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Can post-mining territories become landscapes in motion? A Spatial Strategy to Build a (Landscape) Reputation for a Hidden Area in Tuscany, Italy

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Introduction: setting the stage

1 The politics and territoriality of resource extraction have dominated the debate on the disruptive socio-spatial, environmental and economic effects of the mining industry (also referred to as the transition to a post-carbon society), along with other contemporary forms of extractive economies reorganised in the form of logistical networks. These relate to fuel flows and the creation/extraction of value processes worldwide[1].

2 The debate digs into both the contemporary ways in which mines have become intertwined in an exploding constellation of megacities and infrastructures[2], and the ways in which the ruins of an ex-mining landscape have turned into a post-carbon landscape through strategies of environmental reclamation and territorial regeneration[3].

3 On some parts of the planet, the mining industry remains active, contributing to the capitalist world-system economy as well as the consequent uneven geographical development. This mainly includes areas that are commonly represented as rural, remote or untouched by human impact, and currently being restructured to support the needs of major cities in terms of energy, water, material, food and logistics, such as in East Asia[4].

4 Conversely, in other supposedly remote regions of the planet far beyond city limits, we are witnessing a wide-ranging socio-spatial and environmental transformation. This is currently managed under re-territorialisation approaches to areas that were once exploited for resource extraction[5].

5 These regions, previously integrated within a worldwide fabric of urbanisation as value and resource extraction territories, are now starting a post-mining transformation process that covers spatial, socio-economic, ecological and landscape dimensions, leading to a redefinition of their roles and reputations.

6 This paper refers to this second group of processes, focusing specifically on the process of re-territorialisation[6] of the former brown coal mine area of Santa Barbara, which is a large-scale site of ca. 1,700 hectares located in the Municipality of Cavriglia (Arezzo) in the upper Arno Valley (Valdarno Superiore) of Tuscany. The mine area is owned by ENEL (Ente Nazionale per l'Energia Elettrica – National Agency for Electric Energy), an Italian multinational energy company, first established at the end of 1962 and that is active in the sectors of electricity generation and distribution as well as natural gas distribution.

"Landscape in motion" as a trigger of the territorial regeneration of post-mining sites (previously thermoelectric power plants)

7 In 2017, ENEL launched a socio-spatial regeneration project called "A Strategy for the Redevelopment of the Santa Barbara ENEL Ex-Mining Site in Cavriglia (Arezzo) and Figline e Incisa Valdarno (Firenze)" ("*Una Strategia per la Riconversione dell'Area ex-Mineraria ENEL di Santa Barbara a Cavriglia (AR) e Figline e Incisa Valdarno (FI)*").

8 This project was activated thanks to a wider corporate programme called Futur-e. It's based on the concept of circular economy and aims to recover 23 inactive thermo-electric Italian powerplants and redevelop ex-mining sites, all over Italy. The main goal of this programme is to convert these industrial unused sites into drivers of sustainable development and territorial innovation of wider regions.

9 In the case of Santa Barbara ex-mining site, Future-e was developed through a participatory and negotiating design process among a consistent number of stakeholders that includes public authorities, private landowners, ENEL, local community, local technicians and external scientific experts.

10 In particular, ENEL engaged two universities (Department of Architecture and Urban Studies, Politecnico di Milano, and Department of Architecture, University of Florence), to supervise the whole process by envisioning and addressing the strategies of post-mining transformation and post-carbon regeneration. This resulted in a project of redevelopment of Santa Barbara ex-mining site that is strategic, sustainable, rooted in the local territorial and social heritage. It identifies territorial development strategies inspired by the idea of landscape (a particular type of landscape, the "landscape in motion" as explained below) as driver of reputation of a territory suited to slow and sustainable fruition. This strategy is based on two evidences: the specificity of the local milieu that is connected to the system of historical villages and to the old lignite mine; the reinterpretation of the ruins of a recent history related to the extraction activities of the second post-war period that have being modifying and transfiguring the

landscape for years; a landscape that still shows traces of a deep socio-economic and environmental crisis.

11 The whole project is supported by a consistent business/feasibility plan as well.

12 At the very centre of this strategy is indeed the landscape, as social, economic, spatial and narrative driver of territorial regeneration.

13 The kind of landscape taken into consideration in this paper is defined as "landscape in motion" to explicitly evoke the "mobile" feature of the lands of an opencast mining site (hills of land from the excavations of the artificial lakes of the mining site). Moreover, this idea is coherent with the changing nature of this place through centuries and with the resulting landscape of "mobile lands" and landslides which still have to find a stable structure.

14 As specified in the following paragraphs, the concept of "landscape in motion" is explicitly interpreted through Gilles Clément's idea of the "garden in motion" (2011) and its development into the concept of a planetary garden (2015). We consider this concept particularly well-suited to the Santa Barbara ex-mining site, which the extraction of carbonite has made "fragile" and in-transition, but, above all, currently sterile, unable to produce agricultural goods. In particular, we introduce it for two reasons: 1) the physical nature of the existing landscape that relates to the excavations and movements of lands (that impacts on the survival of some arboreal species and 'paves the way' to pioneer species); 2) the metaphorical/inspirational impress of this concept brings in a place for the present and future transformations and reputation of a landscape that is seeking its stability.

15 In fact, today, Santa Barbara is a site in search of a new territorial and landscape reputation that reflects a balanced socio-economic and ecological metabolism; a particularly relevant aspect in this place which it is squeezed between other branded landscapes of Tuscany such as the so called "Chiantishire", and then potentially neglected as a "land-scrap" and left out of any trajectory of regional redevelopment (see fig. 2).

16 Accordingly, the paper argues that the "landscape in motion" of Santa Barbara, can function both as a metaphorical and material driver of regeneration of the entire site, through which it is possible to experience other potential performances and propensities of the place that range from sustainable cyclo-tourism, well-being, territorial and historical heritage, to produce green energy. The spatial strategy of redevelopment presented in this paper integrates all these propensities which enhance natural and environmental resources and witness a long-term history of a mining community and, therefore, the territorial heritage. Specifically, this strategy stresses the potential of sustainable cyclo-tourism and the performance of an international cycling hub rooted into the local history and economy. This choice emerged from the participatory and negotiating process and has been subsequently redesigned and supported through a feasibility study elaborated by the two universities in charge of supervising the process, and by ENEL.

17 The paper portrays the industrial development and decline of the mining site and describes in detail the regeneration process started by ENEL through the active engagement of public and private stakeholders and the local community.

18 The steps to elaborate the spatial strategy and the results achieved for each of them are then identified: i.e. the guidelines emerged from the stakeholders' engagement process;

interpretation and transferring of the guidelines into the spatial strategy supervised by the two universities; the contribution of ENEL.

19 In doing this, the possible development drivers of the area are underlined and include Santa Barbara, The Cyclo-tourism and Competitive Cycling Hub; Santa Barbara, The Experimental Agricultural Park; and the Geopark. The reasons for the choice to stress the propensity to sustainable cycle-tourism are also explained.

20 The core concept of the re-development strategy – which is "landscape in motion" – is introduced in a separate paragraph and invoked as inspiration and theme of the project in the different stages of the design process.

21 Finally, this contribution outlines the spatial strategy produced by the two university teams as result of the entire process of envisioning, civic and stakeholders' engagement, management and design.

22 All in all, this paper explains how the trigger of this ex-mining site regeneration process assumes peculiar connotations, which makes this case/project a unique example in the national and international panorama, due to the strength of the economic player that started the process and due to the kind of project it is, involving multiple actors and various features – spatial, socio-economic, ecologic, landscape, aesthetic – of the region.

The ex-mining site of Santa Barbara and the leading role of ENEL (electricity company)

A brief excursus on the mining site

23 In the Pleistocene, the Santa Barbara ex-mining site was a lacustrine and swampy environment[7].

24 The industrial extractive activity of the Santa Barbara mining site began in the second half of the 19th century. This site witnessed two periods of extraction, during the first of which the lignite basin was exploited by underground mining. Later, from the beginning of the 20th century, the lignite was also exploited for thermo-electric production, thanks to the creation of a new power plant called Santa Barbara. The second season started in the 50s and was characterised by large-scale open-cast exploitation and ended in 1994 marking *de facto* the end of the mining activities in the area. In the meantime, ENEL has built an electric powerplant, still in use, reconverting part of the mining site[8]. Even though the mining stopped in Santa Barbara, the thermoelectric powerplant, converted into a combined cycle plan in 2006, is still in use[9].

25 In 1974, the same type of mining was extended to the nearby mining sites of Allori and San Donato, enlarging the surface of extraction to up to 3,000 hectares (today reduced to 1,700 hectares).

26 Since 1970, the ENEL company has maintained the mining concession in this area, which will end in 2021, when the company will have to return the mining area reclaimed and valorised.

27 In order to achieve this goal, in 2004 ENEL presented a major rehabilitation project (which also included reclaiming and repairing), formalised in 2006 through an

institutional agreement – a letter of intent/*protocollo di Intesa* – signed by ENEL, the local authorities and the Tuscany Region. This letter of intent defined the work to be done, the prescriptions and the specific goals about future land uses.

28 In 2017 this rehabilitation project merged into the Futur-e Project.

29 It is clear that mining has deeply influenced the social and economic dimensions of this territory, causing a dramatic transformation of the original landscape, especially after the introduction of open-cast mining, which removed existing hills and created massive pits (today partially backfilled to become artificial lakes) and new plateaus.

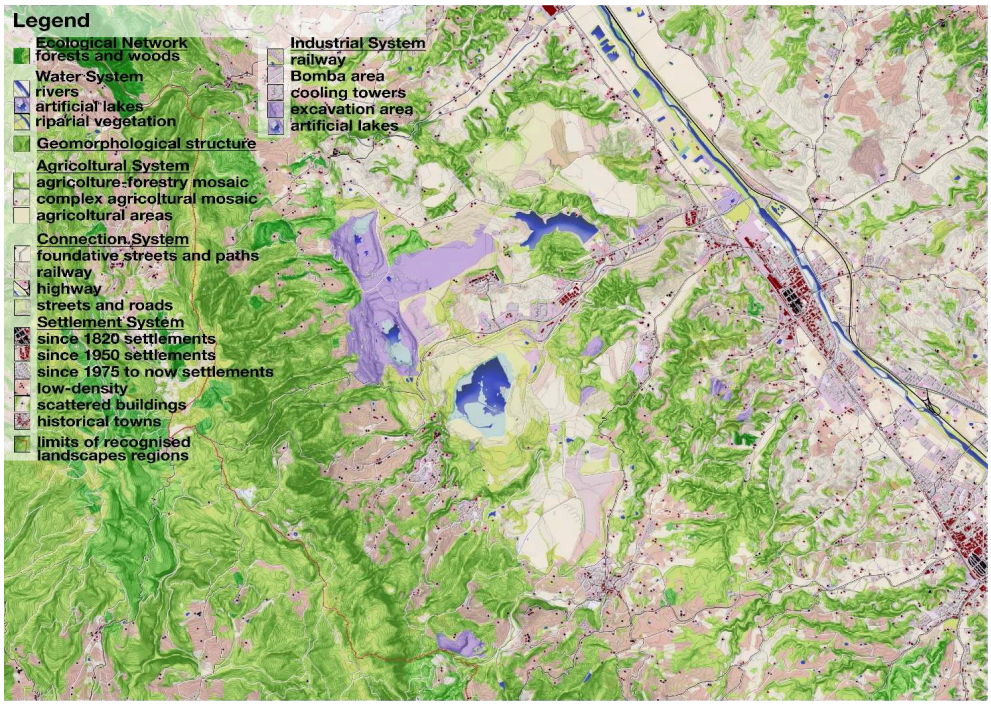
Santa Barbara landscape as mobile land

30 Santa Barbara currently presents peculiar features that differ from its surroundings and the classic images and brands of the Tuscan landscape[10].

31 The Santa Barbara ex-mining landscape stands as an evocative place, where there is evidence of co-existence between the past and present, dynamism and neglect, an intensive and persistent dialectic, between the ground and underground dimensions co-exist [11]. Indeed, mining has deeply influenced and changed the social and economic conditions of the territory and has determined a heavy transformation of the local landscape over a long period of time.

32 The current appearance of this site's landscape is an *in-becoming* result of this diachronic succession of changes triggered by its first industrial exploitation.

Figure 1. Territorial heritage map



Caption: The cartography shows the social, spatial, environmental, cultural heritage of this area. Complex multi-layered contexts where different components and deeply intertwined are visible. The morphology of the territory strongly drove the evolution of the urban and anthropic activities. The excavation area of Santa Barbara is an exception. There, mining activity modelled the geomorphology to the activities.

Source and Copyright: This cartography was elaborated with open data (Tuscany Region databases). Land Use (information and colours, 2013) are from the Tuscany Regional Landscape Plan (open geodatabase). The map is elaborated with QGIS by Flavia Giallorenzo.

33 The initiation of open-cast mining in the 1950s generated a radical change in the landscape: large-scale holes took the place of the small-scale open-cast mines, and hills, ridges, paths and slopes were built and excavated to generate a monofunctional landscape that was completely different from the previous one. Moreover, and consequently, some of the small historical town centres were abandoned, weakening the system of historical settlements (Bomba, Castelnuovo dei Sabbioni, Ronco, San Martino and Basi). The village of Castelnuovo dei Sabbioni was gradually abandoned and partially demolished in the 1960s because of lignite mining. Mining was also the cause of the demolition of the 13th century Castello di Pian Franzese in the 1980s, a historical architectural heritage site.

34 Furthermore, we can affirm that the most evident sign of this first phase of exploitation was the removal of existing hills, the creation of massive pits and new plateaus and the constitution of vast areas for backfill (the so-called “mining waste dumps”). These resulted in an irreversible transformation of the original landscape.

35 The industrial decline, which followed the most intense period of mining, further altered the landscape, corroding it and leaving traces and abandoned “industrial emergencies” throughout the whole area, such as industrial structures and examples of industrial archaeology.

36 Nevertheless, the presence of the electrical company in this area, despite being reduced, is marked by the following: the ENEL electrical power plant, still in use and

fuelled by methane; the two cooling towers of the power plant, which serve as a strong landmark for this territory; along with several housing estates built by ENEL and that are currently inhabited. Furthermore, the industrial area of Bomba is also located in this area, once part of the mining site and now the property of the Cavriglia Administration. In Bomba, there are active industrial sites in different sectors as well as the Cavriglia Business Incubator, which hosts the GeoTecnologies Centre (CGT) of the University of Siena as well as a spin-off of the CGT.

37 The ENEL rehabilitation project has continued the process of transforming these lands by changing the landscape. Among the major interventions that have been addressed are actions on the water, green and building resource systems.

38 Three artificial lakes (Lago di Castelnuovo, Lago degli Allori and Lago di San Cipriano) were created in the great ex-mining pits that were later partially filled with soil. The area is covered by a significant presence of new forests, provided by ENEL and planted by the CREA Institute (Council for Research in Agriculture and for the Analysis of the Agricultural Economy – Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria). Two-hundred and fifty hectares of the ex-mining site have been subject to a reforestation campaign, as compensation for the forests that were cut down due to mining.

39 Finally, other interventions include restored buildings in Castelnuovo dei Sabbioni, such as the old church of San Donato and the old vicarage, a contiguous building that has become the museum for the mines and the territory (MINE)[12].

40 The current landscape of Santa Barbara shows some evidence of its history of exploitation and mining life. Some of these include landmarks of a territory that entrusted its identity to a precious local resource (lignite) and the survival of a mining community. Even though the progressive dismantlement of mining activities has generated diffused socio-economic weaknesses, the local identity is still very much related to the history of this "work landscape". The Mine Museum of Castelnuovo dei Sabbioni is therefore evidence of this, as well as the modern architecture of the power plant designed by a famous Italian architect[13]. In parallel, the widespread decay and abandonment of industrial and residential buildings, superficial water pollution and sterile soil are wounds of a territory where large-scale exploitation investments have left visible traces in a landscape that tries both hard and spontaneously to be reborn. In certain cases, it is even possible to recognise a landscape reconquered by nature, or by a second nature of artificially created lakes and forests, which negotiate lands with the emerging spontaneous and changing landscape.

41 However, the consequences of the monofunctional use of this site, which has created deterritorialisation processes due to the extraction of resources, can be reversed and generate a post-mining landscape with a reputation centred around the new sustainable life of the place. This reputation is linked to the very concept of landscape, which simultaneously becomes a driver of regeneration and a witness to the memory of place, in balance between the removal of material remnants; that is, marks of the industry on the one hand, and the risk of the overvaluation of 'remnants' on the other hand[14].

42 As a result of these changing dynamics, the landscape appears to be a ceaseless and incoherent sequence of places in use, abandoned and/or in constant transformation (in motion), the symptom of an unbroken relationship between the industry and the

territory, a relationship that seems to have found a new potentiality. This is also thanks to the Futur-e Project prompted by ENEL.

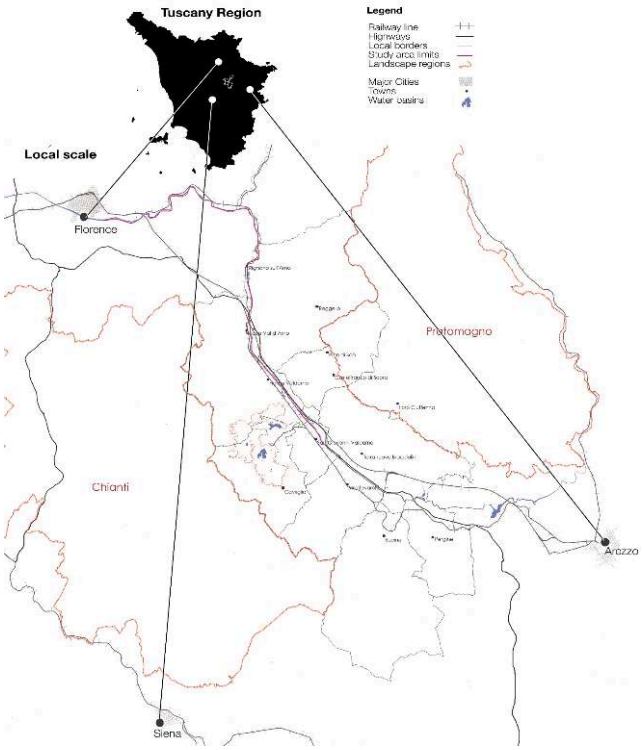
A spatial strategy for the regeneration of the Santa Barbara ex-mining territory

The research project that triggered the strategy for regeneration

43 It is precisely that same company (ENEL) that had been exploiting local natural resources for ages, which has launched a project of the spatial and economic regeneration of the site through a wider corporate programme, Futur-e. The Santa Barbara ex-mining site is the only case among the Futur-e Project that is not a powerplant, but it is a complex and vast area (1,700 hectares)[15]. The main goal of the project is to convert these industrial unused sites into drivers of sustainable development and innovation through collective processes shared with the territories and the local communities.

44 Through this project, ENEL aims at establishing a strong inter-institutional partnership that involves a network of policymakers at the local and regional levels while actively engaging the local community to image and then contribute to carrying out the future of this site, reactivating a new post-carbon local economy. This is very much relevant if we consider the region in which Santa Barbara is located, Upper Valdarno. This region is a complex area located across the administrative borders between the metropolitan city of Florence and the province of Arezzo. This location makes the site an "in-between" space[16], in which new, sometimes contradictory ways of relation/aggregation among geographical, political, economic and social entities increasingly emerge in the system of governance and in the relations among public institutions and networks of private stakeholders at different scales. Between these networks, new models of governance (already *in nuce*) are being set up, becoming flexible, strategic and co-operative, thereby affecting the local place-making in variegated ways.

Figure 2. Santa Barbara and upper Valdarno region in Tuscany



Santa Barbara and upper Valdarno region: upper Valdarno region is an "in-between" place nearby Chianti region and the Pratomagno Mountains, both branded landscapes of Tuscany. Cavriglia and Santa Barbara ex-mining site are 40 km from Firenze, Siena and Arezzo.

Source and Copyright: This map was elaborated by the Research Group (Giovanni Azzone, Alessandro Balducci, Chiara Geroldi, Antonella Bruzzese; Paolo Bozzuto, Valentino Galli, Gloria Pessina, Beatrice Maria Bellé, Camilla Perrone, Maddalena Rossi, Flavia Giallorenzo, Federico Magenes, Marika Arena, Paola Colzani), and expressly modified for this publication.

45 As mentioned above, ENEL has engaged two universities (the Department of Architecture and Urban Studies at the Politecnico di Milano, and the Department of Architecture at the University of Florence) to envision and address the regeneration project and to start the process of redeveloping the site.

46 Supported by the partnership between ENEL, the local authorities, and the two universities, the project has been a way to start the process of socio-spatial "awakening" in the post-carbon society of an abandoned site. The area might therefore find an alternative way to re-enter the global network of flows, contributing with a sustainable proposal of economic and tourism development that involves the local community and that identifies the potential capital for reconstructing (or building) the image/reputation of this place within the landscape (or "landscape in motion").

47 The project is developed into two activities (detailed in the two following paragraphs as activity 1 and 2):

48 - Activity 1. The active gathering of the main territorial actors (institutions, stakeholders, the local community). This phase aims to create a shared diagnosis and a primary design approach to the Santa Barbara ex-mining site.

- Activity 2. The design of a spatial strategy for the regeneration of the area (a masterplan), which includes the business plan and the feasibility study articulated on a

temporal development that is coherent with the economic feasibility of the entire project.

Activity 1. The process: Gathering the territory and the local community

49 Activity 1 consists in two steps in sequence. The first step, coordinated by the two universities, consisted in listening to local community through a *participatory and negotiating process* among actors and stakeholders. The second step comprised analysis of the results of the participatory process and testing of their feasibility. This was done through the method of *co-design workshops* attended by students (from the two universities) who worked out guidelines for design, maps and conceptual sketches.

50 In the first step, the process was aimed at building a shared diagnosis of the main critical and potential issues and at imagining possible drivers of the future. The process was built on the involvement of administrators and economic local and supra-local actors through in-depth interviews; the main local stakeholders through the thematic focus group; the local community and associations through specific public meetings and explorative walk-throughs aimed at intercepting energies; and bottom–up transformative resources from the territory.

51 The interactive process allowed us to revisit the past by comparing different stories of life and feelings of belonging to this territory. Sharing the present conditions (with the local community) was the crucial step of the process to build a map of needs, issues and resources. Building a vision about possible futures of Santa Barbara was the challenge that helped to guide the building of a strategy of sustainable landscape-driven regeneration.

52 The results of the participatory process were collected and transposed (by the team from the universities) into a portrait of territorial issues and opportunities, which led to the definition of three potential and complementary development drivers of regeneration, as follows:

53 - **Potential development driver 1, Santa Barbara. The Cyclo-tourism and Competitive Cycling Hub**. This *potential driver* aims at promoting the spread of local energies detected in terms of expertise, society and outstanding historical sport events in the context of cycling. The goal is to transform the Santa Barbara ex-mining site into an excellent bike park/resort, which may promote and connect local resources, being attractive at the regional and national scale. This goal will be supported by the creation of a soft mobility system spread across the territory, connecting the park/resort to the local heritage (historical, architectural, natural, landscape) resources.

- **Potential development driver 2, Santa Barbara. The Experimental Agricultural Park**. This *potential driver* provides the transformation of the Santa Barbara ex-mining site into a multifunctional agricultural park, an experimental vision that combines the cultivation of rare and ‘pioneer’ species and land-art activities, aimed at enhancing potentialities expressed by the local community.

- ***Potential development driver 3, The Geopark.*** This *potential driver* is aimed at the constitution of an ecosystem of innovation in the geothermal, seismic and geophysical fields. This goal is achievable through the possible boost of a research centre already present in the area, enhancing the existing structure to the international scale.

54 The three *potential development drivers* keep track of the history that shaped the place. They have reinterpreted its geomorphological and natural features and have envisioned a possible future anchored to specific resources/potentialities of the place within a post-carbon scenario of development that is sustainable, inspired by nature, organised by soft mobility and respectful of local identity, history and territorial heritage.

55 Working on these three *potential development drivers* and valuing the local economic futures associated to them had a mainly heuristic purpose, which was investigating Santa Barbara's "readiness" and "resistance" to the transformation, taking into account both the territorial resources (linked to land morphology and topography, historical and cultural heritage of mines, urban planning limitations etc.) and the stakeholders' and local communities' expectations. The economic, social and environmental 'sustainability' of the proposed transformations was the mainstay.

56 Later, the three *potential development drivers* were further explored through an intensive sequence of thematic workshops with the network of stakeholders involved and engaged in the project. They present alternative "pictures" of a possible future for the ex-mining site. Each of the three is intentionally characterised by a strong and specific topic, and, at the same time, includes several alternative options that reflect the multiple features and potentialities of the area. None of the three aspire to constitute autonomously and exclusively the groundwork of the spatial strategy for the future of the area. The three drivers can be ideally 'overlayered' and jointly analysed, to select and define a rank of elements useful to compose a spatial strategy.

57 Indeed, the workshops led to consider them as elements which are complementary of a whole spatial strategy of redevelopment but also implementable/incrementable in subsequent time-steps. In particular, the process identified as a trigger of the strategy the *driver 1* since it is the most consistent with the current local socio-economic potentiality. This is because it does not require heavy infrastructures and land-consumption, it enhances the environmental resources, preserves the landscape and boosts a sustainable use of the territory. The *driver 2* is considered implementable only after a long process of remediation of the current sterile soil. Finally, the *driver 3* could be feasible, once the area is revitalized, appropriately equipped for the research centres interested in the peculiarity of the area.

58 The three development drivers are held together by the core concept of the "landscape in motion" that metaphorically and physically unifies the whole regeneration strategy, enhancing a new reputation, prompting the landscape fruition and preparing the agricultural reconversion of the area.

59 In the second step, the result of the participatory process was further elaborated in a co-design workshop, with 70 students of two courses: the Planning in Historical Context studio (master's degree in architectural project and history, Politecnico di Milano, Mantova) and the Urban and Regional Policies course (master's degree in town and regional planning, University of Florence, Empoli). This workshop took place in October 2017, lasted four days. The students worked intensively to propose maps of the potential development drivers from the participatory process, producing studies and significant design syntheses. Thanks to the input from this intense fieldwork, students drew up nine original project proposals that led to the following stage of the project: the spatial strategy of the regeneration of Santa Barbara.

60 Actions of the activity 1 resulted in guidelines for a spatial project (subsequently developed by the team from the universities in the activity 2) with suggested actions.

Activity 2. A spatial strategy to give a reputation to a hidden area in Tuscany (Italy)

61 The spatial strategy was initially inspired by the experiences of the IBA Emscher Park (Rhur, Germany), the IBA Fürst-Pückler-Land (Lusazia, Germany) and the Stearns Quarry Park (Chicago, IL). Then, the project progressively diverged from those experiences and it assumed peculiar characteristics based on the local human and territorial resource promotion[17].

62 The trigger driver of the spatial strategy is based on the ex-mining site conversion into an international Competitive Cycling Hub offering a network of soft mobility, which connects the Hub to the territory and its territorial heritage, and offers a different kind of landscape fruition (leisure and sport services such as a velodrome, a bike plateau, lakes for fishing and sport activities, beaches and camping). Not secondly, the Hub is integrated into a landscape regeneration strategy founded on the idea of the "garden in motion[18]".

63 The spatial strategy is organised in five overlapping territorial systems called thematic clouds with a prevailing function. Cloud 1 is the System of the Off-road cycling activities, cloud 2 is the System of the "Landscape in Motion", cloud 3 is the System of the Urban Centralities, cloud 4 is the System of Wellness, and cloud 5 is the System of the Large Enclosures. Each System (or Cloud) is a reference to the strategies regarding its nature. Recently, according to an explicit request by ENEL, another cloud is currently under evaluation. This provides an intervention focused on green energies and related to the whole territory.

64 This strategy builds on the following aspects: the landscape features; the need to address a post-carbon sustainable project; the already-initiated activities of re-utilisation of the artificial nature on the site, such as the ones related to the lakes (see captions of Figs. 3.1 and 3.2). Mostly, it takes into account the commonly agreed vision about the future of the site, that is to embed Santa Barbara into the Tuscan tourist circuit, as a way to value the specificity of the landscape and provide a supply of sustainable tourism. Indeed, the spatial strategy suggests transforming Santa Barbara into an international cycling hub: a national and international node related to sport, landscape-oriented tourism and leisure practices, that seems to respond to crucial features to rebuild the reputation of this place.

65 This is possible because Santa Barbara is strategically located within the main cycling itineraries, both at the Italian and the European scale (*Sistema Nazionale delle Ciclovie Turistiche, Bicitalia and Eurovelo*) and even at the local scale (the Marzocchina and the Eroica historical cycling races). Moreover, the site potentially offers a unique supply of paths, tracks, places, functions, facilities and services for cyclo-tourism, for the numerous disciplines of competitive cycling (road cycling, gravel cycling, cycling on dirt roads, cyclocross, mountain biking and BMX) and for triathlons.

66 Finally, Santa Barbara presents the features to become the epicentre of a renewed bike economy that traces back to the long-lasting Tuscan and Italian cycling culture and innovates products, components and accessories on the field.

5. The inspirational core concept of the strategy: “landscape in motion” of Santa Barbara

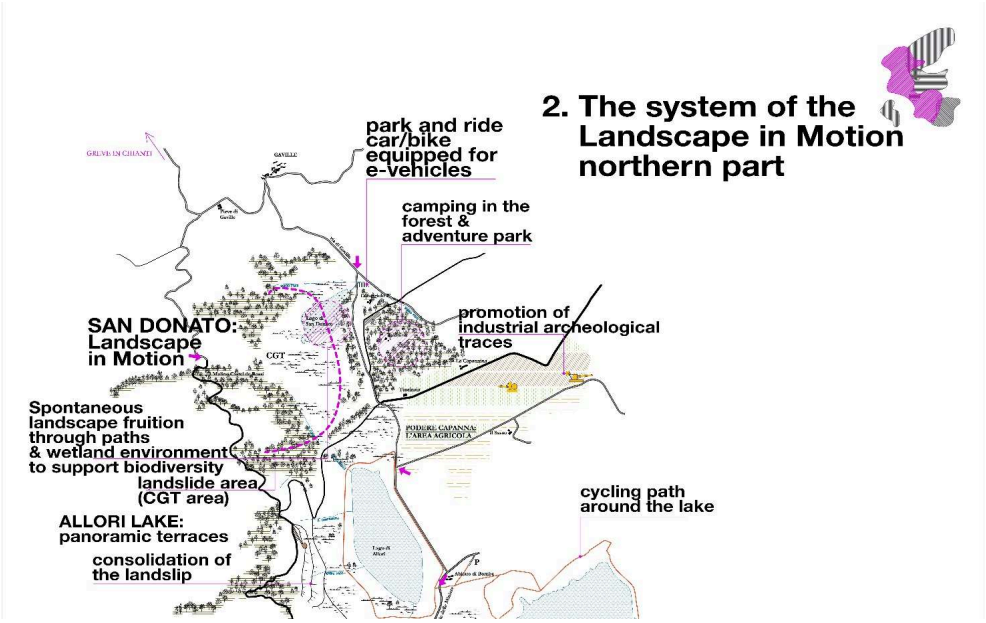
67 Crucial to the spatial strategy is the role of the landscape, and, specifically, of the “landscape in motion”, the core concept of the regeneration process of the area both in the metaphoric and in the physical sense.

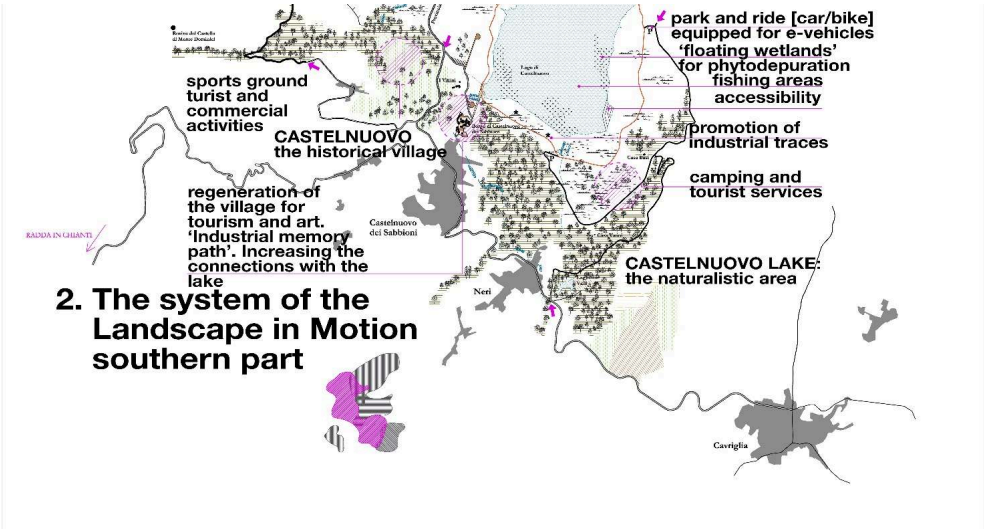
68 The concept is inspired to the idea of “garden in motion”, as defined by the landscape architect Gilles Clément[19], and rethought at the territorial scale (hence the neologism “landscape in motion”).

69 This concept is particularly well-suited to the Santa Barbara ex-mining site, in which the extraction of carbonite has made the ground “fragile”, in transition and still agriculturally unproductive. Therefore, the “motion” is to be meant both as an interpreted metaphoric figure of the site and a real chance to regenerate a sterile territory.

70 Starting from the idea of the “landscape in motion”, the project pursues the goal of creating a park of “pioneer” species. The basic idea is to maintain and preserve the historical and biological landscape, to follow the spontaneous movement of the plants and to develop the features of the site, trying to design as much as possible with nature. Nature is indeed regaining the land and produces a peculiar landscape that shows a high level of assonance signifying this idea of “motion”.

Figures 3.1 and 3.2. “Landscape in Motion” in Santa Barbara ex-mining site





Caption: "Landscape in Motion" in Santa Barbara ex-mining site (brilliant green, textured areas in the map). This is a system in constant transition. The project and its boundaries are fuzzy and resilient. Pioneer species, a core part of the Landscape in Motion System, cover a huge undefined area, whose boundaries depend on the development of the nature. The Landscape in Motion System is connected to the other interventions and areas of the whole project through a dense network of paths that, in specific places, constitutes the doors of the entire Santa Barbara ex-mining site. The north door (the nearest to Florence and Figline Valdarno) is the *Cyclo-tourist* Park, a vast area dedicated to cycling activities. It is connected to the rest through a system of paths and bicycle paths. In this area ENEL will plant new woods. In the central part of this System, the two central lakes and their shores are crucial for the biodiversity of this area. The Landscape in Motion embraces the lakes and unfolds on the hills. Along the lakes shores up to the San Cipriano Lake lies a Land-Art Park, a path enriched with artworks. The village of Castelnuovo dei Sabbioni, within the System of "Borghi" (Historical settlements) is a core of this area. Finally, in the south, near to Cavriglia, the Landscape in Motion represents the south door of the project. A network of paths ensures accessibility, from the Bellosguardo area (equipped with a golf club and airfield) to San Donato Lake. The project is divided in two parts (north and south) to improve the readability.

Source and Copyright: This map was elaborated with open data (Tuscany Region databases) by the Research Group (Giovanni Azzone, Alessandro Balducci, Chiara Geroldi, Antonella Bruzzese; Paolo Bozzuto, Valentino Galli, Gloria Pessina, Beatrice Maria Bellé, Camilla Perrone, Maddalena Rossi, Flavia Giallorenzo, Federico Magenes, Marika Arena, Paola Colzani). It is expressly translated in English by the authors of the paper.

71 The concept of a "landscape in motion" is, then, presented as an innovative landscape iconography that helps to build an alternative reputation – which is different and thus not in competition with the traditional Tuscan landscape – for this area compared to that of its neighbours' internationally renowned 'landscape brands' (as the already mentioned "Chiantishire"). Of course, the whole process of reputation building depends also on the development of the *three potential drivers*.

72 The spatial strategy comes with various risks: the project may be subject to a state of interruption, discontinuity or postponement of its implementation due to technical problems, a lack of funding, a lack of interest among potential investors, an absence of a real "political" commitment of the involved institutional actors and the occurrence of conflictual dynamics among the local communities. Then, one of the crucial points of the spatial strategy is its economic feasibility. According to the ENEL's intentions, the project will be implemented through private investments anticipated by some preliminary necessary interventions for the environmental recovery and the construction of part of the soft mobility network.

73 Thus, the spatial strategy has adopted an incremental rationale based on a time sequence of realising the transformation process of the area according to the criteria of

economic feasibility. This sequence is articulated in three time slots (called T0, T1 and T2). Each time slot constitutes a possible, steady, achievable step of the project, a territorial and practical configuration able to guarantee spatial assets and attractiveness. T0 provides the soft cyclo-mobility system for tourism, the "landscape in motion" implementation and the trigger of the site reputation through national events. To this end, artists are involved to start the regeneration of the site and inaugurate a "house of artists" in Castelnuovo dei Sabbioni (the main village of the historical settlement system). T1 provides the territorial regeneration through the redevelopment of the mining landscape into a landscape for the ordinary fruition and for a sustainable tourism. For example, the artificial mining lakes turn to be fishing and leisure-oriented lakes. Still unused large areas, mainly wastelands, host eco-sustainable camping and accommodation facilities. Castelnuovo dei Sabbioni, previously an abandoned mining village, turns to being an historic village which works as *presidium* of both the territorial heritage and a new sustainable tourism. T2 provides the velodrome and major infrastructures of the competitive cycling hub. Moreover, it checks the feasibility of agricultural activities and of research centres in the geology field, in cycling and green energy sector. The "landscape in motion" is reshaped in the three timeslots, according to the regeneration of the lands.

74 Finally, the device to present this strategy is a master plan conceived of as a complex instrument aimed at guiding a long-term transformation process, achievable through the creation of a dedicated agency for territorial development that may call private investors to realise single projects through competitive tendering procedures. The master plan gives a general framework for the several planning and managing measures that will involve the area over the next decade, including the expectations defined in a look towards the future.

Discussion and preliminary conclusions: The effectiveness of the process of post-mining territorial regeneration through the "landscape in motion"

75 The history of the mining industry has deeply marked the territory of the Santa Barbara site. Lignite mining has generated a multiplicity of anthropic configurations and has strongly altered the environment and the landscape. This kind of historical evolution brings the case object of this paper closer to the evolutionary processes of other important Italian and European mining basins[20].

76 The work on the spatial strategy of the territorial regeneration of Santa Barbara shows how a post-mining territory can start a transition phase towards a post-carbon re-territorialisation. This is addressed within the framework of the XXIst century post-carbon sustainability turn and in line with other international strategies for complex territorial system in transition which were previously integrated into urbanisation processes of extraction of value and resources, and that are now starting a post-mining transformation that covers spatial, economic, ecological and landscape dimensions.

77 Accordingly, this project/process of turning the post-mining site into a Cyclo-tourism and Competitive Cycling Hub that enhances natural, environmental resources and the territorial heritage, shows the repeatability of a sustainable regeneration approach of

similar post-mining territories in search of a new landscape and territorial reputation, based on promotion and investments on local resources.

78 In this particular case, the concept of "motion" has become crucial.

79 The "motion" of the lands has characterized the recent history of the transformation of the place, has changed its physiography, and will still change it in a short time. A "motion" that now belongs to the history of this place and has been considered part of the territorial heritage (as a result of the participatory process), and therefore included in the final project.

80 The "motion" was therefore taken as a strategy to rediscover the heritage of the place and its long-term resources within a frame of sustainable cycle-tourism that introduces the territory into an international circuit through the design of the cycling-hub. This is thought as an integrated and inherited part of the story of this territory and coherent with the other potential development drivers emerged from the local community which aren't feasible today but will be possibly implemented in future.

81 Moreover, this process indicates how the landscape and its local features, in this case reflected in the propensity of nature to reclaim the lands, can play a fundamental role contributing to discovering the multiple ways of regeneration of the local territory.

82 All in all, the project reveals four strengths and one consistent weakness. The strengths includes:1) the participatory-driven methodology – an aspect that greatly distinguishes the Santa Barbara ex-mining site from other similar cases, such as the experience of the regeneration of the Mansfelder Land (Germany) landscape or the case of the Bassin Miniere in the Nord-pas-de-Calais Region (France)[21]; 2) the "motion" as inspiring and guiding concept for the entire regeneration process that pivoted on the idea of "landscape in motion" as the key to interpreting the past, the present, and the future propensity to a sustainable change of the place; 3) the double role of the ENEL company, which acts both as an agent of exploitation of natural non-renewable resources and the irreversible alteration of the historical landscape of Santa Barbara, and, at the same time, as a driver of the regeneration process of the site. This double role played by the company, that is promoting the new development process of this site in cooperation with the local community for the creation of shared territorial value, shows a sort of "territorial responsibility" of the company. However, it is important to note that ENEL has provided its assets to coordinate a process of negotiation of local and supranational interests through complex mediation between public and private actors and different institutional frameworks; 4) the exemplary role of the strategy with reference to territorial/landscape regeneration projects in particular kind of "in-between" territories, such as Valdarno Superiore, that ask for merging of complex and multiple aspects at the regional scale. This opens a core reflection on industries' territorial responsibilities[22], as in the case of ENEL; a debate still open and that needs further exploration.

83 The weakness of the project is related to its economic feasibility. Even though the two universities involved have tried to cope with this weakness by adopting an incremental rationale for the implementation of the spatial strategy, it is not granted that the entire project will be realised. It might be useful to activate a dedicated (public/private) agency for the territorial development as a strategic actor that may guide the transformation process, inspired by the IBA Emscher Park (Rhur, Germany). All in all, the case study opens several future reflection paths on post-mining landscapes considering methods to involve the local communities in the design process,

considering new relationships between the private and the public sphere, and new ways of using endogenous resources as instruments for creating futures.

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15. Suffice it to say that the land area of the Santa Barbara ex-mining site is larger than the sum of all the other power plants areas included in the Futur-e Project. See the ENEL Company website: https://corporate.enel.it/en/futur-e, accessed on [10/11/2019]

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19. As said above, the concept of the "garden in motion" was introduced by the French landscape architect Gilles Clément (Clément, 1991), who tested its studies and theories in the Vallé territories in France. Clément revolutionised the classical idea of the garden, exploring the '*friche* ', or that which is overgrown. This started a long research experience focussed on uncultivated spaces, beside roads, in abandoned or crummy areas where nature reclaims deteriorated building spaces (Clément, 2005). Among the major experiments of this poetic French landscape architect are the Park André Citroen in the ex-factory Citroen in Paris, the Park Henri Matisse in Lille and the Park Living Art (Arte Vivente) in Torino (Fogassi, 2015). Clément created these gardens in abandoned places, where nature had already reclaimed spaces, transforming them into a 'third landscape' (Clément, 2005). The projects are based on a selection of a variety of vegetal species that can survive in sterile soils, as the terrain on which the architect is called to intervene. In these cases, human intervention is marginal and aimed at preferring biodiversity (Clemént, 1994).

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ABSTRACTS

Post-mining territories constitute a structural component of contemporary urbanisation processes. They are often located in post-urban areas and create new landscapes of abandonment.

Sometimes they are stigmatised as landscapes characterised by unsustainable development, and are therefore seen as an obstacle in the transition to a post-carbon society.

This paper contributes to the debate surrounding this question and shows a tentative approach to the reparation of post-mining territories through a (designed) strategy that rebuilds the

territorial, landscape and social reputation of a site called Santa Barbara, that has been exploited by ENEL (*Ente Nazionale per l'Energia Elettrica* – National Agency for Electric Energy), an Italian multinational energy company, for almost 50 years.
Santa Barbara is located in a hidden area of central Tuscany, Italy, in the upper Arno Valley (Valdarno Superiore). It finds itself *in-between* several renowned branded landscapes, such as Chianti (or *Chiantishire* as named by British citizens who began coming to this area for holidays in the late 20th Century), the small city of San Giovanni Valdarno and other prestigious Tuscan landscapes. This area is profoundly intertwined with the urbanisation processes of the greater metropolitan area of Florence, while simultaneously being a mono-functional territory that is not visibly urbanised. Today, this territory is characterised by a peculiar landscape that seems to be dominated by the 'motion' of land. Hills, paths and trajectories of use, which have been changing over the past decades and even in recent years, have inspired the reparation strategy for the landscape. Crucial to this strategy is the role played by ENEL, the company responsible for the deterritorialisation of this site and that launched the 'Future-e Project' in 2017. This project promoted a process aimed at creating a vision for the future of the Santa Barbara ex-mining site alongside local communities (institutions, local economic actors, etc.) and inhabitants. The project, already underway, has also involved the *Politecnico di Milano* and the *Università degli Studi di Firenze*, both called in to assist in analysing the case study.
In short, the paper portrays the socio-territorial evolution of the Santa Barbara ex-mining site and describes a strategy for territorial regeneration aimed at revisiting the past, sharing the present and building the future with a propensity towards renewable energy sources. Central to this strategy is the landscape, which fuels a social, economic, spatial and narrative shift that allows for sustainable and solar energy-driven territorial regeneration. In doing this, the paper investigates the crucial cooperative interplay among a private company (ENEL) and the local community, public actors (the municipalities) and the universities involved in the design of the post-carbon future of this site.

Les territoires post-miniers constituent une composante structurelle des processus d'urbanisation contemporains. Souvent, ils sont situés dans des zones 'post-urbaines', et créent de nouveaux paysages d'abandon. Parfois, ils sont stigmatisés comme des paysages qui témoignent d'un développement insoutenable et donc d'un obstacle à la transition vers une société 'post-carbone'.
Ce document contribue au débat sur cette question et montre une approche pour la réparation des territoires post-miniers par une stratégie (conçue) qui reconstruit le territoire, le paysage et la réputation sociale d'un site, qui est exploitée par l'Enel (une multinationale italienne de l'énergie) depuis près de 50 ans.
Ce site, appelé Santa Barbara, est situé dans une zone cachée de la Toscana centrale (Italie), dans la haute vallée de l'Arno (Valdarno Superiore), entre les paysages de marque très connus tels Chianti (ou Chiantishire comme nommé par les citoyens britanniques qui se sont déplacés dans cette région pour passer des vacances à la fin du 20ème siècle), la petite ville de San Giovanni Valdarno et d'autres paysages toscans prestigieux.
Cette zone est profondément liée aux processus d'urbanisation de la grande métropole de Florence, étant en même temps un territoire mono-fonctionnel non visiblement urbanisé. Aujourd'hui, ce territoire est caractérisé par un paysage particulier, qui semble être dominé par le « mouvement » des terres. Les collines, les chemins et les trajectoires d'utilisation ont changé au cours des dernières décennies et même au cours des dernières années, qui ont même inspiré la stratégie de réparation du paysage.
Crucial pour cette stratégie est le rôle joué par l'entreprise qui est responsable de la déterritorialisation de ce site et qui en 2017 a lancé le « Futur-e Projet». Ce projet a favorisé un processus visant à créer une vision pour l'avenir de l'ex-site minier de Santa Barbara, avec des

communautés locales (institutions, acteurs économiques locaux, etc.) et des habitants. Le projet a également impliqué l'École polytechnique de Milan et l'Université de Florence, dont la perspective est privilégiée dans l'analyse de l'étude de cas.
L'article retrace l'évolution socio-territoriale de l'ancien site minier de Santa Barbara et décrit une stratégie de régénération territoriale visant à revisiter le passé, partager le présent et construire l'avenir. Au cœur de cette stratégie se trouve le paysage qui devient un moteur social, économique, spatial et narratif de la régénération territoriale.
Pour ce faire, le document examine l'interaction coopérative cruciale entre l'entreprise privée (ENEL) et la communauté locale, l'acteur public (les municipalités) et les universités impliquées dans la conception de l'post-avenir carbone de ce site.

INDEX

Keywords: Landscape, Regeneration, Inter-Institutional Partnership, Local Community, Planetary Garden
Mots-clés: Territoire, Régénération, Partenariat interinstitutionnel, Communauté locale, Jardin lanétaire

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