ECO LIGHT NOTE BOOKS

SUSTAINABILITY REPORT

volume 6

Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

ISTITUTO ITALIANO DESIGN

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Association of Journalists - Umbria Region (30.05.2013)
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www-eco-light.it (wp11)

Via XX Settembre 63, Perugia
www.istitutoitalianodesign.it

Finished Printing: June 2026

ISBN 979-12-80235-38-1

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Financed by the European Union
Next Generation EU
Mission 4 Component 1
CUP E96E24000000001

Designed by
Istituto Italiano Design

Curated by
Università Politecnica delle Marche

financed by

designed by

in partnership with

and under the patronage of

eco light project

The WP9 is the point where ECO-Light structures itself as a process of knowledge, making the effects of its actions readable. Through the scientific analysis of the installations, the territorial reading of the activation contexts, and the psychological analysis of the shared experiences, concrete relationships emerge between artistic design, modes of fruition, and the impacts generated. The subsequent development into guidelines and best practices allows these findings to be translated into operational instructions.

The result is a vision of sustainability as an internal principle of the project, capable of guiding choices, interpreting results, and defining replicable models.

1. Work Package 9: Sustainability Report

The Sustainability Report constitutes the analytical and methodological outcome of Work Package 9 – Social and Environmental Sustainability of the ECO-Light project.

1.1 Introduction

The function of this report is neither merely descriptive nor exclusively about reporting: the document has been constructed to give a verifiable form to the mandate of WP9, namely to measure, interpret, and make transferable the ecological, energetic, social, and cultural impacts generated by the project activities, with particular reference to the artistic installations of WP3, the widespread experiences of WP7, and the subsequent development of sustainability guidelines and best practices.

From this perspective, the report should not be read as a final appendix to the project, but as the space where the sustainability of ECO-Light is formalised in technical, interpretative, and operational terms. Its objective is to provide a coherent overview of how the environmental and social dimensions have been adopted not as secondary elements, but as structuring criteria for the project's framework, installation choices, user experiences, and territorial activation processes.

The structure of this volume derives directly from the architecture of WP9, which in the project proposal is divided into three closely connected components:
9.1 Scientific Analysis,
9.2 Psychological Analysis,
9.3 Environmental and Social Sustainability Guidelines and Best Practices.
The coherence of the report depends precisely on this tripartition, which has not been interpreted as a simple sequence of outputs, but as a unified process in which observation, evaluation, and systematisation converge into a single cognitive tool.
The **9.1 Scientific Analysis** component concerns the evaluation of the ecological and energetic impact of the Light Art installations and their related activities. Based on the proposal, it includes the monitoring of the project from an environmental and energetic sustainability viewpoint, and the study of how artistic production affects the territories of Perugia, Terni, and Fabriano, read as complex urban contexts and, within the project framework, comparable to smart cultural city laboratories.
The **9.2 Psychological Analysis** component covers the qualitative reading of shared experiences through reference to Social Dreaming, paying attention to the individual and collective effects of immersive and widespread experiences, as well as the differences in perception attributable to the diverse social and cultural backgrounds of the participants.

Finally, the **9.3 Environmental and Social Sustainability Guidelines and Best Practices** component provides for the convergence of both analyses into a framework of broad sustainability guidelines and best practices, also including procedures aligned with international accreditation and ranking systems such as the THE Impact Ranking.

This report therefore adopts WP9 as its central organizing axis. It does not limit itself to presenting results, but reconstructs the link between data, observations, project choices, and methodological implications, so as to transform the ECO-Light experience into a readable, well-argued, and potentially replicable analytical case study.

1.2 Methodological Framework of the Report

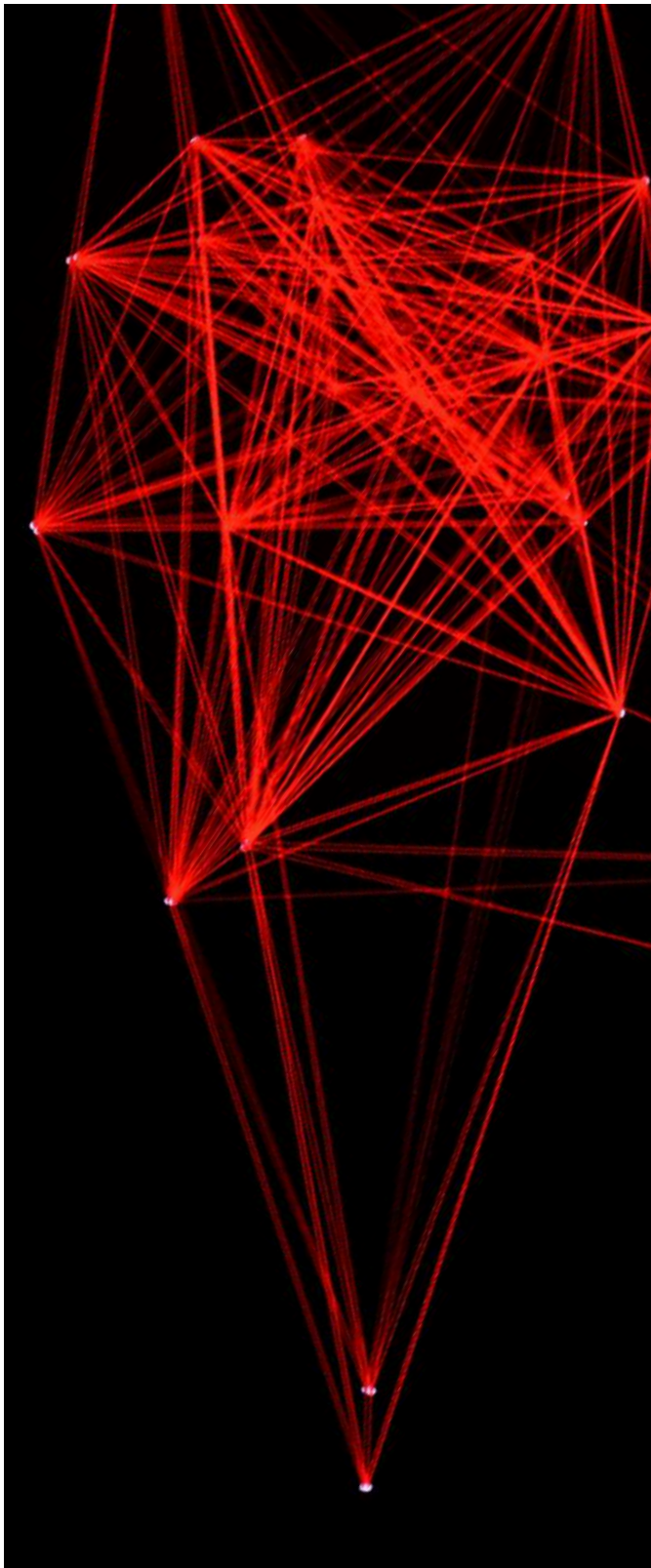
The scientific foundation of the report was developed by the Università Politecnica delle Marche (UNIVPM), the partner responsible for the scientific component of WP9 and, more broadly, for the applied research activities and sustainability analyses connected to the project. Within this framework, a central role was played by the research fellowship awarded to Gaetano Corica, who acted as a linking figure between technical-scientific observation, interpretation of installation configurations, lighting design, and the collection of elements useful for evaluating the environmental, energetic, and territorial impacts of the works. His role was particularly significant as it ensured continuity between the artistic dimension of the project and the need to build an analytical framework aligned with the objectives of WP9.

The methodological systematisation and final writing of this work were developed in collaboration with Maria Vittoria Fiorelli, development economist and strategic consultant for the project's sustainability, who provided support in the narrative and analytical recomposition of the generated content, the calibration of impact indicators, and the construction of a readable and transferable framework. The report is therefore the result of a multi-level construction: scientific responsibility held by UNIVPM, operational and observational continuity ensured by the activities of Gaetano Corica, and strategic-methodological support and final systematisation guaranteed by Maria Vittoria Fiorelli, in coordination with the project's technical-scientific team.

Picture from the General Historical Archive of the State of Sinaloa, Mexico

The methodological criterion adopted stems from the very nature of ECO-Light. The project does not consist of isolated actions, but of a system of interdependent interventions encompassing research, workshop spaces, artistic production, cultural accessibility, territorial activation, communication, and institutional cooperation. For this reason, sustainability was not analysed through a purely performance-based or sector-specific reading, but through an integrated framework capable of binding together technical, environmental, territorial, social, and organizational variables.

On the scientific side, the analysis was set up by considering the installations not as autonomous objects, but as complex installation systems, whose impact depends on the interaction of multiple factors: energy consumption, power sources, material impact, duration, reversibility, intensity of use, modes of activation, compatibility with host contexts, and relation to audience mobility and flows. In the absence of a continuous instrumental monitoring system for all works and all contexts, the evaluation was built through a combination of direct observation, collection of available technical data, analysis of design configurations, comparison between installation types, and interpretation of usage effects. The methodological premise is therefore clear: not an absolute and abstract measurement, but a rigorous, comparable evaluation consistent with the actual implementation conditions of the project.



On the psychological-social side, the analysis focused on the capacity of shared artistic experiences to produce effects in terms of perception, participation, imaginative activation, construction of collective meanings, and relationships between different audiences. In this sense, the report assumes that the sustainability of a cultural project cannot be read exclusively in terms of resources consumed or saved, but must also encompass the quality of the interactions it generates, its ability to reduce cultural distances, broaden access, and produce shared value in the territories and communities involved. It is precisely this dual approach that allows WP9 to perform the function assigned to it by the proposal: making sustainability an analytical criterion and, at the same time, a tool for project-based learning.

Within this volume, sustainability is therefore adopted as a plural category. It includes the minimisation of energy consumption, attention to power sources, the limitation of the material impact of setups, the reversibility of interventions, non-invasiveness regarding natural and urban contexts, and the landscape compatibility of the works. However, it also includes the project's ability to build accessibility, engage heterogeneous audiences, activate networks between institutions, transform peripheral places into spaces for cultural fruition, and produce a methodological legacy that can be used beyond the lifespan of the project itself.

2. The Project

2.1 The ECO-Light Project

ECO-Light (**Eco**-System **L**ighting the **I**nnovative and **G**reen **H**eritage through **T**echnologies) is a multidisciplinary project created with the objective of promoting the Culture of Light as a tool for research, innovation, and sustainability, uniting scientific and artistic knowledge into a single integrated vision. Funded by the European Union under the National Recovery and Resilience Plan (NRRP) – Mission 4, Component 1, Investment 3.4, the project is positioned among the strategic initiatives designed to innovate the international dimension of the AFAM (Higher Education in Art, Music and Dance) system and represents an exemplary model of cooperation between academic institutions, cultural bodies, and creative communities.

Promoted by the Istituto Italiano Design in Perugia in partnership with the "Briccialdi" Conservatory in Terni, Poliarte, and the Università Politecnica delle Marche, ECO-Light is structured as a two-year journey combining advanced training, artistic production, scientific research, and technological experimentation. The project stands out for its ability to activate a dialogue between disciplines and languages, involving actors from the academic, artistic, and production worlds in a co-creation process that merges the aesthetic dimension with ecological and social ones. Light, understood not only as a physical phenomenon but also as a symbolic language and vehicle of knowledge, constitutes the conceptual and operational heart of the entire project.

In ECO-Light, it becomes a dynamic and transformative medium: a tool for research and representation, an element of urban regeneration, and a vehicle for well-being and environmental awareness. The installations,

performances, and educational and dissemination activities that mark its evolution represent immersive experiences capable of weaving together art, science, and technology, offering the public a new way of perceiving and inhabiting light.

Through 12 Work Packages - spanning from research conducted in the Light Ecosystem Lab to installations at UNESCO sites, from international educational programmes to the creation of a digital platform for virtual use - the project builds an open, inclusive, and sustainable cultural ecosystem. Each action is conceived as part of an innovation process that connects artistic experimentation with the prin-

ciples of environmental sustainability (DNSH), social equity, and good governance (ESG), defining a replicable model for the ecological and digital transition within the cultural and educational sectors.
ECO-Light thus interprets light as energy and knowledge, as a bridge between disciplines and generations, and as a tool for community building. Its vision is rooted in the territories of Perugia, Terni, and Fabriano, but projects itself into an international network of cooperation, education, and research, turning Umbria into a laboratory for cultural innovation and sustainability on a European scale.

2.2 Structure and Objectives

ECO-Light is structured around five closely interconnected areas of intervention. Each of these pursues a strategic objective and is broken down into specific Work Packages (WPs), reflecting the systemic and integrated approach of the project.

1. Promotion of Italian Research (WP1, WP2, WP3)
To disseminate and enhance the artistic and scientific research related to light and its applications, contributing to greater international visibility and creating connections between academic institutions, cultural bodies, and local territories.

2. Training and Professionalisation (WP4, WP5)
To create advanced training opportunities for professionals in the field of multimedia communication and the arts, focusing on innovative, interdisciplinary skills linked to the new languages of light.

3. Research and Arts Accessibility (WP6, WP7)
To make research and artistic works accessible to a wider audience, promoting participation, inclusion, and intergenerational dialogue through events, workshops, and immersive pathways.

A SNAPSHOT FROM THE WORKSHOP WHERE THE ELIOS - SOLAR LAND ART HELIOSTATS WERE MADE

4. Internationalization and Sustainability (WP8, WP9, WP10)
To foster international cooperation and promote sustainable practices by measuring the social and environmental impact of artistic and cultural activities, and strengthening the professionalization of the creative sector.

5. Digital Dissemination and Accessibility (WP11, WP12)
To develop an interactive virtual platform and integrated communication strategies to share the project's activities and results, ensuring global and inclusive access.

2.3 Project Consortium

One of the core strengths of ECO-Light lies in its synergistic partnership network, which integrates academic, artistic, scientific, and institutional expertise.

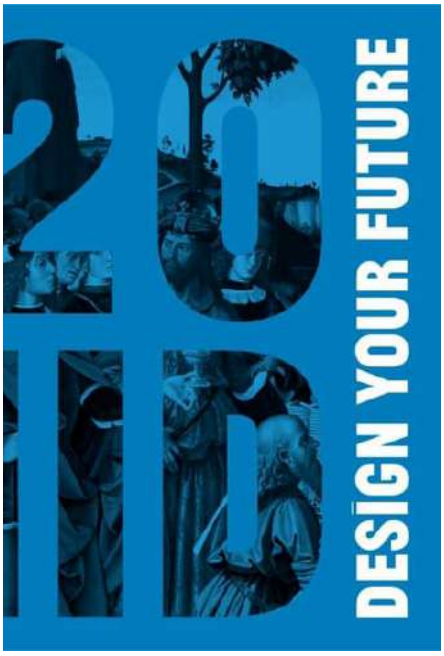
Leading the project as the Lead Institution is the Istituto Italiano Design (IID) of Perugia, responsible for the operational coordination and overall management of activities. With its extensive experience in the field of design and artistic education, IID represents the organizational and creative heart of the project.

Working alongside IID are three main partners:

- **Università Politecnica delle Marche:** Scientific and technological partner, which coordinates the applied research activities and sustainability analyses, as well as managing the interdisciplinary research fellowship and contributing to the development of the digital platform.
- **Istituto Poliarte of Ancona:** Specialised in visual and multimedia arts, committed to artistic production and the creation of Light Art installations.
- **Conservatorio "Giulio Briccialdi" of Terni:** Contributes to the musical and performative component of the project, promoting sound experimentation and research into the relationships between music, light, and perception.

2.3.1 Istituto Italiano Design

Istituto Italiano Design (IID) is a centre of higher education and research recognized nationally and internationally for its ability to combine creativity, business, and sustainability.
Founded in Perugia in 1999, the Institute represents today one of the main Italian hubs dedicated to design culture, with a vision that integrates design, applied arts, communication, fashion, and new technologies. Its mission is to train conscious professionals, responsible innovators, and designers capable of interpreting contemporary languages through a multidisciplinary and sustainable approach. The Institute stands out for its "ISIA-oriented" teaching methodology, based on experiential learning and a constant synergy between research, education, and business. Students are guided along growth pathways that combine technical and humanistic skills, theory and practice, experimentation and critical thinking.
Thanks to a faculty composed of designers, artists, architects, economists, and professionals from the creative sector, IID promotes an inclusive and dynamic learning environment, where every project becomes an opportunity for dialogue between cultures, disciplines, and generations. Over the years, the Institute has built an extensive network of collaborations with companies, public bodies, and international organisations, consolidating its role as an innovation hub for Central Italy. Partnerships with entities such as the Umbria Jazz Foundation, Cari Perugia Arte, the UNESCO Club of Florence, and the G. Giordano Foundation tes-



tify to the commitment to connecting artistic and design research with global challenges of sustainability, ecological transition, and digitalisation. IID is an active part of the Internationalization processes of the AFAM system, with growing participation in European programmes and exchanges with academic institutions of excellence, including the JCI Institute in Vancouver, the Somaiya College in Mumbai, and the Politecnico di Milano. The Institute is also included in the Times Higher Education Ranking and recognized for the quality of its study programmes and the impact of its cultural activities on the territory.

In the ECO-Light project, the Istituto Italiano Design plays the role of lead institution and creative engine, coordinating a network of partners ranging from scientific research to artistic production, and from technological innovation to education. Its recently expanded and regenerated headquarters in Perugia host the new Open Ecosystem Lab, a permanent laboratory dedicated to interdisciplinary experimentation on light, materials, sound, and sustainable design. This space, conceived as a living platform for meetings between students, faculty, businesses, and the community, embodies the vision of IID: a school-laboratory that educates through experience, innovates through collaboration, and grows through environmental and social responsibility. The Istituto Italiano Design does not limit itself to transmitting skills: it shapes design cultures capable of impacting the future. Every student, teacher, and partner becomes part of a community that believes in the transformative power of design as a tool for knowledge, equity, and progress.

2.3.2 Contribution to Sustainability

Istituto Italiano Design, as the lead institution of the ECO-Light project, assumes a central role in building an integrated sustainability model, acting not only as an operational coordinator but as the cultural and methodological director of the entire project framework. In relation to WP9, IID's contribution is cross-cutting and systemic, materialising primarily in the definition of coherent and continuous design choices capable of guiding the entire development of the project towards structured criteria of environmental compatibility, cultural activation, and social accessibility, thereby making sustainability an embedded component of the project rather than an additional or declarative element.

A first fundamental area concerns the design and implementation of the Open Eco-System Labs (WP2), conceived as a central and permanent infrastructure of the project. These are not mere educational environments, but an integrated infrastructure for research, production, experimentation, and public output, designed to connect students, young creatives, professionals, and the local territory within the same spatial and operational mechanism. Within this environment, an experiential laboratory system divided into several interconnected functional areas has been created. The laboratory includes a materials library and a book library to support project research, a study room for individual and collective activities, and an area dedicated to digital modelling, equipped with workstations featuring latest-generation hardware (iMacs with 4.5K Retina displays, M4 chips, 16GB RAM, and SSDs) and updated professional software, including the entire Adobe Creative Cloud suite. This enables students, teachers, and young profession-

THE LED WALL AVAILABLE IN THE OEL OF THE FORMER VAULT IN THE BASEMENT OF THE IID

als to work under advanced technical conditions aligned with the professional standards of the creative and audiovisual sectors. These functions are complemented by a space dedicated to audiovisual and sound production, designed both for content creation (podcasts, radio, multimedia productions) and for public dissemination. The space also includes an immersive environment created in the former vault of the IID headquarters, equipped in part through the use of a rented LED wall, which constitutes one of the most significant outcomes of repurposing existing spaces. Here, the vault does not play a merely containing role but becomes itself part of the cultural project: a space devoid of natural light, intimate, and highly identity-forming, transformed into an environment for perceptual experimentation, exhibition, and immersive fruition. Precisely in this space, the temporary exhibition 'Densità fluorescenti' ('Fluorescent Densities') was also hosted, making tangibly visible the infrastructure's capacity to host artistic practices aligned with the Culture of Light and the objectives of WP9, activating a direct relationship between the work, darkness, emerging light, and the public. In particular, in defining the technological infrastructure and operating conditions of the room, compliance of the Samsung IE025A LED wall with the electrical safety and electromagnetic compatibility (EMC) standards indicated by the manufacturer (Safety IEC 62368-1 and 60950-1; EMC Class A) was considered, as well as the IP20 protection rating for indoor installations, ensuring that the space and systems layouts were consistent with the intended use and safety requirements.

The Mac room in the IID's OEL

On the energy and environmental front, IID, with the technical-design support of the partners, guided spatial and engineering choices towards an efficient use of LED technology: the system operates with a 100–240 VAC, 50/60 Hz power supply and is characterized by stated values of typical and maximum power, alongside heat generation data (BTU) useful for system sizing and the reduction of accessory requirements. Furthermore, the manufacturer's indication

regarding ventilation was considered (absence of need for additional forced ventilation in the cases reported), so as to limit indirect consumption and noise, improving the comfort and operational performance of the room.
From the perspective of life-cycle sustainability, the selected solution features a long-term declared useful life (LED lifetime of 100,000 hours), which contributes to reducing replacement frequency and, consequently, the potential impact linked to maintenance and spare parts; moreover, its modular nature (cabinets) facilitates targeted interventions and reduces waste compared to full replacements.
In line with the principles of the circular economy and resource optimization, it is also highlighted that the installation took place via rental (and not purchase) for the duration of the project: at the end of ECO-Light, the LED wall will return to the availability of the lessor/supplier Pucciufficio, allowing it to be reused in further activities and installations until the long term of its useful life, maximizing its utilization and reducing the need for new productions. The entire system was developed within the IID headquarters, reclaiming and repurposing existing spaces (including a former vault), transformed into environments dedicated to artistic visualization and immersive experience. This design choice allowed for the enhancement of already available structures, reducing the need for new construction and limiting environmental impact.
The configuration of the Open Eco-System Labs (OEL) therefore responds to a precise logic: to concentrate different functions - research, production, education, exhibition, and fruition - into a single ecosystem to reduce infrastructural duplication, contain travel, increase the intensity of space utilization, and produce a material and methodological legacy that extends beyond the lifespan of the project itself.

In this way, the project has built a shared infrastructure capable of generating value over time, going beyond the duration of individual activities. The experience of the immersive vault is particularly relevant in this regard, as it shows how a spatial reclamation choice can translate into a real platform for cultural experimentation, already tested in practice and not merely envisioned in project plans.

Throughout the entire duration of the project, IID ensured that all supplies and services connected to the creation of the spaces were aligned with the principles of the NRRP, particularly with the DNSH (Do No Significant Harm) principle. In the selection and procurement process, suppliers were indeed required to sign formal declarations of environmental and regulatory compliance, committing to respect the obligations set forth by the Environmental Code and the DNSH guidelines. Added to this are requirements for transparency and procedural correctness - including the traceability of financial flows, the absence of conflicts of interest, and checks on beneficial ownership - which strengthen the overall control system and guarantee coherence between design and implementation.

In parallel, IID helped guide the choices related to artistic production (WP3), promoting a design approach attentive to the environmental impact of the installations. This translates into a constant focus on the temporary nature of interventions, compatibility with natural and urban contexts, and the reduction of invasive elements.

The general setup of the project, which privileges light, integrated, and non-permanent installations, stems from a clear line of direction defined at the coordination level. However, IID's most significant contribution is observed in the social and cultural dimension of the impact. IID structured an articulated system of activities aimed at engaging different audiences - students, families, professionals, and local communities - creating the conditions for broad and diversified participation. Initiatives

aimed at younger generations, open days, workshops, and activities in peripheral museums made it possible to activate a direct dialogue with the territory, helping to lower barriers to cultural access and to counter phenomena of educational marginalization.
This ability to activate participatory contexts represents a key element for WP9 as well, as it allows for the generation of data and observations on a real and varied audience, making a social impact assessment based on concrete experiences possible. In this sense, IID does not limit itself to coordinating, but builds the conditions so that the environmental, perceptual, relational, and territorial impacts of the project can be effectively observed, analysed, and presented in a structured form.
The use of the former vault as an immersive experience and exhibition space also reinforces this aspect: the fruition of darkened environments and lighting installations such as 'Densità fluorescenti' made it possible to observe dwell times, intensity of attention, ways of traversing the space, and the quality of the relationship between the audience, the work, and the institutional venue, offering a concrete case of how infrastructure and analysis can mutually support each other.
In summary, the contribution of the Istituto Italiano Design takes the form of a continuous effort to integrate design, management, and engagement, wherein sustainability translates into a stable operational grammar, legible both in spatial choices and in cultural and organizational practices. The added value lies in the ability to transform seemingly technical design choices - such as the configuration of spaces or the organization of activities - into strategic levers for reducing impact and expanding cultural access.

2.3.3 Università Politecnica delle Marche

The Università Politecnica delle Marche (UNIVPM) is a public university of excellence, recognized nationally and internationally for the quality of its scientific research, the multidisciplinarity of its educational pathways, and its constant commitment to environmental, social, and digital sustainability. With over fifty years of history, the University represents today a benchmark for applied research and technical-scientific education, capable of combining academic knowledge, industrial innovation, and social responsibility.
Founded in 1969 and headquartered in Ancona, UNIVPM comprises five faculties - Engineering, Sciences, Medicine and Surgery, Economics, and Agriculture - and stands out for its vision oriented toward the integration of science and society. Its research activities are recognized at European and international levels, with a strong vocation for cross-sector cooperation and the development of sustainable solutions for the ecological and digital

transitions. The University belongs to the Italian University Network for Sustainable Development (RUS) and has integrated the Sustainable Development Goals (SDGs) of the 2030 Agenda into its governance, research, and teaching strategies.
In the scientific field, UNIVPM is a key player in numerous European programmes - including Horizon Europe, LIFE, Erasmus+, and Climate-KIC - and collaborates with research centres, businesses, and institutions in over 40 countries, promoting an open university model connected to the local territory. Its leadership in the fields of sustainability and technological innovation is also recognized globally through the Times Higher Education Impact Ranking, which measures the contribution of universities to the achievement of the SDGs.
In the ECO-Light project, UNIVPM is responsible for the scientific research activities and the measurement of environmental and social impact

The study room at the Faculty of Medicine and Surgery

(WP9 – Social and Environmental Sustainability), coordinating an interdisciplinary research group that brings together engineers, physicists, psychologists, and designers. The Università Politecnica delle Marche thus confirms its status as the strategic and scientific partner of the ECO-Light project: an initiative capable of illuminating contemporary complexity through research, education, and collective responsibility.

2.3.4 Contribution to Sustainability

The Università Politecnica delle Marche has assumed a central role in WP9 as the partner responsible for the scientific component related to the definition, implementation, and validation of the analytical system for the project's environmental and energy impacts. Its contribution developed through a structured analysis activity, supported by a dedicated research fellowship awarded to researcher Gaetano Corica, who operated under the scientific coordination of UNIVPM and with continuous

operational functions throughout the entire life cycle of WP9, serving as a key figure for the operational implementation of activities.

The activity of UNIVPM fits into the framework of the Scientific Analysis (WP9.1), which involves evaluating the ecological and energetic impact of the artistic installations and related activities. Within this scope, the work carried out concerned the definition of observation parameters, data collection during events, and the analysis of dynamics related to both the energy consumption of the works and the mobility of the users. This approach makes it possible to move beyond an abstract vision of sustainability. The presence of the research fellow guaranteed continuity and methodological coherence to the entire process. Gaetano Corica acted as a linking figure between the scientific and artistic dimensions, accompanying the development of the installations and helping to integrate impact assessment right from the preliminary stages of design and implementation. This aspect is particularly significant, as it allows for a monitoring process that is not limited to the final reporting phase but is embedded into the life cycle of the activities, making measurement an integral part of the project itself.

The approach adopted is based on: the evaluation of the technical and engineering solutions adopted in the installations; the analysis of energy sources and procurement methods; the observation of how the works are integrated into urban and natural contexts, with particular attention to their reversibility and compatibility.

This made it possible to build an operational and verifiable reading of the impacts, translating them into observable and comparable elements.

A qualifying aspect is the territorial analysis: Perugia, Terni, and Fabriano, as well as the more peripheral areas touched by the project, are interpreted as complex territorial systems, read through an interpretative lens comparable to that of "smart cultural cities," where installations contribute to processes of regeneration, accessibility, and the reactivation of spaces. This expands the evaluation beyond the direct impact, including indirect effects on attractiveness, mobility,

and the use of spaces.
UNIVPM also contributes to building an integrated framework of analysis by maintaining a dialogue with the other components of WP9, particularly the psychological analysis. While maintaining distinct responsibility relative to the psychological component, the University participates in defining an evaluation system that holds together quantitative and qualitative data, strengthening the overall robustness of the results and their interpretability.
In line with this structure, UNIVPM also assumed the role of tendering authority for outsourcing the activities of systematisation and presentation of results, initiating a dedicated procedure that led to commissioning Maria Vittoria Fiorelli for the finalisation of this report. This assignment aimed to integrate and systemise the data, analyses, and content produced within the scope of WP9, ensuring coherence across the scientific, design, and narrative dimensions. This step is particularly relevant because it allows a heterogeneous set of evidence to be translated into a structured, readable, and transferable framework, in line with the objectives of Work Package 9.
The reporting contribution concludes with the drafting of the Guidelines and Best Practices (WP9.3), where the scientific input of UNIVPM, integrated with the contributions of the other partners, guarantees the methodological robustness of the document and the transferability of the results to similar contexts. In this sense, UNIVPM does not limit itself to a measurement function but helps define a replicable methodological model for analysing environmental and energy impacts in complex cultural projects, capable of connecting artistic, infrastructural, and territorial dimensions into a single interpretative framework.

2.3.5 Istituto Poliarte di Ancona

The Istituto Poliarte of Ancona is an academy of higher education in the fields of design, visual arts, and multimedia production, recognized nationally and internationally for its ability to combine creativity, technology, and business culture.
Founded in 1972 by designer Carlo Bozzi, Poliarte represents one of the first Italian institutions to have conceived design as a total discipline, capable of uniting art, science, and communication into a single design language. With a vision grounded in innovation and project ethics, the Institute promotes an educational model centred on experimentation and applied research, where every study pathway is designed as a laboratory of ideas and interdisciplinary dialogue. Its areas of excellence span from Industrial Design to Visual Communication, from Fashion Design to Cinema and Audiovisual Arts, and up to Sound Design and Interior Design, constituting a creative ecosystem open to dialogue with businesses and cultural institutions.
Poliarte is recognized by the Ministry of University and Research (MUR) and belongs to European networks dedicated to educational innovation and the digital transition of the applied arts. The Institute collaborates with universities, companies, and research centres in Italy and abroad, offering its students international mobility pathways, internships, and co-design opportunities that facilitate their entry into the contemporary creative job market. Its educational philosophy is based on a "learning by doing" perspective, which integrates design practice with critical reflection and the social responsibility of design, fostering a new generation of

conscious, sustainable, and culturally active professionals.
In the ECO-Light project, Poliarte plays a crucial role in the artistic and production direction of creative and multimedia activities, contributing to the design of the Open Eco-System Labs (WP2), the co-creation of the Light Art installations, and the definition of the project's visual and digital communication. The participation of Poliarte ensures the bridge between technical and aesthetic languages, transforming academic research into accessible and immersive visual experiences.

In synergy with the Istituto Italiano Design, the "Briccialdi" Conservatory, and the Università Politecnica delle Marche, Poliarte interprets ECO-Light as an experimental laboratory of convergence between arts, technologies, and sustainability, capable of activating new forms of collaboration among universities, local territories, and the creative industry. The Istituto Poliarte thus continues its pioneering tradition in Italian design, positioning itself as a key actor of the contemporary era and in the formation of a responsible project culture that is sensitive to both people and the environment.

2.3.6 Contribution to Sustainability

Poliarte's contribution to sustainability is primarily situated within the design and implementation phase of the Open Eco-System Labs (WP2), driving an advanced technical-design role in defining spatial, technological, and engineering configurations aimed at constructing high-performance, integrated environments that can be monitored over time.
During the design phase, Poliarte provided specialist design support focused on defining the functional and technological requirements of the spaces, paying particular attention to functionality, technological integration, and the alignment between intended use, expected performance,

and operating conditions. The work involved designing layouts capable of supporting complex, multidisciplinary activities - research, audiovisual production, teaching, and experimentation - through a single, unified spatial system, thereby avoiding infrastructural fragmentation and redundancies. The design choices prioritized:

- Configurational flexibility of environments: Understood as the capacity to adapt to different functions without structural modifications;
- Shared equipment and infrastructures: To reduce duplication and intensify the use of available resources;
- Operational integration across disciplines: With a specific focus on continuity between artistic production and technological support;
- Workflow optimization: Reducing intermediate steps, downtime, and the need to transfer between different spaces.

Poliarte contributed to the design of the OEL spaces through a systemic approach that bound together environmental requirements, technical performance, and real-use conditions, with particular reference to high-tech environments and their operating parameters. In the concept and design coordination phases, Poliarte integrated criteria for user safety, consumption optimization, and thermo-energy management, analyzing the characteristics of the technologies employed in relation to energy loads, heat dissipation, and compatibility with existing systems, thus ensuring compliance with European standards and applicable DNSH principles for the setup.

Finally, in the space-system-technology integration, Poliarte took into account the actual conditions of installation, accessibility, and maintenance, collaborating on the definition of a functional and safe set-up for the educational and performative use of the spaces. This step is significant from a WP9 perspective, as it enables the construction of environments where energetic and operational performances are not merely predicted, but effectively observable, verifiable, and documentable over time.

From the viewpoint of WP9, the value of Poliarte's contribution lies in this ability to transform design criteria into measurable spatial and technical configurations, helping to create the conditions under which impacts

related to resource use, spatial functioning, and production processes can be effectively detected and analyzed. The solutions adopted in spatial design and content production thus become the operational baseline upon which the scientific monitoring activities conducted in WP9 are built.

2.3.7 Conservatorio "G. Briccialdi" di Terni

The "Giulio Briccialdi" Conservatory of Music in Terni is one of the most active and recognized institutions of higher musical education in Italy, serving as a benchmark for artistic experimentation, sound research, and the enhancement of contemporary musical culture.
Founded in 1922 and becoming a state AFAM institution in 1999, the Conservatory is named after the celebrated flautist and composer from Terni, Giulio Briccialdi, a symbol of Italian musical excellence worldwide. For over a century, the Conservatory has trained generations of musicians, composers, and sound professionals, maintaining a balance between academic tradition and the new frontiers of artistic and technological production. The educational offering of the Conservatory embraces all fields of classical, contemporary, jazz, electronic, and multimedia music, featuring first- and second-level academic pathways, masterclasses, and research laboratories that promote interaction between sound languages, performing arts, and new media. The pedagogical approach of the "Briccialdi" stands out for the centrality of the laboratory and experimentation, where musical practice becomes a site of inquiry, innovation, and inclusion. The school is committed to building an accessible, inclusive educational model open to society, encouraging the participation of youth, families, and local communities through educational and performative projects of high cultural value.
Within the context of the ECO-Light project, the "Briccialdi" Conservatory plays a prominent role as an artistic and educational partner, contributing to the realization of sound performances and educational pathways aimed at younger generations (WP6), as well as the activation of an

additional PhD research program, supplementing the pathways already envisioned in the ECO-Light project. The collaboration with the Istituto Italiano Design, Poliarte, and the Università Politecnica delle Marche has given rise to an unprecedented dialogue between music, light, and science, in which the sonic dimension becomes an integral part of the visual and spatial experience. Through concerts, workshops, and interdisciplinary productions, the Conservatory explores the relationship between sound, technology, and sustainability, promoting a new paradigm of responsible and shared creativity.

The "Briccialdi" is also a key protagonist in the Light Art for UNESCO (WP3) initiatives, bringing music to the symbolic sites of Umbria's natural and cultural heritage, such as the Marmore Waterfalls, where sound dialogues with light and the environment, amplifying the sensory perception of the landscape. Its participation in the project helps construct a vision of music as a common good - a tool for cohesion, education, and cultural regeneration. With its long artistic tradition and capacity for constant innovation, the "Giulio Briccialdi" Conservatory represents a bastion of excellence and creativity in the heart of Umbria, a place where music meets research and transforms into a universal language of sustainability and beauty."

2.3.8 Contribution to Sustainability

The Briccialdi Conservatory contributes to WP9 primarily through the construction of the project's sonic, performative, and educational components, which directly impact both the quality of the collective experience and the ability to observe its effects on the audiences involved. Its role develops in continuity with the project's artistic activities, helping to build contexts of participation and sharing that constitute a concrete baseline for interpreting the cultural and relational impact generated by ECO-Light's actions. Indeed, the Conservatory is an active partner in the WPs dedicated to artistic production, interdisciplinary training, activities aimed at younger generations, and widespread museum itineraries, with explicit involvement in musical performances, workshops, and territorial dissemination actions.

From an environmental perspective,

the Conservatory's contribution is mainly integrated into the design and execution of musical performances embedded within the Light Art installations (WP3) and museum pathways (WP7). In these contexts, attention to the compatibility of performative devices operationally translates into the reduction of unnecessary technical equipment, the choice of acoustic and performative solutions compatible with natural settings, the limitation of the events' logistical impact, and the creation of formats adaptable to the hosting venues. The performances are designed to adapt to the locations, avoiding invasive interventions and favoring temporary, light, and reversible setups that are consistent with the site-specific nature of the project and the need to avoid overburdening either natural sites or peripheral museum contexts. The project proposal assigns the Conservatory a precise role precisely within the multisensory pathways of decentralized museums, where music enters into a dialogue with dance, theater, and visual arts following a logic of cultural reactivation of spaces and low-infrastructure usage.

A distinctive element of the Conservatory's contribution concerns the relationship between music, space, and the environment, viewed not as an incidental framework but as an actual design axis. Musical performances become an integral part of the artistic ecosystem, helping to create immersive experiences based on the interaction between sonic presence, the hosting context, and perceptual quality, without relying on scenic or technological apparatuses disproportionate to the action's objectives. This approach reinforces the project's coherence in terms of technical proportionality and the responsible use of resources, demonstrating how cultural production can be rethought through more sober, adaptive, and territorially sensitive performative configurations.

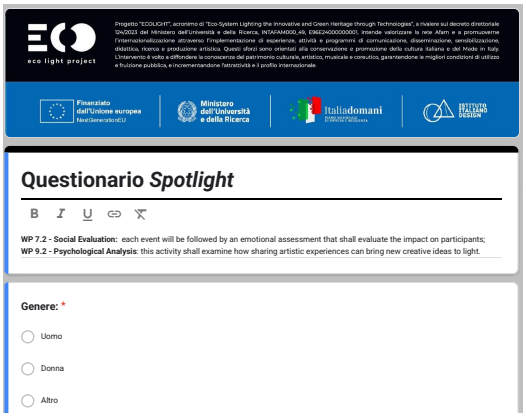
THE POSTER FOR THE BRASS ENSEMBLE'S CONCERT, WHICH TOOK PLACE AT THE MARMORE FALLS

On the social level, the Conservatory assumes a central role in the activities that feed into the Psychological Analysis (WP9.2). Musical performances constitute one of the primary activation mechanisms through which the dynamics of participation and sharing - analyzed via the "Social Dreaming" methodology - are structured. Music, by its very nature, fosters the construction of collective experiences,

making it a particularly effective lever for observing and evaluating the impact of artistic activities on groups and communities. The design setup of WP7 itself stipulates that the multisensory pathways in museums be accompanied by an emotional and participatory evaluation, useful for understanding how artistic experiences alter the perception of places, the quality of engagement, and the relationship between the public and cultural heritage.

The Conservatory's involvement in activities targeting younger generations (WP6) and museum pathways (WP7) further generates qualitative data relevant to WP9, allowing for an analysis of how the artistic experience varies as a function of context, audience, and methods of fruition. This aspect is explicitly envisioned in the project, which directly links immersive and widespread experiences to the evaluation of their effect on audiences differentiated by age, origin, and socio-cultural background. In this framework, the Conservatory's contribution is not merely executive: it is part of the observational architecture of WP9, because it provides performative situations where audience behavior can be read in a contextualized rather than abstract manner.

The project has also generated a structural effect on the educational and research levels internal to the Conservatory. In particular, the activities developed have indirectly contributed to strengthening advanced research pathways, fostering the involvement of academic figures and contributing to the growth of skills related to the interaction between music, technology, and context. This element found a particularly significant realization in the activation, by the "G. Briccialdi" Conservatory of Terni, of an AFAM PhD in "Music, Design, Art and Territories," developed with NRRP funds and in collaboration with IID. This is described in the report as an additional pathway relative to the original project structure and as a natural expansion of WP4. The scholarship was awarded to Dr. Maria Bocelli, whose research is dedicated to the role of intangible cultural heritage in territorial enhancement, tangibly strengthening



SCREENSHOT OF THE QUESTIONNAIRE USED AS A QUANTITATIVE RESEARCH TOOL

the link between artistic production, academic research, and advanced training. Dr. Bocelli herself conducted social research, which is included in this report as a supplementary monitoring analysis of the project and its impact.
This openness to further opportunities represents an added value not foreseen in the initial remodeled plan, capable of extending the scientific and cultural scope of ECO-Light beyond the minimum guaranteed framework established after the replacement of the original PhD with the UNIVPM research fellowship.
The Conservatory's contribution also extends to activities aimed at younger generations (WP6), where music is used as an educational and inclusive tool. Workshops, laboratories, and performative moments help create accessible learning spaces, encouraging the encounter between different disciplines and audiences. This type of activity reinforces the project's capacity to activate qualified cultural access, helping to lower access barriers and promote active participation.
The project implementation explicitly assigns the Conservatory a role in the Umbria Jazz 4Kids workshops, where the interaction between sound and light is translated into a laboratory experience designed for children and families, with educational, perceptual, and interdisciplinary goals.
Within the context of WP9, these experiences represent a particularly relevant wealth of qualitative evidence, useful for analyzing the impact of activities on groups differing in age, background, and modes of participation. The Conservatory's contribution is therefore fundamental to understanding how performative and musical practices affect the relationship between places, audiences, and the co-construction processes of the cultural experience.

In conclusion, the Briccialdi Conservatory brings to WP9 a contribution centered on the relational, educational, and performative quality of the project's actions, placing music at the center as an intangible infrastructure connecting languages, territories, and communities. It helps build the conditions for an analysis grounded not only on the events carried out, but on their capacity to activate participation, produce learning, and consolidate advanced research trajectories consistent with the interdisciplinary framework of ECO-Light.

2.4 Stakeholders' Network

The ECO-Light network extends beyond national borders thanks to collaborations with high-profile international academic and cultural institutions, including the JCI Institute for Multimedia Design in Vancouver and the Somaiya College of Arts in Mumbai, which strengthen the project's global dimension and promote its Internationalization through shared events, exhibitions, and educational programmes.

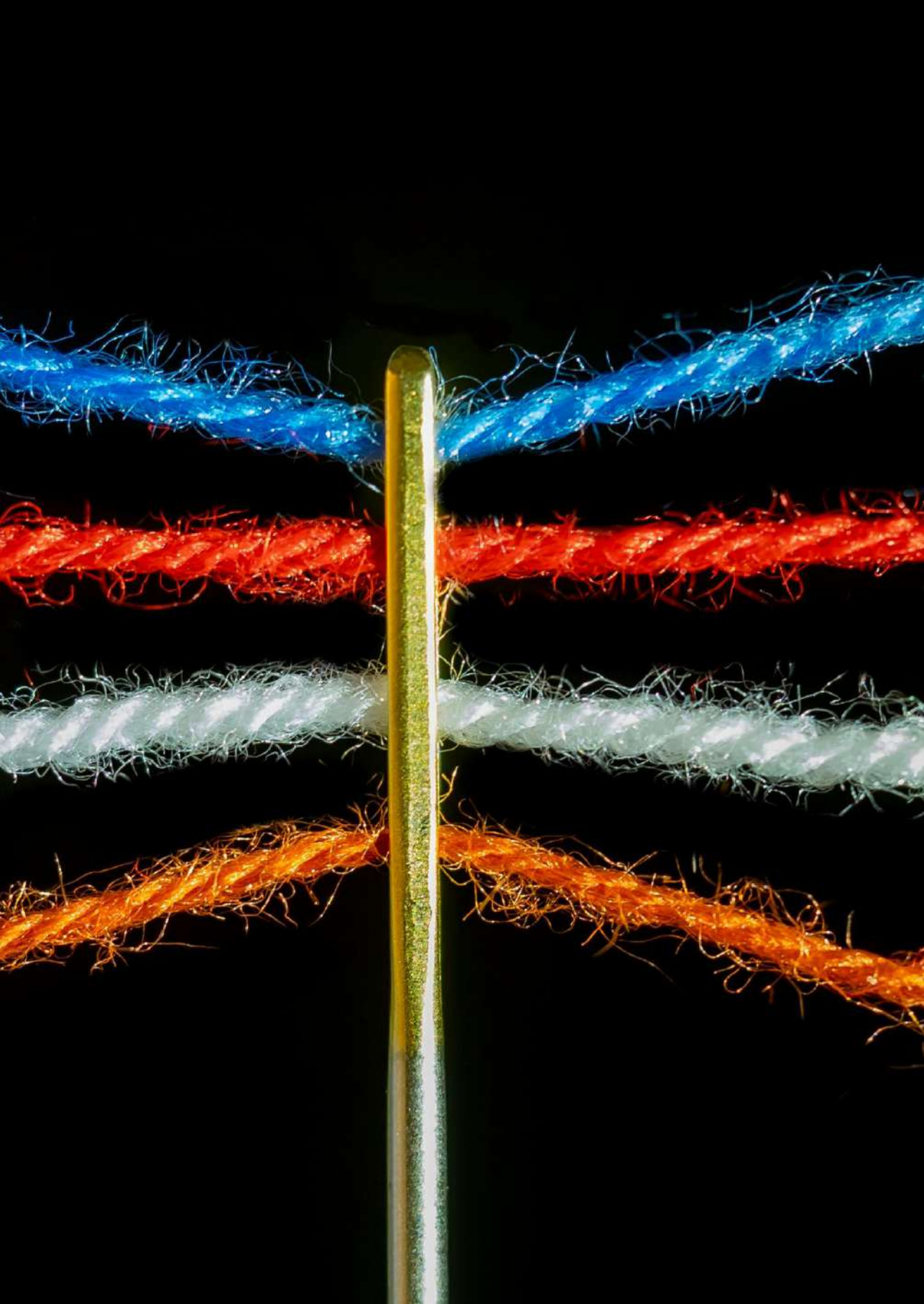
A prominent role is also played by a plurality of territorial and institutional stakeholders - over fifty public and private entities - who support the project through cultural, scientific, and operational partnerships. These include the Municipality of Perugia, the Municipality of Fabriano, the Municipality of Terni, the Fondazione CariPerugia Arte, the Umbria Jazz Foundation, the Giordano Foundation, the Italian-Canadian Chamber of Commerce, the Italian Trade Agency, and the UNESCO Clubs of Perugia and Florence. The participation of museums and foundations - such as the MUAM, the Fuseum, the Museo della Carta e della Filigrana (Museum of Paper and Watermarking) of Fabriano, the Museo del Ricamo (Embroidery Museum) of Sant'Anatolia di Narco, and many others - further enriches the project's cultural and social fabric, making it a model of public-private collaboration for the enhancement of widespread heritage.

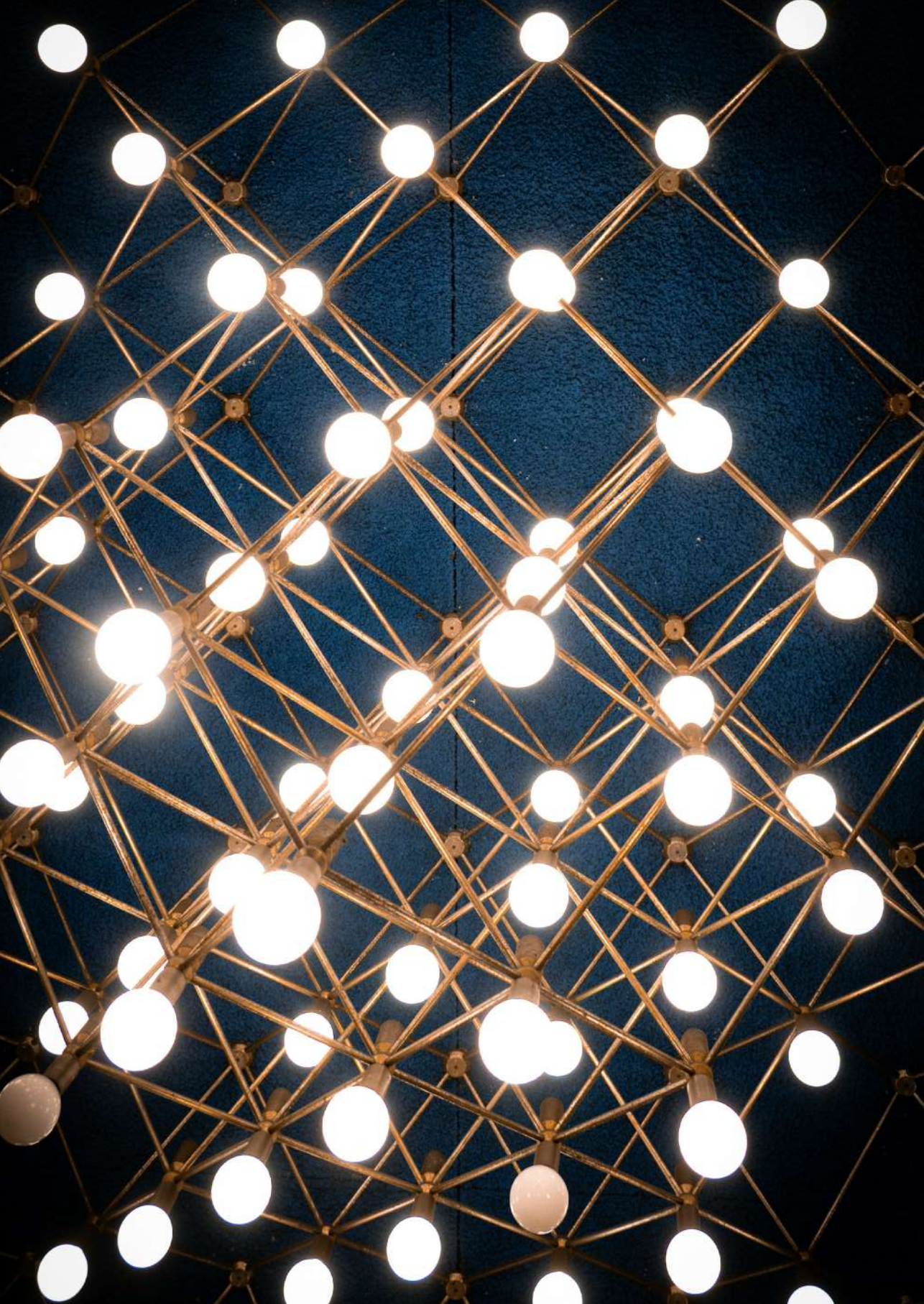
Finally, the participatory dimension of the project is amplified by the presence of civic associations, artistic foundations, schools, and festivals, which contribute to building a dynamic and inclusive ecosystem.

ECO-Light is not merely a project of research and artistic production, but a collective process capable of generating cultural, economic, and social value, igniting new perspectives of cooperation between art, science, institutions, and communities.

2.5 Direct supporters

1. Club di Firenze per l'UNESCO
2. JCI Institute in Vancouver, Canada
3. Somaiya College in Mumbai, India
4. Dance School "Morlacchi"
5. Theatre Festival "Strabismi"
6. Cari Perugia Arte Arts Foundation
7. Umbria Jazz Music Foundation
8. Officine Creative Assoc. Fot.
9. Caos Terni
10. Museum of Embroidery in Val Topina
11. Museum of Crafts in Gubbio
12. Museum of Hemp in S. Anatolia
13. Photo Archive Museum C. Pieve
14. Museo della Carta e della Filigrana di Fabriano
15. Museum Fuseum in Perugia
16. Times Higher Education Ranking
17. Canadian Chamber of Commerce
18. Italian Trade Agency in India
19. WIT Digital Marketing
20. 8.6 Marketing
21. Consul General in Canada (patronage)
22. Perugia Municipality (patronage)
23. Terni Municipality (patronage)
24. Fabriano Municipality (patronage)
25. Tigli Local-Social Association
26. Coraggio Local-Social Association
27. Associazione Il Sigaro di Freud
28. National-Labour Confimi
29. AIDP Italian HR Directors Association
30. Italian Legal Civic Association
31. National Consumers Civic Union
32. ATMO&Gioform (Euro-Chocolate)
33. Orizzonte Nove Festival Organizer
34. Bertacchi Design Studio Italy/Canada
35. Thyrus
37. See You Sun





3. Scientific Analysis

3.1 Methodological Introduction

This chapter presents the results of the scientific analysis conducted within the framework of WP9, with the aim of evaluating the environmental, energy, and territorial impacts of the Light Art installations developed in the ECO-Light project. In doing so, it moves beyond a purely descriptive reading of the works to propose an initial, structured model of observation and interpretation.

The analysis focused on a set of key variables that combine to determine the overall impact of the artistic interventions, treating the installations as integrated systems in which technical components, design choices, and modes of fruition interact with one another. Specifically, the following aspects were examined: the energy consumption of the works, the power sources utilized, the material impact of the setups, the degree of reversibility of the interventions, the duration and methods of activation, and the dynamics of audience access and mobility. This approach made it possible to shift the focus from the artistic object itself to its functioning as an environmental and cultural device, enabling a comparative evaluation between installations that differ in scale, medium, and context.

From a methodological standpoint, the analytical activity was developed through a combination of::

- Direct observation of the installations;
- Collection and systematisation of technical project data (installed power, hours of use, system configurations);
- Analysis of material and installation characteristics;
- Evaluation of user modes and audience flows across the different territorial contexts (Perugia, Terni, Fabriano).

Considering the absence of a continuous instrumental monitoring system, the evaluation was based on technical-design indicators and validated estimates, which nevertheless allow for a coherent and comparable reading of the impacts, in line with the project's objectives and the principles of WP9.

3.1.1 What Has Been Measured

The analysis made it possible to identify and systemise a set of indicators applicable to Light Art practices, including:

- Energy requirement of the installations, expressed in terms of installed power, activation duration, and estimated overall consumption;
- Type of energy source (power grid, hybrid systems, autonomous renewable energy);
- Material impact, understood as the ratio between the perceived volume and the quantity of material used;
- Degree of reversibility of the interventions and the presence or absence of permanent changes to the site;
- User and public access modes, with a specific focus on the impact related to mobility;
- Integration with the hosting context (urban, museum, or natural settings).

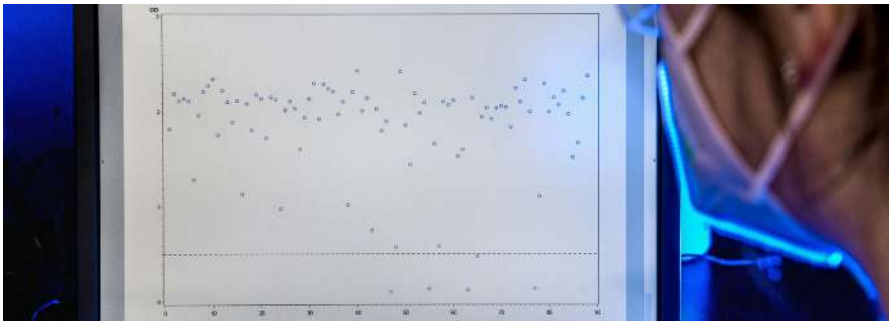
These parameters, applied across the various installations, made it possible to build an initial comparative framework of the environmental and operational impacts of the works.

3.1.2 How Has Been Measured

The measurement was conducted through a comparative and design-oriented approach, based on the analysis of the technical characteristics of individual installations and their translation into impact indicators.

For each intervention, summary sheets were compiled integrating energy data, material information, installation configurations, and usage modes, allowing for the comparison of works that are deeply different from one another (immersive environments, performative installations, site-specific interventions in natural contexts, and hybrid formats). The approach adopted, while not based on real-time instrumental measurements, allows for:

- Standardising the reading of the interventions;
- Identifying recurring design patterns;
- Highlighting critical areas and margins for improvement;
- Defining replicable criteria for future applications.



3.1.3 What Has Emerged

The analysis clearly shows that the environmental impact of Light Art installations does not depend exclusively on technological intensity, but on a set of integrated design choices. In particular, several cross-cutting findings emerge:

- Energy consumption is generally contained, particularly in cases where activation is limited in time or supported by efficient technologies;
- The material component of the works is reduced, with a high incidence of immaterial elements (light, perception), making it possible to limit the use of physical resources;
- The reversibility of the interventions represents a constant and strategic element, avoiding permanent transformations of the hosting contexts;
- Integration with existing spaces (museum, urban, or natural) helps reduce the overall impact, avoiding the creation of new infrastructure;
- Audience mobility, in most cases, remains at contained levels thanks to the integration of the works into contexts that are already active or easily accessible.

Among the cases analysed, different yet complementary models emerge: low-consumption installations in controlled environments, performative devices with a concentrated temporary impact, autonomous renewable energy interventions, and configurations with a zero-energy impact.

3.1.4 Why It Is Relevant

The contribution of this analysis lies in the possibility of translating sustainability, which is often treated in abstract terms within the artistic field, into a set of observable and comparable parameters.

The work carried out indeed allows for:

- Demonstrating that Light Art can be designed according to environmental and energy sustainability criteria;
- Identifying operational models that are replicable in different contexts;
- Integrating the artistic dimension with the technical-scientific one, in line with the objectives of the ECO-Light project;
- Contributing to the development of a methodological approach useful for defining guidelines and best practices.

In this perspective, the analysis is not limited to evaluating the impacts of individual works, but opens up the possibility of considering artistic production as a measurable field of design, capable of generating cultural value without compromising environmental and territorial resources.

3.2 Installation 1: *Densità fluorescenti* Perugia

The works of Alessandro Lupi resulted in a temporary, immersive, and multimedia Black Light Art installation, curated by Gaetano Corica and Gisella Gellini and developed together with design and multimedia students from the IID. The premises in via XX Settembre thus became a site of artistic planning, with the aim of regenerating the area and leaving a visible legacy of the project.
Students and teachers participated in the design, setting up, and communication of the exhibition, making the work a true educational output as well as an artistic one. Its permanence for the entire duration of ECO-Light consolidates the bond between artistic production, school, and territory.
Starting from research into 'fluorescent densities', the intervention transformed one of the exhibition spaces (the former vault later integrated into the OEL) into a dynamic Black Light Art environment that can be updated over time and also used for educational purposes.

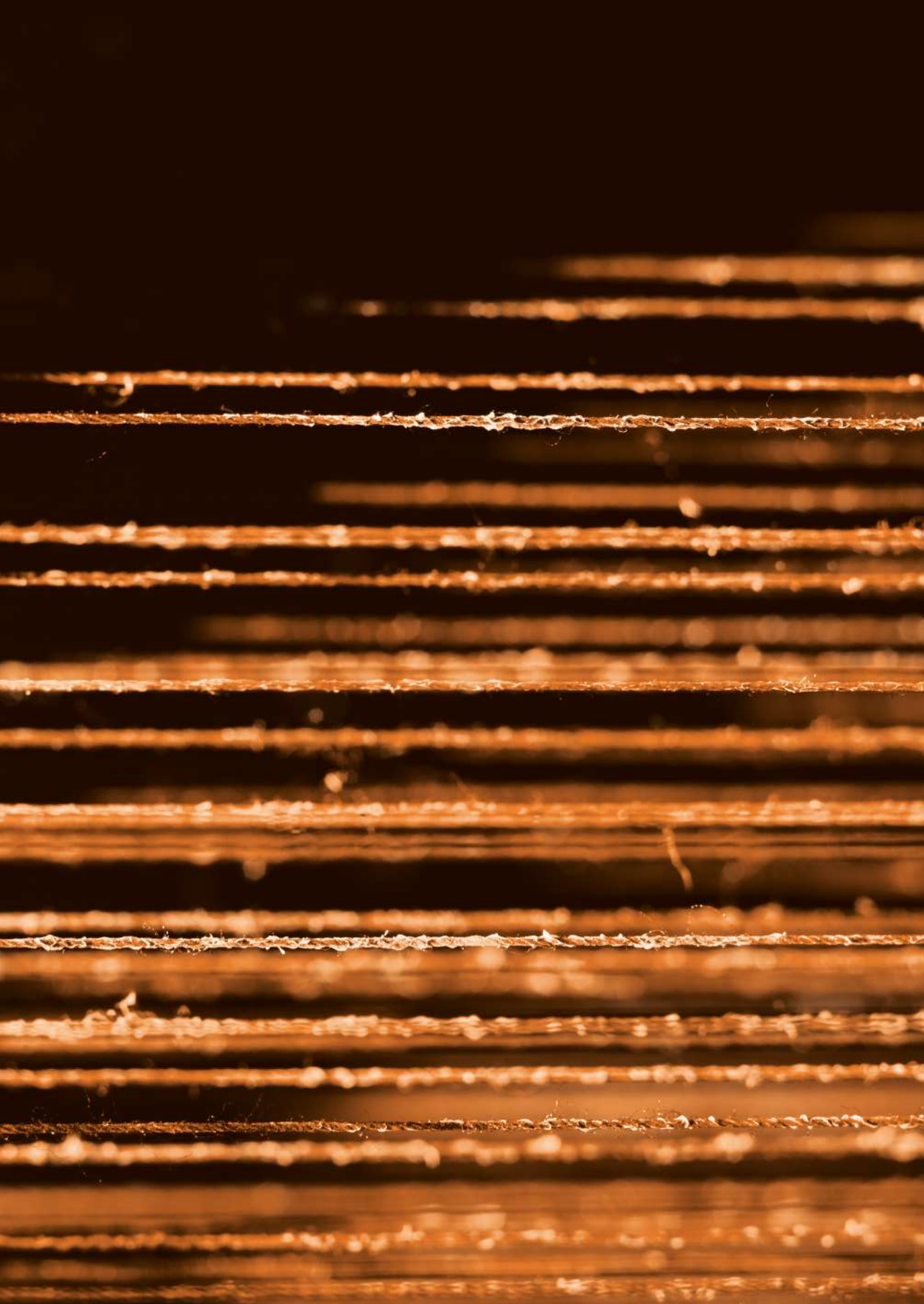
3.2.1 Technical, environmental and socio-cultural impact analysis

(Adapted from the research by Gaetano Corica)

Within the framework of the ECO-Light project activities, Densità fluorescenti represents a particularly significant intervention for analysing the potential of artificial light in controlled exhibition contexts. The work forms part of the research into artist's light as a device capable of activating space through perceptual phenomena, focusing on the relationship between the luminous component, material structure, and audience interpretation.
In this sense, the installation constitutes a relevant case study for the integrated assessment of technical, environmental, and user aspects, in line with the monitoring objectives of the project.

Artistic Concepts and Research about *Densità Fluorescenti*

Alessandro Lupi's research focuses on the relationship between light and perception, exploring the mechanisms through which the human visual system constructs coherent images from partial stimuli. Densità fluorescenti are, in fact, based on a principle of perceptual illusion: three-dimensional figures emerge in space not as fully material objects, but as the results of a cognitive process that unifies dispersed light signals.
From a technical-formal point of view, the works consist of a dense web of polyester threads, arranged in regular configurations and selectively treated with fluorescent paints. The intervention of ultraviolet light activates exclusively the painted portions,



generating the perception of volumes suspended in space. The result is a form of 'immaterial sculpture', in which light takes on the role of the only visible constructive element, while the physical structure remains almost entirely invisible.

Technical Configuration and Light Devices

From a technical point of view, the installation is based on an integrated system of ultraviolet light sources and light-reactive materials. Wood's lamps constitute the primary component of the system, activating the fluorescent surfaces and determining the chromatic and spatial rendering of the works.

These are accompanied, in some cases, by additional technological devices that introduce dynamic elements into the experience, such as rotation systems, programmed light cycles, and audio components. The evolution of LED technologies and control systems has enabled more precise and flexible lighting management, helping to transform originally static works into dynamic and variable environments. The overall configuration is characterised by a relative ease of installation, while maintaining a high degree of control over the perceptual experience.

Integration with space and installation character

The installation finds a particularly effective placement within a space devoid of natural light, a necessary condition for the correct functioning of ultraviolet light. In this sense, the choice of the former vault of the Istituto Italiano Design proves particularly significant: a closed, intimate space characterised by architectural elements with a strong identity.

The relationship between the work and the environment develops through a direct dialogue between darkness and emerging light, in which the works activate the space, transforming it into an immersive environment. The presence of pre-existing elements, such as the reinforced door and the structural configuration of the vault, helps to reinforce the alienating nature of the experience.

From an installation perspective, the intervention remains non-invasive and completely reversible, adapting to the space without requiring permanent alterations.

Sustainability and Material Impact

One of the most significant aspects of the work concerns its reduced material impact. The installations are based on lightweight structures consisting of frames and thin threads, where the physical component occupies a minimal portion of the overall volume, while perception is relies almost entirely on light.

From an energy perspective, the use of UV sources and LED systems keeps consumption within a contained range, particularly in the continuous exhibition mode. Even in cases where dynamic or audio elements are present, the overall energy impact remains limited. This combination of low material impact, contained consumption, and total reversibility of the intervention helps to configure the work as a coherent example of a low-environmental-impact installation.

Educational and Participatory Dimension
A distinctive element of the intervention is the direct involvement of the students from the Istituto Italiano Design in the various phases of design, setting up, and communication. The installation is therefore configured not only as an artistic outcome, but as an integrated educational process in which cultural production becomes an opportunity for learning.

The activation of a dedicated design workshop allowed for the transfer of specific skills related to Light Art, fostering a multidisciplinary approach and active participation. This aspect helps to strengthen the bond between the educational institution, artistic production, and the local area.

Public experience and socio-cultural impact
The visitor experience is characterised by a strong immersive and perceptual component. The darkened environment and the nature of the works induce the public to slow down the pace of their visit, encouraging greater concentration and increasing the time spent in the space.

From a territorial point of view, the initiative represented an opportunity to enhance the premises of the Istituto Italiano Design and to culturally activate the urban area, contributing to the dissemination of light culture outside conventional exhibition circuits.

Conclusions
Overall, *Densità Fluorescenti* is configured as an intervention consistent with the objectives of the ECO-Light project, demonstrating how artificial light can be used as a tool for constructing space and activating perception, with a contained environmental impact.
The work also highlights the possibility of combining artistic research, sustainability, and education, proposing a replicable model of a low-impact installation capable of activating meaningful relationships between space, the public, and the cultural context.

3.2.2 Impacts Sheet

Identification of the Artwork
- Artwork Title: Densità Fluorescenti
- Artist: Alessandro Lupi
- Artwork location: Istituto Italiano Design, Perugia
- Type of setting: indoor (controlled exhibition space, with no natural light to ensure stable viewing conditions)
- Duration: temporary exhibition
- Related Work Package: WP3

Technical and Installation Specifications
- Lighting technology used: Wood's lamps (UV), LED systems
- Primary light source: yes (UV lamps)
- Secondary light source: yes (fluorescent and photoluminescent paints)
- Dynamic/timed systems: present

in some works (rotation, light cycles, audio). Presence of integrated kinetic and sound components, with an experiential rather than structural function regarding the overall energy impact
• Installation configuration: lightweight suspended or tensioned structures, with targeted distribution of UV sources for selective activation of fluorescent materials

Energy Consumption
• Estimated installed power: 150–300 W per work
• Average power-on duration: 4–6 hours/day
• Average hourly consumption: 0.6–1.2 kWh
• Estimated total consumption per event/installation: 6–15 kWh
• Energy impact class: low

Materials and Material Impact
• Main materials: Polyester threads, lightweight frames, fluorescent paints
• Overall material impact: Very low (≈5% matter / 95% void)
• Assembly type: Non-invasive, without permanent structural anchors, utilizing removable and reusable systems
• Reversibility of the installation: Total
• Need for permanent site works: No

Mobility and Audience Experience
• Estimated number of visitors: 300–500 people
• Prevailing access modes: Pedestrian and public transport
• Average distance travelled: < 5 km
• Mobility impact class: Low
• Audience type: Mixed (students, design professionals, local public), with a prevalence of users already present within the target urban context
• Accessibility: High, thanks to the urban location and proximity to services and sustainable mobility infrastructure

Relationship with the Context
• Relationship with space: Direct dialogue with a closed and darkened environment. The space-work relationship is based on total control of lighting conditions, which is necessary for the full activation of the fluorescent materials
• Duration of the intervention: Temporary
• Effects on experience: Increased time spent in the space, immersive experience
• Contribution to smart city practices: Indirect but significant (conscious use of light, local cultural activation)
• Perceptual effect: Construction of an immersive environment based on selective light activation, redefining the perception of the space without altering its physical structure

3.3 Installation 2: Arpa di Luce Umbria Jazz, Palazzo Baldeschi, Perugia

For the context of Umbria Jazz, recognized as part of UNESCO's intangible cultural heritage, the curators worked with artist and musician Pietro Pirelli to set up the 'Arpa di Luce' (Harp of Light), an installation-performance in which laser beams become sound strings that can be played by both the performer and the audience.Placed within a historical space provided by the Fondazione CariPerugia Arte and included in the festival's official program, the work transformed the environment into an immersive musical instrument where gesture, light, and sound coincide.

The initiative was accompanied by an educational program involving Umbrian music conservatories, whose students were able to experiment with the instrument firsthand and explore the relationship between light and music. In this way, the work served a dual purpose: a high-visibility event and an educational tool aligned with the project's objectives.

3.3.1 Technical, environmental and socio-cultural impact analysis

(Adapted from the Research by Gaetano Corica)

Within the framework of the ECO-Light project, Arpa di Luce (Harp of Light) is configured as an artistic and technological installation resulting from a long history of interdisciplinary research where engineering, musical, and visual skills converge. The work represents an emblematic case of integration between technical experimentation and artistic sensitivity, which originated from studies conducted by Gianpietro Grossi in the 1990s and subsequently evolved through collaboration with Pietro Pirelli.

The original concept stemmed from the desire to create an 'intangible' instrument, where the strings consist of luminous energy and are devoid of material substance. Starting from the first prototypes, the project has gone through various evolutionary stages, progressively transforming from an experimental device into an internationally recognized artistic installation.

Technical Evolution and Operating System

From a technical perspective, the Arpa di Luce is configured as a complex human-machine interface system, where light does not produce sound directly but instead triggers a process of electronic translation. Laser beams, connected to optical sensors, generate signals that are interpreted by a control system and transformed into sound impulses via digital synthesizers.

During its development, the system underwent a major evolution: shifting from an initial configuration based on a single beam split by mirrors to the use of autonomous laser

Photo by G. Corica

sources, which guarantee greater precision, reliability, and response speed. The introduction of new interactive software and the optimization of the sensors made it possible to achieve extremely low latency levels, making the instrument highly responsive and performative. This evolution also expanded the expressive possibilities, allowing for greater sound articulation based on gesture and interaction style.

Light, Sound, and the Perceptual Dimension

One of the founding elements of the work is the relationship between light and sound, understood in both a physical and perceptual sense. As highlighted by theoretical studies on the relationship between wave phenomena, light and sound share certain structural characteristics despite belonging to distinct domains. This relationship finds its artistic expression in the synaesthetic dimension of the work, where light assumes an expressive and narrative function capable of generating an immersive experience.

The installation is thus configured as a multisensory environment, where sound emerges from interaction with a luminous space that behaves like dynamic and intangible matter. The gestural component plays a central role: the interaction is not mediated by direct physical contact but develops through movement in space, requiring a heightened bodily and perceptual awareness.

Installation Configuration and Relationship With Space

The work is characterized by remarkable installation flexibility, allowing it to adapt to different spatial contexts. However, its configuration requires specific environmental conditions, including the ability to control ambient light, sufficient ceiling height, and good acoustic performance. In the case of the installation at Palazzo Baldeschi, the choice of space was a determining factor in the success of the intervention. The museum environment enhanced the dialogue between contemporary light and historical heritage, activating a connection between pre-existing artwork and the technological device.

The intervention was developed while respecting the characteristics of the venue through non-invasive and completely reversible installation solutions, thereby ensuring the preservation of the architectural and museum integrity.

Energy Impact and System Sustainability

From an energy standpoint, the installation is characterized by contained consumption relative to the visual and performative impact generated. The lighting system, along with the electronic and audio components, presents relatively low consumption values, particularly in the continuous exhibition mode.

The performance phases involve a temporary increase in energy demand, linked primarily to the amplification system, but these remain limited in duration. This balance allows the overall consumption of the work to be kept under control. The design of the system demonstrates how it is possible to achieve immersive and high-impact effects through a con-

scious and optimized use of energy resources.

Relationship With the Cultural Context
Integrating the work into the Umbria Jazz program helped strengthen its cultural and performative dimension. The installation served as a meeting point for different artistic languages, fostering a dialogue between music, visual art, and technology.
The presence of live performances and interactive moments encouraged dynamic and participatory public engagement, helping to establish the work as one of the main attractions within the urban context during the festival period.

Supplementary Considerations
Alongside the aspects highlighted in the research, the work presents further relevant elements in relation to the environmental and energy analysis objectives of the ECO-Light project. In particular, the reduced material impact of the installation - relying predominantly on lightweight and removable technological components - helps limit the overall footprint of the intervention. The total reversibility of the setup represents a further element of consistency with sustainable practices for enhancing cultural spaces. From a visitor perspective, its inclusion within an established event optimizes audience flows, reducing the need for dedicated travel and indirectly helping to contain mobility-related impacts. Furthermore, its central urban location favors predominantly pedestrian access.
Overall, *Arpa di Luce* is configured as a low-impact intervention, where the balance between the technological component, energy consumption, and engagement modes provides a replicable model for sustainable artistic installations.

3.3.2 Impacts Sheet

Identification of the Artwork
- Artwork Title: Arpa di Luce
- Artist: Pietro Pirelli
- Artwork location: The Altarpiece Room at Palazzo Baldeschi, Perugia
- Type of setting: a museum interior of historical and artistic significance, subject to conservation restrictions, requiring non-invasive interventions
- Exhibition period: 11 - 20 July 2026
- Related Work Package: WP3

Technical and Installation Specifications
- Lighting technology used: Laser
- Presence of primary light source: 11 parallel 200-milliwatt lasers
- Presence of secondary light source: No
- Dynamic/timed systems: Interaction with the laser beams produces sounds tuned by the artist, with near-zero latency. An amplification system featuring a mixer and two 500W speakers is connected to the harp.
- Installation configuration: A linear system of parallel laser beams ("luminous strings") activated by physical interaction, with technological components concentrated rather than

scattered throughout the space.

Energy Consumption
• Estimated installed power: Approximately 100 W in installation mode (laser + control electronics) and up to 1,000 W in performance mode (including audio system)
• Average power-on duration: 5 hours per day, for a total of 50 hours (44 hours in installation mode, 6 hours in performance mode) over the 10-day exhibition period
• Average hourly consumption: 0.1 kWh for the installation, 1 kWh for the performance
• Estimated total consumption per event/installation: 10.4 kWh
• Energy impact class: Low / Medium-Low / Medium

Materials and material impact
• Main materials: Stands and technological supports
• Overall weight/material impact: Very low, as the installation is fundamentally immaterial (light and sound) relative to the physical support elements
• Reversibility of the installation: Total

Need for permanent site works: none; completely non-invasive installation compatible with the preservation constraints of the museum context
• Assembly type: sistemi autoportanti e removibili, senza ancoraggi permanenti o modifiche strutturali dello spazio

Mobility and Audience Experience
• Estimated number of visitors: 230, consistent with museum visitor flows in the historic center and temporary attraction events of Umbria Jazz
• Prevailing access modes: Pedestrian
• Average distance travelled: Less than 25 km, given the local and national audience associated with the Festival in which the event was integrated
• Mobility impact class: Low (exclusive pedestrian access within a central urban area)
• Audience type: Mixed (Umbria Jazz Festival attendees, museum visitors, institutional and local public), with a high concentration of users already present in the historic center

Relationship With the Context
• Relationship with the architectural space: Foundational relationship between pre-existing elements and the artist's light intervention
• Duration of the intervention: Temporary
• Effects on spatial experience: Immersive and dreamlike atmosphere, increased time spent in the space, higher degree of audience interaction
• Contribution to smart city practices: Significant, reinforced by integration with the urban context activated during Umbria Jazz through the concentration of cultural flows, pedestrian use of the historic center, and the activation of museum spaces as temporary nodes in the urban cultural network. The intervention also contributes to a conscious use of technology and a dynamic relationship between art, interaction, and public space, in line with smart cultural city models based on accessibility, proximity, and intensity of space usage.

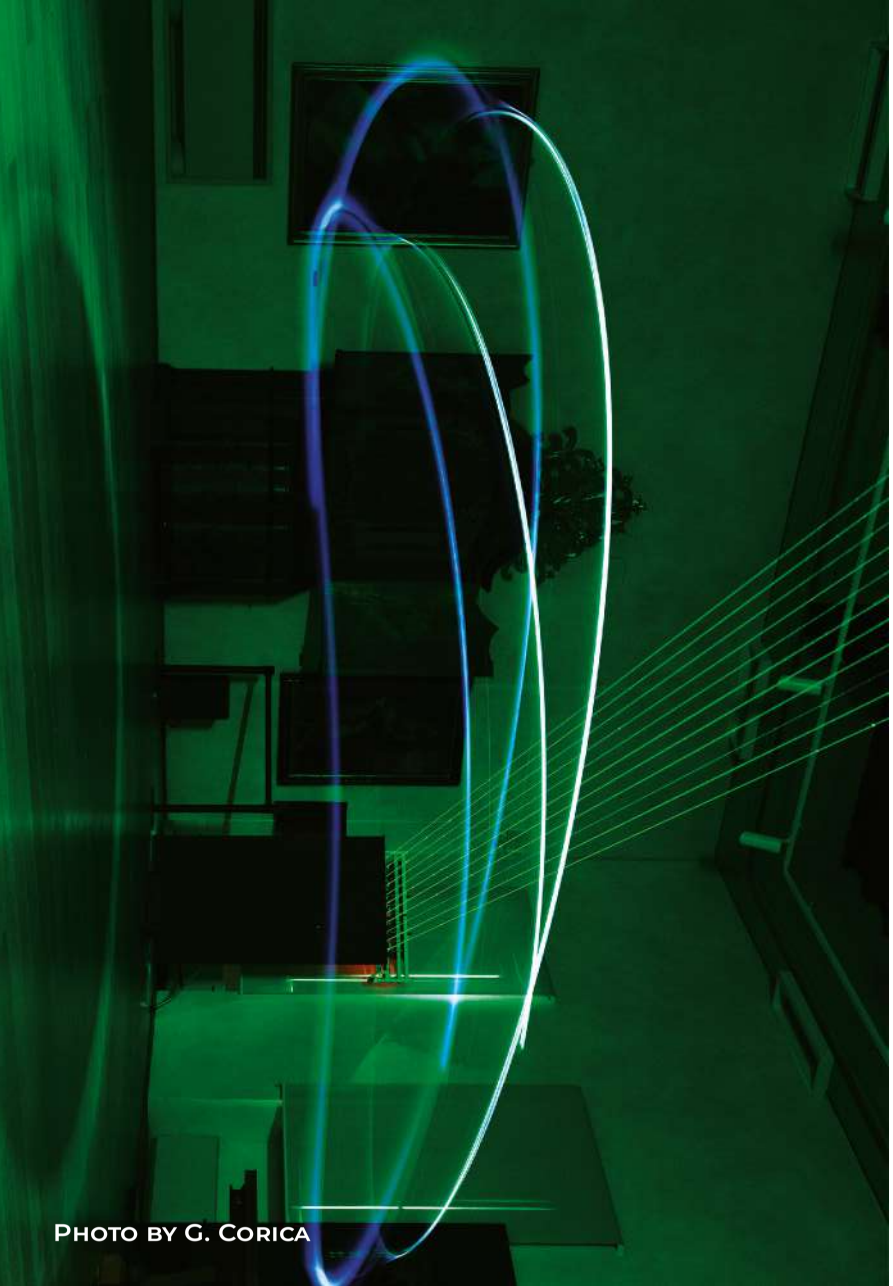


Photo by G. Corica

Photo by G. Corica

3.4 Installation 3: Elios - Solar Land Art Marmore Waterfalls, Terni

The intervention by artist Alessandro Lupi, titled *Elios*, was created as a sustainable artistic gesture designed to dialogue with the natural landscape of the Marmore Waterfalls.
The work relies exclusively on sunlight, reflected by five heliostats powered by small photovoltaic panels. These heliostats project beams of light toward the mist generated by the waterfall, creating dynamic, brief intervals of luminous patterns. Entirely autonomous and reversible, the installation was designed to integrate into the site without disrupting the ecosystem, enhancing phenomena already present within the natural context. Midway through the exhibition period, on August 30, 2025, the artwork became the centerpiece for a brass concert organized by the "G. Briccialdi" Conservatory of Terni. This performance transformed the site into a multisensory experience where sound and light merged. Elios represents one of the most significant moments of the ECO-Light project: an example of environmental art capable of uniting sustainability, technological research, and aesthetic contemplation.

3.4.1 Technical, environmental and socio-cultural impact analysis

(Adapted from the Research by Alessandro Lupi)

Within the framework of the ECO-Light project, Elios represents one of the most emblematic interventions regarding the experimentation of sustainable Light Art models in prestigious natural settings. Conceived by artist and artistic consultant Alessandro Lupi as part of WP3 (Light Art for UNESCO), the installation was designed as a site-specific intervention for the Marmore Waterfalls Park (Terni), a site recognized as a UNESCO asset of interest. From its conceptual premises, Elios configures itself as a work that treats sustainability not as an external constraint, but as a structuring principle of the creative, technical, and installation process.

Artistic Concept and Integration With the Natural Context

Elios is based on the idea of making solar energy visible through an artistic device capable of dialoguing non-invasively with the landscape. The work consists of five programmable kinetic mirrors powered exclusively by solar energy, designed to reflect and direct natural sunlight toward specific points of the waterfalls. The result is not an artificial overlay of light, but the construction of a perceptual experience arising from the interaction between sunlight, misted water, and the observer's point of view. The aesthetic dimension of the work is therefore intrinsically linked to environmental and temporal conditions, making every viewing unique and un-

repeatable.
This approach allows the installation to fit into the landscape context without altering its balance, enhancing already present phenomena - light, water vapor, refraction - and transforming them into expressive material. The work manifests as a light, ephemeral presence in which light acts as an immaterial medium capable of activating the space without permanently modifying it.

Technical Design, Prototyping, and Control

From a technical-scientific standpoint, the realization of Elios is the result of an articulate process of prototyping, testing, and validation. The preliminary phase included an in-depth study of the site's morphology and the solar trajectory in order to optimize the orientation of the mirrors and maximize reflective efficacy while reducing energy consumption. Scaled models and reflection tests were developed in controlled environments, accompanied by the selection of lightweight materials that are weather-resistant and compatible with an installation in a natural environment.
Each kinetic element integrates a complex yet optimized technological system: an ESP32 microcontoller, high-precision absolute encoders, DC motors, solar panels, batteries, and sensors, all governed by custom software developed specifically for the work. The system is able to constantly track the position of the sun thanks to a real-time clock (RTC), autonomously adjusting the movements of the mirrors and balancing energy consumption with solar recharging. The software also includes safety thresholds that inhibit operation under certain charge levels, guaranteeing operational continuity and system durability.

Environmental Validation and Safety

The methodological validation of the work included mechanical and optical safety checks, as well as an environmental compatibility analysis formalized through the Appropriate Assessment procedure (Valutazione di Incidenza - VINCA). The supporting and anchoring structures were designed to withstand atmospheric stresses, particularly wind, without invasive interventions on the soil or the river ecosystem. All materials employed - recycled aluminum, PETG, steel, and shatterproof synthetic glass - are recyclable and were selected to reduce the overall environmental footprint. The work operates according to a controlled temporal logic: activation occurs at limited intervals (approximately five minutes every hour), further reducing energy consumption and transforming the viewing into an anticipated, focused event in dialogue with the natural cycles of light and the opening and closing schedules of the waterfalls.

Environmental, Social, and Cultural Impact

From an environmental perspective, Elios is conceived as a zero-impact installation: exclusive solar power, zero emissions, zero waste production, and total reversibility of the intervention. Alongside these elements is a significant social and cultural dimension. The work invites the public into a new way of observing the landscape,

making renewable energy perceptible as an aesthetic and narrative phenomenon. The experience is inclusive, accessible even from a distance, and fosters reflection on the relationship between technology, nature, and design responsibility.
In this sense, Elios contributes to the tourist and educational enhancement of the Marmore Waterfalls site, stimulating awareness around sustainability themes and proposing itself as a replicable model for future Light Art installations in natural contexts of high environmental and cultural value.

Conclusions
In the context of the ECO-Light project, Elios serves as a particularly significant case study for Environmental Analysis, demonstrating how Light Art can operate responsibly, measurably, and consistently with ESG principles. The work integrates artistic research, technological innovation, and environmental mindfulness into a unified system, offering a methodological benchmark for the development of sustainable lighting design practices and for the dissemination of a new culture of light as a tool for enhancing natural heritage.

3.4.2 Impacts Sheet

Identifycation of the artwork:
- Artwork Title: Elios
- Artist: Alessandro Lupi
- Artwork location: Marmore Waterfalls Park
- Context type: Natural outdoor environment subject to environmental protection due to high landscape and ecological sensitivity, characterized by environmental compatibility constraints
- Exhibition period: July 25 - September 30, 2026
- Related Work Package: WP3

Technical and Installation Specifications:
- Lighting technology used: Natural light
- Presence of primary light source: Natural light
- Presence of secondary light source: None
- Dynamic/timed systems: Yes; five motorized heliostats programmed to activate at predefined intervals, relative to the position of the sun and the operating conditions of the system
- Installation configuration: Site-specific installation composed of five small solar heliostats, mounted on reversible supports and designed to reflect natural light toward the misting area of the waterfall, without introducing additional artificial light sources
- Power supply system: Autonomous, based on small solar panels and integrated batteries, featuring digital motion control and an operating logic synchronized with solar radiation

Energy Consumption:
- Estimated installed power: 50 W
- Average power-on duration: 1 hour/day (the installation activates in 12 preset 5-minute intervals throughout the day)

• Average hourly consumption: 0 kWh in terms of grid electricity draw, as operation is entirely covered by energy self-produced by the solar panels
• Estimated total consumption per event/installation: 0 kWh
• Energy impact class: Zero

Materials and Material Impact
• Main materials: Metals and polymer supports
• Overall weight/material impact: Very low
• Reversibility of the installation: Total

Need for permanent site works: None; the installation is designed to rest preferably on pre-existing structures or temporary supports, without permanent alterations to the ground or the landscape
• Assembly type: Non-invasive, with reversible anchors and the capacity for complete removal at the end of the exhibition period

Mobility and Audience Experience
• Estimated number of visitors: 650 visitors, consistent with the standard tourist and visitor flows of the Marmore Waterfalls Park during the summer period and with the project's dissemination activities
• Prevailing access modes: Pedestrian
• Average distance travelled: Approx. 50 km, given the site's distance from urban centers

Relationship With the Context
• Relationship with the natural space: The installation, featuring minimal visual impact, amplifies luminous and optical phenomena already naturally present at the site, specifically the interaction between sunlight and misted water
• Duration of the intervention: Temporary
• Effects on spatial experience: Enhanced dynamism of natural sunlight, increased time spent in the space
• Contribution to smart city practices: Partial, but highly significant regarding the tourism aspect of adjacent urban areas, as it combines technological innovation, autonomous energy management, cultural activation, and landscape integration
• Perceptual effect: The work acts as a device for revelation rather than overwriting the context, transforming a natural phenomenon into an aesthetic experience without increasing artificial pressure on the site.

PHOTO BY G. CORICA

3.5 Installation 4: Paper Runway. Paper and Light Fashion Show Fabriano (AN)

In dialogue with the Municipality of Fabriano and the 'Fabriano: Carta è Cultura' festival, the project developed a hybrid format combining fashion, identity-defining materials, and Light Art.
Guided by Professor Eleonora Granieri and architect and designer James Dimech, the students created a collection of paper garments, which was showcased alongside further designs developed within Fashion Design courses and international collaborations. This resulted in a runway show structured around multiple collections and expressive languages. The garments, specifically designed to dialogue with light, were enhanced through luminous elements and a theatrical stage production.
The runway show on September 12, 2025, at the Teatro Gentile, presented this year-long educational journey to the public, demonstrating how light can become a narrative device within the fashion realm and how a local industrial heritage (paper) can be reinterpreted through a contemporary lens. The event, included in the official program and amplified by the media, extended the scope of WP3 beyond environmental installations alone, directly engaging the community, students, and local institutions.

3.5.1 Technical, environmental and socio-cultural impact analysis

Within the framework of the ECO-Light project, Paper Runway – Sfilata di carta e luce (Paper and Light Runway Show) represents a significant extension of Light Art practices toward performative and interdisciplinary realms, where light integrates with the languages of fashion and scenography. The intervention stands out for its temporary and process-driven nature, configuring itself as a complex cultural device that unites artistic production, material experimentation, and an educational dimension.
In this context, the event constitutes a relevant case study for analyzing the environmental and socio-cultural impact of hybrid formats, in which the luminous component is not autonomous but rather integrated into a broader stage production.

Design Concept and Integration of Light, Fashion, and Material
The project is founded on the interaction between identity-defining materials - specifically paper - and lighting devices employed as tools for scenic and narrative enhancement. Light does not assume a merely technical function but becomes an active element in constructing the experience, helping to define the volumes, textures, and visual dynamics of the garments.
The use of paper as the primary material introduces a reflection on the relationship between fragility, transfor-

mation, and sustainability, while the luminous component amplifies the perceptual qualities of the artifacts, making details and stratifications visible that would otherwise be difficult to perceive.

Technical Configuration and Scenic System

From a technical perspective, the event is configured as a complex stage production in which theatrical lighting systems and lighting devices integrated into the garments operate in synergy. Light is utilized both as a tool for visibility and as a compositional element, contributing to the construction of atmospheres and narrative sequences.

The temporary nature of the setup and its placement within a theater space allow for the utilization of existing technical infrastructure, reducing the need for permanent installations. This aspect helps contain technical complexity and optimize resource consumption.

Sustainability and Material Impact

The intervention presents interesting characteristics in terms of sustainability, particularly regarding the use of materials. Paper, the central element of the project, represents a renewable resource deeply tied to the local industrial heritage, strengthening the link between the artistic project and the territory.

Furthermore, the use of salvaged materials and up-cycling practices in certain collections highlights an approach oriented toward waste reduction and the enhancement of existing resources.

From an energy standpoint, the temporary nature of the event and the limited duration of the runway show keep overall consumption contained, which is primarily linked to the stage lighting and audio systems. The absence of permanent installations and the reusability of the space further reduce the environmental footprint.

Educational and Participatory Dimension

One of the most significant elements of the intervention is its strong educational component. Indeed, the project originated within an educational framework that involved students across all phases, from the design and creation of the garments to the final stage production.

This participatory dimension transforms the event into a true applied workshop, where cultural production becomes an opportunity for learning and experimentation. Involving students from diverse backgrounds, including international programs, further strengthens the intercultural dimension of the project.

Audience Experience and Socio-Cultural Impact

Integrating the event into the program of the "Fabriano: Carta è Cultura" festival allowed it to reach a broad and diverse audience, contributing to the enhancement of the local area and its manufacturing heritage. The runway show serves as a point of synthesis between tradition and innovation, where paper is reinterpreted through contemporary languages.

From a visitor experience perspective, the event stands out for its ability to engage the audience within a narrati-

ve and spectacular dimension, expanding the scope of Light Art practices beyond the traditional installation context. The ephemeral nature of the performance helps generate an intense, focused experience with strong communicative and media impact.

Conclusions

Overall, *Paper Runway - Sfilata di carta e luce* is configured as an intervention consistent with the objectives of the ECO-Light project, demonstrating how light can be integrated into performative and interdisciplinary contexts with a contained environmental impact.

The combination of low-impact materials, the limited duration of the event, and the utilization of existing infrastructure minimizes the overall footprint of the intervention, while its strong educational and territorial dimension amplifies its cultural value. In this perspective, the project represents a replicable model of sustainable artistic production capable of activating meaningful connections between education, creativity, and the preservation of local heritage.

3.5.2 Impacts Sheet

Identification of the Artwork

- Artwork Title: Paper Runway. Light and Paper Fashion Show
- Artist: James Dimech, with project outcomes developed in collaboration with students during the educational program co-guided by Professor Eleonora Granieri
- Artwork location: Teatro Gentile, Fabriano
- Context type: Urban indoor / theatrical environment
- Exhibition date: September 12, 2025
- Related Work Package:: WP3

Technical and Installation Specifications

- Lighting technology used: Theatrical stage lighting and lighting devices integrated into the stage design and, in some cases, into the garments themselves
- Presence of primary light source: Yes
- Presence of secondary light source (fluorescence/photoluminescence): Not documented as a main element; any potential presence is not decisive for the overall setup
- Dynamic/timed systems: Yes; the event is based on a timed performance sequence, with alternating scenic tableaus, runway walks, and stage lighting variations

Energy Consumption:

- Estimated installed power: 500 - 1,000 W
- Average power-on duration: Approximately 2 - 3 hours, referring to the duration of the active setup and the performance
- Average hourly consumption: 0.5 - 1.0 kWh
- Estimated total consumption per event/installation: Approximately 1.5 - 3 kWh for the stage activation directly attributable to the event;

this value excludes standard, baseline energy consumption of the theater facility itself
• Energy impact class: Medium-Low

Materials and Material Impact
• Main materials: Paper, processed paper elements for the garments, lightweight stage props, textile supports, and technical hardware
• Overall weight/material impact: Medium-Low
• Reversibility of the installation: Total

Need for permanent site works: no

Mobility and Audience Experience
• Estimated number of visitors: 200 people
• Prevailing access modes: Pedestrian / Public Transport / Private Vehicle
• Average distance travelled: 5–20 km, varying due to the mix of local attendees and festival visitors
• Mobility impact class: Medium

Relationship With the Context
• Relationship with the urban/architectural space: Utilization of an existing theater facility suitable for hosting a temporary performance without permanent modifications; integration between architectural heritage, stage design, and the enhancement of Fabriano's cultural context
•
• Duration of the intervention: Temporary
•
• Effects on spatial experience: Transformation of the theater into an immersive performative environment, heightened audience attention, and a narrative enhancement of the relationship between light, paper, and fashion
•
• Contribution to smart city practices: Partial, achieved through the temporary activation of an existing cultural venue, the integration of artistic production, education, and public participation, and the promotion of local supply chains (paper). This contributes to cultural regeneration and the intensive use of available infrastructure without generating new material impacts.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3.6 Conclusions

The analysis conducted on the ECO-Light project installations goes beyond an episodic reading of artistic interventions, providing a structured framework of how Light Art can be designed and evaluated against environmental, energy, and territorial parameters.
The systematic application of technical-design indicators - such as energy consumption, power source, material impact, installation reversibility, activation duration, and user experience modes - has established a comparative baseline across diverse interventions. This demonstrates that an artwork's impact is the result of a deliberate balance between technological choices, installation configuration, and its relationship with the context.

Energy Evidences and Consumption Models
From an energy perspective, the collected data shows a general trend toward containing consumption, with estimated values remaining low even in cases of greater technological complexity.
Specifically:
• Controlled-environment installations, such as Densità fluorescenti, present limited consumption (in the range of 6–15 kWh total) thanks to the use of high-efficiency UV and LED systems;
• Performative devices like Arpa di Luce show low overall consumption (approximately 10.4 kWh), with an energy spike concentrated exclusively during performance phases;
• Temporary events like *Paper Runway – Sfilata di carta e luce* show a moderate and contained energy consumption, estimated between 15 and 25 kWh total per event, primarily linked to stage lighting and audio systems but optimized through the use of existing theater infrastructure;
• Site-specific interventions like Elios achieve complete energy autonomy, resulting in net-zero consumption thanks to the exclusive use of solar energy.
This data confirms that the luminous component within the project was managed mindfully, prioritizing low-consumption, temporary, or self-sufficient solutions capable of significantly reducing energy demand compared to traditional Light Art installations.

Material Impact and the Relationship Between Material and Immaterial
A particularly relevant element emerging from the analysis concerns the relationship between matter and immateriality, which represents one of the most innovative axes of the project.
The analyzed installations show a significant reduction in material footprint, with a strong prevalence of the immaterial component (light, perception, interaction) over physical supports. This is evident in:
• The lightweight, almost invisible structures of *Densità fluorescenti*.
• The immaterial and performative nature of *Arpa di Luce*.
• The total absence of "active" matter in *Elios*, where natural light becomes the sole constructive element.

In the case of *Paper Runway*, this dynamic takes on a different but equally meaningful direction: the use of paper - an identity-defining, renewable, and local material - introduces a conscious material dimension based on the logic of reduction, reuse, and transformation. The use of paper and salvaged materials, often derived from production scraps or leftovers, triggers a concrete reflection on the lifecycle of materials and the possibility of integrating up-cycling practices into artistic production.
Consequently, the project builds a continuous dialogue between:
• The Material: Paper, supports, technical devices.
• The Immaterial: Light, sound, perception, experience.
This relationship proves central to defining sustainable models where reducing matter does not diminish aesthetic intensity but, on the contrary, amplifies its value.

Reversibility and Impact on the Contexts
Another cross-cutting element is the complete reversibility of the interventions. All analyzed installations are characterized by the absence of permanent alterations to their host sites, adopting temporary, lightweight, and adaptable installation solutions.
This aspect is especially crucial in high-value contexts:
• In museum and architectural spaces, where the works integrate without altering historical structures;
• In urban contexts, where they activate existing spaces without requiring new infrastructure;
• In natural settings, such as the Marmore Waterfalls, where the intervention limits itself to amplifying phenomena already present.
Reversibility is therefore configured not just as a technical choice, but as a core design principle that allows cultural production to coexist harmoniously with heritage preservation.

Mobility and Territorial Impact
From a mobility standpoint, embedding the installations into already active contexts - such as festivals, urban centers, and cultural venues - helped minimize the indirect impacts associated with travel.
Access modes were predominantly:
• Pedestrian;
• Integrated with public transport;
• Associated with existing visitor flows (cultural events, local tourism).
This approach limits the generation of additional traffic, containing the overall footprint of the interventions while strengthening the link between artistic production and territorial systems.

Tangible and Intangible Heritage: an Integrated Approach
A point of particular interest is the capacity of these installations to bridge tangible and intangible heritage, in alignment with UNESCO's enhancement principles.
• In contexts like Umbria Jazz, the intangible dimension (music, performance) is reinterpreted through lighting devices that amplify the cultural experience;
• In the case of Fabriano, the tangible heritage of paper - internationally recognized as a historic manufacturing tradition - is reinterpreted through a

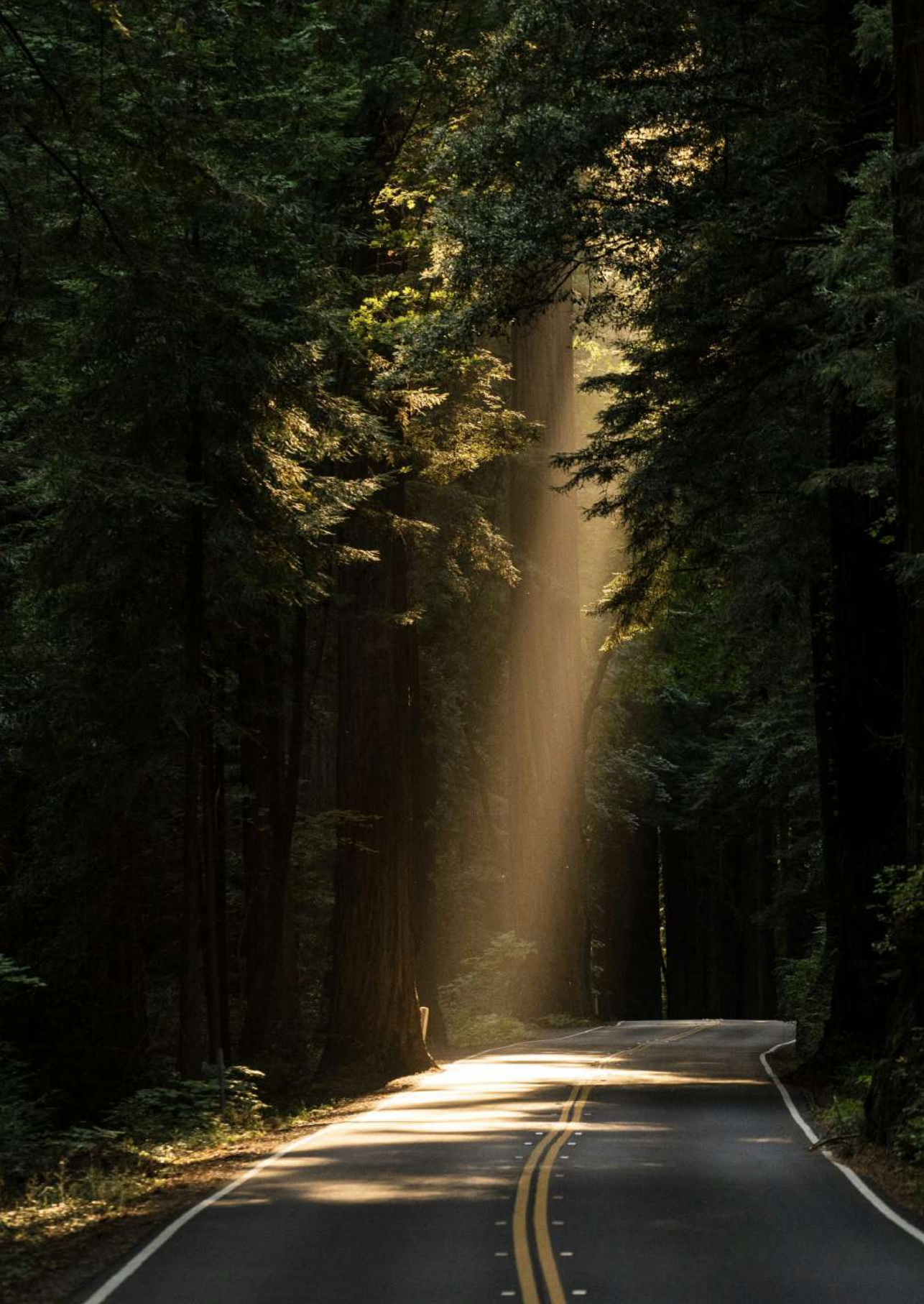
contemporary lens using light, transforming it into a performative language;
• In the case of the Marmore Waterfalls, the natural heritage is enhanced without alteration through an intervention that renders the energy already present within the landscape visible.
The project thus demonstrates how Light Art can operate as a connective device linking tangible assets (architecture, landscapes, local production) with intangible heritage (music, traditional knowledge, cultural practices).

Emerging Models and Replicability
• Among the analyzed cases, Elios represents the highest point of synthesis of the developed model: an intervention where energy autonomy, zero emissions, total reversibility, and integration with the natural context converge into a coherent and replicable system. Alongside it, complementary models emerge:
• Low-consumption installations in controlled environments;
• Temporarily activated performative devices;
• Interdisciplinary events based on sustainable materials and reuse.
This variety demonstrates that sustainability in Light Art is not a rigid, one-size-fits-all formula, but rather a design capacity to adapt dynamically to the context.

Methodological Value and Future Outlook
The primary contribution of this analysis lies in translating sustainability - frequently treated in purely qualitative terms - into a system of observable and comparable parameters.

Even in the absence of continuous instrumental monitoring, this work has made it possible to:
• Structure an initial set of indicators applicable to artistic production;
• Make highly diverse interventions comparable;
• Identify replicable design criteria.
In this perspective, the analysis establishes the methodological foundation for developing the Guidelines and Best Practices envisioned by WP9.3.

Conclusions
Overall, the ECO-Light project demonstrates that light-based artistic production can be intentionally designed as an integrated system of environmental and cultural sustainability. The integration of energy efficiency, material reduction, reversibility, contextual enhancement, and the activation of tangible and intangible heritage delineates a model of Light Art capable of generating value without compromising environmental and territorial resources.
Rather than a simple collection of interventions, ECO-Light configures itself as an applied laboratory where sustainability becomes a concrete, replicable design criterion, paving the way for new methods of conceiving the relationship between art, technology, and the environment.



4. Territorial Analysis

The territorial analysis of the ECO-Light project is situated within the framework of WP9.1 and represents one of its most specific components. It does not limit itself to observing individual installations from an artistic or environmental perspective, but instead focuses on how cultural production impacts the territories of Perugia, Terni, and Fabriano, viewed not as mere event venues but as active contexts for experimentation. In this perspective, the project takes the three hubs across Umbria and Marche as nodes of an integrated territorial system, where research, training, artistic production, accessibility, and public enjoyment combine to redefine the relationship between heritage, community, and cultural innovation.

This approach is fully consistent with WP9, which explicitly envisions the study of how artistic production impacts the geographical areas involved, imagining Perugia, Terni, and Fabriano as actual urban ecosystems comparable to cultural smart cities.

A primary relevant element concerns the geographical structure of the project. Indeed, project documentation and half-yearly reports show that the main operational activities have been planned predominantly within a radius of approximately 100 km from the central hubs of the partnership, so as to guarantee coordination, managerial continuity, and rapid support capacity for artistic and research actions. This choice is not solely organizational; it has a precise territorial impact because it allows for the construction of a proximity model, reducing the dispersion of activities, containing the most burdensome internal travel, and making the relationship between places of production and places of enjoyment more legible.

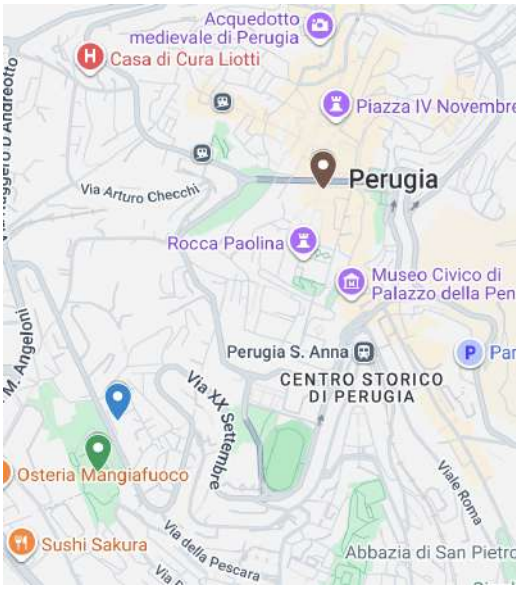
At the same time, the project does not close itself off within a local dimension, but extends certain outreach activities onto a wider scale, particularly in actions aimed at schools and younger generations.

In the case of Perugia, the project operates on multiple levels. On one hand, the city serves as a hub, as it hosts the lead partner, and therefore the Open Eco-System Labs (OEL) and a substantial part of the training, research, and dissemination activities. The OEL, located at the IID headquarters near the Parco della Pescaia, began functioning as an open cultural infrastructure right from the first year of the project, hosting educational, workshop, and production activities, alongside uses by external entities such as dance schools, choirs, and theater groups. In this sense, Perugia is not only the managerial center of the project, but the place where ECO-Light experiments with an initial form of permanent territorial presence, based on equipped, accessible spaces that are progressively opened up to the local community. This same activity links the activation of the OEL to the regeneration of the neighboring area of Via XX Settembre and the Parco della Pescaia, highlighting the project's capacity to influence the quality of use of a real urban context.

Still in Perugia, the relationship between artistic production and territory also manifests itself in the installation and performance dimension. The opening of the exhibition-installation Densità Fluorescenti, inaugurated in May 2025 within the OEL spaces and intended to remain open to visitors until the very end of the project, clearly demonstrates a specific trait of the project: not the simple hosting of an event, but the transformation of a technical space into a space for cultural enjoyment capable

of generating continuity, return visits from the public, and a layering of uses.

In parallel, the Arpa di Luce installation planned for Umbria Jazz - recognized as part of UNESCO's intangible cultural heritage - was placed in the historic center, with confirmation of six performances in the festival's official program and located at Palazzo Baldeschi, within a highly frequented cultural area reachable on foot. This element is territorially very important: it means that the project does not limit itself to inserting itself into a prestigious setting, but utilizes the visibility and attractiveness of an already structured event to experiment with a new relationship between light, music, heritage, and the public. Furthermore, the installation itself is integrated with an educational program involving the Morlacchi



Map of Perugia's historic centre. Palazzo Baldeschi al Corso is highlighted in brown, the Istituto Italiano Design hub in blue, and the Parco della Pescaia area in green.

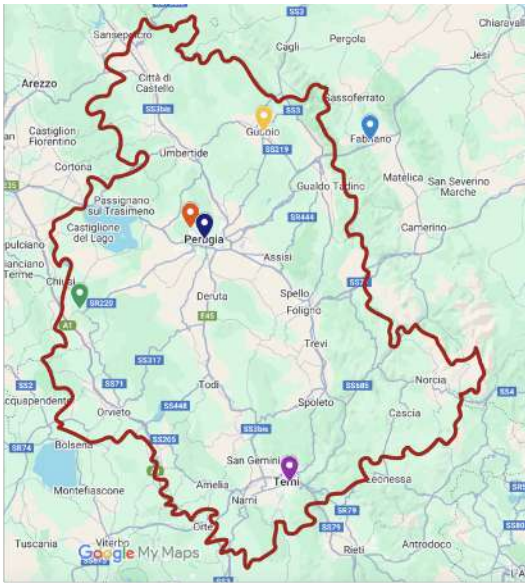
Conservatory, expanding the scope of impact beyond the casual festival audience.

In the case of the Terni area, the territorial dimension assumes a different and complementary configuration. Here, the project works above all on the relationship between art, landscape, and natural heritage, taking the Marmore Waterfalls as an emblematic context. The artwork Elios – Solar Land Art is constructed precisely as a territorial intervention: it does not aim to introduce an autonomous spectacular superstructure, but to read and amplify a phenomenon already present at the site - that of the interaction between sunlight and water mist. Its settlement logic is also significant from a territorial viewpoint: five small heliostats, no grid connection, preferential use of existing structures, activation for brief intervals, and compatibility subject to environmental approvals. Project reports also document the progress of the authorization procedure, which culminated in the favorable regional opinion of February 2025, issued taking into account the direct and indirect effects on habitats and species. This means that the territory is not treated as a mere backdrop for the work, but as a matrix of constraints, ecological relationships, and public responsibilities that enter into the design itself.

Alongside the landscape component, Terni also assumes a cultural and musical function. The enhancement concert planned at the Marmore Waterfalls with the "G. Briccialdi" Conservatory reinforces the territorial reading of the intervention, because it connects the natural site to a local training and performance supply chain. In this way, the project builds a concrete relationship between an educational institution, a symbolic place, and cultural production, generating an impact that is not only visual or tourist-oriented, but also identity-forming and institutional. The Terni area, therefore, is involved as a territory for experimentation where environmental sustainability, natural heritage, and artistic practice

enter into a direct dialogue.
Finally, Fabriano represents the hub where the project works most intensely on the relationship between manufacturing heritage, design languages, and the contemporary reinterpretation of local identity. The event Light and Paper on the Runway, integrated into the UNESCO festival "Fabriano: Carta è cultura", fits into a context that already possesses international recognition linked to paper and manufacturing. Here, the territorial impact of the project does not play out on a landscape or infrastructural dimension, but on the ability to translate a local identity-defining material into a contemporary cultural experience. In this regard, a dialogue was activated with the Municipality of Fabriano, which led to the inclusion of the event in the official festival program and even its enhancement within the dossier sent to UNESCO Paris. This fact is important because it shows that the project does not limit itself to "bringing an event" to Fabriano, but grafts itself onto an already recognized territorial trajectory, helping to strengthen its cultural and international profile. The educational path accompanying the runway show, structured into modules dedicated to the design, tailoring, and development of the paper collection, also confirms that the territorial impact is not episodic, but sedimented through processes of production,

learning, and engagement.
A decisive aspect of the territorial analysis then concerns the diffusion of the project outside the main centers, especially through WP7. Between January and May 2025, five events were held in the Spotlight Museum cycle, distributed across Monte Malbe, Gubbio, Terni, Città della



Pieve, and Fabriano. This articulation is particularly relevant for WP9 because it widens the notion of territorial impact beyond the three major hubs, showing how ECO-Light also works on rebalancing cultural flows by bringing content, performances, and popularization to peripheral or less central museum venues. The territorial logic here is crystal clear: not to concentrate all visibility in the strongest locations, but to build a widespread system of activations that brings new audiences closer to the project and, at the same time, relaunches marginal or less frequented cultural spaces. The project documentation itself emphasizes that these events are designed as an invitation to the main installations and as a public orientation device toward understanding the project's results.
In the case of ECO-Light, the distribution between central hubs, highly attractive festivals, and peripheral museums suggests a model of composite cultural mobility: on one hand, attraction toward strong hubs like Perugia and Umbria Jazz; on the other, a push toward diffusion toward less central sites and peripheral museums; in the middle, the construction of a proximity network that limits dispersion and strengthens regional

accessibility.
Overall, the territorial analysis highlights that ECO-Light does not merely produce events in three cities, but experiments with a model of lightweight cultural infrastructure. Perugia serves as a hub for research, training, production, and urban regeneration; Terni as a laboratory for the relationship between art, landscape, and environmental protection; Fabriano as a context for hybridization between manufacturing heritage and contemporary languages. To these three hubs is added a constellation of peripheral venues that extends the reach of the project and reinforces its public and widespread dimension. In this sense, the territorial impact of ECO-Light does not coincide solely with an increase in cultural visibility, but with the capacity to build connections between different places, institutions, audiences, and forms of enjoyment, according to a logic that responds fully to the vision of WP9: measuring sustainability not only in energy terms, but also in terms of accessibility, territorial distribution, attractiveness, and the cultural activation of the contexts involved.

5. Psychological Analysis

This section is part of the activities planned under WP9.2 of the ECO-Light project, which are aimed at evaluating the emotional and psychological impact of the artistic experiences developed in WP3 (immersive installations) and WP7 (cultural events and Spotlight Museums). The analysis focuses specifically on the ways in which the shared enjoyment of artistic experiences can trigger emotional dynamics, meaning-making processes, and forms of collective resonance. Particular attention is paid to the ability of these experiences to generate new symbolic associations, imaginative activations, and openings toward other cultural and cognitive spheres.

In line with the objectives of WP9.2, the investigation was also oriented toward observing how the evaluation of the experience varies according to the social and cultural background of the participants, considering differences related to age, role, familiarity with art, and modes of active cultural participation. This comparative dimension constitutes a central element of the analysis, as it allows for verification of the artistic experiences' capacity to produce differentiated yet coherent impacts on heterogeneous audiences.

The reference theoretical framework was constructed starting from the model of so-called "Social Dreaming" developed by Gordon Lawrence, reinterpreted as a conceptual device useful for reading emerging content not exclusively as an individual expression, but as traces of a collective dimension of the experience.

In this sense, the analysis does not aim to interpret the personal experiences of individual participants, but rather to identify recurrences, convergences, and differences in the materials produced, in relation to the various contexts of enjoyment and the experiential conditions that characterize them (immersiveness, cultural mediation, interaction, territorial context).

The activities were developed with the contribution of the social promotion association "Il Sigaro di Freud", which supported the definition of the methodological framework and the data interpretation methods, in line with the project's objectives.

5.1 Methodological Approach

The data collection activities were designed to maintain a balance between methodological rigour and consistency with the experiential nature of the project, limiting the use of standardised tools which could have compromised the quality and authenticity of the feedback. This methodological choice addresses the need to preserve the spontaneous and pre-reflective dimension of the experience, which is considered central to the analysis of psychological impact.

The operational setup was structured as follows:

- Activation of Social Dreaming sessions immediately following the artistic experiences, in order to capture the earliest phases of experiential processing while they are still being cognitively stabilized;
- Formation of heterogeneous micro-groups of 5–10 participants, designed to stimulate discussion and cross-pollination between different perspectives;
- Conduction of facilitated sessions varying in duration between 20 and 40 minutes;
- Utilization of qualitative inputs (evoked images, bodily sensations, spontaneous associations, triggered memories);
- Collection of feedback in oral form, unmediated by digital devices or structured questionnaires, to preserve the relational dimension;
- Subsequent interpretative transcription and thematic analysis.

The analysis was conducted through a qualitative coding of the content, aimed at identifying recurring patterns and cross-cutting dimensions of impact.

5.2 Sample and Analytical Contexts

The psycho-social analysis was developed across a total sample of 113 participants, involved cross-cuttingly in the main experiential actions of the project, with specific reference to the WP7 – Spotlight Museums activities and the immersive installations of WP3 – Light Art for UNESCO.

The construction of the sample reflects a methodological choice consistent with the framework of WP9, which is oriented towards capturing heterogeneous audiences in terms of age, cultural background, and modes of enjoyment. This allows for a comparative analysis of how the shared artistic experience generates differentiated impacts at both individual and collective levels. The sample size, while not configured as statistically representative in the strict sense, is appropriate given the qualitative nature of the investigation and makes it possible to identify significant recurrences.

Regarding the Spotlight Museums cycle (WP7), 49 qualitative contributions were collected, distributed across the various territorial contexts involved:

- Fuseum (Perugia): 9 participants
- Muam (Gubbio): 8 participants
- Caos (Terni): 10 participants

- Laboratorio di Cultura Fotografica (Città della Pieve): 7 participants
- Museo della Carta e della Filigrana (Fabriano): 8 participants
- Palazzo Baldeschi (Perugia): 8 participants

In these contexts, characterized by a more intimate dimension and a widespread, territorial enjoyment, the Social Dreaming sessions made it possible to work in greater depth on the relationship between artistic experience, perception of the place, and the construction of shared meanings, highlighting a strong connection between symbolic content and territorial identity.

In parallel, within the framework of the immersive installations of WP3, 64 contributions were collected, structured as follows:

- Arpa di Luce: 15 participants
- Elios: 15 participants
- Densità Fluorescenti: 24 participants
- Paper Runway: 10 participants

In this case, the larger sample size recorded for certain installations - particularly Densità Fluorescenti - is attributable to its more extended duration, which allowed for multiple sessions and consequently a broader and more diverse participation.

The overall distribution of the sample is therefore consistent with the nature of the analyzed activities: on one hand, widespread and territorial events featuring smaller but homogeneous groups (WP7); on the other, immersive installations with greater drawing power and wider participation (WP3).

5.3 Evidence Emerging From Various Contexts

WP7 – Spotlight Museums

In the case of the activities developed within WP7, the emerging results are strongly influenced by the context and format of the individual experiences, particularly by the lectures and moments of cultural mediation, which significantly guide both the spontaneous associations and the evaluations expressed by the participants.

At the Fuseum (Perugia), within the framework of the lecture *Illuminare il futuro: la luce come strumento per una nuova sostenibilità culturale e inclusione sociale* (Lighting the Future: Light as a Tool for a New Cultural Sustainability and Social Inclusion), recurring references emerge regarding urban and social themes, such as cities, safety, and community. The perceived meaningfulness of the experience is high overall, while emotional engagement remains at medium levels, suggesting a form of enjoyment oriented more toward reflection than immediate sensory impact.

In the case of the MUAM (Gubbio), with the lecture *Luce e territorio: scoprire, illuminare, tutelare* (Light and Territory: Discovering, Illuminating, Protecting), the collected materials highlight a greater presence of critical reflections, with the emergence of terms linked to balance, responsibility, and pollution. In this context, a lower emotional activation is observed alongside a greater conceptual articulation, indicating a more rational and analytical processing framework.

At the CAOS (Terni), within the musical event *D'improvviso... la luce: l'arte dell'improvvisazione* (Suddenly... Light: The Art of Improvisation), one of the highest levels of engagement among the Spotlight events was recorded. The performative dimension and the dynamic nature of the experience foster the emergence of associations linked to music, interactions, and sensory perception, highlighting a powerful activation of the relational and bodily dimensions.

In the context of Città della Pieve, with the lecture *Scolpire la luce: fotografia tra creatività e testimonianza* (Sculpting Light: Photography Between Creativity and Witnessing), the associations focus predominantly on image, memory, and interpretation. A prevalence of individual readings is observed, with lower activation of the collective dimension, but a good depth of personal processing.

For the Paper Museum of Fabriano (Museo della Carta di Fabriano), within the lecture *Archivi: che passione!* (Archives: What a Passion!), themes related to memory, the past, and accumulation emerge, often associated with a perception of complexity. This case records one of the lowest levels of emerging creativity, in favour of a greater concentration on cognitive and analytical content.

Finally, at Palazzo Baldeschi (Perugia), with the lecture *Luce e arte: non solo valorizzazione* (Light and Art: Not Just Valorisation), a more balanced distribution is observed among the analyzed dimensions, with references to the relationship between art, technology, and transformation, suggesting a solid integration between the emotional and reflective components.

Taken as a whole, the WP7 contexts highlight a higher incidence of mediated content and a prevalence of cognitive and territorial processing, resulting in a more gradual and structured impact.

WP3 – Immersive Installations

In the case of the WP3 artistic installations, the results highlight an overall higher level of emotional engagement compared to the Spotlight Museums, accompanied by greater variability in meaning-making processes.

The immersive installations thus function as high-intensity perceptual devices, in which the reduction of cultural mediation fosters greater interpretive freedom, but also a more pronounced polarization of emotional responses.

For *Arpa di Luce*, an interactive artwork based on the sonic activation of laser beams, associations linked to harmony, suspension, and peace emerge. The participatory component also fosters a relatively high level of social resonance, triggering interactive dynamics among the participants.

In the case of *Elios*, an artwork immersed in a natural setting, one of the highest levels of consistency in the emerging vocabulary is recorded, with recurring terms such as nature, energy, and interconnection. The perceived meaningfulness is among the highest, highlighting a powerful integration between the aesthetic experience and its symbolic interpretation.

Densità Fluorescenti, an immersive environment based on UV light, represents the case of greatest emotional intensity. The spatial and perceptual configuration of the work - characterized by forms resembling suspended and confined bodies - generates sensations of compression, proximity, and disorientation. Alongside these, associations linked to fear, fragility, and instability emerge, with less clarity in meaning-making and a marked polarization of responses. This distinct polarization is a significant finding, as it indicates the work's capacity to trigger deep, non-neutral responses typical of high-sensory immersion experiences.

In the case of *Paper Runway*, a performative fashion show integrating fashion, paper, and light, one of the highest levels of emerging creativity is observed, accompanied by a significant social component. Associations are distributed across spectacle, sustainability, and possibility, highlighting the experience's strong generative and design-oriented capacity.

Taken as a whole, the WP3 artworks are configured as high-intensity perceptual devices capable of triggering profound emotional responses and freer, albeit more variable, imaginative processes

5.4 Cross-Reading

The results highlight structural differences between the two analyzed contexts. Emotional engagement is, on average, higher in the immersive installations (WP3), where the direct and sensory experience fosters an immediate and intense response. Conversely, within the WP7 contexts, engagement appears more mediated and progressive, influenced by the presence of explanatory content and accompanying support devices.
Meaning-making presents itself as more stable and coherent in the guided contexts (WP7), whereas immersive installations show greater interpretive openness, with a wider variability in readings. Finally, the social dimension is actively present across both contexts, but through different modes: more rational and dialogic in the Spotlight Museums, and more emerging and spontaneous in the installations.
This differentiation does not represent a flaw, but rather a result consistent with the project design, which integrates diverse experiential devices to activate complementary levels of psychological and social impact.

5.5 Emerging Results

The processing of data collected through the Social Dreaming sessions made it possible to identify a series of recurring dimensions, which clearly define the psychological and social impact of the project. It should be noted that the percentages reported in this section are derived from a qualitative estimate based on the frequency of the themes emerging in the session transcripts. These values must therefore be interpreted as trend indicators, useful for highlighting the relative relevance of the observed phenomena, rather than as statistical data in the strict sense.

Imaginative Activation and Symbolic Production
The artistic experiences generated a significant activation of the imaginative dimension. In an estimated percentage exceeding 75% of participants, spontaneous narratives emerged linked to recurring symbolic images - such as light as transformation, water as flow, and space as an act of crossing. These were frequently connected to personal life experiences, memories, or inner representations.
This finding highlights the capacity of the installations to operate not only on a perceptual level but also on a symbolic and cognitive one, triggering complex processing mechanisms that go beyond simple aesthetic appreciation. The analyzed experiences thus function as devices capable of stimulating the production of meaning, contributing to the construction of both individual and collective imaginaries.

Construction of Collective Imaginaries
One of the most notable elements to emerge concerns the thematic convergence among the individual feedback

responses. Even in the absence of coordination or directive prompts, the groups produced strikingly coherent representations, characterized by shared symbolic and narrative recurrences.

This phenomenon confirms the underlying hypothesis of Social Dreaming: that a shared experience activates content that does not belong exclusively to the individual dimension, but instead emerges as an expression of a collective imaginary. In this sense, art serves as a space for activating and recognizing shared meanings, even in contexts characterized by a high heterogeneity of participants.

Strengthening of Relational Dynamics

The sharing phase generated an increase in the perceived quality of relationships among participants. Approximately 65–70% of individuals reported a heightened sense of connection, openness, and mutual listening, effectively transforming the artistic experience from an individual event into a social process.

The strengthening of relational dynamics stands out as one of the most significant effects of the shared experience, confirming the role of art as a social tool capable of facilitating interactions, empathy, and the building of temporary yet meaningful bonds. This aspect is particularly relevant in relation to the project's objectives of social inclusion and cultural participation.

Variability Linked to Socio-Cultural Background

The analysis revealed significant differences in how the experiences were interpreted, which were closely tied to the participants' backgrounds:

- Individuals with an artistic or cultural background tended to develop more conceptual and meta-reflective readings;
- Non-specialist participants provided feedback that was more emotional, physical, and autobiographical;
- Younger groups demonstrated greater imaginative fluidity and less interpretive rigidity;
- Participants from peripheral areas placed greater value on the territorial dimension and the newly provided access to a cultural experience.

This heterogeneity represents a key element for impact assessment, as it demonstrates the project's capacity to adapt to different audiences while maintaining a high level of effectiveness in generating activation and engagement.

Effects on Well-Being and Temporal Perception

A significant proportion of participants (approximately 60%) associated the experience with sensations of suspension, slowing down, and detachment from everyday life. The feedback highlights an altered perception of time, characterized by a temporary departure from routine and a heightened concentration on the present experience.

This element suggests a positive impact on immediate psychological well-being, with potentially significant effects in terms of cognitive regeneration, stress reduction, and an overall improvement in the quality of the lived experience.

5.6 Cross-cutting Impacts

In line with the provisions of WP9.2, the analysis included a qualitative assessment of the effects of the artistic experiences on other spheres. The results indicate:

- An increase in interest toward participating in cultural events (approximately 70% of participants stated a greater future propensity);
- A strengthening of the perception of art's accessibility, especially within peripheral contexts (WP7);
- The activation of informal dissemination dynamics (word-of-mouth, social sharing);
- Greater attention toward the cultural value of the territories involved;
- A potential increase in local attractiveness, with indirect implications on an economic level as well.

In this sense, the artistic experiences function as drivers of cultural and territorial activation, capable of influencing behaviors and perceptions well beyond the moment of the event itself. These effects indicate that the impact of the artistic experiences is not exhausted at the time of enjoyment, but instead extends to behaviors, attitudes, and perceptions over the medium term.

5.7 Interpretative Synthesis

The analysis conducted highlights how ECO-Light operates effectively at a profound level of collective activation, transforming the artistic experience into a process of shared meaning-making. In this sense, the psychological impact cannot be interpreted as an isolated individual effect, but rather as an emerging phenomenon arising from relational and contextual dynamics.

The Social Dreaming methodology proved to be a particularly adequate tool to:

- Capture the non-explicit dimension of the experience;
- Reflect the complexity of the activated processes;
- Highlight the role of art as a space for collective processing.

Taken as a whole, the activity confirms that sustainability is not limited to reducing environmental impacts, but extends to the capacity to generate lasting cultural, relational, and perceptual transformations. From this perspective, the psychological analysis contributes substantially to the objectives of WP9, demonstrating how the social and cultural dimensions of sustainability can be observed, described, and interpreted through structured qualitative tools.

6. Social Analysis

(Excerpt from the research by Maria Bocelli on the social impact of the Spotlight Museums lecture series)

6.1 Context and Objectives

Within the ECO-Light project, the Spotlight Museums cycle was designed not only as an outreach program on the culture of light in peripheral museums across Central Italy, but also as an opportunity to rigorously measure its social and cultural impact. In line with European mandates for projects funded by the PNRR - which require dedicated scientific studies to evaluate the outcomes of implemented actions - a specific research initiative was launched. Conducted by Maria Bocelli, the study focuses on three main objectives:

• To understand if and to what extent activities organized by a cultural institution contribute to building a sense of community and place belonging;

• To understand if and how sharing a cultural experience (whether participating in or organizing an event) can foster the emergence of new ideas;

• To measure the impact that a shared experience has on both the individual and the community, from the perspective of both the users and the organizers.

The focus is not merely on the educational or informative outcomes of the lectures, but on their generative potential: the ability to trigger relationships, stimulate creativity, and strengthen the bond between citizens and cultural institutions, particularly in peripheral contexts or areas less exposed to major tourist flows.

6.2 Methodological Design

To measure these aspects, a structured quantitative survey tool was chosen, deployed through web browser (Google Forms). This choice meets several requirements:

• To present the same questions to heterogeneous groups (by age, professional role, and gender);

• To collect comparable and generalizable data on the variables under examination;

• To facilitate the compilation by people with limited time available (professionals, teachers, cultural prac-

titioners), thereby reducing the drop-out rate.
The survey was launched immediately after the conclusion of the Spotlight Museums cycle (first event: 27 January 2025; final event: 26 June 2025; questionnaire filling-out window: 1–10 July 2025, with a reminder sent on 9 July). To ensure that responses reflected an experience that had actually been lived, only participants who had taken part in at least one lecture were involved. The names were obtained from the attendance sheets completed during the 'Spotlight Museums' lectures (including institutional affiliation and contact details). From a total of 168 recorded attendances, 133 email addresses were collected, 16 of which proved to be invalid; the questionnaire was completed by 28 people, equivalent to approximately one-third of the working addresses. Compilation was anonymous, but demographic and professional information nevertheless allows for the definition of the participants' profile.

6.3 Structure of the Questionnaire

The questionnaire was divided into three main sections, progressing from the general to the specific.

Socio-demographic profile:
• Gender (including non-binary options);
• Age groups (under 18, 18-24, 25-34, 35-44, 45-54, 55-64, 65+);
• Occupation/role (high school students, university students, teachers, speakers, staff of host organisations, IID staff, public administrators, freelancers, organisers, with an open

'Other' category).

Social and Cultural Practices

- Frequency of participation in cultural life in the place of residence;
- Form of participation (active: organisation/animation; passive: simply attending);
- Importance accorded to social and cultural life;
- Association between cultural events and positive or negative memories.

Spotlight Museums' Specific Experience

- Which sessions were attended and at which venues;
- Whether or not participants were already familiar with the host institutions;
- Intention to return and visit the venues again;
- Stimuli generated by participation (curiosity, new ideas, excursions, professional contacts, new projects, indifference, other);
- Association of the experience with positive/negative memories;
- A final open-ended question (optional) to describe in their own words what the experience has left them with.

Mainly closed-ended and single-choice questions were adopted, with a few multiple-choice possibilities to better capture the complexity of the effects, and a single open-ended question to gather qualitative insights.

6.4 Profile of the Study Sample

The sample that responded to the questionnaire displays several characteristics relevant to the interpretation of the results:

• Gender: a slight female prevalence (57.1%);

• Age: a complete absence of the under-18 bracket (high school students), with a significant presence of young adults (18-34 years, primarily university students) and professionals in the 35-64 age brackets;

• Profession/Role:
  - 10 university students;
  - 8 freelancers/independent professionals (communication profiles, cultural practitioners, etc.);
  - 2 guest lecturers;
  - 1 accompanying teacher;
  - 1 organiser;
  - 6 people in the "Other" category, attributable to roles in organisation, public administration, and cultural planning.

University students represent the youngest age bracket; freelancers are distributed across the various age groups; organisers and lecturers are predominantly positioned between 45 and 65+ years old.

A major structural finding is the total lack of responses from secondary school students, despite their strong attendance at the meetings; this was likely due to the use of institutional email addresses that were not checked during the summer period. While this limitation reduces the representativeness of the 14-18 age bracket, it does not compromise the interpretation of the effects on practitioners, university students, and professionals.

6.5 Cultural Participation and Sense of Community

The answers reveal several cross-cutting trends:

• Most respondents state that they participate, with varying frequency, in the cultural life of their local area;

• The frequency of participation increases with age: university students are more often "sporadic" or absent, whereas freelancers and organisers are significantly more active;

• Over a third of the sample define themselves as active participants (organising events, proposing topics, contributing to debates), and another third see themselves as both active and passive; only a minority do not participate at all;

• For everyone, cultural life holds value: participants consider it important or very important, and the events they attended are associated almost exclusively with positive memories.

This framework outlines a target community that is already culturally aware, but highlights a more fragile university youth bracket in terms of participation: less engaged and "spectator", compared to the other groups.

6.6 The Impact of Spotlight Museums on Institutions and the Public

The final part of the survey focuses directly on the impact of the Spotlight Museums cycle on both the host institutions and the participants.

Knowledge and Perception of Museum Institutions

The majority of respondents were already familiar with the museums that hosted the lectures, but this figure is heavily driven by organisers and lecturers: among freelancers and students, awareness is more evenly split between "yes" and "no". It follows that the museums involved are far better known to professionals in the field than to the general population, confirming the initial hypothesis: that these are "minor" or decentralised institutions compared to major tourist flows.

No one stated that they did not want to return: 53.6% certainly intend to visit again, while the remainder leave the possibility open. In this case too, university students represent the most uncertain category.

This indicates that Spotlight Museums functioned as a tool for territorial valorisation, bringing renewed attention and new visitors to lesser-frequented museum spaces, literally opening the doors of cultural venues to the public.

Prompts Generated by the Experience

When asked what participating in Spotlight Museums had stimulated, the responses converge on a few main core areas:

- Curiosity towards the themes covered (14 responses, cross-cutting across all categories);
- An opportunity to explore a different area (10);
- Further study of the issues addressed (9);
- The creation of new professional contacts (5);
- The launch of new projects linked to the initiative and visits to connected exhibitions/installations (4 each).

Only one student expressed indifference; one freelancer reported "a new field of investigation" among their personal outcomes. It is particularly significant that freelancers are the category that capitalises most on the experience in terms of contacts, projects, and broadening horizons - a sign of the format's potential to also act as a driver for new collaborations and professional practices.

Memory and Experience

For 78.6% of respondents, Spotlight Museums is associated with a fond memory; no one links it to a negative memory. Only a small proportion - principally university students - does not associate any particular memories with the experience. The few open-ended responses collected, although numerically limited, confirm the emotional and relational dimension of the experience: participating in the construction of a complex event, experiencing collaboration between different institutions, and seeing music, images, light, and heritage intertwine are perceived as valuable elements capable of "generating emotion and interest" as well as new perspectives for working together

6.7 Final Remarks and Implications for ECO-Light

The analysis of the Spotlight Museums questionnaire gives back several key insights for the ECO-Light project:

• The cycle of meetings effectively strengthened the bond between the community and local cultural institutions, particularly in peripheral museums, helping them emerge as vibrant and recognisable spaces;

• The lectures acted as spaces of mediation between different disciplines (technical physics, photography, music, archives, design), stimulating curiosity, a desire to explore further, and the creation of new contacts and projects;

• For a significant proportion of participants, the experience had a positive impact in terms of memory, belonging, and identification, confirming the potential of the "culture of light" as a tool for inclusion and social activation;

• At the same time, certain generational challenges emerge, particularly the difficulty in fully engaging university students, who are often less involved in the cultural life of their local areas and less inclined to recognise the value of this type of initiative.

From an overall perspective, the research demonstrates that Spotlight Museums was not merely a cycle of thematic lectures, but a social laboratory in which light acted as a common language connecting local communities, cultural institutions, schools, universities, and professionals.

Alongside the environmental and energy sustainability analyses of the Light Art installations, this study offers the complementary side: the measurement of ECO-Light's emotional, relational, and territorial impact, and the confirmation that the 'Culture of Light' can simultaneously serve as an artistic practice, an educational tool, and a driver of social cohesion.

7. Best Practices

This chapter gathers a series of Best Practices that emerged from the experience of the ECO-Light project, in line with Objective 9.3, which is dedicated to defining guidelines and good practices derived from the analyses carried out during the project. The proposed indications stem from the convergence between the results of the environmental and energy analyses conducted on the WP3 installations and the findings of the psycho-social analysis carried out across the project's immersive and decentralised contexts.
For this reason, they do not relate solely to environmental and social sustainability in the strict sense, but rather to a broader notion that aligns more closely with the project's nature: a form of design, cultural, and territorial sustainability capable of integrating artistic quality, measurability of impacts, attentiveness to locations, public accessibility, and the ability to trigger long-lasting relationships and learning.
These are therefore not abstract principles, but practices that were actively tested during ECO-Light and proved particularly effective in the design, creation, and activation of the works, educational devices, and decentralised events. In this sense, the Best Practices collected here constitute an initial, replicable methodological platform for future interdisciplinary cultural initiatives, especially where the goal is to work at the intersection of art, research, heritage, sustainability, and community engagement

7.1 Best Practice 1: To Build Interdisciplinary and Local Partnerships as the Project's Infrastructure

One of the central elements of ECO-Light was the coordinated involvement of diverse stakeholders: universities, AFAM institutions (Higher Education in Art, Music and Dance), local authorities, museums, festivals, professionals, and cultural organisations.
This plurality of expertise was not a mere organizational detail, but a genuine design infrastructure. Without it, the project could not have devel-

oped that simultaneous presence of research, artistic production, technological experimentation, cultural mediation, and impact analysis that defines its identity.
From the perspective of WP9, building interdisciplinary partnerships proved decisive for at least three reasons. First: it allowed sustainability to be viewed not as a subject separate from artistic design, but as a cross-cutting criterion discussed and embedded from the earliest conceptual stages. Then, it made it possible to connect data and observations from different domains - energy, installation, perception, relationship, and territory - thereby avoiding partial or fragmented interpretations; Finally, it strengthened the project's capacity to take root locally, thanks to the active role of territorial stakeholders capable of guiding the languages, timing, and forms of engagement.
The experience confirms the value of partnerships as an essential prerequisite for cultural initiatives oriented towards sustainability and innovation.

The resulting guideline is clear: in complex cultural projects, partnership must not be understood as a mere sum of formal endorsements, but as an architecture of complementary skills, built to seamlessly hold together production, analysis, public activation, and the transferability of results.

7.2 Best Practice 2: To Integrate Education, Research and Artistic Production Into a Single Operational Cycle

One of the distinctive elements of ECO-Light was the link between training activities, applied research, and cultural production. The involvement of students, teachers, researchers, and professionals in shared pathways fostered the growth of skills and the generation of tangible outputs, such as works, events, scientific content, and opportunities for experimentation.
The project demonstrates in a particularly clear manner that the educational dimension is not an incidental or accompanying element, but a structural component capable of strengthening the quality of artistic production. At the same time, it benefits from engaging with real cases, concrete devices, technical constraints, and actual contexts of activation. This integration was especially visible at multiple stages of the project: in the installations developed with the direct involvement of students, in contexts where research was translated into a work or performance, and in situations where the public experience itself produced materials useful for scientific and psycho-social evaluation.
From the perspective of WP9.3, this practice takes on the value of a guideline because it demonstrates that sustainability increases when the processes of learning, experimentation, and production are not separated, but instead organized in continuity.

In operational terms, this means designing activities in which research does not merely arrive retrospectively to measure a pre-existing outcome, but accompanies the construction of the intervention itself. Similarly, training must not be relegated solely to the transmission of content, but must contribute to generating outputs and understanding their impacts. The replicability of this model lies precisely in its ability to transform every activity into a meeting point between learning, production, and evaluation.

7.3 Best Practice 3: Engaging Different Communities and Audiences Through a Variety of Access Channels

The project engaged heterogeneous audiences through a variety of different tools: immersive installations, public meetings, lectures in museums, open days, workshops, and outreach activities. This plurality of languages made it possible to reach audiences that differed in age, interests, background, and level of familiarity with the themes covered.

The diversification of access methods proves to be an important lever, not only for broadening participation and fostering cultural inclusion, but also for differentiating and making the impacts generated by the various types of experience more legible.

The psycho-social analysis clearly showed that the activation of different audiences does not produce uniform effects, but rather specific responses linked to the participants' background, the degree of mediation present, the type of context, and the level of immersiveness of the experience. Far from being a limitation, this finding represents one of the main insights gained from the project: cultural effectiveness does not depend on the homogeneity of the audience, but on the project's capacity to build differentiated thresholds of access while maintaining a coherent vision.

The resulting best practice consists, therefore, in not relying on a single format or language for public activation, but in building ecosystems of access. Within these ecosystems, experiences of high perceptual intensity coexist with moments of deeper study, discussion, mediation, and feedback. From this perspective, inclusion does not merely coincide with increasing audience numbers, but with the capacity to produce conditions for meaningful participation for diverse individuals.

7.4 Best Practice 4: To Treat the Host Environment As an Active Component of the Design

In the ECO-Light project, activities were developed in close relation to the host locations, adapting content, languages, and operational methods to the characteristics of the different contexts. Artistic installations, public events, and outreach initiatives took on different forms depending on whether they took place in natural sites, urban spaces, museums, theatres, or production environments. This approach demonstrated that a location is not a mere backdrop, but an active component of the project, capable of shaping its objectives, audience engagement, and overall impacts.

From the perspective of WP9, this is one of the most significant pieces of evidence. Scientific analysis showed

that context directly affects the material and energy sustainability of an intervention: technical requirements, possibilities for reversibility, the relationship with natural or artificial light, access methods, pressure on the site, and the very legibility of the work all change. Parallel to this, the psycho-social analysis highlighted that context also influences the construction of meaning: the exact same experience activates different responses depending on whether it occurs in a museum space, a natural setting, or a place perceived as close to the daily life of the community.

The emerging guideline is that location must be treated as a primary design variable. This involves at least three key considerations: reading the context before intervening; modulating the languages and intensity of the experience according to the material and symbolic characteristics of the site; and avoiding the imposition of standardised formats that reduce the location to a neutral container. In a project like ECO-Light, the context was never just the place where something happened: it was part of the experience, and often part of its impact as well.

7.5 Best Practice 5: To Reduce Material and Energy Impacts Right from the Design Stage

The analyses carried out within the project highlighted the value of lightweight, low-consumption solutions with limited material impact. The use of efficient technologies, devices with reduced energy requirements, and non-invasive installations made it possible to contain environmental impacts without compromising the quality of the cultural experience. ECO-Light thus confirms that sustainability and artistic value can be pursued in an integrated manner, especially when these choices are considered from the earliest design stages. This best practice represents the point where WP9.1 finds its most operational translation. The analyses conducted on the installations showed that reducing impacts does not depend on a single measure, but on a combination of design decisions: selecting the light source, containing the installed power, limiting activation times, using lightweight structures, opting for reversible solutions, reducing permanent works on site, optimising public flows and, where possible, using renewable sources or autonomous energy.

From this perspective, sustainability does not intervene as a final correction to an already conceived work, but as a design criterion that shapes the very form of the intervention. This is the decisive step: in the project's most successful cases, artistic quality was achieved not in spite of the reduction of impacts, but thanks to it. The essentiality of the matter, the lightness of the installation, the calibrated use of light, and the temporary nature of the activation all contributed to producing an intense experience without burdening the context.

The resulting guideline is clear: every Light Art or light-based cultural activation project should include, as early as the concept phase, a preliminary assessment of energy consumption, material impact, reversibility, accessibility, and the relationship between the intensity of the effect and the intensity of the impact. It is within this balance that the real sustainability of the intervention is defined.

7.6 Best Practice 6: To Embrace Temporariness and Adaptability as Design Values, Not as Limitations

Many of the initiatives carried out showed how temporary and adaptable formats can generate significant results in cultural and participatory terms. The ability to modulate activities based on different spaces, occasions, and audiences fostered organisational flexibility and respon-

siveness to the constraints of the host contexts. Temporariness thus proved to be not only a technical choice, but also a lever for activating locations and communities in a dynamic way.
In the case of ECO-Light, temporariness did not equate to fragility or lesser impact. On the contrary, in several instances, it proved to be a favourable condition for containing material impact, respecting locations, experimenting with different formats, and strengthening the quality of the experience. Precisely because they were not designed as permanent, many of the project's actions were able to adapt more effectively to the characteristics of the sites, organisational conditions, the audiences present, and the available time frames.
On a psychological level, temporariness also produced significant effects. Limited-duration experiences often intensified attention, engagement, and memorability, fostering more focused enjoyment and a richer feedback loop during subsequent moments of sharing. Furthermore, from a scientific standpoint, the ability to modulate timing and activations made the relationship between the effect produced and the resources used more controllable.

The best practice consists, therefore, in viewing temporariness not as a compromise, but as a choice aligned with sustainability and the relational nature of the cultural experience. Linked to this is the principle of adaptability: designing formats that can be recalibrated without losing their identity, thereby making the project more resilient, more replicable, and less dependent on a single configuration.

7.7 Best Practice 7: To Enhance Peripheral Areas and Locations through High-Quality Design and Local Networks

Through the Spotlight Museums cycle and other decentralised initiatives, ECO-Light has demonstrated the cultural potential of minor museums, intermediate towns, and territories outside the main tourist circuits. The quality of the content proposed, combined with the creation of local networks and collaboration with regional stakeholders, has helped to strengthen the visibility and recognition of these locations. The project confirms that cultural innovation can also thrive in decentralised contexts, provided it is adequately supported.

This is one of the most significant guidelines of WP9.3, as it directly links cultural sustainability, territorial impact, and accessibility. The psycho-social analysis showed that in peripheral or less central contexts, the dimension of the cultural experience was frequently associated with themes of belonging, recognition, proximity, and access. This suggests that the quality of an intervention is not measured solely in terms of artistic attractiveness, but also by its capacity to make places visible, visitable, and symbolically active once again.

On a broader sustainability level, the valorisation of peripheral territories serves a dual purpose. On the one hand, it distributes the cultural offering and reduces the concentration of activities solely within already established hubs; on the other hand, it creates favourable conditions for a closer relationship between the project and the community, making the cultural and social benefits of the intervention more legible. This aspect is fully aligned with the project's goal of viewing Perugia, Terni, and Fabriano not merely as event venues, but as areas where artistic production can generate reactivation effects comparable to the dynamics of a cultural smart city.

The emerging guideline is that the valorisation of peripheral territories requires two concurrent conditions: never lowering the quality of the content, and building local alliances capable of accompanying, interpreting, and embedding the project. Only in this way does territorial dissemination move beyond the simple geographical distribution of activities to become an integral part of their impact.

7.8 Best Practice 8: To Link impact Assessment to Transferability and Institutional Positioning

An additional best practice that emerged from the project concerns the necessity of not viewing impact evaluation as a mere final compliance requirement, but rather as a tool for positioning and transferability. WP9 explicitly intended for the two strands of analysis to converge into a set of guidelines and best practices for broad sustainability, valuable also in relation to accreditation processes and international rankings, including the THE Impact Ranking. In this sense, ECO-Light has shown that the structured collection of environmental, energy, psycho-social, and territorial evidence can become an integral part of an institution's ability to make its contribution to sustainability fully legible.

This best practice does not solely concern project communication, but its overall design. When impacts are observed, described, and linked to replicable practices, the project produces value far beyond its own duration: it offers criteria, lexicon, methods, and cases that can be reused by other initiatives, other stakeholders, and other contexts. For AFAM and university institutions, this also means strengthening their capacity to engage with international evaluation frameworks founded on evidence, territorial responsibility, inclusion, and social innovation.

The resulting guideline is twofold: on the one hand, to design minimal yet clear impact observation systems from the very outset; on the other hand, to organise the final feedback not as a simple narrative of results, but as a methodological document capable of supporting institutional learning, replicability, and positioning.

7.9 Final Considerations

Taken together, the Best Practices that emerged from ECO-Light indicate that sustainability in interdisciplinary cultural projects does not hinge on a single technical or environmental dimension. Rather, it depends on the ability to hold multiple levels together: artistic quality, energy and material responsibility, attentiveness to locations, public activation, the building of effective partnerships, the legibility of impacts, and the transferability of results.

Precisely because they are grounded in the concrete experience of the project and the convergence between scientific and psycho-social analysis, these guidelines constitute the most mature outcome of WP9.3 and the most directly reusable methodological contribution from ECO-Light for the future.

8. Lessons Learned

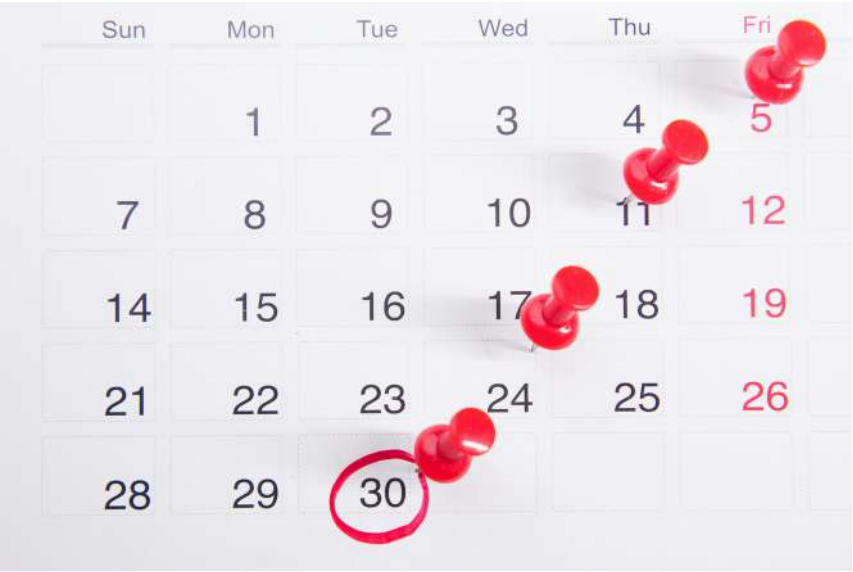
This section gathers the primary Lessons Learned that emerged during the implementation of the ECO-Light project.
In continuity with the Best Practices, this section reflects on the insights gained at the organizational, methodological, and operational levels. It highlights not only the approaches that proved successful, but also the conditions, constraints, and critical issues that tangibly influenced the development of the activities.
These elements are essential not just for a more comprehensive interpretation of the project experience, but also for understanding the actual conditions required to make an interdisciplinary cultural project viable when it aims to integrate artistic production, research, sustainability, and territorial activation.
Taken together, these considerations emphasize that a project's sustainability also depends on its ability to adapt to real-world constraints, coordinate diverse stakeholders, and transform critical challenges into opportunities for improvement. In this sense, the Lessons Learned do not represent a residual section, but a necessary component of WP9.3: they are the point where project experience is translated into operational knowledge.

8.1 Lesson Learned 1: Permits and Institutional Timelines Are an Integral Part of the Design Process

The ECO-Light experience demonstrated that, particularly in sensitive contexts or environments involving multiple institutional entities, the permitting and approval process is not an incidental phase, but a structural component of the project.
Administrative timelines, overlapping jurisdictions, approval procedures, and the need for coordination directly affect the viability of activities. They require proper planning that integrates these variables from the very outset.
From this perspective, the case of *Elios* at the Marmore Waterfalls is highly instructive. The installation was conceived as a site-specific work

with minimal impact: five heliostats that allowed the project to remain compatible with a highly sensitive environmental context. However, it also made it clear that a high-quality concept is not enough unless it is paired with a rigorous, well-documented, and proactive approach to securing approvals.
Engaging with environmental compatibility procedures, safety checks, assessments regarding potential disturbances to flora and fauna, as well as the value of gathering insights from specialists, taught us that in such cases, institutional time frames are not external to the project - they are a core, constituent part of it.

The lesson learned is clear: in protected or regulated contexts, the artistic schedule must be built around the authorization timeline, and never the other way around.



8.2 Lesson Learned 2: Sustainability Includes "Avoided Disruption"

In cultural projects carried out in natural, urban, or highly identity-defining spaces, sustainability does not exclusively hinge on reducing energy consumption or the materials used. The capacity to limit interference with the host context - by avoiding perceptual impacts, excessive pressure, or unnecessary alterations - is equally critical. Consequently, focusing on "avoided disturbance" broadens the very concept of design sustainability.
In this case as well, the work carried out for Elios was exemplary: the piece was designed not to introduce a new artificial light source to the landscape, but to amplify existing optical phenomena by working with the reflection of sunlight within the waterfall's

mist. The time-limited activations, the lack of a grid connection, the reversibility of the intervention, and the choice not to permanently alter the site all show how sustainability can also be interpreted as a reduction of the overall disturbance generated.
The lesson learned is that, in certain contexts, the most important parameter is not just "how much an artwork consumes", but also "how much it interferes": with the landscape, with the perception of the place, with its ecological balances, and with pre-existing local practices. This broadening of perspective is one of the project's most significant takeaways.

8.3 Lesson Learned 3: Balancing Academic and Operational Commitments Requires Constant Energy

The project brought together research activities, educational pathways, artistic production, and public events, each characterized by different timelines and working methods. The experience highlights that the effectiveness of these models depends on the ability to coordinate diverse schedules, responsibilities, and expectations, while maintaining a balance between scientific requirements and operational needs.
This aspect became particularly evident in the relationship between the development of the installations, the timing of data collection, and the compilation of the final report. The requirements for scientific and psycho-social observation do not always coincide with the timelines of artistic production or those of public event programming.

The lesson learned is that, in complex projects, management must not be limited to coordinating activities. Instead, it must build continuous points of connection among those who produce, those who observe, those who mediate, and those who report. In other words, the quality of the project also depends on the ability to foster a dialogue between the timeline of the artwork and the timeline of the analysis.

8.4 Lesson Learned 4: Organisational Flexibility Is Crucial in Large-Scale Projects

When activities are distributed across multiple locations, partners, and timeframes, the capacity to adapt schedules and operational methods becomes essential. ECO-Light demonstrated how flexible management allows for a better response to calendar changes, venue availability, emerging opportunities, and local specificities, while simultaneously preserving the overall coherence of the project.

8.5 Lesson Learned 5: Content Quality Remains Crucial Even in Innovative Formats

Immersive installations, widespread events, and interdisciplinary formats can easily capture public attention, but they are no substitute for the quality of the content proposed. The project's experience confirms that the cultural value of an initiative also depends on the solidity of the ideas, the expertise of the individuals involved, and the ability to offer meaningful experiences beyond mere spectacle.
This aspect emerged with particular force in contexts where the perceptual intensity of the experience could have been seen as an end in itself. Instead, the psycho-social analysis showed that the most effective experiences were not necessarily the most spectacular ones, but those where sensory power was accompanied by a legible cultural framework, a coherence between form and content, and a genuine capacity to activate meaning, imagination, or reflection.

The lesson learned is clear: an innovative format opens a window of attention, but it is the quality of the content that transforms that attention into a meaningful experience.

8.6 Lesson Learned 6: Different Geographical Contexts Require Specific Adaptations

The activities developed across cities, museums, natural spaces, and venues with vastly different characteristics highlighted that there is no single model applicable everywhere. Languages, timelines, engagement tools, and organizational methods must be calibrated according to the host territories, local networks, and the expectations of the target audiences.
The ECO-Light experience demonstrated that replicability does not equate to repetition. A project is truly replicable when it succeeds in keeping its core framework recognizable, even while altering its tools, intensity, and operational methods based on the location. In natural contexts, the issue of environmental compatibility prevails; in museums and cultural spaces, the relationship with mediation and heritage matters more; in urban and performing arts contexts, public accessibility and the capacity to trigger widespread engagement become prominent.

The lesson learned is therefore that adaptation does not weaken the project: it constitutes the very condition for its effectiveness.

8.7 Lesson Learned 7: Partnerships Require a Common Language

Collaboration between entities belonging to different worlds - universities, cultural bodies, local authorities, professionals, and educational institutions - represents an added value, but it also requires shared communication and coordination tools. Defining clear objectives, legible responsibilities, and common operational methods is essential to avoid delays and misunderstandings.

In the course of the project, it became apparent that differences in language concern not only disciplinary vocabularies, but also the way each stakeholder interprets timelines, priorities, constraints, and expected outcomes. For this reason, one of the most useful lessons learned concerns the need to build mechanisms for mutual translation right from the start: alignment meetings, shared working documents, clarification of responsibilities, and continuous review stages. When these tools are missing, the partnership risks remaining a mere sum of parts; when they work, however, the partnership becomes a system capable of generating genuine added value.

8.8 Lesson Learned 8: In Long-Term Projects, Adaptability Is a Key Skill

In multi-year projects, it is entirely natural for external conditions, operational priorities, and organizational setups to evolve over time.

The ECO-Light experience shows that the ability to recalibrate tools, resources, and solutions without losing sight of the strategic direction constitutes a fundamental skill to guarantee continuity and effectiveness throughout the entire project lifecycle.

This lesson learned takes on a specific value in relation to WP9 as well. The project demonstrated that impact evaluation is not a linear operation, but a process built progressively, adapting tools and interpretations according to what the activities actually produce.

Sustainability, therefore, does not only concern the subject of the project, but also the way in which the project manages to remain coherent while changing. In ECO-Light, this capacity for adaptation was not a simple reaction to unexpected events; it became a core criterion of design quality.

8.9 Final Considerations

The Lessons Learned from ECO-Light show that the sustainability of an interdisciplinary cultural project depends not only on the quality of its outcomes, but also on the ability to govern processes: anticipating institutional timelines, reducing disturbance beyond consumption, coordinating differing schedules, adapting formats to contexts, maintaining high content quality, building common languages, and recalibrating the project over time. It is precisely in this capacity to hold vision and operational reality together that the project has generated its most useful and transferable insights.

9. SDGs & THE Impact Rankings

9.1 SDGs & Sustainable Development in the ECO-Light Project

Although originating with a strong artistic, cultural, and interdisciplinary vocation, the ECO-Light project developed a series of activities throughout its implementation that align with several Sustainable Development Goals (SDGs) promoted by the United Nations. This coherence should not be interpreted exclusively in environmental terms, but within a broader perspective of sustainability, understood as the capacity to generate long-lasting value on educational, social, territorial, cultural, and economic levels.

Indeed, the experience gained during the project shows how initiatives founded on the intersection of universities, artistic production, applied research, and regional activation can tangibly contribute to objectives that are currently central to European and international policies. ECO-Light addressed the theme of sustainability not as a separate dimension from creativity, but as a transversal criterion capable of guiding the design of artworks, audience engagement, the building of collaborative networks, and the valorisation of host contexts.

In light of the activities carried out, five SDGs emerge in particular, with respect to which the project presents significant elements of alignment:

- SDG 4: Quality Education
- SDG 11: Sustainable Cities and Communities
- SDG 17: Partnerships for the Goals
- SDG 12: Responsible Consumption and Production
- SDG 7: Affordable and Clean Energy

SDG 4: Quality Education

With reference to SDG 4 (Quality Education), ECO-Light promoted interdisciplinary learning pathways that involved students, professors, researchers, and external audiences in applied educational activities, workshops, open days, laboratories, and dissemination initiatives. In par-

ticular, the Open Eco-System Labs (OEL) spaces and the activities aimed at schools fostered experiential learning methods and a dialogue between artistic, scientific, and design skills, strengthening the dimension of lifelong learning and education open to the local territory.

SDG 11: Sustainable Cities and Communities

Regarding SDG 11 (Sustainable Cities and Communities), the project contributed to the cultural valorisation of cities and territories through artistic installations, widespread events, and the Spotlight Museums cycle, which involved peripheral museums and local realities often excluded from major cultural flows. In this sense, ECO-Light promoted new forms of cultural accessibility, strengthening the relationship between heritage, communities, and creative innovation.

SDG 17: Partnerships for the Goals

The project was built upon an articulated network of collaborations between universities, AFAM institutions (Higher Education in Art, Music and Dance), local authorities, museums, schools, professionals, and international partners. The construction of these relationships represented a structural element of the project, enabling the integration of diverse expertise and the implementation of complex initiatives across multiple contexts. To this are added the dissemination and documentation activities, as well as the production of shared outputs.

SDG 12: Responsible Consumption and Production

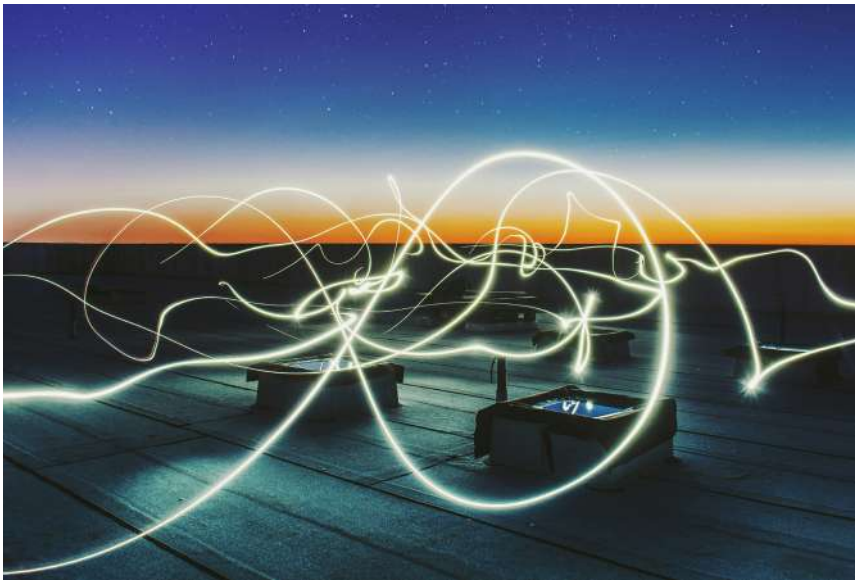
Further elements of alignment emerge with respect to SDG 12 (Responsible Consumption and Production), particularly in activities oriented towards the creative reuse of materials, the design experimentation of Paper Runway, the choice of temporary and lightweight solutions, and the focus on reducing the material impact of cultural productions. From this perspective, the OEL laboratory spaces can also be viewed as infrastructures oriented towards more responsible models of cultural production, based on resource sharing, experimentation, and the efficient use of available spaces and equipment.

SDG 7: Affordable and Clean Energy

With reference to SDG 7 (Affordable and Clean Energy), the project also dedicated specific attention to the theme of energy efficiency and the conscious use of light, both on a symbolic and a technical-applied level. The use of low-consumption devices, the pursuit of energy-light solutions, reflection on the relationship between technology and sustainability, and certain experiments based on autonomous systems or those powered by renewable sources show how artistic and cultural production can also contribute to the spread of practices aligned with a sustainable energy transition.

In conclusion, ECO-Light demonstrates how a contemporary cultural project can tangibly contribute to multiple dimensions of sustainability, integrating education, heritage, innovation, institutional collaboration, material responsibility, and energy efficiency into a single, coherent project pathway. The experience developed also confirms that culture can represent not only a sphere of symbolic production, but also an operational tool capable of activating skills, generating territorial networks, promoting responsible behaviours, and strengthening the dialogue between research, creativity, and society. In this perspective, ECO-Light configures itself as a replicable model of integration between artistic practices and sustainable development goals.

These dimensions are taking on an increasing significance today within the main international university impact assessment systems, including the THE Impact Rankings, which measures the contribution of higher education institutions to the SDGs through indicators relating to research, education, partnerships, regional valorisation, and sustainable practices.



9.2 Connections with THE Impact Rankings

The dimensions highlighted above are taking on an increasing significance today within the main international university impact assessment systems. Among these, the THE Impact Rankings, promoted by Times Higher Education, measures the contribution of higher education institutions to the Sustainable Development Goals (SDGs). It uses a methodology that considers not only scientific output, but also the capacity of universities to generate tangible effects on an educational, territorial, social, and organizational level.

For each selected SDG, the ranking evaluates a combination of indicators relating to research, education, institutional partnerships, relationships with local communities, responsible resource management, and the production of public evidence. From this perspective, the ECO-Light project presents numerous elements of alignment with some of the areas most heavily considered by these evaluation systems, confirming how complex cultural initiatives can also significantly contribute to the strategic positioning of universities.

Related to SDG 4 – Quality Education, ECO-Light specifically aligns with indicators relating to lifelong learning measures (4.3), public events (4.3.2), and education outreach activities beyond campus (4.3.4). Tangible examples of this include the open days organized at the OEL laboratories, the interdisciplinary workshops aimed at students and young participants, pathways developed with schools, demonstration activities open to the local territory, the involvement of external audiences in educational and experimental processes, and the integration of universities and AFAM institutions within the educational pathways promoted by the project.

According to SDG 11 – Sustainable Cities and Communities, the project proves particularly coherent with indicators dedicated to the support of arts and heritage (11.2) and, complementarily, with certain aspects of sustainable practices (11.4) linked to the relationship between universities, territories, and the sustainable use of spaces. The Spotlight Museums cycle, the cultural reactivation of peripheral museums, the dissemination of events in decentralized contexts, the valorisation of local heritage, and the strengthening of the bond between cultural spaces and citizenship represent particularly significant evidence. The OEL laboratories can also be viewed in this light as tools for urban regeneration and open infrastructures dedicated to innovation, creativity, and cultural services.

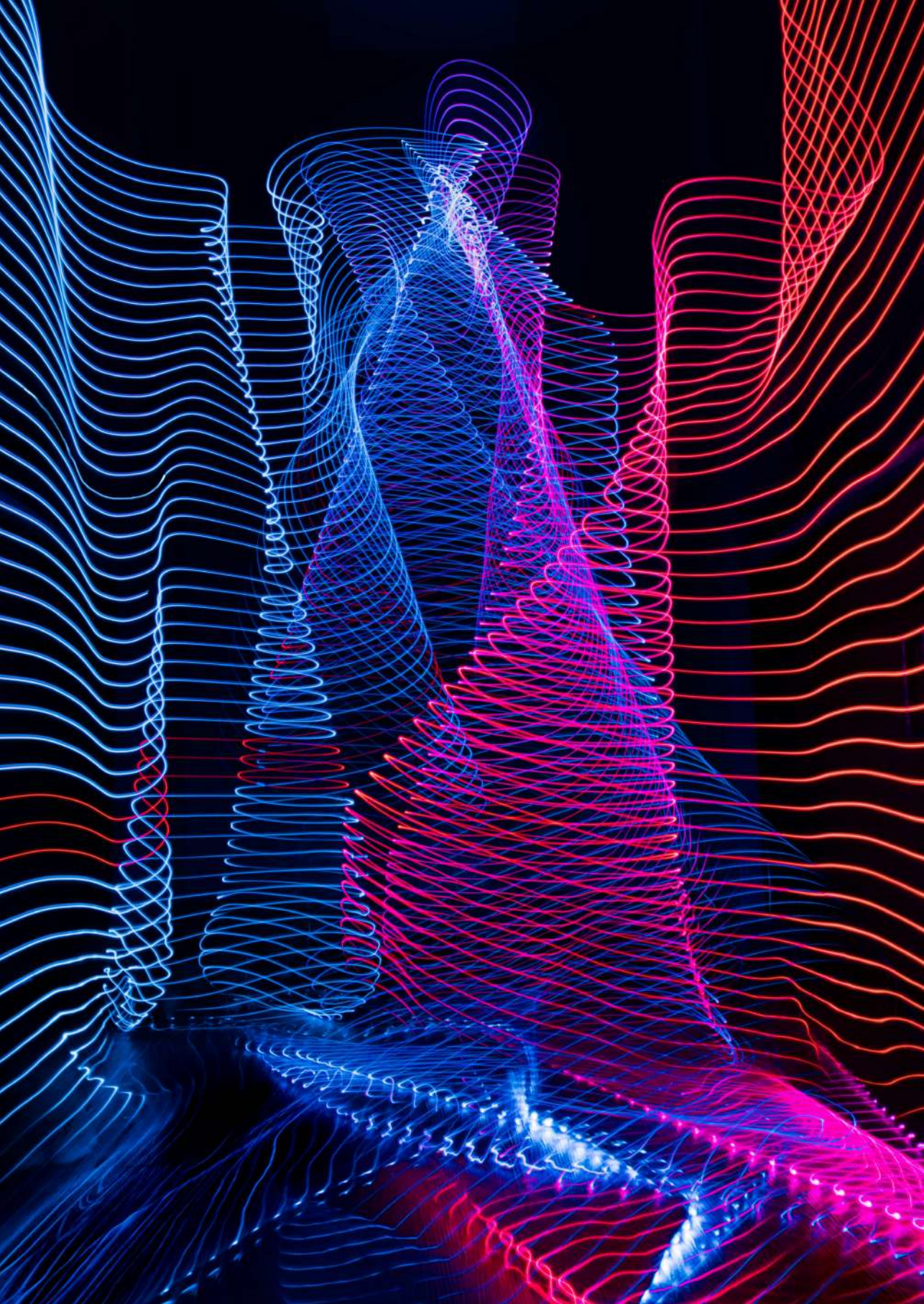
About SDG 17 – Partnerships for the Goals, ECO-Light connects with indicators relating to relationships to support the goals (17.2), publication of SDG reports (17.3), and education

on the SDGs (17.4). The partnership between universities, AFAM institutions, local authorities, museums, schools, professionals, and international partners - together with the production of final reports, guidelines, publications, thematic notebooks, and shared outputs - shows strong alignment with the structured cooperation logic valued by the ranking. This framework also includes the internationalization actions and the relationships developed with foreign entities throughout the project.

Further connections emerge regarding indicators dedicated to operational measures (12.2), the promotion of reuse, and, in part, the production of public documentation on results (12.4). Viewed through this lens are the Paper Runway project, based on upcycling practices and the creative reuse of paper; the choice of temporary, lightweight solutions for certain installations; the focus on reducing the material impact of artistic productions; and the design of the OEL laboratories according to criteria of resource efficiency, equipment sharing, and operational sustainability.

Finally, The project intersects with indicators linked to clean energy measures (7.2) and, in part, low-carbon energy use (7.5). This is achieved through the use of low-consumption devices, the design of lighting installations with reduced energy requirements, and various experiments based on autonomous systems or those powered by renewable sources, as seen in interventions designed with integrated solar energy. Furthermore, the reflection developed within the project on the relationship between light, technology, and energy efficiency helps spread a culture of conscious energy use within creative and cultural contexts.

In conclusion, the ECO-Light experience highlights how interdisciplinary cultural projects can contribute not only to internationally promoted sustainability goals, but also to the evaluation dynamics that currently measure a university's capacity to produce a real impact on regions, communities, and social systems. In this sense, the project represents a significant example of integration between the "Third Mission" (terza missione), cultural innovation, and sustainable development strategies.



10. Conclusions

The pathway captured in this volume is neither a mere summary of the activities carried out, nor is it limited to a simple checklist of achieved objectives. Instead, what clearly emerges is the progressive construction of a working field where sustainability does not act as an external evaluation criterion, but as a generative principle capable of guiding the entire project framework from its earliest stages. In ECO-Light, sustainability is configured as an operational matrix running through artistic design, technological choices, methods of relating to contexts, and the construction of the public experience, ultimately translating into a system of transferable knowledge.

In this sense, WP9 assumed a decisive function. It was not a final reporting activity, nor a simple apparatus for measuring impacts, but a genuine mechanism for observation and interpretation, capable of accompanying the project in its evolution while providing a structured analysis of it. Its breakdown into scientific analysis, psychological analysis, and the development of guidelines made it possible to hold together dimensions that are often treated separately, enabling a unified understanding of the processes activated.

The scientific analysis represented the first level of this framework. The focus on environmental and energy aspects was not limited to quantifying consumption; rather, it allowed for the development of a comparative reading of the installations. It interconnected elements such as the energy sources used, the material impact of the interventions, the degree of reversibility, compatibility with natural and urban contexts, the duration and methods of activating the works, as well as the dynamics of audience access and mobility. The result is an articulate map of contemporary Light Art, in which different yet coherent models coexist: controlled immersive environments, temporary performing devices, site-specific interventions integrated into the landscape, and hybrid formats connecting light, sound, body, and matter.

In certain cases, these principles found an especially evident translation. The intervention at the Marmore Waterfalls, for example, explicitly demonstrated a design approach where the artwork does not introduce an alteration to the context, but grafts

itself onto existing phenomena. It amplifies them through a controlled, autonomous use of solar energy, utilizing reversible and temporary devices. This approach is not an exception, but one of the possible expressions of a broader orientation, where artistic design measures itself against the ability to reduce its footprint and establish non-invasive relationships with the environment.

Alongside this dimension, the analysis highlighted how sustainability is also played out at the level of spatial configurations and infrastructures. The Open Eco-System Labs (OEL), much like the permanent and temporary installations, were not simply places of production or exhibition. They were devices designed to activate practices, generate access, foster interdisciplinarity, and build continuity between research, training, and public enjoyment. In this sense, sustainability is linked to the capacity to generate durable systems that continue to produce effects well beyond the project's lifespan.

While the scientific analysis made it possible to read the material and energy conditions of the interventions, the psychological and social dimension revealed another level of impact - less immediately measurable, but equally structural. Through the adoption of tools such as Social Dreaming, the project investigated how a shared artistic experience can activate meaning-making processes, generate common imaginaries, and affect the ways in which individuals and groups perceive and interpret places.

What emerges from this perspective is that art, within ECO-Light, is not configured as an object to be observed, but as a relational device. The installations and events produced effects across multiple levels: emotional activation, participation, the building of bonds, cultural access, and the redefinition of fruition practices. In some contexts, these dynamics translated into a greater capacity for a critical reading of spaces; in others, they favored processes of inclusion and the engagement of less traditional audiences; in still others, they generated forms of active participation that blurred the line between spectator and actor.

This dimension intertwines directly with the territorial scale of the project. Perugia, Terni, and Fabriano were not merely operational hubs, but distinct testing grounds, each with its own function within the overall ecosystem. Perugia configured itself as the central node for research, training, and infrastructure, concentrating laboratory spaces, educational activities, and permanent installations. Terni assumed the role of a laboratory exploring the relationship between art and landscape, where the environmental dimension became a structural element of the design. Fabriano represented an emblematic case of hybridization between industrial heritage and contemporary languages, where material tradition was reactivated through innovative artistic practices.

Added to this articulation is the network of peripheral museums and decentralized contexts, which the project involved through itinerant

pathways and multisensory interventions. In these cases, sustainability is also measured by the ability to redistribute cultural access, activate marginal territories, and construct new geographies of fruition. The project demonstrated how Light Art can operate as a connecting tool, capable of linking places, communities, and heritage, contributing to a form of valorisation that goes beyond mere visibility to impact local dynamics.

A central element in this construction is represented by the partnership. The collaboration between the Istituto Italiano Design, Università Politecnica delle Marche, Poliarte, and the Conservatorio Briccialdi gave shape to a truly interdisciplinary model, in which differing expertise did not overlap but integrated in a structured way. Cultural and organizational direction, scientific oversight, technical-design capacity, and the performing and sound dimension operated as components of a single system, making continuity possible between conception, production, analysis, and dissemination.

This integration is one of the project's most significant outcomes. It proves that sustainability, in complex cultural contexts, cannot be tackled sectorally. Instead, it requires the construction of mechanisms capable of holding together different skills, vocabularies, and levels of intervention. In this sense, the value of the partnership lies in its capacity to produce not only outputs, but replicable working methods.

The decisive step taken by this report concerns the transformation of project experience into structured knowledge. The document does not limit itself to recording what has been done; it builds an initial methodological framework to read and interpret sustainability in contemporary cultural projects. The analyses conducted, the indicators used, the case studies developed, and the guidelines drafted constitute a coherent set of tools that can be reactivated in other contexts.

In this perspective, ECO-Light leaves behind a legacy that includes not only material infrastructure - such as the laboratory spaces or permanent installations - but also an immaterial heritage composed of practices, evaluation criteria, design models, and a shared operational vocabulary. This heritage is the prerequisite for the replicability of these experiences and their future evolution.

The development of the guidelines, envisioned as an outcome of WP9, fits precisely into this logic. They are not configured as a prescriptive set of rules, but as an open system of guidance, derived from the direct observation of processes and their critical interpretation. Their value lies in their ability to make explicit the links between design choices and the impacts generated, offering tools for more conscious planning.

Ultimately, what this volume reflects is the transition from an experimental phase to a formalization phase. ECO-Light operated as an extended laboratory in which art, science, technology, and territory were brought into relationship through light as a common element. WP9 made these relationships legible, transforming them into shareable knowledge.

The conclusion of this report does not coincide, therefore, with a closure in the strict sense, but with the opening of a trajectory. The work collected here constitutes a building block of a broader reflection, presenting the project within the series of notebooks of which this report forms a part.

Sustainability is not a status achieved, but a process in continuous redefinition, requiring tools for interpretation, critical capacity, and a willingness to re-examine one's own operational methods.
ECO-Light demonstrates that it is possible to build cultural projects in which sustainability is not a constraint, but a generative condition.