Available online at www.sciencedirect.com

ScienceDirect

Energy Procedia 115 (2017) 127–138

Energy Procedia

www.elsevier.com/locate/procedia

International Conference – Alternative and Renewable Energy Quest, AREQ 2017, 1-3 February 2017, Spain

OILANDSCAPES. Agro-energy parks to create social inclusion in Adriatic-Ionian oil meshes

Alberto Verde[a]*

[a]*University of Ferrara, Department of Architecture, Via della Ghiara 36, 44100 Ferrara, Italy*

Abstract

The paper explores the role of oil infrastructures (upstream, midstream, downstream) in the light of the imminent territorial restructuring due to the Third Industrial Revolution. New socio-economic and energetic dynamics are going to reshape the Second Industrial Revolution's landscapes. It will be necessary to overcome the common vision of oil infrastructures as punctual elements which scatter the territories, so as to recognize their potential as "oil meshes" spread over vast territories. This will contribute to define innovative local development scenarios, integrating socio-ecological dimensions to ancient oil infrastructures (OILANDSCAPES). The paper proposes "Agro-energy parks" as a possible model to reconvert oil meshes through multi-scalar design tools (territorial/landscape/urban/architectural) aiming to couple renewable energies' production processes to social inclusion.

Peer-review under responsibility of the organizing committee of AREQ 2017.

Keywords: oil industry; infrastructures; landscape; territorial restructuring; multi-scalar design; social inclusion.

1. Energetic infrastructures and industrial revolutions: two sides of the same coin

Energy production is a topic closely related to industrial revolutions. The mechanization of industrial processes, which firstly spread in England at the end of the XVIII century, required a lot of energy obtained through a wide use of carbon-fossil resources. During the last two centuries, the greater or lesser availability in the subsoil of these

* Corresponding author:
E-mail address: alberto.verde@unife.it

Peer-review under responsibility of the organizing committee of AREQ 2017.
10.1016/j.egypro.2017.05.013

components completely redefined the geo-political equilibrium among European and non-European countries and became one of the first issues for the definition of a socio-economic development of entire regions. From the beginning of the industrialization era until today, the extraction of carbon-fossil resources has required the investment of huge amounts of funds, because the deployment of a widespread infrastructural network is necessary. In particular, two kinds of infrastructures are fundamental: mobility and energetic infrastructures.
According to different infrastructural planning strategies, we are able to recognize two principal technological innovations in energy production which differently influenced mobility and energetic infrastructures' planning. Thus, quoting the international renowned American economist Jeremy Rifkin [1], our industrialization era has experienced, up to now, two principal industrial revolutions, characterized by peculiar energetic, mobility and communication infrastructures, which can be summarized as follows:

- The First Industrial Revolution was entirely dominated by the transformation of thermal energy into mechanical energy through coal-steamed powered engines. The abundance of some European regions in coal, such as Germany, Belgium and Great Britain, was the principal carrier of the first developed industrial regions. These areas did not necessary coincide with the most important cities of the countries, so this event radically transformed rural areas in densely inhabited urban centers and, in parallel, gave a boost to new mobility infrastructures' implementation, like railways. The urban model which derived from the First Industrial Revolution corresponds to dense urban cores surrounded by worker-class residential areas in the periphery, built up in proximity of coal-mining areas
- at the end of the XIX century, coal was substituted by oil as the principal resource for energy production and this event marked the transition from the First to the Second Industrial Revolution. But oil was not so spread in the subsoil as coal in industrialized European territories, so most of European countries, at the beginning of the XX century, decided to adopt colonialist political strategies against North African and Middle-Eastern countries so as to directly control its extraction and its market. In the meanwhile, they had to infrastructure their native coasts so as to harbor oil coming by oil-tankers from abroad, since downstream and refining processes can be carried out everywhere. Thus, Mediterranean countries, and in particular Italy, adopted some economic development policies apt to specialize certain underdeveloped regions in refining and petrochemical sector. The results have been the appearance of several refineries and oil-based power plants in proximity with new harbors along European Mediterranean coasts. In a period deeply rooted in positivist thought, industrialization was seen as an opportunity to boost weak agricultural and underdeveloped economic situations and to solve hygienic and sanitary problems of some marshy wetlands through vast land reclamations. One of the most representative Italian case study is Porto Marghera harbor, lying on the Venice Lagoon. Its first project dates back to 1917 and it perfectly describes the above mentioned fascist territorial planning strategies. If downstream oil sector brought on Western Mediterranean coasts harbors and huge industrial districts, midstream activities implemented energetic and mobility infrastructures in a wider scale. In fact, lots of kilometers of underground pipelines, railways, roads and waterways were realized to provide the vastest territory with petroleum products. After World War II, the increasing economic well-being made automotive industry accessible to a wide spectrum of users, so boosting the implementation of individual mobility infrastructures such as highways. The second industrial revolution led urban planning models to pander the Keynesian oil-based consumerism, so as to amplify energy and individual transport needs, settling low density residential neighborhoods far from dense city cores, in those areas which we normally call 'suburbs'.

To sum it up, the two industrial revolutions we have experienced up to now, both based on carbon-fossil resources' exploitation, have been managed by a top-down hierarchical system, where only very few private pockets and public investors have been able to build infrastructures and own the entire energy processes, from resources' extraction to their transformation and distribution to final consumers.

2. From oil infrastructures to oil meshes

Currently, even if we are still living in a mostly centralized oil-based energetic culture, it is undeniable that, on Western Mediterranean coasts, we are witnessing a growing crisis of downstream oil sector due to [2]:

- very restrictive EU environmental laws that make the refining process more competitive in non-EU countries
- very high costs of energy in Western European countries
- the current geo-political instability in the Middle-East and North-Africa
- a massive substitution of oil with natural gas for energy production and for household heating
- the reduction of the demand for fuels and derived oil products because of a more and more rampant ecological sensitivity and awareness.

In this global economic context the downstream oil sector crisis is leaving huge abandoned refineries and petrochemical sites on our territories, together with desperate social situations and polluted environmental conditions. It is imaginable that the number of abandoned oil sites will continue to grow up in coming years. In fact, according to recent EU directives, Western European countries are witnessing an increasing environmental cultural awareness which is slowly leading to an energetic infrastructural conversion towards renewable energies. At the moment, we know little about dealing with those abandoned oil-based energy production sites, since the application of traditional urban regeneration programs, generally based on the valorization of the area through the construction of huge residential and administrative building stocks, has mostly failed because of the economic contingencies of the recent financial crisis and cleaning-up's high costs. Thus, if we want to propose some innovative business plans and regeneration programs, we have to differently look at the reconversion process of these sites with a considerable territorial influence.

Let us take into considerations two very different oil networks which belong to the Adriatic-Ionian region (the Eastern Po valley oil district and the Sicilian one in Italy) which from a GIS cartographical analysis and comparison show some recurrent characteristics:

- a first common remarkable element is that both the oil meshes are constituted by a continuous and widespread territorial network of physical and functional connections among upstream, midstream and downstream infrastructures which directly relate territories very far from each other. Thus, if on one hand the very potential of oil infrastructures stands for considering them as a whole, as territorial 'oil meshes', on the other hand their very limit is that they have been historically conceived in a technical and functional way. Therefore, quoting Bhatia [3], how could they be redesigned by architecture to be adapted for socio-ecological uses? Using Bélanger's terms [4]: how design could de-engineer existing infrastructures?

Fig. 1. Oil meshes (a) Eastern Po valley; (b) South-Eastern Sicily (elaborated by the author).

- the second common interesting element is that downstream oil sites are often in tight relationship with extremely fragile environments and protected natural areas, think of Natura2000 areas. In fact, refineries and petrochemical plants were settled:
  - in proximity of water courses for guaranteeing their functioning and for shipping facilities
  - quite far from dense inhabited centers, without any concern for the environmental consequences
  - in economically depressed territories to boost their local development.

If until today the tight proximity of oil infrastructures with natural fragile environments represented a threat for territories' health, in the light of a reconversion of oil infrastructures towards socio-ecological uses we could consider this feature as a real opportunity.

Fig. 2. Proximity between oil meshes and natural protected areas (a) Eastern Po valley; (b) South-Eastern Sicily (elaborated by the author).

Focusing on oil infrastructures as "territorial oil meshes" could allow us to re-design new relationships between obsolete oil sites and innovative economic local development processes, which cannot escape from a deep restructuring of energy production system towards a more democratic and distributed model, based on renewable energies' exploitation.

3. The Third Industrial Revolution as a framework for oil meshes' de-engineering process

The transition towards a 'zero-carbon' economy constitutes the ideal background of our assumptions, so an improvement of energetic and mobility infrastructural networks is required. According to Rifkin [1], if we look back to the transition from the First to the Second Industrial Revolution, the implementation of infrastructures from coal to oil-powered ones took almost 50 years. If the transition from the Second to the Third Industrial Revolution took the same time, we could think to use this transition period to prepare out territories to the radical shift.
Some suggestions to prepare territories for the Third Industrial Revolution come from Jeremy Rifkin, whose "five pillars" can be listed this way:

- a decisive shift to renewable energies
- a transformation of the existing building stock into micro-power plants to collect renewable energies on site
- the deployment of hydrogen storage technology to stock renewable intermittent energies
- the implementation of internet technologies to energetic power grids to achieve an energy sharing-grid
- a transition of transport fleet to electric plug-in and fuel cell vehicles connected on a smart power grid.

If the two previous Industrial Revolutions were set on a vertical and hierarchical economic model, the Third Industrial Revolution should lie on a democratized, distributed and collaborative energetic production system, when everyone produces and shares electricity with other consumers, and multinational energy production companies convert their business in "utility companies", so guaranteeing the maintaining and the improvement of infrastructures.
Accepting Rifkin's vision, the Third Industrial Revolution would generate millions of jobs all over the world. As architects, we have the responsibility to imagine in advance how the Third Industrial Revolution could transform our landscapes and which tools we have at our disposal to steer this epochal territorial restructuring.

Thus, if the First Industrial Revolution left us "density" as its corresponding urban model, and the Second one "suburbs and sprawl", how the territories of the Third Industrial Revolution will look like and what will be the corresponding urban model?
As a logical consequence of the contemporary awareness that "territory" is a non-renewable resource and its consumption has to be limited, Rifkin suggests that the "refurbishment" of the existing building stock in micro-power plants could represent the urban model for the Third Industrial Revolution. Nevertheless, we notice that "density" and "sprawl" concepts convey a higher level of relational complexity among infrastructures, society and territories. In our opinion, Rifkin's proposal has probably a stop at a technological level, which can be correct, but it is not sufficient to describe the way our landscapes will be planned according to the new economic model and how a distributed renewable energy production model could contribute to generate social inclusion.

4. Testing ground: the Eastern Po Valley oil mesh

In order to try to make practical our theoretical assumptions, we need a concrete case study on which focusing our cartographical analysis. Between the two above-mentioned oil districts, we think that the Eastern Po valley oil mesh could offer us more cues for its complexity and for its diversified situations.
Thus, let us take into consideration a 200x200 km territorial portion of the Eastern Po valley, so as to include several interrelated oil infrastructures which constitute the oil mesh we wish to study.
Thanks to a preliminary cartographical assessment, oil industry in the Eastern Po valley is distributed as follows:

- in the south part of Porto Marghera harbor, we can find one of the most important Italian refinery (belonging to Eni group) which has been still active and operating since 1926. In 2014 it has been transformed in a "biorefinery"
- in the same Porto Marghera industrial area, the thermoelectric power plant "Giuseppe Volpi", fueled by coal and oil, operated from 1922 to 2012, when it was dismissed and sold by Enel to private actors as part of the redevelopment project "Futur-E" whose goal is that of reconverting the less efficient power plants through innovative multifunctional programs
- in the locality of Fusina, we can find another thermo-electric power plant, belonging to Enel, the "Andrea Palladio" one, powered by coal, dense oil and methane, which is still active. In the nearby, the "Integrated Project Fusina" represents the evolution of the existing sewage treatment plant for Porto Marghera industrial waste waters into a "multifunctional platform", which introduced a chemical-physical primary treatment followed by a phyto-purification system in the wetland of the lagoon named "Cassa di Colmata A" (150 ha). A wetland area of about 100 ha is used for phyto-purification processes of industrial waters and about 30 ha are intended for recreational and educational purposes

Fig. 3-4-5. Porto Marghera, Polesine Camerini and Ravenna existing oil infrastructures.

Fig. 6-7-8. Ferrara, Mantua and Sermide existing oil infrastructures.

- in the very middle of the Po Delta, in a very fragile ecosystem and in one of the most scarcely inhabited Italian municipalities (Porto Tolle, 39 inhabitants per hectare), Enel settled one of the biggest oil-powered thermo-electric power plant in Europe. The power plant started operating in the ‘80s and stopped working in 2015. Polesine Camerini is one of the dismissed power plants which is planned to be reconverted through innovative business plans within the Futur-E project
- the oil-industrial area in Ravenna harbor is directly connected with Polesine Camerini power plant through an underground oil pipeline which crosses the Natural Park of the Po Delta. Ravenna harbour also guests a still operating refinery (AlmaPetroli) and a petrochemical complex (belonging to Versalis).

If we move to the west, we can find other important oil sites:
- in the periphery of Ferrara, a huge petrochemical site, which dates back to the ‘30s, transforms refined oil and gases in derived-oil products (plastic, etc.) and lies along the Boicelli canal, an artificial watercourse realized during the ‘30s, which links the Po river to its ancient branch (Po di Volano). For a few decades, the petrochemical site in Ferrara has slowly been dismissed
- a petrochemical complex (property of Versalis) and a refinery (IES) lie along the banks of Mincio river, in front of Mantua historical city center. The refinery site is completely dismissed and actually used only as oil storage. The area is connected with the Po Delta and the Adriatic sea through the Fissero-Tartaro-Canalbianco waterway. A long underground oil stream pipeline connects Mantua oil refinery with the Porto Marghera one
- in the locality of Sermide, 40 km far from Mantua, a natural gas and oil combined thermo-electric power plant has been producing electric energy since 1985. An underground oil pipeline directly connects Sermide power plant to the refinery in Mantua. The oil-powered turbines stopped working in 2004.

It is worthwhile to underline that our testing ground is also rich in natural gas infrastructures, such as the dense underground network of gas pipelines which connects East European countries' providers to our distributive backbone which crosses Italy along the Apennines and the Porto Viro off-shore regasification terminal (LNG).

5. GIS mapping: identifying "regional districts" to interpret oil meshes' dynamics

Since oil meshes span across vast territories which overpass administrative boundaries and which are concerned with very different territorial problems, we propose to use some GIS mapping tools to focus on some territorial indicators which are the result of the intersection of statistical data and of geographical information. This first analytical step allows us to identify the so-called "regional districts" which can be described by similar socio-economic dynamics or imbalances and which should share the same operative solutions to boost a collaborative urban and economic development. The term "regional district" (Comprensori Regionali) is borrowed from Giuseppe Samonà, one of the most interesting Italian urban planners in rupture with the modernist urban planning tradition, who, in 1961, participated to the redaction of an innovative "Local development plan for the Municipalities of the Polesine" (Piano comprensoriale dei Comuni del Polesine) in the province of Rovigo [5].

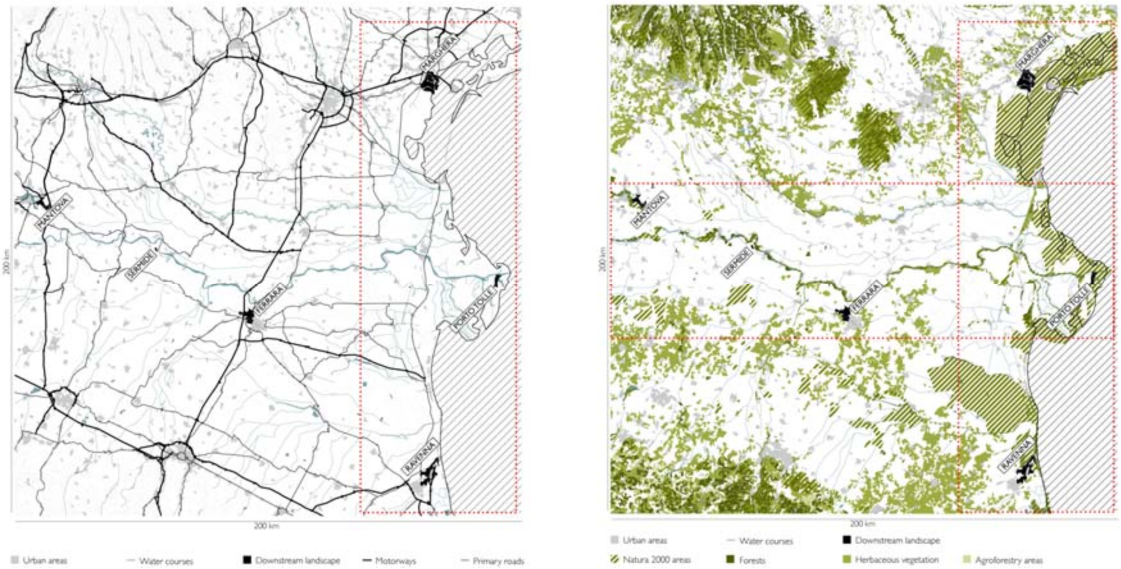

Fig. 9-10. Eastern Po Valley's mobility infrastructures and ecological infrastructures (elaborated by the author).

From a geographical point of view, two are the significant indicators we think have to be analysed: mobility and ecological existing networks. If we first consider "mobility", it is remarkable how the Adriatic coastal arc from Ravenna to Porto Marghera is not reached by any national motorway. The consequence is a vehicular superabundance along the "SS 309 Romea", the only primary road which crosses from north to south the Adriatic coastal arc and which touches the most fragile protected areas of the Po Delta valley, so generating a sharp break in territories. Then, concerning the existing ecological network, it is evident that two principal ecological systems intersect all the downstream sites in our territorial portion: we recognize the Natura2000 network, which runs parallel to the Adriatic shoreline from Ravenna to Porto Marghera, and the East-West natural protected areas along the Po river.

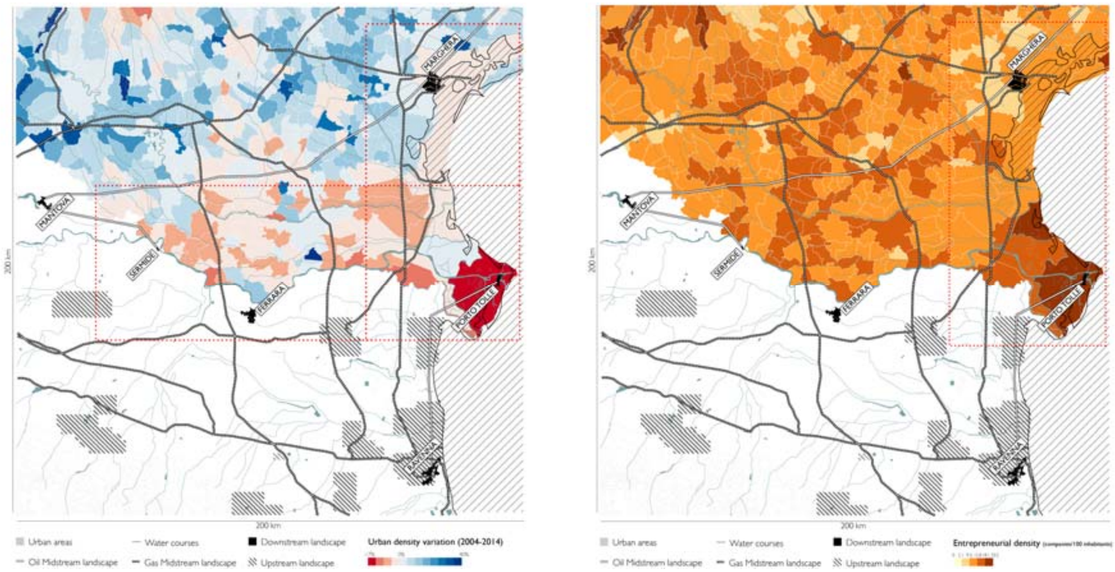

Fig. 11-12. Urban density variation (2004-2014) and entrepreneurial density (2013) (elaborated by the author).

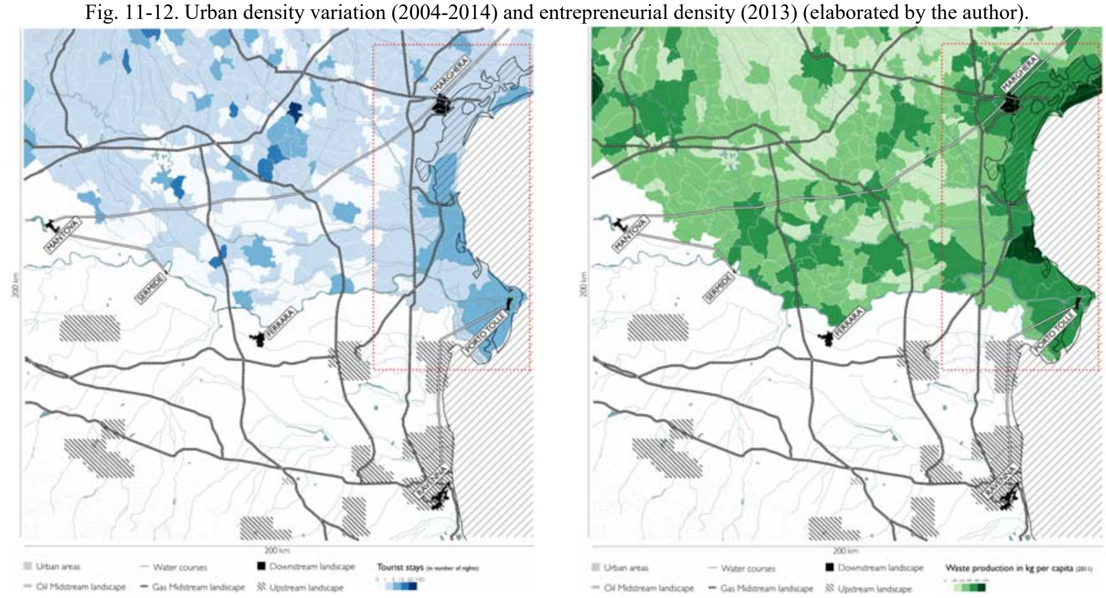

Fig. 13-14. Average overnight stays (2014) and waste production per capita (2011) (elaborated by the author).

To be noticed that, from a statistical perspective, the considerations which follow are the partial results of an on-going analysis that affects the whole 200x200 km study area and three different administrative regions, but which, at the moment, has not been completed due to some difficulties in finding comparable statistical data in diverse regional databases. Thus, the paper focuses principally on some statistical data drawn from Veneto region [6], so defining some early trends which will have to be confirmed by two other regions' available data (from Lombardia and Emilia-Romagna), nonetheless scientifically reliable in a methodological exercise.

Examining the "urban density variation" in Veneto in a time span of ten years (2004-2014) [6], it is quite evident that, along the two above-mentioned existing ecological axes, a depopulation process is on-going. Nevertheless, in correspondence with the highest peak of depopulation (the Po Delta valley), we find the area with the highest entrepreneurial density per inhabitants, 30% of which operating in the agricultural sector [7].

From a touristic point of view, the "average overnight stays" in 2014 describes a quite homogeneous phenomenon along the Adriatic coastal arc [6]. . Since the demographic pressure is very low in this area, we can interpret the medium-high concentration of "municipal waste production per capita" [6] along the Adriatic coastal arc as the result of two diverse factors: the presence of an important entrepreneurial network and of a significant touristic inflow.

To sum it up, thanks to GIS cartographical tools, we can affirm that the Adriatic coastal arc can be considered as a "regional district", because it presents some similar socio-economic trends, strengths and weaknesses which could constitute the framework on which we can try to speculate on a plausible local development strategic vision, that starts from the de-engineering of the existing oil infrastructures as the main assumption.

6. OILANDSCAPES. When a distributed agro-energetic production creates social inclusion

At a territorial scale, we have seen how the notion of "regional districts" overcomes administrative boundaries. That is a territory where demographic density is very low, depopulation is increasing, the presence of oil industry's infrastructures has always been the engine of the local development and an impressive richness in unique fragile environments is threatened by pollutant processes of oil infrastructures dismissing. For this area we think that we have to seek for a new narrative for the imminent territorial restructuring of this "regional district", experiencing the Third Industrial Revolution. Our assumption sinks its basis in some regional intentions of local development (expressed in the PTRC of Veneto) [8] which aim at the naturalization of some territories along the Adriatic coastal arc and the Po river through the reforestation and the increasing of agricultural biodiversity.

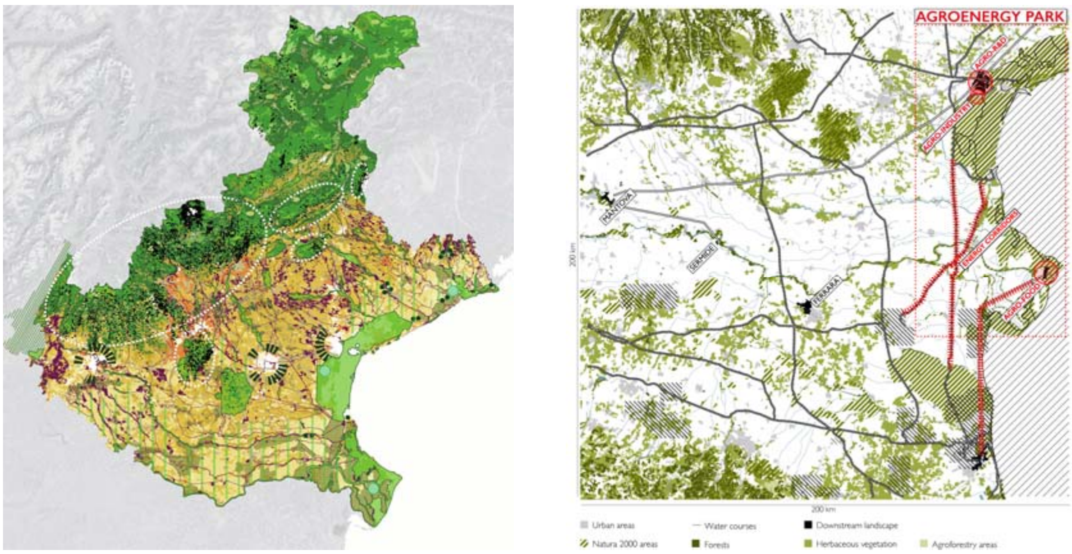

Fig. 15-16. PTRC of Veneto – Biodiversity and the "Agro-energy park" of the Eastern Po valley (elaborated by the author).

Thus, we think that the new narrative for the territorial development of these territories could merge naturalization's strategies with that renewable energy production which allows to create social inclusion. In this framework we would like to propose our "Agro-energy park" model as a possible territorial strategic vision, coupling naturalization and renewable energy production along the Adriatic coastal arc district.

Two are the theoretical urban models which corroborate the proposal of our "Agro-energy parks" conceptual speculation:

- the first one is proposed by Samonà [5] in the '60s, proposing the expression "urbanized rurality" (Campagna Urbanizzata) to describe a huge city-territory in low-dense areas conceived in extension and not in concentration,

which counts on the inter-municipal collaboration and on the organization of urban extensions around port facilities and industrial sites
- the second one is the "weak urbanization model" proposed by Andrea Branzi [9] at the beginning of '00s. This innovative urban model includes reversibility concept for flexible and almost seasonal functional programs of the built environment. The model incorporates energy and food production within a new urbanity which plans highly technologized large agricultural parks.

The scenario of the macro "Agro-energy park" along the Adriatic coastal arc district federates some local strategies apt to convert oil downstream infrastructures, contributing for the overall vision in this way:

- the presence of the Scientific and Technological Park VEGA in northern Porto Marghera industrial area and its institutional relationship with universities could contribute in implementing R&D activities about agro-energetic production. In addition, the proximity of the existing agro-industrial sewage treatment plant in Fusina, which integrates natural phyto-purification processes to educative and ecological awareness campaigns, could support a sustainable development towards a green economy industrial reconversion of the site
- the ecological uniqueness of the Po Delta valley is carrier of a very rich variety in the agricultural and fish farming sectors. The reconversion of Polesine Camerini power plant in an "agro-food park" could enhance the agricultural biodiversity, so implementing food industry and creating an innovative food hub. In addition, the absence of chemical processes, normally tied to refining processes, on Polesine Camerini site makes it the less polluted site among the existing oil infrastructures in the regional district. That is to say that the site is quickly remediable to accommodate agro-food industrial activities
- concerning the existing midstream infrastructures, some researches preview the possibility to reconvert exhausted upstream sites and gas pipelines into suitable infrastructures for hydrogen storage (see the EU funded project by FP6 - "Naturalhy" [10]) or some crude oil pipelines into aqueducts for a wider water distribution in the most remote areas [11]. But we are more interested in looking for the role of these infrastructures on the surface rather than in their underground technical use. Considering that primary pipelines define "not constructible buffer zones" of about 10 meters from the axis on the one side and on the other, we wonder about the possibility to punctually involve this "void" in some ecological corridors' reconnecting strategies.

Once defined the overall reconversion strategies of our "Agro-energy park", we think it could be worth to move to urban design scale and try to sketch some design tools for urban regeneration. For the aim of this paper, we will focus on Polesine Camerini dismissed power plant site.

Learning from Latz and partners's experience for Landschaft Park Duisburg Nord [12], "cyclical space-time articulation" and "ecological stabilization" are the driving forces for an innovative reintegration of oil sites into territories which are bound to the Third Industrial Revolution economic model.

For "cyclical space-time articulation", we mean that the reconversion of oil sites has to be spatially and temporally planned per phases of uses and of interventions, so acting with "regenerative cycles" on portions of the site and with flexible and interchangeable activities.

For "ecological stabilization", a primordial acceptance of current contaminated physical qualities of oil sites is necessary, with the aim to avoid an invasive off-site remediation of contaminated grounds, but privileging a natural on-site cleaning up by phytoremediation which will be articulated over the course of several years or decades, so enhancing diverse cyclical uses according to the remediation status.

We are aware that, scaling down, we are entering a "slippery ground" which would need interdisciplinary and technical insights concerning, for example, the actual level of ground and water pollution of Polesine Camerini site, the economic convenience and quantitative calculations. Of course, these contents cannot be forgotten, but at the moment we are interested in a methodological speculation about plausible strategies, which can propose innovative mixed programs and business plans based on an agro-energy production and prepare territories to accommodate a new type of "urbanity".

In this sense we think that the following hypothetical regenerative cycles proposed for Polesine Camerini power plant must be interpreted:

Fig. 17-18-19. Polesine Camerini power plant's reconversion phases

- Phase 1 - Energy from phytoremediation (hypothetically 2016-2025)
  - Action 1: a biological cleaning-up of the entire site through phytoremediation can be foreseen. Thus, void areas can be planted by plant species able to degrade and remove the contaminated elements present in land. According to ground contamination depth, diverse plant species can be used
  - Action 2: in the meanwhile, oil storage tanks could be transformed in "bio-digestors" so as to receive the bio-mass obtained by phytoremediation and treat it to obtain biogas through anaerobic digestion processes. Biogas can be used for thermal and electrical energy production and methanogenic digestate, once purified from toxic substances, can be exploited as fertilizer
  - Action 3: a selective and targeted reuse of the built existing stock for professional and educational activities in food industry and in ho.re.ca activities can be launched
- Phase 2 – Definition of urban infrastructures (hypothetically 2020-2025)
  - Action 4: some portions of not constructible buffer zones of midstream underground infrastructures can be transformed in ecological corridors to make the site accessible to a wider slow mobility network
  - Action 5: the predisposition and pre-landscaping of public voids will structure the urban form, waiting for future settlements and the arrival of urbanity
- Phase 3 – Energy from Agro-food production (hypothetically from 2025 onwards)
  - Action 6: when biological cleaning-up process will end its function, terrains will be clean and ready to enhance the production of local agricultural products with innovative techniques
  - Action 7: fish farming can be implemented in proximity of water courses
  - Action 8: learning from Grupo EPM's experience in Medellin [13], where they propose to create public spaces around city's water cisterns so as to solve security problems, we can imagine to propose a similar strategy in the definition of livable public spaces around our bio-digestors, which will be continuously fed by food processing waste, by maintenance public green waste and by municipal solid waste (produced by a growing use of the area).

It is now evident how the symbol of a centralized energetic production model, typical of the Second Industrial Revolution, has slowly been reconverted into a still productive site which combine agriculture for energy production and for food industry to create social inclusion. Starting from this moment, we can imagine that the area has been spatially and temporally prepared to accommodate a new coming "urbanity", responding to the Third Industrial Revolution model. It is worthwhile to underline that this aspect will not be deepened in this paper because it deserves to be separately explored, being necessary to enlarge the field of study beyond the role of energy infrastructures.

7. Conclusion: multi-scalar design as a flexible answer to territorial restructuring

The aim of the paper is to show how the imminent arrival of the Third Industrial Revolution can be carrier of some fresh opportunities to reorganize some territorial hierarchies related to oil infrastructures and to define their new role of possible carriers of socio-ecological realms. The slow shift towards renewable energies and the necessary transport and energetic infrastructural implementation invites us to imagine how the urban model responding to the Third Industrial Revolution economic model will look like and how the vast influence of our "oil meshes" could contribute in territorial restructuring. Oil meshes are the support for the conversion of oil infrastructures into territorial distributed energy production sites which will generate social inclusion using agricultural tools.

Thanks to the use of some GIS analytical tools, which allowed us to cross some statistical data and cartographic information, we are able to identify our "regional districts" (comprensori regionali), characterized by similar infrastructural and ecological situations and by comparable economic, touristic and social trends, which have to respond to a unique territorial strategic vision. Being "regional districts" defined by some indicators which overcome administrative boundaries, a classic multi-layered territorial planning approach (in Italy it is constituted by regional, provincial and municipal level) does not match with our infrastructural restructuring vision and risks to be too rigid to get the overall vision of the potential influence of oil meshes in restructuring regional districts through an energetic production strategy which can create social inclusion. Thus, we need more flexible design tools to respond to this challenge. The reintegration of infrastructures' domain in architects' and landscape architects' competences would allow them to intervene on and manage social and environmental realms from a broader point of view, reconciling contemporary architecture potential with its historic relationship to the city [14]. In this sense we think that a multi-scalar design approach, which involve territorial, landscape, urban and architectural considerations and responses, would allow us to speculate on plausible reconversion scenarios, so as to evaluate their mutual interrelation and contribution for our overall "Agro-energy park" vision.

Thus, we think that "feasibility study", with its intrinsic aptitude for creating scenarios to be compared, can be considered as a tool which flexibly answers to our previous expectations, integrating multi-scalar design with economic, regulatory and phasing considerations to manage territorial restructuring's complexity.

References

[1] Rifkin J. The Third Industrial Revolution: How lateral power is transforming energy, the economy and the world. New York: Palgrave Macmillan; 2011.

[2] Oliva E. La crisi della raffinazione. L'Indro (online journal; March 18th, 2014); http://www.lindro.it/la-crisi-della-raffinazione/.

[3] Bhatia N. Harvesting urbanism through territorial logistics. In: Bhatia N, Casper M, editors. The Petropolis of Tomorrow. New York; Actar Publishers; 2013.

[4] Bélanger P. Landscape infrastructure: Urbanism beyond engineering. Lecture held on May 8th, 2012 at the EPFL in Lausanne; http://archizoom.epfl.ch/op/edit/page-101622-en.html.

[5] Samonà G, Trincanato E, Dardi N. Piano comprensoriale dei comuni del Polesine. Relazione introduttiva. Archivio progetti IUAV; Venice; 1961.

[6] http://idt.regione.veneto.it/app/metacatalog/.

[7] http://www.unioncamere.gov.it/atlante_2015/regioni/veneto/tessuto.html

[8] http://ptrc.regione.veneto.it/.

[9] Branzi A. Modernità debole e diffusa: Il mondo del progetto all'inizio del XXI secolo. Ginevra-Milano; Skira; 2006.

[10] EU funded project by FP6-SUSTDEV program: NATURALHY. Preparing for the hydrogen economy by using existing natural gas system as a catalyst. http://cordis.europa.eu/project/rcn/73964_en.html. 2004-2009.

[11] Bhatia N. Rewiring Territories. Volume #47 – The System; 2016.

[12] Latz P. The metamorphosis of an industrial site. In: Kirkwood N, editor. Manufactured sites. 2nd ed. London – New York: Taylor&Francis; 2011.

[13] Grupo EPM. Water tanks. Medellin; Colombia. http://u-in-u.com/en/venice-biennale/2016-architecture/central-expo-arsenale/grupo-epm-2/.

[14] Waldheim C. Urbanism after form. Pamphlet Architecture 30 – Coupling. Strategies for infrastructural opportunism; New York: Princeton Architectural Press; 2011.