# 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 Sh
apely 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(
```

```python
# Parameters
country = "Italy"
```

```
Exposure files:
  Exposure_Com_Italy.csv
  Exposure_Ind_Italy.csv
  Exposure_Res_Italy.csv
```

**Sanity checks and formats**

# Exposure at National level

### Summary by occupancy type

| OCCUPANCY | OCCUPANTS | BUILDINGS | COST_USD | BUILDINGS_% | COST_USD_% |
|---|---|---|---|---|---|
| Res | 60.3M | 11,354.4K | $4,398.6B | 93.16% | 73.30% |
| IND | 19.0M | 287.0K | $1,031.6B | 2.36% | 17.19% |
| COM | 24.1M | 546.3K | $570.9B | 4.48% | 9.51% |

### Other metrics to consider

| OCCUPANCY | AREA_SQM | COST_BUILDING_USD | AVG_BUILDING_AREA_SQM | AVG_COST_PER_AREA_USD |
|---|---|---|---|---|
| Total | 2,787.3M | $4,217.0B | 229 | $2,153 |
| Res | 2,481.4M | $3,518.9B | 219 | $1,773 |
| IND | 200.0M | $412.7B | 697 | $5,158 |
| COM | 105.9M | $285.4B | 194 | $5,389 |

# Exposure summary at Admin level 1

| NAME_1 | COST_USD | BUILDINGS | OCCUPANTS | COST_USD_% | BUILDINGS_% | OCCUPANTS_% |
|---|---|---|---|---|---|---|
| Lombardia | $1,044.2B | 1,596.2K | 17,137.8K | 17.40% | 13.10% | 16.57% |
| Veneto | $594.0B | 1,127.1K | 8,695.6K | 9.90% | 9.25% | 8.41% |
| Lazio | $563.9B | 841.6K | 9,709.9K | 9.40% | 6.91% | 9.39% |
| Emilia-Romagna | $542.5B | 874.9K | 7,809.9K | 9.04% | 7.18% | 7.55% |
| Piemonte | $457.5B | 923.3K | 7,588.3K | 7.62% | 7.58% | 7.34% |
| Campania | $431.3B | 909.0K | 9,638.1K | 7.19% | 7.46% | 9.32% |
| Sicilia | $425.7B | 1,281.0K | 8,451.6K | 7.09% | 10.51% | 8.17% |
| Toscana | $381.2B | 765.9K | 6,615.1K | 6.35% | 6.28% | 6.40% |
| Puglia | $353.6B | 867.8K | 6,923.3K | 5.89% | 7.12% | 6.69% |
| Marche | $167.4B | 323.3K | 2,746.7K | 2.79% | 2.65% | 2.66% |
| Calabria | $166.0B | 561.1K | 3,188.0K | 2.77% | 4.60% | 3.08% |
| Sardegna | $164.2B | 489.8K | 2,836.3K | 2.74% | 4.02% | 2.74% |
| Friuli-Venezia Giulia | $146.0B | 317.1K | 2,137.8K | 2.43% | 2.60% | 2.07% |
| Liguria | $145.7B | 265.1K | 2,682.7K | 2.43% | 2.17% | 2.59% |
| Abruzzo | $127.9B | 331.7K | 2,237.8K | 2.13% | 2.72% | 2.16% |
| Umbria | $95.6B | 208.8K | 1,583.6K | 1.59% | 1.71% | 1.53% |
| Trentino-Alto Adige | $95.6B | 216.6K | 1,752.9K | 1.59% | 1.78% | 1.69% |
| Basilicata | $54.1B | 154.4K | 961.5K | 0.90% | 1.27% | 0.93% |
| Molise | $31.6B | 94.9K | 529.3K | 0.53% | 0.78% | 0.51% |
| Valle d'Aosta | $13.0B | 38.1K | 212.7K | 0.22% | 0.31% | 0.21% |

# Exposure by simplified taxonomy

```
Adding `MACRO_TAXO` column
```

| MACRO_TAXO | COST_USD | BUILDINGS | OCCUPANTS | COST_USD_% | BUILDINGS_% | OCCUPANTS_% |
|---|---|---|---|---|---|---|
| RC | $3,249.3B | 3,998.3K | 55,198.7K | 54.14% | 32.81% | 53.36% |
| MUR | $1,958.5B | 6,611.4K | 35,873.4K | 32.64% | 54.25% | 34.68% |
| MCF | $564.1B | 1,512.2K | 7,847.0K | 9.40% | 12.41% | 7.59% |
| S | $229.3B | 65.8K | 4,519.7K | 3.82% | 0.54% | 4.37% |

# Exposure by taxonomy

```
Showing only taxonomies that represent 90% of the total `COST_USD`
```

| MACRO_TAXO | TAXONOMY | COST_USD | BUILDINGS | COST_USD_% | BUILDINGS_% |
|---|---|---|---|---|---|
| RC | CR/LFINF+CDL+LFC:0.0/HBET:4-/RES | $966.4B | 449.6K | 17.95% | 4.14% |
| MUR | MUR+STRUB/LWAL+CDN/H:2/RES | $734.7B | 3,368.9K | 13.65% | 31.04% |
| RC | CR+PC/LFM+CDN/H:1/IND | $576.2B | 157.9K | 10.70% | 1.45% |
| MUR | MUR+STRUB/LWAL+CDN/H:3/RES | $440.8B | 1,540.3K | 8.19% | 14.19% |
| | MUR+STDRE/LWAL+CDN/HBET:4-/RES | $350.7B | 444.4K | 6.52% | 4.09% |
| RC | CR/LFINF+CDL+LFC:0.0/H:2/RES | $329.1B | 1,080.7K | 6.11% | 9.96% |
| | CR/LFINF+CDL+LFC:0.0/H:3/RES | $317.8B | 643.9K | 5.90% | 5.93% |
| MCF | MCF/LWAL+CDN/H:2/RES | $205.0B | 715.7K | 3.81% | 6.59% |
| MUR | MUR+STRUB/LWAL+CDN/H:1/RES | $169.2B | 1,039.1K | 3.14% | 9.57% |
| MCF | MCF/LWAL+CDN/H:3/RES | $144.2B | 359.3K | 2.68% | 3.31% |
| | MCF/LWAL+CDN/HBET:4-/RES | $133.8B | 118.6K | 2.48% | 1.09% |
| RC | CR/LFINF+CDL+LFC:0.0/HBET:3-5/COM | $101.4B | 79.6K | 1.88% | 0.73% |
| S | S+SR/LFM+CDN/H:1/IND | $99.8B | 28.7K | 1.85% | 0.26% |
| | S/LFM+CDN/H:1/IND | $99.8B | 28.7K | 1.85% | 0.26% |
| RC | CR/LFINF+CDL+LFC:0.0/H:2/COM | $98.0B | 87.0K | 1.82% | 0.80% |
| | CR+PC/LFM+CDN/H:2/COM | $83.8B | 23.0K | 1.56% | 0.21% |
| MUR | MUR+STRUB/LWAL+CDN/H:1/COM | $83.1B | 121.8K | 1.54% | 1.12% |
| RC | CR/LFINF+CDL+LFC:7.0/HBET:4-/RES | $65.1B | 55.9K | 1.21% | 0.52% |
| | CR/LFINF+CDL+LFC:0.0/H:1/RES | $64.7B | 296.7K | 1.20% | 2.73% |
| MUR | MUR+STRUB/LWAL+CDN/HBET:3-5/COM | $56.2B | 17.8K | 1.04% | 0.16% |
| | MUR+STRUB/LWAL+CDN/H:2/COM | $55.5B | 46.6K | 1.03% | 0.43% |
| | CR/LFINF+CDM+LFC:0.0/HBET:4-/RES | $55.1B | 30.0K | 1.02% | 0.28% |
| RC | CR+PC/LFM+CDN/HBET:3-5/IND | $52.4B | 14.4K | 0.97% | 0.13% |
| | CR/LFINF+CDN/H:1/IND | $52.4B | 14.4K | 0.97% | 0.13% |
| | CR/LFINF+CDL+LFC:0.0/H:1/COM | $48.3B | 89.8K | 0.90% | 0.83% |