

# COUNTRY EXPOSURE MODEL

Review main statistic of a exposure model and create summaries for a given Country.

/home/risk/venvs/py38w/lib/python3.8/site-packages/geopandas/\_compat.py:111: UserWarning: The Shapely GEOS version (3.9.1-CAPI-1.14.2) is incompatible with the GEOS version PyGEOS was compiled with (3.10.1-CAPI-1.16.0). Conversions between both will be slow.  
warnings.warn(

# Parameters

country = "Russia"

Exposure files:

Exposure\_Com\_Russia.csv

Exposure\_Ind\_Russia.csv

Exposure\_Res\_Russia.csv

## Sanity checks and formats

Russia

Exposure/Exposure/Exposure\_Com\_Russia.csv

Exposure/Exposure/Exposure\_Ind\_Russia.csv

Exposure/Exposure/Exposure\_Res\_Russia.csv

Occupants / Dwellings = 2.6

Reference avg household size (2019) = 2.59

Population (exposure / UN\_2021) = 1.0

Exposure models OK

## Exposure at National level

### Summary by occupancy type

	OCCUPANTS	BUILDINGS	COST_USD	BUILDINGS_%	COST_USD_%
OCCUPANCY					
Res	145.9M	16,295.3K	\$4,088.3B	87.00%	78.88%
Ind	0.0M	859.0K	\$298.6B	4.59%	5.76%
Com	0.0M	1,576.1K	\$796.2B	8.41%	15.36%

### Other metrics to consider

	AREA_SQM	COST_BUILDING_USD	AVG_BUILDING_AREA_SQM	AVG_COST_PER_AREA_USD
OCCUPANCY				
Total	6,559.0M	\$3,734.0B	350	\$790
Res	5,649.6M	\$3,085.3B	347	\$724
Ind	343.6M	\$149.7B	400	\$869
Com	565.8M	\$499.0B	359	\$1,407

## Exposure summary at Admin level 1

	COST_USD	BUILDINGS	OCCUPANTS	COST_USD_%	BUILDINGS_%	OCCUPANTS_%
NAME_1						
Moscow	\$847,519.5M	793,255	12,653.6K	16.35%	4.24%	8.67%
Moscow Oblast	\$298,468.9M	560,814	7,706.7K	5.76%	2.99%	5.28%
Saint Petersburg	\$268,769.9M	347,125	5,384.0K	5.19%	1.85%	3.69%
Sverdlovsk Oblast	\$174,954.0M	399,330	4,288.1K	3.38%	2.13%	2.94%
Krasnodar Krai	\$156,872.1M	1,283,334	5,682.3K	3.03%	6.85%	3.89%
Tatarstan	\$152,078.4M	534,846	3,892.3K	2.93%	2.86%	2.67%
Tyumen Oblast	\$135,626.4M	316,157	3,776.6K	2.62%	1.69%	2.59%
Nizhny Novgorod Oblast	\$132,889.1M	368,130	3,175.0K	2.56%	1.97%	2.18%
Bashkortostan	\$118,135.4M	644,344	4,012.2K	2.28%	3.44%	2.75%
Krasnoyarsk Krai	\$115,021.1M	255,443	2,854.4K	2.22%	1.36%	1.96%
Novosibirsk Oblast	\$113,785.2M	337,860	2,784.2K	2.20%	1.80%	1.91%
Rostov Oblast	\$100,600.9M	784,472	4,179.6K	1.94%	4.19%	2.86%
Chelyabinsk Oblast	\$93,467.0M	373,130	3,441.1K	1.80%	1.99%	2.36%
Irkutsk Oblast	\$92,228.9M	267,978	2,373.4K	1.78%	1.43%	1.63%
Volgograd Oblast	\$84,208.4M	404,130	2,472.8K	1.62%	2.16%	1.69%
Samara Oblast	\$82,898.0M	332,875	3,152.4K	1.60%	1.78%	2.16%
Perm Krai	\$81,498.1M	276,208	2,577.0K	1.57%	1.47%	1.77%
Kemerovo Oblast	\$74,929.0M	303,736	2,631.7K	1.45%	1.62%	1.80%
Voronezh Oblast	\$73,979.7M	406,802	2,303.9K	1.43%	2.17%	1.58%
Primorsky Krai	\$71,253.0M	174,926	1,875.8K	1.37%	0.93%	1.29%
Leningrad oblast	\$67,467.9M	156,529	1,890.7K	1.30%	0.84%	1.30%
Altai Krai	\$66,929.3M	358,376	2,294.6K	1.29%	1.91%	1.57%
Stavropol Krai	\$61,715.1M	613,305	2,791.1K	1.19%	3.27%	1.91%
Khanty-Mansiysk Autonomous Okrug - Ugra	\$61,222.4M	89,559	1,686.4K	1.18%	0.48%	1.16%
Saratov Oblast	\$59,015.2M	314,741	2,393.6K	1.14%	1.68%	1.64%
Khabarovsk Krai	\$56,648.9M	97,559	1,299.1K	1.09%	0.52%	0.89%
Sakha Republic	\$55,037.0M	150,765	980.3K	1.06%	0.80%	0.67%
Omsk Oblast	\$52,091.6M	236,854	1,902.2K	1.01%	1.26%	1.30%
Dagestan	\$51,925.1M	888,139	3,131.5K	1.00%	4.74%	2.15%
Belgorod Oblast	\$51,686.9M	281,454	1,539.3K	1.00%	1.50%	1.06%
Tula Oblast	\$47,685.4M	145,694	1,447.2K	0.92%	0.78%	0.99%
Udmurtia	\$47,569.2M	206,601	1,491.1K	0.92%	1.10%	1.02%
Tomsk Oblast	\$42,990.2M	96,018	1,067.7K	0.83%	0.51%	0.73%
Yaroslavl Oblast	\$40,390.5M	111,153	1,239.7K	0.78%	0.59%	0.85%
Murmansk Oblast	\$40,105.6M	23,458	731.4K	0.77%	0.13%	0.50%
Arkhangelsk Oblast	\$39,943.6M	83,326	1,125.6K	0.77%	0.44%	0.77%
Zabaykalsky Krai	\$38,342.5M	147,587	1,051.7K	0.74%	0.79%	0.72%
Tver Oblast	\$36,590.9M	153,768	1,243.7K	0.71%	0.82%	0.85%
Orenburg Oblast	\$36,440.0M	309,064	1,941.3K	0.70%	1.65%	1.33%
Ryazan Oblast	\$35,583.0M	140,209	1,096.6K	0.69%	0.75%	0.75%
Amur Oblast	\$35,335.3M	87,602	780.3K	0.68%	0.47%	0.53%
Buryatia	\$34,773.0M	164,421	983.6K	0.67%	0.88%	0.67%
Astrakhan Oblast	\$34,542.9M	185,731	995.6K	0.67%	0.99%	0.68%
Vladimir Oblast	\$33,857.5M	136,690	1,340.5K	0.65%	0.73%	0.92%
Kaliningrad	\$33,732.9M	96,557	1,016.7K	0.65%	0.52%	0.70%
Penza Oblast	\$33,517.9M	207,407	1,289.4K	0.65%	1.11%	0.88%
Kaluga Oblast	\$33,126.6M	102,686	999.0K	0.64%	0.55%	0.68%
Ulyanovsk Oblast	\$31,943.9M	152,484	1,216.4K	0.62%	0.81%	0.83%
Sakhalin Oblast	\$31,655.2M	32,039	483.4K	0.61%	0.17%	0.33%
Vologda Oblast	\$31,343.9M	111,091	1,149.8K	0.60%	0.59%	0.79%
Komi Republic	\$30,910.0M	61,268	812.7K	0.60%	0.33%	0.56%
Chuvashia	\$29,122.8M	189,170	1,206.0K	0.56%	1.01%	0.83%
Lipetsk Oblast	\$28,710.9M	173,922	1,126.2K	0.55%	0.93%	0.77%
Kirov Oblast	\$28,601.3M	127,032	1,248.5K	0.55%	0.68%	0.86%
Kursk Oblast	\$27,243.1M	187,384	1,094.5K	0.53%	1.00%	0.75%
Bryansk Oblast	\$27,162.3M	219,996	1,181.1K	0.52%	1.17%	0.81%
Yamalo-Nenets Autonomous Okrug	\$26,578.1M	25,011	545.2K	0.51%	0.13%	0.37%
Tambov Oblast	\$26,293.7M	180,934	992.7K	0.51%	0.97%	0.68%
Ivanovo Oblast	\$25,410.7M	132,551	985.1K	0.49%	0.71%	0.68%
Chechnya	\$25,396.3M	464,592	1,496.8K	0.49%	2.48%	1.03%
Smolensk Oblast	\$24,998.5M	120,100	919.6K	0.48%	0.64%	0.63%
Kamchatka Krai	\$24,758.7M	15,556	309.7K	0.48%	0.08%	0.21%
Republic of Karelia	\$21,937.6M	41,760	607.8K	0.42%	0.22%	0.42%
Kurgan Oblast	\$21,634.7M	125,239	816.7K	0.42%	0.67%	0.56%
Republic of Mordovia	\$20,099.1M	123,455	777.2K	0.39%	0.66%	0.53%
Pskov Oblast	\$18,980.7M	89,382	618.6K	0.37%	0.48%	0.42%
Oryol Oblast	\$17,827.7M	120,976	723.0K	0.34%	0.65%	0.50%
Kabardino-Balkaria	\$17,802.3M	224,287	867.8K	0.34%	1.20%	0.59%
Khakassia	\$15,838.6M	63,405	530.3K	0.31%	0.34%	0.36%
Kostroma Oblast	\$15,466.1M	70,244	626.9K	0.30%	0.38%	0.43%
North Ossetia-Alania	\$15,123.4M	152,888	691.8K	0.29%	0.82%	0.47%
Mari El	\$14,896.7M	90,422	673.6K	0.29%	0.48%	0.46%
Novgorod Oblast	\$14,671.4M	74,302	590.9K	0.28%	0.40%	0.40%
Tuva	\$11,777.3M	51,424	328.7K	0.23%	0.27%	0.23%
Karachay-Cherkessia	\$11,399.0M	122,367	463.9K	0.22%	0.65%	0.32%
Adygea	\$10,993.2M	120,556	461.4K	0.21%	0.64%	0.32%
Magadan Oblast	\$7,649.7M	6,387	137.8K	0.15%	0.03%	0.09%
Ingushetia	\$7,017.3M	179,704	514.5K	0.14%	0.96%	0.35%
Altai Republic	\$6,272.1M	53,125	219.2K	0.12%	0.28%	0.15%
Chukotka Autonomous Okrug	\$5,049.1M	1,456	47.6K	0.10%	0.01%	0.03%
Kalmykia	\$4,715.2M	55,871	268.2K	0.09%	0.30%	0.18%
Jewish Autonomous Oblast	\$3,886.3M	15,392	155.3K	0.07%	0.08%	0.11%
Nenets Autonomous Okrug	\$2,530.3M	4,579	43.3K	0.05%	0.02%	0.03%

## Exposure by simplified taxonomy

Adding `MACRO\_TAXO` column

	COST_USD	BUILDINGS	OCCUPANTS	COST_USD_%	BUILDINGS_%	OCCUPANTS_%
MACRO_TAXO						

		CR+PC/LPB+CDL/HBET:9-/RES	\$481.1B	108.8K	10.31%	0.66%
		MUR+CL/LWAL+CDN/H:2/RES	\$196.9B	1,251.4K	4.22%	7.58%
		MUR+CLBRH/LWAL+CDN/H:2/RES	\$169.3B	1,209.8K	3.63%	7.33%
	MUR	MUR+CB/LWAL+CDN/H:4/RES	\$169.3B	102.3K	3.63%	0.62%
		MUR+CL/LWAL+CDN/H:3/RES	\$153.6B	354.9K	3.29%	2.15%
		MUR+CL/LWAL+CDN/HBET:4-6/RES	\$137.5B	71.7K	2.95%	0.43%
	W	W/LO+CDL/H:2/RES	\$137.3B	1,232.6K	2.94%	7.47%
		W/LWAL+CDL/H:1/RES	\$132.3B	1,338.8K	2.84%	8.11%
	MUR	MUR+CLBRH/LWAL+CDN/H:3/RES	\$126.3B	330.6K	2.71%	2.00%
	W	W/LWAL+CDL/H:2/RES	\$121.4B	690.4K	2.60%	4.18%
	MUR	MUR+CLBRH/LWAL+CDN/HBET:4-6/RES	\$110.2B	57.2K	2.36%	0.35%
	W	W/LO+CDL/H:1/RES	\$108.7B	1,240.4K	2.33%	7.52%
		MUR+CL/LWAL+CDN/H:1/RES	\$98.1B	1,192.5K	2.10%	7.23%
	MUR	MUR+CLBRH/LWAL+CDN/H:1/RES	\$89.6B	1,165.9K	1.92%	7.07%
		MUR+CL/LWAL+CDN/H:2/COM	\$89.3B	177.8K	1.92%	1.08%
		MUR+CB/LWAL+CDN/H:2/COM	\$86.9B	173.7K	1.86%	1.05%
	W	W/LWAL+CDL/H:3/RES	\$86.1B	247.2K	1.85%	1.50%
	MUR	MUR+CL/LWAL+CDN/H:1/COM	\$73.7B	298.8K	1.58%	1.81%
	W	W/LFM+CDL/H:2/RES	\$71.5B	554.9K	1.53%	3.36%
		MUR+CB/LWAL+CDN/H:2/RES	\$71.2B	312.4K	1.53%	1.89%
	MUR	MUR+CB/LWAL+CDN/H:1/COM	\$67.4B	274.2K	1.45%	1.66%
		MUR+CL/LWAL+CDN/H:3/COM	\$64.3B	85.9K	1.38%	0.52%
		MUR+CB/LWAL+CDN/H:3/COM	\$62.9B	84.3K	1.35%	0.51%
	OT	MATO/RES	\$61.1B	791.0K	1.31%	4.79%
	RC	CR+PC/LPB+CDL/H:4/RES	\$60.5B	30.9K	1.30%	0.19%
	MUR	MUR+CB/LWAL+CDN/H:3/RES	\$60.4B	97.8K	1.29%	0.59%
		CR+PC/LPB+CDL/H:6/RES	\$60.1B	20.4K	1.29%	0.12%
	RC	CR+PC/LPB+CDL/H:7/RES	\$60.1B	17.5K	1.29%	0.11%
		CR+PC/LPB+CDL/H:8/RES	\$60.1B	15.3K	1.29%	0.09%
	W	W/LO+CDL/H:3/RES	\$55.8B	283.1K	1.20%	1.72%
	MIX	MIX(MUR+W)/LWAL+CDL/H:2/RES	\$53.9B	647.9K	1.16%	3.93%
	W	W/LFM+CDL/H:1/RES	\$53.5B	559.3K	1.15%	3.39%
	RC	CR/LFINF+CDL/HBET:3-5/COM	\$43.3B	26.8K	0.93%	0.16%
	S	S+SL/LFM+CDL/H:1/IND	\$39.2B	139.8K	0.84%	0.85%
		S/LFM+CDL/H:1/IND	\$39.2B	139.8K	0.84%	0.85%
	MR	MR+CB/LWAL+CDL/H:4/RES	\$38.6B	18.7K	0.83%	0.11%
	W	W/LWAL+CDL/H:2/COM	\$38.4B	64.3K	0.82%	0.39%
	RC	CR/LFINF+CDL/HBET:6-/COM	\$38.0B	8.1K	0.81%	0.05%
	MUR	MUR+STDRE/LWAL+CDN/H:2/RES	\$36.1B	84.1K	0.77%	0.51%
		MUR+STDRE/LWAL+CDN/H:1/RES	\$35.5B	127.3K	0.76%	0.77%
	W	W/LFM+CDL/H:3/RES	\$35.4B	131.5K	0.76%	0.80%
		MCF+CL/LWAL+CDL/HBET:4-6/RES	\$33.9B	14.4K	0.73%	0.09%
	MCF	MCF+CL/LWAL+CDL/H:3/RES	\$33.8B	23.6K	0.72%	0.14%
		MCF+CL/LWAL+CDL/H:2/RES	\$33.6B	36.3K	0.72%	0.22%
	W	W/LWAL+CDL/H:1/COM	\$33.4B	114.4K	0.72%	0.69%
	RC	CR+PC/LPB+CDM/H:5/RES	\$26.5B	10.3K	0.57%	0.06%
		CR+PC/LPB+CDM/HBET:9-/RES	\$26.5B	5.7K	0.57%	0.03%
	S	S+SL/LFM+CDL/H:2/IND	\$26.1B	46.6K	0.56%	0.28%
		S/LFM+CDL/H:2/IND	\$26.1B	46.6K	0.56%	0.28%
	RC	CR/LWAL+CDL/HBET:3-5/COM	\$25.7B	15.9K	0.55%	0.10%
	MCF	MCF/LWAL+CDL/HBET:3-5/COM	\$23.7B	15.9K	0.51%	0.10%
	RC	CR/LWAL+CDL/HBET:6-/COM	\$23.1B	5.2K	0.49%	0.03%
	MCF	MCF/LWAL+CDL/HBET:6-/COM	\$21.3B	5.2K	0.46%	0.03%
	MUR	MUR/LWAL+CDN/H:1/IND	\$20.6B	90.2K	0.44%	0.55%
	RC	CR/LFINF+CDL/H:2/COM	\$19.4B	34.4K	0.42%	0.21%
		CR/LFINF+CDL/H:1/IND	\$18.0B	55.9K	0.39%	0.34%
	MUR	MUR+STDRE/LWAL+CDN/H:3/RES	\$17.4B	23.0K	0.37%	0.14%