

## REHABILITATION STRATEGIES FOR THE ENHANCE OF A DISMISSED INDUSTRIAL DISTRICT, PORTO MARGHERA OF VENICE

[Estrategias de rehabilitación energética para la revalorización del parque industrial en desuso que ocupa parte del área de Porto Marghera en Venecia]

*Esther Giani* (luav, Venice-Italy)

*Cristina Pardal* (Etsab, Barcelona, Spain)

### 1. Introduction

The Venetian industrial district of Porto Marghera as a place in the availability of the society, is an open question from its genesis (1917). Porto Marghera has, indeed, an ambiguous relationship with its context: first of all with the historical center of Venice of which it is the industrial offshoot and the preferential horizon; in second place with the Lagoon and the water where it is reflected and multiplied while it affects the fragile ecosystem; lastly with the mainland where it vanishes through a poorly tolerated connection with the agricultural, rural, and productive landscaping. Its 100 years history have seen a changing fortune of productiveness up to the heights of the 1970s, swan song of a heavy industry in inexorable decline. In the last 25 years the decrease of the activities inside the district – technological development and economic crisis together brought to a progressive abandonment of some areas – has seen all the stakeholders (politicians, entrepreneurs, academia) envisioning possible scenarios for the revival of the District. Another topic – beside the research but strongly attached to the contextualized reality – is the social question. As a matter of fact Porto Marghera maintains ambiguous – because fluctuating – relations with the civil society that perceives it as a job opportunity as well as the cause of all local pathologies. However, it is undeniable that negativity, pessimism, and resignation, are what distinguishes the collective imagery when we talk about Porto Marghera and its future. [1]



Venice and Porto Marghera.

## 1.1 Overview

To clearly understand the character, the opportunities, and the contradictions of this territory, it is necessary to contextualize the historical development, from the genesis of the so-called 'Operazione Porto Marghera', to the scenarios, achieved or denied, that have been repeatedly interchanged on this site.

Generally speaking: the morphological structure of the Venetian industrial district is defined in its current size, in between the two world wars, around chemical and iron and steel industry. [2]

The political, administrative, and economic reasons that are behind this framework, have roots that come from far ago and are attributable first of all to international geopolitical events (the opening of the Suez Channel and the consequent new role of the Mediterranean in commercial trade) that have an impact in the reorganization of the city's commercial and port structures. A new infrastructure system that is functional to the port structure, invites us to look at the mainland as the place for expanding the *Marittima* and characterizes from the beginning the settlement pattern of the early industrial area.

The race toward the modernization of the port of Venice isn't the only reason for the inception of Porto Marghera: the development on the mainland becomes possible when multiple interests come into place and as an answer to numerous and urgent needs that are reclaimed by the city of Venice in the first years of the 1900s. As a matter of fact, during those years, the city becomes overcrowded, and it is in this moment, when social and environmental disadvantage [3] converge with the housing crisis [4], when the demand of new areas for local production as well as of technical and economic production in competition with other ports of the Mediterranean arouse, that Porto Marghera finds the reason to exist. In 1917, on the year when Porto Marghera is established, the *Sindacato di Studi per le Imprese Elettrometallurgiche* (research union of the electrometallurgy enterprises) [5] is started and in synergy with the local administration and the central government they define the development of the industrial port. [6]

In 1919 following the project of Coen Cagli the construction of the district begins, and in 1922, with the inauguration of the great navigation canal parallel to the railway bridge (the Vittorio Emanuele Canal) the port hinterland is now completed, and all the major Italian industrial groups are attracted to Marghera. To this first industrial section or historical core of the Venetian industry, an expansion is added after the Second World War. In the 1950s a land remediation takes place indeed in a section of the *barene* [7], in a territory located south-west of the island of the commercial port. This new landfill, partly filled with by-products of the industries of the first section, will become the location for the petrochemical production, that huge interconnected plant that represents, in the general public imagery, the whole Porto Marghera. The economic development model that is at the foundation of this new expansion, reiterates the public-private partnership in place during the previous thirty years: large private companies establish production with the help of the public administration that subsidizes the industrial activity of the territory by way of special legislations.

«The stabilization of the productive structure of the basic sector (metallurgy, mechanical, chemical, energetic) (...) is achieved over a mixed system of public and private property of the large companies with the mediation of the IRI [8] and Mediobanca foundation». [9]

To this we have to add that, once the regional land-use plan (PRG) proposal of 1956 fails, the plan of 1963 included that at Porto Marghera polluting establishments could be built, as it had already happened. [10]

After the peak of production during the 1970s [11], the district starts to decline and it is today partially still in that process, with workforce reduction and no more production in some sectors. For these reasons, the envisioned third industrial area, was started with some landfill but hasn't been completed.

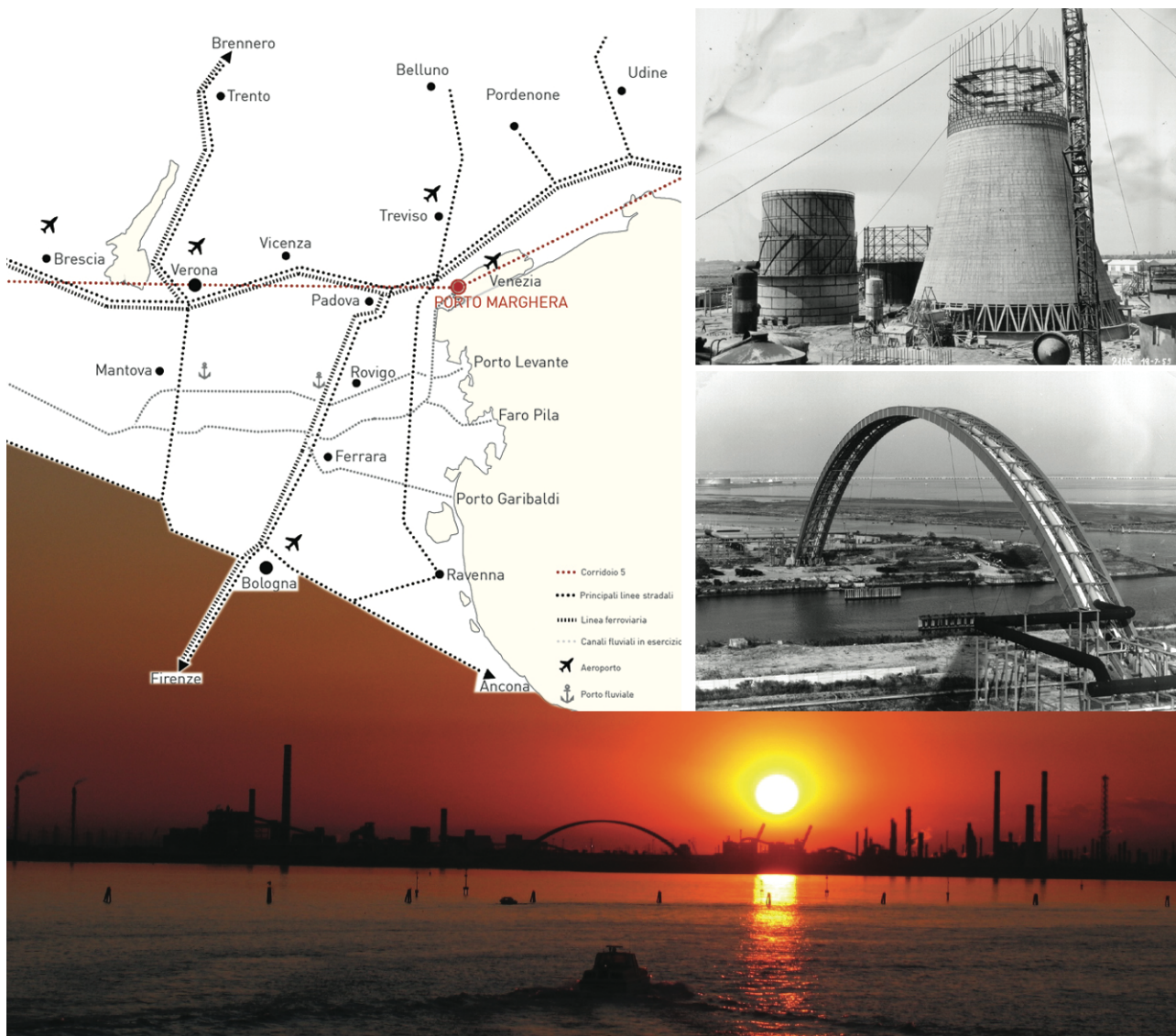
Porto Marghera is a model not only for its history, genesis, and development, but also for its geographic as well as political-administrative context, in relation with the metropolitan city. [12]

The strategic interest of one of the most infrastructured European territories [13] is outlined in the relationships between the Venetian industrial district and the international infrastructure system: a catchment area that intercepts the corridor no. 5 where it connects with the Adriatic Baltic corridor, railways, roads and highways (in both directions east-west and north-south), river canals, river and

sea ports of the North Adriatic, airports [14]. Therefore we have a system of infrastructures that is much more wide than the municipal (or provincial) boundaries of Venice: is quite sufficient to say that the city airport is the fourth in importance in Italy for cargo plane, and third, after Rome and Milan, for passengers.

If one side the analysis of these data is proof of an undeniable international dimension, on the other side the ambiguity regarding where the boundaries of the metropolitan territory should be, is still present, as well as the contradictions linked with the urban morphology that are very heterogeneous, and that the institution should direct, comprehend, and govern. As a matter of fact Venice is so much different from the other Italian metropolitan cities (as Rome and Milan) and European (Paris, Barcelona etc.) where both centralities and hierarchy are clear. In Europe, the metropolitan cities that have specific rules «to regulate them and that makes them different from the other cities (...) are only ten and only concern very large cities, often capital cities [15]. They have substantial differences in governance models, but it is clear that these countries have tried to resolve the difficult issue of how to govern urban areas, by means of establishing special authorities, with powers and administrative tools for complex realities like the ones of high density conurbation». [16]

Quite the opposite, the territory around Venice shows clear settlement dispersion with boundaries that aren't clear and that intermix with sections of the Padua and Treviso provinces. As a confirmation of this unique regional metropolitan system, an analysis of 2010 promoted by OCDE, the Municipality, the Venezia Foundation, Venice International University, and the Italian Government, shows how the eastern side of the Veneto region is altogether an urban place where two and a half billion people live. [17]



## 2. The need of refurbishment

The renovation of abandoned industrial buildings, currently occupying different sectors in the Porto Marghera area, must be understood from its global context as well as from its local reality.

Very few positive things emerge from the economic crisis we are now experiencing to a greater or lesser extent in the different countries of the first world, as for the energetic and environmental crisis, these do affect the whole planet alike. With regard to architecture and building, both of these crises have fully hit the sector, forcing us to rethink many things, and this is positive, as there is time left for reflection. The deceleration and lack of activity have allowed us to dedicate time to rethink and evaluate the repercussion that our manner of proceeding as architects has had on the economy, society and the environment in recent years and up until the beginning of the crisis.

Today the fruits of these two crises are already visible although in a very early stage.

*Construction and architecture.* Firstly, the proliferation of architecture of a very high level and low budget which is very well constructed employing very basic materials that have been left visible without coatings, claddings or other dispensable decorative elements. Architecture and construction go hand in hand in understanding that well-constructed architecture does not need to hide anything.

*Society and architecture.* Secondly architecture has taken a big step forward in approaching society not only to provide shelter and serve it, but by also allowing it to participate in the conception from participative processes or cooperative non-profit organizations that promote and manage project schemes that are usually dwellings.

*Resources and architecture.* Thirdly, there is awareness now that resources, both material and fossil energy, are limited; that the extraction process, manufacturing, construction, etc. have a negative impact on the planet; and the generation of waste is undesirable even when reincorporating it in the production chain.

### 2.1 Architectonic refurbishment strategies

The forms of intervening on built heritage are different according to the protection grade of the building, its state at the time of the intervention and the objectives. The patrimony in question is of industrial character, with a century of history and without any protection that safeguards it; thus, the interventions on the various buildings can range from the simple consolidation of existing elements, to the total refurbishment and makeover of the compound.

The decision will be taken by the architects in charge of each of the projects.

These interventions, being more or less conservative, will have to contemplate improving the building's energetic performance; namely to apply passive strategies that minimize the consumptions in order to obtain a global performance according to what the European directive indicates on NZEB. From here onwards we do not intend to give concrete solutions to specific projects but to illustrate the different refurbishment strategies by means of qualifying tables and generic proposals, emphasizing on the inseparable nature between architectural strategy and energetic strategy; something that was obvious during centuries of history and that, thanks to technologic advances, some architectures have been allowed to ignore in their original conception resorting to machineries and other added contraptions in order to ensure comfort.

Any intervention whatsoever, with regard to what is constructed, that has as one of its objectives to improve the energy performance of the building by means of passive systems in order to reduce the demand, will have to make up for the deficiencies of the existing enclosure by adding layers both on the opaque parts of the façade as on the glazed ones. Thermal insulation, double skins with ventilated chambers or sunscreens are some of the elements to which the architectural designer will resort to. These added layers can be placed directly on the enclosure of the existing building or at a certain distance of it by dividing the space in areas with different comfort conditions. On the other hand, the intervention can be carried out on the exterior face of the enclosure or on the interior one. Intervening at the same time on both the inside and outside by superimposing layers at varying distances according to the rest of the design criteria that affects the project shows the complexity that can result from such apparently simple decisions.

The strategies we propose emerge from the combination of these two design parameters as illustrated in the attached array:

- On the x-axis, the relation of proximity – depending on the existing enclosure, new layers are exempt or totally attached to it. These new layers are only considered exempt when they create an intermediate space, according to the definition below.
- On the y-axis, the possibility of intervention either on the inside or the outside of the existing enclosure.

Four main strategies arise:



O: outside space. M: intermediate space. I: inside space according comfort requirements

#### In / off

*The new elements on the inside of the enclosure clad on all the existing façades and roofs.*

#### Out / off

*The new elements on the outside of the enclosure clad on all the existing façades and roofs.*

#### In / ex

*The new elements on the inside of the enclosure do not clad on the existing façades and roofs, preserving an intermediate space between them.*

#### Out / ex

*The new elements on the outside of the enclosure do not clad on the existing façades and roofs, preserving an intermediate space between them.*

Apart from these main rows and columns that define four basic strategies, a few combined ones appear shown in the third column and row.

#### In / off+ex

*The new elements on the inside of the enclosure clad on some of the existing façades or roofs, but not on all of them.*

#### Out / off+ex

*The new elements on the outside of the enclosure clad on some of the existing façades or roofs, but not on all of them.*

#### In+Out / off

*The new elements are placed on the inner and outer sides of the enclosure of the existing construction, cladding all of its façades and roofs.*

#### In+Out / ex

*The new elements are placed on the inner and outer sides of the enclosure of the existing construction, without cladding any of its façades and roofs.*

#### In+Out / off+ex

*The new elements are placed on the inner and outer sides of the enclosure of the existing construction, cladding some of the existing façades or roofs, but not all of them.*

We can distinguish three different space qualities derived from those interventions:

Outside space: is the space where the weather conditions are not controlled.

Intermediate spaces: are those spaces accessible not only for maintenance purposes but for developing activities related to the building program. The gap between the two layers of a double skin façade, although being accessible, its accessibility is limited to maintenance purposes so it cannot be considered an intermediate space.

Inside spaces: are considered those spaces where the comfort conditions are optimal and therefore can be equipped with artificial mechanisms.

### 2.3 Response of the strategies to three relevant aspects of architectural design

Three fundamental aspects that guide the election of one or another strategy are: the variation of the image of the existing façade either from the inside or the outside, the variation of spaces due to their enlargement or fragmentation, and the major or minor contribution to energy saving.

The table accompanying this text summarizes, for each one of the basic strategies and its combinations, the answer given to these three design aspects.

Main strategies	Image variation		Space variation			Energetic efficiency	
	From inside	From outside	Inside comfort volume dimension	Occupied surface on site dimension	Intermediate space creation	Thermal enclosure continuity	Artificial conditioning of inner spaces
In/off	total	no	scarcely reduced	no variation	no	No in case of slabs	no space dimension control
Out/off	no	total	equal	scarcely enlarged	no	yes	no space dimension control
In/ex	no	no	reduced	no variation	yes	yes	space dimension control
Out/ex	no	no	equal	enlarged	yes	yes	no space dimension control

Combined strategies	Image variation		Space variation			Energetic efficiency	
	From inside	From outside	Inside comfort volume dimension	Occupied surface on site dimension	Intermediate space creation	Thermal enclosure continuity	Artificial conditioning of inner spaces
In/off+ex	partial	no	reduced	no variation	yes	no, in case of slabs	space dimension control
Out/off+ex	no	partial	-	enlarged	yes	yes	-
In+Out /off	partial	partial	equal	scarcely enlarged	no	no, in case of slabs	no space dimension control
In+Out /ex	no	no	-	enlarged	yes	no, in case of slabs	-
In+Out / off+ex	partial	partial	-	enlarged	yes	no, in case of slabs	-

Each one of the architectural strategies resulting from the matrix can be formalized in various manners. The translation of strategy to system is not direct or immediate.

On the one hand, it is very common to resort to proposals of façade that arise from combined strategies; on the other, some of the features of the existing enclosure are of such significance that they lead to introduce sub-classifiers that help arrange the systems. The thermal inertia of the enclosure is one of the most relevant physical characteristics that apart from other aspects can lead us to decide whether to intervene from the interior, the exterior or both.

These considerations led to, when thinking of which systems to use, arranging them according to the following sections:

- Offset, on the inside or outside or both, on an existing high thermal mass enclosure. Suitable solutions for the offset strategy on a high thermal mass enclosure, putting systems together where the elements are added on the outside, the inside or both.
- Offset, on the inside or outside or both, on an existing low thermal mass enclosure. Also a suitable solution for the offset strategy, but when the thermal mass of the enclosure is low, putting again systems together where the added elements are on the outside, the inside or both.
- Exempt inside - Exempt outside

### 3. Conclusions

«Will the metamorphosis of Italy, from the land of cities to a nebula of peripheries, erode also the uniqueness of Venice? The bureaucratic invention of the “metropolitan cities” established even by the Constitution (2001), stipulated the triumph of urban sprawl, that is now promoted as main structure of the residential territory of the country». [18]

At this point we have to question ourselves about the complexity of the historical, political, and environmental context, and if it is possible that it has influenced costs and timeframes of the regeneration, as well as modalities and functions of the rehabilitation underway. Recent history and future directions of development, they together trace the limits of *many* Porto Marghera that are incompatible at least at present. On one side we have the strategic development of the Venetian port that envisions for the future of the city the hypothesis of a high ground platform; on the other side there is the ambitious urban transformation project that is interested in developing a strategic quadrant of the city of Venice during the next twenty years: the mainland waterfront that expands in the large island located north of Porto Marghera and around Vega, the Scientific and Technological Park of Venice. In the first case, beside economic arguments around the benefits of the project, there are inevitable doubts linked with the amount of the investment, the topic of the giant size of the work, and the consequences on the territory (urban, suburban, agricultural, and rural) and the environmental. As a story that repeats itself, the destiny of the great transformations of the Venetian territory seems to be linked with the run-up of the technical and economic adjustment of the port.

The Vega Waterfront project (that doesn't seem to confront the ambitious projects of the Port Authority) instead fits into a wider vision, extremely suggestive: the green tree strategy, metaphor that sees in the insular Venice the roots of a tree and in the mainland branches and green leaves, or, development possibilities [19]. This urban-environmental regeneration strategy doesn't seem to have effects on the territory, if we do not consider the areas that are directly controlled by VeGa.

Both visions, even if of undeniable interest, should maybe clarify and question themselves about the nature of the points in which the geography of flows (and the geography of economic interests) encounters the geography of places.

### Notes

[1] The research that we are presenting is the last part of a study that was started by G. Carnevale and E. Giani in 1998 at the Iuav University of Venice, Italy. The research team «dismissed areas and landscape requalification» consists of I. Peron, W. De Marchi and D. Scomparin and it is now coordinated by E. Giani. In 2013, she addressed a detailed study of the 'objects' that are part of the Venetian industrial district. This article is indeed the result of the collective work and especially of the those dissertations directed also by I. Peron, herself the author of a recent Ph.D. thesis about land reclamation and what it does imply in the architectural project. In 2016 E. Giani asked C. Pardal of EtsaB (Building Construction department) to examine in depth one aspect of the subject matter. While Visiting Professor, C. Pardal investigates possible sustainable methods to accurately rehabilitate industrial artifacts.

[2] In the following years different industrial sectors related with the raw chemical industry and the steel industry, will settle in Porto Marghera.

[3] We are here referring to the problem of wholesomeness of the area, deeply felt by the population.

[4] The industrial facilities located in the Venetian islands, at the end of the 1800s attracted skilled workers and problems of overcrowding initiated in the nearby areas.

[5] The union was founded by Giuseppe Volpi (Minister for Finance in the Mussolini government from 1925 to 1928) shareholder at SADE (Società Adriatica di Elettricità), the Adriatic electrical society, that from 1905 started to provide electricity to the city of Venice with the thermal power plant at San Giobbe. The SADE was relocated to Porto Marghera anticipating the construction of the industrial Port.

[6] The project Coen Cagli organized basic docks and infrastructures to help develop the main sectors: the productive areas of the industrial port, the areas part of the commercial port, storage areas for the oil port, and a residential neighbourhood for 30000 residents. The operation is encouraged by the large amount of land that is available in the mainland and no building regulations. «Volpi was able to build all the harbor structures of Marghera, both industrial and commercial, with State funds, to receive at no cost State land, and to add through expropriation the residual private property areas, receive construction permits and of usage of the railway infrastructure of the area». W. Dorigo, *Una legge contro Venezia. Natura, storia, interessi nella questione della città e della laguna*, Venezia 1973. The count Volpi conveniently settled here (his) SADE to provide electricity to the the companies (see note 2).

[7] The *barene* are specific kind of lagoon land that are constantly flooded by the tides. These natural structures have a very important role in balancing the lagoon ecosystem because they are able to slow down waves and they guide the spreading of the tides. The *barene* are also a breeding ground for some plant species that have a phytological healing effect on water.

[8] IRI (Istituto per la Ricostruzione Industriale), institute for the industrial reconstruction, a public entity founded in 1933 to face the economic crisis of 1929.

[9] L. Cerasi, *Perdonare Marghera. La città del lavoro nella memoria post-industriale*, Franco Angeli, Milan 2007, p. 52.

[10] In the PRG (regional land-use plan) of 1956 it was written: «in the industrial area we will concentrate the structures that produce vibrations and eject in the air smoke, dust, and, dangerous fumes for the human life, and that discharge poisonous substances and noises» (implementation rules, article 15, subparagraph 3).

[11] 15000 workers were employed in the petrochemical sector in Porto Marghera, and at a certain point it reached a 45000 peak.

[12] From the Latin word *contextus, con-texere*, to weave together, to intertwine. We can affirm that to react in a predefined context implies the need to *intertwine* with it by ensuring the detectability of the parts.

[13] «Porto Marghera occupies 2000 more than 2000 hectares, 1600 are industrial areas Venice with the Saint Marc basin and the Saint George and Giudecca islands, cover all together 700 hectares), crossed by canals and ponds (340 hectares), by roads and railways (80hectares), and enclosed by State properties (40 hectares), with the commercial port (120 hectares), 18 kilometres of water roads and 32 km of industrial water roads, with at least 100 piers and 13000 meters of docks,40 km of internal road and 135 km of internal railway system». G. Bettin M. Dianese, *Petrolkiller*, Milan 2002, p. 109.

[14] A Pan-European multimodal corridor as defined in 1994: a communication road (of goods and of people), a railway and highway path in Central Europe that connects Kiev to Lisbon and intercepts as intermediate junctions the cities of Uzhgorod, Budapest, Maribor, Ljubljana, Trieste, Venice (Porto Marghera), Milan, Turin, Lyon, Barcelona, and Madrid. In 2005 it is added into the Trans European Network-Transport (TEN-T).

[15] The metropolitan cities are: London, Paris, Madrid, Berlin, Barcelona, Hamburg, Vienna, Amsterdam, Lyon, Marseille.

[16] A. Norsa (edited by), *Venezia (città metropolitana) e l'architettura* conference, Aquae pavilion – Expo Venice – Venice Porto Marghera 5.6.2015, estratto del documento di guida alla discussione.

[17] *OECD Territorial Reviews. Venice, Italy 2010*.

[18] S. Settis, *Se Venezia muore*, Giulio Einaudi, Turin 2014, p 89.

[19] The 'Green tree strategy' is a project by Land (A. Kipar) promoted by Vega (the scientific technological park of Venice) in 2014. The project defines the general guidelines for the strategic development of the metropolitan city of Venice with references to *L'albero delle relazioni* (the relationships tree), a urban-environmental strategy that makes operative existing ecological corridors with green bypass projects and with new revitalizing cores.

