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Co-productive Energy Landscape Project: Borgo Monteruga

**Elena Vigliocco (1), Paolo Mellano (2),
Elena Guidetti (3), Riccardo Ronzani (4)**

Abstract

Assuming that an agricultural landscape is an energetic solar landscape, the article describes the premises and the strategy for the regeneration of Borgo Monteruga in Salento, a region known in ancient times for producing lamp oil. After becoming an agricultural site dedicated exclusively to oil production for food purposes, it is now wholly unproductive due to the spread of *Xylella Fastidiosa*. The absence of unequivocal legislation on agrivoltaics and the need to identify a productive layout that could reactivate and renew the site led the owner to appoint a third-party research institution to determine the most appropriate strategy for the economic regeneration of this non-productive landscape. The method proposed for pursuing the design of a new multifunctional landscape is grounded in the historical reading of the landscape. The visual essay consists of a timeline divided into four sections corresponding to four landscapes. Each section describes how the changing demand for energy, local and supralocal, has modified the actions imprinted on this solar landscape. The last section presents the project scenario reconciling two energy landscapes perceived as inconsistent into a co-productive energy landscape, assuming the historical analysis as design support.

Affiliation:

(1), (2), (3), (4)
Politecnico di
Torino, Department
of Architecture and
Design / FULL -
Future Urban
Legacy Lab

Contacts:

(1) elena [dot]
vigliocco [at] polito
[dot] it
(2) paolo [dot]
mellano [at] polito
[dot] it
(3) elena [dot]
guidetti [at] polito
[dot] it
(4) riccardo [dot]
ronzani [at] polito
[dot] it

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Introduction

In 2004, fossil fuels supplied 86.5% of the global energy consumption, which amounted to 15,000 TWh (Jefferson, 2005). In 2019, global energy consumption increased by 16% in fifteen years (Degl’Innocenti, 2020). The latest report from the International Energy Agency (2021) estimates that energy consumption will rise again by around 20% in 2020-2050¹. The increase in consumption would not be a problem if it were not the leading cause of global warming. To achieve net zero emissions by 2050, the widespread use of available technologies that use renewable sources is necessary to implement the energy transition.

Among renewable sources, solar radiation is the primary energy source for life through photosynthesis (Smil, 2022). If in acquiring societies, the food, the energy that man needs in terms of caloric needs, was collected, and obtained from wild nature, the introduction of agriculture opens up new demographic opportunities. Agriculture is the first form of extensive domestication of nature, which aims to increase the production of food – energy – for human beings. An agricultural landscape is, therefore, by definition, an energy landscape.

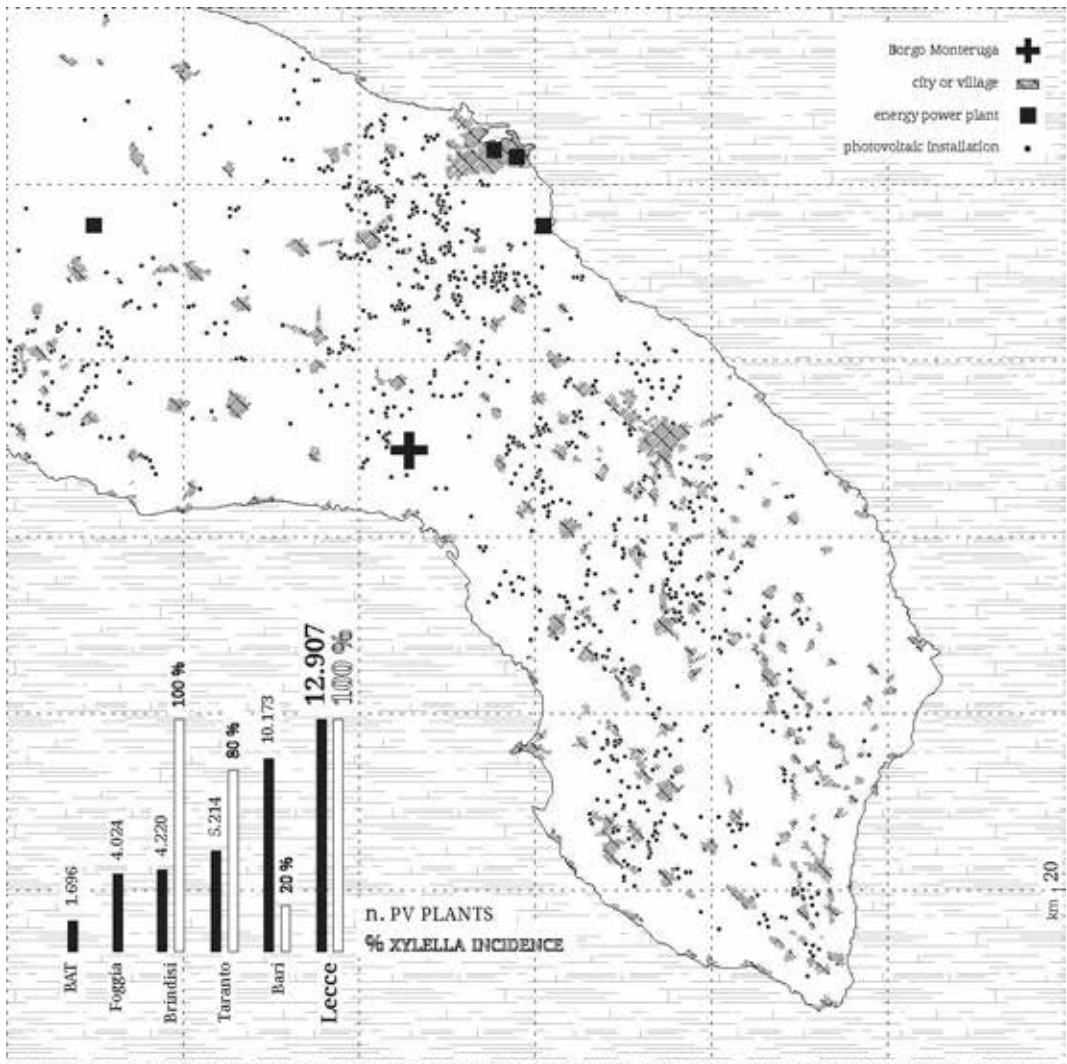
Assuming the landscape as “an area, as perceived by people, whose character is the result of the action and interaction of natural and human factors” (Council of Europe, 2000), disclosing the story of a landscape means unveiling the story of economies that produced that landscape and how those economies have modified it over time.

Conflicting solar landscapes

“Not In My Backyard” (NIMBY) indicates the slogan that is often used in protests against works considered to have a negative and relevant impact to be carried out in an area that is perceived as close to the daily interests of those protesting (Carley et al., 2020). In Italy, these complaints involve the debate on large ground-mounted solar parks (Roccatò, Mannarini, 2012). The main criticism against these plants is that, by replacing agricultural production with devices for electricity production, the historical image of the Italian agricultural landscape (Sereni, 1961) would be corrupted. The effect of this ideological resistance determined that in 2022, only 1% of large ground-mounted photovoltaic systems were authorized (Legambiente, 2023).

Who plans the planning?

In 2021, a private agricultural company specializing in the production of olive oil purchased the Monteruga property in Salento, a region where lamp oil was produced in ancient times. The intention is to reactivate the economy of this area whose agricultural production has stalled due to *Xylella Fastidiosa*. The need to plant more than 100,000 olive trees, which will only come into production after five to eight years, makes it necessary to introduce a second production capable of making the operation economically sustainable. Thus, the agricultural company imagines combining olive growing with the production of electricity from solar sources. Identifying a productive layout that could revive the site, without distorting it, led the company to turn to the Politecnico di Torino. The



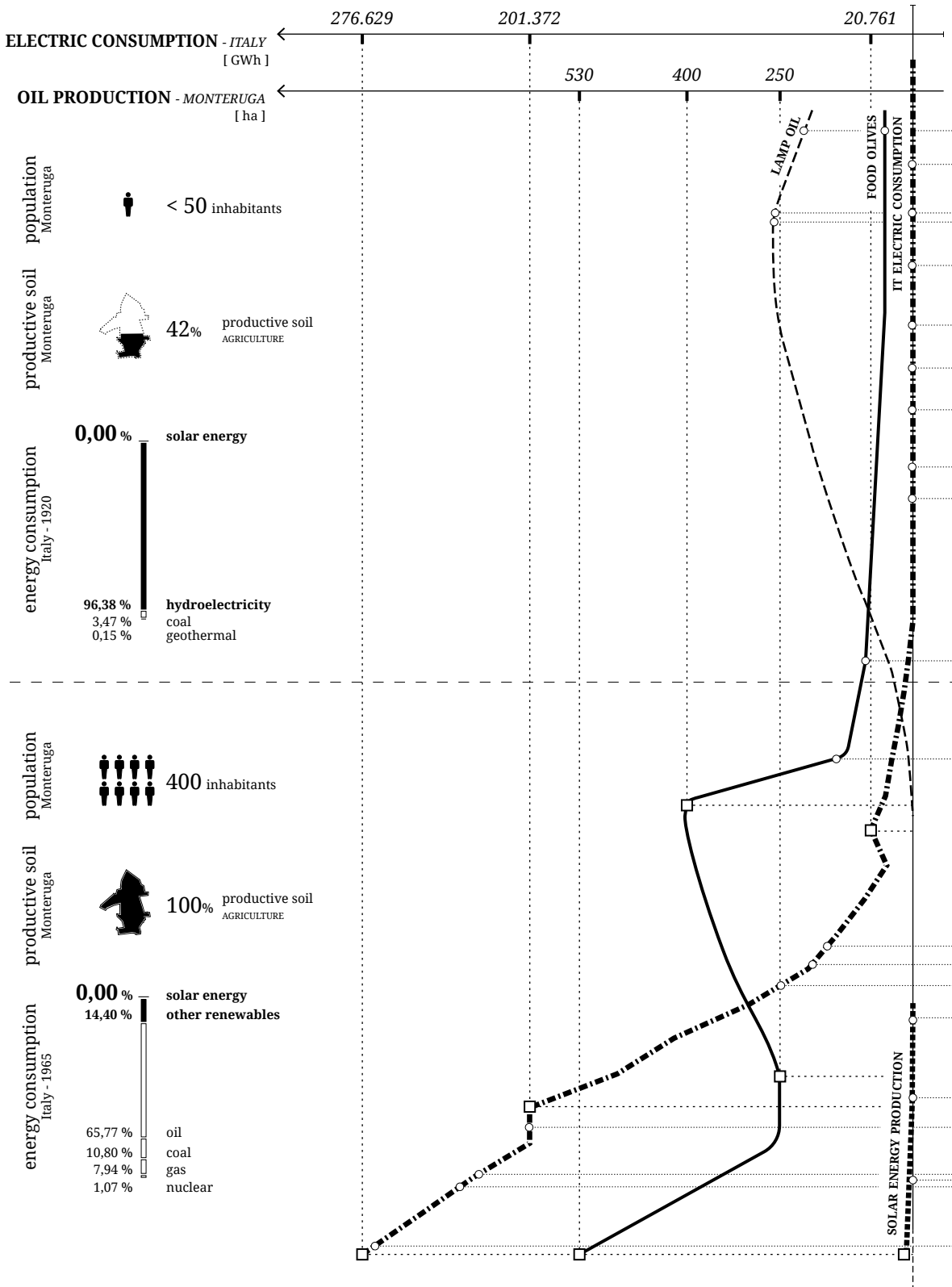
historical reading of the landscape, which highlighted the material and immaterial components and put in evidence the site's characters, made it possible to design a co-productive energy landscape that alternates food and electricity production at variable densities.

Reading notes

The paper presents the logical construction of the installation strategy of the new agrivoltaic system in Monteruga. The project aims to build a unique alliance between two kinds of energy derived from the sun. The outcome is a new energy solar landscape. The process is based on examining the transformations carried out on this solar landscape by the generations that have succeeded one another and have modified it opportunistically. Four historical sections organize the reading thanks to the maps repository listed at the chapter's end.

Fig. 1 - Location of Monteruga within the Salento context (Apulia Region, Italy).

Fig. 2 - Timeline describing the interaction between events, changes in energy demand, and energy production from solar renewable sources at the local and supra-local scales (1800-2000) [Following pages].



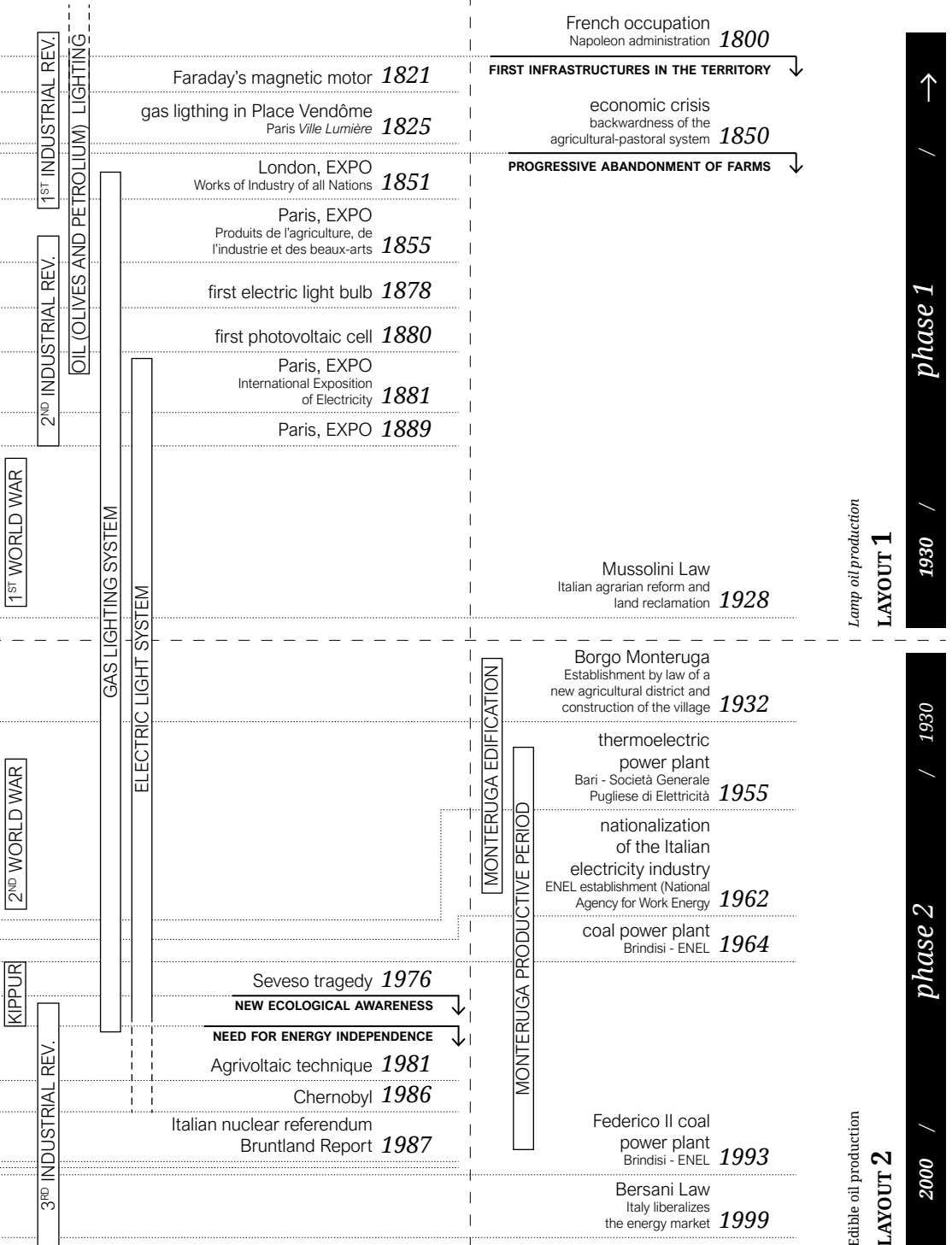
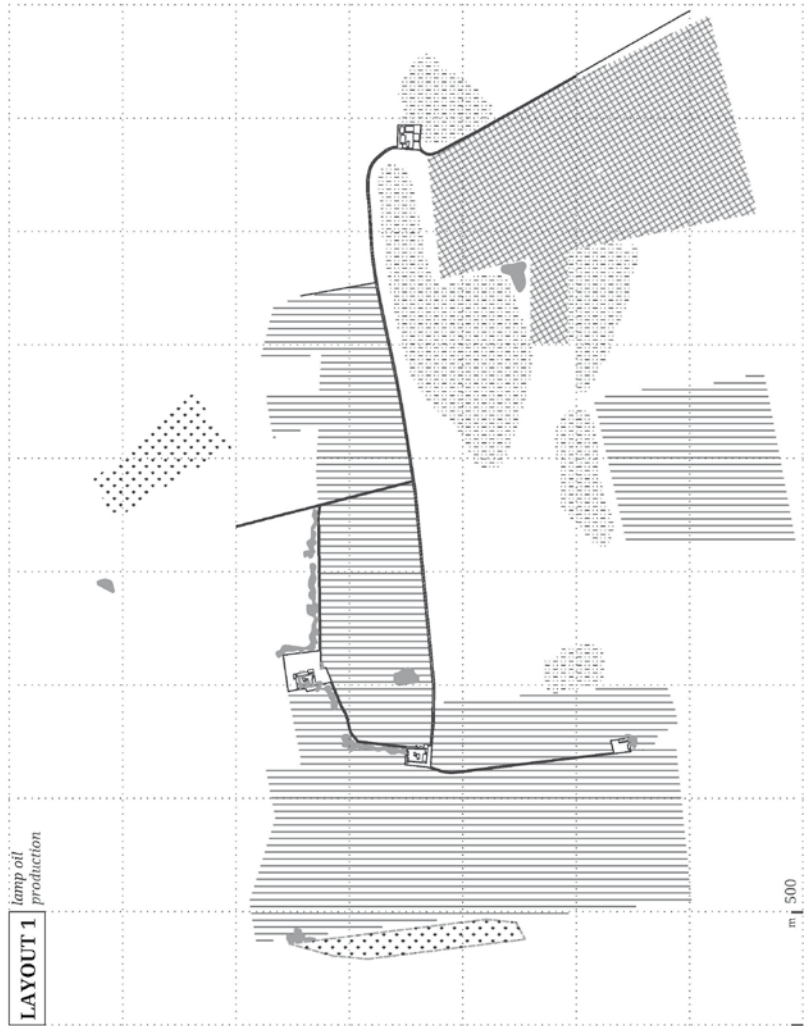
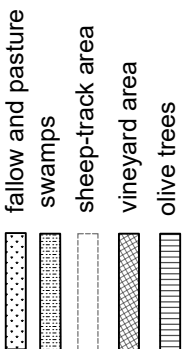


Fig. 3 - Monteruga region before the 1928's agrarian reform.



LAYOUT 1: Solar landscape 1 - Lamp oil production

The territory is predominantly calcareous characterized by bushy pastures, scrubland, and swamps. There are extensive marshy areas, which make the place unattractive to human settlement. There are four agricultural farms. Economic activities are linked to agriculture and pastoralism. The olive groves produce olives whose refining produces poor quality oil used as fuel for lighting oil lamps. According to Giovanni Presta (D'Astore, 2001), already in the 18th century, 90% of the oil exported from Puglia was lamp oil purchased especially from foreign states for lighting, wool processing, and making soap. The other 10% was exported to other Italian states for food.



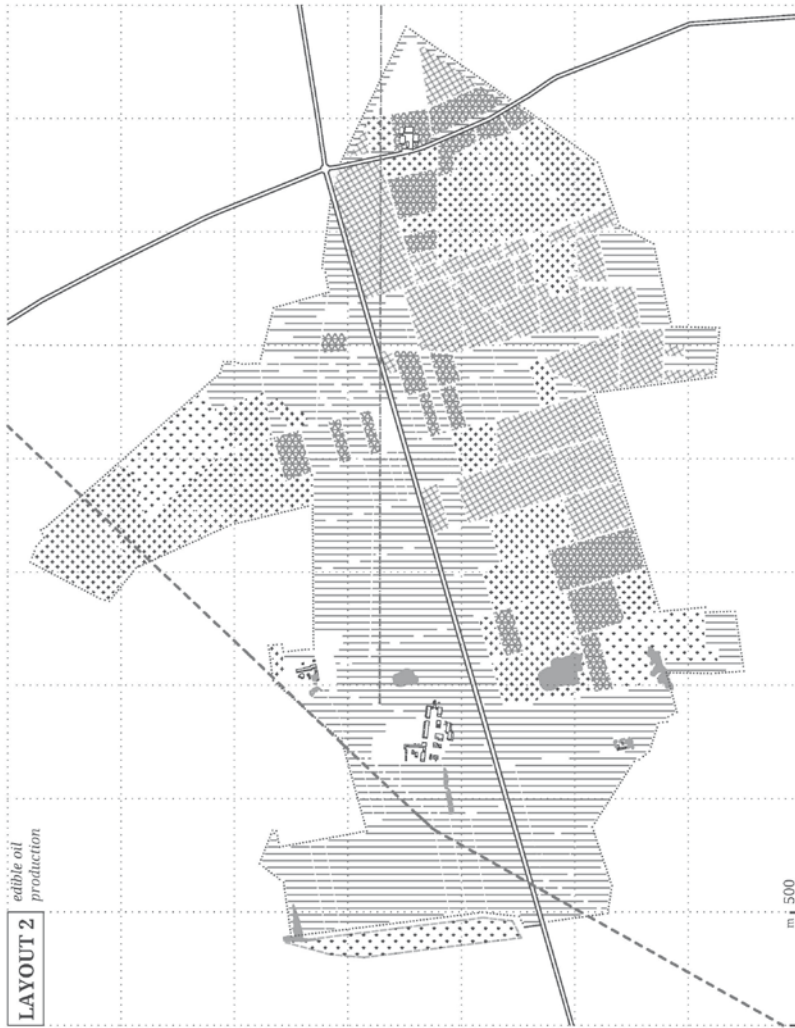
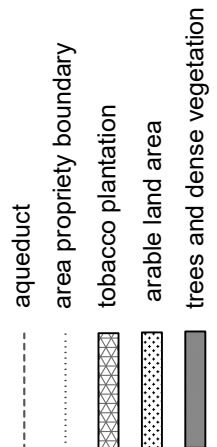


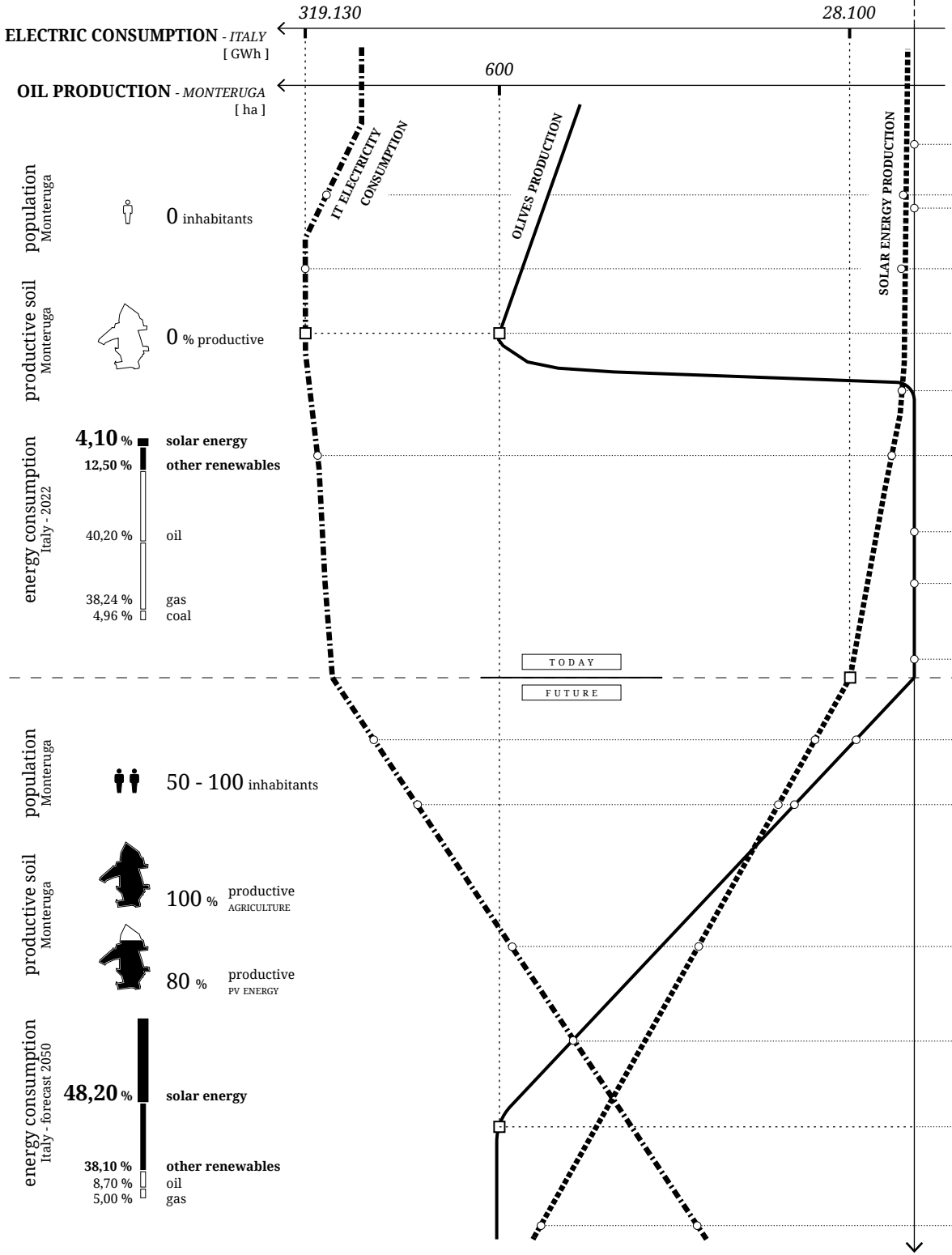
Fig. 4 - Monteruga region after the agrarian reform.

Fig. 5 - Timeline describing the interaction between events, changes in energy demand, and energy production from solar renewable sources at the local and supra-local scales (2000-2050) [Following pages].

LAYOUT 2: Solar landscape 2 - Edible oil production

Starting from the end of the 19th century, the new Italian government gave a new impetus to public works by commissioning investigations on marshy and unhealthy territories. Subsequently, the fascist era recognized land reclamation as crucial in encouraging agricultural production as a strategic asset for Italy. The fascist regime encouraged land reclamation and reorganization and, with the agrarian reform, expropriated the large estates. Fourteen rural villages have been created in Puglia. Borgo Monteruga is one of them and is made of approximately 900 hectares of farmland. The farm located in the lower half is expanded by building new infrastructures and farmhouses. At the same time, land reclamation increases the quality of olive oil production, and the reconversion begins: progressive electrification requires adapting to new market demands.





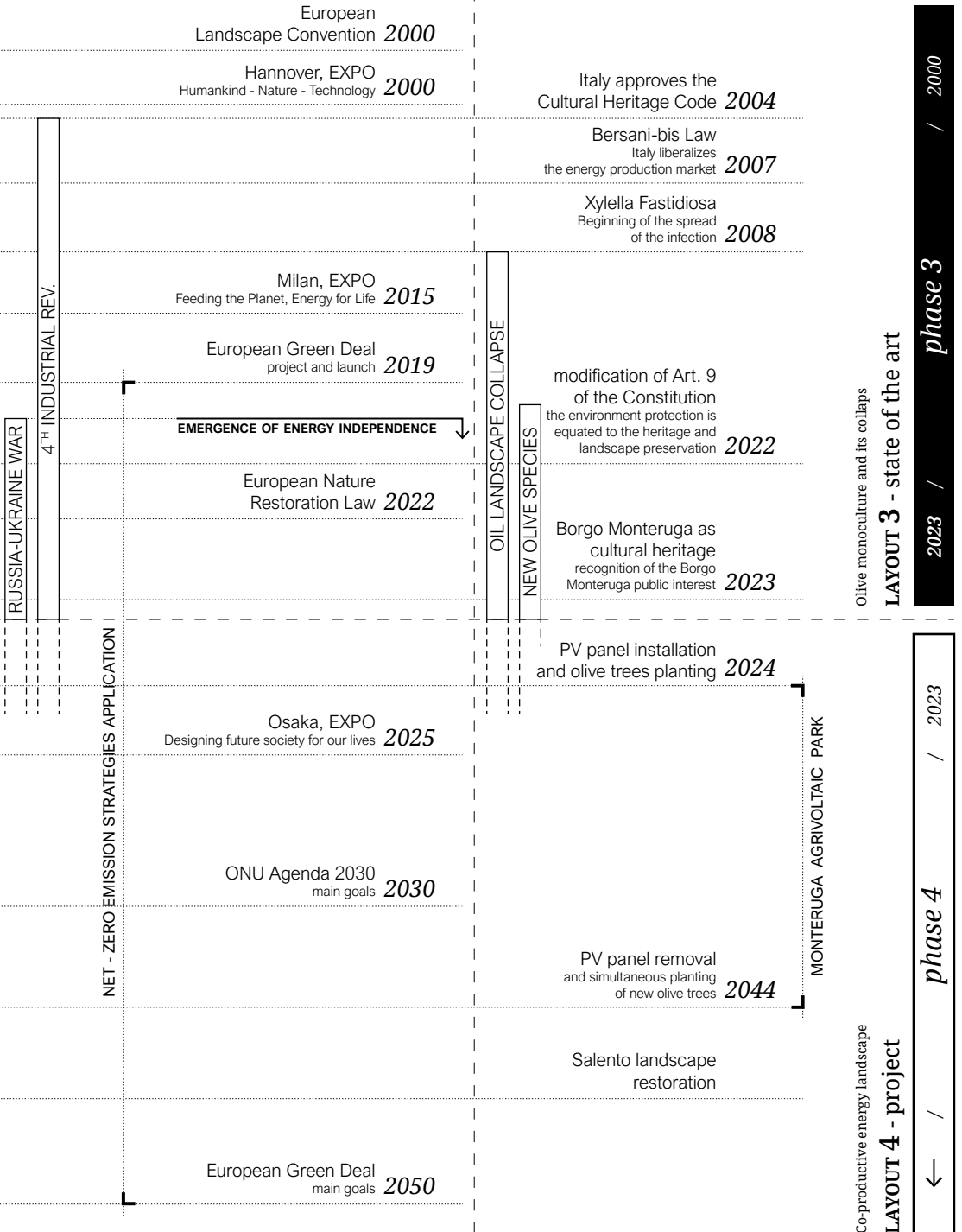
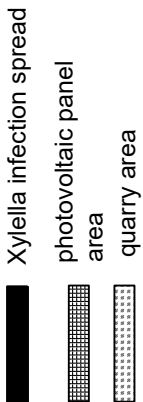


Fig. 6 - Monteruga region after the spread of *Xylella fastidiosa*.



LAYOUT 3: Solar landscape 3 - Olive monoculture and its collapse

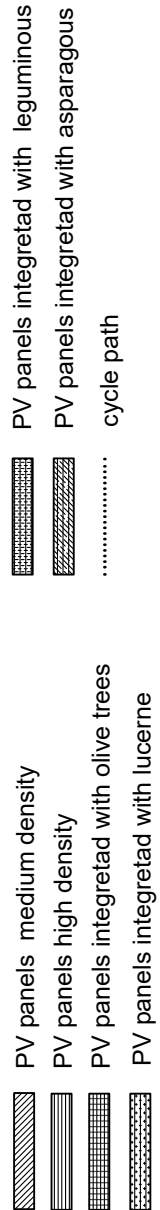
The increase in the planting of olive trees is directly proportional to the rise in demand for olive oil for food purposes. The isolation of the village and the changes in the lifestyle of Italians in the 60s and 70s led to the progressive abandonment of the agricultural center as a residence. In the 80s, the area was privatized and acquired by SEBI. The last inhabitants have moved away. At the beginning of the 2000s, many agricultural productions were eliminated by the monoculture of the olive tree. However, the spread of *Xylella fastidiosa* causes it to stop. The trees that inhabit the area die and must be eradicated. Added to the abandonment of the village is the abandonment of the agricultural production area. In 2023, the unused agricultural surface is 100% of the property.



LAYOUT 4: Solar landscape 4 - Co-productive energy landscape

The main difficulty in designing an area of approximately 900 hectares consists in imagining in a synchronic way what is generally the result of a diachronic process. Opportunistically, the settlement strategy of the new agricultural and photovoltaic system increases the opportunities offered by solar radiation, giving rise to a new solar landscape that intercepts two productions of energy: food and electricity. After examining the Monteruga landscape's consistencies, the redesign proposes a non-homogeneous and monotonous landscape. For this reason, the proposal develops a layout with variable densities in which alternating rows of olive trees and trackers produce a symbiotic solar landscape

Fig. 7 - The project for a new enhanced and co-productive energy landscape.



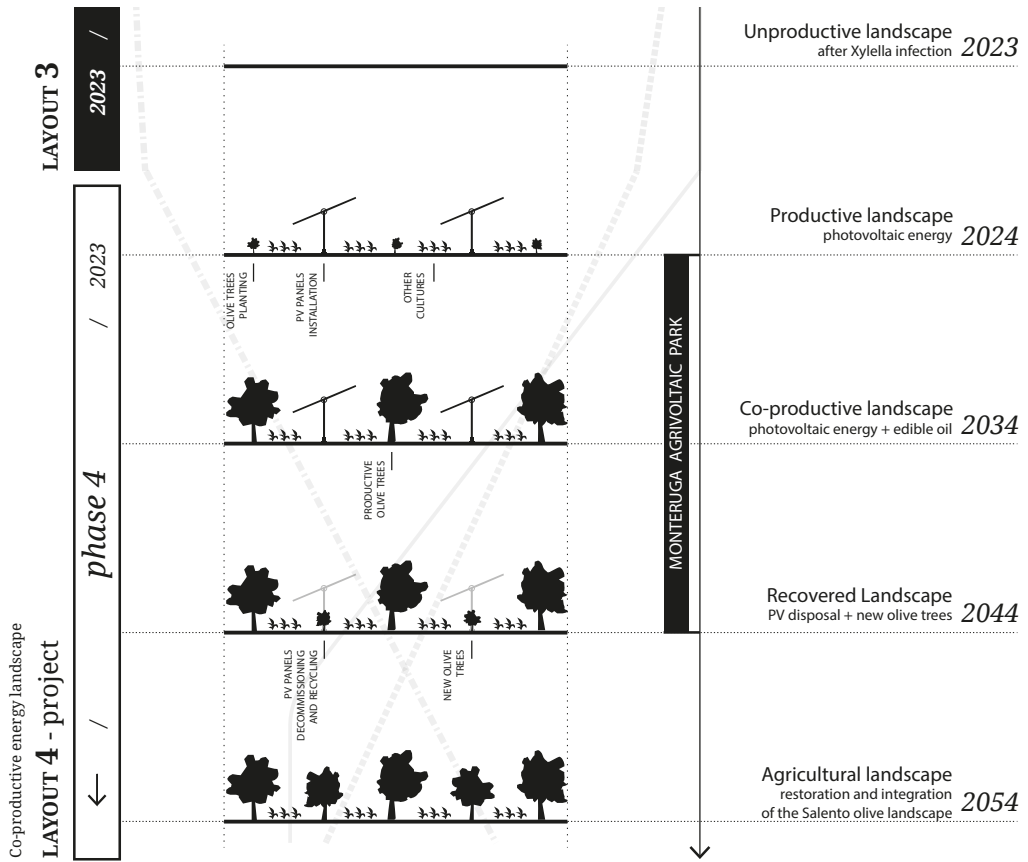
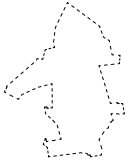


Fig. 8 - Restoring process of the Salento agricultural landscape through a phase of co-productive energy landscape. The dismantling of photovoltaic panels at the end of their life corresponds with the planting of new olive trees.

Conclusion

Despite the definition (Europe Council, 2000), the landscape has always been the victim of hard-to-die simplifications. In practice, the landscape project is reduced to *landscaping* (Folléa, 2019), corresponding to beautifying technological infrastructures you do not want to see by planting trees. Today, faced with an indispensable energy transition, we must imagine new project strategies for energy landscapes that have a specific impact, but which allow us, in a medium-long time (equal to almost the two decades it took from Xylella to annihilate the economy), to restore life, economy, image and meaning to this critical portion of Salento. Starting from a landscape diachronic analysis, the study unveils unexpected characteristics and not exploited potentialities of the site on which grounding the design of a new solar landscape. Because the landscape is not a static concept, this experience assumes that the historical evolution of the landscape must be at the center of every energy transition project. Only by achieving a correct awareness of the landscape under examination can the design strategies find the point of balance between preservation and innovation requests.



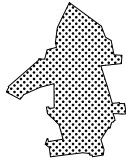
LAYOUT 1

1 - Provincia di terra d'Otranto già delineata da Magini e nuovamente ampliata in ogni sua parte secondo lo stato presente. *Data in luce da Domenico De Rossi, 1714.* Archivio I.G.M. Firenze, 21. B-6, n. 517.

2 - Oria, Lecce. Otranto del cartografo Giovanni Antonio Bartolomeo Rizzi Zannoni, 1808. Map published in <https://www.davidrumsey.com/>.

3 - "La Descrizione del Regno delle Due Sicilie" - di Benedetto MARZOLLA (Napoli 1851), 1851. Map published in <https://belsalento.altervista.org/>

4 - Benedetto Marzolla, *Carta dei prodotti alimentari delle Provincie Continentali del Regno delle Due Sicilie*," 1856. Map published in <https://belsalento.altervista.org/>.



LAYOUT 2

1 - Planimetria Bonifica di Arneo 1:100.000 (1930). ASL Lecce, Genio Civile, folder 145, dossier 817.

2 - Masseria Monteruga. Mappa catastale 1:4000, 1927. Map published in Mainardi, M. (1997), *La modernizzazione rurale a Veglie e in Arnèo negli anni Venti e Trenta*, Manduria, p.40.

3 - Progetto costruzione strada Monteruga-Cerfeta per Veglie del 7 maggio 1932 redatto da ing. C. Castrignanò. *Scala 1:2000.* Archivio di Stato di Lecce, Genio Civile, Titolo XIII, folder 145, dossier 817.

4 - Planimetria del 1934 con descrizione delle zone con ristagni di acque. Archivio di Stato di Bari. Ministero dell'Agricoltura e delle Foreste, Ispettorato Compartmentale Agrario, folder 215, dossier 11.

5 - Plan attached to the 1940 report with description of the land purchased by SEBI. Archivio di Stato di Bari. Ministero dell'Agricoltura e delle Foreste, Ispettorato Compartmentale Agrario, folder 215, dossier 14.

6 - Terreni dell'Azienda Monteruga negli anni Settanta. Map published in Diso, A. (2013), *Monteruga. Frammenti di memoria*, Monteroni.

7 - Lottizzazione degli anni Cinquanta. Map published in Mainardi, M. (1994), *Trasformazioni del paesaggio e habitat rurale in un'area salentina negli anni Venti e Cinquanta del Novecento: il caso Arneo.* In *Annali del Dipartimento di Scienze Storiche Geografiche e Sociali dell'Università degli Studi di Lecce*, VIII 1991-1992, Manduria, p. 375.

8 - Planimetria del 1940 con descrizione della destinazione d'uso dei terreni acquistati dalla SEBI. Archivio di Stato di Bari. Ministero dell'Agricoltura e delle foreste, Ispettorato Compartmentale Agrario, folder 215, dossier 14.

9 - Planimetria del 1955 con descrizione della destinazione d'uso dei terreni acquistati dalla SEBI. Archivio di Stato di Bari. Ministero dell'Agricoltura e delle foreste, Ispettorato Compartmentale Agrario, folder 953, dossier 1.

10 - Planimetria del 1968 con descrizione della destinazione d'uso dei terreni acquistati dalla SEBI. Archivio di Stato di Bari. Ministero dell'Agricoltura e delle foreste, Ispettorato Compartmentale Agrario, Progetto di trasformazione fondiario agrario. folder 1375, dossier B/4111.



LAYOUT 3

1 - 2023, current layout. The visual survey of the site took place in two stages: May and September 2023.



LAYOUT 4

1 - Co-productive solar energy landscape. The project map includes the constraints imposed by current legislation regarding preserving cultural heritage and landscape.

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Maps repository

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