SUV, 4X4
 Long-term prospect: development of shared mobility, e-hailing – special car requirements: high utilization, high mileage, passenger comfort, low-cost TCO, fuel efficiency, connected cars, ADAS.

Key profit drivers for OEMs

Modularization
 Telematics/ Connected cars
 ADAS

Prospects for suppliers

Russian OEMs' suppliers:
 TIER 1 – AVTOVAZ, UAZ
 TIER 2,3 – RENAULT-NISSAN, HYUNDAI-KIA, VOLKSWAGEN
Foreign OEMs' suppliers:
 TIER 1 ,2,3– AVTOVAZ, UAZ
 RENAULT-NISSAN, HYUNDAI-KIA, VOLKSWAGEN

Aftermarket suppliers

The largest segment – spare parts for Russian makes, spare parts for foreign medium-price brands, sedans, SUV, petrol cars, Japanese cars.
 In the mid-term future – Korean cars

Top priority

- Keep production volume
- Develop localization
- Develop local suppliers
- Protect the auto component market from Southeast Asia's producers
- Increase attractiveness for investors



Truck market transformation

Key trends

Production



One of the largest markets in Europe
 One of the largest manufacturers in Europe
 Big number of production sites of global OEMs
 Small production volume of foreign brands
 Predominance of Russian brands in production: 85-90%

Export



Export prospects look more promising than in the car segment

Export limitations:

- Localization requirements in foreign markets
- National standardization systems
- Adopting a EU emission standard in emerging markets
- Revision of current customs unions, alliances
- Tariffs/non-tariffs barriers
- Cost of each market penetration/ market size
- Severe competition with Chinese, Indian OEMs
- Significant overcapacity in production sites in in China

Export possibilities:

«Good enough», reliable truck, high utilization, high mileage, low-cost TCO

Market

2/3 of trucks sold – low-cost segment

Dramatic fluctuations in the share of Russian makes: 45-70%
 Expansion of imported vehicles during the recovery period
 Competition with Chinese OEMs
 Customer requirements: greater capacity, more robust suspension systems,
 low-cost TCO, fuel efficiency, telematics systems



Key profit drivers for OEMs

- Modularization
- Telematics/ Connected vehicles
- ADAS



Prospects for suppliers

Growth in attractiveness for foreign suppliers during the recovery period

OEMs' suppliers

Low-cost segment
 TIER 1 – KAMAZ, GAZ Group

Aftermarket suppliers

The largest segment – spare parts for Russian, Belorussian makes, diesel trucks

The potential of gas /bi-fuel trucks in the mid-term future is not high.



Top priority

- **Maintain a 50%+ share of Russian trucks**
- **Import substitution in the segment of foreign trucks**
- **Increase attractiveness for investors**

LCV market transformation

Key trends

Production



One of the largest markets in Europe
 One of the largest manufacturers in Europe
 Small production volume of foreign brands
 Predominance of Russian brands in production:
 85-95%

Export

Export limitations:

Severe competition with global and Chinese OEMs
 Localization requirements in foreign markets
 National standardization systems
 Adopting a EU emission standard in emerging markets
 Revisions of current customs unions, alliances
 Tariffs/non-tariffs barriers
 Cost of each market penetration/ market size

Export possibilities:

«Good enough», reliable LCV, high utilization, high mileage, low-cost TCO

Market



Dramatic fluctuations in the share of Russian makes: 50-70%
 Prevalence of the low-cost segment
 Prevalence of vehicles for cargo transportation
 Prevalence of petrol vehicles
 Customer requirements: greater capacity, more robust suspension systems
 low-cost TCO, fuel efficiency, telematics systems

Key profit drivers for OEMs

Modularization
 Telematics/Connected vehicles
 ADAS



Prospects for suppliers

Low-cost segment
 Russian models

OEMs' suppliers

TIER 1 – GAZ Group, UAZ, AVTOVAZ

Aftermarket suppliers

The largest segment – spare parts for Russian makes
 Petrol/diesel vehicles

The potential of gas /bi-fuel LCV in the mid-term future is not high.



Top priority

- Maintain a 50%+ share of Russian LCV
- Import substitution in the segment of foreign LCV
- Increase attractiveness for investors

Bus market transformation

Key trends

Production

One of the largest markets in Europe
 One of the largest manufacturers in Europe
 Predominance of Russian brands in production:
 99%

Export

Export limitations:

Severe competition with global and Chinese OEMs
 Localization requirements in foreign markets
 National standardization systems
 Adopting a EU emission standard in emerging markets
 Revision of current customs unions, alliances
 Tariffs/non-tariffs barriers
 Cost of each market penetration/ market size

Export possibilities:

«Good enough», reliable bus, high utilization, high mileage, low-cost TCO

Market

Dependence on public procurement
 Predominance of the low-cost segment
 Prevalence of Russian makes
 A considerable share of small class buses
 A considerable share of petrol and diesel buses

Steady demand for gas buses as long as supported by the government
 Development of public transport in megacities
 In megacities – competition with shared mobility, e-hailing
 In small towns, rural areas – competitions with private cars
 Development of multiple mobility system
 Growth in expansion of Belorussian, Chinese, Korean buses during the recovery period

Prospects for suppliers

Growth of attractiveness for foreign suppliers during the recovery period
 Low-cost segment

The prospects of gas /bi-fuel buses in the mid-term future are moderate, depend on government support.

OEMs' suppliers

TIER 1 – GAZ Group,

Aftermarket suppliers

The largest segment – spare parts for Russian makes

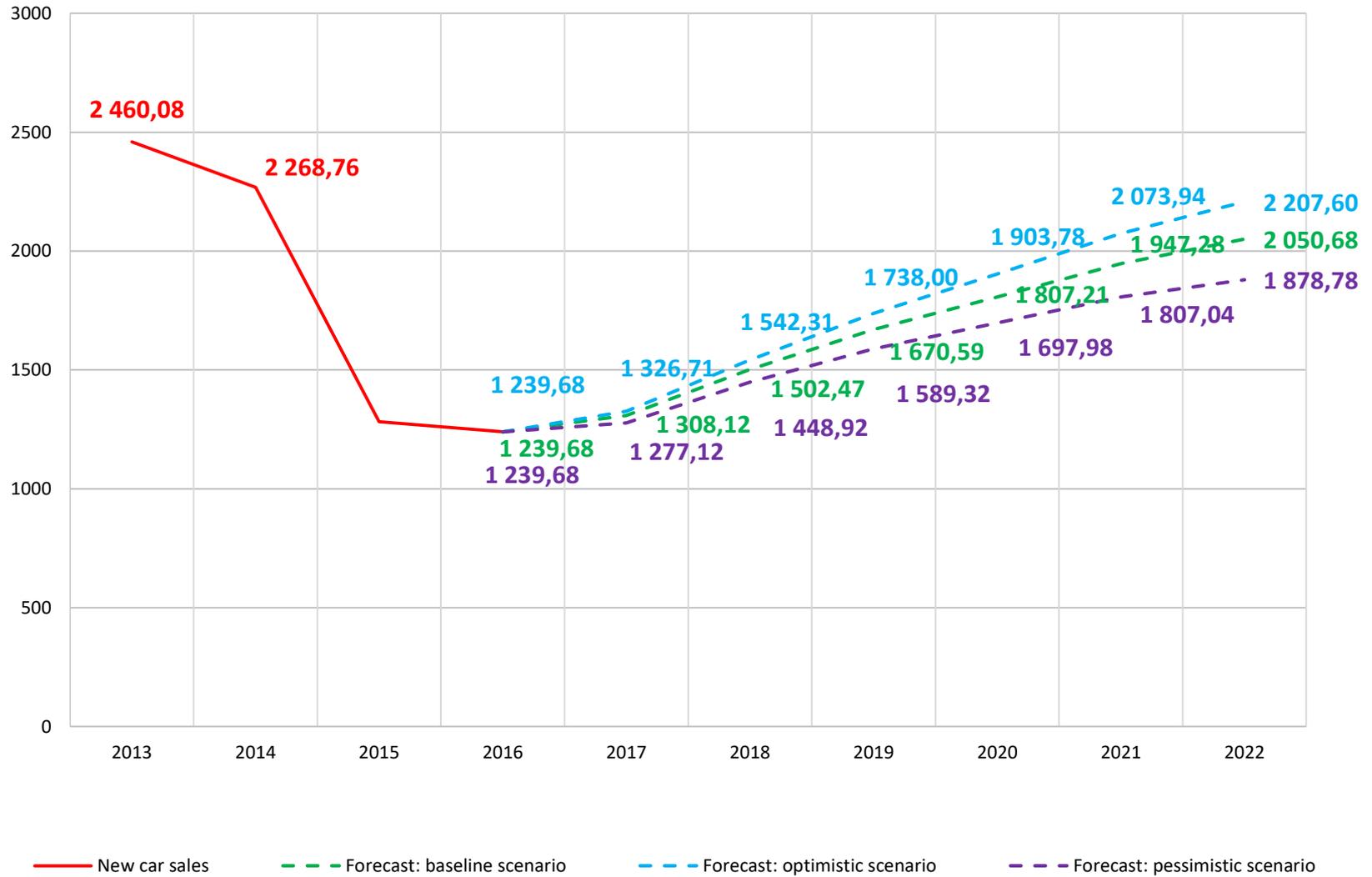


Top priority

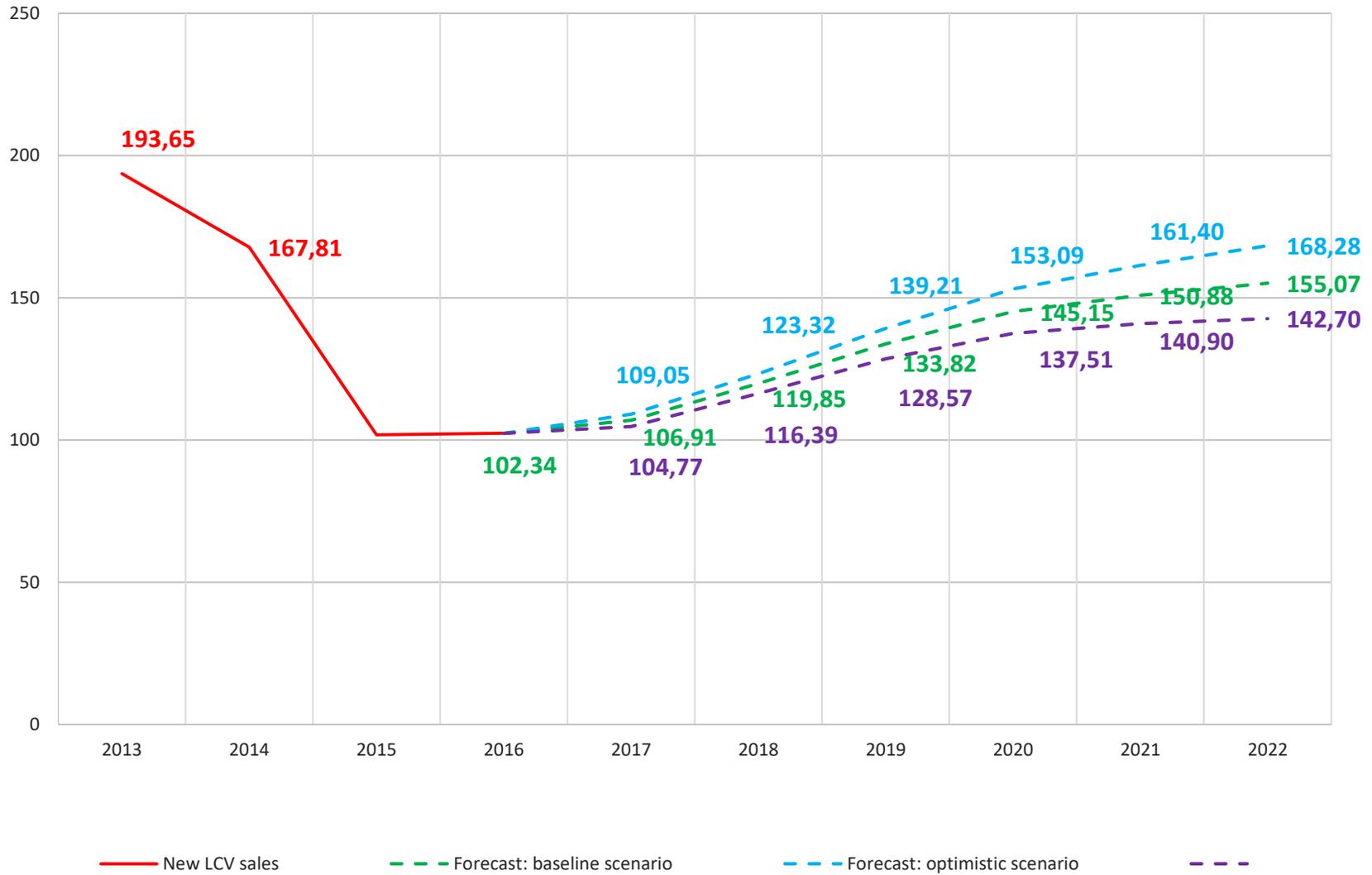
- Maintain a 80%+ share of Russian buses
- Import substitution in the segment of foreign buses
- Increase attractiveness for investors



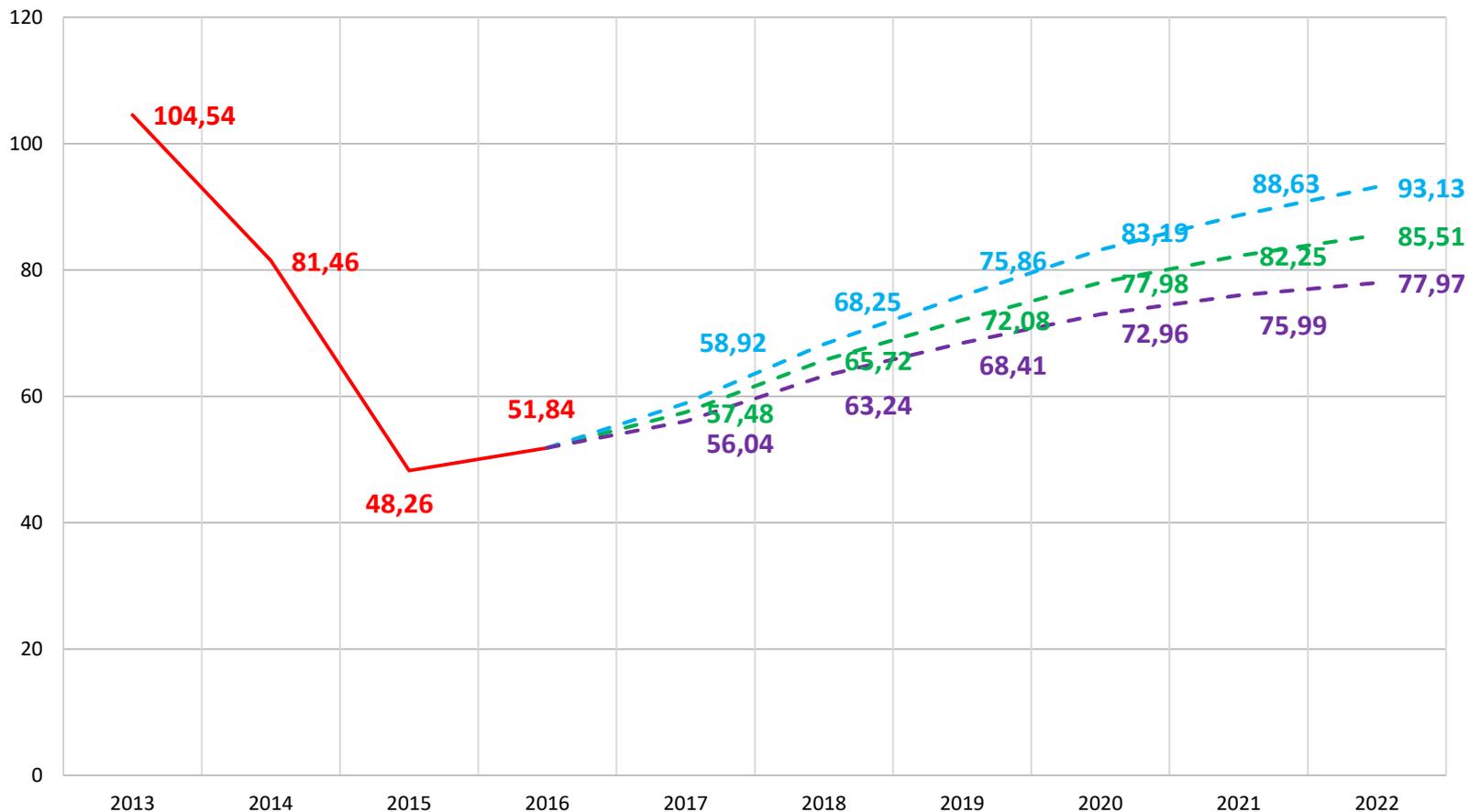
Car sales forecast, thousand units



LCV sales forecast, thousand units

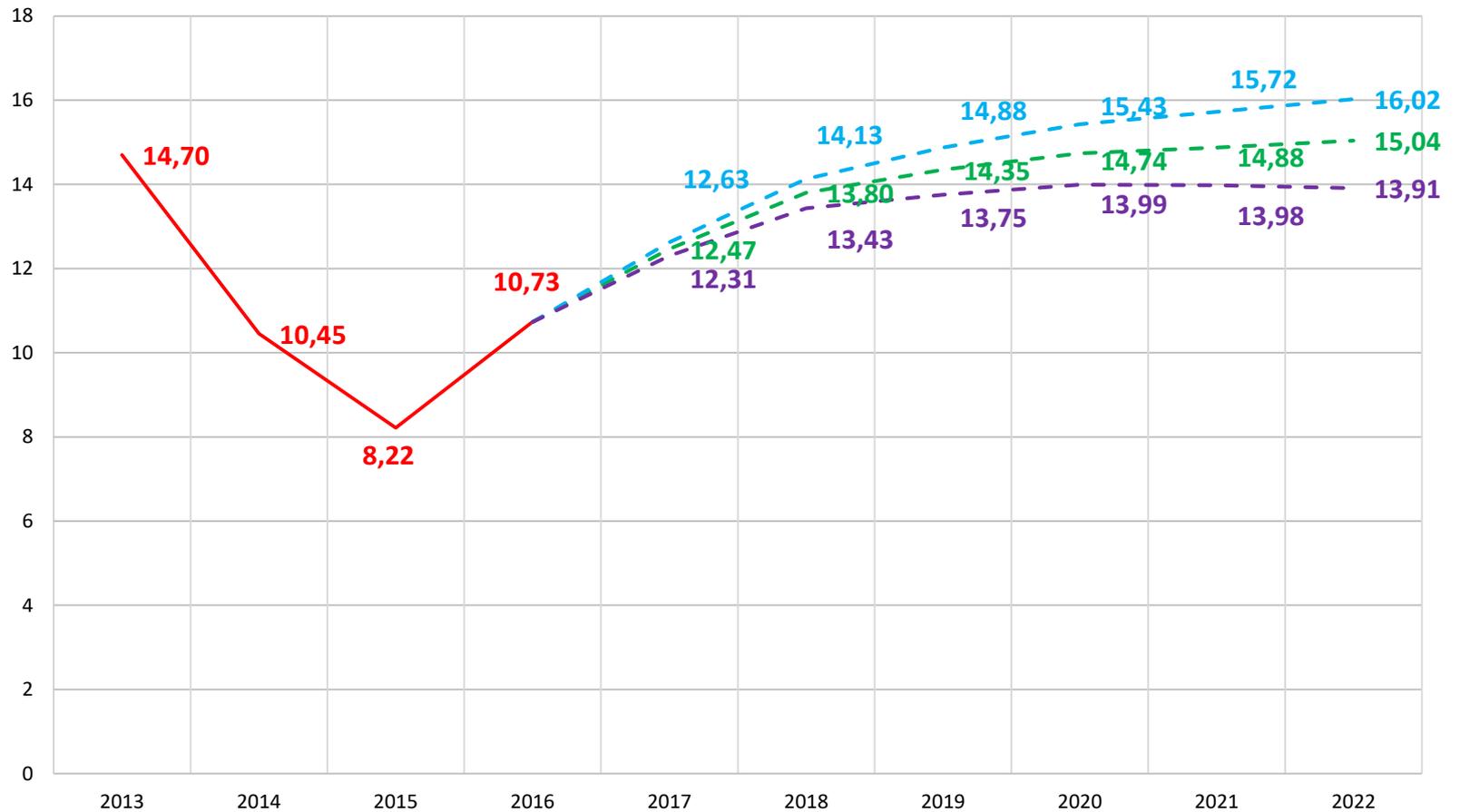


Truck sales forecast, thousand units



— New truck sales
 - - - Forecast: baseline scenario
 - - - Forecast: optimistic scenario
 - - - Forecast: pessimistic scenario

Bus sales forecast, thousand units



— New bus sales
 - - - Forecast: baseline scenario
 - - - Forecast: optimistic scenario
 - - - Forecast: pessimistic scenario



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