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# INDUSTRIAL AREAS. A SURVEY, ANALYSIS AND APPRAISAL OF THE POTENTIAL FOR CONVERSION OF DISUSED INDUSTRIAL AREAS IN TICINO

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## Abstract

This research, promoted by the Università della Svizzera italiana, Accademia di architettura di Mendrisio, through i.CUP (Institute for the Contemporary Urban Project) laid the ground for establishing an observatory of industrial buildings that would give special attention to their fall into disuse and – at the same time – explore the scenarios for appraising the scope for converting potentially disused buildings and land. The study of disused industrial buildings in Ticino revealed considerable scope for the reuse of potentially disused industrial buildings. The data on buildings put to industrial use show that the number of industrial premises in Ticino is 3,681 and that they occupy 2,743 land parcels. The surface area covered by these buildings amounts to 2,503,335 square metres, corresponding to 8.7% of the total area of land built on in the canton. Land parcels accommodating at least one building put to a mainly industrial use account for 14,349,282 square metres of land in Ticino, equal about to 6% of the overall building area of Ticino Canton. Of the above land and building stock, 1,120 buildings (casting off 30.4%) covering a total surface area of 804,591 square metres (casting off 32.1%) (corresponding to the built surface of Bellinzona commune) qualify as potentially disused and the land parcels accommodating them number 813 (casting off 29.6%), 7,058,532 sq m (casting off 49.1%), equating to about half the surface area of Bellinzona commune. An approximate estimate of the volume of the buildings surveyed (the average height is 6 metres) yields a value of 5,000,000 cubic metres.

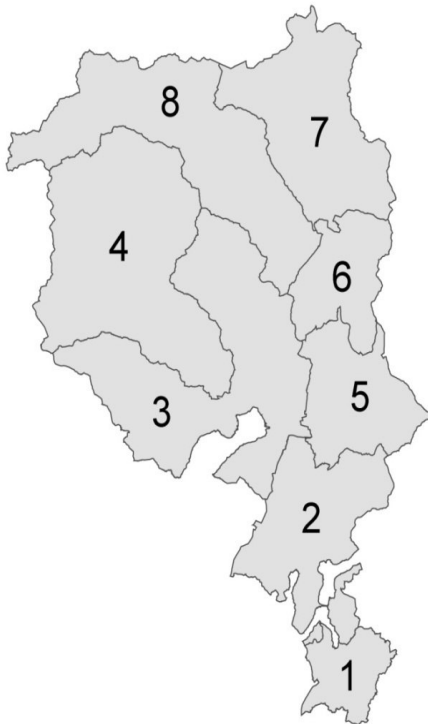
**Keywords:** industrial areas, disused buildings, disused land

## 1. Introduction

Canton Ticino, or Ticino, is the southernmost canton of Switzerland. The written language is Italian in almost the entire canton. Together with areas of the canton of Graubünden it makes up the so-called

Svizzera Italiana (Italian Switzerland). The canton of Ticino is almost entirely surrounded by Italy which lies to its east, west and south. To the north lie the cantons of Valais and Uri, to the northeast the canton of Graubünden. Its area is 2,812 square kilometers (1,086 sq mi), of which about three quarters are considered productive.

The Canton of Ticino is divided into 8 districts (Figure 1):



1. *Mendrisio* District
2. *Lugano* District
3. *Locarno* District
4. *Vallemaggia* District
5. *Bellinzona* District
6. *Riviera* District
7. *Blenio* District
8. *Leventina* District

FIGURE 1 – CANTON OF TICINO

Modern society is notable for far-reaching changes directly attributable to the processes of globalisation and the re-location of manufacturing concurrent with the increasing strategic importance of the advanced tertiary sector. The scope for converting disused industrial land and buildings is, in this context, extremely significant<sup>1</sup>.

The importance of these ongoing changes was highlighted in the “*Rapporto sullo sviluppo territoriale*”, drawn up in 2005 by DATEC, Switzerland’s federal government department for the environment, transport, energy, and communications. The report – which makes a major contribution to analysing land development and to pointing to its future – provides in its introduction a clear picture of the far-reaching and rapid changes with which modern Switzerland must contend. With a view to meeting these

<sup>1</sup> This article is the result of the research “Industrial areas” by Enrico Sassi, Nicoletta Ossanna Cavadini, Francesco Vismara and Josep Acebillo ([http://www.arch.unisi.ch/index/ocup/edifici\\_dismessi.htm](http://www.arch.unisi.ch/index/ocup/edifici_dismessi.htm))

challenges emphasis is placed on the need to develop new horizons and, at the same time, attention is drawn to the absence of a unifying vision.

The report brings to light the current trends in land development, which may be summarised as follows:

- 1) many areas have gradually lost their rural character without, however, acquiring an urban quality;
- 2) the growing importance of mobility and its direct implication as regards the wide-spread model of urbanisation;
- 3) the functional segregation in land use whereby, increasingly, it is the norm to “work in the city and live in the country”;
- 4) the lack of solidarity in urban agglomerations, where centres shoulder the costs of services used by everyone while small municipalities have little say in decisions;
- 5) the growing value of rural areas as a place for recreation, tourism, and ecological relief;
- 6) the growing demand for land and an outlook that offers no prospect of a slowdown in this respect;
- 7) the importance of disused industrial land as a resource in transforming and developing already urbanised areas.

Switzerland's Federal Council had already pointed in the same direction in its report *Politica degli agglomerati della Confederazione* (Federal Council 2001). In it a clear statement is made of the aims of federal strategy: to contribute to the sustainable growth of urban space; to take a hand in maintaining the economic appeal of urban areas and a high quality of life for urban dwellers; to maintain a multi-centre network of towns and agglomerations; to limit the expansion of urban areas, structure them, and encourage building development that gravitated “inward” about the inner city.

It is precisely with a view to this latter objective that industrial land and buildings are particularly significant. In promoting inner-city residential development an essential step is to examine the scope for intensified use of the existing urban structure, focusing especially on the conversion of disused industrial land and buildings.

The federal government's land development agency (Ufficio federale dello sviluppo territoriale, also referred to herein as ARE) in its 2004 report “*La Suisse et ses friches industrielles – Des opportunités de développement au coeur des agglomérations*” (ARE 2004) estimates that the amount of disused industrial land in Switzerland (Figure 2). is 17 million sq m, mostly located in urban regions and in its table-land area. Most of this land is in the canton of Zurich (24.8% of the total nationally). In the Confederation rankings Ticino canton is placed twentieth with 0.3% of the national total. In that study, however, only sites with a surface area in excess of 10,000 sq m were logged. A very large amount of industrial land and buildings were excluded from the analysis.

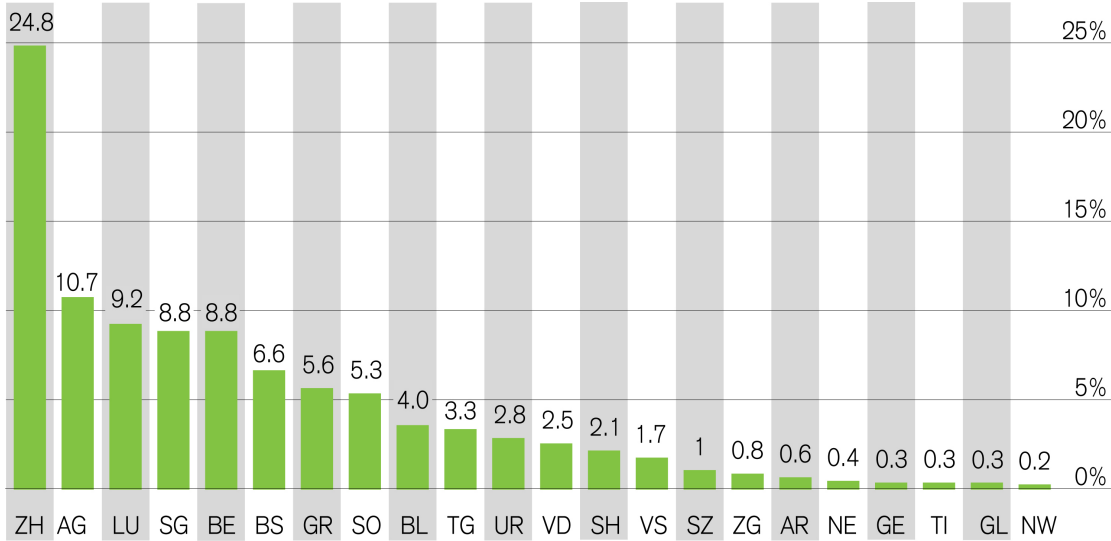


FIGURE 2 - DISUSED INDUSTRIAL LAND IN SWITZERLAND

## 2. Definition of Industrial buildings

What is an industrial building? Though seemingly easy, the task of providing a definition in response is, on closer examination, no simple matter.

In the first place, rather than “industrial buildings” it makes more sense to talk of “buildings put to industrial use”. On that basis a huge range of buildings may be deemed as put to an industrial use: workshop and similar premises linked to production processing, storage depots, workshop and similar premises, manufacturing facilities, buildings where personnel management and administration functions are accommodated.

Though apparently straight-forward, also knowing when to define a building put to industrial use as “disused” can be fairly complicated.

The definition of industrial building and of disused industrial building adopted are that used by Dipartimento Finanze e economia of Ticino Canton, notably by its Ufficio Stima (which fixes tax-related property valuations). By that definition “industrial buildings” are any premises that meet specific definitions for floor-space use (single-storey storage building, multi-storey industrial structure, a light-industry facility, workshop and similar premises) and for income (workshop and similar premises, storage depot, warehouse, production facility, multi-purpose structure for industrial use), while buildings put to industrial use that may be considered disused fall into one of the following two categories:

- a) industrial buildings the valuation of which has been obtained from the official filings of owners who have stated that the business has, wholly or partly, been closed down or that the building is untenanted, either entirely or in part;
- b) industrial buildings the valuation of which – made by one of the canton’s expert assessors – reveals that the business has been closed down or that there is no possibility of the building generating income.

### 3. Data analysis

The data<sup>2</sup> on buildings put to industrial use in Ticino canton show that there are 3,681 such buildings in the canton distributed over 2,743 land parcels. In terms of surface area, these buildings cover 2,503,335 square metres of land, which approximates to 1.8% of the total built-on surface area in the canton. Land parcels where there are at least one building put to mainly industrial use occupy in total 14,349,282 square metres, equal about to 6% of the overall building area of Ticino Canton. Of the above land and building stock, 1,120 buildings (casting off 30.4%) covering a total surface area of 804,591 square metres (casting off 32.1%) qualify as potentially disused and the land parcels accommodating them number 813 (casting off 29.6%), 7,058,532 sq m (casting off 49.1%).

Figure 3 shows that the bulk of potentially disused industrial buildings have a surface area of between 200 and 1000 sq m. The tails of the sample comprise, at one extreme, 24 buildings (2.6 %) that are very sizeable (over 5,000 sq m) and, at the other, 70 buildings (8%) of limited space (under 60 sq m). The 24 buildings with a surface area of over 5,000 sq m include 8 heavy-industry installations (out of a total of 19) and 9 light-industry installations (out of a total of 117). The remaining 7 include storage depots (single floor), industrial structures, and workshop and similar premises.

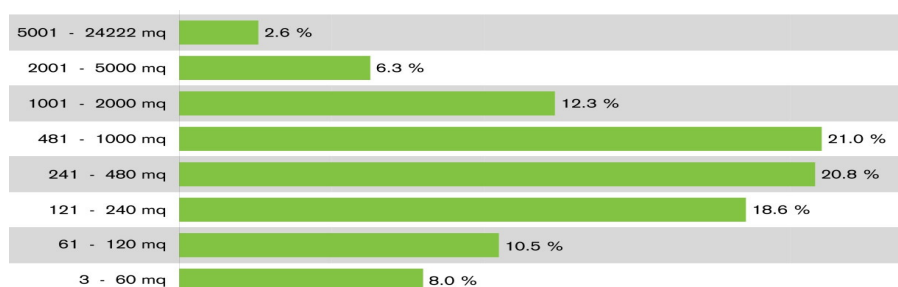


FIGURE 3 - DISUSED INDUSTRIAL BUILDINGS BY ORDER OF SIZE

<sup>2</sup> The canton-based analysis is conducted using a database kept by the Ufficio Stima and covering just land parcels where there are (or were) industrial buildings assessed in the last general revision of property valuations, made on about 01.01.2003. On that date a detailed "snapshot" was taken of all existing property to value – buildings and land plots of all kinds grouped under land-parcel numbers. The data used for the analysis was extracted on 13.11.2006

The type with the highest number of potentially disused buildings is the “workshop and similar premises” one, despite the fact that percentage casting off in relation to this type of use is the second lowest (Figure 4).

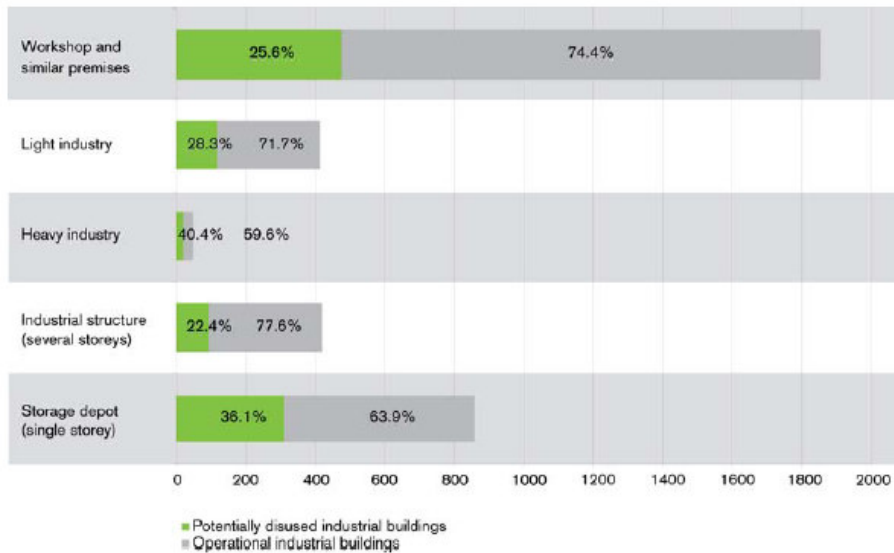


FIGURE 4- TYPES OF USE OF INDUSTRIAL BUILDINGS – COMPARISON IN ABSOLUTE TERMS (TICINO)

The percentage distribution by type as above is much in line with that for all industrial buildings. The relatively unchanged percentages revealed in this breakdown demonstrate that casting off has no preponderant incidence on any one type of use but maintains its pattern of distribution over them all (Figure 5).

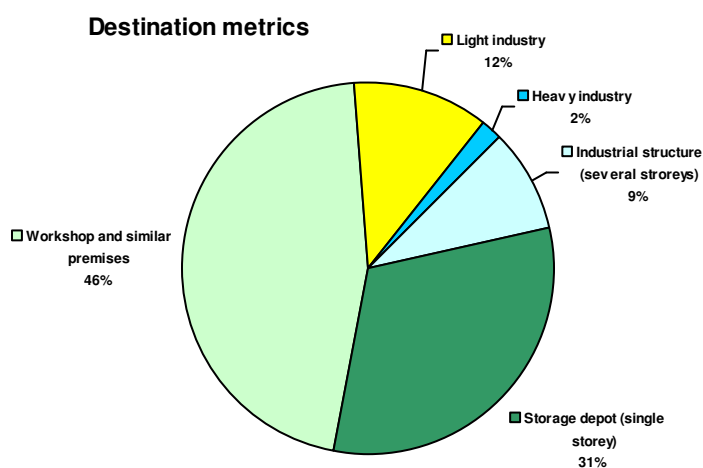


FIGURE 5 - TYPES OF USE ASSOCIATED WITH POTENTIALLY DISUSED INDUSTRIAL BUILDINGS (TICINO)

An analysis was conducted to assess the location and accessibility of potentially disused industrial buildings in Ticino canton.

*Railway access:* Ticino comprises 248 communes (prior to aggregations), and only 87 of these have a railway line passing through them. Most buildings put to industrial use are located in these communes (2541 buildings, 69%). In the case of potentially disused buildings the corresponding figures are 856 buildings, and 76%. Factoring in an imaginary 300-m “inclusion” zone about the railway line, the number of communes that can draw on the rail service rises to 118 and the industrial buildings they host increase to 2987 (81%), of which 935 are potentially disused (83%).

To assess the ease of rail access to these buildings an analysis was undertaken of their distance from the nearest railway station in communes through which the railway passes (0-350 m, 351-700 m, 701-1000 m). The analysis shows that a significant percentage of potentially disused buildings (8.1% within 350 m, 24.3% within 700 m, and 38.2% within 1000 m) are in the vicinity of the railway line. If a different statistical universe is chosen – namely, industrial buildings in communes through which the railway passes, rather than all industrial buildings throughout the length and breadth of Ticino canton – the percentages stated above rise appreciably: on that comparison it emerges that in communes on a railway line a very large share of disused industrial buildings are in the immediate vicinity of the station (10.6% within 350 m, 31.8% within 700 m, 50.0% within 1000 m). In Mendrisio Commune (a special case) 81.8% of the buildings are sited within a 1000-m radius of the railway station.

*Motorway access:* In crossing Ticino canton the motorway route comes into contact with 75 communes. These host 66% (2435) of total industrial buildings in the canton and, in terms of potentially disused buildings, 70% (792) of the corresponding total. Factoring in a 300-m inclusion zone about the motorway route, the number of communes served by road traffic is 92, with 2864 industrial buildings in them (77%), 884 of which are potentially disused (78%). We examined the location of potentially disused industrial buildings with respect to motorway exits and found that 23% of them (262) are within a maximum radius of 1 km of the nearest motorway exit point (504 within 2 km (45%), 691 within 3 km (62%)). In Mendrisio commune (a special case), 86.3% of the buildings were within 1000 m of the motorway exit.

The analysis of accessibility via the motorway network and the public transport system highlighted the ease of access to potentially disused industrial buildings, so revealing this to be a significant factor in relation to the possible functional conversion of the buildings.

The different measures of distance applied in the two parts of the analysis reflect the respective nature of the two modes of transport considered. Whereas distance from a motorway exit is of less concern for

workers and goods freight using road transport, proximity to stations is considerably more important for rail users. In this connection it might be observed that the railway, while providing greater coverage in Ticino than the motorway system, does not afford the same degree of accessibility to the industrial buildings, both in terms of goods freight and mobility of persons/workers.

#### 4. Potential for conversion

The results of an examination of the data for Ticino canton are highly significant given the potential offered by already built-on land. Such land, by and large, has very good infrastructure and is, above all, located in areas well suited to become new urban centres. If surface areas already utilised industrially can be adaptively reused (for residence, services, commerce) the existing urban fabric can be used more intensively. In this way multiple use and a functional mix become features of easily reachable and strategically important areas and, in the process, a further expansion of building land can be avoided. This strategy offers an effective response to the need to consolidate the inward development of towns and cities and, at the same time, it contributes to restricting urban sprawl.

In making an assessment of the potential of disused industrial buildings – in purely quantitative terms – the approach embraced is that which seeks to check the increase in the surface area currently built on and to instead capitalise on the potential offered by existing such land by changing its use – from industrial to mixed (residential and/or offices). In assessing the potential for converting the entire surface area of the industrial land parcels to a residential function, we have applied the method used by the Ufficio Federale per lo Sviluppo Territoriale (Federal Land Development Agency) in its study on disused industrial land<sup>3</sup>, in which a conversion parameter of about 90 square metres per occupant is postulated.

To assess the potential for converting the buildings, we have applied a parameter of 120 square metres (gross surface area per apartment) to the total square metres built on, while as regards office conversions the parameter used is 25 square metres per work station. This means that the conversion, across Ticino canton, of existing industrial buildings into housing would create 6,705 new housing units or 32,183 new work stations. If, on the other hand, the decision was taken to construct accommodation using the entire surface area available accommodation units could be provided for 78,428 persons.

The overall land area of the canton covered by industrial buildings is 2,503,335 sq m, of which 804,591 sq m are potentially disused. To assess the scope for producing PV energy a reduction coefficient of 0.5 was applied to the net collector surface to allow for the likelihood that sloping roofs and roofing with poor exposure to sunlight might be suited only to partial use. The effective surface area obtained after



applying this coefficient was about 400,000 sq m which – multiplied by the average level of insolation of 1200-1300kWh (ARE 2004) and by the typical yield of a photovoltaic module (0.1)<sup>3</sup> – indicates that average yearly production of photovoltaic energy might be estimated as 50,000 MWh/yearly.

In economic terms this quantity of electric energy, when fed into the grid and charged at a rate that – under the new law on electricity supply<sup>4</sup> relating to integrated systems – will be at least CHF 0.5 per kWh, will be worth over CHF 22.5 million per year .

## 5. Conclusion

The analysis of the potential for conversion of disused industrial buildings on the territory of the Canton Ticino is, without doubt, the novelty of this research. These buildings listed individually on separate schedule and analyzed globally towards the surface of the Ticino canton, are - for their large numerical presence - a significant resource in at least three areas of competence:

- Canton level, with a planning programme dedicated to the requalification and to the strengthening of existing urban structures, and to the evaluation of a coordinated system of priorities for intervention;
- Municipal level, providing a set of skills that enable the various municipalities to decide consciously on change in land uses on its territory;
- Private level, it offers to individuals the opportunity to understand and realize the characteristic opportunities of an intense and productive urban space, contributing to its economic development and improvement in quality.

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<sup>3</sup> The potential for producing photovoltaic energy is based on the average insolation and the average output of photovoltaic installations (130-140 kW/sq m/yearly at the average latitude of Ticino canton), cfr. Enea – Sviluppo sostenibile, L'energia fotovoltaica.

<sup>4</sup> Loi sur l'approvisionnement en électricité (of 23 March 2007, brought into force: January 2008)

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