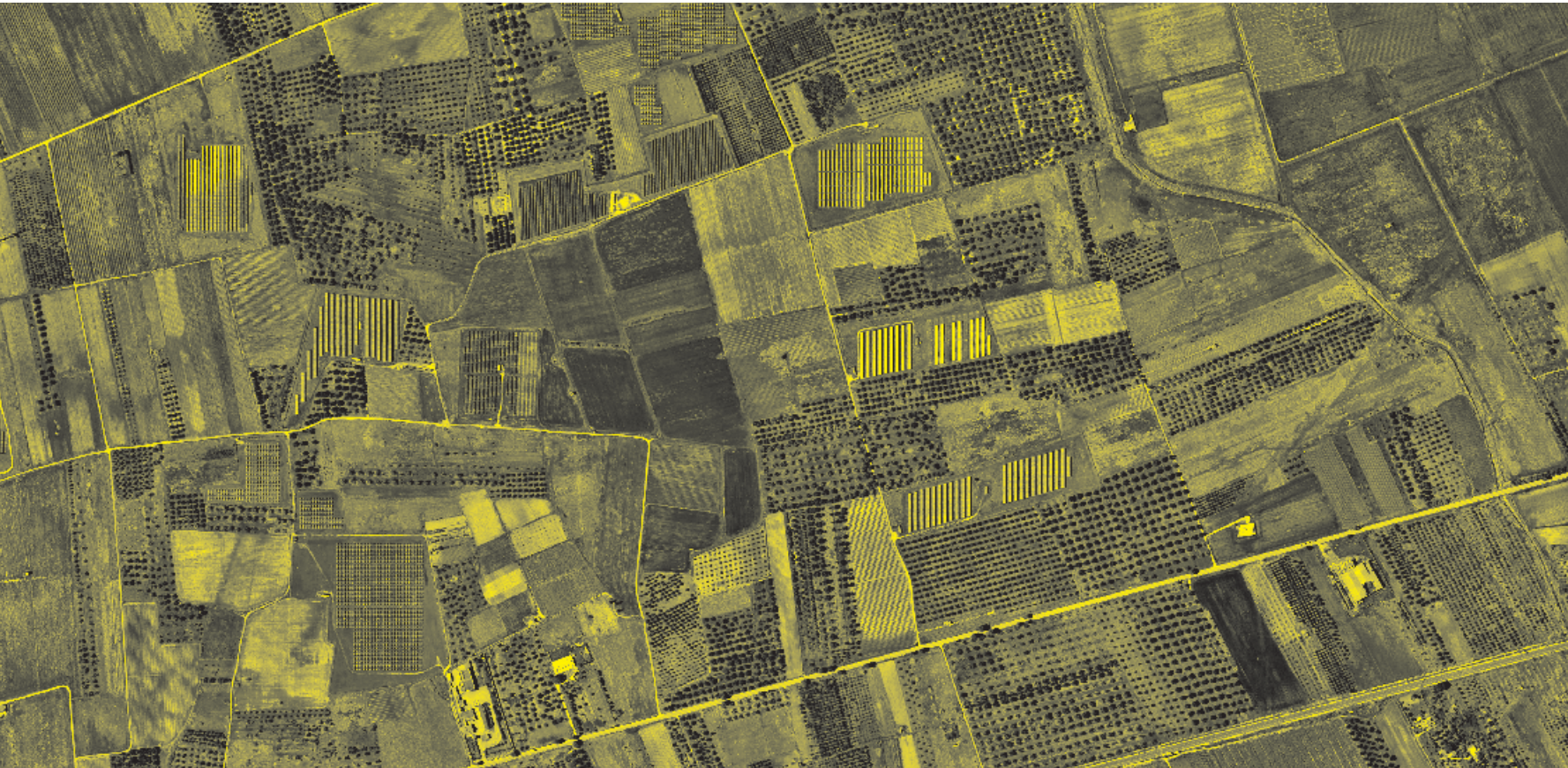
DESIGNING FORMS FOR FUTURE SOLARSCAPES

A VISION FOR THE ITALIAN PALIMPSEST

EDITED BY
ELENA VIGLIOCCO



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This study was carried out within the *Next generation solar landscapes. Methods and tools for the design of new generation solar landscapes: the renewal of photovoltaic fields at the end of life project* – funded by European Union – Next Generation EU within the PRIN 2022 program (D.D. 104 - 02/02/2022 Ministero dell'Università e della Ricerca). This manuscript reflects only the authors' views and opinions and the Ministry cannot be considered responsible for them.

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LetteraVentidue

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NEW PERSPECTIVES

INSIGHT

FOREWORD

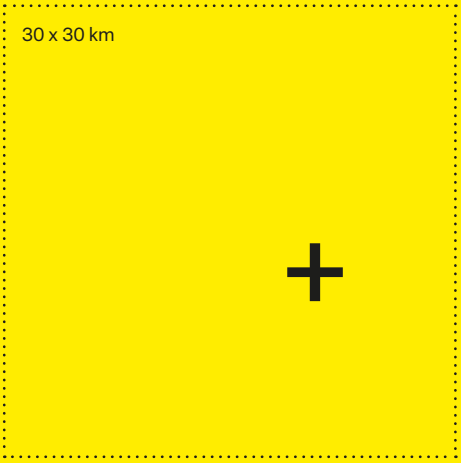
ELENA VIGLIOCCO

October 2025

This book is the primary outcome of the research MUR program PRIN2022 *Next Genetarion Solar Landscapes. Method and Tools for next generation solar landscape design: the renewal of photovoltaic fields at the end of life*.
The main goal of the research was to promote new knowledge about the reuse and redesign – decommissioning and revamping – of photovoltaic fields at the end of life. The study assumed that reusing and redesigning these photovoltaic fields can be essential in constructing a new energy policy and renovating the landscape culture. The research intended to identify innovative interpretative methods that, through the optimisation of land use, can decrease the degraded and unused areas. In particular, the study has investigated the opportunities offered by the reuse and redesign of photovoltaic fields to develop new settlement models which can mend impoverished and fragmented landscapes and provide the partial recovery of agricultural productions. Since photovoltaic fields are spread across many Italian regions, the research project aimed to foster the identification of shared knowledge and landscape development strategies.
The research team consisted of three research units with distinct characteristics. The first research unit, composed of Elena Guidetti, Roberta Ingaramo, Simone Parola, Matteo Robiglio, Riccardo Ronzani, Ilaria Tonti, Elena Vigliocco (Principal Investigator and Reseach Unit Coordinator), with the contribution of Marco Cappellazzo and Antonia Spanò (LabG4CH), from Politecnico di Torino,

examined the architectural impacts of photovoltaic fields and identified morphological strategies to re-evaluate the relationship between solar fields design and landscape design. The second research unit, composed of Simone Baccaglini, Morris Brenna, Giulia Cazzaniga, Sara Anna Sapone, and Sara Protasoni (Research Unit Coordinator), with the contribution of Marco Agosti, from Politecnico di Milano, grounded in landscape research, focused on processes that have transformed the landscape to highlight new opportunities for decommissioning and revamping solar fields. The third research unit, composed of Stefano Maruccia, and Amedeo Reyneri di Lagnasco (Research Unit Coordinator), from the Università degli Studi di Torino, experts in agronomic research, focused on the specific evaluation of the opportunities/criticalities triggered by decommissioning. Due to this creative partnership, the research contributes to the definition and adoption of the best policies and practices addressed to policymakers and practitioners, aiming to increase the environmental, social, cultural, and economic impact of the reuse and redesign of photovoltaic fields.

At the end of this brief foreword, I would like to thank my colleagues who actively participated in the development and drafting of a multidisciplinary research project exploring a little-researched design field with uncertain operational implications. I thank the tenacity of my research unit and the young researchers who, alongside me, chose to venture into the field of architectural design applied to solar landscapes.



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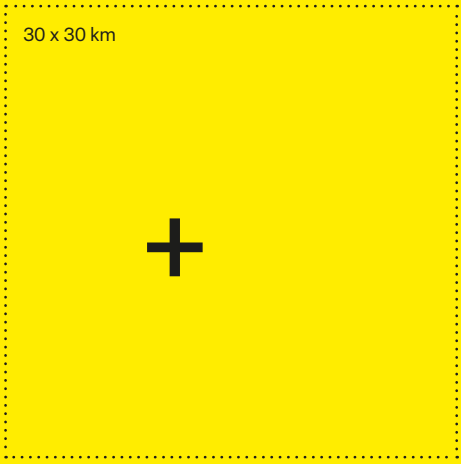
INTRODUCTIONS



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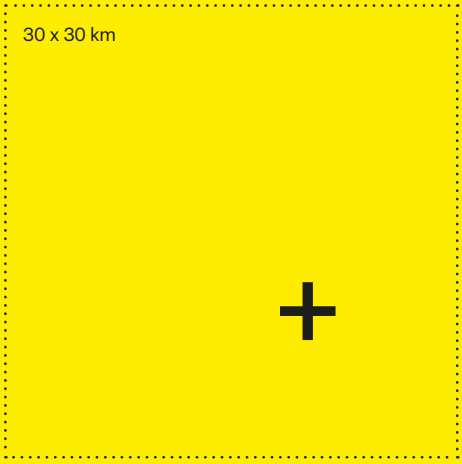

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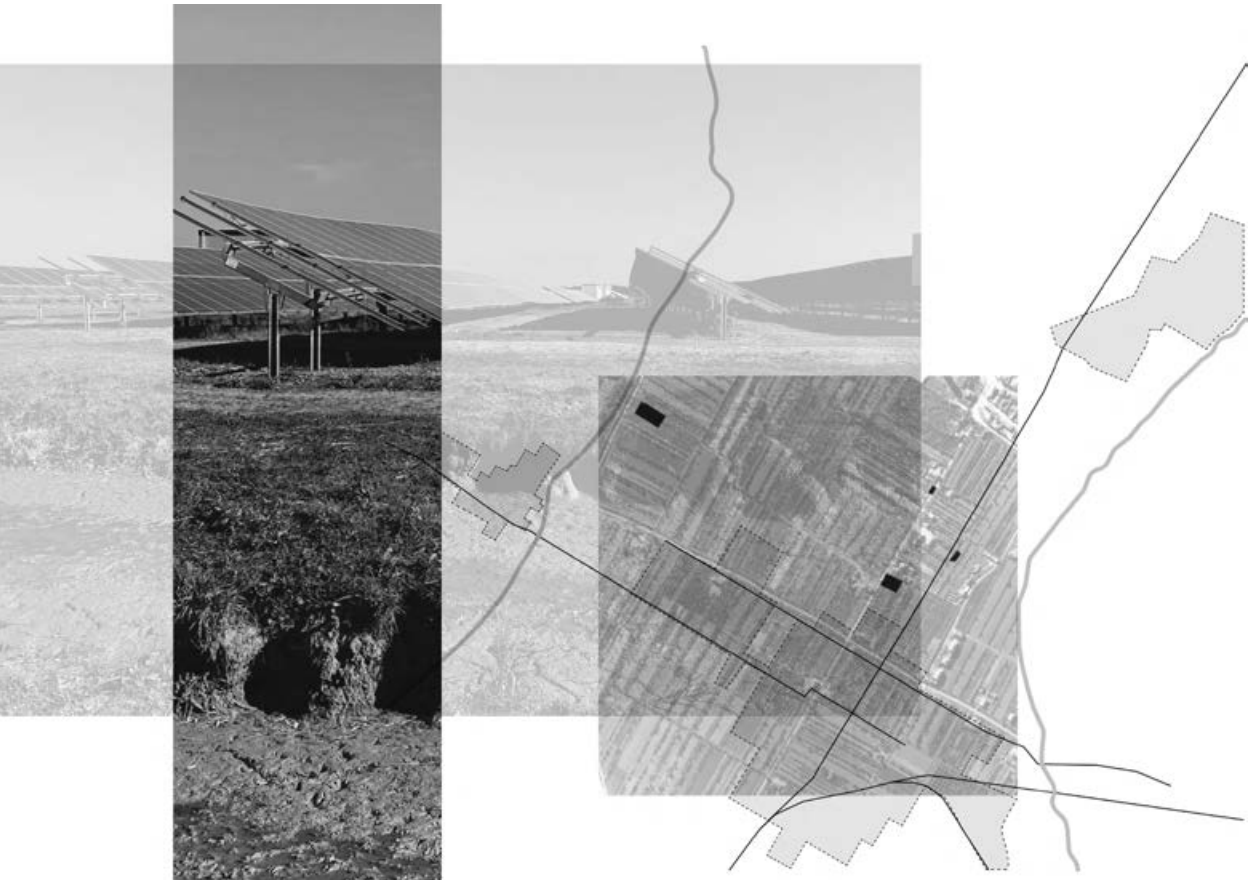
ENERGY LANDSCAPES

PALIMPSEST, PROCESS AND SCALES

SARA PROTASONI



«The objective is no longer so much to think and act on the landscape, but to think and act with the landscape, engaging with society and its spaces by starting from the questions that the landscape itself poses [...] That is to say [...] the issues of the soil (in a philosophical sense, but also concretely biological and 'agronomic'), of living things, of the scales of thought and of urban and territorial action, of history and memory, and finally and above all, of the forms and values of collective (political) action in the planning of existence. The landscape therefore ceases to be an object (to be dealt with among others, and usually one of the last, in the name of an ideology of the picturesque), to become a method, a set of questions about societies and their spaces, and a horizon of meaning for action and thought»[1].

The research addresses the issue of transforming existing photovoltaic parks that have reached, or are approaching, their end-of-life. This is a phenomenon poised to become substantial, widespread, and extensive throughout Italy for a variety of reasons, though primarily due to the expiration of the various incentive schemes that supported the widespread installation of small and medium-sized ground-mounted photovoltaic parks between 2010 and 2020.
Within this framework, the interplay between national and local regulations and the European programmes aimed at achieving decarbonisation introduces a broad range of variables and uncertainties. The hypothesis put forward is that this new challenge – the transformation of photovoltaic parks at or nearing their end-of-life – also engages architectural and landscape design at various scales, along with their conceptual and operational tools. Specifically, the operational unit at Politecnico di Milano – DAStU has examined which conceptual categories and operational tools landscape architecture can effectively deploy within the processes that involve either revamping (aimed at the technological upgrading of the plant) or total decommissioning (aimed at reconfiguring the sites of former installations following their dismantling).
The research is based on the concept of new energy landscape, for which there is a wealth of detailed literature[2]. The concept is that, similarly to other major

1 Jean-Marc Besse, *Paesaggio ambiente. Natura, territorio, percezione*, Rome, DeriveApprodi, 2020, p. 119.

2 Among the other, Sven Stremke, Dirk Oudes, Paolo Picchi, *The Power of Landscape Novel Narratives to Engage with the Energy Transition*, Rotterdam, nai010 Publishers, 2022; Sylvain Allemand, Auréline Doreau, Bertrand Folléa, *Paysages et énergies. Une mise en perspective historique*, Paris, Herman, 2021; Dirk Sijmons, *Landscape and Energy. Designing Transition*, Rotterdam, nai010 Publishers, 2014; Martin J. Pasqualetti, *Reading the Changing Energy Landscape*, in Sven Stremke, Andy van den Dobbelsteen, *Sustainable Energy Landscapes. Designing, Planning, and Development*, Boca Raton, CRC Press, 2012, pp. 11-44.

Previous page. The collage shows the solar photovoltaic plant as the latest inscription on a deeply layered surface, not just a standalone feature. It invites considering the landscape as a dynamic, multi-temporal field where all epochs coexist and continually reshape one another. Collage by Giulia Cazzaniga, 2025.

infrastructural transformations (e.g., irrigation canal networks, land reclamation, hydropower systems in some Alpine districts, energy transport networks, roads and highways, etc.) it is possible and necessary to promote a profound cultural change, which looks at infrastructures for energy production as works that contribute to building a territory, concretely implementing (in a place, in a time and with respect to determined economic, technological and cultural conditions) the functional and meaningful relationships between the elements and systems of the inhabited world, between nature and artifice.
This delimitation of the research field raises several general issues of great complexity. These are currently held in abeyance but the research aims to contribute to a hypothetical response, based on the conviction that the processes surrounding solar photovoltaics involve a multiplicity of objectives, actors, techniques, and necessary and possible actions that must be addressed with an integrated approach. The objective is to promote a profound cultural shift in the conventional way the topic is addressed.

This shift is based on several premises.
1. The transition towards energy production from renewable sources is a shared goal at various levels, from local to global.
2. To be effective, the renewable energy production facilities must be exposed to their energy sources (sun, wind, water). Consequently, by their very nature, they radically alter the configuration of the territories on which they are located, not only with regard to morpho-spatial and eco-systemic aspects, but also cultural aspects related to shared representations and the narratives connected to them.
3. Moving beyond the conventional performance-based approach, which regards them exclusively as technological facilities, the research proposes to consider renewable energy production facilities as new landscapes, which can be defined as energy landscapes.
4. The transition from the idea of a facility to that of an energy landscape is based on a concept of landscape as a complex and continuously changing entity, the result of stratified transformations. These are caused

both by human intervention for the exploitation of natural resources and by natural processes (often unpredictable)[3] that modify places within a complex system of reciprocal relationships, according to the cyclic rhythm of the seasons and the linear progression of biological processes involving the various life forms that inhabit them.
5. This "processual" vision is embodied in an approach to the topic that considers the entire life cycle of the facilities. This includes planning, various levels of design (including permitting processes), construction, the management of the technological devices and the site as a whole (which includes routine maintenance and revamping interventions), and finally, the management of their end-of-life, which is specifically addressed in the research published in this volume.

Energy landscapes

The discourse surrounding energy landscapes fundamentally intertwines, alongside the diverse plants and technologies embedded within them, with a number of other entities and systems. These encompass cultural landscapes, traditional rural systems, open urban spaces, hydrological networks, and ecological corridors. Within these contexts, formal, spatial, and cultural dimensions are intricately interwoven, manifesting through multiple transformative dynamics of varying durations. In this interplay, spontaneous elements and phenomena are reshaped by anthropogenic actions, which, in turn, are profoundly influenced by these natural processes.This complex interaction between the spontaneous and the anthropogenic necessitates the invocation of interpretive frameworks and operational methodologies from diverse disciplines, including architecture, geography, history, and ecology. Such interdisciplinary approaches are essential for deciphering the palimpsest of space and time in which human communities and natural ecologies have mutually influenced one another through an ongoing process of co-evolution. Addressing the theme of energy landscapes in contemporary discourse requires a steadfast commitment to this premise. Acknowledging the intricate relationships between natural and human systems is imperative for the development of sustainable

3 Catherine Mosbach, *Travresées Crossing*, Paris, Ici interface, 2010.

energy solutions that not only respect but also enhance the cultural and ecological fabric of our environments.
In a recent essay, Peter Sloterdijk[4] outlines a metabolic history of *Homo sapiens*, centred on the history of fire as a general synonym for energy. Following this interpretation, it could be stated that the transformation of the surrounding environment by the human species to generate its environmental niche and transform it into a cultural world is always connected to the different possible forms of energy and the different ways of producing and distributing it.
In this approach, the relationship between nature and techniques, which underpins these intentional transformations, must be understood in all its complexity and ambivalence. Bernard Stiegler[5], revisiting the Platonic version of the myth of Prometheus and Epimetheus, highlights how the human species is the product of a twofold error. This marks its constitution not only as *Homo faber* but also as *Homo sapiens*, constantly forced to re-think and therefore re-modulate a posteriori the technological conditions of its existence, and continuously confronting the question of the limits of its transformative action.
Epimetheus, as recounted in Plato's dialogue Protagoras, is the twin brother of Prometheus. Having been given the task of distributing natural faculties to all living species, he forgets about humans, condemning them to be deprived of some essential prerequisites for their survival. Only the subsequent theft of fire and techniques, carried out by Prometheus at the gods' expense, would attempt to remedy this error by violating the boundary that should have distinguished the human from the divine sphere, and by instilling in humankind the belief that they possess almost divine tools for understanding and manipulating the world.
Today, it is clear that the constantly evolving artefacts and techniques necessary for human existence in the world must be continually scrutinised regarding their sustainability, the so-called "limits to growth"[6], and their ethical and political value. This is an unavoidable step to provide answers to some urgent and unpostponable challenges, such as the defence of biodiversity, considered an essential heritage for ecological balance;

4 Peter Sloterdijk, *Prometheus's Remorse. From the Gift of Fire to Global Arson*, Cambridge, The MIT Press, 2024.

5 Bernard Stiegler, *La technique et le temps, 1: La faute d'Épiméthée*, Paris, Galilée, 1994.

6 Donella H. Meadows, Dennis L. Meadows. Jørgen Randers, William W. Behrens III, *The Limits to Growth*, New York, Universe Books, 1972; Hans Jonas, Das Prinzip Verantwortung, Insel Verlag, Frankfurt 1979. Bruno Latour, Peteer Weibel (eds.), *Critical Zones: The Science and Politics of Landing on Earth*, Cambridge, The MIT Press, 2020.

the protection of primary resources such as water, air, and soil; combating climate change through emission reduction and the promotion of renewable energies; and ensuring equity in resource accessibility, guaranteeing that all peoples have the right to a dignified quality of life without compromising the future of coming generations. It is in relation to this broad frame of reference that the general theme of ecological transition, and more specifically, the construction, management, and decommissioning of facilities for producing energy from renewable sources, must be brought into focus. This is necessary to fully comprehend the reasons behind the current public debate, in which ideological simplifications, divergent positions, and irreconcilable conflicts emerge. Energy landscapes should be understood as contested landscapes, characterised by competing interests, values, and perspectives concerning their use, management, and worth. Recognising the social, economic, and environmental implications associated with energy production and consumption is, therefore, a critical consideration for addressing the complexities inherent in design and transformation processes.

Cultural landscape / Ecological landscape

As is well known, within the European tradition, the word "landscape" simultaneously indicates a thing and its representation, understood as perception, view, and prospect, and has even come to define a genre in the history of painting. In this sense, landscape is commonly invoked in reflections on infrastructure based on how it is perceived (individually and collectively): it becomes a represented landscape and, consequently, a cultural product, as established by the European Landscape Convention[7]. This approach opens up a field of action for "landscape architects/conservators" who, by centring on the problem of beauty[8], seek to define criteria and various forms of mitigation that would allow the issue of new infrastructure acceptance by a territory's inhabitants to be addressed. This purely visual idea of landscape is based on a dualistic notion that contrasts human beings (the subject) with their living environment (understood as an object), within an anthropocentric perspective. A different idea of landscape underpins the work

7 The European Landscape Convention (ELC), adopted by the Council of Europe in 2000 with the aims to promote the protection, management, and planning of landscapes across Europe, states «landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors».

8 The notion that the primary (if not exclusive) role of landscape architecture is to address the formal and perceptual aspects of places remains prevalent in numerous fields. See, among the many other texts that could be cited, Lucius Burckhardt, (Markus Ritter, Martin Schmits eds.), *Why is Landscape Beautiful? The Science of Strollology*, Basel, Birkhäuser, 2015.

presented here by the Politecnico di Milano-DAStU group. It is now understood that the space in which we operate as landscape researchers and designers should be conceived as a field[9], a place open to all manner of relationships, through which various living entities traverse and transform it. It is inhabited, crossed, modified, cultivated, constructed, and devastated not only by humans, animals, plants, stones, mosses, clouds, viruses, and bacteria, but also by narratives, objets trouvés, and images, which are capable of constantly re-founding multiple processes and interacting to produce new and mutated forms. These forms coexist with ancient – sometimes very ancient – and highly resilient entities. Within this complex web of dynamics, time (in its multiple dimensions, from a single event to a geological era) plays a crucial role as a measure of transformative processes. This always raises the question not only of the survival or extinction of various living entities, but also of the inertia and modification of the constituent elements of physical space.

To comprehend landscape in this manner implies a systemic description based on relational scales that unlock significant worlds beyond the visible. These include the dimensions of the infinitely small and the infinitely large, which transcend our perceptual capacities. We must account for the microscopic scale when referring to organisms such as viruses and bacteria, or even the macroscopic, if not planetary, scale when referring to the worlds described by geography or geology[10].

Building upon the ideas articulated by Augustin Berque many years ago[11], landscape is something that is shared, mediated by words and images, and interpreted by cultural archetypes. It should not be regarded exclusively as a thing, but rather as a mutable set of relationships, connected to the capacity of living beings (human and non-human, animal and plant) to capture the messages of the natural environment and bring them into the circuit of their own acting/being. For the human species, this is a relationship of both ecological and cultural significance, understood as a synthesis capable of guiding human action within their living environment. It is in this relationship that the dense network of

9 James Corner defines "Field Operations" as a dynamic, site-specific approach to urban design and landscape architecture that perceives landscapes as evolving systems rather than static entities. This methodology prioritises an in-depth understanding of the unique ecology, culture, and history of each site to foster the creation of innovative public spaces. Rather than adhering to a singular style, Field Operations emphasises process and interdisciplinary collaboration, aiming to design vibrant, functional, and authentic environments that adapt and transform over time. James Corner (ed.), *Recovering Landscape: Essays in Contemporary Landscape Architecture*, New York, Princeton Architectural Press, 1999.

10 Alessandra Capuano with Veronica Caprino, Liliana Impellizzeri Laino, Athanassia Sakellariou (eds.), *The Landscape as Union between Art and Science. The Legacy of Alexander von Humboldt and Ernst Haeckel*, Macerata, Quodlibet, 2023.

11 Augustin Berque, *Médiance, de milieux en paysages*, Paris, Reclus Belin, 2000 (original ed. 1991).

connections linking the elements of physical space (natural and artificial, living and mineral) with the universe of meanings and values is manifested.
The keyword for this perspective is "coexistence", which underpins positions that theorise the need to practice a relationship with the world centred on seeking a possible co-evolution between the different entities comprising the biosphere.
Designing landscapes as arenas for coexistence makes possible a relationship between nature and culture wherein the direct, sensory experience of the world of living things prepares the individual for a full (non-intellectualist) understanding of life. This is fundamental for humans to become custodians of rights and duties towards the community of living beings.
It is at this point that a new significance emerges for landscape design, which increasingly assumes a greater responsibility in the spatial and functional prefiguration of "common" living contexts for all living species. This is done consciously, through the shared objective of communal care across different spheres of intervention (from the state and political action to individual responsibility).
As Paola Viganò has highlighted in a recent volume[12], the post-structuralist critique regarding the large-scale causes and responsibilities for the environmental crisis – initiated by Michel Foucault's reflection on the relationship between the exercise of power and bodies and life[13] – challenges architecture to position its projects within a broader biopolitical framework. This moves towards a kind of affirmative biopolitics (a concept drawn from earlier studies by Roberto Esposito)[14] «committed, from the perspective of constructing and transforming the inhabited space, to keeping a population alive, protecting, educating, and emancipating it»[15].
From this perspective, investigating the potential transformation of end-of-life photovoltaic sites implies an approach that can never be deduced from the application of a single model, but is instead built through multiple approximations. This is achieved by investigating the profound changes that have affected a specific territorial area and the installations within it over a given time interval. These changes require different disciplines

12 Paola Viganò, *Il giardino biopolitico. Spazi, vite e transizione*, Rome, Donzelli Editore, 2023.

13 Michel Foucault, *The Birth of Biopolitics: Lectures at the Collège de France 1978-1979*, New York, Picador, 2008.

14 Roberto Esposito, *Bios: Biopolitics and Philosophy*, Minneapolis, Minnesota University Press, 2008.

15 Paola Viganò, cit., 2019, p. 109.

(landscape architecture, agrarian sciences, natural sciences, and engineering, cultural sociology) to engage with one another, sometimes through antagonism, sometimes through positive synergies that can generate high-quality outcomes.
An adaptive project-based approach is emerging that can observe phenomena at different scales (from the geographical scale of the territory to the close-up scale of architecture). It can synthesise diverse knowledge (from natural sciences, earth sciences, and human sciences) and, above all, engage with transformation processes adaptively, by addressing decision-making, implementation, realisation, and management aspects in an integrated manner. This means working along a multidimensional and extended temporal axis to include different natural and anthropogenic cycles and processes[16]. Landscape architecture can usefully enter into the processes of defining and implementing transformations, not to perform a scenic embellishment, but to combine art and technique in defining effective solutions for managing rainwater, improving the quality of air, water, and soil, increasing species biodiversity, contributing to the development of complex ecosystems, and configuring places for new public uses and programmes, while simultaneously working on the legibility of the site and its cultural values[17].

Palimpsest: space, time and ecology

The emergence of landscape ecology as a specific field of research has prompted the disciplines of design and planning to consider not only the forms and uses concerning inhabited territories, but also the dynamic, multispecies relationships that constitute and transform space into a complex system of interactions involving soil, water, vegetation, animal populations, microbes, and even viruses and bacteria. Today, it is widely acknowledged that these components interact in complex and continuously evolving ways, and in ways that are not always visible, driving the continuous transformation of landscapes.
The concept of the palimpsest[18] allows us to highlight how landscapes are never entirely new, but are rather overwritten spaces where traces of the past coexist with

16 Anne Whiston Spirn, *The Language of Landscape*, New Haven and London, Yale University Press, 1998.

17 Elizabeth K. Meyer, *Sustaining beauty. The performance of appearance A manifesto in three parts*, in "Journal of Landscape Architecture", n. 3, 2008, pp. 6-23.

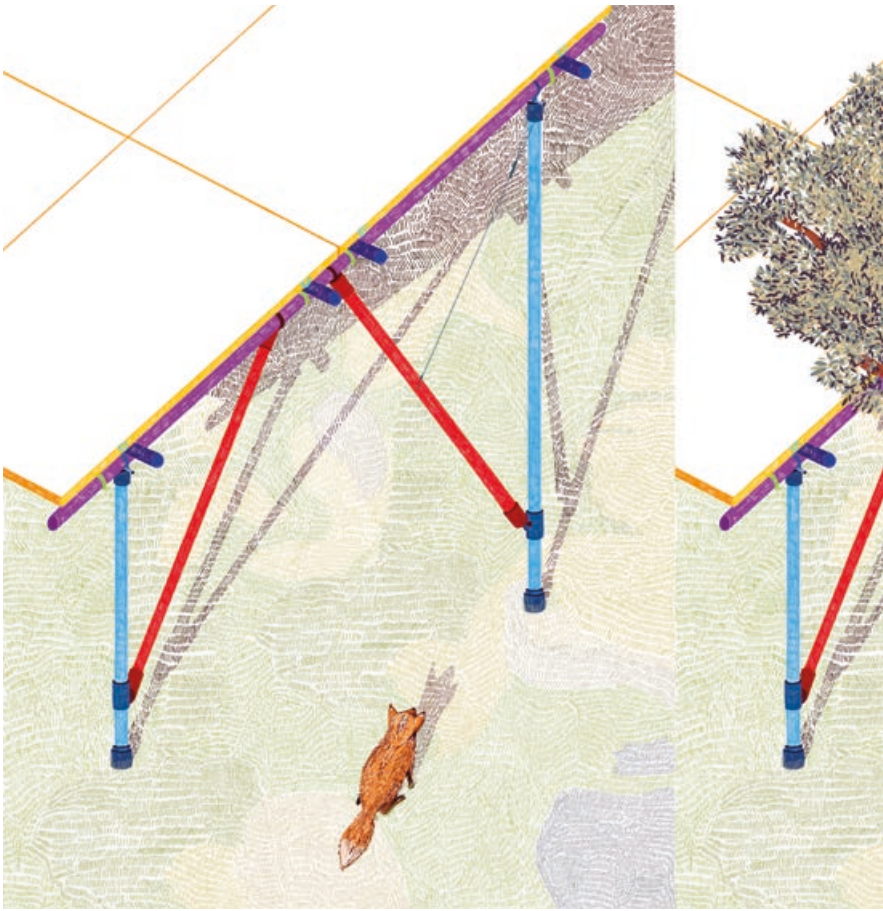
18 André Corboz, *The Land as Palimpsest*, in "Diogens", n. 121(31), pp. 12-34.

elements resulting from emergent processes. This vision resonates with contemporary ecological approaches that integrate biotic and abiotic systems – soils, waters, vegetation, animals, humans, and even microbes – into a single dynamic field of relationships. Within this, it is possible to recognise a design activity (collective and individual) that tends to guide the process towards predetermined goals, even if they are sometimes in conflict with one another. To use Corboz's words, the territory is a project. Yet, the project Corboz speaks of does not tend towards a closed and defined form; rather, it is the set of actions that trigger processes of transformation according to often unpredictable dynamics and geographies.

Corboz's insight consists in recognising that the landscape, much like a palimpsest, preserves traces of previous uses, forms, and meanings beneath its current surface. Human interventions, whether agricultural, infrastructural, or symbolic, do not completely erase the past but rather inscribe new layers upon it. This interpretation has supported a design philosophy that does not consider a place as a tabula rasa. Instead, it employs specific tools of description and interpretation necessary to account for the complexity of inherited forms, reading the site as a text. In relation to this text, the design process proceeds primarily through acts of negotiation: with the site, its history, and the multitude of entities that traverse, modify, cultivate, construct, and devastate it. From this perspective, architecture and landscape research become practices aimed at rewriting, annotating, and reinterpreting rather than simply imposing.

In contemporary landscape architecture, the narrative dimension implicit in this kind of design action has acquired increasing centrality. Indeed, landscapes are to be considered not only as physical environments but also as narrative devices, constructs capable of conveying stories, identities, and future aspirations. In this sense, the task of architecture also involves creating spaces that can stimulate the imagination, giving form to values and meanings, evoking individual and collective memories, and inspiring aspirations and desires for change within complex social, ecological, and cultural contexts.

The centrality gained from acknowledging the narrative significance of the landscape suggests moving beyond the conventional approach – which focuses on formal definition, ecological function, and decorative effect – towards engaging with the genius loci, the dimension of time, and the lived experience of its inhabitants. The landscape becomes a palimpsest, a stratified system in which it is possible to identify not only the traces of past actions and projects, but also potential for the future. The aim of design should be to construct landscapes that engage users and inhabitants as co-authors of the value



The evolution of the Energy landscape as a layered phenomenon encompassing technical elements and biodiversity.

Hand drawing by Simone Baccaglini, 2025.

and meaning of places, assigning a central role to their movement, the multiplicity of experiences of the different bodies that traverse the space, and the behaviours that inhabit it, both ritualistic and unforeseen. James Corner's idea of "recovering landscape"[19], developed over twenty-five years ago, moves in this same direction, highlighting how the importance of the narrative dimension of places must be deeply connected to issues such as programme, spaces for particular uses, and the broader topics of function, economics, logistics, the constraints derived from feasibility, and desires.

19 James Corner (ed.), cit., 1999.