Virtual CityLab: Energy Efficiency (Renewable Energy) and World Heritage

Co-organized with the City of Luxembourg
April 9, 2026

Report

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INTRODUCTION

Since 2025, the *CityLabs* have been contributing to the collective development of the *New Urban Process* (NUP) of the Organization of World Heritage Cities (OWHC). By exploring thematic issues deemed essential by member cities, they ensure that the key challenges of historic centers are fully integrated into the NUP.

With a view to the adoption of the NUP at the 18th OWHC World Congress in Marrakech (October 26–29, 2026), the *CityLabs* have shifted to a virtual format to facilitate final discussions on themes that have not yet been sufficiently explored but are essential to the coherence and relevance of the NUP.

It is within this framework that the City of Luxembourg, in coordination with the General Secretariat, organized a virtual *CityLab* entitled "**Energy Efficiency (Renewable Energy) and World Heritage**." The *CityLab* had two main objectives: first, to establish a consensus on the statements related to the issues addressed (situations, challenges, and vulnerabilities); and second, to generate proposals that could inform the definition of operational principles and objectives.

More specifically, it aimed to explore the conditions for integrating renewable energy—particularly solar energy—into historic centers, reconciling the imperatives of the energy transition with the conservation of Outstanding Universal Value (OUV). The discussion was based on a case study developed by the City of Luxembourg, focusing on the analysis of the conditions for installing solar systems at a territorial scale, using a multi-criteria approach.

The contributions gathered during this workshop form the basis of this report, prepared jointly by the General Secretariat of the OWHC and the City of Luxembourg.

CITYLAB THEMATIC

The CityLab coordinated by the City of Luxembourg focused on the integration of renewable energy—particularly solar energy—into historic centers listed as World Heritage sites, in a context marked by increasing energy demand and sustainability challenges. This topic highlights a growing tension between the energy transition and the conservation of OUV, particularly in sensitive and highly constrained urban environments.

From this perspective, the CityLab aimed to explore ways to reconcile these issues by comparing the approaches and experiences of the participating cities (Agadez, Évora, Visby, Vilnius, Edinburgh, and Bordeaux), whose contributions helped highlight contrasting realities and shared challenges.

This thematic initiative is part of an exploratory initiative launched by the City of Luxembourg, aimed at adapting a framework for reflection to the urban context initially developed at the international level, particularly through UNESCO's work on renewable energy in heritage sites. The challenge is not merely to identify technical solutions, but to systematically assess the conditions under which their integration can be considered without compromising the attributes of OUV. The City of Luxembourg's approach is based on a multi-criteria analysis combining 3D modeling, solar cadastre, vegetation mapping, and analysis of viewpoints (fixed, linear, and dynamic). This approach moves beyond a case-by-case assessment to enable an objective, territory-wide evaluation of impacts, thereby informing public decision-making.

MAIN COMMON STATEMENTS

A fundamental tension between the energy transition and heritage
World Heritage cities face a constant trade-off between local energy production and the preservation of their urban landscapes. There is no one-size-fits-all solution; the answers depend heavily on local contexts.

Differentiated approaches based on local contexts
Cities adopt contrasting positions, ranging from total bans in certain highly exposed historic centers (Vilnius) to experimental efforts to integrate innovative solutions (Évora), as well as intermediate approaches based on conditional permits. This diversity reflects varied regulatory, geographic, and political contexts and limits the direct transferability of solutions.

Approaches that remain largely fragmented
Management that is predominantly case-by-case creates uncertainty and limits the ability to anticipate cumulative impacts at the urban scale. There is a widely shared need for territorial approaches and structured frameworks.

Visibility and authenticity at the heart of trade-offs
Visual impact is the primary evaluation criterion in contexts where total invisibility is rarely achievable. This constraint fuels a gradual redefinition of authenticity, balancing the preservation of existing forms with adaptation to contemporary issues, while highlighting the need to account for traditional construction techniques, some of which may prove incompatible with the integration of photovoltaic systems.

Persistent uncertainties and a shift toward hybrid models
The technical, environmental, and economic limitations of these solutions raise questions about their long-term relevance and actual effectiveness. They are fostering the emergence of hybrid models that combine local, decentralized, and shared production, as well as the exploration of alternatives to conventional photovoltaic panels, such as photovoltaic tiles, photovoltaic glass, crystalline glass, and photovoltaic membranes. Complementary solutions, such as participation in solar farms located outside historic centers, have also been proposed to limit direct visual impacts on heritage sites.

COMMON COURSES OF ACTION

Develop territorial and systemic approaches
Integrate energy issues at the territorial level and in coordination with urban policies (mobility, housing, and governance) to move beyond fragmented approaches.

Implement shared decision-making tools
Develop common methodologies, mapping tools, and evaluation frameworks to support the analysis of impacts in a heritage context.

Strengthen cooperation and knowledge-sharing among cities
Structure the sharing of experiences and organize the pooling of knowledge (good practices and lessons learned) to consolidate collective learning.

Test tailored and reversible solutions
Encourage pilot projects that integrate heritage requirements, as well as sustainability, life-cycle, and reversibility considerations.

Develop complementary and acceptable energy models
Explore alternative solutions (decentralized, shared, or off-site production), including the use of innovative systems integrated into buildings, and incorporate social acceptability issues into decision-making processes.

Integrate the issue of the life cycle of energy installations
Anticipate the lifespan, maintenance requirements, and replacement conditions of systems to ensure their long-term compatibility with heritage requirements, considering, in particular, the overall carbon footprint of solutions and differences in sustainability between traditional materials and energy systems, such as photovoltaic tiles.

PERSPECTIVES

The CityLab opens several avenues for furthering the discussion:

- It appears necessary to **strengthen long-term impact analyses**, particularly **by integrating environmental** (including life-cycle carbon footprint of materials and installations)**, technical, and heritage dimensions**; as well as to develop alternative energy production scenarios tailored to the specific characteristics of historic districts.

- **Testing pilot solutions** in diverse contexts **is also a key lever** for testing, evaluation, and a refinement of approaches with a view to their potential scalability and replicability.

- **The need to view historic centers as spaces for experimentation, where cities can test, evaluate, and gradually adjust proposed solutions, following a "living lab" approach**. This approach requires strengthening the capacity for observation, monitoring, and sharing of results among cities.

CONCLUSION

This CityLab highlights a central challenge for the New Urban Process: **the need to reconcile the energy transition and heritage preservation without opposing them.** The diversity of approaches observed confirms that the subject remains in an exploratory phase, but that it already represents a key strategic lever for ensuring the habitability of historic centers, particularly by integrating diversified approaches, considering the life cycle of solutions, and utilizing complementary energy models. As such, it calls for continued efforts toward clarification, experimentation, and cooperation to develop appropriate, balanced, and sustainable solutions.

APPENDIX

List of participants:

CITY	LAST NAME	ROLE
Luxembourg	**Shaaf Milani-Nia** Architect-Director and UNESCO Site Manager, City of Luxembourg	Coordinator
Luxembourg	**Sébastien Busch** Architectural Department – Urban Planning Division, City of Luxembourg	Coordination Support
Agadez	**Ali Salifou** Curator of the Historic Center of Agadez	Participant
Bordeaux	**Anne-Laure Moniot** Head of the Architecture and Urban Heritage Planning Department, Joint Department of the City of Bordeaux – Bordeaux Métropole	Participant
Bordeaux	**Christian Guillaume** Strategy and Energy Initiatives Division, Bordeaux Métropole	Participant
Edinburgh	**Yann Grandgirard** Climate Change Manager, Edinburgh World Heritage	Participant
Évora	**Nuno Bilo** Mechanical Engineer, POCITYF Project, Municipality of Évora	Participant
Vilnius	**Donata Kabelke** Head of the Cultural Heritage Conservation Division, Municipality of Vilnius	Participant
Visby	**Louise Hoffman Borgö** World Heritage Site Coordinator, Gotland Region	Participant