Recycling the City New Perspective on the Real-Estate Market and Construction Industry

Ezio Micelli and Alessia Mangialardo

Abstract Themes related to the conservation of the existing city recently became a relevant issue in national and international public policies. One of the challenges that European Union and Italian authorities seek to pursue is sustainable-cities development on energetic, social and economic levels, discouraging urban sprawl, and promoting reuse of the existing real-estate stock. City reuse instead of its expansion onto greenfields has then become in Italy a priority for the construction industry. The aim of the paper is to point out the potential radical change of the construction industry in Italy and the new perspectives the industry can pursue in the future. Existing city reuse can be undertaken in two ways: through demolition and reconstruction or retrofitting the existing real-estate stock. The preference between the two options depends by real-estate market dynamics and by zoning rules made by local authorities. In the majority of Italian cities, retrofit operations appear to be the true challenge because real-estate market values are not capable of supporting radical city transformations through demolition and reconstruction. Market figures make clear that the shift towards reuse is already under way, with a significant growth of the reuse-segment over the span 2008–2014. Nevertheless, the major costs for reuse and the limited budget of Italian families represent relevant issues standing in the way. So the construction industry confronts a new challenge: innovating reuse technology—with reduced costs and increased effectiveness—and finding new sources of value to support the investment choice. The Dutch Energiesprong case study shows that highly-industrialized retrofit processes and the conversion of the energy bill into a financial source to support stock refurbishment represent the pillars of a disruptive and effective strategy.

E. Micelli (✉)
Department of Architecture Construction and Conservation, University IUAV of Venice, Dorsoduro 2206, 30123 Venice, Italy
e-mail: micelli@iuav.it

A. Mangialardo
Department of Civil Engineering, Construction and Environment, University of Padua, Via Venezia 1, 35100 Padua, Italy
e-mail: alessia.mangialardo@dicea.unipd.it

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1 Introduction

In recent years in Italy, with the advent of the global financial crisis, the demand for conservation of urban and environmental quality assumed a key role in the city development. The reuse of the existing city has become a central theme at the national and international levels, with important implications in city management. The significant slowdown in the construction industry and in new urban expansion investments have led to a radical change of perspectives on the urban development along with a new social, cultural, and economic interest to recover the existing city especially for brownfields.

Rather than focus on a new urban expansion, perspectives are centered on reusing the existing city to achieve multiple objectives: containing the land use, redeveloping existing urban areas to preserve and to increase the green areas on one hand, making sustainable cities and protecting the environment, and limiting both the energy consumption and pollution on the other.

Urban renewal has become a strategy that public authorities pursue to recover, revitalize, and innovate the city through technological interventions along with social measures, supporting citizenry to care for their territory. Retrofitting operations in existing buildings and regenerating parts of the city represent new key options for a sustainable development.

The European Union and also Italian Authorities promote the reuse of the existing city by means of economic incentives and provisions that discourage new construction. That's why in recent years a new demand emerged, based on re-use and re-cycle the existing city, to which experts, professionals, and construction companies must respond. The construction industry overturned its field of action, drastically reducing the construction of new buildings and increasing interventions to recover the existing city, through retrofitting or demolition and reconstruction operations. Representing one of the leading Italian economic industries, construction companies must find strategies for innovating, thus recovering from the crisis and providing simultaneously more economic and durable interventions.

The paper aims to illustrate the new side of the construction industry in Italy, employing retrofit operations to retrofit existing buildings, presenting also the advanced Dutch experience called Energieprong. This case study represents an excellent example of the construction sector, ensuring sustainable, economic, durable, and also attractive interventions on existing obsolete real-estate assets.

The paper is divided into four parts. The first one illustrates the current situation of the real-estate market and of the construction industry in Italy. The second one

analyzes the possible solutions to regenerate the existing housing stock, which are retrofitting or demolition and reconstruction operations. The third one shows the Dutch case of Energiesprong. Finally, the fourth one highlights some considerations and defines some future research fields.

2 A Market Moving Toward the Retrofitting of the Existing Stock

Despite some recent signs of recovery, the Italian economy is still notable to grow. The country is going through a difficult situation of uncertainty, which continues in all areas of the economy and indicates medium-term stagnation in GDP. The International Monetary Fund (IMF), comparing the GDP of the various countries of the European Union, describes Italy as particularly fragile, putting it in the last place for increase in GDP in absolute terms at constant prices compared to other European countries (Fig. 1).

The construction industry has significant dimension, contributing almost a tenth of GDP, especially for residential buildings, its most relevant segment. Real-estate assets represent two-thirds of household wealth. The economic crisis has significantly depleted the Italian population especially of the younger generations who find it increasingly difficult to buy a house. Insufficient income and a greater difficulty in accessing bank loans are two of the main elements causing the downturn of the real-estate market.

Qualified studies (ANCE 2014) depict the difficult national context in the construction field, with a new demand side emerging compared to the pre-crisis market, and a significant drop in real-estate-values, especially for the residential sector.[1] The ANCE report on the construction industry[2] summarizes the data referring to the Italian real-estate sector characterized by strong instability. From 2008 to 2014, the decline in investment in the construction industry amounted to 31.7 %, dropping about 58 Million Euros, returning to a level comparable to the year 1967 (Fig. 2). New residential buildings represent the segment hit hardest, with a decline over the span 2008–2014 of 58.1 % in value (ANCE 2014).

Related to the investment decline in the construction sector is the sharp decline of building permits issued by local authorities for new dwellings. Istat statistics show the number of permits issued by municipalities to build new houses or to significantly modify existing ones (Fig. 3). After a major peak detected in 2005 (305.706 permits), building permits decreased from 2006 to 2013 by 81 %,

[1]Between 2010 and 2014, houses prices have been characterized by a net decrease of 13.6 %. In detail, the new residential construction marked a reduction of 1 %, the existing building of 18.8 %.

[2]Osservatorio Congiunturale sull'Industria delle Costruzioni, July, 2014.

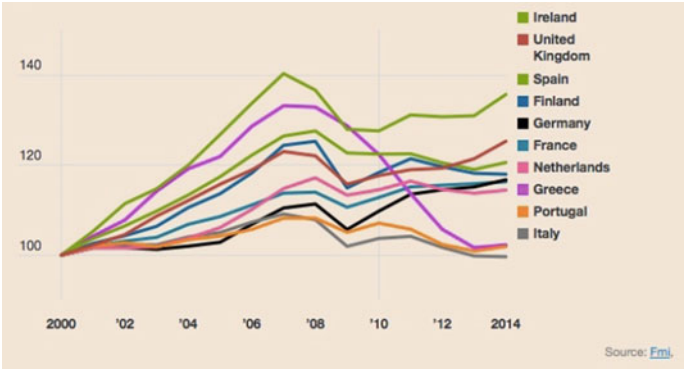


Fig. 1 A country with no growth, Italian GDP 2000–2014

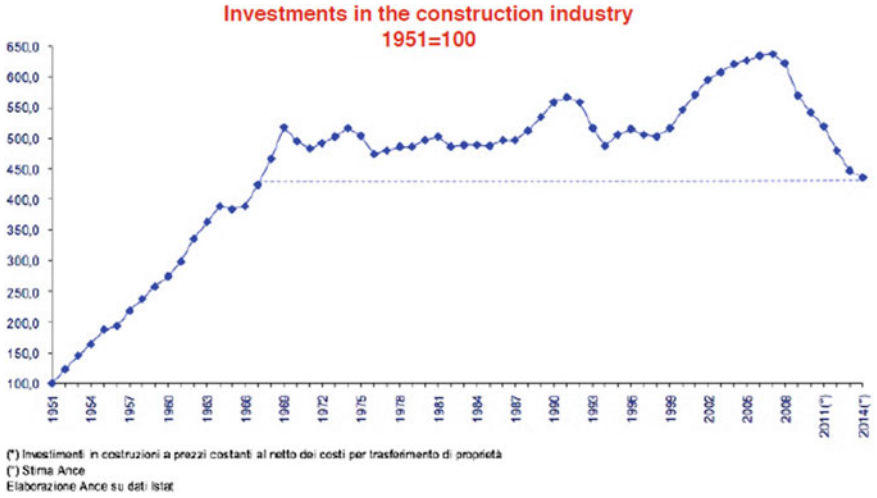


Fig. 2 Investments in the construction industry long-term trend: back to the 60s

returning to a situation similar to 1936, excluding the years of World War II (Fig. 4).

Although in Italy the housing demand remains high thanks to an increase of 1.6 % in the number of resident families, in just 7 years the number of newly built homes fell by 59 % (2008–2014).

Some figures point out where the market is moving, providing useful elements to draw a scenario for the future. Refurbishment of the existing residential stock partly counterbalances the decrease of investments in new buildings (Fig. 3), and, in 2014, investments in refurbishment amounted to 50,225 million Euros and since

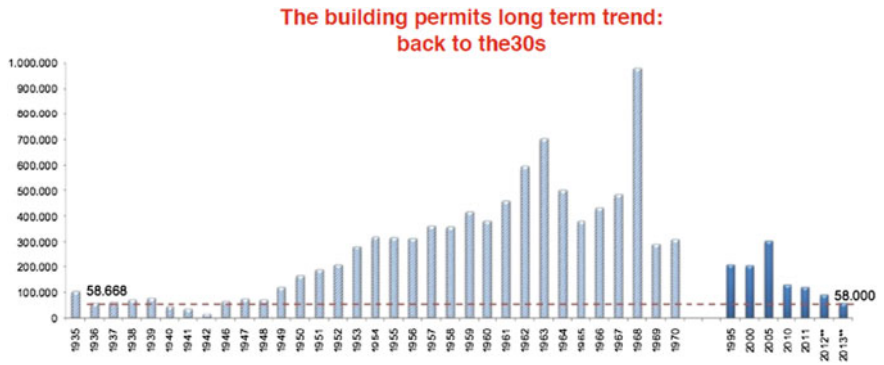


Fig. 3 The building-permits long-term trend-back to the 30s

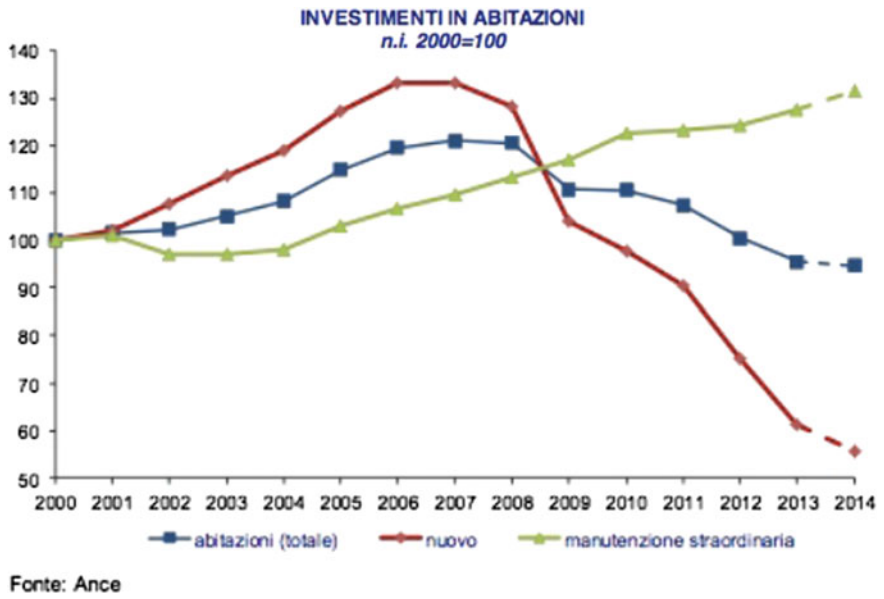
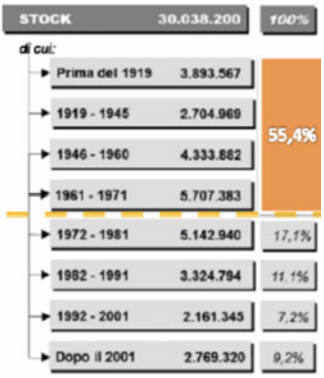


Fig. 4 The existing trend and the relevance of the refurbishment

2008 marked an increase of 20 %, representing the sole positive figure in the construction industry.

Retrofitting operations now account for 40 % of the interventions in the industry, representing its most promising segment. Recent European and Italian public policies also incentivize urban reuse by means of norms that focus, in particular, on fiscal benefits. Graph 3: New building development: the building permits' long term trend. Recent standards, still under discussion, are likely to state that new land consumption is allowed only where no alternatives on already

Table 1 The housing stock in Italy



urbanized areas can be undertaken.[3] In recent years, Italian public authorities supported retrofit and reuse investments in the existing dwelling stock by enabling cost recovery through tax credits.

Focusing on urban redevelopment represents a new opportunity to renovate the construction industry. Over 50 % of Italians (Table 1) lives in dwellings designed and built before 1971. Much of the Italian housing stock is more than 40 years old, and it is now obsolete, being responsible for the consumption of a vast amount of non-renewable energy and for a significant fraction of urban pollution. The new horizon of the construction industry is then represented by interventions on the existing building stock within the wider frame of a more sustainable and wealthier city.

3 Demolition/Reconstruction Versus Retrofitting: Two Options to Regenerate Cities

Recovery of the existing asset, the reuse of brownfields, the containment of land use, and the energy performance improvement of buildings are just some of the goals that public policies at a global level aim to achieve to implement sustainable territorial strategies.

Recently the issue related to re-use and re-cycling became a central topic for public policies, to limit the harm to the environment for the future habitability of the planet. The overbuilding of lands not yet urbanized recall problems not only related to GHG emissions, but also to a collective-costs perspective (Talen 2011). About

[3]D.D.L. Containment of soil consumption—approved on 12th of May 2016.

70 % of the European population lives in urban areas. Therefore, the European Union issued a directive to reduce at least 20 % of the emissions causing global warming by the year 2020. Existing buildings represent an extraordinary resource: with appropriate energy policies for the existing stock, we can significantly reduce CO_2 emissions compared to other sectors such as agriculture, transports, or industry (Dowson et al. 2012).

There are two ways to pursue the sustainable reuse of the existing city. First, the replacement of obsolete real-estate asset or retrieving it through retrofitting operations (Della Puppa 2012; Micelli 2014). These two scenarios are different in implementation methods, but they result in a more compact and liveable city (Antoniucci and Marella 2014; Antoniucci et al. 2015; Gordon 1997). Both ensure a better quality of private and collective life, enhancing the existing social capital and providing greater durability in the performance of existing buildings (Fusco Girard et al. 2011; Micelli 2000).

The two models may appear equivalent, but, from an economic point of view, the difference between demolition-reconstruction operations and the reuse of existing buildings is significant. The first scenario takes place normally in locations where a property can draw a considerable economic advantage, extracting value from the potential rent related to the development opportunity set by the zoning instruments and by the real-estate market. If such conditions are not verified, the second scenario is the only option, and it is then necessary to proceed to upgrade the existing assets (Micelli 2014).

To reuse buildings, optimizing their intrinsic energy and economic value requires other finance sources different than the potential rent contained in the property. Deep retrofitting can actually be financed by energy bills, diverting the stream of revenues currently allocated to the energy payments to finance retrofit interventions and so extracting the maximum value from properties and taking a conservationist attitude with respect to the energy stocked in buildings (Johnson et al. 2014; Power 2008).

In Italy, the economic preference between the two urban reuse models assumes a specific geography. In high-density urban areas, with a high development potential, often with better—present or planned—infrastructural facilities, the demolition and reconstruction option should maximize the property value assuming relevant real-estate market opportunities and a coherent zoning set of rules. On the contrary, in cities with reduced market pressure, as characterized by a normally populated urban territory with low building density and valuable buildings, policies should focus on retrofitting existing buildings.

This is the case of the first suburbs built-up between the World War II and the economic boom of the last century, representing the majority of real-estate assets in Italy. In such contexts, the potential rent does not match the existing assets value, and, if public authorities and investors are determined in regenerating the stock, in the absence of specific subsidies, it is necessary to provide requalification and enhancement operations on existing real-estate assets (Micelli 2014).

4 How to Combine Successfully Energy Value and Stock Retrofitting: The Energiesprong Case Study

The regeneration of the existing real-estate stock represents an important priority at the international level.[4] In Italy, retrofit operations are still relatively sporadic and insufficient to guarantee the European requirements. The relevance of real-estate-stock regeneration is remarkable: more than 17 million residential units are obsolete with poor energetic performances and in need of renewal. But, the retrofitting of obsolete buildings, even when generating positive returns for energy bills, appear to be a controversial investment (Rovers 2014; Konstantinou et al. 2015).

The scarce economic resources from public and private entities are one of the most important factors for which public policies must provide. Considering the difficulty to access public resources, private resources are considered the other main solution. For example, ESCo (Energy Service Company) societies finance interventions with private funding, assuming the risks of the venture and recovering expenses through the energy-bill savings. The commitment to repay the intervention is linked to the building and not to the homeowners. After having invested significant economic resources, from the first year of the intervention, funders and private investors gain from these investments by more than 7 %.

In the UK, the Green Deal[5] provides for a similar strategy. The method is based on implementing the energy-efficiency performance in the existing buildings without initial expenditure by homeowners—the total operation cost will be recovered from the energy bills—managed by a public-private consortium of ESCo. In Italy, the interventions supported by ESCo are yet uncommon, because these initiatives need public incentives and anticipated infusion of private capital.

Since 2010 in the Netherlands, an independent non-profit team formed by some real-estate developers and 27 social-housing associations (HLM's) proved to provide a significant solution for this issue (2015). This team started by considering that the real competitors for builders are the energy companies, founding a virtuous funding mechanism without the need for public or homeowners' economic resources, using the energy-bill savings to finance the retrofit interventions.

The main purpose of this project was to refurbish with Net-Zero-Energy levels—a building producing as much energy as it consumes—for residential buildings. Energiesprong worked up a market-development program for refurbishing 111,000 houses (Munckhof and Erck 2015). Initially for social housing, today this project

[4]At the European level, Germany promoted the Passivhaus standard, instituting an energy-efficiency program for all buildings built before 1984 (more than 40 million houses) by 2050. In the UK, the so-called Energy Act, approved in 2011, established some urgent measures for improving energy efficiency in 7 million houses by 2020. Similar to these are the Empty-Home agency in Ireland and the project 2ndSkin—BTA in the Netherlands.

[5]To learn more about the Green Deal, please refer to the official decree, available at this website: https://www.gov.uk/green-deal-energy-saving-measures/.

deals with the real-estate private sector, also expanding to the UK and France. Especially in the social housing sector, the tenants pay directly to the manager of the social housing, instead of paying energy bills to the energy provider. In this case, the manager of social housing uses this money to invest in new retrofit operations. In the private sector, it works in almost the same way: homeowners pay a higher mortgage rate, but they save on energy bills.

The goals of this team are very ambitious: the drastic reduction of costs and time for refurbishments, along with a long-life performance guarantee. In 2010, Energiesprong retrofitted the first home in Rosendaal with Euro 130,000. In 2013, during another retrofit intervention in Arnhem, they reduced costs by two third, arriving at just Euro 40,000, for the same type of refurbishment (2015). These lower transaction costs for deep retrofit operations ensure, at the same time, a high level of energy-performance guarantee after the completion, on the order of about 40 years (2015).

As well cost reductions, also time spans required for refurbishment were greatly reduced. Retrofit operations last about 10 days and, at the maximum, 2 weeks, so the inhabitants' disturbance is limited to a few days, reducing noise and dust to a minimum. To reduce refurbishment time spans, it is necessary to undertake prefabrication of the main refurbishment components. In this way, through a preliminary analysis, the construction companies prepare the components, so the elements constructed on site are reduced to the minimum, ensuring less operative time in situ.

Specific technologies are necessary for monitoring and measuring the relevant dimensions of houses with great precision, like 3D scanning techniques. The measurements captured are fed into a computer program that creates a model. In the final step, these technical drawings directly produce components with the packages then ready to be transferred in situ. Prefabrication also provides for comfortable and attractiveness internal and external spaces for living, improving the quality of occupants' life and the aesthetic level of the houses.

These temporal and cost benefits introduce an innovation technology for the building sector, transforming the construction industry in industrialized and not project-based solutions. In this way, Energiesprong has managed to reduce significantly costs and time spans for the refurbishment of the buildings.

Extracting value form the existing stock is possible: new technologies enable processes radically more effective and more efficient, thus exploiting the opportunities of the digital manufacturing revolution. The funds currently destined for energy bill can then by the financial source for retrofitting.

5 Conclusions

Urban regeneration and land-use containment represent priorities of the territorial policies, in Italy and in a wider international context. The statistics of the Italian construction industry reveal a profound crisis in recent years for the traditional real-estate field. The low real-estate market demand discloses that the new

residential construction sector has dropped dramatically. The re-use and re-cycling of the existing buildings, without subtracting unbuilt territory, is the new perspective to create a sustainable city. The urban-reuse processes are quite different: demolition-reconstruction or retrofitting operations. The regeneration processes based on the demolition and reconstruction of the assets are expensive and destined to require a modest fortune in the absence of major public support, while retrofitting interventions seem to be only one option in the majority of Italian cities.

The recent acceleration of upgrading the energy-efficiency programs of real-estate assets requires raising substantial financial resources. Based on its primary role of intermediary between the supply and the demand side, considering the actual economic crisis, the new commitment that the construction industry must take is combining major urban renewal with the shortage of private and public financial resources. The existing assets are likely to be subject to a process of deep retrofitting at much more competitive costs than their current values suggest. Energiesprong demonstrated that, by coordinating the various stakeholders, it is possible to activate a virtuous funding mechanism without other sources of economic resources. On the basis of this project, the strategy is to convert energy bills into an energy plan to pay for the investment, while considering also some actual industrial issues related to the construction industry: major energy performance guarantees, shorter times for delivery, and the affordability and the attractiveness of the renewed buildings. Energiesprong provided for all these matters: reducing by two-thirds retrofitting costs, decreasing the time for refurbishment (10 days), guaranteeing 40 years of energy performance, and also improving the aesthetic internal and external quality of the houses (2015).

Future research could analyze whether, and under what conditions, an urban-regeneration process will be able to take place, and consistent with preserving Italy's cultural heritage, a country with a significant downturn in the housing market, in terms of the development of the city and also of the possible social polarization.

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