THE INSTITUTE FOR URBAN ECONOMICS

A Study on the Housing and Urban Planning Sectors Perfomance Indicators in Major Russian Metropolitan Areas

This study was carried out by the Institute for Urban Economics in 2018, at the order of DOM.RF

CONTENT

INTRODUCTION

RELEVANCE

This study has been conducted to develop a list of qualitative and quantitative indicators of the urban planning and housing sector perfomance in the 17 major Russian metropolitan areas.

We analyzed key urban spatial development and housing sector trends over 2010–2016 to obtain new knowledge about the quality of urban planning regulation and housing policy, the patterns of spatial development of metropolitan areas. Such patterns in turn influence the quality of living conditions, housing affordability, local budjets' revenues and expenditures, housing stock real capitalization etc.

We believe this study will encourage the further analytical research of the Russian metropolitan areas and cities, promote efficient state and regional policies towards the development of major metropolitan areas as urbanized territories with a united economic, social and urban space.

GOAL OF THE STUDY

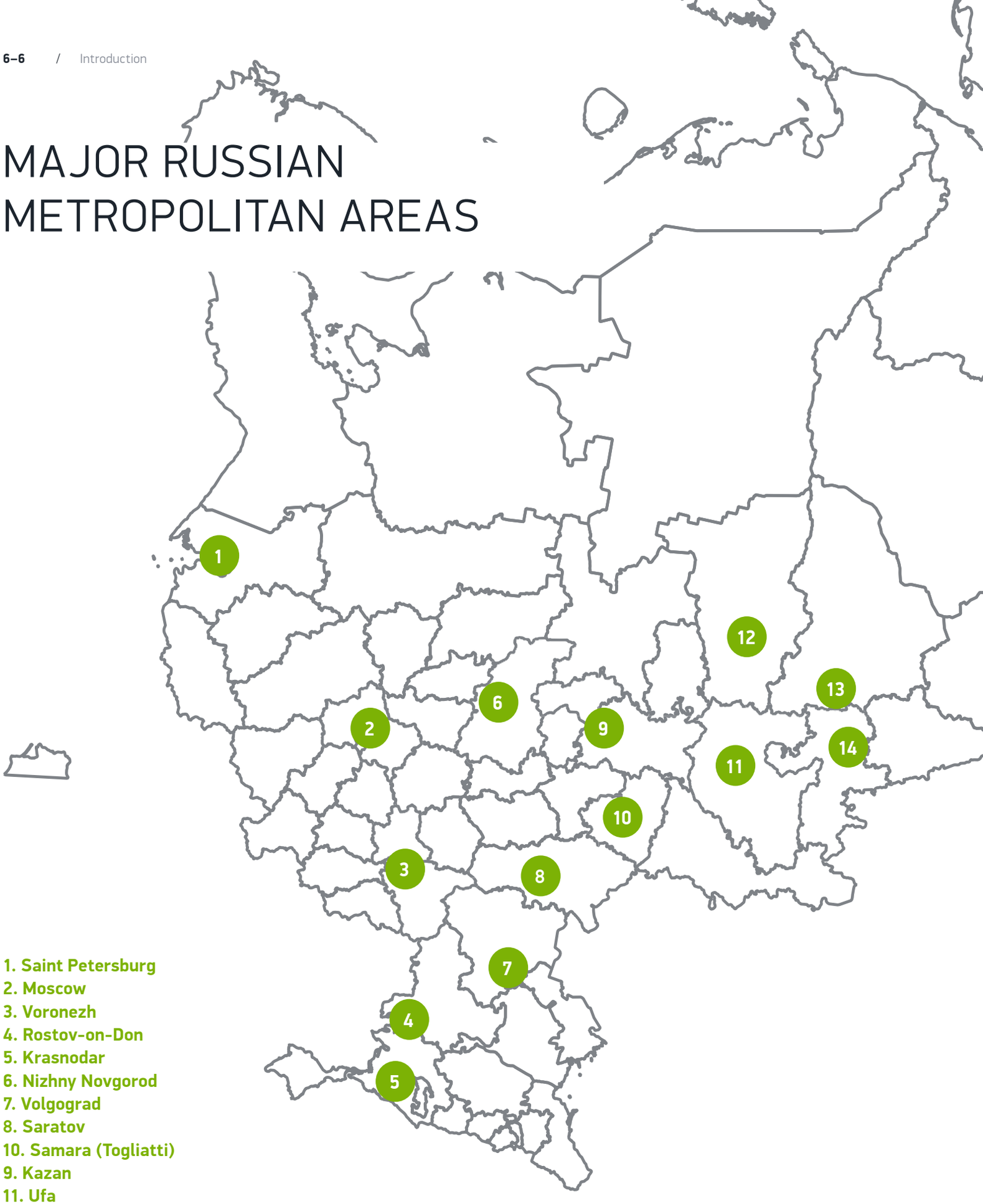
To develop and test a methodology for measuring the indicators of the current and prospective perfomance of the urban planning and housing sectors of the major Russian metropolitan areas, that would allow comparisons of such metropolitan areas with each other and with foreign metropolitan areas.

THE STUDY INVOLVES 17 MAJOR RUSSIAN METROPOLITAN AREAS WITH POPULATION EXCEEDING

1 000 000*

* The Omsk, Novokuznetsk, and Irkutsk metropolitan areas have not been reviewed.

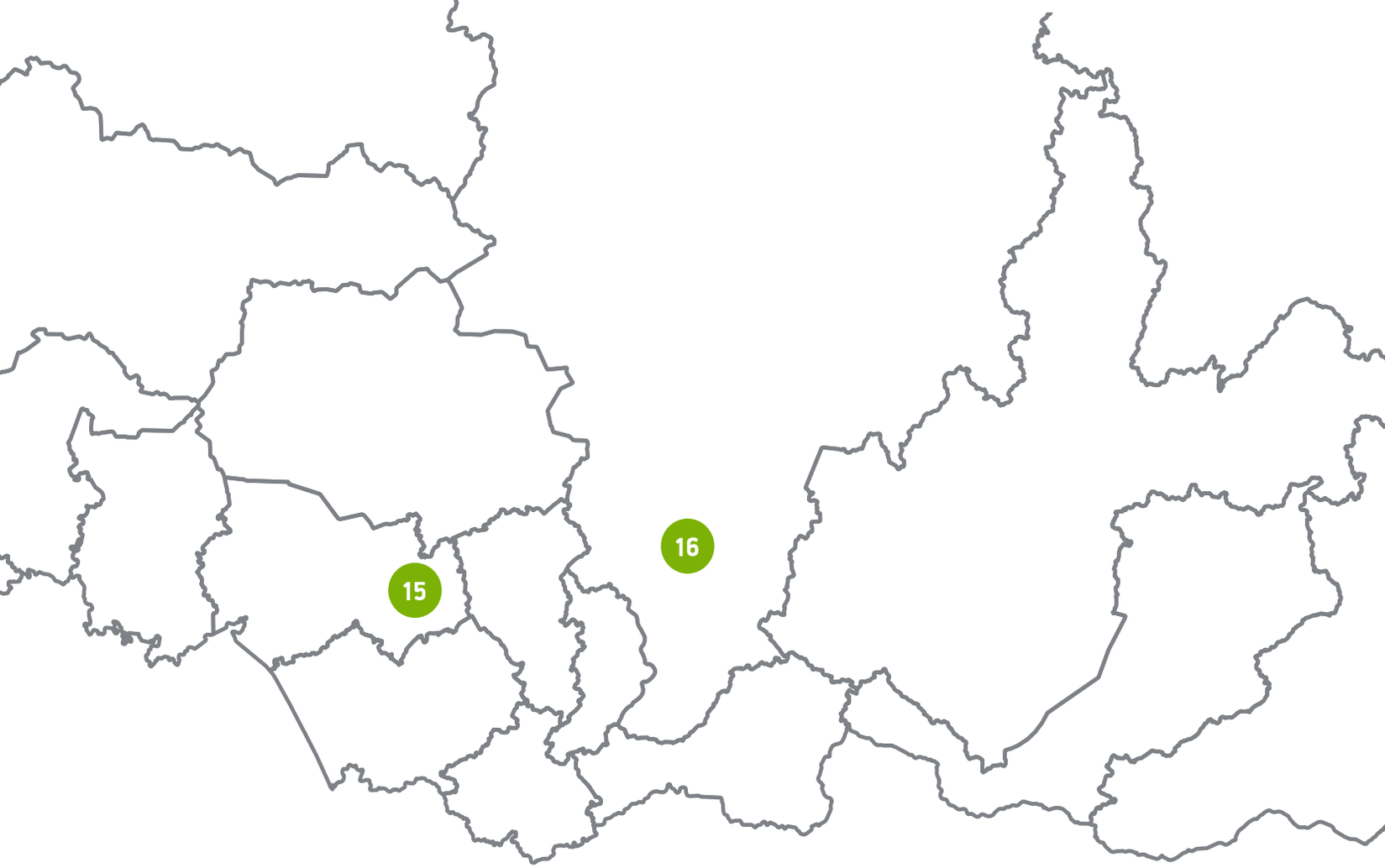
MAJOR RUSSIAN METROPOLITAN AREAS

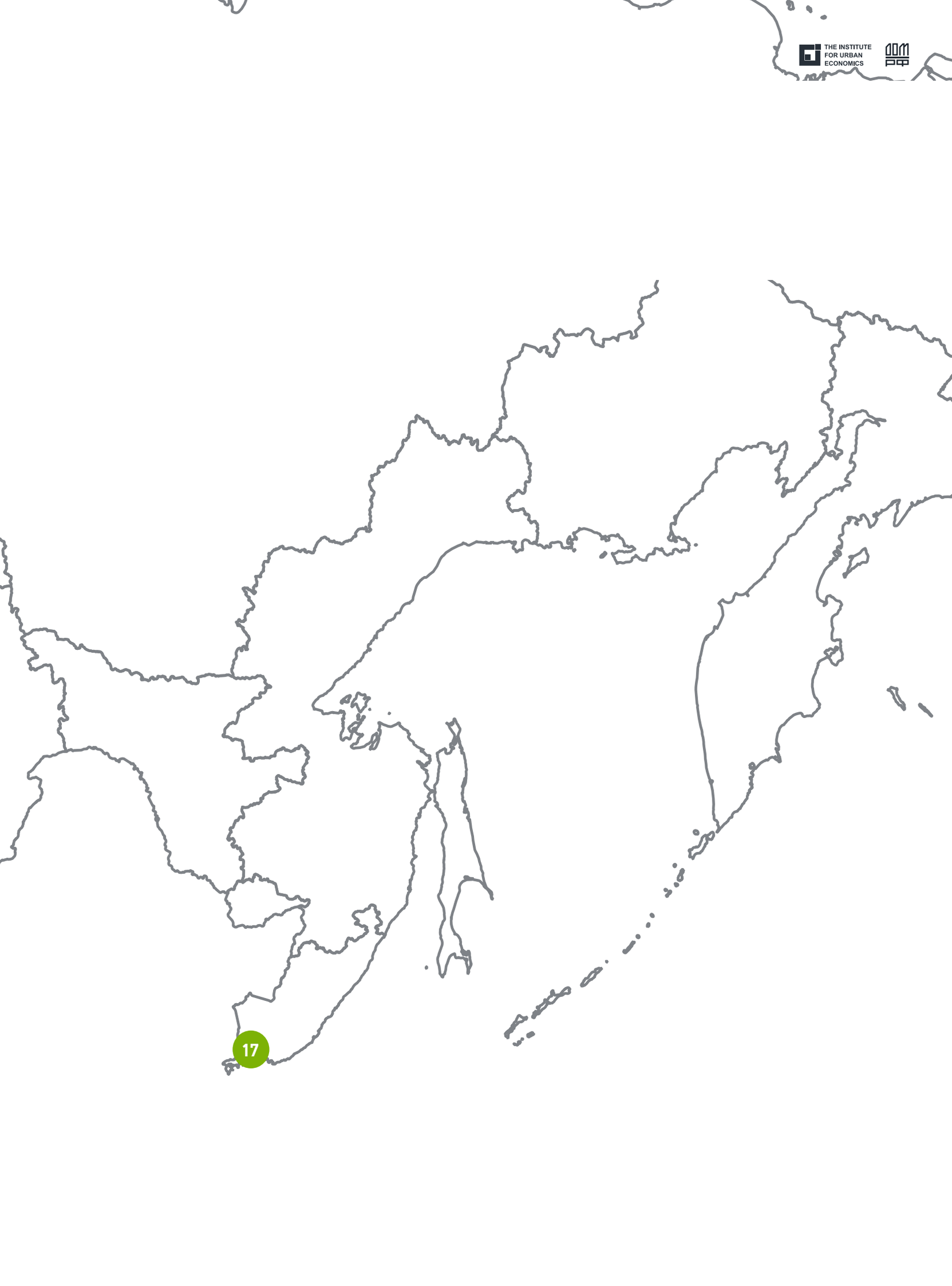


1. Saint Petersburg
2. Moscow
3. Voronezh
4. Rostov-on-Don
5. Krasnodar
6. Nizhny Novgorod
7. Volgograd
8. Saratov
10. Samara (Togliatti)
9. Kazan
11. Ufa
12. Perm
13. Yekaterinburg
14. Chelyabinsk
15. Novosibirsk
16. Krasnoyarsk
17. Vladivostok

A metropolitan area is an urbanized territory united into a single whole by various interrelations.

The borders of metropolitan areas are determined based on official strategic and territorial planning documents, intermunicipal agreements, and other sources.

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17

MAJOR RUSSIAN METROPOLITAN AREAS

HOUSING AND URBAN PLANING SECTORS PERFOMANCE INDICATORS IN MAJOR RUSSIAN METROPOLITAN AREAS[1]

BASIC INDICATORS OF SOCIOECONOMIC DEVELOPMENT

1. Population size and its change in 2010–2016.
2. Household income, international dollars[2] per capita per month in 2016 and growth in real terms in 2010–2016.
3. Average total residential floor space per capita, m^2 of total residential floor space, 2016.
4. Housing prices, international dollars per m^2 of residential floor space.

HOUSING CONSTRUCTION DEVELOPMENT INDICATORS

5. Annual volume of housing construction, thousand m^2 of total floor space, 2016.
6. Annual volume of housing construction, m^2 of total floor space per capita, number of housing units per 1,000 of population, 2016 and growth rate in 2010–2016.
7. Annual volume of housing construction (apartment buildings constructed by development companies), m^2 of total floor space per capita, 2016 and growth rate in 2010–2016.
8. Share of self-built housing construction (single-family houses) in the annual volume of housing construction, % and growth rate in 2010–2016.
9. Annual volume of housing construction per RUB 1 million (~45,000 of international dollars) of aggregate household real incomes, m^2 of total floor space, 2016 and growth rate in 2010–2016.
10. Share of three, four, and five largest companies in the housing construction market, 2017, % of planned housing construction volume according to construction permits issued.

HOUSING AFFORDABILITY INDICATORS

11. Housing price to income ratio and its change in 2010–2016, years.

[1] See detailed reaserch methodology on p. 84.
[2] All monetary indicators are calculated in current Russian Rubles and then are converted in 2016 international dollars using the IMF exchange rate equaled to 23 Rubles per 1 international dollar.

INDICATORS OF HOUSING PRICE SPATIAL DIFFERENTIATION (HOUSING SUPPLY DIVERSITY INDICATOR) AND THE CORRELATION OF HOUSING PRICES WITH THE TRANSPORT CONNECTIVITY OF METROPOLITAN AREAS

12. Correlation between housing market prices and the transport connectivity of the core, 2016.

13. Correlation between housing affordability and housing price spatial differentiation, 2016.

URBAN PLANNING POLICY QUALITY INDICATORS

14. Urban planning regulation stringency index, 2017, on a scale from 0 to 1.

15. Urban sprawl index of metropolitan areas, on a scale from 0 to 1.

16. Urban planning policy spatial coordination index, 2017, on a scale from 0 to 1.

INDICATORS OF THE URBAN ECONOMY, INCLUDING THE HOUSING SECTOR

17. Revenues and expenditures of local budgets of metropolitan area centers, 2010–2016, million of international dollars, and per capita.

18. Tax revenues from property taxes in metropolitan area centers, 2010–2016, million of international dollars, ratio to local budget revenues (%), and per capita.

19. Land rent indicators: increase in the real capitalization of the housing stock, billion of international dollars and % in 2010–2015.

INDICATORS OF THE UTILIZATION OF METROPOLITAN AREA TERRITORIES AND THE POTENTIAL FOR INCREASING UTILIZATION

20. Residential development density and the profile of the weighted-average residential development density depending on the distance from the metropolitan area center, 2017, '000 m^2 of total floor space per hectar.

21. Investment and redevelopment potential: potential for increasing development mass within existing residential developments of the metropolitan areas by increasing the density of such developments, 2017, million m^2, % of existing housing stock, billion of international dollars.

THE KEY CONCLUSIONS

01.

Housing conditions have been improved in 17 major Russian metropolitan areas in recent years. The average housing floor space per capita increased in 16 out of the 17 metropolitan areas (except Moscow) in the range from 1 to 5 m^2 per capita, while in 12 out of the 17 areas the housing price-to-income ratio was below 3 years in 2016 (housing could be considered as affordable according to UN Habitat criteria).

02.

Housing construction volumes in the Russian metropolitan areas considerably exceed those in developed foreign metropolitan areas: 10 residential units per 1,000 people annually on average against 3–4 residential units per 1,000 people.

03.

Since 2005, the housing and urban planning policy has been focused on the priority of increasing new housing supply, as part of the goal to improve housing purchase affordability, which has been successfully achieved: in 2010–2016, in 16 out of the 17 metropolitan areas housing affordability improved, and significantly so in 5 metropolitan areas (Moscow, Saint Petersburg, Novosibirsk, Voronezh, Krasnodar).

04.

A persistent correlation is observed in developed countries: cities offering the most comfortable living conditions are those with stringent urban planning regulation and low market housing affordability. No such pattern has been discovered by analyzing the 17 major Russian metropolitan areas. For example, the Moscow, Saint Petersburg, and Kazan metropolitan areas demonstrate the lowest housing affordability while ranked low among metropolitan areas in terms of the stringency and spatial coordination of urban planning regulation.

05.

Imbalances were identified in 15 of the 17 metropolitan areas in residential density between center and periphery (as distance from the center grows, the density increases instead of decreasing), which had been caused by the large-scale green field development outside the urbanized zones of metropolitan areas (sprawl) in the past years.

06.

This trend is further enhanced by the poor coordination of the urban planning policy between municipalities in metropolitan areas.
For example, in roughly half of the metropolitan areas no limits on the floorage of buildings are established in the areas of high-rise residential development in the cores of metropolitan areas, while such limits are established in the periphery of metropolitan areas at quite high levels (more than 10 floors).

07.

The new housing supply created as a result of this urban planning policy (sprawl) was relatively homogeneous by quality (standard and obsolete designs, poor district facilities), while the main pricing driver was the transport connectivity with the core of the metropolitan area, which concentrates most of the jobs.

08.

The total space of residential developments in built-up areas (mostly in the mid belt of the core cities) of the 17 metropolitan areas could increase by to 987 million m^2 of residential floor space under the assumption of redevelopment with increasing density (which now is relatively low). A full realization of this potential requires investments in housing reconstruction and in the transport, utility, and social infrastructure in the amount of around 3.2 trillion of international dollars, or 84.6 % of the Russian GDP.

09.

The full realization of the built-up areas potential in the urbanized zones of metropolitan areas could increase the housing space per capita in the metropolitan areas by 38 % on average, from 25 to 34.8 m^2 per capita.
Moreover, taking into account potential of single-family housing developments in suburban zones, such an increase may be considerably greater (until now suburban zones were developed by the hise-rise buildings as well). The highest potential for increasing the housing space per capita (to around 40 m^2 per capita — European average) through the redevelopment of built-up territories in the urbanized zone is possible in the four metropolitan areas: Nizhny Novgorod, Kazan, Chelyabinsk, and Voronezh.

10.

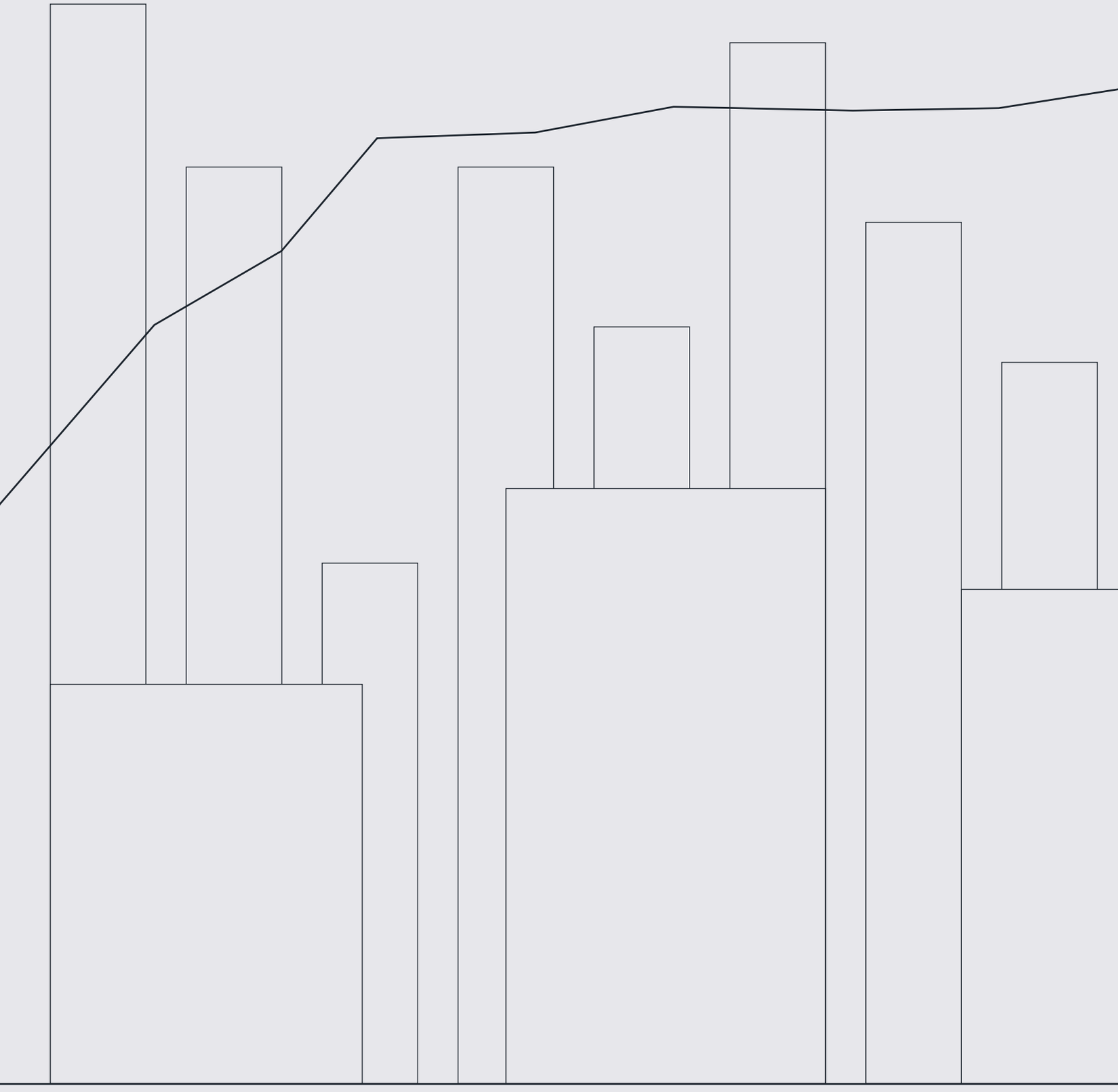
The analysis of the full range of urban planning regulatory documents of the 17 metropolitan areas has shown that the urban planning policy is still a ‘soft’ one, promotes urban sprawl, and is poorly coordinated at the level of municipalities within metropolitan areas. This resulted in the increased price elasticity of new housing supply (sensitivity of construction volumes to increasing demand).

11.

The efficiency of land rent management differs between metropolitan areas: in real terms, in 30 % of metropolitan areas housing stock capitalization reduced or hardly changed between 2010 and 2015, despite the real gross urban product (GUP) growth. Up to now, urban planning development has not been a tool in managing the quality of the housing conditions and urban environment, and had at times a negative effect on the efficiency of urban territory utilization.

12.

Urban real estate does not yet provide a source of finance for urban development and municipal budgets’ investment in such a development payback, despite the significant revenue it generates. On average, urban real estate generates only about 10 % of local budget revenues of metropolitan area centers. The largest of the three real estate taxes is the corporate property tax (around 80 % of property tax collected) passes to the regional budgets (rather than to the municipal ones) and is not used for the development of the urban infrastructure.



BASIC INDICATORS OF SOCIOECONOMIC DEVELOPMENT

01

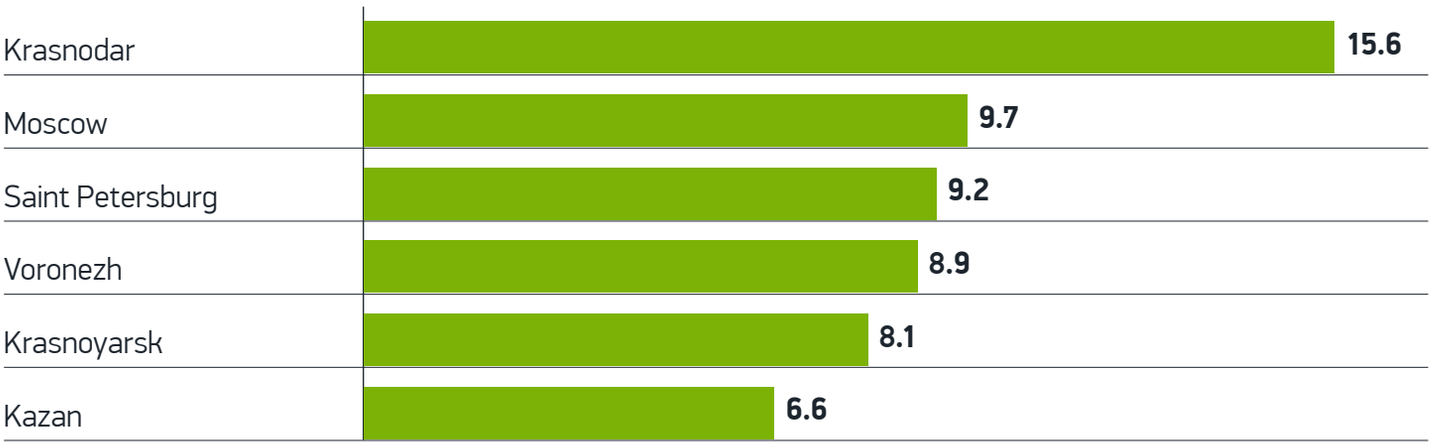
BASIC INDICATORS OF SOCIOECONOMIC DEVELOPMENT

POPULATION (2016)

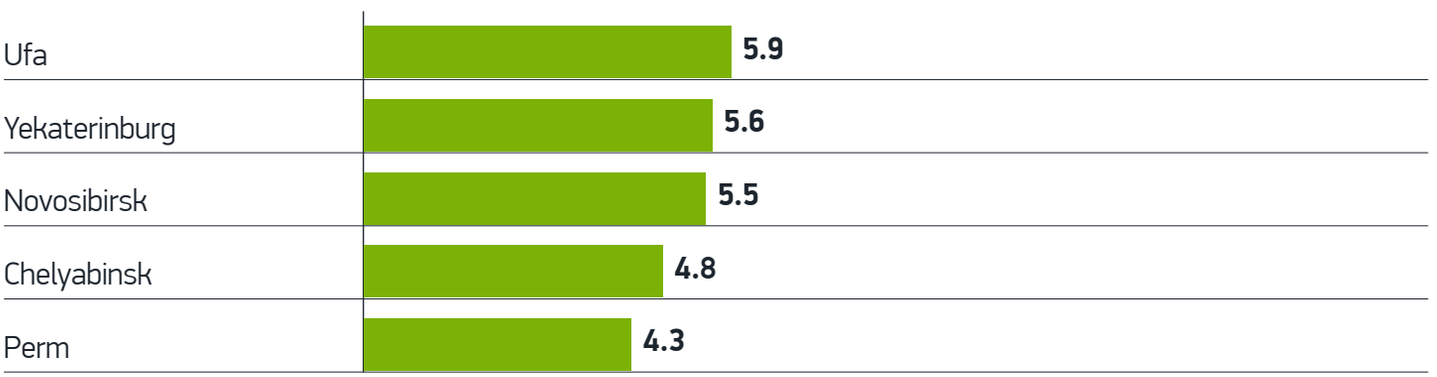
Metropolitan area	**Population,** thousand people
Moscow	17 045
Saint Petersburg	6259
Samara (Togliatti)	2738
Novosibirsk	2229
Yekaterinburg	2201
Nizhny Novgorod	2087
Rostov-on-Don	2084
Kazan	1667
Chelyabinsk	1594
Voronezh	1536
Ufa	1449
Volgograd	1409
Krasnodar	1403
Perm	1350
Krasnoyarsk	1264
Saratov	1231
Vladivostok	1046

POPULATION CHANGE (2010–2016)

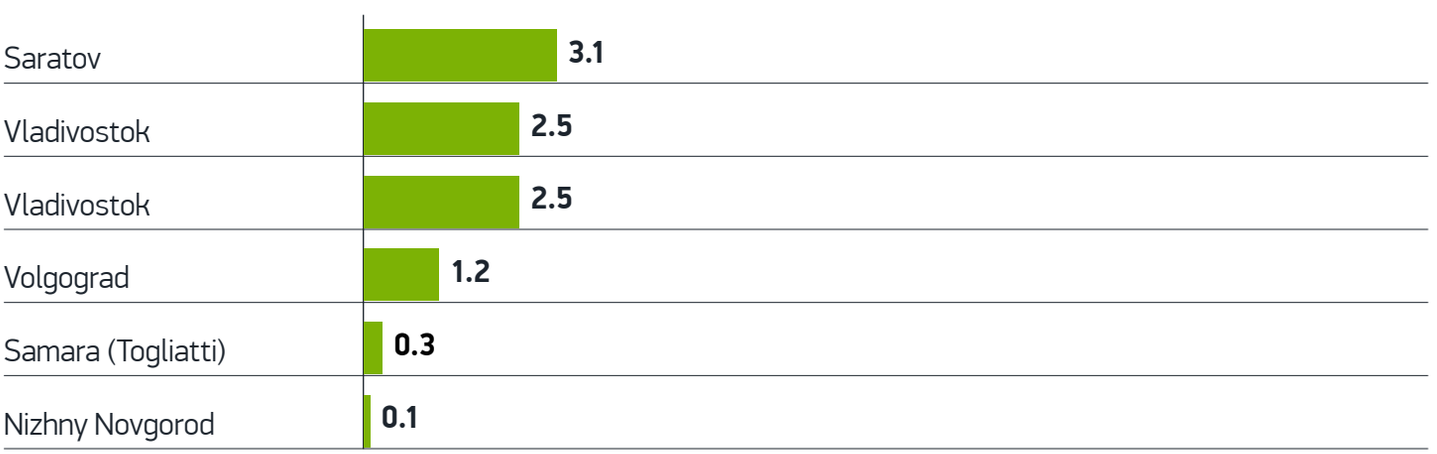
GROWTH LEADERS (6–16 % POPULATION INCREASE IN 7 YEARS), %



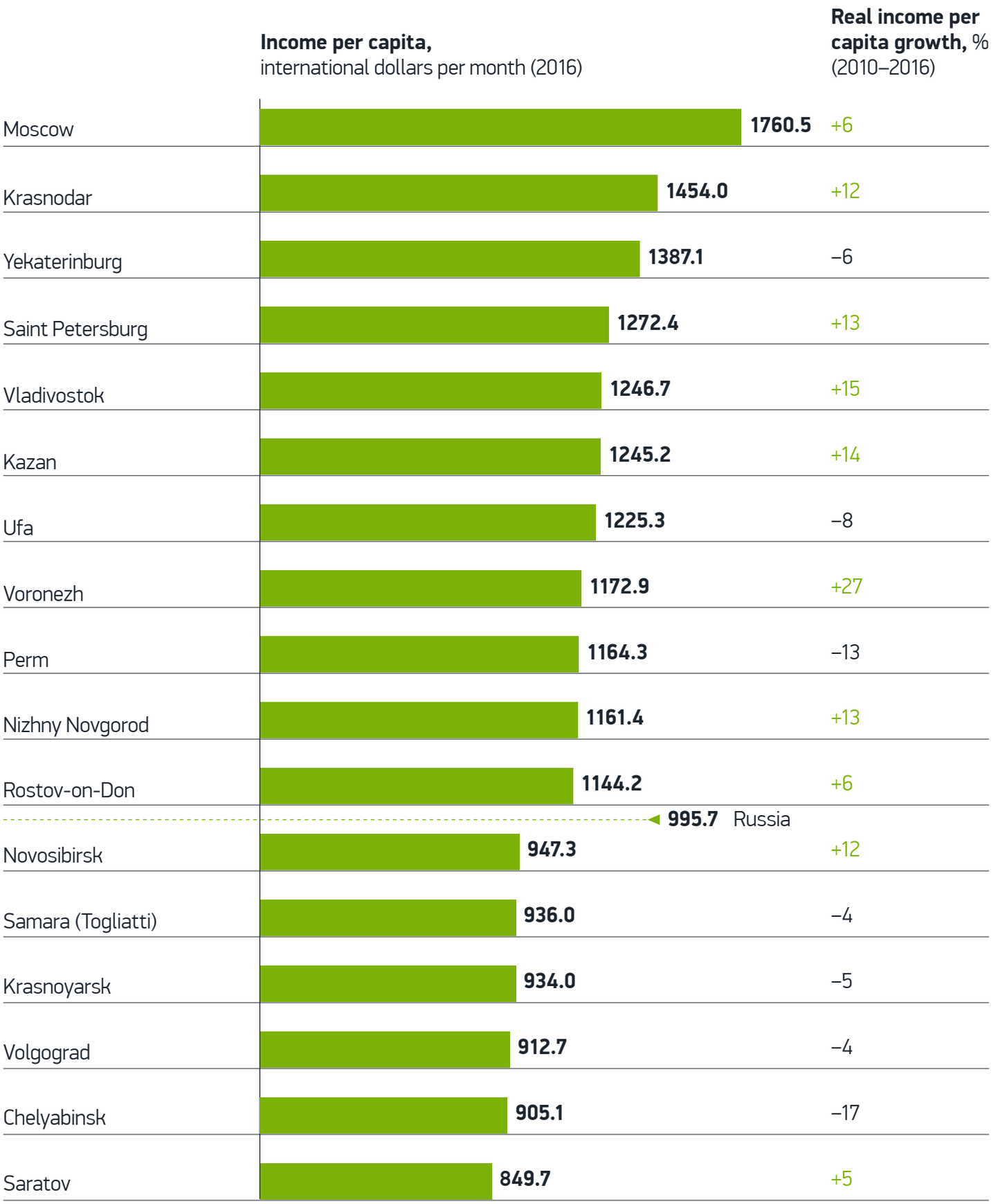
AVERAGE GROWTH RATES (4–6% POPULATION INCREASE IN 7 YEARS), %



GROWTH OUTSIDERS (0–3% POPULATION INCREASE IN 7 YEARS), %



HOUSHOLD INCOME (2016) AND GROWTH RATE IN REAL TERMS (2010–2016)



COMPARISON BETWEEN RUSSIAN AND FOREIGN METROPOLITAN AREAS IN TERMS OF HOUSEHOLD INCOME

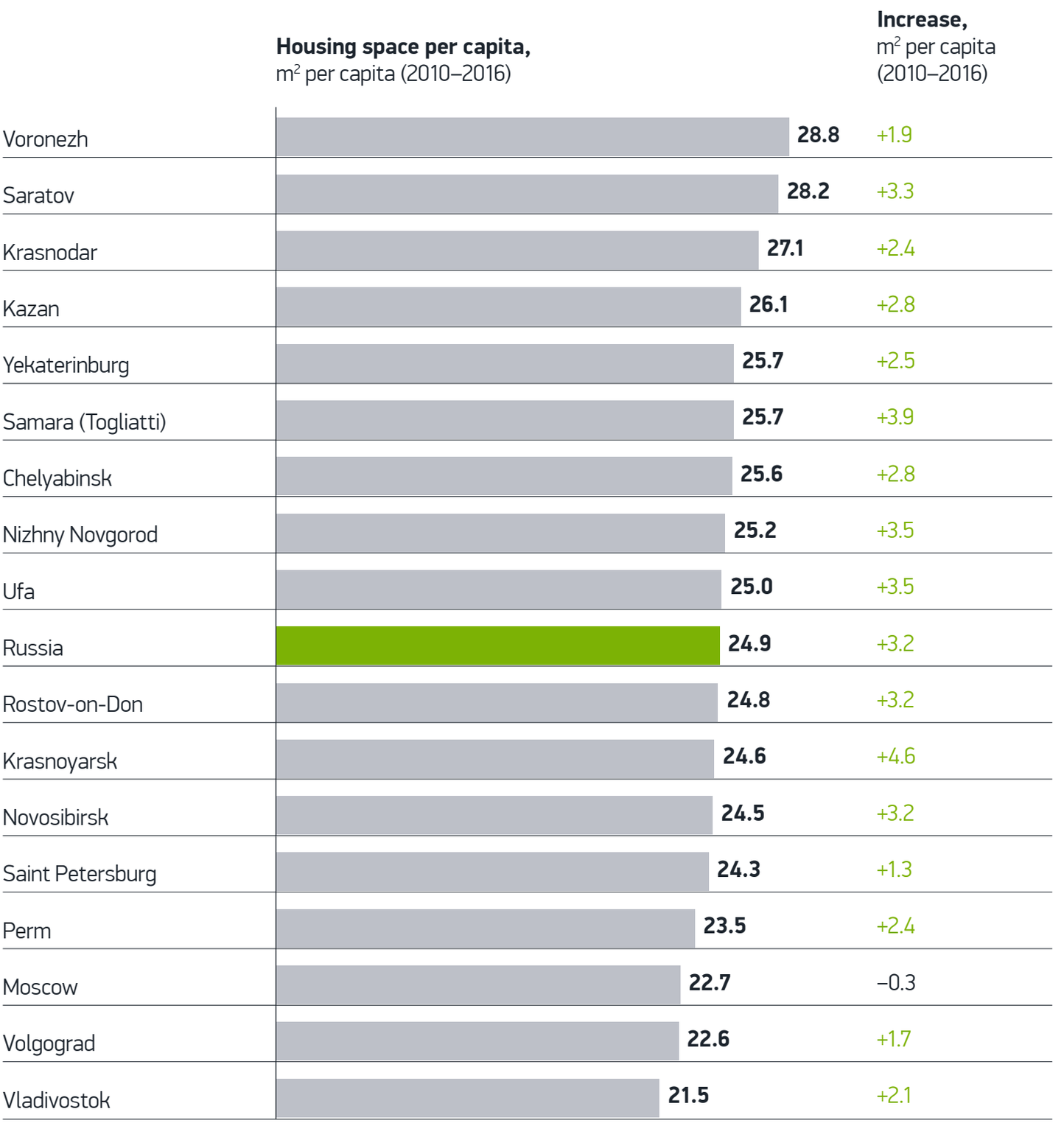
Metropolitan area	**Median monthly income,** USD per capita (based on IMF PPP)
New York	2139
London	3156
Singapore	2584
Dubai	2967

Sources
New York: censusreporter.org/profiles/31000US35620-new-york-newark-jersey-city-ny-nj-pa-metro-area/#income.
London: data.london.gov.uk/dataset/average-income-tax-payers-borough.
Singapore: www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/household_income_and_expenditure/pp-s23.pdf.
Dubai: www.dsc.gov.ae/Report/T%2018.pdf.

THE MEDIAN HOUSEHOLD INCOME IN THE LARGE FOREIGN METROPOLITAN AREAS IS 2–3 TIMES HIGHER THAN IN RUSSIAN ONES.

ONLY THE MOSCOW METROPOLITAN AREA IS COMPARABLE IN TERMS OF HOUSEHOLD INCOME TO, E. G., NEW YORK.

AVERAGE TOTAL RESIDENTIAL FLOOR SPACE PER CAPITA

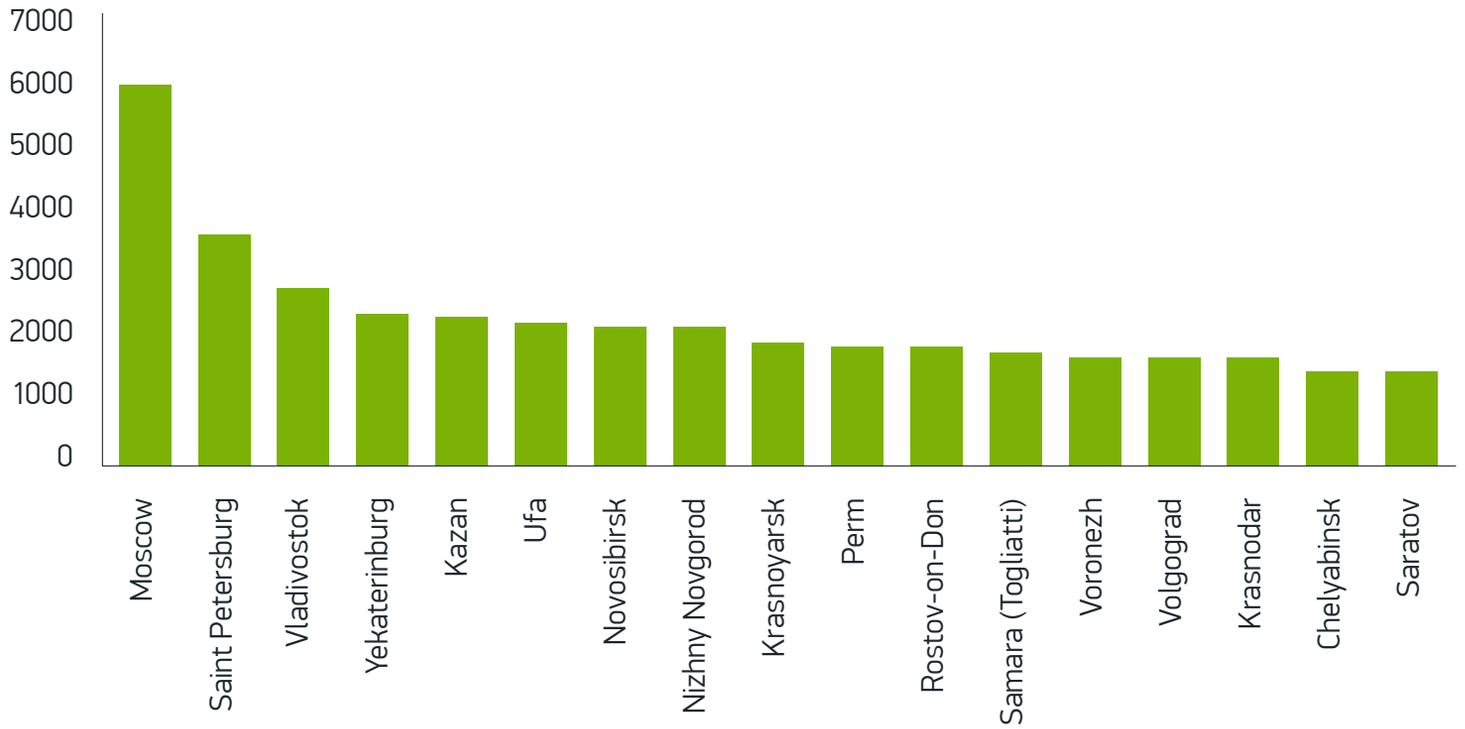


Only in 8 of the 17 metropolitan areas, the housing space per capita is higher than the national average.

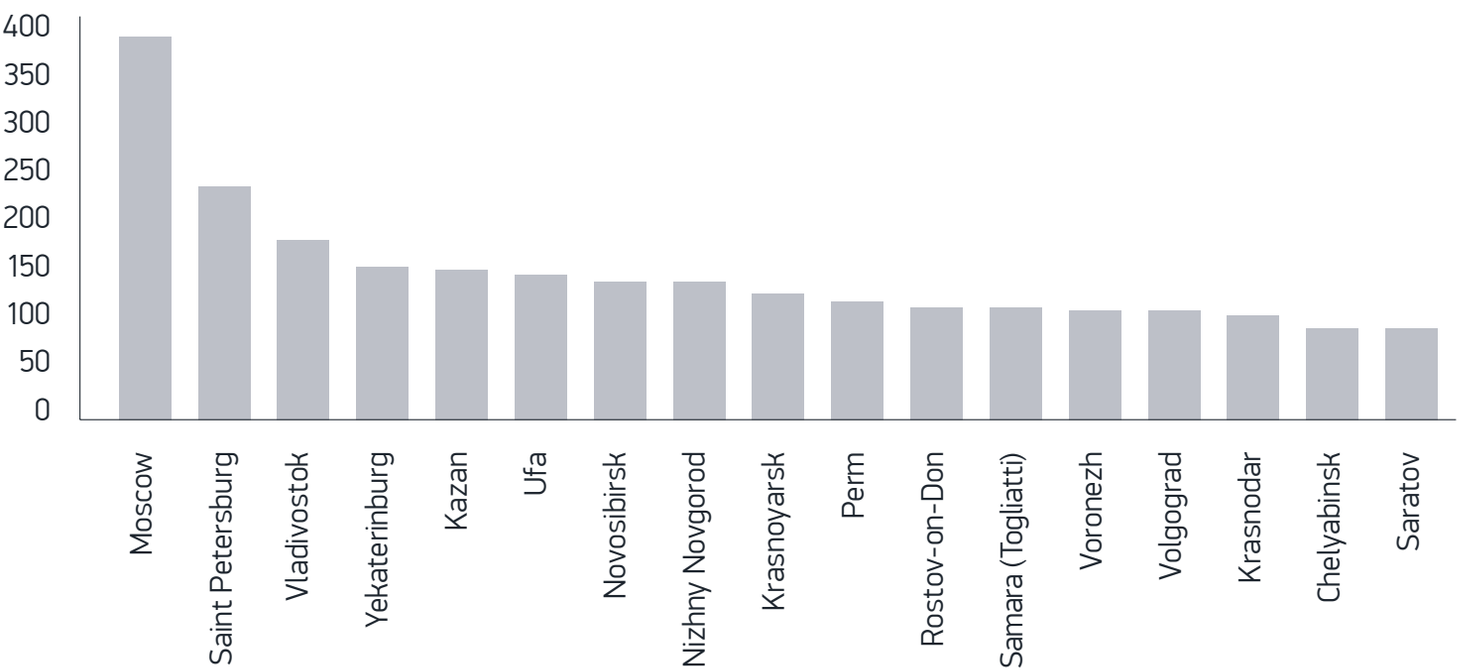
Over 7 years, the housing space per capita increased by 1.3–4.6 m², except for the Moscow metropolitan area (–0.3 m²).

HOUSING PRICES

HOUSING PRICES, INTERNATIONAL DOLLARS PER M² (2016)



HOUSING PRICES, THOUSAND OF INTERNATIONAL DOLLARS PER STANDARD FLAT (54 M²), 2016



COMPARISON BETWEEN RUSSIAN AND FOREIGN METROPOLITAN AREAS IN TERMS OF HOUSING PRICES

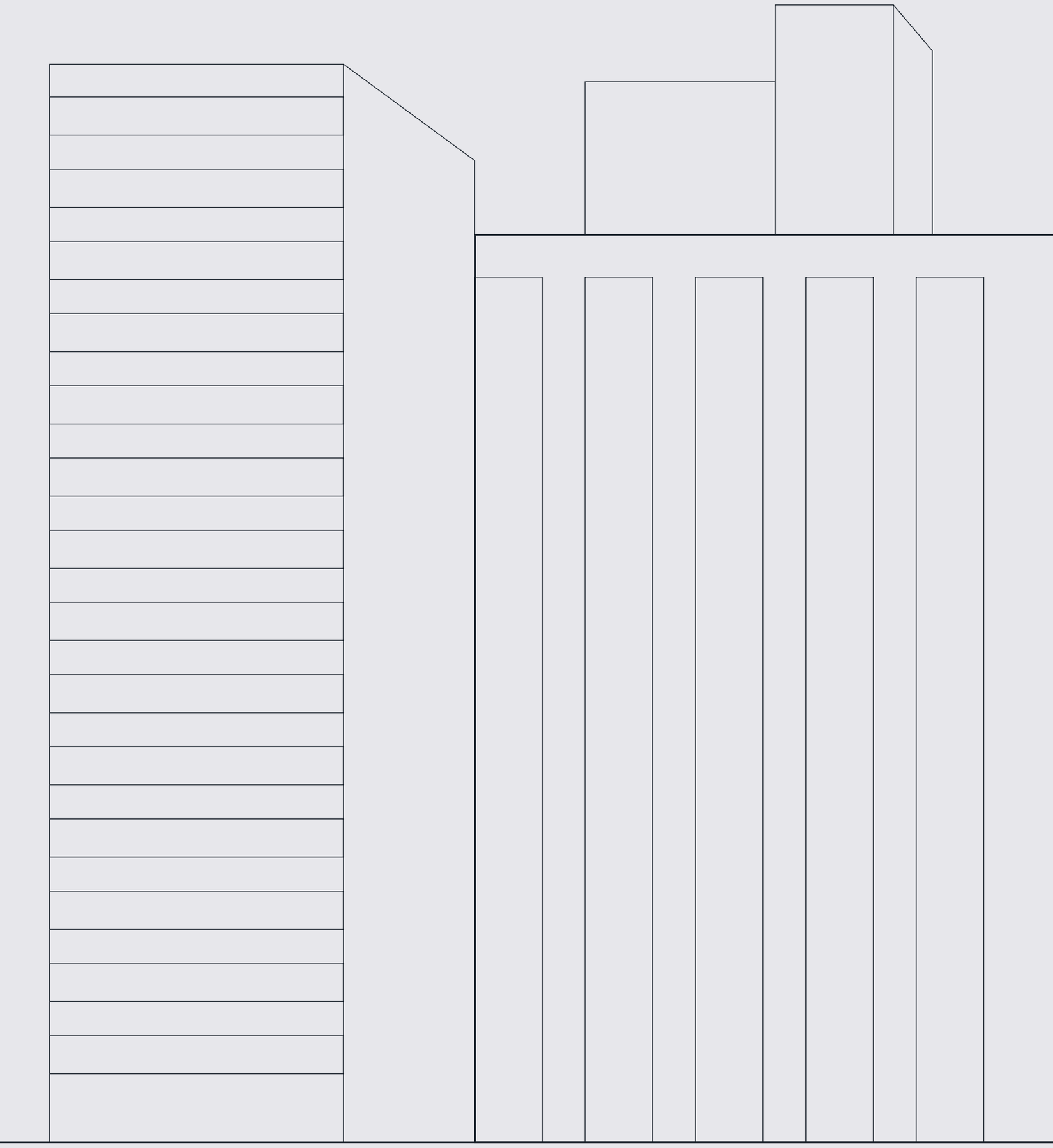
Metropolitan area	**Average price of 1 m² of housing,** USD
London	14,960.0
Singapore	13,718.0
Shanghai	10,893.0
New York	10,272.0
Nuremberg	4027.0
Dubai	3539.0
Rio de Janeiro	2865.5
Delhi	2054.0
Poznan	1779.0
Almaty	1165.0

Source:
Numbeo global living conditions database: www.numbeo.com/cost-ofliving.

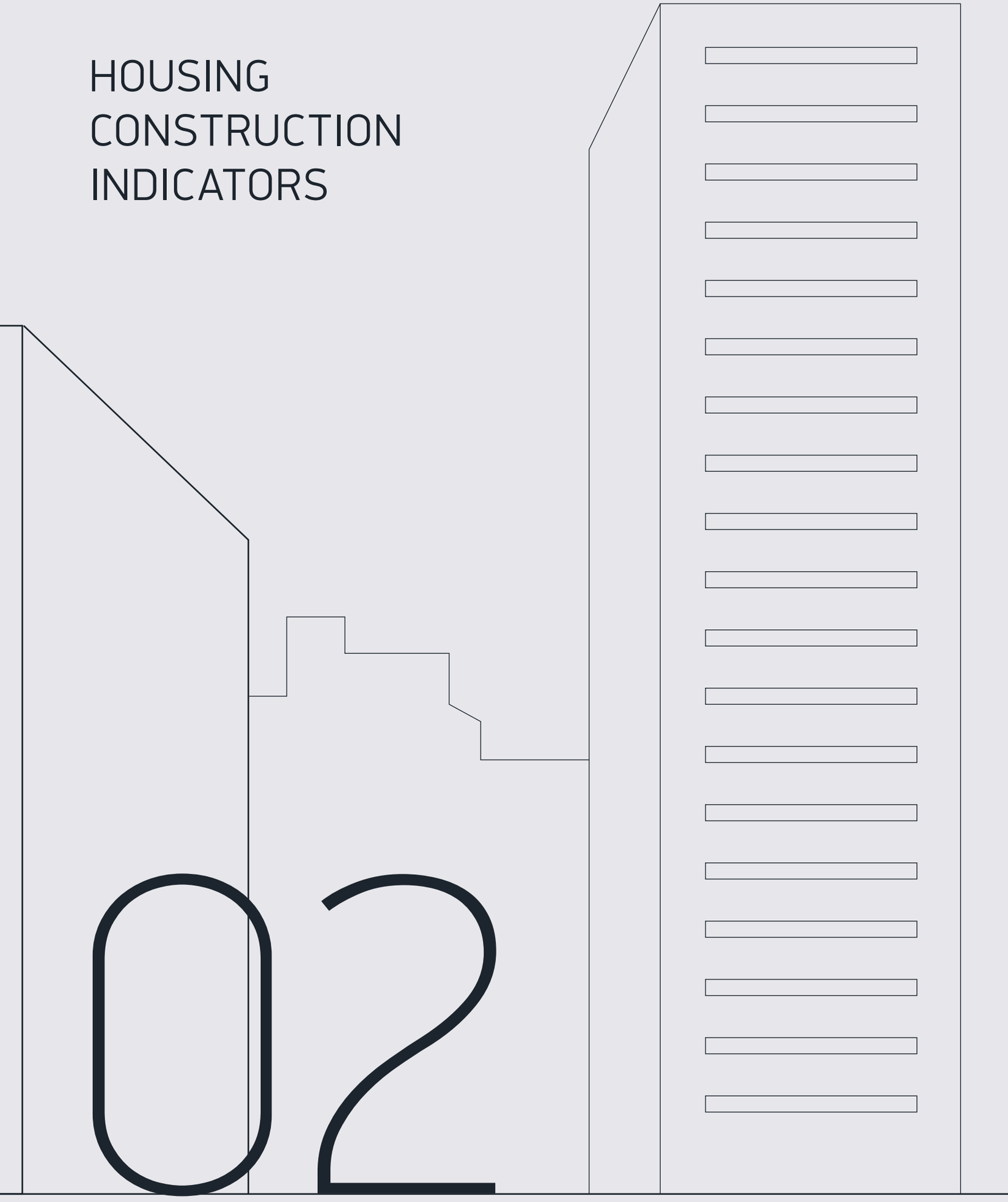
The price is calculated as the arithmetic mean of the price range limits in the housing market in the city center and in the suburbs.

NEW YORK, LONDON, SINGAPORE, AND SHANGHAI SIGNIFICANTLY OUTPERFORM THE MOST EXPENSIVE MOSCOW METROPOLITAN AREA.

HOUSING PRICES IN DUBAI ARE COMPARABLE TO THOSE IN THE SAINT PETERSBURG METROPOLITAN AREA. THOSE IN VLADIVOSTOK ARE COMPARABLE TO THOSE IN RIO DE JANEIRO.



HOUSING CONSTRUCTION INDICATORS



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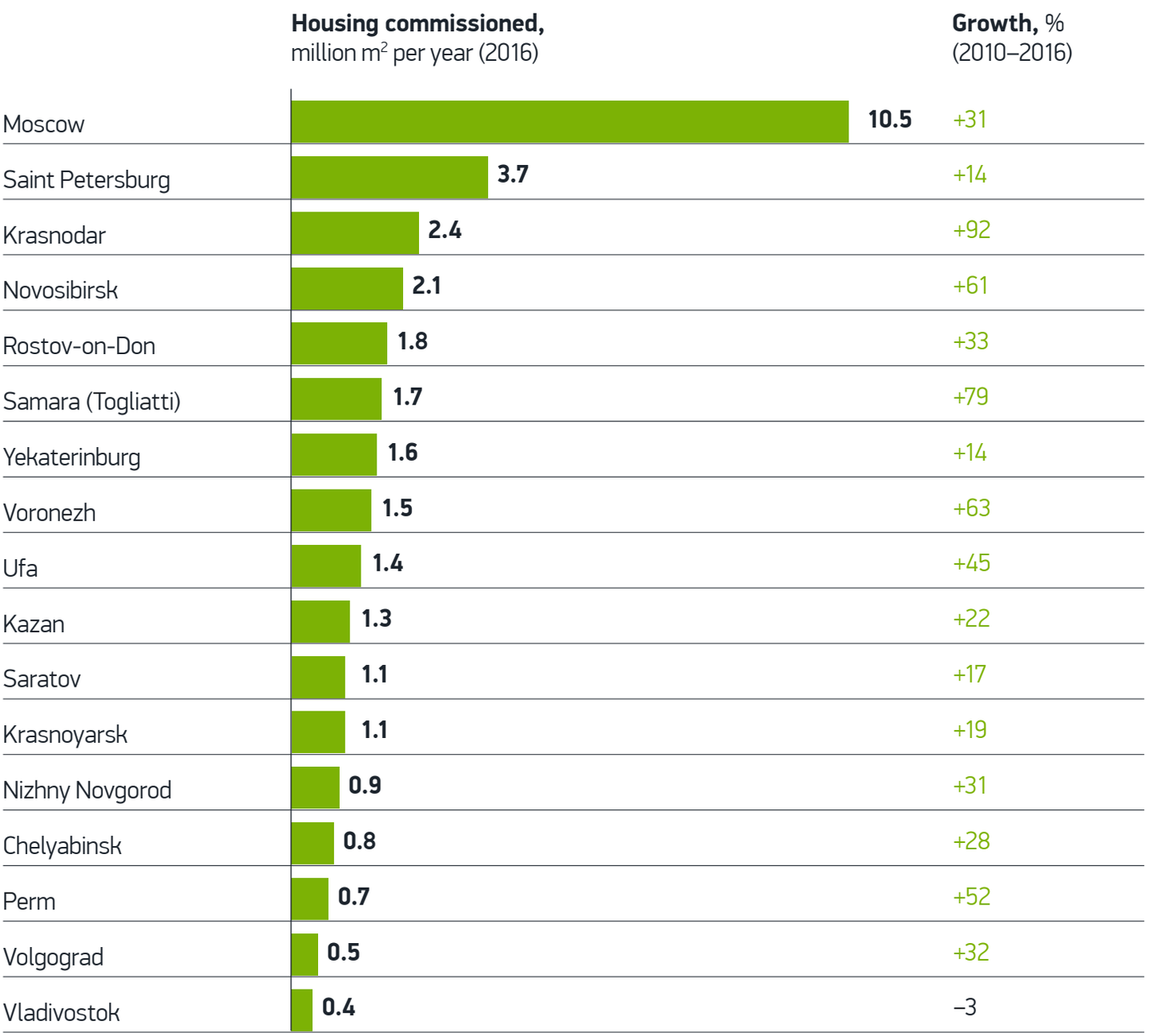
HOUSING CONSTRUCTION INDICATORS

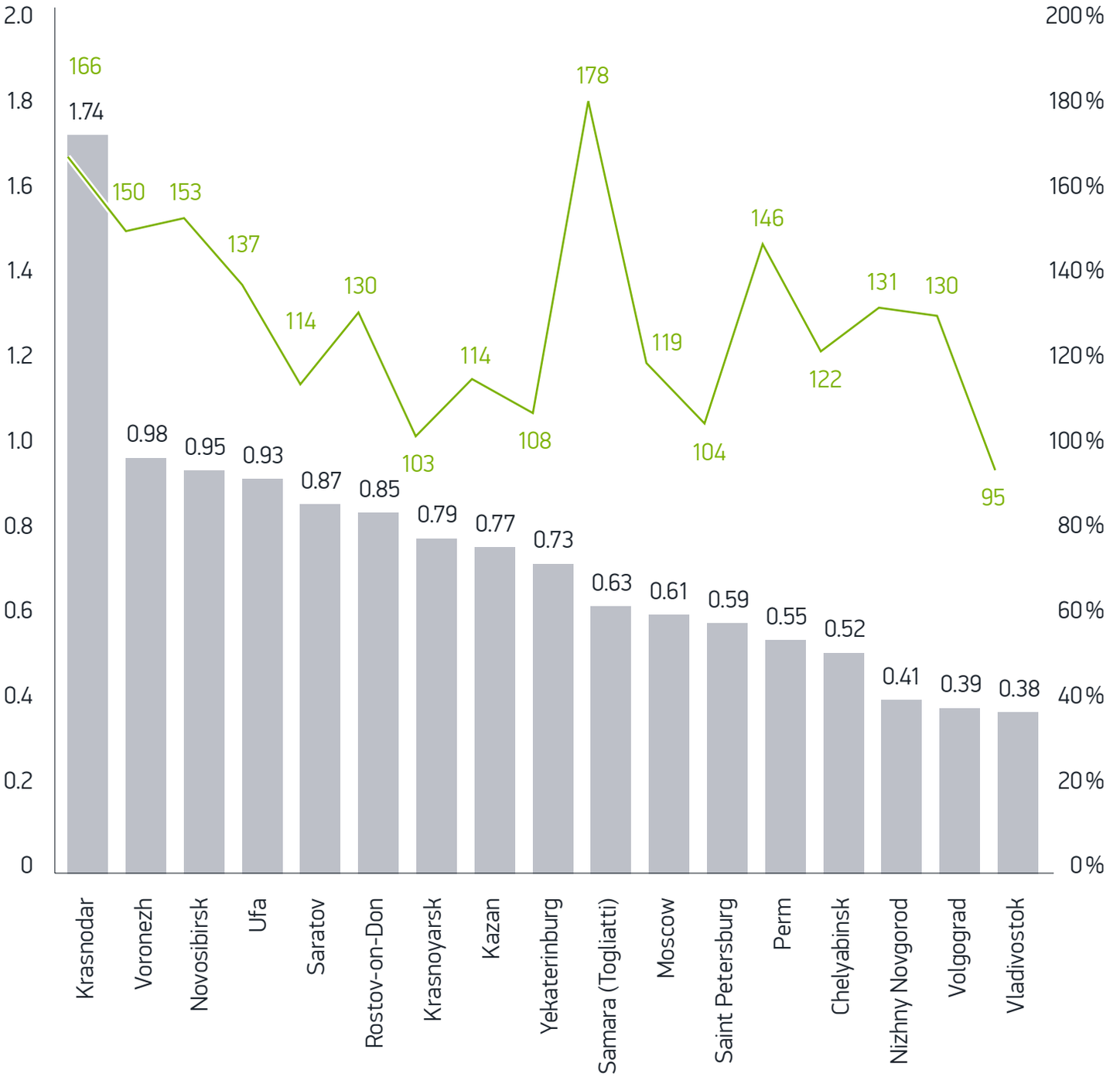
ANNUAL HOUSING CONSTRUCTION VOLUME (2016)



The housing construction volume in the 17 metropolitan areas is 33.5 million m², or 42 % of housing constriuction volume in Russia.

The housing construction volume increase over 7 years was between 14 % and 92 %, except for the Vladivostok metropolitan area (–3 %).

ANNUAL VOLUME OF HOUSING CONSTRUCTION, M² OF TOTAL FLOOR SPACE PER CAPITA, 2016 AND GROWTH RATE IN 2010–2016



Housing commissioned per capita (2016)

Housing commissioned per capita change, % (2010–2016)

ANNUAL VOLUME OF HOUSING CONSTRUCTION, NUMBER OF HOUSING UNITS PER 1,000 OF POPULATION, 2016

THE NUMBER OF NEWLY BUILT HOUSING UNITS PER 1,000 OF POPULATION IS SEVERAL TIMES GREATER IN RUSSIAN METROPOLITAN AREAS THAN IN FOREIGN METROPOLITAN AREAS

Metropolitan area	Housing units completed per 1,000 of population
Dubai	4.37
Singapore	3.86
New York	3.25
London	3.25
Poznan	2.08
Nuremberg	0.42

Russia average —

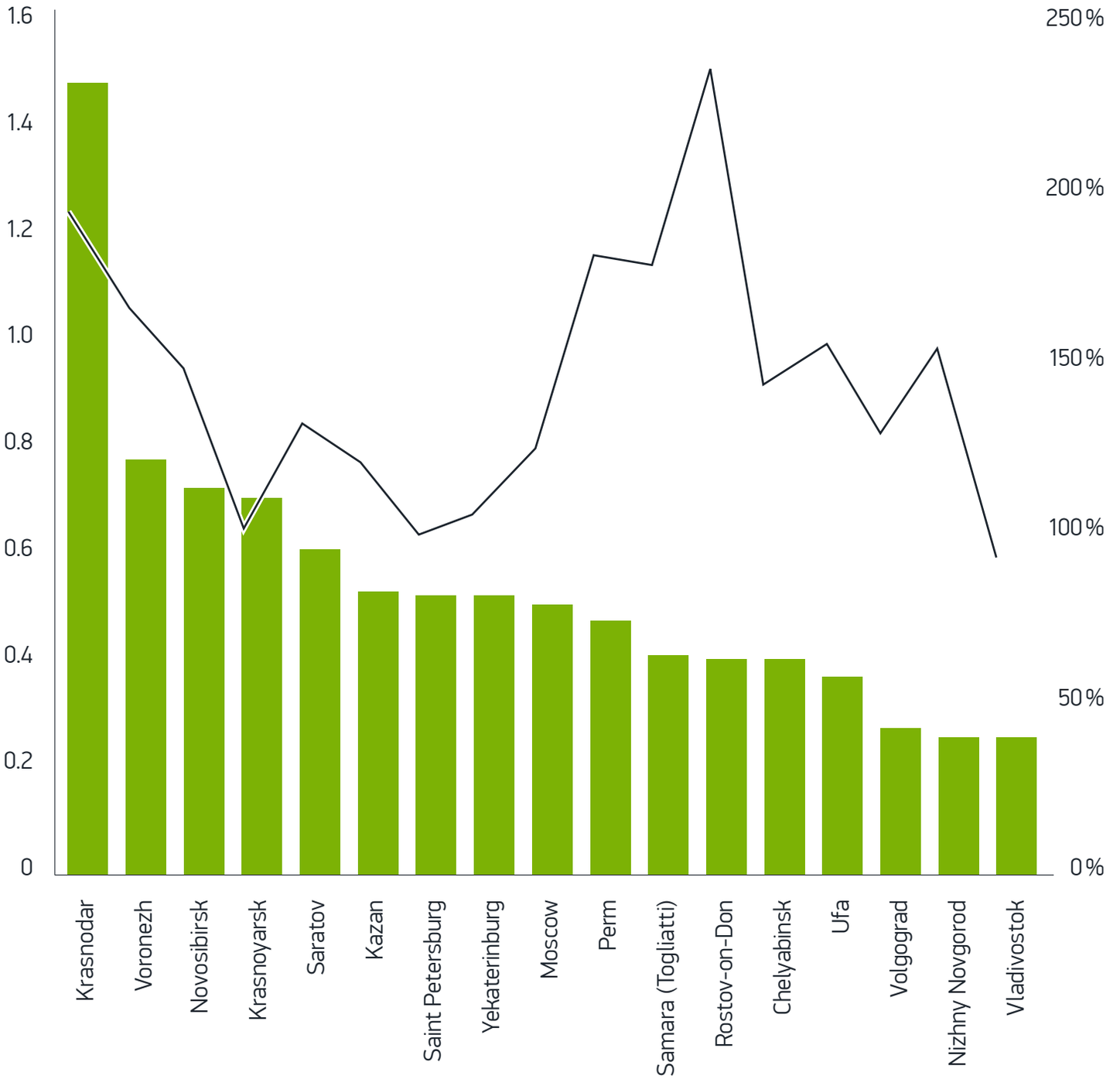
7.9

HOUSING UNITS PER 1,000 OF POPULATION

Metropolitan area	Housing units completed per 1,000 of population
Krasnodar metropolitan area	30.00
Voronezh metropolitan area	16.24
Novosibirsk metropolitan area	15.37
Krasnoyarsk metropolitan area	13.92
Saratov metropolitan area	13.59
Kazan metropolitan area	11.89
Yekaterinburg metropolitan area	11.48
Ufa metropolitan area	11.43
Rostov-on-Don metropolitan area	11.15
Saint Petersburg metropolitan area	10.42
Moscow metropolitan area	10.33
Perm metropolitan area	9.48
Samara (Togliatti) metropolitan area	9.46
Chelyabinsk metropolitan area	8.57
Nizhny Novgorod metropolitan area	6.10
Volgograd metropolitan area	6.05
Vladivostok metropolitan area	5.86

Sources
New York: www.census.gov/construction/nrc;London https://data.london.gov.uk/dataset/housing-london/resource/27e10d40-bb04-4028-95a6-606bd13d7777
Singapore: www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/reference/sif2017.pdf
Dubai: www.dsc.gov.ae/Report/Copy%20of%20DSC_SYB_2016_02%20_%2002.pdf
Poznan: poznan.stat.gov.pl/en/current-studies/communiqus-and-announcements/bulletins/statistical-bulletin-poznan-iv-quarter-2016,2,23.html
Nuremberg: www.regionalstatistik.de

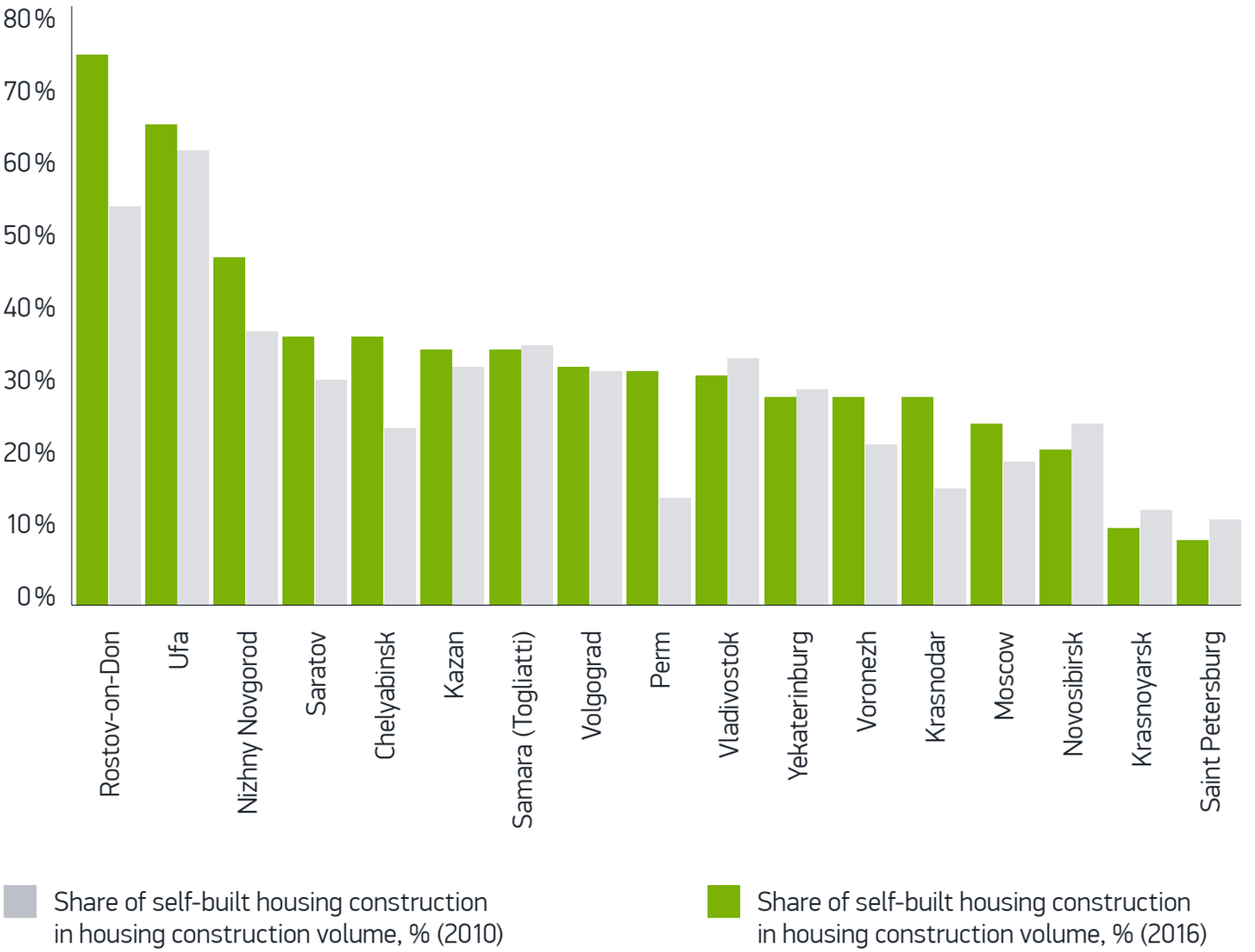
ANNUAL VOLUME OF HOUSING CONSTRUCTION (APARTMENT BUILDINGS CONSTRUCTED BY DEVELOPMENT COMPANIES), M² OF TOTAL FLOOR SPACE PER CAPITA, 2016 AND GROWTH RATE IN 2010–2016)



Total floor space of flats in apartment builings commissioned per capita, 2016

Total floor space of flats in apartment builings commissioned per capita change (2010–2016)

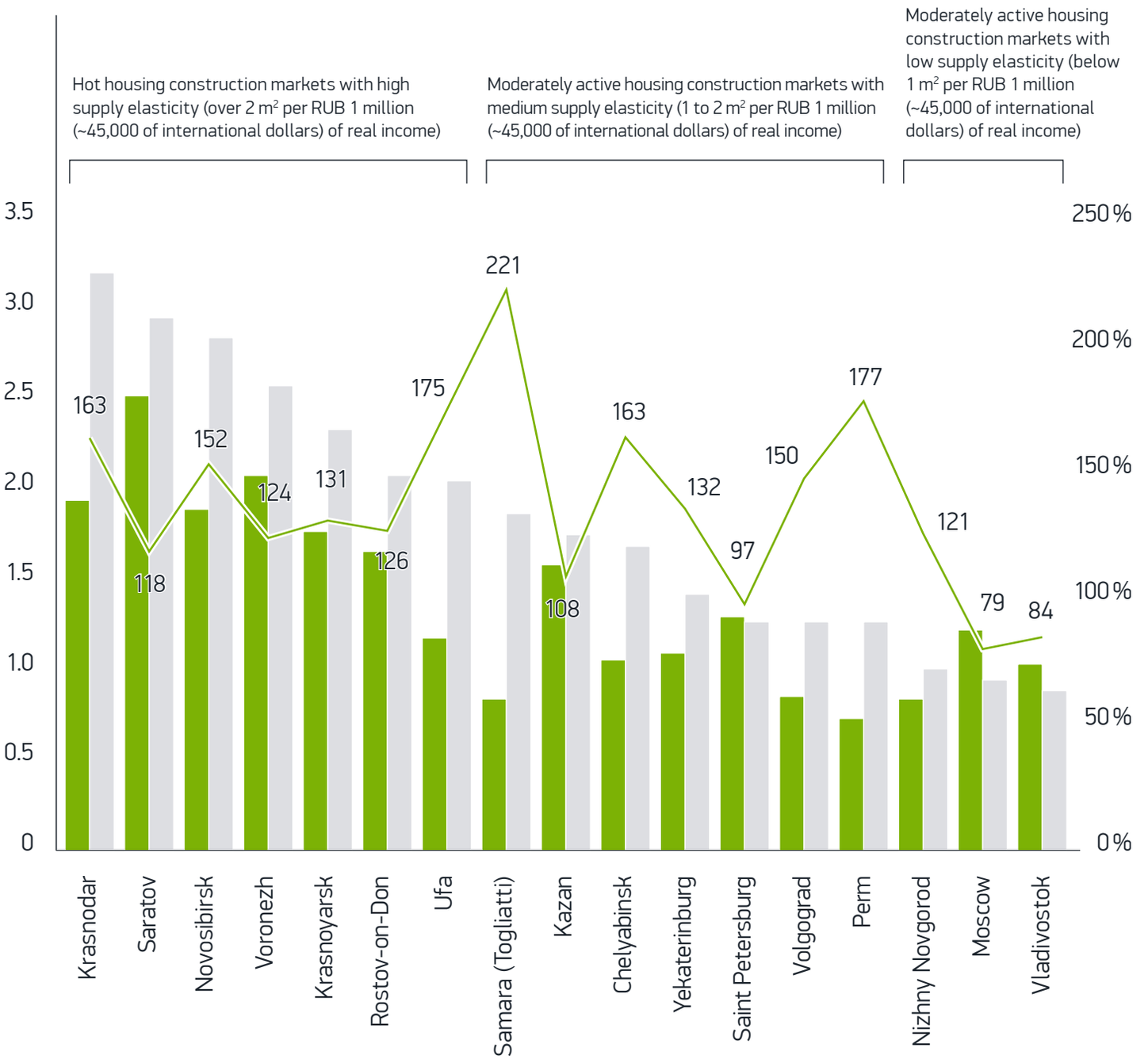
SHARE OF SELF-BUILT HOUSING CONSTRUCTION (SINGLE-FAMILY HOUSES) IN THE ANNUAL VOLUME OF HOUSING CONSTRUCTION, % AND GROWTH RATE IN 2010–2016



A REDUCING SHARE OF SELF-BUILT SINGLE-FAMILY HOUSING CONSTRUCTION IN THE TOTAL HOUSING CONSTRUCTION VOLUME IS COMMON TREND FOR THE THE MOST OF METROPOLITAN AREAS AS WELL AS FOR THE COUNTRY AS A WHOLE.

ONLY THE UFA AND ROSTOV-ON-DON METROPOLITAN AREAS DEMONSTRATE HIGH SHARES OF SELF-BUILT SINGLE-FAMILY HOUSING CONSTRUCTION, I. E. OVER 50 % OF HOUSING CONSTRUCTION.

ANNUAL VOLUME OF HOUSING CONSTRUCTION PER RUB 1 MILLION (~45.000 OF INTERNATIONAL DOLLARS) OF AGGREGATE HOUSEHOLD REAL INCOMES, M² OF TOTAL FLOOR SPACE, 2016 AND GROWTH RATE IN 2010–2016



Annual volume of housing construction per Rub 1 million (~45,000 of international dollars) of aggregate household real incomes, m² of total floor space (2010)

Annual volume of housing construction per Rub 1 million (~45,000 of international dollars) of aggregate household real incomes, m² of total floor space (2016)

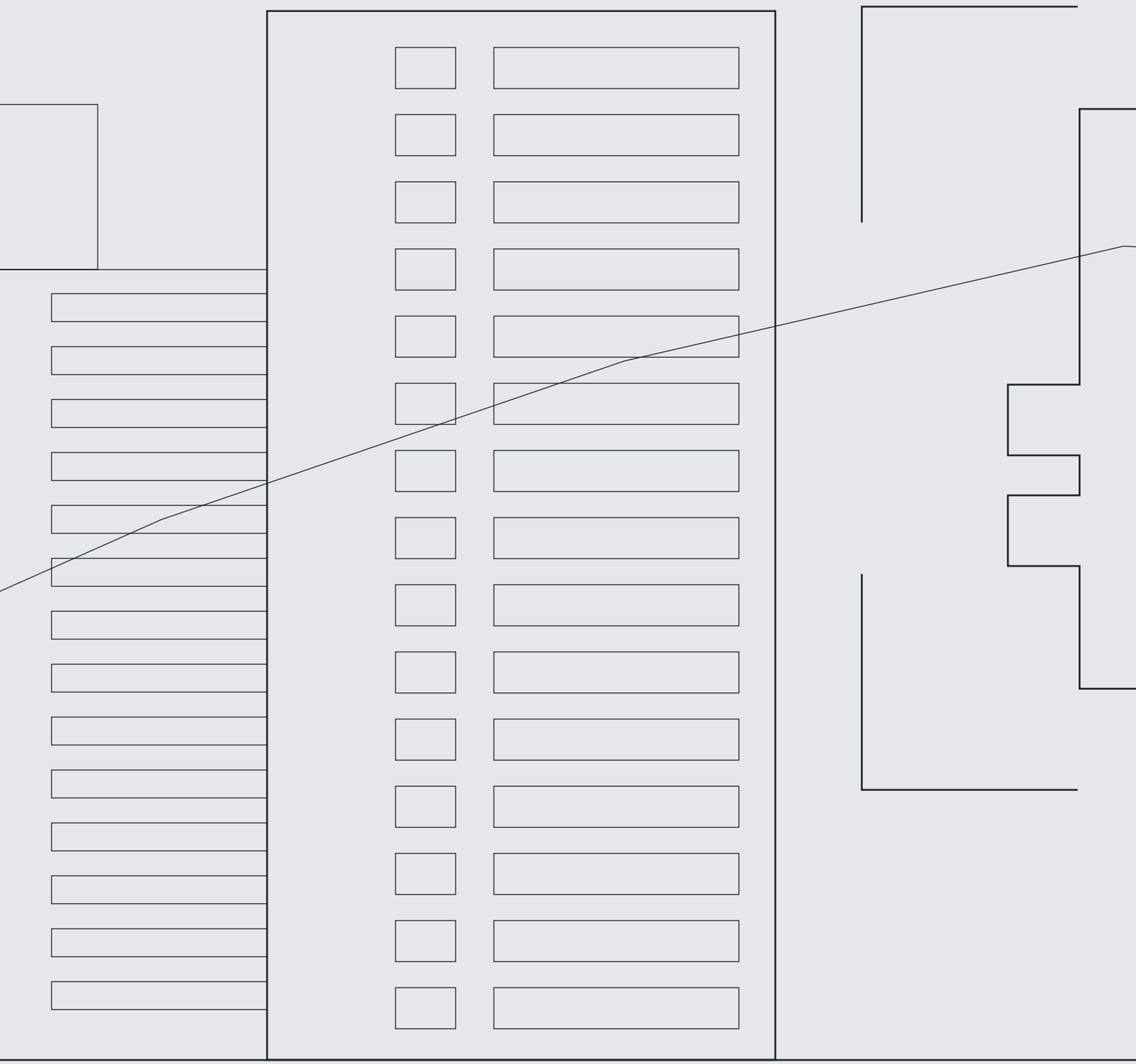
Growth rate, % (2010–2016)

SHARE OF THREE, FOUR, AND FIVE LARGEST COMPANIS IN THE HOUSING CONSTRUCTION MARKET, % OF PLANNED HOUSING CONSTRUCTION VOLUME ACCORDING TO CONSTRUCTION PERMITS ISSUED

Metropolitan area	Share of three largest companis	Share of four largest companis	Share of five largest companis	Total companis
Voronezh	48 %	54 %	59 %	51
Nizhny Novgorod	37 %	44 %	47 %	74
Saint Petersburg	32 %	37 %	41 %	186
Chelyabinsk	32 %	40 %	48 %	47
Saratov	31 %	38 %	45 %	37
Kazan	30 %	38 %	46 %	42
Volgograd	29 %	35 %	40 %	47
Krasnoyarsk	29 %	35 %	41 %	60
Samara (Togliatti)	29 %	36 %	42 %	64
Vladivostok	28 %	34 %	39 %	36
Ufa	26 %	32 %	37 %	63
Perm	25 %	32 %	38 %	47
Yekaterinburg	22 %	27 %	31 %	68
Rostov-on-Don	22 %	25 %	29 %	127
Moscow	19 %	21 %	24 %	293
Krasnodar	16 %	20 %	24 %	123
Novosibirsk	16 %	21 %	25 %	105

Metropolitan area	Share of four largest companies
Cincinnati	47.7 %
Birmingham	40.8 %
Baltimore	36.8 %
Columbus	36.5 %
Jacksonville	33.7 %
San Diego	30.1 %
Saint Louis	28.6 %
Charlotte	28.4 %
Indianapolis	28.3 %
Portland	27.5 %
Atlanta	26.3 %
Phoenix	24.9 %
Philadelphia	24.5 %
Dallas	24.3 %
Saint Petersburg	24.0 %
Los Angeles	23.8 %
San Antonio	22.5 %
Denver	19.7 %

Sources:
Russian metropolitan areas: calculation based on planned housing construction volume according to construction permits issued as of December 2017.
Foreign metropolitan areas: Beck, J., Scott, F., Yelowitz, F. Concentration and Market Structure in Local Real Estate Markets. Real Estate Economics, 2012, vol. 40, no. 3 — pp. 422–460.



HOUSING AFFORDABILITY INDICATORS

03

HOUSING AFFORDABILITY INDICATORS

HOUSING PRICE TO INCOME RATIO AND ITS CHANGE (2010–2016)

№	**Metropolitan area**	**Housing price to income ratio,** years (2016)	**Growth,** years (2010–2016)	**Housing affordability level** (2016)	**2010–2016 trend**
1	Moscow	5.3	–2.2	Severely unaffordable	Significant increase in housing affordability
2	Saint Petersburg	4.4	–2.0	Seriously unaffordable	Significant increase in housing affordability
3	Novosibirsk	3.6	–1.8	Moderately unaffordable	Significant increase in housing affordability
4	Vladivostok	3.4	–1.3		Moderate increase in housing affordability
5	Krasnoyarsk	3.2	–0.4		Moderate increase in housing affordability
6	Kazan	2.9	–0.4		Moderate increase in housing affordability
7	Nizhny Novgorod	2.9	–0.7		Moderate increase in housing affordability
8	Volgograd	2.9	–0.7		Moderate increase in housing affordability
9	Ufa	2.9	+0.0		No change
10	Samara (Togliatti)	2.8	–0.8		Moderate increase in housing affordability
11	Yekaterinburg	2.6	–0.5	Affordable	Moderate increase in housing affordability
12	Saratov	2.6	–0.5		Moderate increase in housing affordability
13	Perm	2.4	0.0		No change in housing affordability
14	Chelyabinsk	2.4	–0.1		Insignificant increase in housing affordability
15	Rostov-on-Don	2.4	–0.8		Moderate increase in housing affordability
16	Voronezh	2.2	–1.1		Significant increase in housing affordability
17	Krasnodar	1.8	–0.9		Significant increase in housing affordability

HOUSING PRICE TO INCOME RATIO IN FOREIGN METROPOLITAN AREAS

HOUSING PRICE TO INCOME RATIO, YEARS

Metropolitan area	2010	2011	2012	2013	2014	2015	2016
New York	6.1	6.2	6.2	6.2	6.1	5.9	5.7
London	7.2	6.9	7.8	7.3	8.5	8.5	8.5
Singapore	—	—	5.9	5.1	5	5	4.8
Hong Kong	11.4	12.6	13.5	14.9	17	19	18.1

Source: Annual Demographia International Housing Affordability Survey, 2011–2017.

OVERALL HOUSING AFFORDABILITY IN RUSSIAN METROPOLITAN AREAS IS HIGHER THAN IN SOME FOREIGN METROPOLITAN AREAS. HOWEVER, THE CALCULATION FOR RUSSIA IS BASED ON THE LOWER RESIDENCE AREA (54 M^2).

LONDON AND HONG KONG: PERSISTENT DECREASE IN HOUSING AFFORDABILITY; NEW YORK AND SINGAPORE: INSIGNIFICANT INCREASE IN HOUSING AFFORDABILITY. RUSSIAN METROPOLITAN AREAS: OPPOSITE TREND TOWARDS MODERATE OR SIGNIFICANT INCREASE IN HOUSING AFFORDABILITY.

INDICATORS OF HOUSING PRICE SPATIAL DIFFERENTIATION (HOUSING SUPPLY DIVERSITY INDICATOR) AND THE CORRELATION OF HOUSING PRICES WITH THE TRANSPORT CONNECTIVITY OF METROPOLITAN AREAS

04

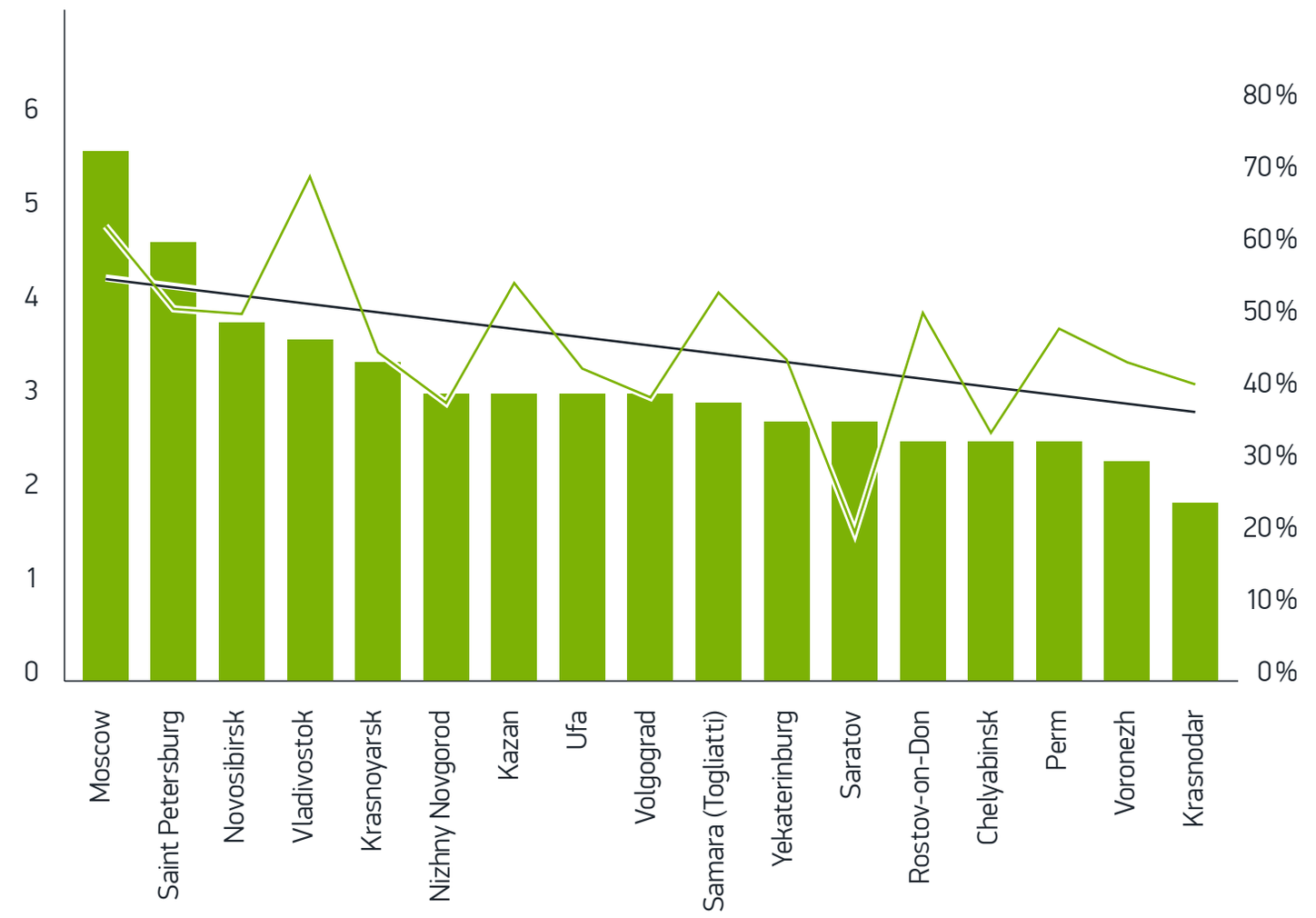
INDICATORS OF HOUSING PRICE SPATIAL DIFFERENTIATION AND THE CORRELATION OF HOUSING PRICES WITH THE TRANSPORT CONNECTIVITY OF METROPOLITAN AREAS

CORRELATION BETWEEN HOUSING MARKET PRICES AND THE TRANSPORT CONNECTIVITY OF THE CORE, 2016

Metropolitan area	Correlation between the housing price and commute time from the core	Metropolitan area	Correlation between the housing price and commute time from the core
Nizhny Novgorod	0.957	Saratov	0.774
Paris	0.929	Krasnoyarsk	0.773
Kazan	0.897	Moscow	0.742
Saint Petersburg	0.892	Samara (Togliatti)	0.725
Chelyabinsk	0.889	New York	0.722
Ufa	0.844	Volgograd	0.700
Vladivostok	0.843	Voronezh	0.693
Novosibirsk	0.828	Perm	0.668
San Francisco	0.814	Krasnodar	0.629
Yekaterinburg	0.811	Rostov-on-Don	0.578
London	0.779	Los Angeles	0.237

A MAJORITY OF THE LARGE METROPOLITAN AREAS ARE CHARACTERIZED BY A HIGH DEGREE OF CORRELATION BETWEEN HOUSING PRICES AND THE AVERAGE COMMUTE TIME FROM THE CORE CENTER: TRANSPORT CONNECTIVITY IS AN ESSENTIAL FACTOR OF PRICING IN THE HOUSING MARKET.

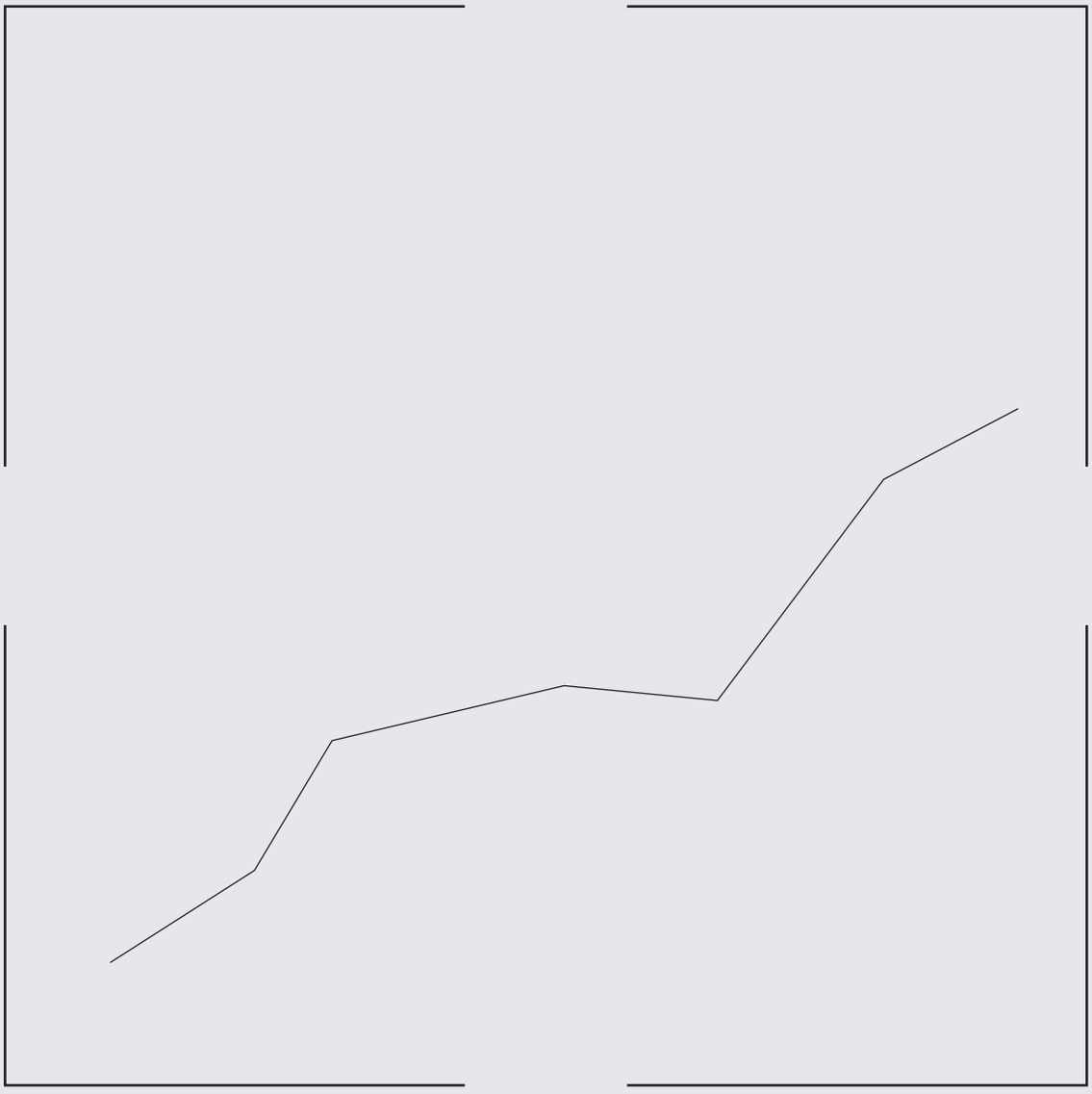
CORRELATION BETWEEN HOUSING AFFORDABILITY AND HOUSING PRICE SPATIAL DIFFERENTIATION (2016)



Housing price to income ratio (left axis), years (2016)

Housing price differentiation across metropolitan area – variation ratio (right axis), (2016)

Housing price variation ratio trend across metropolitan area



URBAN PLANNING POLICY QUALITY INDICATORS

05

URBAN PLANNING POLICY QUALITY INDICATORS

URBAN PLANNING REGULATION STRINGENCY INDEX (2017), ON A SCALE FROM 0 TO 1

Rank	Metropolitan area	Index value
1	Novosibirsk	0.79
2	Volgograd	0.67
3	Yekaterinburg	0.67
4	Krasnodar	0.63
5	Perm	0.63
6	Samara (Togliatti)	0.58
7	Voronezh	0.54
8	Krasnoyarsk	0.54
9	Vladivostok	0.50
10	Moscow	0.50
11	Nizhny Novgorod	0.50
12	Saratov	0.50
13	Chelyabinsk	0.50
14	Saint Petersburg	0.46
15	Ufa	0.42
16	Kazan	0.28
17	Rostov-on-Don	0.25

From more stringent to less stringent regulation

URBAN PLANNING REGULATION STRINGENCY INDEX (WHARTON RESIDENTIAL LAND USE REGULATION INDEX — WRLURI) BY U.S. METROPOLITAN AREAS, DEVELOPED BY WHARTON BUSINESS SCHOOL

AVERAGE WRLURI VALUES BY METROPOLITAN AREAS WITH TEN OR MORE OBSERVATIONS

Metropolitan Area	WRLURI	Number of Observations
1. Providence-Fall River-Warwick, RI-MA	1.79	16
2. Boston, MA-NH	1.54	41
3. Monmouth-Ocean, NJ	1.21	15
4. Philadelphia, PA	1.03	55
5. Seattle-Bellevue-Everett, WA	1.01	21
6. San Francisco, CA	0.90	13
7. Denver, CO	0.85	13
8. Nassau-Suffolk, NY	0.80	14
9. Bergen-Passaic, NJ	0.71	21
10. Fort Lauderdale, FL	0.70	16
11. Phoenix-Mesa, AZ	0.70	18
12. New York, NY	0.63	19
13. Riverside-San Bernardino, CA	0.61	20
14. Newark, NJ	0.60	25
15. Springfield, MA	0.58	13
16. Harrisburg-Lebanon-Carlise, PA	0.55	15
17. Oakland, CA	0.52	12
18. Los Angeles-Long Beach, CA	0.51	32
19. Hartford, CT	0.50	28
20. San Diego, CA	0.48	11
21. Orange County, CA	0.39	14
22. Minneapolis-St. Paul, MN-WI	0.34	48
23. Washington, DC-MD-VA-WV	0.33	12
24. Portland-Vancouver, OR-WA	0.29	20
25. Milwaukee-Waukesha, WI	0.25	21
26. Akron, OH	0.15	11
27. Detroit, MI	0.12	46
28. Allentown-Bethlehem-Easton, PA	0.10	14
29. Chicago, IL	0.06	95
30. Pittsburgh, PA	0.06	44
31. Atlanta, GA	0.04	26
32. Scranton-Wilkes-Barre-Hazelton, PA	0.03	11
33. Salt Lake City-Ogden, UT	–0.10	19
34. Grand Rapids-Muskegon-Holland, MI	–0.15	16
35. Cleveland-Lorain-Elyria, OH	–0.16	31
36. Rochester, NY	–0.17	12
37. Tampa-St. Petersburg-Clearwater, FL	–0.17	12
38. Houston, TX	–0.19	13
39. San Antonio, TX	–0.24	12
40. Fort Worth-Arlington, TX	–0.27	15
41. Dallas, TX	–0.35	31
42. Oklahoma City, OK	–0.41	12
43. Dayton-Springfield, OH	–0.50	17
44. Cincinnati, OH-KY-IN	–0.56	27
45. St. Louis, MO-IL	–0.72	27
46. Indianapolis, IN	–0.76	12
47. Kansas City, MO-KS	–0.80	29

Source: Joseph Gyourko, Albert Saiz, Anita Summers. (2008). A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index. Urban Studies. Volume: 45 issue: 3, page(s): 693–729.

URBAN SPRAWL INDEX OF METROPOLITAN AREAS, ON A SCALE FROM 0 TO 1

Rank	Metropolitan area	Index value
1	Chelyabinsk	1.00
2	Yekaterinburg	0.83
3	Volgograd	0.73
4	Nizhny Novgorod	0.67
5	Novosibirsk	0.67
6	Ufa	0.67
7	Voronezh	0.63
8	Rostov-on-Don	0.57
9	Samara (Togliatti)	0.57
10	Saint Petersburg	0.57
11	Perm	0.40
12	Kazan	0.33
13	Krasnoyarsk	0.33
14	Vladivostok	0.23
15	Krasnodar	0.17
16	Moscow	0.07
17	Saratov	0.00

From less sprawling to more sprawling areas according to urban planning regulatory documents

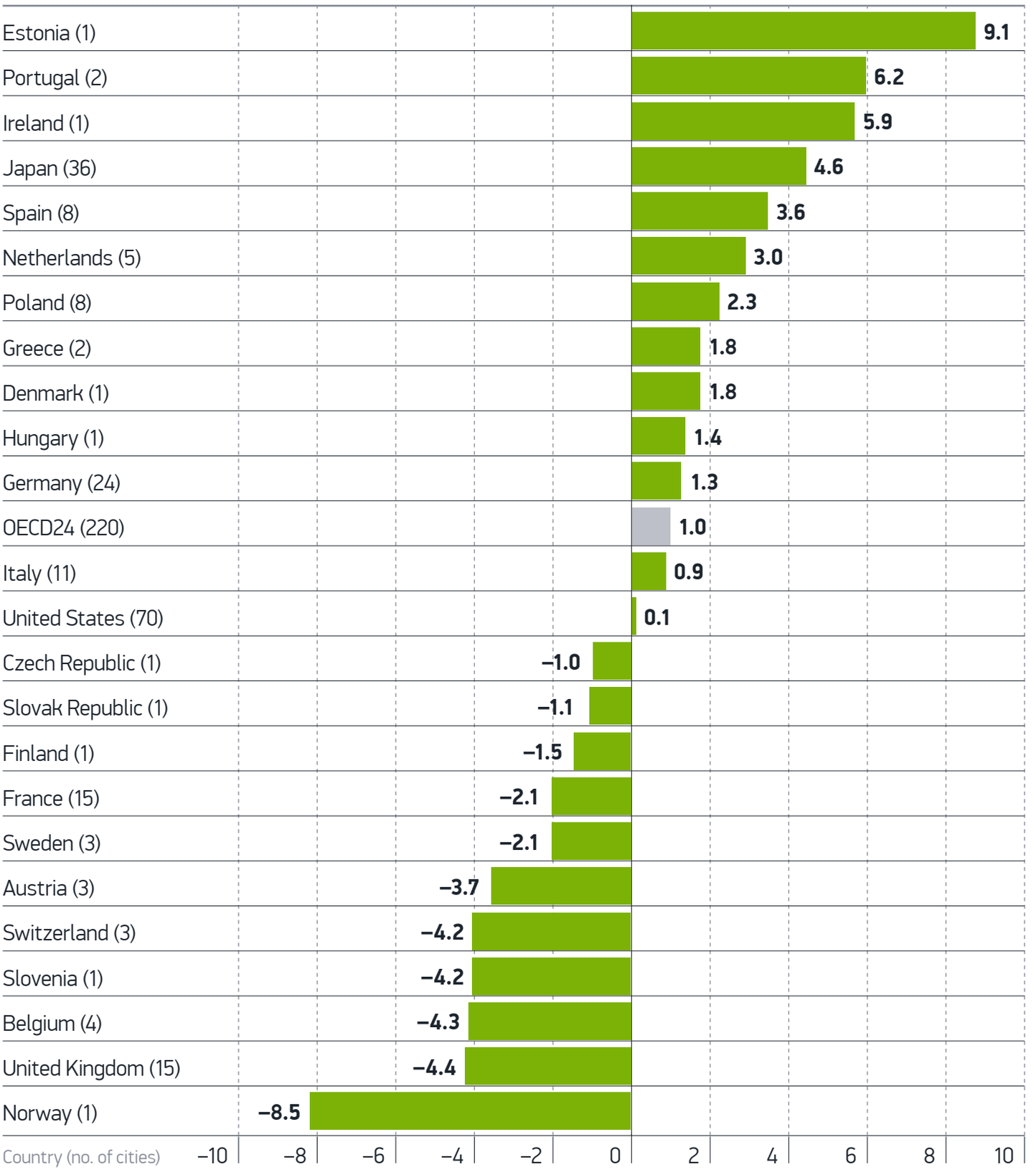
THE MOST COMPACT AND THE MOST SPRAWLING MAJOR U. S. METROPOLITAN AREAS

Metro area	Index score	
New York / White Plains / Wayne, NY-NJ	203.4	
San Francisco / San Mateo-Redwood City, CA	194.3	
Miami / Miami Beach / Kendall, FL	144.1	
Santa Ana / Anaheim / Irvine, CA	139.9	
Detroit / Livonia / Dearborn, MI	137.2	
Milwaukee / Waukesha / West Allis, WI	134.2	**Compact**
Los Angeles / Long Beach / Glendale, CA	130.3	
San Jose / Sunnyvale / Santa Clara, CA	128.8	
Oakland / Fremont / Hayward, CA	127.2	
Chicago / Joliet / Naperville, IL	125.9	
Houston / Sugar Land / Baytown, TX	76.7	
Richmond, VA	76.4	
Rochester, NY	74.5	
Birmingham-Hoover, AL	73.6	
Memphis, TN-MS-AR	70.8	
Charlotte / Gastonia-Rock Hill, NC-SC	70.5	**Sprawling**
Warren / Troy / Farmington Hills, MI	67.0	
Riverside-San Bernardino / Ontario, CA	56.3	
Nashville / Davidson / Murfreesboro / Franklin, TN	51.7	
Atlanta-Sandy Springs / Marietta, GA	41.0	

Source: Smart growth America. Measuring Sprawl 2014.

URBAN SPRAWL INDEX IN OECD COUNTRIES

URBAN SPRAWL INDEX IN OECD METROPOLITAN AREAS, AVERAGE BY COUNTRY, 2000–2006



URBAN PLANNING POLICY SPATIAL COORDINATION INDEX (2017), ON A SCALE FROM 0 TO 1

Rank	Metropolitan area	Index value
1	Novosibirsk	0.55
2	Nizhny Novgorod	0.38
3	Yekaterinburg	0.33
4	Krasnodar	0.33
5	Volgograd	0.30
6	Vladivostok	0.28
7	Samara (Togliatti)	0.18
8	Voronezh	0.05
9	Krasnoyarsk	0.05
10	Perm	0.05
11	Saratov	0.05
12	Chelyabinsk	0.05
13	Ufa	0.05
14	Kazan	0.03
15	Rostov-on-Don	0.03
16	Saint Petersburg	0.03
17	Moscow	0.00

From more spatially coordinated policy to less spatially coordinated policy

Left table
Source: OECD Regions at a Glance 2013.

INDICATORS OF THE URBAN ECONOMY, INCLUDING THE HOUSING SECTOR

INDICATORS OF THE URBAN ECONOMY, INCLUDING THE HOUSING SECTOR

REVENUES OF LOCAL BUDGETS OF METROPOLITAN AREA CENTERS (2010–2016), MILLION OF INTERNATIONAL DOLLARS PER YEAR

Metropolitan area central city	**2010**	**2016**	**Growth rate,** %
Moscow	48089.5	75512.3	+65
Saint Petersburg	15589.9	21588.1	+37
Novosibirsk	1341.4	1545.7	+19
Yekaterinburg	1115.8	948.9	+40
Chelyabinsk	1055.4	1480.8	+33
Rostov-on-Don-on-Don	1054.3	1352.2	+39
Krasnoyarsk	997.4	1362.8	+19
Perm	967.9	1199.0	+18
Nizhny Novgorod	933.1	1039.3	+45
Kazan	914.2	1233.4	+33
Ufa	672.5	1121.5	+47
Voronezh	656.3	1065.4	+27
Krasnodar	626.6	1031.6	+67
Samara	620.6	699.4	+71
Vladivostok	593.5	878.6	–8
Volgograd	488.1	665.8	+51
Saratov	479.1	533.3	+40

REVENUES OF LOCAL BUDGETS OF METROPOLITAN AREA CENTERS PER CAPITA (2010–2016), INTERNATIONAL DOLLARS PER YEAR

Metropolitan area central city	**2010**	**2016**	**Growth rate,** %
Moscow	4256.5	6534.8	153.5
Saint Petersburg	3082.6	3926.1	127.3
Krasnoyarsk	982.6	1065.2	108.1
Vladivostok	939.1	843.5	90.1
Rostov-on-Don-on-Don	917.4	1243.5	135.1
Perm	904.3	1017.4	112.2
Chelyabinsk	895.7	1130.4	126.3
Novosibirsk	860.9	952.2	110.6
Yekaterinburg	778.3	1013.0	130.1
Krasnodar	773.9	1073.9	138.8
Voronezh	691.3	760.9	109.6
Nizhny Novgorod	678.3	969.6	143
Ufa	643.5	895.7	139.9
Kazan	639.1	791.3	124
Volgograd	560.9	847.8	150.8
Saratov	560.9	769.6	137.3
Samara	517.4	882.6	170.6

EXPENDITURES OF LOCAL BUDGETS OF METROPOLITAN AREA CENTERS (2010–2016), MILLION OF INTERNATIONAL DOLLARS PER YEAR

Metropolitan area central city	**2010**	**2016**	**Growth rate,** %
Moscow	48089.5	75512.3	+57.0
Saint Petersburg	15589.9	21588.1	+38.5
Novosibirsk	1341.4	1545.7	+15.2
Kazan	1115.8	948.9	–15.0
Yekaterinburg	1055.4	1480.8	+40.3
Rostov-on-Don-on-Don	1054.3	1352.2	+28.3
Chelyabinsk	997.4	1362.8	+36.6
Krasnoyarsk	967.9	1199.0	+23.9
Perm	933.1	1039.3	+11.4
Nizhny Novgorod	914.2	1233.4	+34.9
Ufa	672.5	1121.5	+66.8
Krasnodar	656.3	1065.4	+62.3
Samara	626.6	1031.6	+64.6
Voronezh	620.6	699.4	+12.7
Volgograd	593.5	878.6	+48.0
Saratov	488.1	665.8	+36.4
Vladivostok	479.1	533.3	+11.3

EXPENDITURES OF LOCAL BUDGETS OF METROPOLITAN AREA CENTERS PER CAPITA (2010–2016), INTERNATIONAL DOLLARS PER YEAR

Metropolitan area central city	**2010**	**2016**	**Growth rate,** %
Moscow	4178.3	6126.1	146.5
Saint Petersburg	3182.6	4087.0	128.5
Krasnoyarsk	995.7	1121.7	113.0
Kazan	973.9	769.6	79.1
Rostov-on-Don-on-Don	965.2	1208.7	124.9
Perm	943.5	995.7	105.8
Novosibirsk	908.7	973.9	107.2
Chelyabinsk	882.6	1143.5	129.7
Krasnodar	839.1	1130.4	134.8
Vladivostok	773.9	843.5	108.8
Yekaterinburg	765.2	1000.0	130.6
Nizhny Novgorod	726.1	965.2	133.5
Voronezh	695.7	678.3	97.1
Ufa	626.1	995.7	159.2
Saratov	591.3	791.3	133.8
Volgograd	587.0	865.2	147.8
Samara	539.1	882.6	163.9

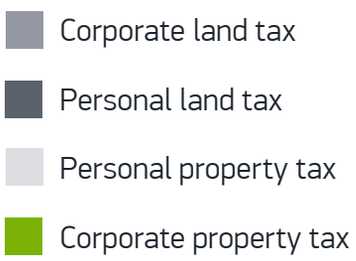
TAX REVENUES FROM PROPERTY TAXES IN METROPOLITAN AREA CENTERS (2010-2016), RATIO TO LOCAL BUDGET REVENUES

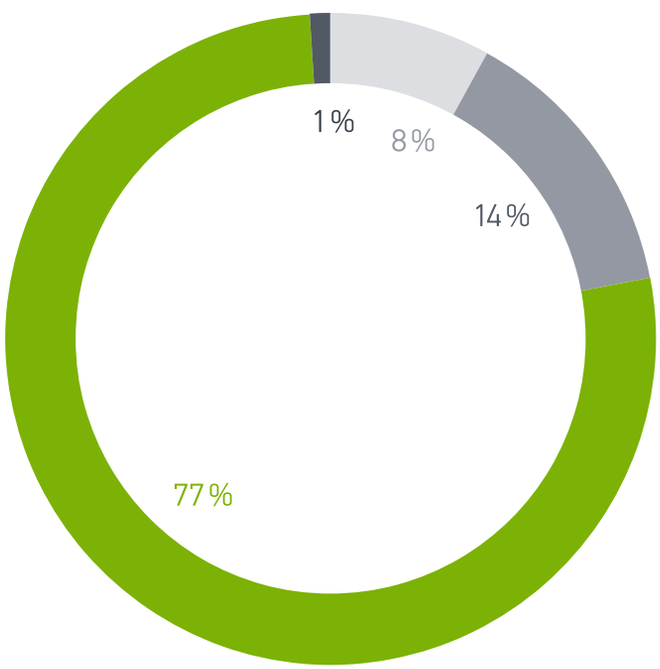
Metropolitan area central city	**Total revenues from property taxes,** million of int. dollars		**Total revenues from property taxes,** ratio to local budget revenues, %		**Total revenues from property taxes,** international dollars per capita	
	2010	**2016**	**2010**	**2016**	**2010**	**2016**
Moscow	3541.4	6054.2	7.23	7.52	308.7	491.3
Saint Petersburg	1064.9	1723.3	7.05	8.32	217.4	326.1
Samara	445.8	450.4	73.87	43.54	382.6	382.6
Yekaterinburg	414.8	814.0	38.65	54.28	300.0	552.2
Novosibirsk	402.4	499.3	31.66	33.05	273.9	313.0
Kazan	395.7	585.0	54.15	60.05	343.5	473.9
Perm	361.4	321.4	40.33	30.37	365.2	308.7
Rostov-on-Don	322.8	443.6	32.20	31.89	295.7	395.7
Ufa	291.1	451.3	42.22	44.66	269.6	400.0
Nizhny Novgorod	278.9	430.2	32.61	34.81	221.7	339.1
Saratov	249.1	272.6	53.82	42.05	300.0	321.7
Volgograd	221.4	279.1	38.84	32.43	217.4	273.9
Vladivostok	218.5	293.6	37.65	54.87	352.2	465.2
Krasnoyarsk	211.2	312.3	22.05	27.50	217.4	291.3
Voronezh	194.8	293.3	31.59	37.39	217.4	282.6
Chelyabinsk	—	—	—	—	—	—
Krasnodar	—	—	—	—	—	—

TAX REVENUES FROM LOCAL PROPERTY TAXES IN METROPOLITAN AREA CENTERS

Metropolitan area central city	**Land tax and personal property tax in local budget revenues** (2016), %	**Potential increase in local budget revenues if corporate property tax is transferred to from regional local level** (2016), %
Kazan	19.80	40
Vladivostok	14.30	41
Perm	12.40	18
Rostov-on-Don-on-Don	12.00	20
Volgograd	11.60	21
Krasnodar	11.20	—
Novosibirsk	10.30	23
Voronezh	10.20	27
Samara	9.70	34
Yekaterinburg	9.50	45
Nizhny Novgorod	6.70	28
Saratov	6.10	36
Ufa	5.30	39
Krasnoyarsk	4.70	23

Actual tax revenues from real estate could account for 30 % of local budget revenues. The largest of the three real estate taxes is the corporate property tax (about 80 % of tax collected), which is collected by regional budgets and is not used for the development of the urban infrastructure.





LAND RENT INDICATORS: INCREASE IN THE REAL CAPITALIZATION OF THE HOUSING STOCK (2010–2015)

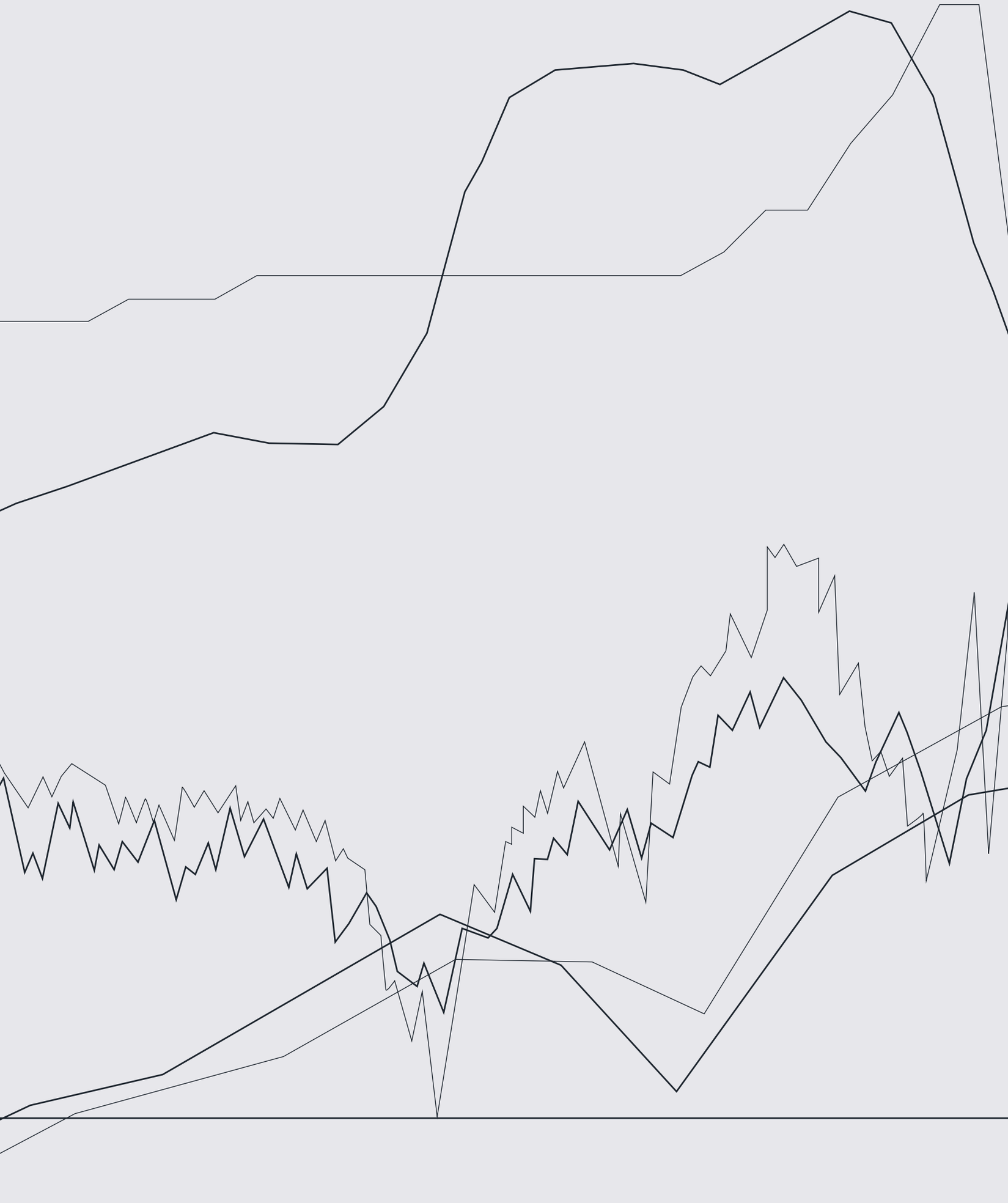
Metropolitan area	**Capitalization in 2010,** billion of international dollars of 2016	**Capitalization in 2015,** billion of international dollars of 2016	**Growth rate,** %
Moscow	2808	2366	-15.73
Saint Petersburg	618	547	-11.40
Yekaterinburg	142	142	-0.21
Samara (Togliatti)	133	128	-3.86
Novosibirsk	128	126	-1.71
Nizhny Novgorod	104	122	+17.01
Rostov-on-Don	97	93	-4.04
Kazan	82	101	+23.35
Voronezh	73	78	+6.24
Ufa	71	85	+19.55
Krasnodar	65	62	-3.34
Vladivostok	63	64	+0.09
Volgograd	63	55	-12.65
Chelyabinsk	62	62	+0.99
Perm	56	62	+11.14
Krasnoyarsk	56	63	+13.20
Saratov	48	51	+8.26

Housing stock capitalization indicators reduced in real terms in around half of the metropolitan areas from 2010 to 2015.

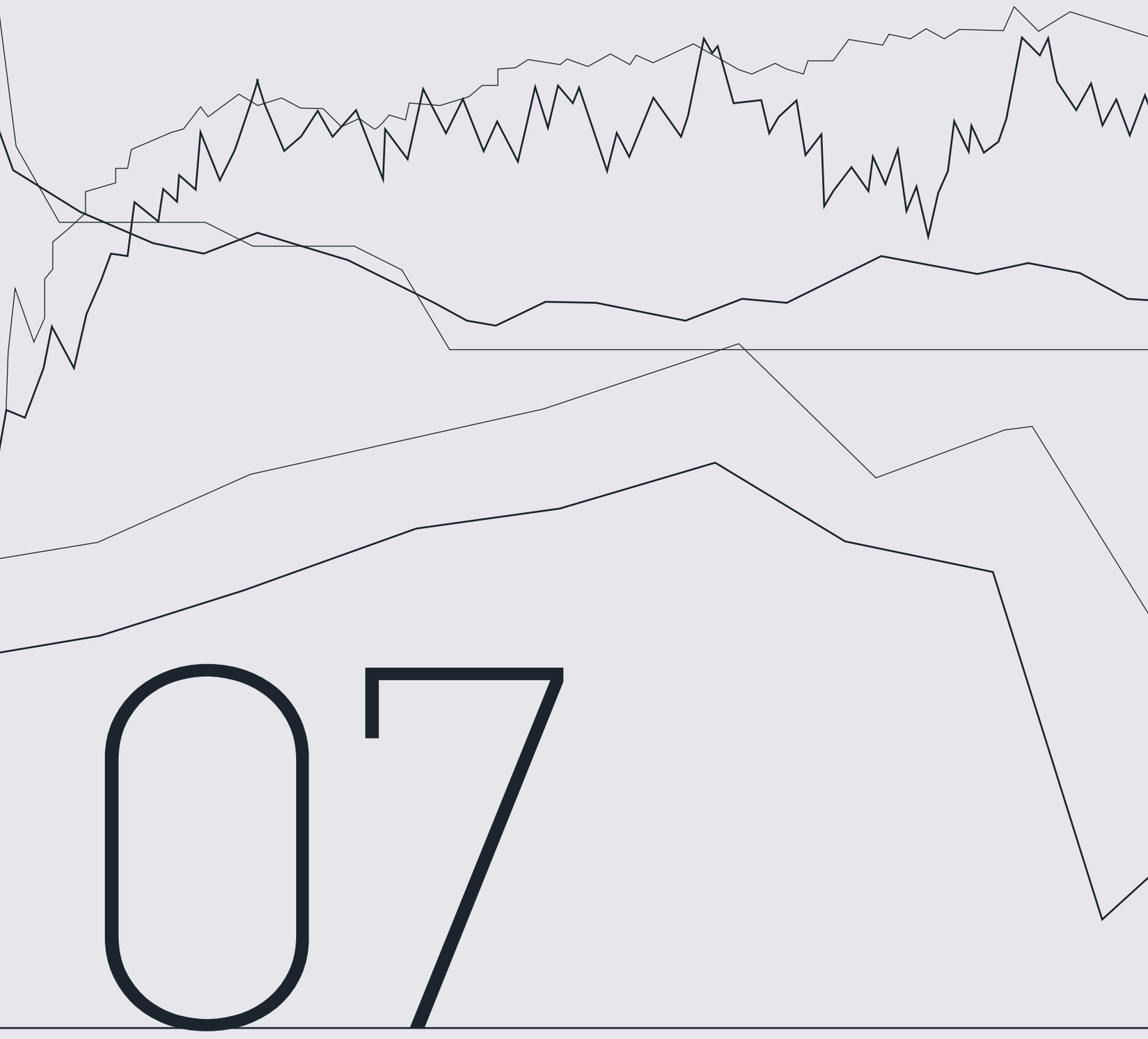
LAND RENT INDICATORS: HOUSING STOCK CAPITALIZATION AND GUP DYNAMICS (2010–2015)

		Real housing stock capitalization , (2010–2015)	
		Falling	**Growing**
Real GUP of metropolitan area, 2010–2015	**Falling**	Moscow	Vladivostok
		Samara (Togliatti)	
	Growing	Volgograd	Voronezh
		Saint Petersburg	Kazan
		Krasnodar	Nizhny Novgorod
		Novosibirsk	Perm
		Rostov-on-Don	Saratov
		Yekaterinburg	Ufa
			Chelyabinsk

IN 6 METROPOLITAN AREAS, HOUSING STOCK CAPITALIZATION REDUCED DESPITE INCREASED GUP THAT COULD BE AN EVIDENCE OF INEFFICIENCY OF URBAN PLANNING POLICY



INDICATORS OF THE INTENSITY OF UTILIZATION OF METROPOLITAN AREA TERRITORIES AND THE POTENTIAL FOR INCREASING UTILIZATION



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INDICATORS OF THE INTENCITY OF UTILIZATION OF METROPOLITAN AREA TERRITORIES AND THE POTENTIAL FOR INCREASING UTILIZATION

TYPOLOGY OF METROPOLITAN AREAS BY DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY FROM CENTER TOWARDS PERIPHERY

		Increasing residential density (pairs of belts[1] are specified)	
Type	**Metropolitan area**	**in urban zone**	**in suburban zone**
1. Steadily reducing weighted-average residential density	Novosibirsk	—	—
	Chelyabinsk	—	—
2. Variably reducing weighted-average residential density	Vladivostok	2–3 and 3–4	—
	Volgograd	3–4	—
	Voronezh	2–3	—
	Yekaterinburg	1–2	6–7
	Kazan	1–2	6–7
	Krasnodar	2–3	—
	Krasnoyarsk	1–2	—
	Moscow	1–2 and 2–3	4–5 and 5–6
	Nizhny Novgorod	1–2	—
	Perm	1–2	4–5 and 6–7
	Rostov-on-Don	3–4	5–6
	Samara (Togliatti)	3–4	—
	Saint Petersburg	1–2, 4–5 and 5–6	—
	Saratov	1–2 and 3–4	6–7
	Ufa	3–4 and 5–6	—

[1] Commuter belts: 1 — 1 km, 2 — 3 km, 3 — 6 km, 4 — 9 km, 5 — 12 km, 6 — 15 km, 7 — 18 km.

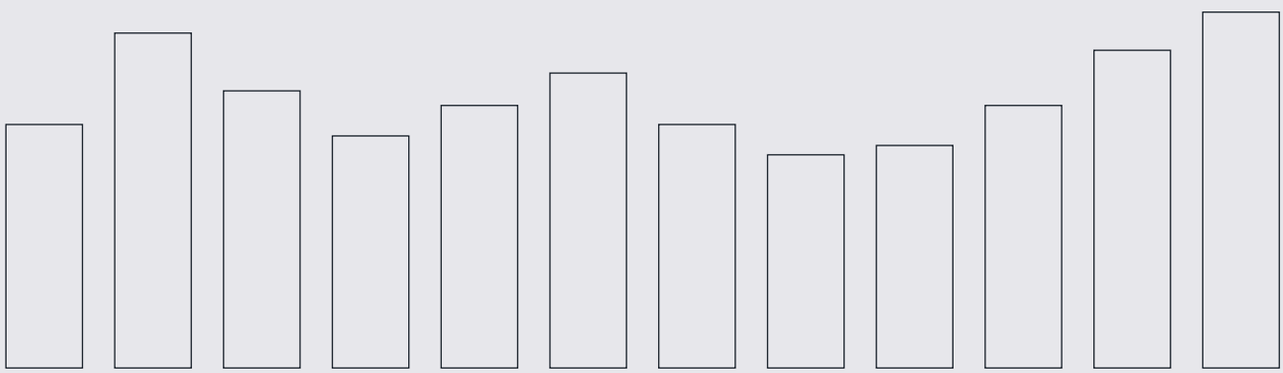
INVESTMENT AND REDEVELOPMENT POTENTIAL IN BUILT-UP AREAS OF THE 17 METROPOLITAN AREAS (2017), MILLION M^2 AND BILLION OF INTERNATIONAL DOLLARS

The total space of residential developments in built-up areas (mostly in the mid belt of the core cities) of the 17 metropolitan areas could increase on the 987 million m^2 of residential floor space under the assumption of redevelopment with increasing density (which now is relatively low). A full realization of this potential requires investments in housing reconstruction and in the transport, utility, and social infrastructure in the amount of around 3.2 trillion of international dollars, or 84.6 % of the Russian GDP as of 2016.

Metropolitan area	**Housing construction potential,** million m^2 of total residential floor space	**Investment potential,** billion of international dollars
Moscow	280.2	1137.8
Saint Petersburg	97.6	437.3
Kazan	70.6	178.2
Nizhny Novgorod	62.8	185.6
Novosibirsk	55.4	162.6
Voronezh	54.9	126.2
Yekaterinburg	50.4	148.3
Chelyabinsk	48.5	113.5
Krasnodar	47.1	124.9
Rostov-on-Don	44.1	121.8
Samara (Togliatti)	35.7	108.3
Krasnoyarsk	35.5	109.5
Saratov	28.5	66.6
Perm	23.7	63.5
Volgograd	23.7	55.3
Ufa	17.5	46.8
Vladivostok	11.2	42.0

REDEVELOPMENT POTENTIAL IN BUILT-UP AREAS OF THE 17 METROPOLITAN AREAS (2017), % OF EXISTING HOUSING STOCK

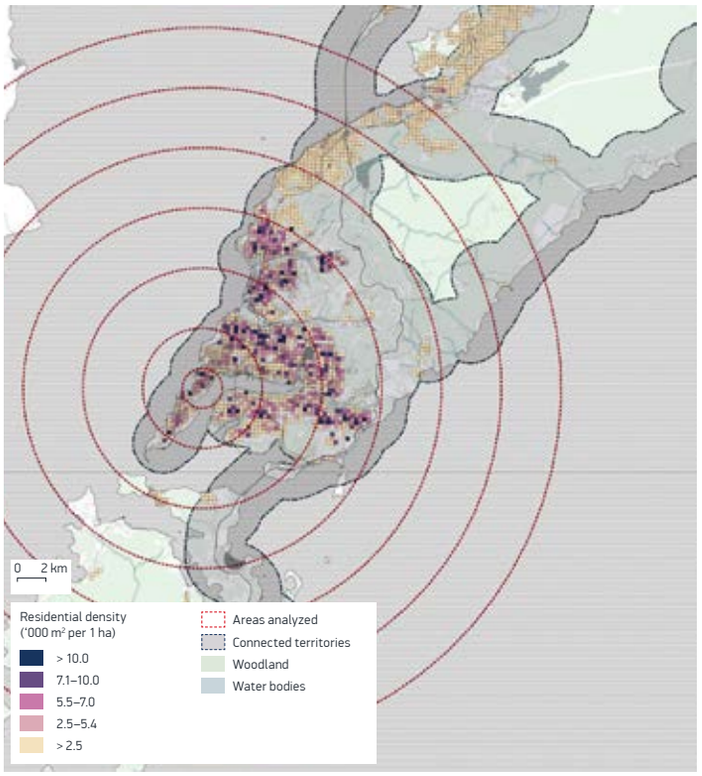
Rank	**Metropolitan area**	**Potential additional housing floor space to existing housing stock ratio (2016),** %
1	Kazan	162
2	Voronezh	124
3	Krasnodar	124
4	Nizhny Novgorod	119
5	Chelyabinsk	119
6	Krasnoyarsk	107
7	Novosibirsk	101
8	Rostov-on-Don	85
9	Saratov	82
10	Yekaterinburg	80
11	Perm	75
12	Volgograd	74
13	Moscow	72
14	Samara (Togliatti)	66
15	Saint Petersburg	64
16	Vladivostok	50
17	Ufa	48



SPATIAL ECONOMIC PROFILES OF MAJOR METROPOLITAN AREAS

08

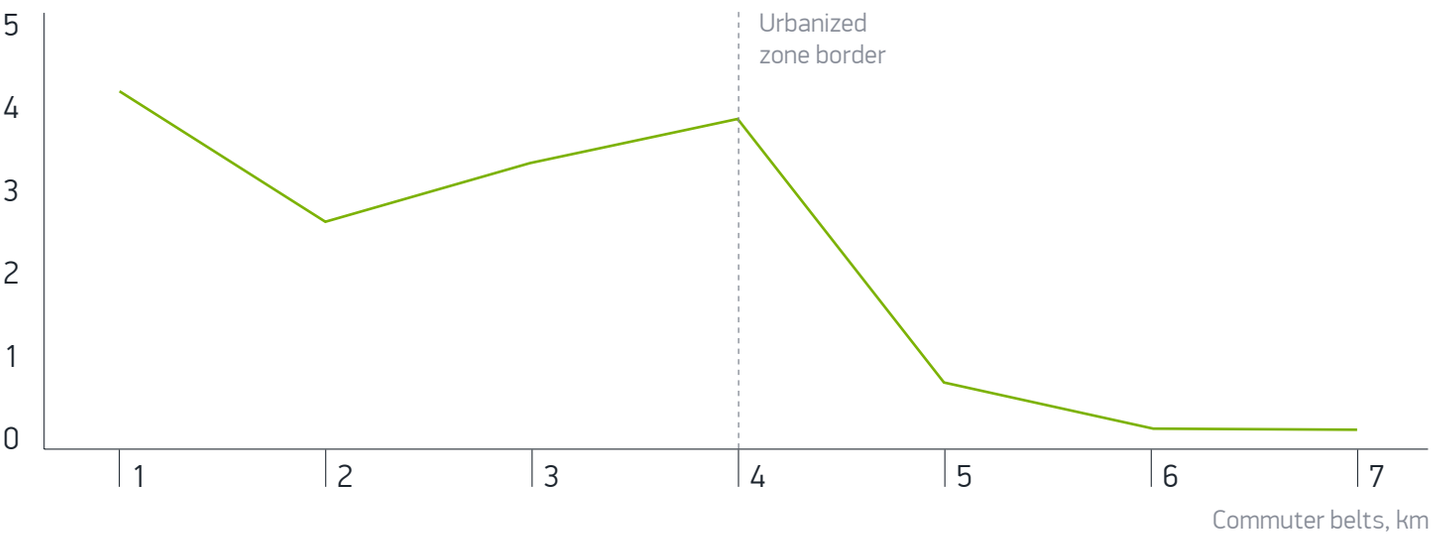
SPATIAL ECONOMIC PROFILE OF THE VLADIVOSTOK METROPOLITAN AREA



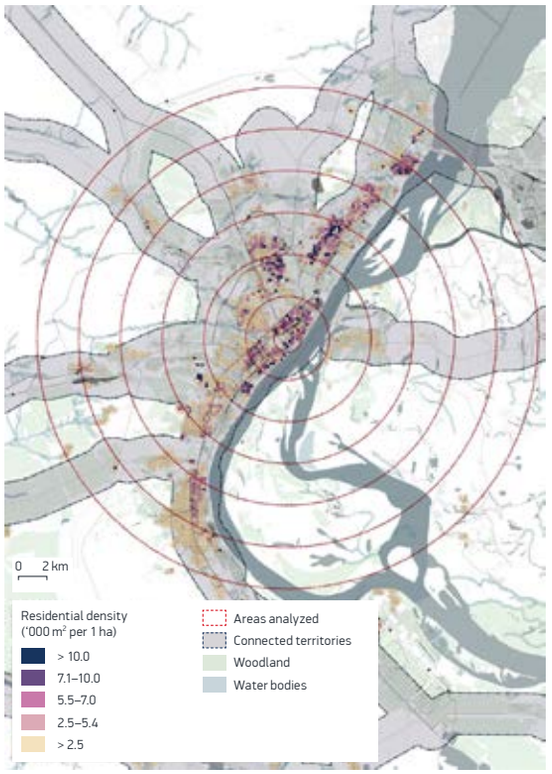
Population growth rates in 2010–2016	Low (5.6 % — below 1 million)
Housing construction activity	Below average (5.86 residential units per 1000 people)
Housing affordability	Medium (3.4 years)
Urban sprawl	High (14th out of 17)
Urban planning policy coordination between municipal entities	Moderate (6th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



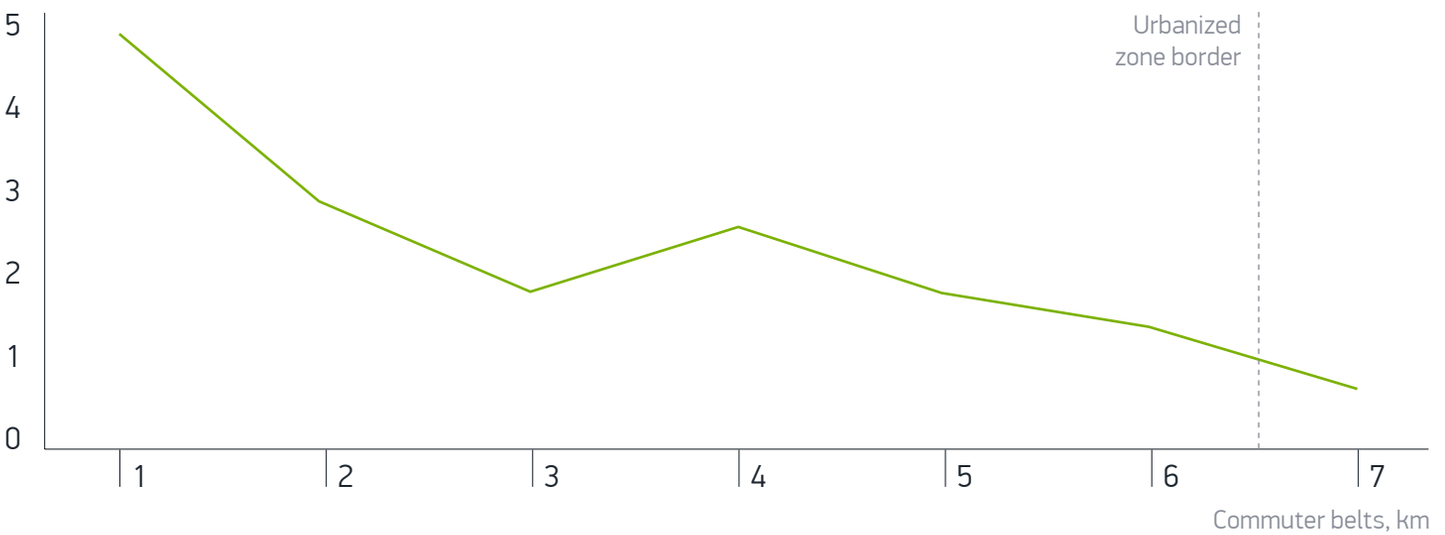
SPATIAL ECONOMIC PROFILE OF THE VOLGOGRAD METROPOLITAN AREA



Population growth rates in 2010–2016	Low (1.2 % — below 1.4 million)
Housing construction activity	Below average (6.05 residential units per 1000 people)
Housing affordability	Medium (2.9 years)
Urban sprawl	Low (3th out of 17)
Urban planning policy coordination between municipal entities	High (5th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha

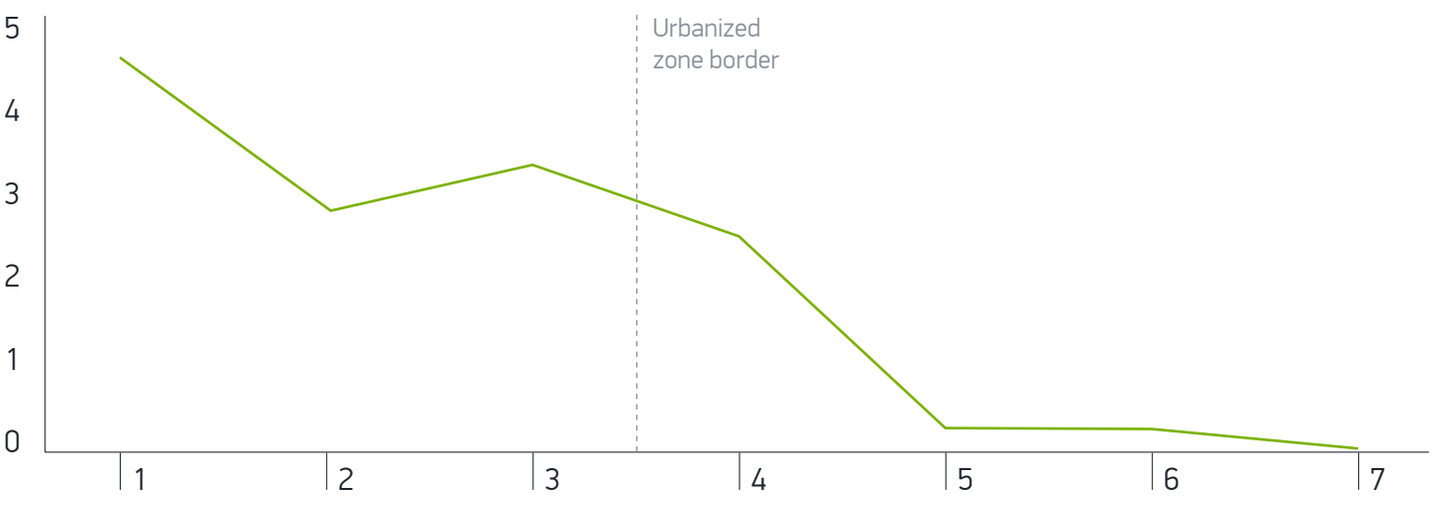


SPATIAL ECONOMIC PROFILE OF THE VORONEZH METROPOLITAN AREA

Population growth rates in 2010–2016	High (8.9 % — below 1.5 million)
Housing construction activity	Above average (16.24 residential units per 1000 people)
Housing affordability	High (2.2 years)
Urban sprawl	Moderate (7th out of 17)
Urban planning policy coordination between municipal entities	Moderate (8th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha

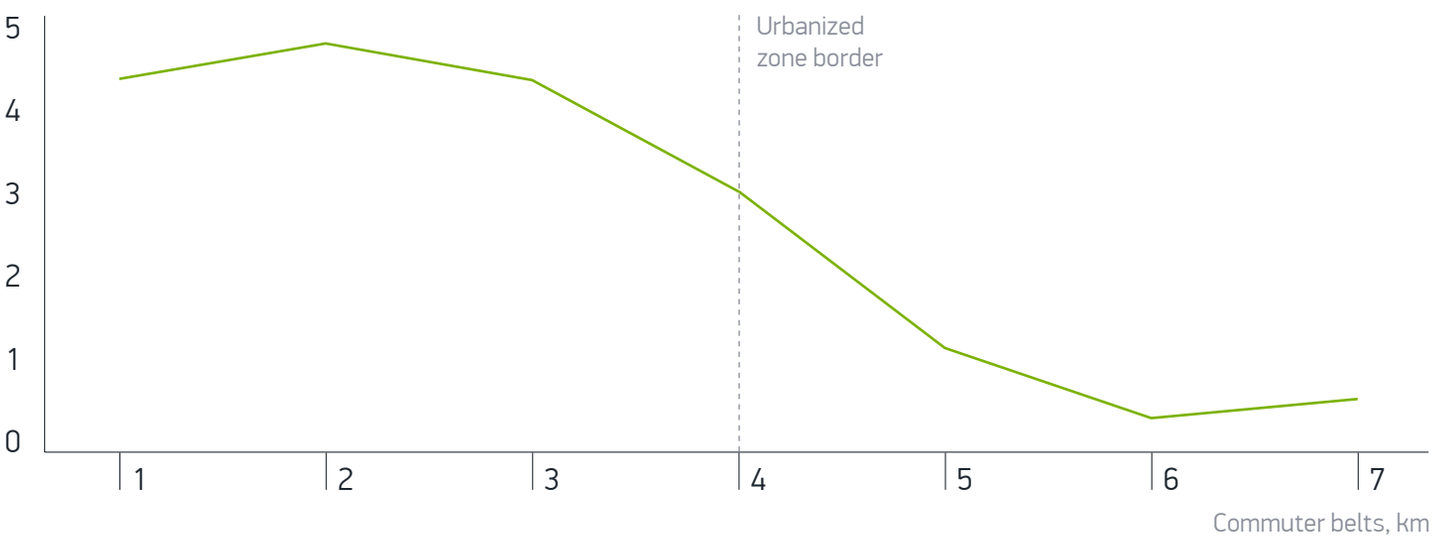


SPATIAL ECONOMIC PROFILE OF THE YEKATERINBURG METROPOLITAN AREA

Population growth rates in 2010–2016	Medium (5.6 % — below 2.2 million)
Housing construction activity	Above average (11.48 residential units per 1000 people)
Housing affordability	High (2.6 years)
Urban sprawl	Low (2th out of 17)
Urban planning policy coordination between municipal entities	High (3th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha

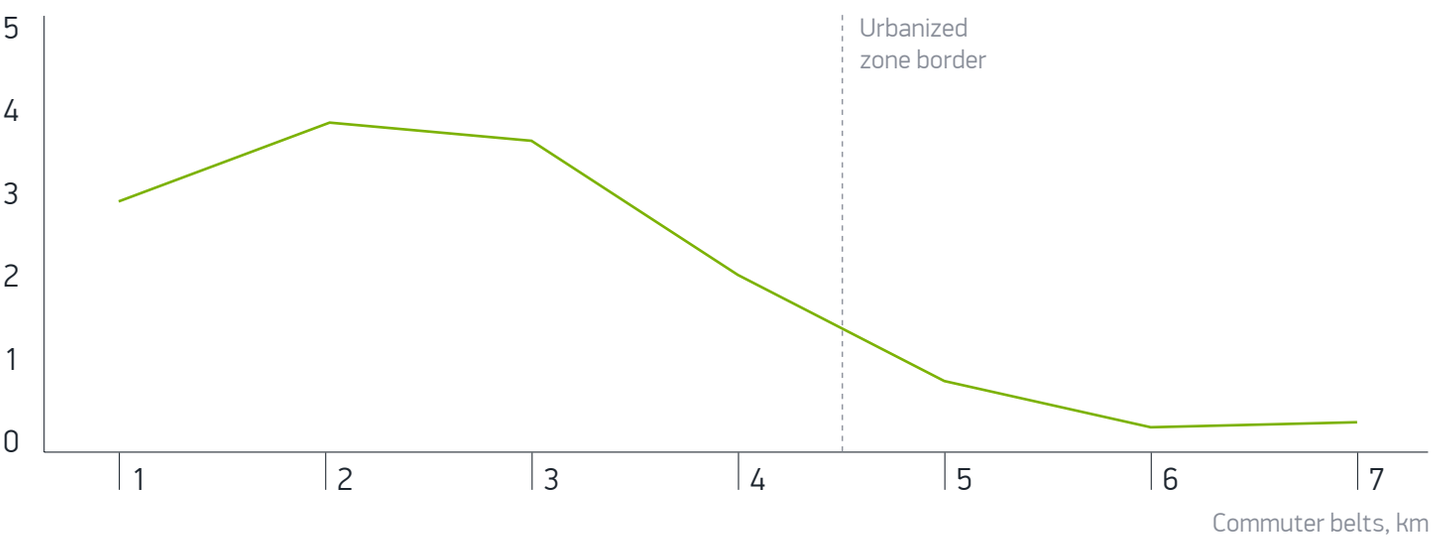


SPATIAL ECONOMIC PROFILE OF THE KAZAN METROPOLITAN AREA

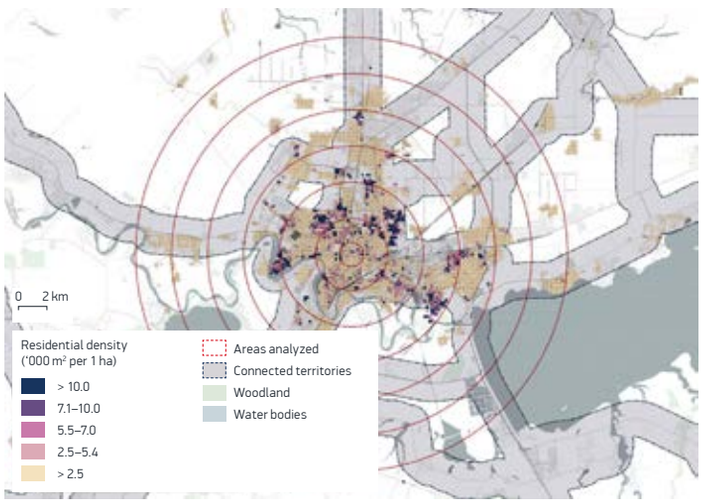
Population growth rates in 2010–2016	High (6.6 % — below 1.7 million people)
Housing construction activity	Above average (11.89 residential units per 1000 people)
Housing affordability	Medium (2.9 years)
Urban sprawl	High (12th out of 17)
Urban planning policy coordination between municipal entities	Low (14th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



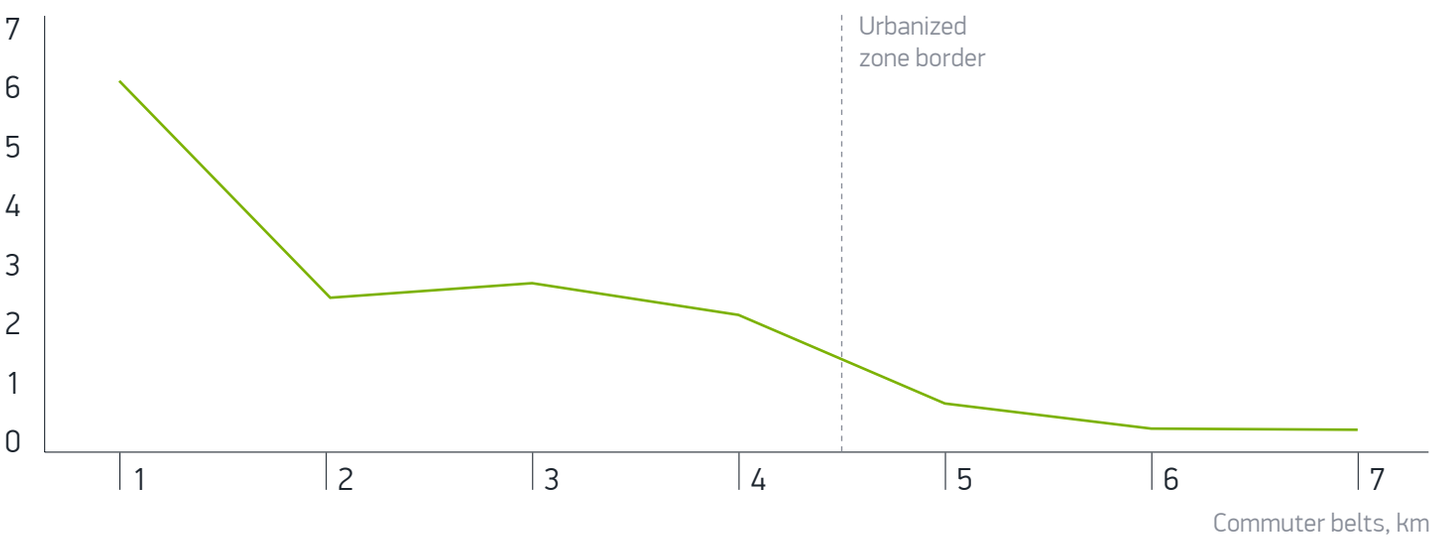
SPATIAL ECONOMIC PROFILE OF THE KRASNODAR METROPOLITAN AREA



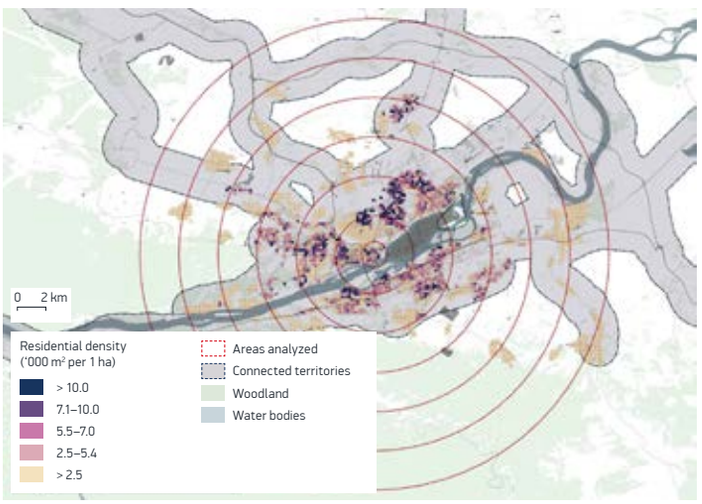
Темпы прироста населения в 2010–2016 yearsx	High (15.6 % — below 1.4 million)
Housing construction activity	Above average (30.00 residential units per 1000 people)
Housing affordability	High (1.8 years)
Urban sprawl	High (15th out of 17)
Urban planning policy coordination between municipal entities	High (4th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



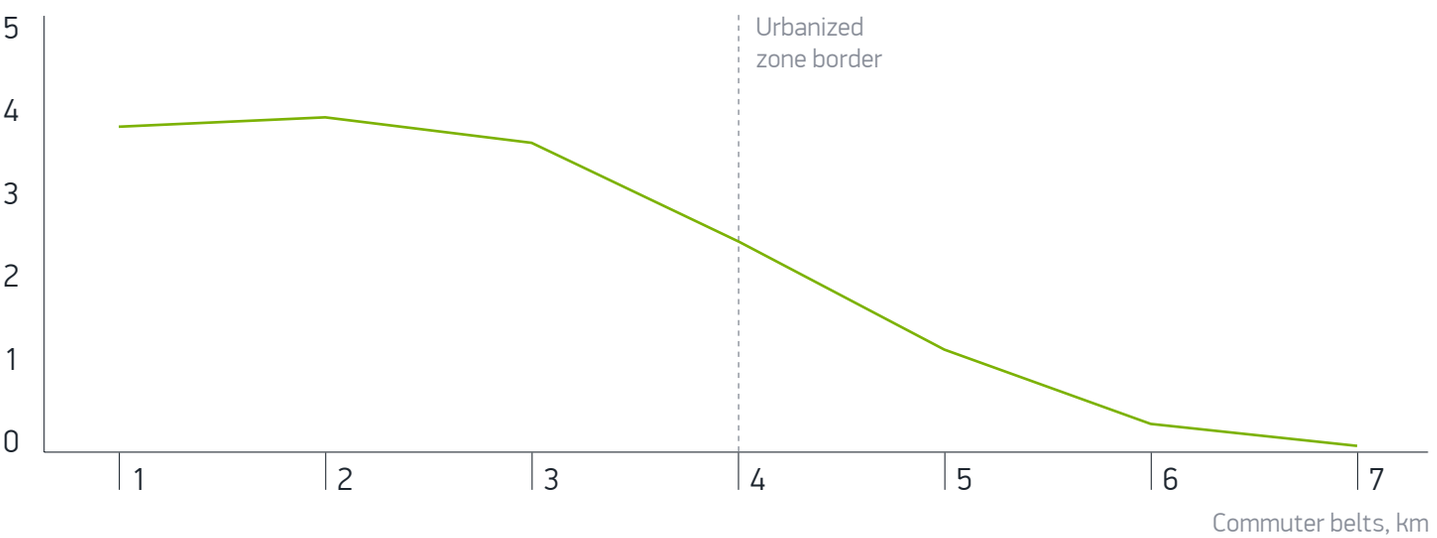
SPATIAL ECONOMIC PROFILE OF THE KRASNOYARSK METROPOLITAN AREA



Темпы прироста населения в 2010–2016 yearsx	High (8.1 % — below 3.3 million)
Housing construction activity	Above average (13.92 residential units per 1000 people)
Housing affordability	Medium (3.2 years)
Urban sprawl	High (13th out of 17)
Urban planning policy coordination between municipal entities	Moderate (9th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



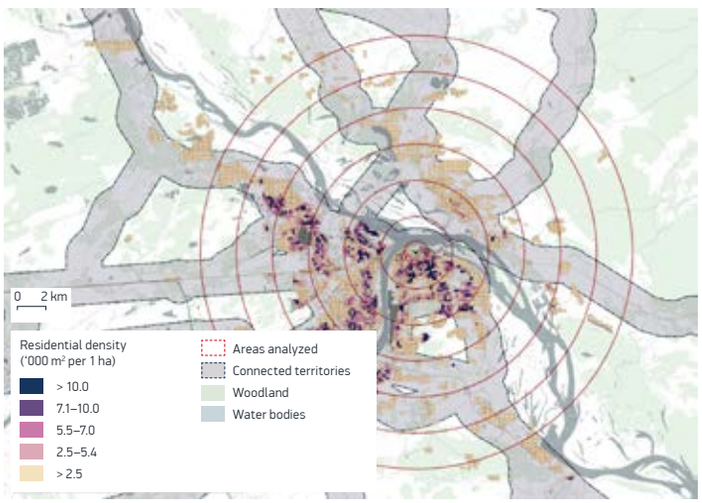
SPATIAL ECONOMIC PROFILE OF THE MOSCOW METROPOLITAN AREA

Population growth rates in 2010–2016	High (9.7 % — below 17 million)
Housing construction activity	Medium (10.33 residential units per 1000 people)
Housing affordability	Low (5.3 years)
Urban sprawl	High (16th out of 17)
Urban planning policy coordination between municipal entities	Low (17th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha

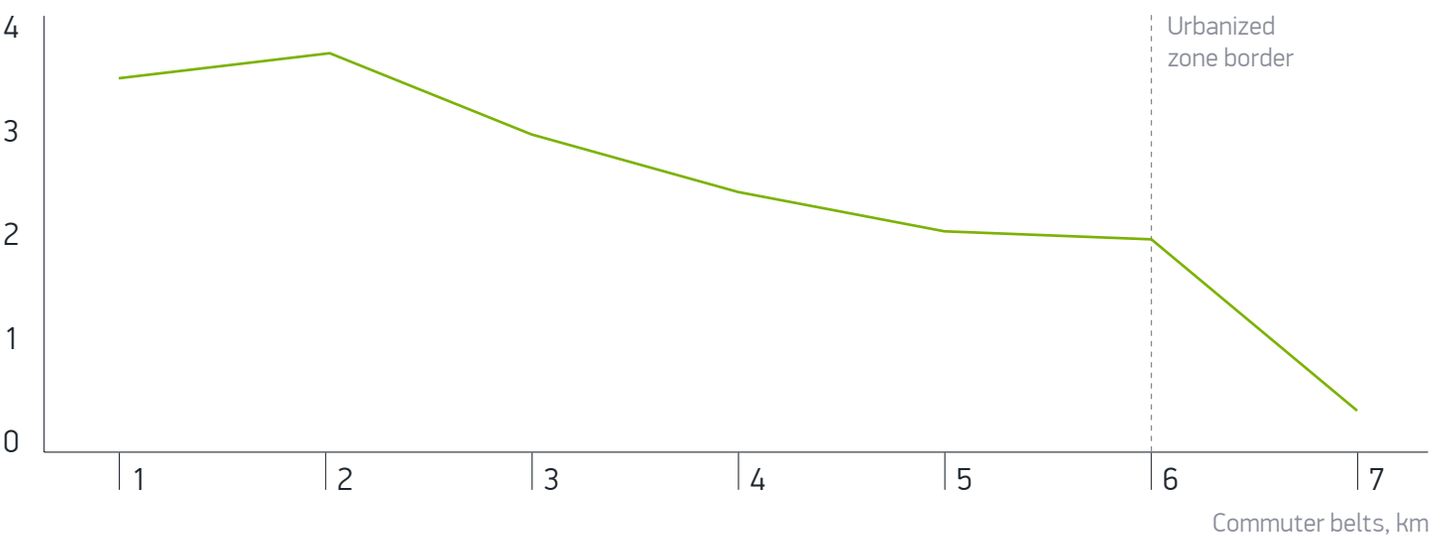
SPATIAL ECONOMIC PROFILE OF THE NIZHNY NOVGOROD METROPOLITAN AREA



Темпы прироста населения в 2010–2016 yearsx	Low (0.1 % — below 2.1 million)
Housing construction activity	Below average (6.10 residential units per 1000 people)
Housing affordability	Medium (2.9 years)
Urban sprawl	Low (4th out of 17)
Urban planning policy coordination between municipal entities	High (2th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha

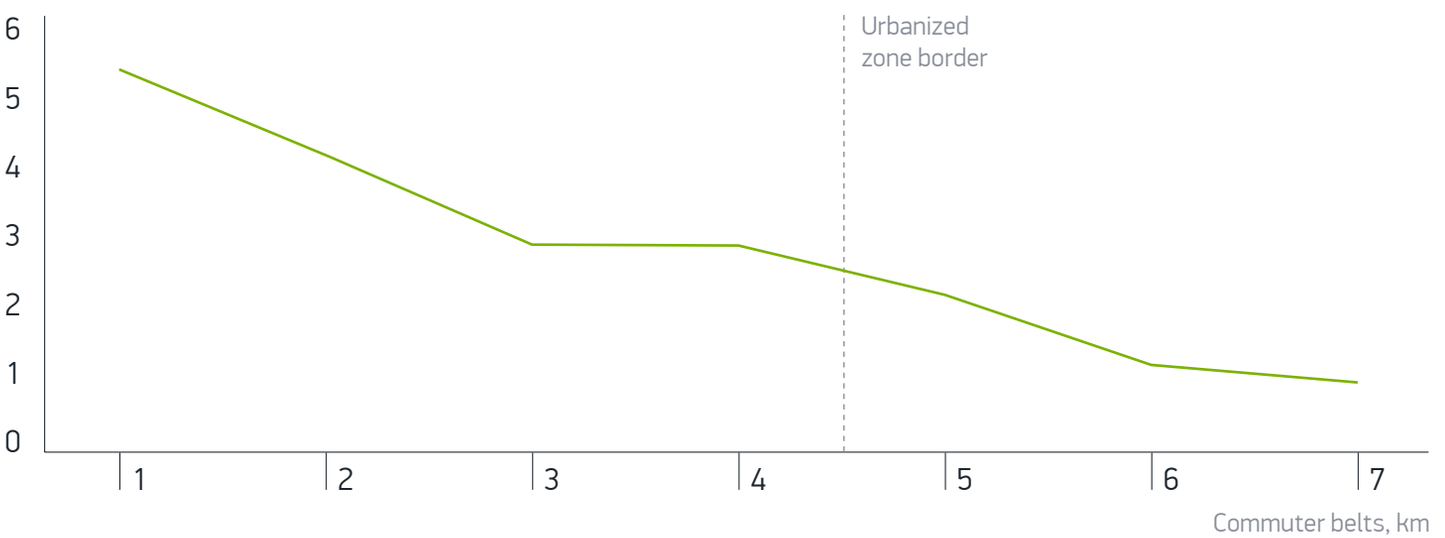


SPATIAL ECONOMIC PROFILE OF THE NOVOSIBIRSK METROPOLITAN AREA

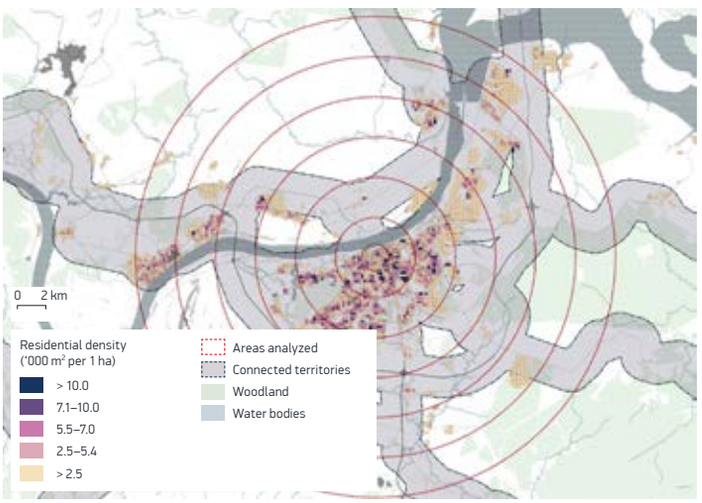
Population growth rates in 2010–2016	Medium (5.5 % — below 2.2 million)
Housing construction activity	Above average (15.37 residential units per 1000 people)
Housing affordability	Medium (3.6 years)
Urban sprawl	Low (5th out of 17)
Urban planning policy coordination between municipal entities	High (1th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



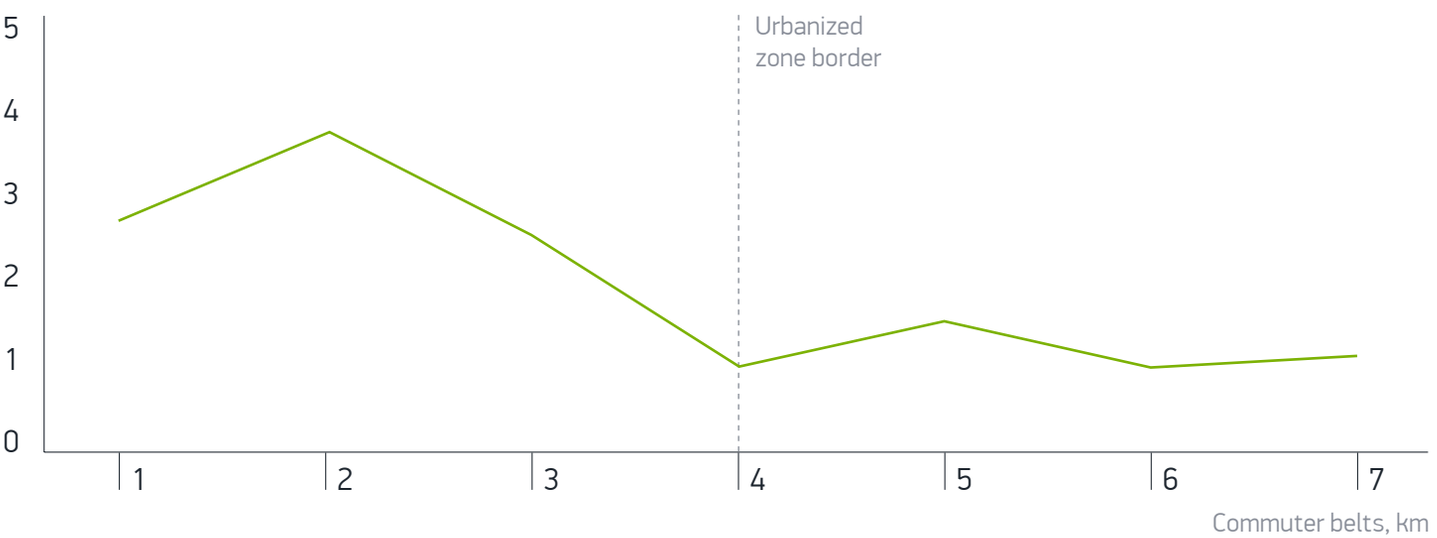
SPATIAL ECONOMIC PROFILE OF THE PERM METROPOLITAN AREA



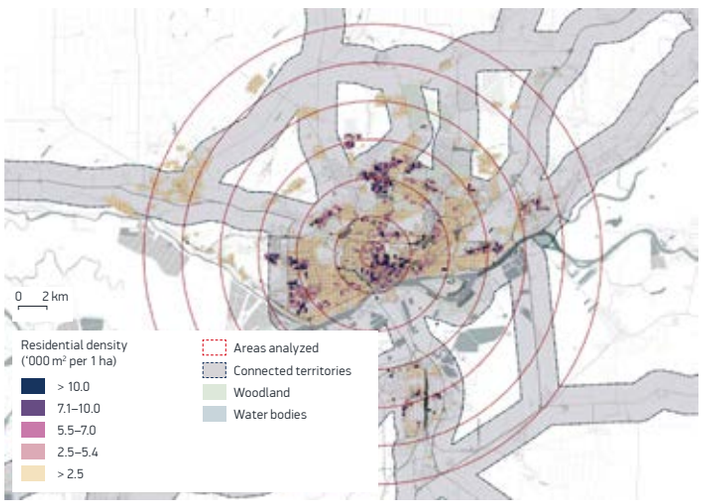
Population growth rates in 2010–2016	Medium (4.3 % — below 1.3 million)
Housing construction activity	Medium (9.48 residential units per 1000 people)
Housing affordability	High (2.4 years)
Urban sprawl	High (11th out of 17)
Urban planning policy coordination between municipal entities	Moderate (10th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



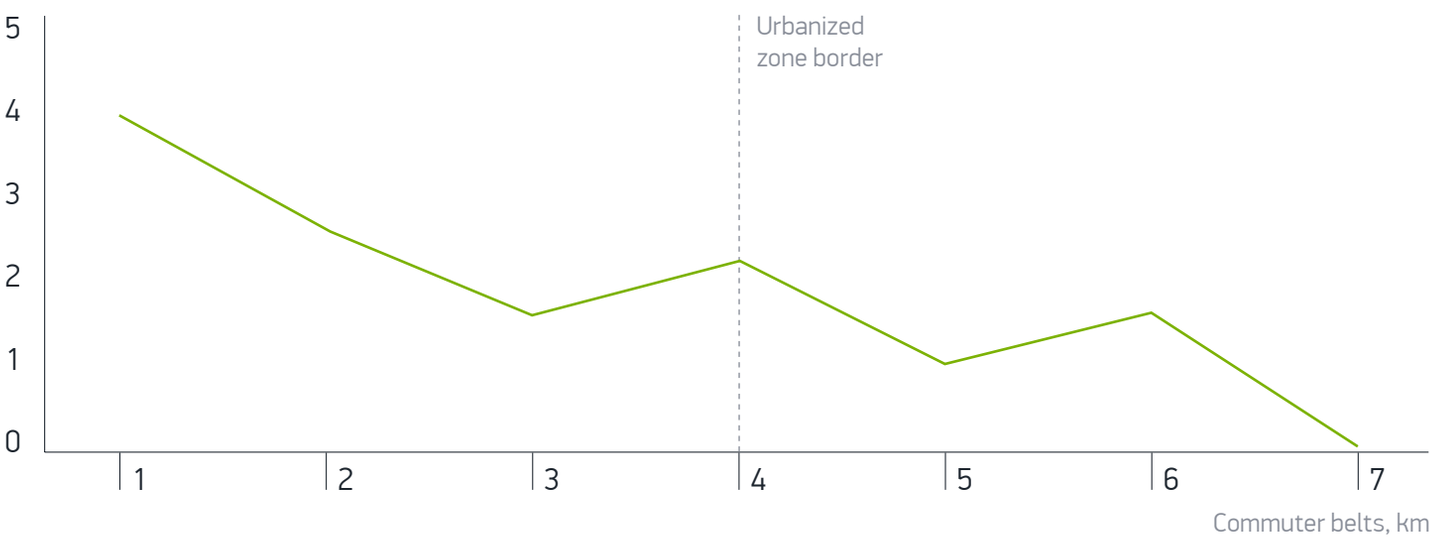
SPATIAL ECONOMIC PROFILE OF THE ROSTOV-ON-DON METROPOLITAN AREA



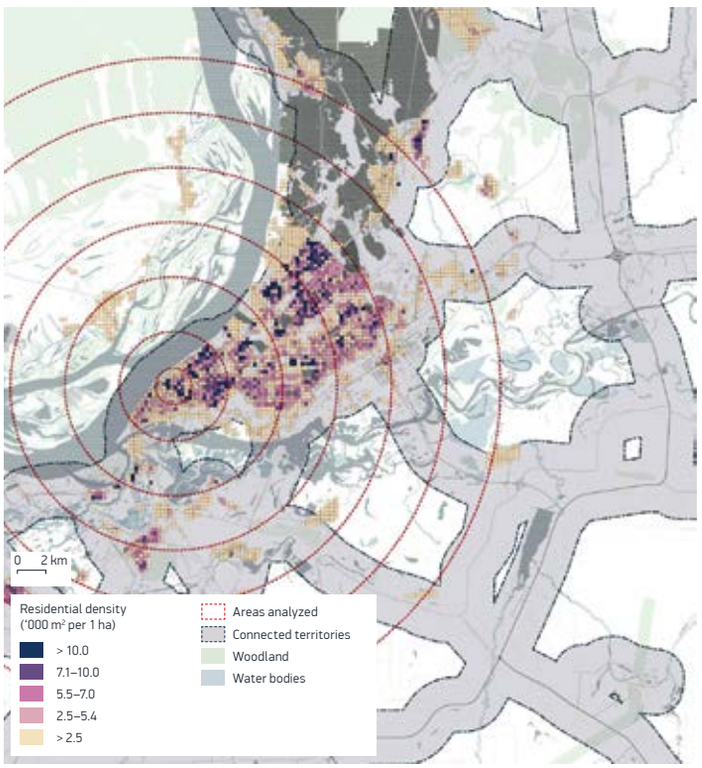
Population growth rates in 2010–2016	Low (2.5 % — below 2.1 million)
Housing construction activity	Medium (11.15 residential units per 1000 people)
Housing affordability	High (2.4 years)
Urban sprawl	Moderate (8th out of 17)
Urban planning policy coordination between municipal entities	Low (15th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



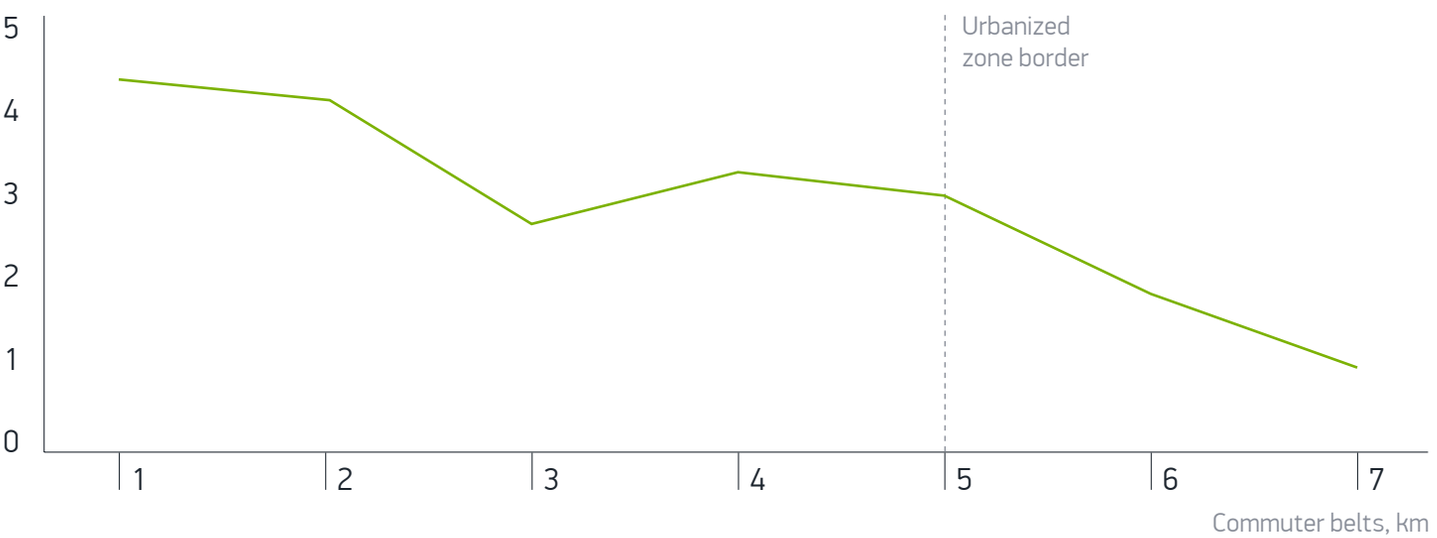
SPATIAL ECONOMIC PROFILE OF THE SAMARA (TOGLIATTI) METROPOLITAN AREA



Population growth rates in 2010–2016	Low (0.3 % — below 2.7 million)
Housing construction activity	Medium (9.46 residential units per 1000 people)
Housing affordability	Medium (2.8 years)
Urban sprawl	Moderate (9th out of 17)
Urban planning policy coordination between municipal entities	Moderate (7th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha

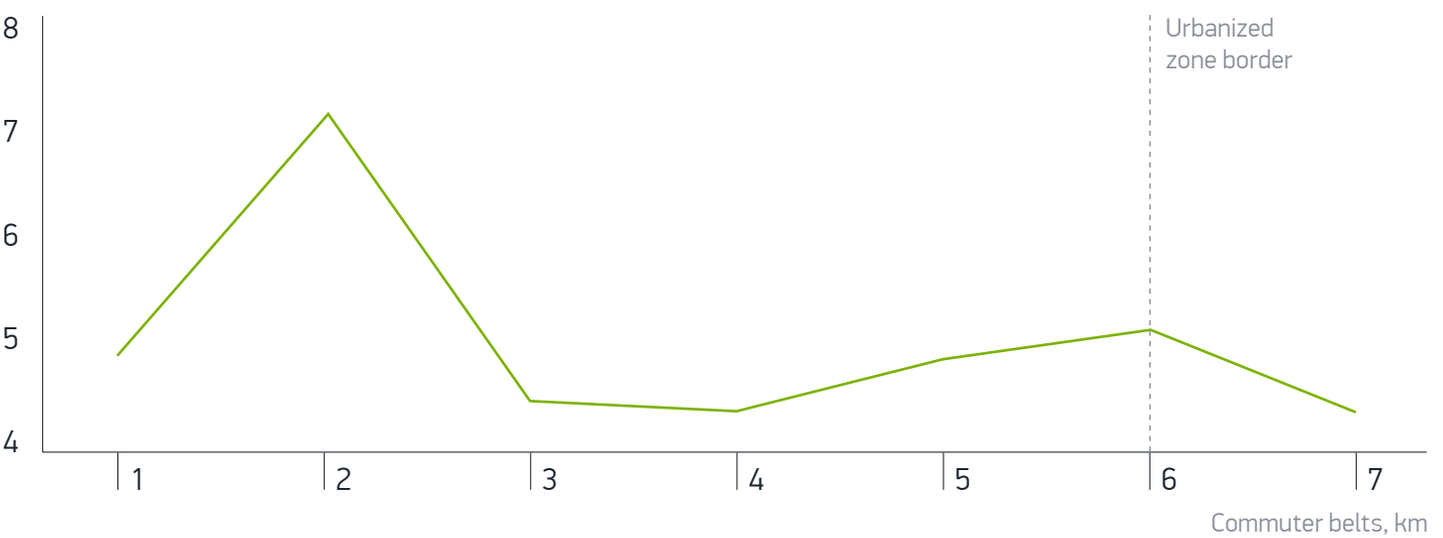


SPATIAL ECONOMIC PROFILE OF THE SAINT PETERSBURG METROPOLITAN AREA

Population growth rates in 2010–2016	High (9.2 % — below 6.3 million)
Housing construction activity	Medium (10.42 residential units per 1000 people)
Housing affordability	Low (4.4 years)
Urban sprawl	Moderate (10th out of 17)
Urban planning policy coordination between municipal entities	Low (16th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha

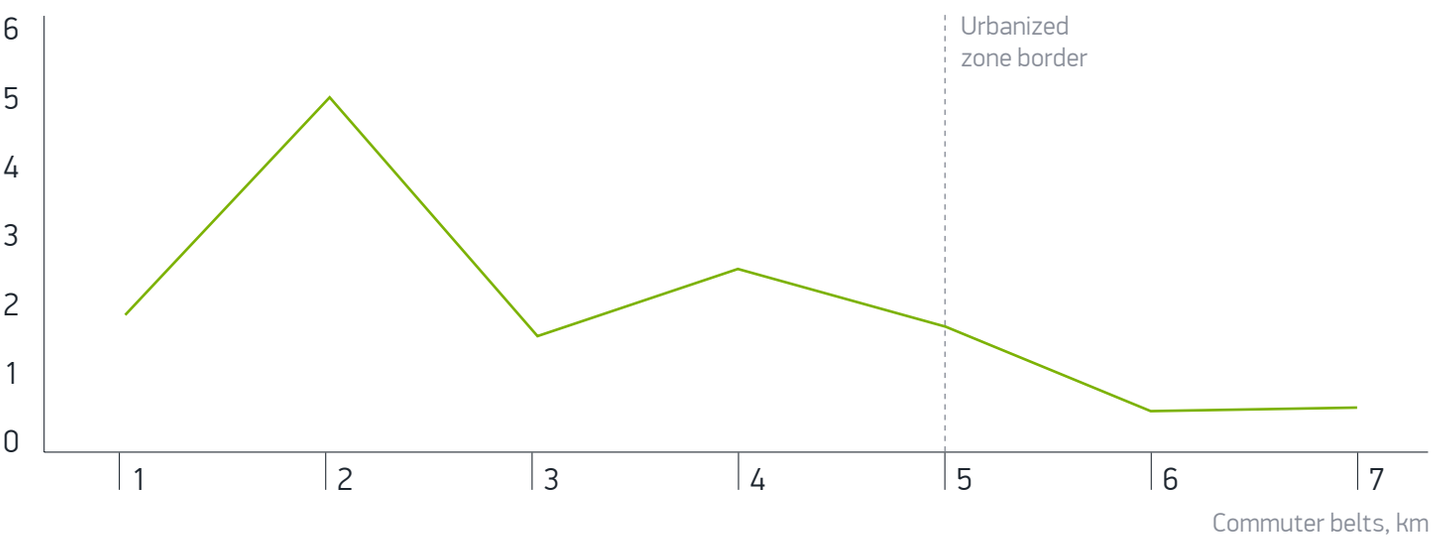


SPATIAL ECONOMIC PROFILE OF THE SARATOV METROPOLITAN AREA

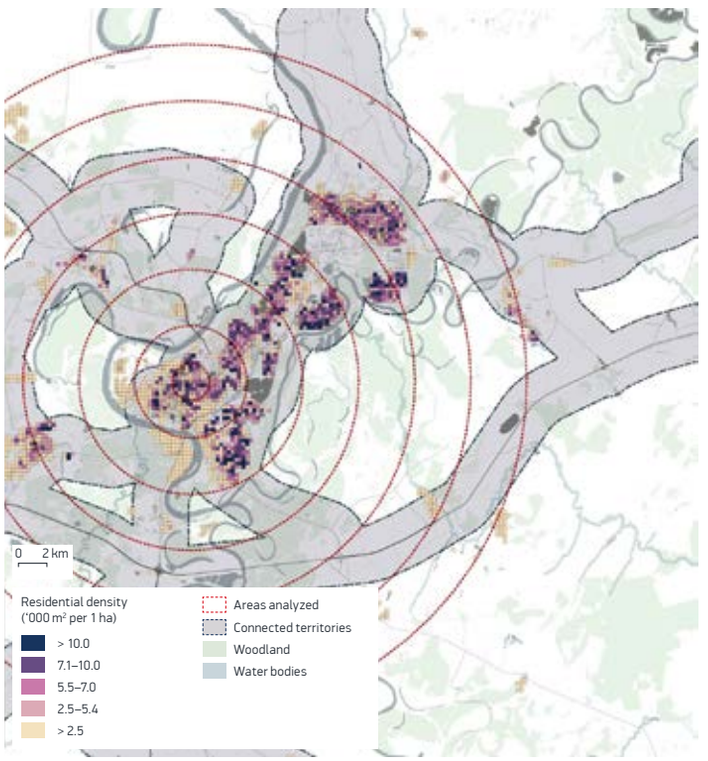
Темпы прироста населения в 2010–2016 yearsx	Low (3.1 % — below 1.2 million)
Housing construction activity	Above average (13.59 residential units per 1000 people)
Housing affordability	High (2.6 years)
Urban sprawl	High (17th out of 17)
Urban planning policy coordination between municipal entities	Low (11th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



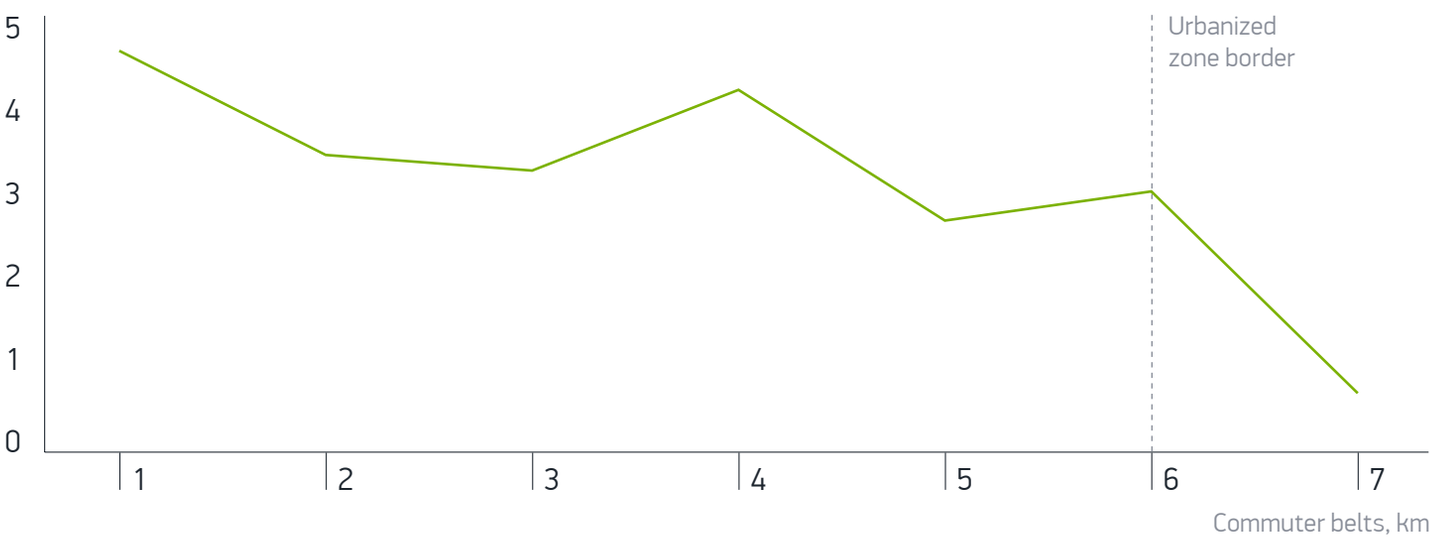
SPATIAL ECONOMIC PROFILE OF THE YFA METROPOLITAN AREA



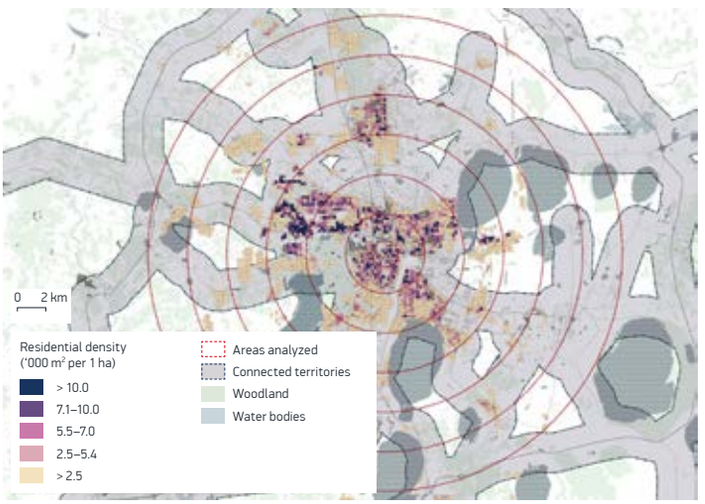
Population growth rates in 2010–2016	Medium (5.9 % — below 1.4 million)
Housing construction activity	Above average (11.43 residential units per 1000 people)
Housing affordability	Medium (2.9 years)
Urban sprawl	Moderate (6th out of 17)
Urban planning policy coordination between municipal entities	Low (13th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha



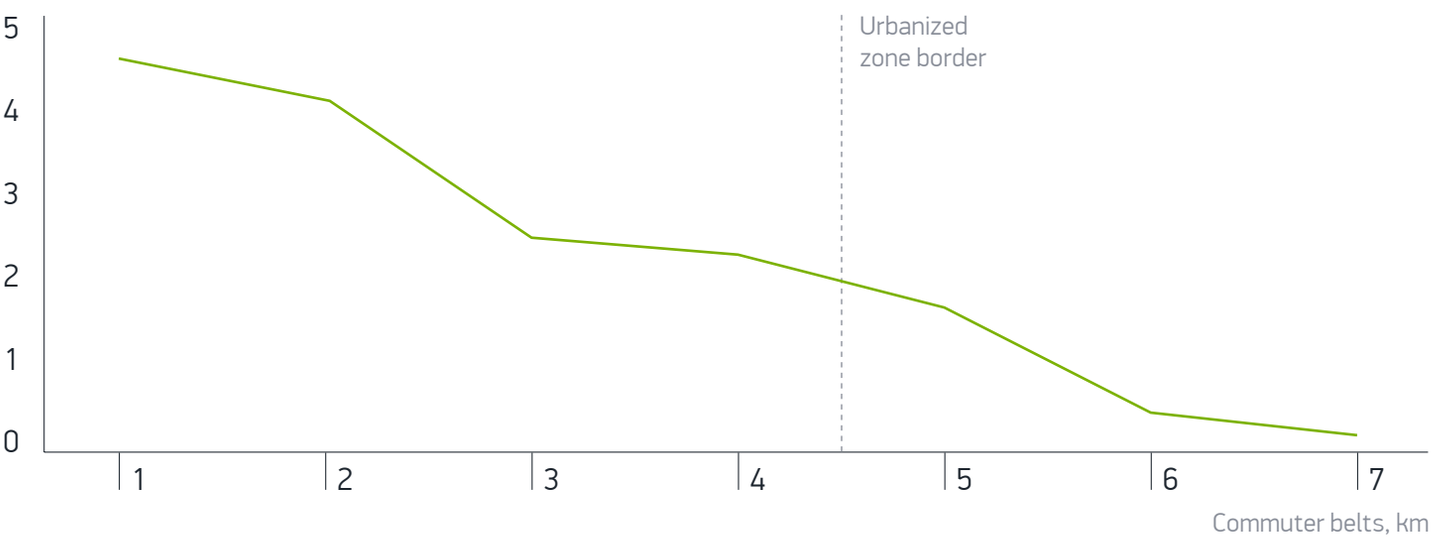
SPATIAL ECONOMIC PROFILE OF THE CHELYABINSK METROPOLITAN AREA

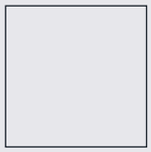


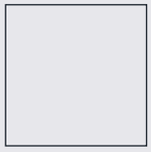
Population growth rates in 2010–2016	Medium (4.8 % — below 1.6 million)
Housing construction activity	Medium (8.57 residential units per 1000 people)
Housing affordability	High (2.4 years)
Urban sprawl	Low (1th out of 17)
Urban planning policy coordination between municipal entities	Low (12th out of 17)

DISTRIBUTION OF AVERAGE RESIDENTIAL DENSITY BETWEEN COMMUTER BELTS

Average residential density by commuter belt, '000 m2 per ha







RESEARCH METHODOLOGY

02

METHODOLOGY

Calculation methodology	Data source
Population	
1. The indicator is needed to calculate additional indicators of the housing per capita ratio. The data was obtained from Rosstat's Municipal Entity Indicators data base (MEIDB). We used the indicator "estimated current year population, people".	Federal State Statistic Service
Household income, international dollars per capita per month	
1. Calculation of average per capita household income in each municipal entity in the metropolitan area. 2. Calculation of average per capita household income in the metropolitan area as the average value of per capita household income in municipal entities of the metropolitan area weighted by population. 3. Calculation of the basic indicator of household income in the metropolitan area through the adjustment of per capita household income in the metropolitan area by the gap between per capita and median per capita income in the corresponding region of the Russian Federation in which the metropolitan area is located.	Federal State Statistic Service
Average total residential floor space per capita, m^2	
1. Calculation of the total area of housing stock, summed across all municipal entities in the metropolitan area. 2. Calculation of the population in all municipal entities in the metropolitan area. 3. Calculation of the indicator by dividing the calculation result in p. 1 by the calculation result in p. 2.	Federal State Statistic Service

TABLE CONTINUED

Calculation methodology	Data source
Housing prices, international dollars per m^2	
1. Determination of a residence sale median advertisement in terms of price per 1 m^2 in respect of residences with fixed parameters (two-room flat in an apartment building) in each municipal entity in the metropolitan area by finding a median advertisement in the list of advertisements at the primary and secondary housing market at the time of the study (October-November 2016). 2. Verification of values obtained against official Federal State Statistic Service data on average housing market prices in corresponding regions of the Russian Federation and other public sources. 3. Building of a retrospective sequence of data (2010–2015) on housing prices in each municipal entity in the metropolitan area by indexing the values obtained in respect of the 2016 housing market price index in the corresponding region of the Russian Federation, based on Federal State Statistic Service data. 4. Calculation of the basic indicator of housing market prices in the metropolitan area by weighing prices for 1 m^2 of housing in municipal entities in the metropolitan area by population.	Federal State Statistic Service, Domofond.ru (public Internet housing sale advertisement board), data published by Russian Realtors' Guild
Annual volume of housing construction, '000 m^2 of total floor space	
1. Calculation of the total area of housing commissioned, summed across all municipal entities in the metropolitan area.	Federal State Statistic Service
Annual volume of housing construction, m^2 of total floor space per capita, number of housing units per 1,000 of population	
1. Calculation of the total area of housing commissioned, summed across all municipal entities in the metropolitan area. 2. Calculation of the basic indicator by dividing the total area of housing commissioned by the total population of municipal entities in the metropolitan area.	Federal State Statistic Service

TABLE CONTINUED

Calculation methodology	Data source
Annual volume of housing construction (apartment buildings constructed by development companies companies), m^2 of total floor space per capita	
1. Calculation of the total area of housing constructed by developmnet companies, summed across all municipal entities in the metropolitan area, as the difference between the total housing construction and self-built housing construction. 2. Calculation of the basic indicator by dividing the total area of housing constructed be development companies by the total population of municipal entities in the metropolitan area.	Federal State Statistic Service
Share of self-built housing construction (single-family houses) in the annual volume of housing construction, %	
1. Calculation of the total area of self-built housing commissioned, summed across all municipal entities in the metropolitan area. 2. Calculation of the basic indicator by dividing the total area of self-built housing commissioned by the total area of housing construction in municipal entities in the metropolitan area.	Federal State Statistic Service
Annual volume of housing construction per RUB 1 million (~ 45.000 international dollars) of aggregate household real incomes, m^2 of total floor space	
1. Calculation of the total area of housing construction, summed across all municipal entities in the metropolitan area. 2. Calculation of total household income in each municipal entity in the metropolitan area by multiplying per capita income by population size. 3. Calculation of total household real income, summed across all municipal entities in the metropolitan area by reducing the nominal values obtained to 2016 constant prices through indexing based on the consumer price index in the constituent entity of the Russian Federation. 4. Calculation of the basic indicator by dividing the total area of housing construction by total household real income in municipal entities in the metropolitan area.	Federal State Statistic Service

TABLE CONTINUED

Calculation methodology	Data source
Share of three, four, and five largest companies in the housing construction market, 2017, % of planned housing construction volume according to construction permits issued	
1. Grouping developments in progress in the metropolitan area by the group of developer companies. 2. Summing the "Designed Residential Space" indicator across company groups. 3. Calculation of the share of the largest three (four or five) company groups in designed residential space.	Database on blocks of flats under construction
Housing price to income ratio, years	
1. Calculation of the housing price to income ratio in each municipal entity in the metropolitan area by dividing the price of a 54 m^2 residential unit based on the median price of 1 m^2 of housing in the municipal entity by the yearly income of a three-person family, obtained by multiplying median monthly per capita income in the municipal entity by 36 (3 persons x 12 months). 2. Calculation of the basic indicator by weighing the housing price to income ratios obtained in respect of municipal entities by population size.	Federal State Statistic Service, Domofond.ru (public Internet housing sale advertisement board), data published by Russian Realtors' Guild
Correlation between housing market prices and the transport connectivity of the core	
1. Calculation of housing market prices in municipal entities included in the metropolitan area and prices in the center and in the periphery of the core. 2. Calculation of car commute time from the core center to the center of each peripheral municipal entity at 6 p.m. on a weekday, taking traffic into account. 3. Calculation of the correlation between the calculation result in p. 1 and the calculation result in p. 2.	Domofond.ru (public Internet housing sale advertisement board), Google Maps

TABLE CONTINUED

Calculation methodology	Data source
Correlation between housing affordability and housing price spatial differentiation	
1. Calculation of correlation between housing affordability indicator and housing price spatial variation ratio.	Federal State Statistic Service, Domofond.ru (public Internet housing sale advertisement board), data published by Russian Realtors' Guild
Urban planning regulation stringency index, 2017, on a scale from 0 to 1	
1. Measurement of two indicators of the index on a scale from 0 to 1 in each metropolitan area in respect of a sample of municipalities: – presence or absence of minimum and maximum requirements to the number of floors in an apartment buildings development zone in the land use and development rules; – presence or absence of minimum and maximum requirements to land plot sizes in an apartment buildings development zone in the land use and development rules. 2. Calculation of the aggregate index value as the arithmetic mean between indicator values.	Land use and development rules of sampled municipal entities of metropolitan areas demonstrating the highest activity in housing construction
Urban sprawl index, on a scale from 0 to 1	
1. Measurement of three indicators of the index on a scale from 0 to 1 in each metropolitan area in respect of a sample of municipalities: – planned change of residential development density; – diversity of residential developments by type and number of floors in the central and peripheral parts of metropolitan areas: single-family housing, apartment buildings with various numbers of floors; – presence of mixed-use zones (residential and non-residential). 2. Calculation of the aggregate index value as the arithmetic mean between indicator values.	General layouts, land use and development rules of sampled municipal entities of metropolitan areas demonstrating the highest activity in housing construction

TABLE CONTINUED

Calculation methodology	Data source
Urban planning policy spatial coordination index, 2017, on a scale from 0 to 1	
1. Measurement of two indicators of the index on a scale from 0 to 1 in each metropolitan area in respect of a sample of municipalities: – spatial differentiation of minimum and maximum requirements to the number of floors in apartment buildings development zones in the land use and development rules; – spatial differentiation of minimum and maximum requirements to land plot sizes in high-rise residential and single-family housing development zones in the land use and development rules. 2. Calculation of the aggregate index value as the arithmetic mean between indicator values.	Land use and development rules of sampled municipal entities of metropolitan areas demonstrating the highest activity in housing construction
Revenues and expenditures of local budgets of central cities, million of international dollars	
1. Use of data from municipalities' official reports on the revenues and expenditures of the local budget of the metropolitan area's central city.	Local budget performance reports
Tax revenues from property tax in metropolitan area centers, 2010–2016, million of international dollars per year, international dollars per capita, ratio to local budget revenues, %	
1. Calculation of the sum of actual local property tax collected (land tax and personal property tax) and actual regional corporate property tax collected in the central municipal entity of each metropolitan area. 2. Calculation of the sum of actual real estate tax collected in the central municipal entity in million of international dollars, international dollars per capita per year and in relation to local budget revenues (%)	Public statement forms of the Federal Tax Service

TABLE CONTINUED

Calculation methodology	Data source
Land rent indicators: increase in the real capitalization of the housing stock in monetary terms, billion international dollars and %	
1. Calculation of residential space in all municipal entities included in the metropolitan area in 2010 and 2015. 2. Calculation of housing market prices in the metropolitan area in 2010 and 2015, in 2015 prices. 3. Calculation of the capitalization indicator by multiplying the calculation result in p. 1 by the calculation result in p. 2. 4. Calculation of indicator increase in p. 3 in 2015 as a ratio to 2010.	Federal State Statistic Service, Domofond.ru (public Internet housing sale advertisement board)
Residential density and the profile of the average residential density based on distance from the metropolitan area center, 2017, '000 m^2 of total residential space per ha	
1. Spatial reference (imposition) of addresses of blocks of flats and the total residential space in those blocks of flats to the map of each metropolitan area under review, based on Utility Sector Reform portal data (www.reformagkh.ru), using R Studio software and QGIS geoinformation package. 2. Determination of the territories and measurement of the volume of low-rise housing (3 floors and lower), based on OpenStreetMap data (www.openstreetmap.org). 3. Calculation of residential density in a 200m x 200m grid as the quotient of division of the summed total residential space in buildings located within a cell by the area of the footprint under such buildings. 4. Calculation of average residential density in seven commuter belts (with radiuses of 1, 3, 6, 9, 12, 15, and 18 km). 5. Visualization of the calculations of residential development density in a 200 x 200 m grid.	"Utility Sector Reform", OpenStreetMap

TABLE CONCLUDED

Calculation methodology	Data source
Investment and redevelopment potential: potential for increasing development mass within existing residential developments of the metropolitan areas reviewed (footprints of such developments) by increasing the density of such developments, 2017, million m^2, % of existing housing stock, billion of international dollars	
1. Determination of potential threshold average residential density in each commuter belt (with radiuses of 1, 3, 6, 9, 12, 15, and 18 km). 2. Calculation of the potential mass of additional development in these territories by achieving such threshold average density.	"Utility Sector Reform", OpenStreetMap, IUE expert opinions on potential threshold density

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