

Geometra 2030: Challenges and Insights in Spatial Planning for the Italian Surveyors

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Key words: Spatial Planning, Energy Efficiency, Superbonus110, Spatial Planning Instruments, SDG

SUMMARY

Our society, as we know it, has changed a lot in the last three years. With natural calamities and anthropogenic disasters on one end, and advancing technologies on the other, we developed a different sense on how we live our homes, our environment, our workplace, our surroundings, and the world in general.

In Italy, a National Plan for Resilience and Recovery (PNRR) was introduced in 2020. PNRR is a collective form of investment grants and reform packages amounting to €. 750 billion and is part of the Next Generation EU program, thus its main goals are coherent to the latter's three strategic axes namely: digitization and innovation, ecological transition, and social inclusion. At the local level, PNRR revolves around the following six key areas, or "missions": 1) Digitization, Innovation, Competitiveness, Culture; 2) Green Revolution and Ecological Transition; 3) Infrastructure for Sustainable Mobility; 4) Education and Research; 5) Inclusion and Cohesion; and 6) Health.

Our paper will assess possible outlets in which, Italian surveyors can play a significant role in projects that can be supported by funds from the PNRR, how the Consiglio Nazionale dei Geometri e Geometri Italiani of Italy (CNGeGL) are supporting its constituents through the Geometra 2030 project, and what are the first challenges that were encountered in this program.

Moreover, we will illustrate the first effects of Superbonus 110%, a nationwide government initiative that allows citizens to undertake energy efficiency and seismic improvement project with almost zero cost through unprecedented fiscal breaks. Through open data available, a GIS analysis of Superbonus 110% projects on sample city like Bologna, we will determine if how initiatives under PNRR are affecting a city's design and its citizens' perception towards a more catastrophe resilient society.

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Introduction

The world, as we know it, has changed, more so, it suffered a drastic shift on our habits and perceptions in the last years. With natural calamities and anthropogenic disasters on one end, and advancing technologies on the other, we developed a different approach on how we live our homes, our environment, our workplace, our surroundings, and the world in general. But how can our society, with the latest directives on energy efficiency, and use of resources, address and upfront this evolution?

According a study conducted by the Bertelsmann Foundation in 2015 for the United Nation's Sustainable Development Goals (or SDGs), Italy ranks 26th out of the 34 OECD countries. The country places on the top three for 9 out of the 34 indicators, while also being the top five for 3 items. Italy's performance however, seems to be unstable.

For the other 16 indicators, Italy ranks among the worst three, while it is among the worst five for five items.

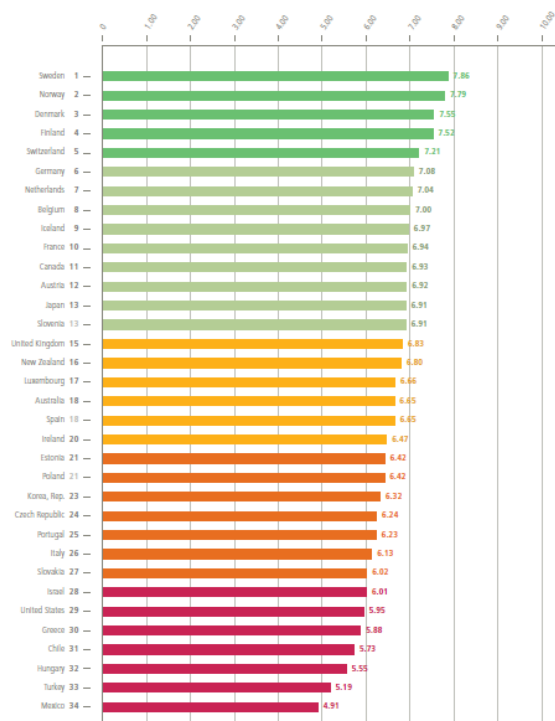


Figure 1 Global rankings of each OECD country based on the 17 goals and 34 indicators

Moreover, the Sustainable Development Solutions Network (SDSN) published in February 2016, the Preliminary Report Sustainable Development Goals Index and Dashboard that used a limited set of indicators (40 in all) and was made available to international organizations. The Report (preliminary and submitted to public consultation) also presents the status of the 118 comprising countries, based on a composite index of all the indicators considered, of which, Italy positions itself between the 21st and the 23rd position, depending of the kind of methodology used. On the other hand, Italy ranks between the 18th and the 28th position for the OECD countries. What's interesting is in three objectives: 7- Affordable and Clean Energy, 8 – Decent Work and Employment Growth, 17 – Partnership for the Goals, Italy appears particularly negative.

Background

The European Directive

Energy efficiency improvements could reduce not only carbon dioxide emissions, but also the EU's €330 billion annual bill for energy imports. As greed in the 2018 Energy Efficiency Directive, EU lawmakers are working on an update of the 2030 energy efficiency target of 32.5%.

The new targets, approved by the European Parliament in September 2022, aims for a reduction of at least 40% of final energy consumption and 42.5% of primary energy consumption. Final energy consumption refers to the energy used by final consumers (such as electricity consumption by households), on the other hand primary energy consumption represents the total energy demand within a country (such as fuel consumption to produce electricity).

An important area for improvement is in the heating and cooling of buildings, which accounts for 40% of all energy consumed in the EU. About 75% of buildings are energy inefficient.

In April 2018, the EU Parliament adopted rules on the energy efficiency of buildings requiring EU countries to prepare long-term national strategies to support the renovation of residential and non-residential buildings.

In December 2021, as part of the Ready for 55 plan to overhaul key legislation to reduce greenhouse gas emissions in the EU, the European Commission proposed an update of the Energy Performance of Buildings Directive. The goal is to have a carbon-neutral building stock by 2050. The directive includes renovation strategies and a requirement for all new buildings in the EU to be carbon-neutral from 2030, while all new buildings Public transport should be carbon neutral from 2027.

The new rules would essentially reduce greenhouse gas emissions and final energy consumption in the buildings sector by 2030 and then set a long-term vision for a climate-neutral EU building sector by 2050. It would ensure that all new buildings in the EU meet zero-emissions building standards and ensure that all future buildings – both new and refurbished – are in line with the 2050 climate-neutrality requirements.

This update will also make it mandatory for EU countries to ensure that new buildings are equipped with solar panels. From the end of 2026 to the end of 2029, it will progressively apply to all new public and commercial buildings with a usable area greater than 250.00 sqm, to all existing public and commercial buildings with the same dimensions and to all new residential buildings.

In December 2022, Parliament voted to introduce an obligation for Member States to issue permits within one month for the installation of solar energy systems on buildings. An exception would be for systems below 50 kW when a simple notification would be enough. The installation of solar panels would be exempt from the obligation to carry out an environmental impact assessment. The process of issuing a permit for the installation of heat pumps should not exceed one month.

The National Recovery and Resilience Plan of Italy

The National Recovery and Resilience Plan (Piano Nazionale di Ripresa e Resilienza, PNRR) is part of the Next Generation EU (NGEU) programme, consisting of a € 750 billion package of which about half is in the form of grants – that the European Union negotiated in response to the pandemic crisis. The main component of the NGEU programme is the Recovery and Resilience Facility (RRF), which has a duration of six years, from 2021 to 2026, and a total size of € 672.5 billion, of which € 312.5 billion as grants, and the remaining € 360 billion as low-interest loans.

The Recovery and Resilience Plan presented by Italy envisages investments and a consistent reform package, with € 191.5 billion in resources being allocated through the Recovery and Resilience Facility and € 30.6 billion being funded through the Complementary Fund established by Italian Decree-Law No.59 of 6 May 2021, based on the multi-year budget variance approved by the Italian Council of Ministers on 15 April. The total amount of funds envisaged amounts to € 222.1 billion. In addition, a further € 26 billion has been marked for the implementation of specific works and for replenishing the resources of the Development and Cohesion Fund by 2032. A total of € 248 billion will be available. In addition, there are also those made available by the REACT-EU programme, which will be spent in the years 2021-2023 in accordance with EU regulations. These funds amount to a further € 13 billion.

The Plan is developed around three strategic axes shared at a European level: *digitisation and innovation, ecological transition, and social inclusion*. It is an intervention that aims at repairing the economic and social damage caused by the pandemic crisis, contributing to addressing the structural weaknesses of the Italian economy, and leading the country along a path of ecological and environmental transition. The NRRP will contribute to reducing territorial, generational and gender gaps.

The Plan allocates € 82 billion to the South out of a total of € 206 billion that can be distributed according to geographical criteria (i.e., 40%) and also provides for significant investments in young people and women.

The Plan is developed around six missions:

- *Digitisation, Innovation, Competitiveness, Culture* which will have a total of € 49.2 billion (of which € 40.7 billion from the Recovery and Resilience Facility and € 8.5 billion from the Complementary Fund) with the aim of promoting the country's digital transformation, supporting innovation in the production system, and investing in two key sectors for Italy: tourism and culture.
- *Green Revolution and Ecological Transition* allocates a total of € 68.6 billion (€ 59.3 billion from the RRF Facility and € 9.3 billion from the Fund) with the main goals of improving the sustainability and resilience of the economic system and ensuring a fair and inclusive environmental transition.

- *Infrastructure for Sustainable Mobility* allocates a total amount of € 31.4 billion (€ 25.1 billion from the RRF Facility and € 6.3 billion from the Fund). Its primary objective is the development of a modern, sustainable transport infrastructure extended to all areas of the country.
- *Education and Research* allocates a total of € 31.9 billion (€ 30.9 billion from the RRF Facility and € 1 billion from the Fund) with the aim of strengthening the education system, digital and technical-scientific skills, research and technology transfer.
- *Inclusion and Cohesion* provides for a total allocation of € 22.4 billion (of which € 19.8 billion from the RRF Facility and € 2.6 billion from the Fund) to facilitate labour market participation, including through training, strengthen active labour market policies and foster social inclusion.
- *Health* allocates a total of € 18.5 billion (€ 15.6 billion from the RRF Facility and € 2.9 billion from the Fund) with the aim of strengthening local prevention and health services, modernising and digitising the health system and ensuring equal access to care.

The Plan also includes a set of reforms to facilitate the implementation phase and to contribute to the modernisation of the country and make the economic environment more favourable to the development of business activities:

- A Public Administration reform to provide better services, encourage the recruitment of young people, invest in human capital and increase the level of digitisation.
- A justice reform to reduce the length of legal proceedings, especially civil proceedings, and the heavy burden of backlogs.
- Simplification measures in matters of permits and authorisations and public procurement, to ensure the implementation and maximum impact of investments.
- Reforms to promote competition as an instrument of social cohesion and economic growth.

The NRRP will have a significant impact on economic and productivity growth. According to the Italian Government, in 2026 it will transmute in a GDP rise of at least 3.6% higher than the baseline scenario that does not include the introduction of the Plan. The governance of the Plan contemplates direct responsibility of Italian Ministries and Local Governments for carrying out the investments and reforms that they are to implement within the agreed timeframe, and for the regular, proper and effective management of resources. A significant role will be played by Local Authorities, which are responsible for investments amounting to more than € 87 billion. The Italian Ministry of Economy and Finance will monitor progress in the implementation of reforms and investments and will be the sole point of contact with the European Commission. Finally, a Steering Committee will be set up at the Presidency of the Italian Council of Ministers.

Geometra 2030 – Roles to have, Risks to take

The Italian surveyors want to reclaim their role as key players in urban development in the Italian socio-economic landscape by taking the lead on the implementation of both the NRRP and Superbonus 110%.

Infact, Surveyors are regarded as highly compente in at least 2 of the 6 missions of NRRP. Firstly, on digitization, innovation, competitiveness and culture, and secondly, on green revolution and transition ecological because of their ability to put technology at the service of

sustainable policies: protection of the territory, safety, energy saving, reduction of soil consumption".

It is not to be undermined also that surveyors could play a concrete role in all six missions of the NRRP.

Digitization, innovation, competitiveness, culture, green revolution and transition ecological are sectors with a great socio-economic impact, areas in which surveyors, can put the skills into practice skills learned over the years of study and work.

Infact:

- *Mission 1.* This mission includes specific development coordinates regarding digitalisation, innovation, competitiveness and culture. Going more specifically, the simplification of building procedures (a sector in which surveyors have been standard bearers for some time) can represent a strong boost to the recovery of the economy just as the GIS technology, Geographic Information Systems, can be a weapon crucial in tackling climate change, territorial monitoring, subterranean services, and cadastral issues. Moreso, the removal of architectural barriers and accessibility is essential to revitalized the reuse existing building infrastructures. Other sectors where surveyors can contribute further are in territorial monitoring, surge of primary and secondary services (subterrean), and climate-centric project designs.
- *Mission 2.* The green revolution, the ecological transition, efficiency energy and seismic are already sectors where surveyors play a leading role. The 110% superbonus and the associated bureaucratic procedures have in fact reiterated the importance and centrality of the profession of surveyor. To be more specific, technical competence by the surveyors are widely used in the construction industry, urban regeneration and planning, specifically in project design, project management, cost estimations and budgeting, site safety management, auditing, as-built surveying, and HVAC installations.

Superbonus 110%

The Superbonus 110% is collective incentives introduced by the Italian Government in mid 2020 through Legislative Decree n. 34/2020, otherwise called as "Decreto Rilancio." Such project aims to provide fiscal assistance or tax benefit to home owners who wish to start property improvements relating to energy efficiency and seismic structural improvements. Superbonus 110% was successively went in vigor after the publication on the 6th of August 2020 of Decreto *Requisiti Tecnici* by the Ministry of Economic Development which defines the technical requirements to access tax deductions for energy requalification of buildings (i.e. Ecobonus), and Decreto *Asseverazioni* which covers all the necessary (sworn) documentation needed for the entire intervention.

The Superbonus is mainly divided into into two categories of interventions. The first is the EcoBonus that includes all related works to energy efficiency, and the SismaBonus, for seismic improvements and retrofitting of existing buldings. It is also possible to combine said incentives among themselves and with other types of tax benefit existing until the end of 2020.

The incentive consists of a tax deduction up until 110% of actual expenses made, incurred from 1 July 2020 to 30 June 2022. The tax deduction is divided in five annual installments. However, from 2022 the tax benefit was reduced to four equal annual installments.

The Superbonus has three main purposes, which are:

1. to relaunch the supply chain industry of Italy, which over the years has suffered from the economic crises and which involves many other industrial sectors linked to the building industry;

2. to focus on the energy and anti-seismic redevelopments of our private residential building assets, while at the same time allowing citizens to be able to access such types interventions without the need to shoulder excessive amount of payment.

3. to promote and enact energy saving procedures where the built environment plays an important role in achieving the national and regional objectives for the reduction of carbon dioxide emissions.

Interested beneficiaries can choose how to apply the tax benefits offered by Superbonus. First, they can directly use the 110% deduction as personal tax deductions in the following years of the end of the project. Beneficiaries can also choose to transfer the accrued tax credit to third parties (general contractors, banks, corporations, private companies), with possible consequence of gaining liquidity or not having to pay the final invoice. Lastly, the beneficiaries can consider asking the invoice discount option from the general contractor) carrying out the work but without the necessity to actually have any monetary outlay.

To be able to access Superbonus, it is necessary to carry out at least one so-called "Intervento Trainante", such as thermal insulation of the building perimeter, replacement of the existing HVAC system with new and highly efficient centralized systems, and seismic retrofittings.

Aside from the above, some "interventi trainati" can be done together with the "interventi trainanti," such as installations of solar panels and batteries, electric car chargers, removal of architectural barriers, and any other types of energy efficiency measures that can achieve the minimum requirement of increasing at least two building energy class.

The first effects of SuperBonus - Advantages and Disadvantages

According to initial researches on the effects of Superbonus, such ambitious project that is highly focused on redevelopment and energy efficiency of existing properties, an estimated increase of +5% on real estate value can be achieved. The increase in the value of the properties subject to redevelopment, in the hypothesis that all the redeveloped real estate units fall within the lower energy classes, would exceed 7 billion euros. Moreover, according to Censis, the multi-billion investment creates a noteworthy energy savings estimated to be around 11.700 Gwh/year, and if another annual 150 Gwh energy production from renewable power sources will be considered, this could only translate to 40% energy savings set by the Italian emergency plan to reduce consumption in the domestic sector for autumn-winter 2022-2023.

As far as CO₂ emissions are concerned, a reduction of 1.4 billion tonnes of avoided emissions is estimated thanks to these efficiency measures implemented within Superbonus. These are important numbers considering that the Italian building heritage is particularly energy-intensive.

Moreover, by the end of 2022 through the 110% Monitor report published in February 2023 by Nomisma, an independent company that conducts sectoral and territorial studies, economic research and market intelligence, evaluations, decision support tools, strategic advisory and consultancy services, it was estimated that the Italian Government has spent 71.8 billion euros for the Superbonus. The total works started for energy efficiency in our country

has amounted to 65.3 billion euros in January 2023, with an average investment of 175,234 euros, of which, 46.7% were from condominiums, 37.5% were from single-family buildings, and the remaining 15.8% from functionally independent buildings.

In 2022, around 372,297 sworn affidavits were filed equivalent to completed interventions of €. 49.7 billion. These are furtherly divided in 51,247 from condominiums, or the type of property that should have benefited from the provision, 215,105 of single-family buildings and 105,945 from functionally independent residential units.

Data from ENEA also showed that 58,355 sworn affidavits were presented in Lombardy (15.3%), 46,500 in Veneto (12.3%), 31,500 from Lazio (8.6%), 30,700 from Emilia-Romagna (8.0%), 29,600 from Tuscany (7.8%) and around 27,000 from Piedmont (7.2%). There would be around 232,000 construction sites that should have been completed and would cover less than 2% of the residential building patrimony in Italy.

The effects of Superbonus also reverbrated on the economic level, with an impact on the national economy amounting to €. 195.2 billion euros from which €. 87.7 billion from direct effects, €. 39.6 billion of indirect effects, and €. 67.8 billion of induced activities.

Further analyses from the National Council of Engineers, in theri publication on April 2023 highlights that a 1.5% increase on GDP from the built industry and other connected industries was registered for 2022 alone.

Focusing on the gross income of different professional figures involved in Superbonus 110%, and following the different roles that surveyors are called for, a 44% increase on gross annual income was registered according to the Cassa Geometri, that is from a €. 22.215.00 gross income in 2021 to €. 32.005.00 in 2022.

Case Study - Bologna

To further highlight the effects of Superbonus 110% alongside actual spatial development instruments available through opensources and with published open data, a case study on the communal territory was conducted.

The preliminary data were gathered from the City Engineers' office (Dipartimento di Urbanistica, Casa ed Ambiente), and through the websites of ENEA and Agenzia del Territorio. The data were then collated and cleaned in QGIS with stitching plugins in order to align different features, such as cadatral identifiers, street names, neighborhood and fractions.

Data Analysis

In order to analyze any regulatory provision and the changes it brings over a certain amount of time, be it on national, regional or municipal scale, it is essential to map the data.

The monitoring of a measurement must not be read only from aggregate numbers but by breaking the data down, it can be analyzed by time and coordinates thus creating a chronological approach on visual data. Only in this way can one reasonably guess what is working and what needs to be fixed instead.

With the help of the Dipartimento di Urbanistica, Casa ed Ambiente of the Municipality of Bologna, approximately 60,000 building permits were analyzed on a real estate portfolio of over 40,000 buildings, of which more than half qualify as residential buildings. Cross-

referencing municipal and revenue agency databases, geolocating the interventions, qualifying them with precision, it emerged how urban-building policies is impacting the city in general.



Figure 2 Sample Data gathered on D4 OMI area - southeast neighborhood of Bologna

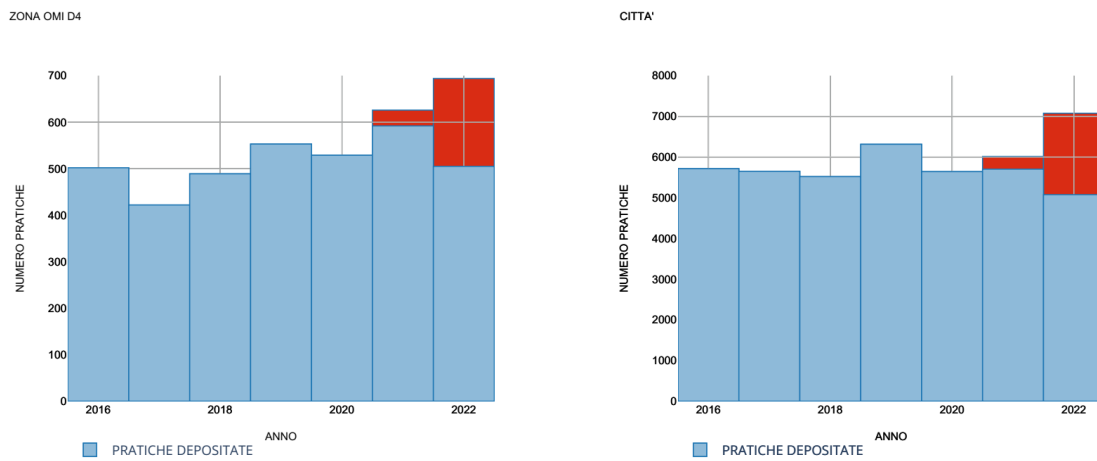


Figure 3 Sample Analysis of Data - total building works requests against CILA-S permit in a six year timespan



ZONA	Buildings	Residential B.	Flats	AVG16-20	Cila-s/Res [%]	Cila-s
C5	803	613	4758	164	1,79	11
C9	384	327	3183	90	3,36	11
B7	146	112	932	34	1,79	2
C4	342	246	1929	49	0,81	1
C5	709	532	4322	129	2,82	14
C7	153	127	886	24	2,36	4
C8	799	634	4467	133	1,89	11
C10	173	149	1673	46	1,34	2
B1	942	709	7582	379	2,4	13
C11	564	425	7718	259	7,06	32
C3	421	296	3764	121	4,05	15

Zone	Buildings	Residential B.	Res/Bui	Flats	Apt/Res	Cila-s	% 110
CENTRO STORICO	5436	4172	77%	41214	10	117	2,8
BOLOGNA	35277	22453	64%	185194	8	1880	8,37

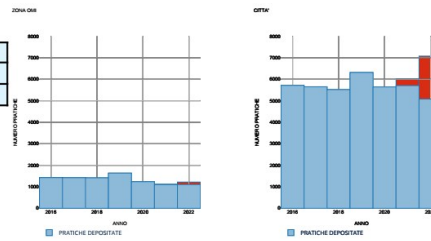


Figure 4 Data gathered for Bologna City Center



ZONA	Buildings	Residential B.	Flats	AVG16-20	Cila-s/Res [%]	Cila-s
D8	2288	1398	13239	273	10,73	145
D17	2552	1947	7053	266	7,96	138
R1	1296	753	1143	36	3,85	27
D21	1121	886	6774	187	8,24	72
D9	1705	924	7474	120	7,58	71
R3	1058	601	939	28	3,66	24
D23	293	155	2069	62	7,74	12
D3	1133	772	10332	216	14,51	110
D2	1004	801	8455	223	7,62	58
D4	2826	1882	23153	499	9,72	189
D6	114	8	237	NULL	50	4
D19	1012	646	5727	156	15,17	95
R2	411	188	257	9	5,85	8
D20	3024	1987	18639	404	9,81	199
E1	1998	916	5921	87	5,79	55
D5	2185	1428	19743	388	8,89	126
D24	1232	974	8874	279	8,73	86
E5	3132	1770	12405	247	8,98	150
D25	1413	895	10628	294	7,6	66
D7	638	415	6511	120	8,67	37
D16	1530	1136	6287	239	6,43	76
D22	1981	1156	8410	161	9	101

Zone	Buildings	Residential B.	Res/Bui	Flats	Apt/Res	Cila-s	% 110
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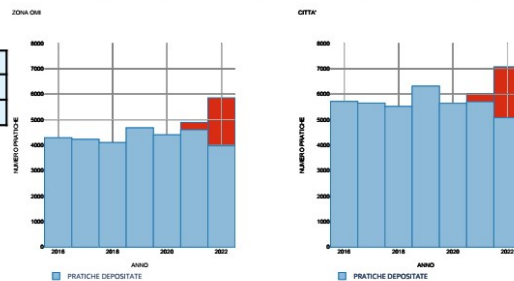
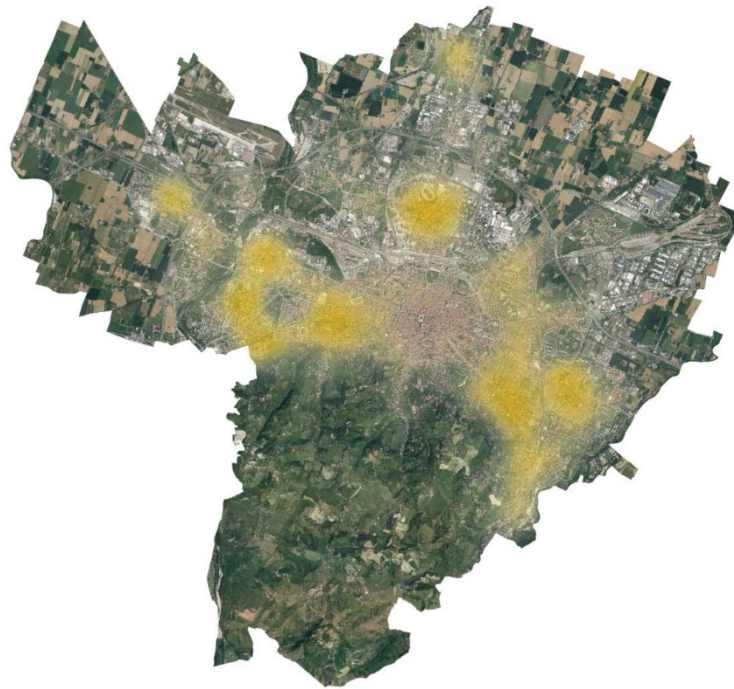
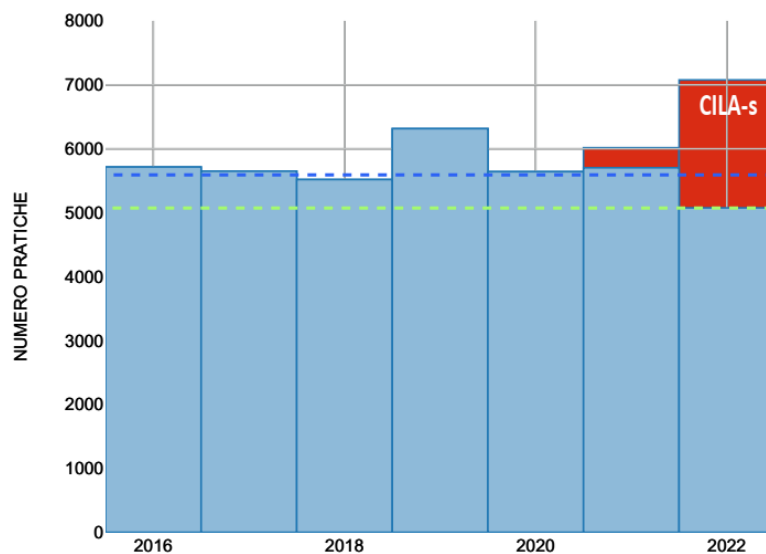


Figure 5 Bologna - Peripheral Territories

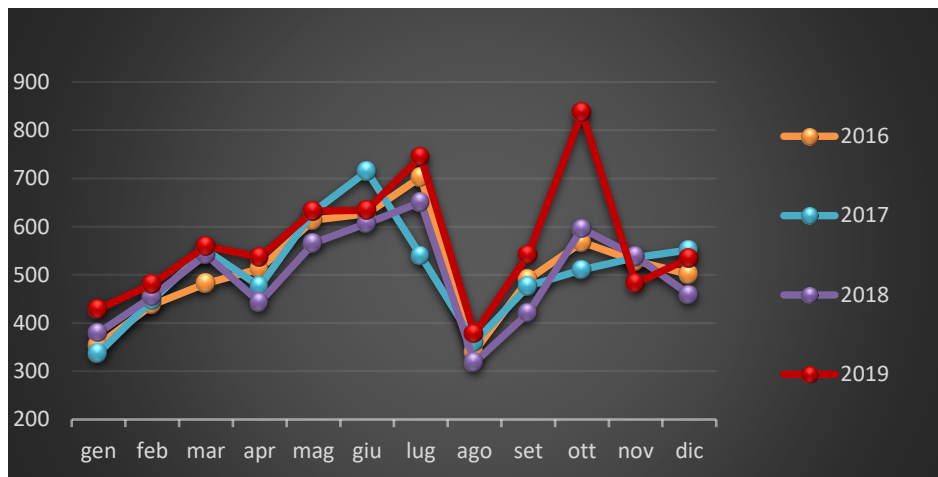


From the data mapping it emerges that most of the CILA-s are located outside the historic center of Bologna. In fact, only 10% of the Superbonus interventions are located within the Historic City Center.

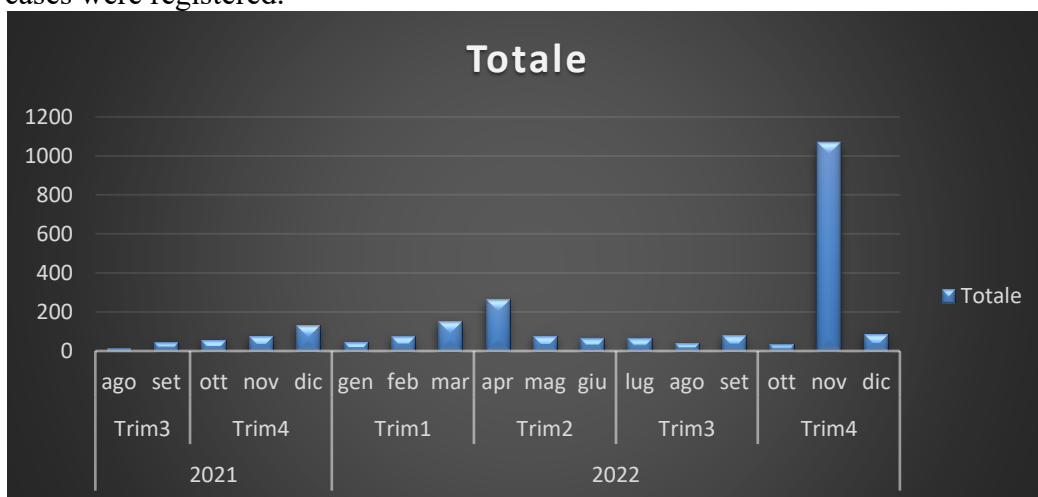
It is also noticeable an indirect relationship between the number of CILA-s submitted and enacted with the number of other types of building interventions, such as Permesso di Costruire (Construction Permit) and SCIA.



Other analyzes useful for understanding the effects of the regulations on the building trend is even more evident when the interventions are searched temporally and/or by geolocation. In 2019, a regulatory change to the Bologna Building Regulations took place which was known to have the greatest impact on the Historic Center. It happened in October 2019



In the same way, it is very clear how the deadline set for the 10th of November 2022 impacted the presentations of the CILA-s. In the days between 10 and 25 November alone, almost 50% of the cases were registered.



It is also evident how data analysis through GIS software can allow a very in-depth reading of the links between decisions and effects but, even more, it is an indispensable tool for defining strategies: urban planning, economic, orientation.

Conclusions:

This exposition features both the positive and negative effects of new spatial development instruments introduced by the Italian government, such as Superbonus 110%.

Despite the evident difficulties encountered in its implementation and evolution and the preception from the proprietors point of view, such undertakings could not only benefit the society, but the whole territory in general by revitalizing the existing buildings and the built environment of a country known for its heritage, culture, and tourism.

One key result of this study is that such project are made specifically for the peripheral sub-peripheral areas of a city or town, where buildings are mostly comprised of medium to highrise residential buildings. Application of Superbonus within a town's historic city center revealed to be strenuous from the perspective of heritage preservation and conservation. On rural areas, economic disadvantage is to be accounted for.

Moreover, socio-economic instability determined by the pandemic (and other societal factors such as territorial conflicts), and the continuous legislative and financial revisions, have caused a lot of interruption when it comes to material procurements, logistics, and project management.

The upside in all these however, lies on the final energy consumption and seismic response of buildings that underwent such restructuring and refurbishing in order to produce economic savings while responding to regional requisites on energy efficiency, climate change mitigation, and disaster management.

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BIOGRAPHICAL NOTES

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