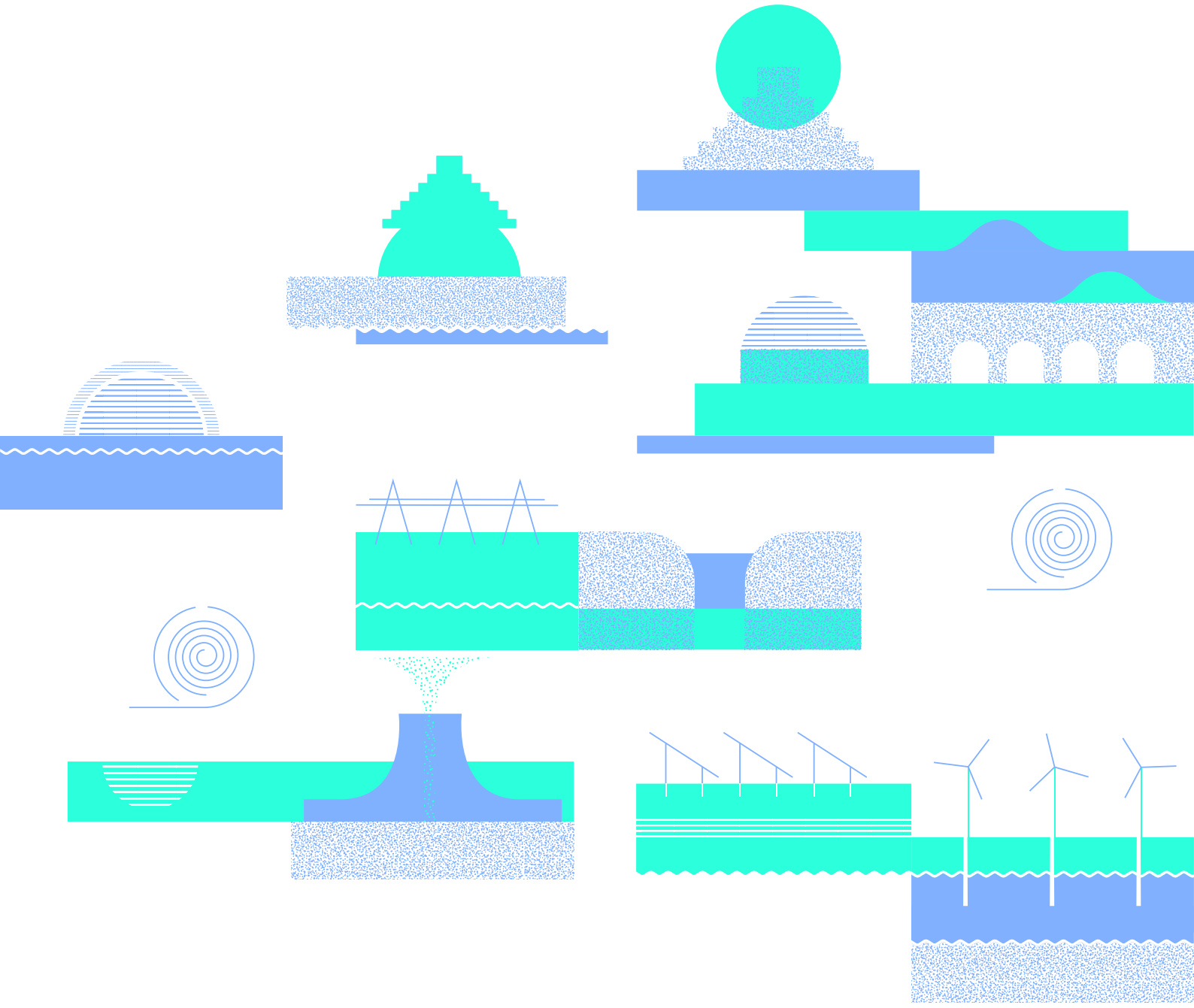
PROTECTING WORLD HERITAGE

WORLD HERITAGE AND RENEWABLE ENERGY

Guidance on wind and solar energy projects in a World Heritage context



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Protecting World Heritage in the face of the renewable energy transition

National strategies and policies for the transition to renewable energy and initiatives for decarbonization are often based on the strategic principles and guidelines set in international agreements and directives. However, the implementation of international agreements or directives relating to renewable energy may not be cross-checked and aligned with national policies and regulations protecting natural and cultural heritage, including World Heritage properties. It is similarly important that national policies, programmes and plans, as well as the accompanying national legal frameworks, give due consideration to heritage protection and ensure full protection of World Heritage properties. In addition to the establishment of an appropriate legal framework, a proactive approach to site management could effectively supplement national legal tools and support and strengthen protection measures ensuring the preservation of World Heritage properties for future generations.

A proactive and integrated approach to planning renewable energy development is key to ensuring its swift and reliable delivery, while also supporting States Parties in upholding their commitment to protecting Outstanding Universal Value.

By ratifying the World Heritage Convention, States Parties commit to protecting and effectively managing the World Heritage properties located within their territory. This includes taking appropriate policy, legal, scientific, technical, administrative and financial measures to ensure the long-term preservation of these properties.

In the context of accelerating action to address climate change, including the development of renewable energy infrastructure, States Parties are encouraged to align the protection of World Heritage with efforts to reduce greenhouse gas (GHG) emissions. This requires a harmonized approach that integrates renewable energy development and heritage conservation into national and local planning processes.

According to Article 5(a) of the Convention, States Parties must 'adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes.' This means that World Heritage considerations should be embedded in all relevant planning and development frameworks, including those related to the energy transition.

While large-scale renewable energy projects such as wind farms and solar farms are often subject to formal Environmental Impact Assessments (EIAs), smaller-scale interventions, particularly in urban contexts, may not trigger such requirements under national law. However, even small-scale technologies such as rooftop solar PV panels, solar hot water systems and vertical-axis wind turbines can affect the visual or physical integrity of a World Heritage property, especially when installed in or near the property, its buffer zone or its wider setting.

For this reason, impact assessment approaches, even when not legally required, are valuable tools for supporting informed, transparent and consistent decision-making. They can help to evaluate whether proposals are appropriate in terms of location, scale and technology, and whether mitigation or alternative solutions are needed.

To support this process, proactive planning is essential. Residents, property owners and investors in or near World Heritage properties should have clear access to information, know who to contact and understand what procedures apply when planning to install renewable energy systems. A well communicated and coordinated approach will help to ensure that the development of clean energy is compatible with the protection of Outstanding Universal Value.

Renewable energy systems can help to support local communities and reduce the environmental impacts of our energy use. However, site management bodies also have a fundamental role to play in ensuring that the Outstanding Universal Value of a property is maintained. In the best cases, renewable energy development can take place and urban communities can flourish at the same time that World Heritage is fully protected; however, care is needed to make sure that the commitment to World Heritage is never compromised when the proposed project(s) would have negative impacts.

Proactive planning and standard setting is the best way to protect World Heritage and provide clarity to residents and investors.

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World Heritage and the renewable energy transition: Outstanding Universal Value-focused decision-making

All World Heritage properties should be regarded as highly sensitive to changes that may result from the development of renewable energy infrastructure. For this reason, projects involving renewable energy such as wind and solar power and their associated transmission systems must be carefully assessed before they are implemented. It is crucial that proactive research and planning are undertaken to develop policies and tools that help to ensure the Outstanding Universal Value of World Heritage properties is preserved throughout the renewable energy transition. A precautionary approach is essential, given the responsibility of States Parties under the Convention to ensure the maintenance of the Outstanding Universal Value of World Heritage properties in their territories. The European Union's precautionary principle provides a helpful example: 'if it is possible that a given policy or action might cause harm to the public or the environment and if there is still no scientific agreement on the issue, the policy or action in question should not be carried out'.

It is therefore important that States Parties and World Heritage site managers, at all relevant levels, adopt strict and cautious policies regarding renewable energy developments in and around World Heritage properties and their buffer zones.

The Policy Document for the Integration of a Sustainable Development Perspective into the Processes of the World Heritage Convention highlights that 'for many World Heritage properties, achieving sustainable development will require acting at a scale that is much larger than the property itself and (...), in the process, some dimensions of sustainable development may prove to be of greater relevance than others. Thus, States Parties should integrate conservation and management approaches for World Heritage properties within their larger regional planning frameworks, giving consideration in particular to the integrity of socio-ecological systems' (para. 10).

In line with the Policy Document, any renewable energy or transmission infrastructure developed within a World Heritage property, its buffer zone or its wider setting should follow best practices. This includes ensuring sustainability and responsibility at every stage, from sourcing materials and manufacturing to construction, ongoing maintenance and eventual decommissioning or repowering. Wherever possible, rare materials should be recovered and recycled to minimize environmental impacts.

Checklist for site managers to ensure notification to the World Heritage Centre

The Operational Guidelines include an invitation to States Parties to the World Heritage Convention 'to inform the [World Heritage] Committee, through the Secretariat, of their intention to undertake or to authorize in an area protected under the Convention major restorations or new constructions which may affect the Outstanding Universal Value of the property. Notice should be given as soon as possible (for instance, before drafting basic documents for specific projects) and before making any decisions that would be difficult to reverse, so that the Committee may assist in seeking appropriate solutions to ensure that the Outstanding Universal Value of the property is fully preserved' (Operational Guidelines, para. 172).

World Heritage site managers should, therefore, through their National Focal Point for World Heritage, make sure that information is passed to the World Heritage Committee regarding wind, solar and transmission infrastructure where these may have negative impacts on the World Heritage property under their care. The challenge is to define when a project is large enough to warrant notification to the World Heritage Committee.

There are two approaches that can be followed, both of which must be based on a thorough understanding of the Outstanding Universal Value of the World Heritage property with the aim of conserving it.

Proactive planning and guidance, and monitoring

1. By setting out appropriate options for small-scale renewable energy development in a World Heritage property and its setting, a site manager can promote options that are appropriate to the World Heritage property though using planning instruments and guidelines.

2. Such options could include:
   - policies,
   - installation guides,
   - lists of acceptable types and sizes of solar PV and solar hot water systems,
   - acceptable locations for installations,
   - technical and safety requirements,
   - by-laws or other legal and planning instruments, including approvals processes, determined through vulnerability assessments.
     (See '*Vulnerability assessment of World Heritage properties*') and other studies.

3. Monitoring the cumulation of change is important to ensure that the developed plans and guidance documents deliver results that are aligned with the maintenance of the Outstanding Universal Value of a property while also meeting the expectations of local communities.

4. Plans and guidance documents can be submitted to the World Heritage Committee and assessed by the Advisory Bodies ICOMOS and IUCN to ensure that they will contribute to the ambition to maintain the Outstanding Universal Value of a World Heritage property.

Impact assessment: screening and scoping

1. The first two steps in the World Heritage impact assessment process are the 'screening' and 'scoping' phases. They are intended to highlight if an impact assessment may be needed and, if appropriate, who should be involved.

2. Where no generally accepted planning instruments and guidelines exist, a site manager can use these two steps to check if there might be a negative impact, in which case the next steps should be to:
   - notify the project proponent that they cannot proceed without first changing the project or undertaking an impact assessment,
   - notify the World Heritage Committee.

3. To be able to undertake the screening process, the World Heritage site manager should have a well-developed inventory of attributes. (See Tool 1 in the *'Guidance and Toolkit for Impact Assessments in a World Heritage Context'*) against which to be able to assess the potential impact of a proposal.

Understanding World Heritage properties and sharing information

As the energy transition progresses, it is important to strengthen the connection between clean energy development and the goal of protecting World Heritage properties for future generations. This includes increasing awareness and understanding of the World Heritage system and the concepts it is based on. (See the section on *'Understanding World Heritage'*). Even though World Heritage properties are generally well researched, their role in relation to their wider cultural, social, environmental and economic context is still too often overlooked.

One effective way to support both World Heritage protection and renewable energy development is to encourage transparency in planning processes. Making timely, detailed information about World Heritage properties available – including their Outstanding Universal Value and the key attributes that convey it – can help to inform decision-making and foster mutual understanding. National authorities may consider maintaining and sharing national inventories or databases with specific information on World Heritage sites within their territories. Linking this information to national development databases, maps and plans can support better coordination across sectors and assist project developers during early screening. Making details about site governance and management bodies accessible can also help to ensure that rights holders, landowners and site managers are engaged as early as possible.

Information about World Heritage properties should also be included in national inventories for protected or listed cultural and natural heritage sites. The databases need to be aligned with each other and stored and kept up to date by national authorities such as national heritage protection agencies, site management teams and institutions to ensure the reliability of its content. Dedicated websites for the respective World Heritage properties are also efficient at providing detailed information related to each site. The governance arrangement and management entity(ies) for the World Heritage property should also be readily available to ensure that the relevant rights holders, landowners and site managers are informed as early as possible.

What should World Heritage related databases include?

The essential World Heritage specific inventories and databases are advised to include the following information:

- Statements of Outstanding Universal Value and other heritage values,
- attributes (location and description) that convey Outstanding Universal Value,
- maps of and data from geographic information systems (GIS) on attributes with their descriptions,
- descriptions, images and photos illustrating attributes and their state of conservation,
- maps of and GIS data on the boundaries and buffer zones of properties,
- a description of properties' management systems (including their legal frameworks, governance arrangements and management processes),
- protection regimes and relevant legal regulations (including planning regulations and guidance that might incorporate policies/regulations for the protection of the Outstanding Universal Value of properties beyond their boundaries and buffer zones),
- management and conservation plans,
- the results of vulnerability assessments and maps of sensitive areas, also in the wider settings of properties,
- bibliographical resources,
- any other relevant document at the national, regional and local level.

To be effective and fully serve the purpose of protecting World Heritage properties, inventories and databases should be open to consultation by project proponents and, where possible, be publicly accessible.

Strengthening World Heritage protection in policies and legal frameworks

Many countries have taken an active role in advancing the international climate agenda, including through the adoption and implementation of global agreements (e.g., the Paris Agreement and the 2030 Agenda for Sustainable Development) and supranational strategic directions (e.g., the European Green Deal and the African Union's African Energy Transition Programme). Recent supranational initiatives such as the ninth (IX) Summit of the Americas' Declaration on Accelerating the Clean, Sustainable, Renewable, and Just Energy Transition (Americas), the Latin America and the Caribbean Action Plan Towards Climate Resilience and Neutrality (Latin America and the Caribbean) and the Southeast Asia Energy Transition Partnership (Asia) reflect a growing political momentum for coordinated and equitable renewable energy transitions.

Many countries are also adapting these international agreements and strategies on a national level and implementing them at national, regional and local levels. When ratifying and implementing international policies and legislation, specific consideration for World Heritage and other heritage should also be included.

Although the different strategies, policies and frameworks have common objectives, the means of implementation may vary from one country to another. At times, implementation can also conflict with existing commitments for the protection of World Heritage properties and the preservation of other protected natural and cultural heritage. In such cases, it is important for everyone involved – including the renewable energy sector and national planning and development institutions – to work together to ensure that development proposals take World Heritage protection into account and contribute to better alignment with national policies.

National legal frameworks for the protection of World Heritage

Countries' legal frameworks typically include national and/or federal protection mechanisms for natural and cultural heritage properties, stipulated in formal legislation including laws, codes and regulations. The protection of World Heritage properties is often the subject of these laws and their accompanying regulations. Only a few countries have developed a specific World Heritage law, while others include references to 'sensitive', protected or heritage areas that may also designate World Heritage properties.

When legal processes fail to adequately protect World Heritage

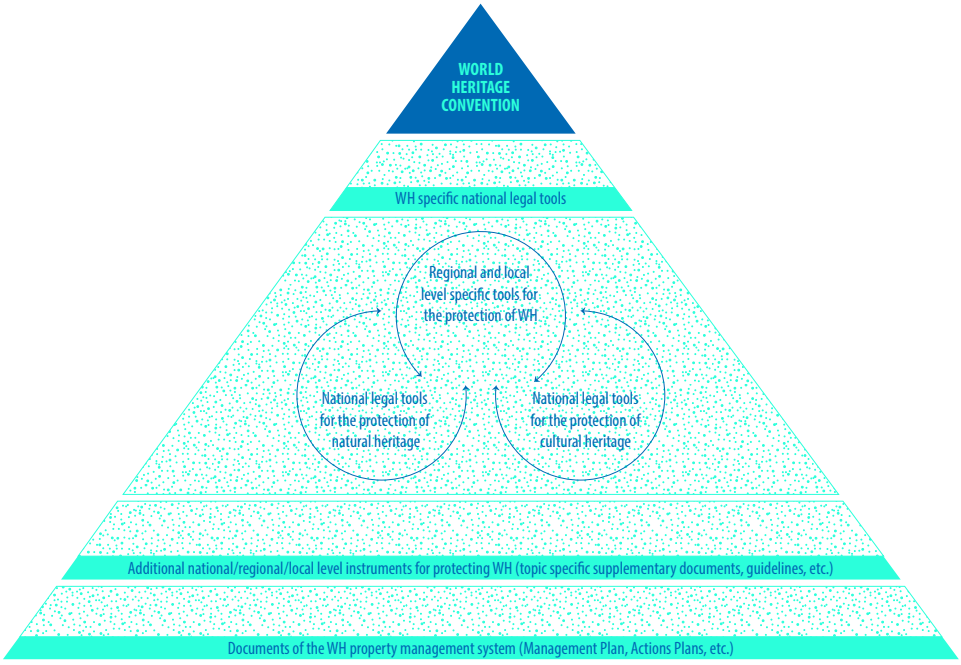
It is possible that projects, including renewable energy projects, conform fully to national and local laws, policies and regulations, but also result in harm to the Outstanding Universal Value (OUV) of a World Heritage property. In such instances, the commitment of a State Party under the Convention is clear: it has the duty of ensuring the protection and conservation of World Heritage (Article 4 of the World Heritage Convention).

Therefore, States Parties, their Focal Points and those responsible for World Heritage management, including municipalities and World Heritage site managers, must ensure that:

- the World Heritage Committee is notified as early as possible of projects that may harm the OUV of a World Heritage property, before any decisions are made (Operational Guidelines, para. 172),
- projects are evaluated through an appropriate impact assessment before any irreversible decisions are made (Operational Guidelines, para. 110 and 118bis).

This should be done even where there is no national or local legal requirement for the approval of projects that may affect the OUV of a World Heritage property. As an example: local regulations may allow for the placement of solar PV panels in a historic area without any formal planning approval process. This does not exempt a project proponent or World Heritage manager (at the local, regional or national level) from ensuring that due process is followed in notifying the World Heritage Committee and ensuring that no harm is done to the Outstanding Universal Value of a World Heritage property.

Situations where projects – including renewable energy developments – are legally permitted but risk harming the OUV of a World Heritage property indicate that the existing protection and management system is not fully effective. In such cases, it may be necessary to review and improve the system as a matter of priority. While this is underway, it would be advisable to pause similar developments to avoid further risk.



Diagrammatic representation illustrating the relationship of legal and planning tools in support of the implementation of the World Heritage Convention.

National legal frameworks for planning

Renewable energy projects such as the construction of wind farms are usually governed by national legal frameworks. These typically include planning regulations at national, regional and local levels, along with additional planning guidance. Project proposals are also assessed in relation to spatial planning documents and zoning plans. In general, spatial planning helps to coordinate policies and practices that shape the use and organization of land, with relevant plans available at different territorial levels. Authorities responsible for taking planning decisions about wind energy projects operate mainly on a national or regional level, while solar energy projects are often decided at a regional and local level, usually by a municipal administration. In addition, governmental and public specialized bodies responsible for the protection of natural and cultural heritage are often involved in the planning process as statutory consultees or in an advisory role.

Legal tools and policy documents

Legal tools and policy documents that typically regulate the planning framework in the case of renewable energy projects include:

- international treaties and other types of documents related to renewable energy and regional energy grid alignment and connectivity,
- national policy documents/development plans and programmes (including planned strategic outcomes and priorities, also in relation to the renewable energy transition and decarbonization),
- national planning frameworks (the highest level policy document for managing change),
- legal planning regulations at the national/regional/local level (including measures related to impact assessments: Strategic Environmental Assessments and/or Environmental and Social Impact Assessments),
- legal regulations for the protection of the environment and cultural and natural heritage/World Heritage properties (considering official databases for natural and cultural heritage),
- regional renewable energy strategies (including wind and solar energy),
- spatial planning documents (national/regional/local plans) with zoning maps,
- supplementary planning documents (for expanding and specifying policies contained in higher level policy documents at a national/regional/local level),
- guidance documents (that could exist at the national, regional and local level, for planning renewable energy projects and for the protection of natural and cultural heritage/World Heritage).

Legal challenges related to planning wind and solar energy projects

Protecting World Heritage is primarily the responsibility of each country (the "State Party"), at all levels of government. The World Heritage Convention is an international treaty and it is the legal obligation of each State Party to implement its provisions within its national jurisdiction and to be accountable for that implementation. However, the effectiveness of the Convention relies on its full incorporation into domestic legislation and planning frameworks.

Key legal issues:

- Even when local heritage experts are involved in renewable energy planning, their advice is not always considered at regional or national levels.
- Some planning authorities may not be aware of how energy strategies or land-use plans could harm a World Heritage property or its Outstanding Universal Value.
- Land-use and spatial planning databases should include World Heritage data to help to avoid inappropriate development.

What needs to be in place:

- Energy and development policies must account for World Heritage and other heritage protections when selecting sites for renewable projects.
- A strong national planning framework should:
  - ensure clear guidance at all levels,
  - support transparent, informed decision-making,
  - align with the World Heritage Convention.

Risks and consequences:

- National laws may allow certain 'high public interest' projects to bypass standard approval steps. These fast-tracked processes can exclude heritage authorities, increasing the risk of harmful decisions.
- If World Heritage is not properly considered, decisions may be legally valid but not compliant with international obligations, causing delays, disputes or reputational damage.

Legal frameworks must actively include World Heritage protection in renewable energy planning to prevent conflicts and ensure projects meet both development and conservation goals.

Hierarchy and potential connection points between different elements of the national legal framework relating to wind energy plans, spatial planning and the protection and management of World Heritage properties.

World Heritage in the context of national and local renewable energy plans and programmes

- National and local renewable energy plans and programmes are important strategic documents to guide wind and solar energy project proponents when planning new projects. To make the planning process more predictable, renewable energy policies and strategies should consider including information on World Heritage properties (especially concerning their spatial boundaries and the characteristics of their Outstanding Universal Value) together with information that may lead to planning restrictions.
- Information about the boundaries, buffer zones and, ideally, wider areas of influence of World Heritage properties should be included in any GIS data related to territorial planning and made available to all potential proponents for consideration, even before feasibility is assessed.
- Adequate communication and enhanced coordination are also important at the highest level of government, particularly the ministry responsible for energy and renewable energy and the ministry responsible for culture and environment, so that both sectors are aware of the priorities and short/medium/long-term strategies in both fields and that plans, policies and programmes are aligned to serve the interest of both.

Case studies

- The Netherlands approved an Environment and Planning Act (2024), which applies to the entire territory of the country and includes an article specifying that provisions must be created to avoid any damage to or destruction of World Heritage properties. This Act has an overall regulatory effect on lower-level governing tools, giving the authorities permission to deny the approval of development applications that might have a negative impact on the Outstanding Universal Value of a World Heritage property, even if this impact comes from its wider setting.
- The Cultural Heritage Agency of the Netherlands has also developed a national-level guidance for the integration of solar photovoltaic (PV) systems in cultural heritage contexts, which highlights that careful site-specific adaptation is required to safeguard the Outstanding Universal Value of World Heritage properties.
- In France, a specific guidance document was developed in 2016 and updated in 2020 (by the Ministry of the Ecological Transition and Territorial Cohesion) on the preparation of impact assessments for onshore wind projects. It contains a chapter focusing on the specificities related to World Heritage properties.
- The French Ministry for Culture also developed a *Guide to the architectural and landscape integration of solar panels* in France. Nevertheless, this guide is not World Heritage specific and such guides should always be adapted to the specificities of a World Heritage property if they are used in a World Heritage context.
- In 2020, the Federal Council of Switzerland adopted a Wind Energy Concept. This document sets out how the interests of the Confederation – including the preservation of World Heritage properties, their buffer zones and wider settings – are to be considered in the planning of wind power plants and identifies areas with potential for wind energy development. This provides decision-makers and project proponents with a planning aid.
- The UNESCO publication World Heritage and wind energy planning: Protecting visual integrity in the context of the energy transition (2021) presents case studies from four European countries, Austria, France, Germany and Scotland, and showcases best practices in the field of wind energy planning in the context of World Heritage properties.

Starting an early dialogue between those proposing renewable energy projects and the people responsible for protecting and managing World Heritage sites is an important step in planning. This includes individuals planning to install small-scale solar energy systems. Early communication can help to identify and prevent potential negative impacts on World Heritage properties, while also improving coordination and ensuring smooth information sharing throughout the process.

One of the most effective early planning tools is the preparation of Strategic Environmental Assessments (SEAs) for renewable energy, as these include wind and solar energy policies, plans and programmes as well as development plans for transmission or distribution infrastructure and ensure:

- the early identification of potential impacts and the prevention of negative impacts on the Outstanding Universal Value of World Heritage properties and their attributes;
- the prevention of conflicts with national bodies responsible for the protection of World Heritage properties and the implementation of the World Heritage Convention and the Operational Guidelines for the Implementation of the World Heritage Convention;
- enhanced planning security and cost efficiency for all renewable energy developers, including individuals proposing private installations;
- the prevention of extra costs and delays due to obligations to redesign or displace projects or installations owing to their incompatibility with World Heritage protection;
- the prevention of loss of investment in the event the project or installation must be abandoned or reduced in size after land has been acquired or other investments made, and plans have been developed due to incompatibility with World Heritage protection;
- the protection and enhanced management of World Heritage properties in a more strategic manner during the energy transition by increasing the involvement of and facilitating dialogue between responsible organizations for World Heritage, planning authorities at all levels, the wind and solar industries, individuals and local communities.

The potential or planned development of wind or solar energy plans and programmes and transmission or distribution infrastructure related to a specific World Heritage property could also be the topic of an SEA, as an initiative of the site management organization or other relevant authorities. Private stand-alone solar projects may also require assessment through Environmental and Social Impact Assessments (ESIAs) or Heritage Impact Assessments (HIAs). (See in more detail *'Types of impact assessments'* and the relevant part of the *'Guidance and Toolkit for Impact Assessments in a World Heritage Context'*.)

The advantages of early communication between wind and solar energy project proponents and the relevant national bodies have the potential to ensure:

- the timely identification of any relevant World Heritage sensitivities and easier planning of the scope and focus of an on-site survey,
- the clarification of local conditions to set the basis for and feed into early design stages (screening and scoping phases of an impact assessment),
- the early identification of solutions to potential constraints, including mitigation measures or redesign (identifying and predicting impacts for an upcoming impact assessment).

Facilitating early communication with the renewable energy industry

Efficient early communication between key actors, particularly between the project proponent and the World Heritage management authorities, is highly important. The following actions might also facilitate this communication. The relevant heritage authorities could:

- enhance the 'visibility' of World Heritage properties in national/regional/local strategies and policies;
- ensure the inclusion of World Heritage GIS information in national plans, maps and databases;
- ensure that the identification of heritage values and attributes is available and up to date;
- guide project proponents and facilitate their access to available datasets and databases such as the World Heritage Centre's online platform that includes, for each World Heritage property, its:
  - Statement of Outstanding Universal Value,
  - boundary delimitation as adopted by the World Heritage Committee*,
  - nomination file,
  - ICOMOS and/or IUCN evaluations,
  - management system descriptions and plans,
  - state of conservation reports,
  - other relevant documents.
- Develop, in consultation with rights holders, local communities and all relevant stakeholders, a land use plan for the property and its surrounding areas. The land use plan, together with other applicable plans such as the management plan for a World Heritage property, should be used to inform any development proposals in and around a property.

*Additionally, the UNESCO Sites Navigator (previously known as the 'World Heritage Online Map Platform') is a website that displays the georeferenced and verified boundaries of World Heritage properties and their buffer zones (if any) on different basemaps.

Case studies

The guidance Siting and Designing Wind Farms in the Landscape (by Scottish Natural Heritage, 2015) offers an overview of how early planning can bring benefits to wind energy projects while ensuring the protection of heritage values and assets. The guidance provides information on how the wind energy industry can actively engage with the heritage sector and offers helpful planning advice, which is complemented by the Planning for Development - Our Service Statement that clarifies the role of Scotland's Nature Agency (called NaturScot today) in the planning systems.

Renewable energy and World Heritage: matching project size to site sensitivity

Renewable energy systems come in many sizes – from small rooftop solar panels to large wind farms supplying electricity to national grids. Whether a project is suitable for a specific location, especially within or around a World Heritage property, depends on two key factors:

- the scale and type of the project, and
- how sensitive the Outstanding Universal Value is to the addition of such technological elements.

Because each World Heritage property is unique – and because project types and site conditions can vary greatly – there is no one-size-fits-all approach to assessing renewable energy proposals in the context of World Heritage.

In general, most projects fall into one of two categories:

- large-scale projects (landscape scale), and
- small-scale projects (building scale).

Case studies

Developing solar energy projects in the setting of the Buddhist Monuments at Sanchi (India)

Large-scale projects (landscape scale)

These are often stand-alone energy developments – whether on land or offshore – designed to meet national or industrial energy demands. They are typically planned over long time frames by specialized teams and are subject to rigorous planning and approval processes. Examples include:

- wind farms,
- utility-scale solar PV stations,
- large concentrated solar power (CSP) plants,
- major electrical transmission lines.

Projects of this scale typically require an impact assessment before any permits can be issued. When such projects are proposed in a World Heritage context – usually outside the boundaries of a World Heritage property, but potentially within its buffer zone or wider setting – the World Heritage Committee must be notified and consulted before any irreversible decisions are made (see the Operational Guidelines, para. 110, 118bis and 172). These assessments are essential for identifying any risks to the property's Outstanding Universal Value.

Detailed guidance on how to carry out impact assessments for large-scale projects can be found in the section on 'Assessing Impacts' and in the relevant section of the '*Guidance and Toolkit for Impact Assessments in a World Heritage Context*').

Small-scale projects (building scale)

These are (often non-commercial) renewable energy systems installed on or near buildings or other structures such as walkways and sheds. Procedures for their installation vary widely from country to country. In many cases, they may not require formal approval or any types of impact assessments. Examples include:

- rooftop solar (PV) panels or building-integrated photovoltaics (BIPV),
- domestic solar water heaters,
- small wind turbines.

Although these systems are relatively small in scale, they still introduce modern technologies into heritage environments – especially if installed on protected buildings, within protected areas or in historical urban settings. Depending on the specifics of the location's characteristics, such installations can have visual, cultural, ecological or other types of impact. Their installation requires specific policies and careful planning in or near World Heritage properties to ensure that these smaller-scale projects do not harm the site's Outstanding Universal Value – either through individual impacts or cumulative effects over time.

- If only one installation is planned (e.g., a solar unit to power critical infrastructure in a remote natural area), a case-by-case impact assessment should be carried out. Thoughtful siting and screening can help to avoid potential negative effects.
- If multiple small installations are expected such as solar panels or BIPV on private homes within a historic urban area, then clear policies and planning procedures should be established to manage their collective impact. In the absence of such policies, each proposal should be assessed individually to ensure that the Outstanding Universal Value is not compromised.

Further guidance on managing small-scale renewable energy projects is provided in the next section, and the specific checklists are available at the end of this pdf for various actors involved in World Heritage and the renewable energy transition.

Case studies

Integrating solar energy planning into urban plans and policies in the Town of Bamberg (Germany)

Planning ahead for World Heritage protection in the renewable energy transition

To ensure that the Outstanding Universal Value of World Heritage properties is preserved in the integration of small-scale renewable energy systems, it is essential that local policymakers, supported by national authorities, develop a clear planning framework, possibly in the form of a renewable energy transition policy or strategy, that applies to the World Heritage property itself, its buffer zone and the wider setting.

Such a framework should:

- be based on a thorough understanding of the property's Outstanding Universal Value and specific vulnerabilities,
- define, based on this assessment, what types and scales of solar and wind energy installations may be appropriate – or inappropriate – within and around the World Heritage property,
- identify specific areas or zones where solar and wind energy projects could – or could not – be developed, clearly indicating the types and scales of installations allowed. (If the vulnerability assessment finds that all forms of renewable energy projects would negatively affect the site's Outstanding Universal Value, the policy or strategy should designate these zones as exclusion areas or no-go zones.)
- provide clear and accessible guidance for homeowners, landowners and project developers on how to plan and carry out solar or wind energy projects in or near the site,
- be aligned with existing planning instruments and follow the approach outlined in the UNESCO Recommendation on the Historic Urban Landscape (2011).

In the absence of a dedicated policy or framework, all renewable energy project proposals, regardless of size, should be reviewed individually. These reviews must pay particular attention to whether a project could have direct, indirect or cumulative impacts on the attributes that convey the property's Outstanding Universal Value.

The Recommendation on the Historic Urban Landscape (HUL)

In 2011, UNESCO's General Conference adopted the Recommendation on the Historic Urban Landscape (HUL), which proposes a landscape approach to managing historic urban areas. The HUL Recommendation is a tool to integrate policies and practices for conserving the built environment within wider urban development goals in accordance with the inherited values and traditions of different cultural contexts.

The UNESCO Urban Heritage Atlas

The UNESCO Urban Heritage Atlas is a tool hosted on the UNESCO website that serves as an archive and atlas of urban World Heritage areas. It offers States Parties the opportunity to map urban World Heritage properties, inventory their key attributes and present their unicity.

These and other tools can inform renewable energy development, but, more importantly, renewable energy development in historic urban areas, and other areas, should be aligned with the conservation of cultural and natural World Heritage in integrated planning processes.

In addition, UNESCO is also working to develop other tools for implementing the HUL.

The following steps outline a recommended approach for such case-by-case assessments.

1. Understand the property's Outstanding Universal Value and setting

- Identify and document the attributes that express the property's Outstanding Universal Value.
- Assess the contribution of the buffer zone and wider setting, including any functional or visual links to the surrounding landscape.
- Evaluate the sensitivity of these attributes to different renewable energy technologies and development scales (e.g., rooftop solar panels versus large-scale wind farms).

2. Engage rights holders and stakeholders from the outset

- Involve rights holders, local communities, planning authorities, utility companies and site users from the outset.
- Hold participatory workshops to raise awareness of the property's Outstanding Universal Value and gather input on sensitivities and expectations.
- Ensure inclusive representation that reflects diverse community perspectives and knowledge systems.

3. Review existing legal, planning and policy frameworks

- Analyse national, regional and local legislation and policies relating to heritage, planning, energy and the environment.
- Identify any gaps, inconsistencies or risks concerning renewable energy development in or near World Heritage properties.

4. Assess alternative locations and development options

- Systematically consider whether the proposed renewable energy installation could be located outside sensitive areas, including the World Heritage property, its buffer zone or its wider setting.

5. Conduct a baseline and vulnerability assessment

- Map existing and planned renewable energy infrastructure in or near the property.
- Identify potential cumulative impacts from multiple small- or large-scale developments.
- Analyse sensitive zones based on visual, ecological and cultural factors.
- Use overlays of vulnerability maps with renewable energy potential maps to identify areas of conflict and support informed site selection.

6. Develop guiding principles for renewable energy development

- Establish principles aligned with the World Heritage Convention and its Operational Guidelines (particularly paragraphs 110, 118bis and 172).
- Emphasize the avoidance of impacts on the attributes that express Outstanding Universal Value through careful technology selection, siting, design and scale.
- Integrate climate goals with the obligation to conserve cultural and natural heritage.

7. Establish decision-making procedures and assessment tools

- Define clear screening and scoping criteria to determine when a proposal requires formal review or impact assessment.
- Specify approval procedures and designate the responsible authorities.
- Provide guidance on when case-by-case reviews are necessary, particularly for projects in or near sensitive areas.

8. Integrate the policy into site management systems

- Incorporate the renewable energy policy or guidance into the property's management systems, for instance by integrating it into the existing management plan, or appending it as a formal addendum.
- Align the policy with relevant spatial and energy planning frameworks, or adapt these if they are not aligned with the maintenance of the property's Outstanding Universal Value, using the approach recommended in UNESCO's Recommendation on the Historic Urban Landscape (2011).

9. Provide technical guidance and visual impact tools

- Offer practical design and siting guidelines tailored to different technologies and project scales.
- Include illustrated examples of acceptable solutions (e.g., solar panel angle, colour, materials and screening options).

10. Monitor, evaluate and update the strategy

- Set up mechanisms for the continuous monitoring of installed systems and their impact on the property's Outstanding Universal Value.
- Review and update the strategy regularly to reflect advances in technology, regulatory changes and evolving site conditions.

In situations where renewable energy proposals fall outside the scope of an established renewable energy transition policy or strategy – and where there may be an impact on the Outstanding Universal Value of a World Heritage property – relevant authorities must notify and consult the World Heritage Committee as early as possible in the planning process, in accordance with paragraph 172 of the *Operational Guidelines for the Implementation of the World Heritage Convention*.

Conservation actions – enhancing management in view of the energy transition

Management systems and management plans

World Heritage management systems aim to maintain the Outstanding Universal Value of a property. When these systems are well integrated into national, regional, and local planning and legal frameworks, they can actively help to assess both potential and actual changes to the property's Outstanding Universal Value. A management system can be described in a management plan. Well informed and effective management plans are key tools to be used and consulted in the early planning stages of wind energy installations. An up-to-date management plan can establish a system for the identification and prevention of potential conflicts with World Heritage requirements. Information should include explanations on measures protecting the Outstanding Universal Value and refer to conservation objectives and action plans. The responsible authorities in each country, including the site management team, should ensure that World Heritage management plans also include information and appropriate measures in relation to the buffer zones and wider settings of World Heritage properties.

The importance of World Heritage management systems and management plans

Management plans are important documents for a World Heritage property. They may document the management system of the property and often include a more detailed description of attributes and values than what can be found in the Statement of Outstanding Universal Value (SOUV). They may also set out any legal restrictions or regulations for the property and its buffer zone and wider setting that can be relevant to project planning. Evidence of an effective management system – often provided through a management plan – is now a required part of the World Heritage nomination dossier. These plans must be regularly reviewed and updated, typically every five years. World Heritage management plans and descriptions of management systems are key resources that provide important context for project proposals and other types of change. Energy project developers are therefore advised to consult these documents early in the planning process. In the case of transboundary World Heritage properties, each State Party is responsible for managing the part of the site within its borders through its own national system. However, there should also be a jointly coordinated, harmonized management framework between the countries involved.

(See information on transboundary, serial and serial transnational World Heritage properties.)

Vulnerability assessment of World Heritage properties

There are various tools that can be used to increase understanding of the attributes conveying the Outstanding Universal Value of a property and to help to better anticipate and prepare for potential changes or developments. Mapping attributes and then monitoring their state of conservation helps to identify vulnerable and sensitive areas. It also makes it possible to link sensitivity and vulnerability indicators to the physical elements in the environment, thus forming the basis for sensitivity mapping within the property and its wider setting. It is also important to identify (and map where possible) factors that could have negative impacts on a property so as to ensure not only that proposals do not amplify them, but also possibly even address them through interventions. (See details about the spatial boundaries of World Heritage properties and attributes in '*Understanding World Heritage*' and in the relevant part of the *'Guidance and Toolkit for Impact Assessments in a World Heritage Context'*, including its Tool 1).

Another possible approach is to develop national, regional or local vulnerability maps of all World Heritage properties in relation to renewable energy development – particularly in the context of wind or large-scale energy policies and strategies. Such an integrated process could help to identify the potential impacts of multiple large-scale wind and solar energy projects, along with their associated transmission infrastructure, on the Outstanding Universal Value of World Heritage properties and their key attributes. (See in detail in 'Note 1'.) This type of assessment could be carried out as part of a Strategic Environmental Assessment. (See in more detail in *'Assessing Impacts'* and in the relevant part of the *'Guidance and Toolkit for Impact Assessments in a World Heritage Context'*.)

How can the results of vulnerability assessments be used for renewable energy project planning?

The results of vulnerability assessments are valuable data sets regarding areas identified for renewable energy development. This information can support strategic planning and also help to strengthen the protection of World Heritage properties. A targeted study focusing on World Heritage in relation to areas with high potential for renewable energy development could also provide important insights when assessing the potential impacts of future renewable energy project proposals.

The results of vulnerability assessments focused on renewable energy development potential could enhance the:

- early identification of the potential impacts of renewable energy projects on the Outstanding Universal Value of specific World Heritage properties,
- direct identification of areas/zones where renewable energy development is potentially feasible/not feasible in relation to the vulnerabilities of a World Heritage property (these areas could include the property, its buffer zone and its wider setting),
- identification of areas related to World Heritage that overlap with zones of high renewable energy potential, highlighting where renewable energy development might be considered.

Sensitivity mapping can support the early screening phase of impact assessments for potential renewable energy projects. It can also be used to inform specific zoning plans and planning regulations.

See for details the section *'Assessing Impacts'* and specifically the step on *'screening'*.

Case studies

Understanding sensitivities and vulnerabilities in La Chaux-de-Fonds/Le Locle, watchmaking town planning (Switzerland)

Solar energy installation to support local communities on isolated islands: the case of Maria Island (Australia)

Vulnerability mapping in urban World Heritage environments as a tool to facilitate renewable energy development

The potential impact of energy projects on heritage is not only linked to their large-scale. Even small-scale renewable energy installations in urban areas such as small vertical wind turbines and solar technologies such as solar PV and solar hot water systems require careful planning and consideration. Pre-emptive mapping of the vulnerabilities and opportunities of a World Heritage property can help to inform appropriate policies and plans for renewable energy development in and around these important sites.

Planning proactively and setting clear standards are among the most effective ways to guide investment in renewable energy systems and offer clarity to both residents and investors. In addition to the approach promoted by the Recommendation on the Historic Urban Landscape (HUL), there are various tools available to help to map the urban environments of World Heritage properties. By combining the following tools, it is possible to develop renewable energy plans that support the preservation of the Outstanding Universal Value of World Heritage sites. (The World Heritage Online Map Platform provides a useful tool for obtaining information on the boundaries and buffer zones of World Heritage sites and layering this information with that of other maps.)

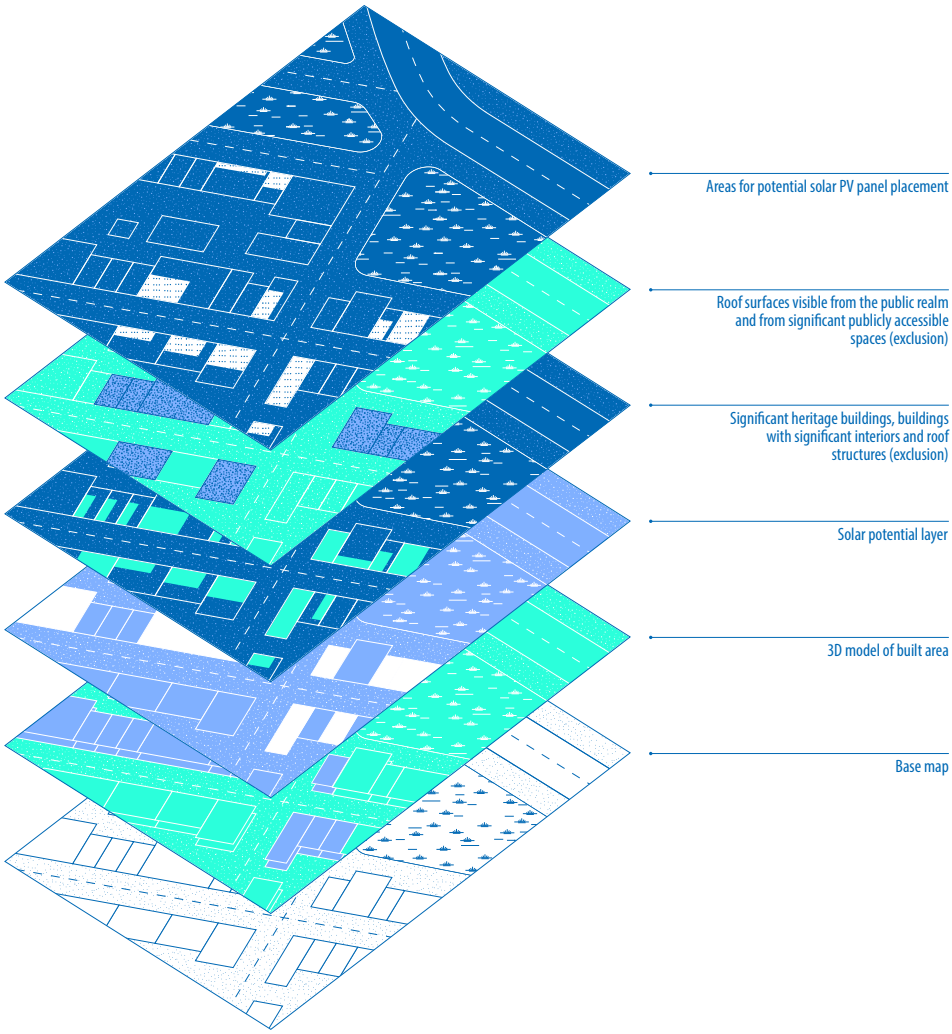
- Maps showing spatial characteristics, functional or visual relationships, urban morphology, etc., that contribute to the Outstanding Universal Value of a property.
- Maps showing sensitive or special buildings or places (architectural, historical, landmark) or buildings with noteworthy interiors or collections (museums, palaces, etc). Due to risks such as water damage from solar hot water systems or fire hazards from solar PV installations, a site management authority or local council might decide to exclude certain buildings from renewable energy development.
- Thematic heritage sensitivity maps could, for example, show where historically important features – such as specific roof types, roof structures or wall paintings – are located. This information can help to ensure these areas are either excluded from solar or wind energy development or handled with extra caution.
- Maps of solar or wind potential show where sunlight or wind is strong enough to be effectively harnessed. While they help to identify locations suitable for installing renewable energy systems, they do not provide information about the possible impacts such installations might have.
- Visibility maps are created using 3D models of a city, but can also be developed through careful observations on the ground. They show which parts of walls and roofs are visible from public streets or specific viewpoints. These visible areas can be identified as sensitive to change or important to the overall appearance of the place, so their impact on the Outstanding Universal Value should be considered when making decisions. However, these maps do not provide information about the potential for energy production, nor about the historical significance of the buildings or materials that might be affected by solar or wind installations.

World Heritage boundaries should always be included on these maps. By combining them with a clear understanding of a property's Outstanding Universal Value and the attributes that contribute to it, it becomes possible, in theory, to create a map of renewable energy potential aligned with World Heritage protection. This map would highlight areas within a World Heritage property and its setting where wind and solar energy development might be suitable. However, such a map would need to be carefully tested and supported by guidelines developed specifically for the World Heritage property. Continuous monitoring should aim to assess whether the installation of wind and solar energy infrastructure would lead to unforeseen negative impacts on the Outstanding Universal Value and the attributes of a World Heritage property.

While there may already be national guidelines for wind and solar energy development in historic urban landscapes, these guidelines often need to be carefully reviewed and adapted to fit the unique features and requirements of each World Heritage property. Every site has its own specific characteristics, values and vulnerabilities, which means that some renewable energy technologies may be suitable in certain locations but not in others. Tailoring guidelines helps to ensure that renewable energy development supports sustainable goals without compromising the Outstanding Universal Value or integrity of World Heritage properties and, in the case of cultural World Heritage properties, their authenticity.

Case study

Municipal policy for solar energy installations within a protected historical cityscape (Kingdom of the Netherlands)



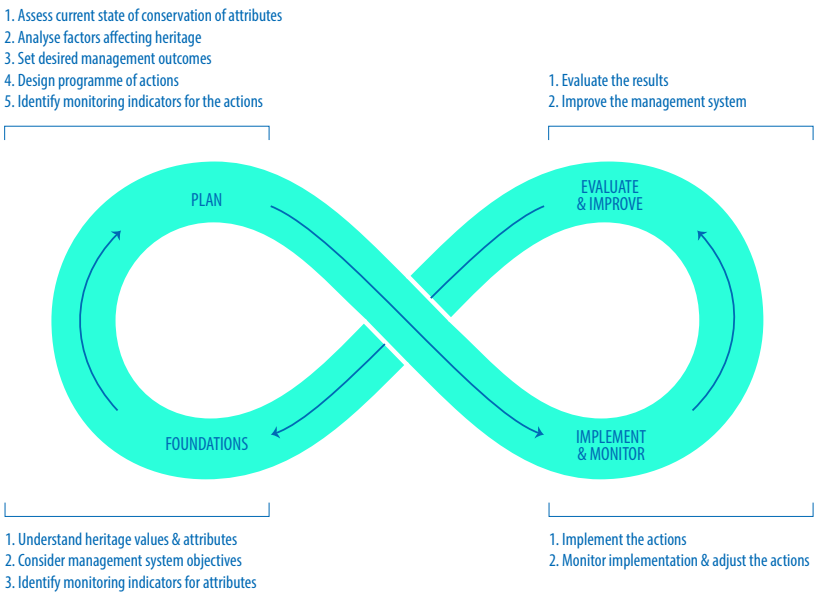
Vulnerably mapping may include various thematic layers, which, when combined, can provide insights into areas with high levels of sensitivity, and those with lower sensitivity.

Monitoring World Heritage properties

Renewable energy development could potentially affect any and all World Heritage properties. Monitoring the factors that could potentially affect those properties is, therefore, essential for an adequate World Heritage management system. These factors could be due to natural processes or human-induced actions such as developments. Monitoring the state of conservation of World Heritage properties also means that there are up-to-date data sets ready to be used as a baseline in the event that an impact assessment is needed. In addition to monitoring mechanisms established by the World Heritage Convention, World Heritage properties need to have site-specific monitoring in place as part of the management system to ensure their protection and long-term preservation.

Monitoring under World Heritage management plans takes a broad approach, focusing on the overall condition of the site, including its buffer zone and wider setting. To do this effectively, site-specific key indicators need to be developed. As effective monitoring involves tracking changes caused by developments, it is important to establish a reliable monitoring mechanism within the management system. Such a system can help to identify and alert relevant parties to potential impacts – including cumulative effects – from wind energy infrastructure and other projects.

However, this broad and regular monitoring does not replace the detailed, project-specific assessments conducted through Heritage Impact Assessment (HIA) or Environmental Impact Assessment (EIA) processes. The responsibility for this project-focused monitoring lies with the developers themselves, not the site management team.



Iterative planning process for managing World Heritage. *(Adapted from Managing World Heritage, UNESCO et al., 2025)*

Moreover, approved follow-up actions for specific completed renewable energy projects should be systematically included in the World Heritage monitoring system. This ensures that approved mitigation and enhancement measures are properly implemented, enabling any unexpected changes to be promptly identified and addressed. The information gathered through monitoring also feeds into the property's ongoing management cycle and helps to inform planning for future renewable energy development and other projects. (See details here in the *'Guidance and Toolkit for Impact Assessments in a World Heritage Context'*.)

How are World Heritage sites monitored under the Convention?

The World Heritage Committee has two main tools to check the state of conservation of World Heritage properties.

Reactive Monitoring

This is when UNESCO and its partners report to the World Heritage Committee about properties that are under threat. The process includes:

- inscribing properties on or removing them from the List of World Heritage in Danger,
- in extreme cases, deleting a site from the World Heritage List entirely,
- the process outlined in paragraph 172 of the Operational Guidelines, which requires countries to provide the World Heritage Committee with advance notice if they plan any major building or restoration projects that might affect a site's Outstanding Universal Value.

Periodic Reporting

This exercise takes place on average every six years. Each State Party submits a report on:

- how it is implementing the World Heritage Convention,
- the current state of conservation of its World Heritage properties.

UNESCO reviews these reports to help to create regional World Heritage action plans, tailored strategies for future conservation efforts.

Paragraph 172 of the Operational Guidelines

In accordance with paragraph 172 of the *Operational Guidelines for the Implementation of the World Heritage Convention*, States Parties must notify the World Heritage Committee (through UNESCO's Secretariat, which is the World Heritage Centre) as early as possible if they plan:

- major restorations, or
- new construction that could affect the Outstanding Universal Value of a World Heritage property.

This should happen before key decisions are made – ideally before project designs or plans are final. Early notification helps UNESCO and the Committee's Advisory Bodies to offer guidance to avoid damage to the property.

Monitoring of renewable energy projects

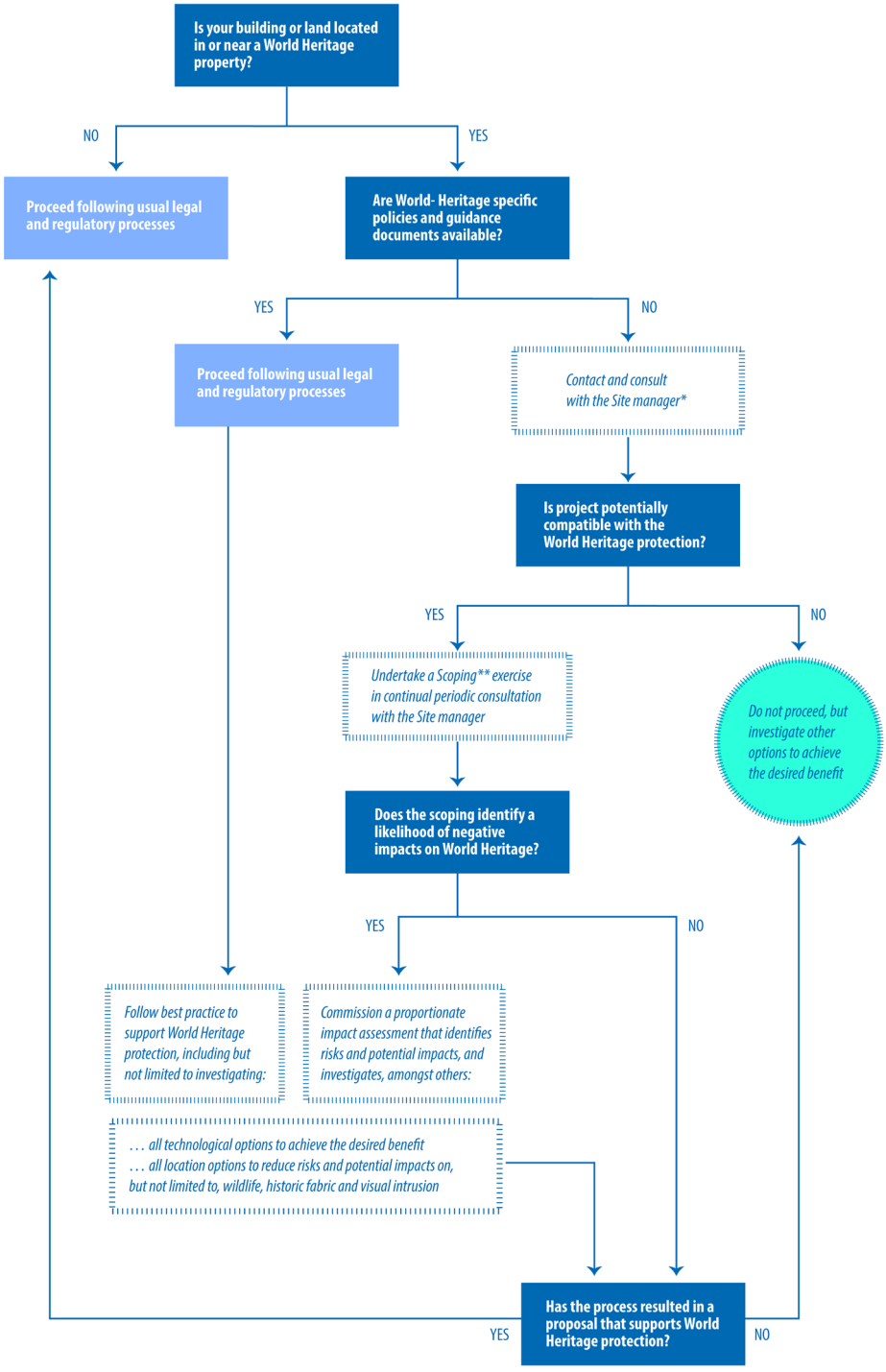
If a wind or solar energy project is planned within (only small-scale projects) or near a World Heritage property (inside its buffer zone or within its wider setting), this reporting and monitoring process must be part of early planning.

- Information on the project, together with the results of impact assessments, should be shared with UNESCO to allow for a proper review of the potential impacts on Outstanding Universal Value.
- If this process is ignored, serious problems can arise later including:
  - the need to redesign or relocate the project,
  - increased costs and delays,
  - conflicts between developers and heritage authorities,
  - inclusion of the World Heritage property in the Reactive Monitoring process, if the management system is considered inefficient.

In short, early cooperation and transparency with UNESCO and national heritage bodies are essential to avoid long-term issues when planning renewable energy projects near World Heritage properties.

Key considerations for small-scale solar energy installations in World Heritage properties and their settings

A first step for any small-scale solar or wind energy installation is to follow the '*screening*' step of this Guidance, or the related advice in the 'Guidance and Toolkit for Impact Assessments in a World Heritage Context' and consider whether a formal impact assessment is required. It may be helpful to develop a checklist for each World Heritage property based on the specific attributes that convey the Outstanding Universal Value of the World Heritage property. This can support a shared understanding of when a proposed project might have a potential impact. The checklist should help to determine whether an installation could negatively affect Outstanding Universal Value, either on its own or in combination with other developments. See also the flowchart below.



*The Site manager could be an individual at a nature conservation agency, a municipality, a museum organisation etc. Contact the organisation with the most direct role in daily management of the proposed project location to find out who to talk to.

** Refer to to the section on Impact Assessment in this Guidance and to the 'Guidance and Toolkit for Impact Assessments in a World Heritage Context'.

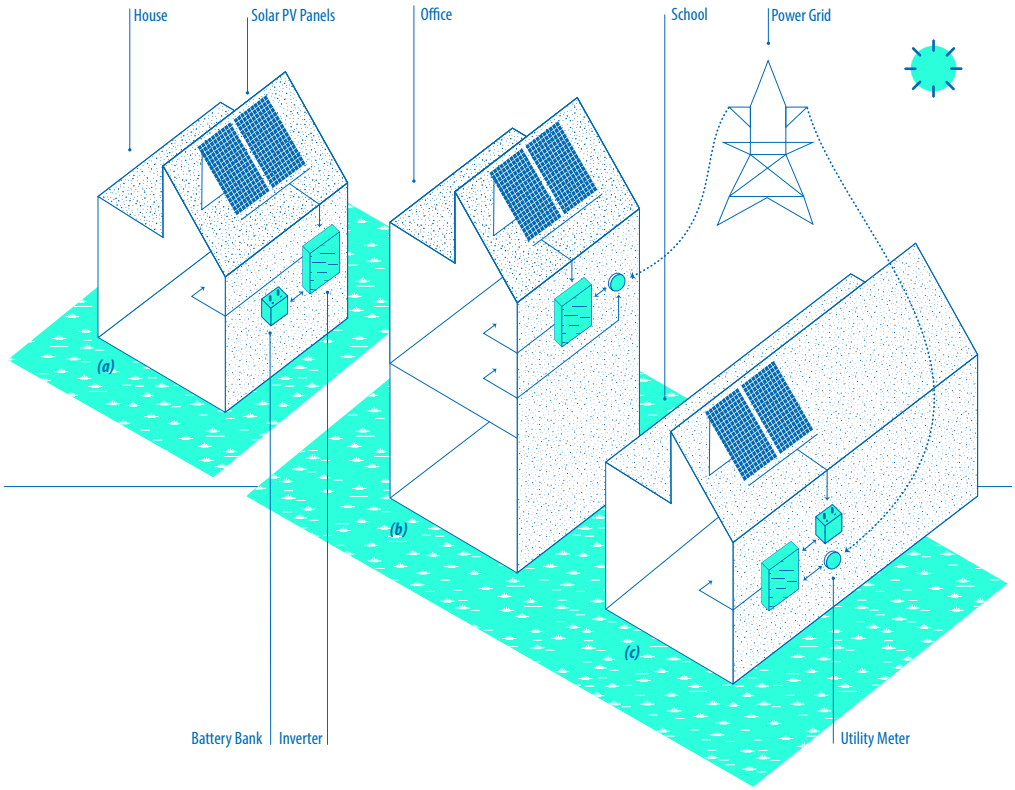
- If the answer is 'yes', then either the project should not continue, or a stand-alone or legally required impact assessment is needed, and specific mitigation measures may need to follow.
- If the answer is 'no', the installation should still follow best practices for supporting both World Heritage protection and sustainability goals, by maximizing positive outcomes and minimizing any potential negative environmental or social impacts.

Key considerations for using solar PV and BIPV panels on historic buildings and in areas within World Heritage sites and their settings

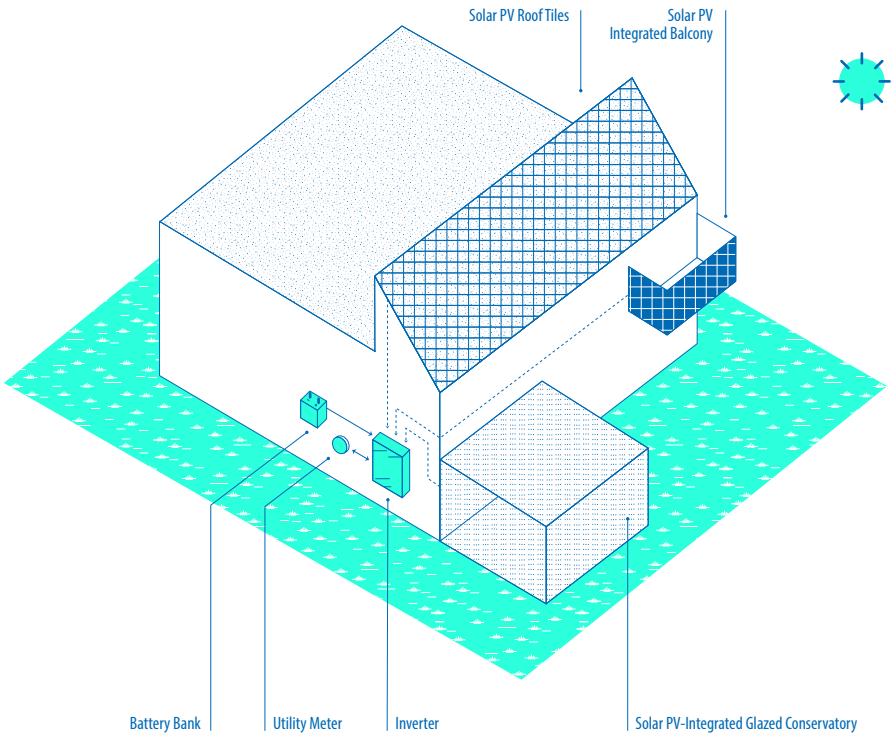
Solar photovoltaic (PV) panels can either be mounted directly on the roofs of historic buildings or placed on the ground nearby to serve them. These small-scale installations can often be adapted to suit the specific context, but they require careful planning to ensure they are appropriate and sensitive to their surroundings. It is especially important to note that permission from the relevant authorities is usually required when installing PV panels within a legally protected or designated historic area.

Key aspects to consider:

- Planning permission is usually required for the installation of PV panels on historic buildings or in historic areas, so it is important to check local planning regulations and consents required for changes to historic buildings. In some cases, an impact assessment approach may be the best way to evaluate any potential negative impacts and identify mitigation measures.
- A fire risk assessment for the specific building/area in which installation is planned should be carried out and risk mitigation measures identified, including signs that indicate the specific locations of automatic shutdown devices.
- In an off-grid system, a secure and cool location in which to keep storage batteries should be identified.
- Any cabling needed inside a building to connect the PV panels to the off-grid system or to the local grid should be considered.
- Any panels on a building structure should be located so as to account for their visibility and avoid disrupting the main views of the building. For example, panels could be hidden behind parapets or internal roof slopes that cannot be seen from the ground.
- Panels located on the ground usually benefit from being shielded from view by plants, for example, avoiding key views of/from historic buildings.
- Shade from buildings or trees should be noted, as, if it falls upon panels, it can affect the performance of PV arrays enormously.
- It is important to check whether the building structure can withstand the additional wind and static load. In cases in which the building may require reinforcement to withstand additional loads, it should be ensured that this will not have negative impacts.
- No protected species, for instance protected bat and bird species, should be disturbed by the installation of PV panels, particularly under roof coverings or inside roof spaces. The disturbance of birds should take into consideration the season in which the installation is planned.
- A certified installer who has experience working in historic environments should be identified and detailed plans of the panel installation and its cabling obtained.



Examples of solar PV installations at single-building scale: off-grid (a), grid-connected (b), and hybrid (c).



BIPV elements can be applied on different surfaces of a building.

Building-integrated photovoltaics (BIPV) such as solar PV roof tiles and shingles are often identified as a possible option in World Heritage contexts because they can be visually integrated into existing buildings.

However, installing these systems typically involves replacing existing building elements with new ones. For example, using BIPV instead of traditional roof tiles may require not only the replacement of some or all of the tiles, but also parts of the timber roof structure that supports them. Since BIPV systems generally have a lifespan of around 25 to 30 years – after which they no longer generate electricity efficiently – this could lead to a situation in which the roof needs to be replaced every few decades to maintain energy production, which would lead to clear and specific consequences for the maintenance of historic elements.

Key aspects to consider relating to loss of significant fabric, impact and life-cycle costs

- How important are the existing (historical) elements that would need to be replaced? Are they attributes of Outstanding Universal Value?
- What is the consequence for the rest of the building? For instance, would installing BIPV roof tiles require changes to historically valuable structural elements, such as purlins, beams and trusses?
- Does the BIPV element actually approximate the existing historical fabric in form and appearance? Texture, gloss and ageing over time should also be considered.
- Will the installation produce more energy than it takes to produce its various components over its lifetime (what are the life-cycle costs)?
- Are there other alternatives such as the application of (coloured) flat solar panels that can be installed on top of existing historical fabric, with an acceptable (limited) change to the appearance of the building, similar or greater energy production and a greater level of removability?

How to choose a solar energy system

When considering the installation of a solar energy system, it is useful to ask the following questions:

- Do you need consent (e.g., for listed buildings or conservation areas)?
- Do you need the system for heating or electricity?
- How much energy could be generated, and what is the expected payback period?
- Are there any technical risks associated with the system?
- What colour will the panels or materials be?
- What pattern or layout will they follow?
- Will there be any issues with glint or glare?
- What type of finish will be used?
- What size and style of framing or panels will be used?
- Is the system easily removable?
- Will the installation cause loss of historically significant fabric?
- Can the system be integrated into new additions rather than affecting historical structures?
- Can PV cells be incorporated into lighting devices or signs to avoid visual impact?
- Can lightweight materials or thin-film solar PV systems be used?
- Will the energy produced be used locally?
- Is there a designed intervention or locally specific approach?
- What is the weight of the system and its structural implications?
- How will piping and cable runs be accommodated?
- Where will ancillary infrastructure (e.g., inverters, batteries, water tanks, electrical geysers) be located?

Case studies

Building-integrated photovoltaics on the rooftop terrace of the Royal Opera, Madrid (Spain), in the buffer zone of the World Heritage property 'Paseo del Prado and Buen Retiro, a landscape of Arts and Sciences'.

Project analysis and decision-making for photovoltaic installations at the Bois-du-Luc component of the Major Mining Sites of Wallonia (Belgium)

Key considerations for small-scale solar panels in natural World Heritage contexts

Small-scale photovoltaics (PV) in natural World Heritage contexts could take a number of forms. Typically, these will be stand-alone installations that aim to provide electrical power for specific buildings and/or purposes, for example to provide lighting and run computers and radios at a ranger post, to replace diesel generation at a tourist facility or to charge electric vehicles or boats.

Depending on the context, small-scale solar PV systems may or may not be connected to the wider electricity grid. However, self-contained wind or solar micro-grids with their own distribution networks are not considered small-scale installations in the context of World Heritage properties.

Key aspects to consider:

- The necessary planning permission or management approvals should be obtained.
- PV panel type, design of supporting structures and location should be chosen so as to minimize the visual impact.
- Stand-alone panels should be located so as to avoid any loss of natural habitat.
- The construction and securing of panels, supporting structures, cabling and fencing should minimize potential hazards to people or wildlife (e.g., from electrocution or tangling).
- PV panel type and quality should be considered in relation to lifespan, not only in terms of cost but also long-term sustainability.
- Regular maintenance and controls should be carried out to minimize the risk of wildfires due to electrical malfunctions.
- Transport and construction should be carefully managed to minimize disturbance and ensure appropriate waste disposal.
- Decommissioning or repowering should be planned and options for recycling to minimize resource use and the creation of hazardous or bulky waste taken into consideration.

If you are a site manager or building owner/manager, consult and follow relevant items in the checklists in this section of the Guidance.

Aspects to consider regarding small-scale solar hot water systems on historic buildings or in urban and natural areas within World Heritage properties and their settings

Solar hot water systems offer excellent value for money and can provide an almost unlimited supply of hot water, even in areas where other renewable energy sources such as solar PV are already in use. Their operation typically incurs no ongoing costs, as they use only tap water from the main supply and do not require connection to larger infrastructure networks. For these reasons, solar hot water systems are commonly installed in urban areas alongside other energy systems.

In natural settings, solar hot water systems are often installed on the roofs of existing structures such as ranger posts, administrative or staff housing blocks and visitor facilities including cabins or lodges. They may also be fitted onto stand-alone structures near the buildings where hot water will be used.

These small-scale installations are relatively flexible in scale and location but will need a reliable and clean (sediment-free) water supply, which may require ancillary infrastructure such as an electric pump, storage tank or water tower. Consents from the relevant management authorities will likely be required for installing solar hot water systems within a designated protected area.

Key aspects to consider:

- The necessary planning permission or management approvals should be obtained.
- The appropriateness of installing solar hot water systems on roofs above important collections or significant interiors should be carefully considered.
- It should be considered how to avoid or minimize new visual impacts, e.g., from piping or a new water tower, that would reduce the natural appearance of existing settings.
- Technical advice should be sought regarding the sizing of the system in relation to water use, the structural strength of the roof or supports (for both static and wind load, and for both installation and operation), the collector type (e.g., flat plate or evacuated tube), placement in relation to sunlight exposure, the insulation of tanks and piping, and temperature monitors and controls.
- Technical advice should be sought on water quality and the potential need to manage water chemistry (to avoid scale build-up or corrosion) or use filters, and to ensure water is heated sufficiently to avoid risks of *Legionella* or other bacterial build-up.
- Installations should not block access for future maintenance, e.g., to flashing or ridge tiles on roofing.
- No protected species should be disturbed by installations, particularly under roof coverings or inside roof spaces. The season in which the installation is planned should be taken into consideration.
- The creation of new cavities or spaces that could be colonized by potentially hazardous wildlife (e.g., venomous spiders or snakes) or damage the installation should be avoided.
- A certified and qualified installer who can ensure site hazards are assessed and properly managed during construction should be identified and employed.
- Regular inspections and maintenance, which could involve periodic flushing to clean the system, should be carried out.

If you are a site manager or building owner/manager, consult and follow relevant items in the checklists in this section of the Guidance.

Potential benefits of wind and solar developments

Enhancement provides a chance to increase the positive effects of a proposed action or to create new benefits for both natural and cultural heritage, as well as for local communities. The development of wind and solar energy projects can present opportunities to enhance habitats for wildlife both above and below water, as well as to create space for plant growth or to support local communities through the provision of renewable energy. Where possible, it would be beneficial to explore such positive effects, including within cultural heritage environments. However, it is important to recognize that any gains in biodiversity or other benefits should not be seen as a way to offset potential negative impacts on the Outstanding Universal Value of a World Heritage property, given the irreplaceable nature of this value. When assessing the impacts of proposals, a distinction is usually made between positive impacts – those that support, strengthen or help to restore Outstanding Universal Value – and enhancements, which improve the site without significantly affecting its Outstanding Universal Value.

The Policy Document for the Integration of a Sustainable Development Perspective into the Processes of the World Heritage Convention, adopted by States Parties in 2015, recognizes the importance of strengthening environmental sustainability, inclusive social development and inclusive economic development, as well as fostering peace and security, while protecting the Outstanding Universal Value of World Heritage properties.

As noted in the *Guidance and Toolkit for Impact Assessments in a World Heritage Context*, impact assessment offers an opportunity to enhance the positive impacts of a proposed action, or create new ones, for the benefit of both natural and cultural heritage and society. Best practices in impact assessment seek not only to 'do no harm', but also to actively 'do good', all without compromising Outstanding Universal Value of a World Heritage property.

Case studies

Solar energy installation to support local communities on isolated islands: the case of Aldabra Atoll (Seychelles)

Solar energy installation to support local communities on isolated islands: the case of Lord Howe Island (Australia)

Solar energy installation to support local communities on isolated islands: the case of Komodo National Park (Indonesia)

Wind and solar developments may provide opportunities for such positive impacts. Utility-scale wind and solar developments, for instance, typically require considerable space, extending over sizeable areas of land or water. However, the development infrastructure itself covers only a part of this area, leaving scope for site management to achieve, for instance, nature conservation goals. In some circumstances, the infrastructure itself may offer opportunities for enhancing biodiversity.

The type and scale of such opportunities will always depend on context. Opportunities are likely to be greatest when developments take place on land or water that is already converted to non-natural habitats or in a degraded state rather than in natural habitats that are in good condition.

Nevertheless, it should be stressed that benefits, including biodiversity enhancement, should never be seen to justify a project approval or as an option to offset negative impacts on the Outstanding Universal Value of a World Heritage site.

The potential benefits of wind and solar energy development for World Heritage

While wind and solar projects can present risks to Outstanding Universal Value (OUV) if poorly sited or designed, they also offer opportunities to strengthen the long-term sustainability, resilience and relevance of heritage places. When carefully planned, these technologies can enhance conservation efforts, support local communities and demonstrate how heritage can be part of the solution to global sustainability challenges.

Biodiversity enhancement

In the World Heritage context, biodiversity enhancement means taking extra steps to support wildlife and habitats beyond simply avoiding or reducing any harm caused by a project. These actions usually happen within the area of a wind or solar energy development, but may focus on different parts of the environment than those affected by the project itself. They often include creating or restoring natural or semi-natural habitats and helping particular species to thrive.

In the context of World Heritage properties and their Outstanding Universal Value, opportunities are likely to be greatest for properties that represent outstanding examples of ongoing ecological and biological processes (included in the World Heritage List under criterion (ix)) or the most significant natural habitats for biodiversity conservation (included under criterion (x)). However, there may be opportunities to enhance biodiversity in all World Heritage properties, regardless of the criteria under which they are listed. Properties identified under these criteria must be sufficiently large, intact and ecologically diverse to maintain the Outstanding Universal Value for which they are recognized. Positive conservation actions in their buffer zones or wider settings can also contribute to maintaining those values and supporting specific aims within management systems or plans.

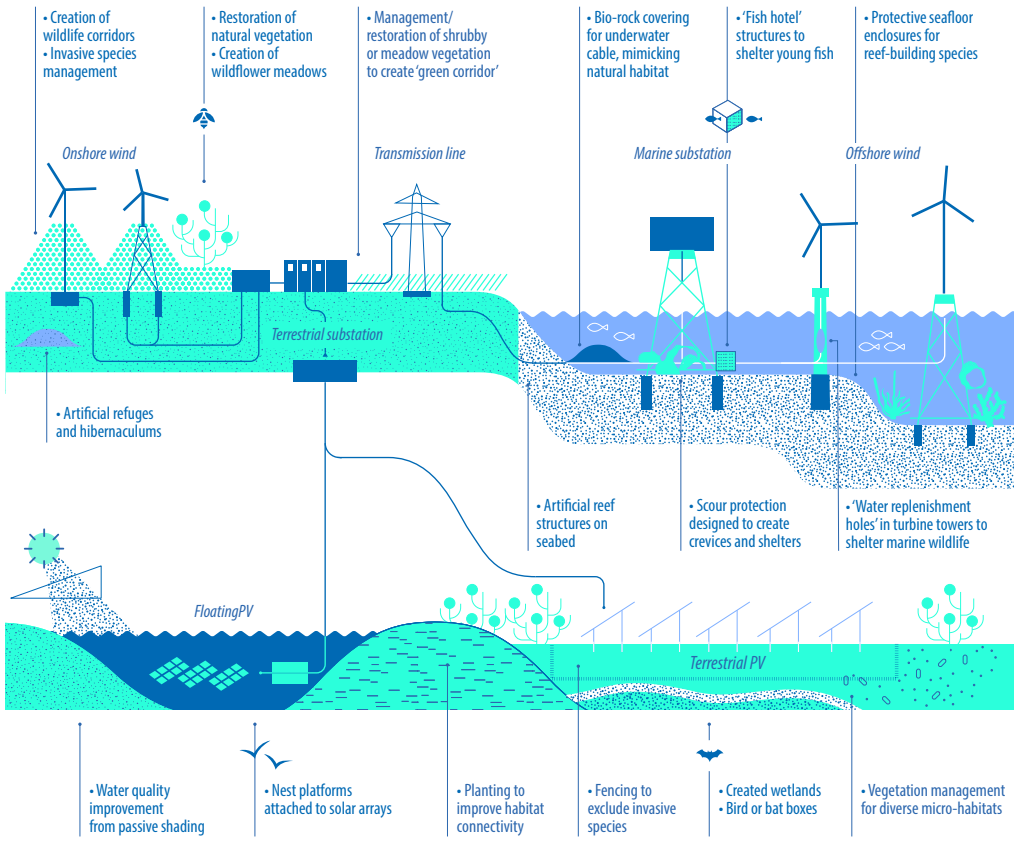
Opportunities for enhancing biodiversity at wind and solar energy developments, published by IUCN, outlines the context of and potential approaches to biodiversity enhancement in wind and solar projects. This serves as a useful reference for more detailed information. The key points from that document relevant to World Heritage contexts are summarized in this Guidance.

Biodiversity enhancement also differs from 'additional conservation actions', which are typically interventions such as education, capacity-building and research that help to support or enable conservation, but do not have easily measurable outcomes.

Biodiversity enhancement can thus be defined as conservation actions, usually taken at the project level, that measurably improve biodiversity after, and in addition to, actions taken in line with the mitigation hierarchy.

In addition to supporting wildlife, biodiversity enhancement actions can also improve ecosystem services – the benefits that nature provides to people – and, in some cases, may qualify as nature-based solutions. For example, restoring semi-natural vegetation or riparian habitats could increase water security and reduce flood risk, enhancing ecosystem services and addressing societal challenges through a nature-based approach. Such actions could benefit mixed or cultural World Heritage properties such as those inscribed under criterion (v) on the World Heritage List, recognized as outstanding but vulnerable examples of human interaction with the environment.

In some cases, biodiversity enhancement may also provide direct management benefits for wind or solar energy projects. For example, the restoration of vegetation around solar panels may improve efficiency through temperature reduction and dust suppression.



Examples of options to enhance biodiversity around wind and solar PV energy projects.

Biodiversity enhancement actions

There are many potential actions for biodiversity enhancement. The decision of which actions to implement needs to be informed by the context, a good understanding of ecology, and landscape or seascape conservation goals, as well as the potential unintended adverse consequences (see below).

Onshore PV and wind

- Restoration of natural vegetation
- Wildflower meadows to improve pollinator diversity
- Plantings to increase connectivity and enable wildlife movements
- Invasive species management
- Artificial habitat structures for particular species: bird and bat boxes (solar only), artificial hibernacula, burrows, hollows, refuges, etc.
- Habitat creation – e.g., engineered ponds or waterscapes as new wetlands (solar only)
- Fencing for livestock protection – reducing human-wildlife conflict
- Fencing for wildlife protection
- Exclusion fencing for vegetation protection and/ or to exclude invasive species

Floating PV

- Passive benefits from water shading such as reduced algal blooms, the mitigation of aquatic weed growth and reduced water evaporation
- Installation of nest platforms or refuges attached to solar arrays

Offshore wind

- Design of scour protection structures to maximize biodiversity benefits, e.g., through creating large and small holes and crevices, selecting substrates with chemical properties encouraging target species to settle there and the active introduction of target species to speed up colonization
- Addition of underwater cages to turbine towers, floating bases or substation supports, or including holes in turbine tower designs to provide shelter for young fish and other wildlife
- Installation of artificial reefs to create new seafloor habitats
- Installation of protective enclosures on the seafloor to promote the establishment of target species, or protection of seafloor cables with biorock to mimic natural habitats
- Establishment of no-catch zones, or enhanced fisheries, within the area of the wind farm

Benefits of biodiversity enhancement actions for World Heritage properties

There are various ways in which biodiversity enhancement actions associated with wind and solar developments in the buffer zones or wider settings of World Heritage properties could potentially support their management. Examples include:

- creating safe refuges and stop-over points for migratory species;
- improving landscape connectivity and reducing barriers to movement and dispersal, helping to improve the gene flow and effective population size of key species;
- increasing the area and/or quality of natural habitats in the landscape;
- providing new foraging opportunities and nesting or shelter sites for key species;
- providing nature-based solutions to reduce potential pressures on the World Heritage property and/or buffer zone;
- improving the provision of ecosystem services for local communities, reducing potential pressures on the World Heritage property and/or buffer zone.

Key considerations for supporting effective biodiversity enhancement

When planning enhancement actions, potential risks and unintended consequences must be considered. For example, restoring or enhancing natural habitats, or constructing new habitats such as wetlands, within or near a wind farm could potentially attract bird or bat species at risk of collision with wind turbines and infrastructure.

Establishing a wildlife refuge within a wind or solar development may sometimes lead to concerns among neighbouring landowners, particularly if they worry about an increase in 'problem animals'. Additionally, certain species such as venomous snakes or scorpions could present safety risks for on site workers.

Less directly, changes in land use or management may offer on-site benefits by shifting impacts – such as those from agriculture, grazing or fishing – to other areas. However, this displacement could potentially create new risks to natural habitats in the wider landscape, including possibly within the World Heritage property itself.

In some World Heritage properties, renewable energy can provide communities with a cleaner, more affordable way to heat or cool their homes, helping residents to remain in place. However, when planning such improvements, care must be taken to ensure that the energy installations do not cause any damage to the homes themselves.

Good practice principles for biodiversity enhancement

Timing and process

- Consider biodiversity enhancement early in the project cycle, identify and scope in a participatory way and ensure enhancement is not a replacement for the measures required for impact mitigation.
- Ensure that enhancement measures can be implemented within a time frame appropriate for the project.

Relevance

- Target actions on biodiversity features that are relevant to the specific landscape, project location and defined Outstanding Universal Value of the World Heritage property.

Evidence and evaluation

- Review the evidence base for enhancement measures, define clear and measurable goals and outcomes, establish a baseline, ensure appropriate monitoring and manage adaptively based on monitoring results.

Permanence

- Plan for enhancement outcomes to be sustained in the long term for a lasting legacy.

Source: IUCN, 2025, Opportunities for enhancing biodiversity at wind and solar energy developments.

Checklists for actors in renewable energy development in a World Heritage context

The protection and conservation of the Outstanding Universal Value (OUV in the checklists) of World Heritage properties requires informed decision-making by all involved actors. The following checklists, while not exhaustive, are intended to guide building — and land-owners, actors responsible for protecting and managing World Heritage, project proponents and impact assessment specialists, who each have a role to play in ensuring the preservation of World Heritage when initiating projects or contributing to decision making.

Following the sequence of the project lifecycle (from concept to recovery), these checklists aim to help identify key actions, responsibilities and coordination needs, particularly in relation to potential impacts on World Heritage. By providing a quick overview, each checklist highlights the importance of early engagement, the use of available information sources, and the need to apply the principles and tools of impact assessment. Collectively, these checklists support the consistent application of information provided in other parts of this Guidance and strengthen the protection of World Heritage in the context of the energy transition.

Checklist

Building- and landowners who wish to install small-scale wind or solar energy systems

Project Phase	Proposed Location and Alternatives	Information Sources	Approvals Process
1. Concept	• Have you explored different location options for your renewable energy installation — on or near your building or land — to avoid or minimise negative impacts on historic fabric or elements, important historic views, sensitive ecological areas or wildlife? • Have you considered productive lifespan and maintenance requirements for different technical solutions, in light of sustainability and practicality?	• Have you spoken with the Site Manager of the World Heritage property or local heritage authority to understand how your building or land contributes to the World Heritage property's OUV?	• Are you aware of the need to consult or notify authorities before proceeding, even at the conceptual stage?
2. Planning	• Have you selected a technical solution (e.g. rooftop panels, BIPV systems) that aligns with the character and materials of your building or land? • Have you confirmed that the installation will not result in damage to historic materials or lead to removal of original features?	• Have you reviewed local planning policies, renewable energy guidelines, or heritage regulations? • If these do not exist, have you asked the Site Manager for advice?	• Have you checked whether your planned installation requires permits, and do you understand the approval process in your area?
3. Construction — Installation	• Have you engaged a specialist in installation to ensure that no damage to historic materials will occur?	• Have you researched best practices for installation on historic structures (e.g. non-invasive/destructive mounting techniques)?	• Are your installers qualified and certified, particularly for work on heritage buildings or within World Heritage properties?
4. Operation	• Have you verified that the installed system will not visually intrude or create ongoing noise, flicker or glint/glare affecting your neighbours and passers-by, as well as the character of the local area?	• Are you following manufacturer recommendations and heritage-sensitive maintenance guidelines?	• Do you conduct regular check-ups to ensure the system continues to operate safely and appropriately?
5. Repowering Replacement Decommissioning	• Have you planned how upgrades or replacements will continue to respect the way in which your property contributes to the OUV of the World Heritage property?	• Do you know where to find updated policies or guidance as technologies change?	• Will you need to inform authorities if major replacements or new equipment are introduced?
6. Recovery	• Have you considered how to recover or recycle solar or wind energy components at the end of life, in ways that minimize environmental harm?	• Are you aware of options for recycling or reusing the elements of the installed infrastructure in your region (e.g. extended producer responsibility schemes)?	• Do you perhaps need a certificate that you recycled your previous installed infrastructure?

Checklist

World Heritage managers

Site managers play a key role in the energy transition at the World Heritage properties where they work. By monitoring planned and implemented developments in the context of a World Heritage property (including its buffer zone or wider setting and noting that many renewable energy installations will not be appropriate to be installed within the property itself), they can ensure that World Heritage considerations are included in energy project planning, often by bridging between the various actors involved. In order to ensure these, a proactive approach is needed from their side. The checklist below aims to support site managers to ensure the protection and conservation of the Outstanding Universal Value (OUV) of World Heritage properties:

Project Phase	Proposed Location and Alternatives	Information Sources	Approvals Process
1. Concept	• Have you checked if protecting and conserving World Heritage is a consideration in renewable energy policies and programmes for the local area/region? • Does your World Heritage property have a specific policy related to installation of renewable energy systems? (If not, perhaps this is an issue to be raised with the National Focal Point for the implementation of the World Heritage Convention.) • Are you supporting project proponents to identify locations that avoid negative impacts on the OUV of the World Heritage property, and on other heritage values? (For this you will need to have a clearly defined set of attributes that convey OUV.) • Have you recommended evaluation of alternative locations outside the property, its buffer zone, and wider setting? • Are off-grid and grid-connection needs part of early site suitability analysis?	• Are you providing access to key documents of the World Heritage property, such as the Statement of OUV, attribute inventories, maps, GIS layers, state of conservation data, and heritage sensitivity overlays? • Have you shared resources from the World Heritage Centre, the Advisory Bodies and Category 2 Centres to help assess risks and best practices?	• Are you informing project proponents of World Heritage procedures, including the need for early notification to the World Heritage Centre (Operational Guidelines, Paragraph 172) for projects with potential negative impact on the OUV? • Have you indicated, if needed, the requirement for a formal Impact Assessment as mandated by Paragraph 118bis of the Operational Guidelines? • Have you highlighted to regulators and relevant government departments the need for coordination with national Focal Points and other permitting bodies? To whom?
2. Planning	• Are you guiding the screening of project proposals for direct, indirect, and cumulative impacts on the OUV of the property? (See what screening is in the '*Step-by-step guidance…*' within '*Assessing Impacts*'.) If relevant, does the screening include assessing transmission routes, construction footprints, and ancillary infrastructure for medium/large-scale and off-grid systems?	• Have you developed site-specific checklists or planning tools to evaluate renewable energy proposals? • Are stakeholders aware of broader landscape/urban conservation plans, energy policies, and zoning regulations that relate to (World) heritage?	• Have you checked with local/regional planning authorities if the principle to protect the OUV of the World Heritage property is integrated into the relevant planning framework? (If it is not, perhaps this is an issue to be raised with the National Focal Point for the implementation of the World Heritage Convention.) • Are World Heritage focused impact assessments required for renewable energy projects posing potential risks to the OUV even when not mandated by national law? (If not, perhaps this is an issue to be raised with the National Focal Point for the implementation of the World Heritage Convention.)
3. Construction — Installation	• Are you reviewing construction and logistics to prevent loss of attributes conveying the OUV (such as demolition of heritage fabric, archaeological disturbance, or changes to topography or seascape)? • Are you supporting proposals that emphasize reversible or low-impact construction methods? • Have you ensured that World Heritage considerations are included in Environmental and Social Management Plans (ESMPs) for the construction site?	• Have you ensured that the project is carried out in the authorised way, respecting the protection and conservation of World Heritage properties?	• Are you monitoring compliance with permits and World Heritage-related commitments during the construction phase, including mitigation actions where needed? • If no permitting is needed for small-scale wind and solar energy projects, are you monitoring compliance with relevant local/national strategies and policies? • Are you monitoring in general, that installed wind and solar energy projects do not harm the OUV of the World Heritage property?

4. Operation	• Are you monitoring long-term visual, noise, or ecological effects of the installation (e.g. glint/glare, flicker, vegetation management, maintenance access, water usage)? • Are relevant indicators part of your Management Plan? (If not, you are advised to act when there is a possibility for updating the document.) • For large installations, are grid performance and local usage impacts monitored over time?	• Is there a grievance mechanism to gather community input or complaints, and to update operational guidance in response to emerging issues?	• Are you maintaining regular communication with regulatory agencies and the national World Heritage focal point to review operational impacts on the OUV of the property and other values?
5. Repowering Replacement Decommissioning	• Are you ensuring that upgrades or removals are planned and agreed to in advance to minimize intervention in heritage-sensitive areas and prevent damage to surviving elements or features?	• Do you maintain records of technologies used, their expected lifespan, and sustainability implications of their removal or replacement?	• Are there mechanisms requiring environmental and heritage impact checks for repowering or repurposing, and coordinating with authorities to update approvals accordingly? (If not, perhaps this is an issue to be raised with the National Focal Point for the implementation of the World Heritage Convention.)
6. Recovery	• Are you advising on restoration of landscapes, removal of obsolete infrastructure, and reuse of energy infrastructure in ways that support conservation goals? • Are you proposing solutions that could enhance the management of the wider heritage place?	• Are you linking proponents with material recovery and recycling schemes and supporting life-cycle-based sustainability planning?	• Are you archiving documentation of project interventions to ensure continuity of knowledge for future management and monitoring cycles?

Checklist

National Focal Points implementing the World Heritage Convention

Focal Points are a key link between the international and national levels of the World Heritage Convention and, as such, are essential to ensuring that there is full consideration of World Heritage during the energy transition in each country, contributing to policy, planning and implementation. They have the potential to promote improvements to strategies, policies and relevant legal frameworks, including the planning framework of wind and solar energy projects. Proactive action is needed from their side to ensure that adequate mechanisms are in place at national and local levels, and Focal Points have a key role to play to ensure that such mechanisms are in place. They can also encourage cross-sectorial dialogue and to support site managers at the local level.

Project Phase	Proposed Location and Alternatives	Information Sources	Approvals Process
1. Concept	• Have you reviewed the relevant national strategies and policies to ensure that they do not include potentially problematic wind and solar energy target areas within or near World Heritage properties, without checking that these sitings will not become problematic? • Are you ensuring that World Heritage considerations are included in national renewable energy policies and programmes? • Are you encouraging the use of Strategic Environmental Assessments (SEAs) in renewable energy policy and planning on national, regional and local level? Is World Heritage considered in such SEAs? • Have you checked that national spatial strategies incorporate low-impact zones for renewable energy development?	• Have you provided Site Managers and planners with resource materials and directed them to international guidance and technical tools? • Have you ensured that key World Heritage guidance documents are known to relevant actors and are translated into national language(s)? • Have you organized any information-sharing events or capacity-building activities to support all actors involved in the energy transition in a World Heritage context?	• Have you ensured that national guidance on renewable energy development incorporates requirements for early screening and risk identification that are relevant for World Heritage? • Have you checked if national development strategies are harmonized with World Heritage policies? • Are you ensuring that the national impact assessment framework and practices are aligned with Paragraph 118bis of the Operational Guidelines?
2. Planning	• Have you checked that national renewable strategies and policies include planning zones that protect heritage-sensitive areas, such as World Heritage properties and their wider setting? • Have you promoted national-scale alternatives analysis to avoid negative impacts on World Heritage?	• Have you checked if national heritage databases (that include all relevant information on World Heritage properties as well) are shared across sectors and available for project proponents? • Have you ensured that decision-makers for proposed wind and solar energy projects are aware about the commitment of your country to protect and preserve World Heritage properties? • Have you ensured that national authorities are informed of known attributes and sensitivities of World Heritage properties and the supporting role of buffer zones?	• Have you ensured that notification is provided to the World Heritage Centre in outstanding cases (as per Paragraph 172 of the Operational Guidelines), before any irreversible decisions are made? • Have you checked if construction permits for large-scale wind and solar energy projects need prior consultation with Site Managers and that an assessment of potential impacts on the OUV of World Heritage properties is an obligatory prerequisite in the process? • Have you ensured that if permitting is not a legal requirement for small-scale wind and solar energy projects, the protection and preservation of the OUV is still ensured (for example through general policies, established exclusion zones, etc.)?
3. Construction — Installation	• Have you supported training of implementing agencies and developers on construction safeguards in sensitive heritage locations?	• Is there a way you could encourage or ensure that contractors implementing wind and solar energy projects are qualified and trained in heritage-sensitive methods if working in such an environment? • Have technical guidelines been developed and disseminated, which ensures the protection and preservation of World Heritage properties during the construction phase of wind and solar energy projects?	• Have you ensured that a monitoring mechanisms are in place at World Heritage properties to ensure that projects are implemented in a way that does not harm their OUV? • Have you ensured that if permits are legally not required for wind and solar energy projects, their impact is also monitored in relation to the OUV of World Heritage properties?
4. Operation	• Have you coordinated national monitoring frameworks that track cumulative impacts from the operation of wind and solar energy infrastructures installed within or near World Heritage properties?	• Have you encouraged the monitoring and evaluation of operational impacts (e.g., visibility, noise, light pollution) in national-level monitoring and site evaluation policies and plans?	• Have you ensured that the plans and policies governing operation of wind and solar energy infrastructure are periodically reviewed for their alignment with preserving World Heritage properties, including in national reporting to the World Heritage Centre?

5. Repowering Replacement Decommissioning	• Have you developed national guidance on how repowering and decommissioning wind and solar energy infrastructure should be carried out to result in no or minimal impact on World Heritage properties?	• Are you ensuring that national registries are updated with data on decommissioned projects? • Are you ensuring that recycling wind and solar energy infrastructure is aligned with the protection and preservation of World Heritage?	• Have you checked if there is a mechanism in place for screening repowering proposals against up-to-date information on World Heritage properties and that review procedures include national and local heritage authorities?
6. Recovery	• Have you ensured that national recovery or rehabilitation policies promote restoration of heritage-sensitive landscapes post-decommissioning and clearly identify who is responsible?	• Have you ensured that national recovery or rehabilitation policies promote restoration of heritage-sensitive landscapes post-decommissioning and clearly identify who is responsible?	• Have you checked that permitting frameworks include appropriate recovery and monitoring provisions, aligned with restoration of heritage-sensitive landscapes?

Checklist

Planners

Planners involved in developing spatial planning documents and other policy level tools, are important actors in bridging national planning systems with the commitment States Parties have made to the World Heritage Convention.

Project Phase	Proposed Location and Alternatives	Information Sources	Approvals Process
1. Concept	• Do the polices and plans that you develop guide proponents of large-scale renewable energy projects to avoid locations within and near World Heritage properties? • Are there policies and strategies considering the OUV of World Heritage properties in relation to potential locations of wind and solar energy installations? • Have off-grid or grid-integrated needs been considered at early policy and planning stages?	• Has the spatial information on World Heritage properties been consulted and considered (spatial databases, GIS overlays, and heritage sensitivity maps from relevant national heritage bodies)? • Have the boundaries and buffer zones and the wider settings of World Heritage properties (as well as locations of tangible attributes of OUV) been integrated into municipal/regional GIS databases and planning tools?	• Is the project approval framework linked with policy frameworks concerning renewable energy? • Is World Heritage interest included in early screening criteria? • Are renewable energy project applicants made aware of obligations under the Operational Guidelines, especially Paragraph 172, in all policies and plans?
2. Planning	• Have landscape-scale suitability analyses been conducted to identify low-risk zones (regarding World Heritage interests) for energy infrastructure? • Do siting and routing decisions factor in cumulative impacts on the OUV of World Heritage properties, including from ancillary infrastructure?	• Have national, regional, and local plans (e.g., development plans, heritage registers, energy strategies) been cross-referenced to identify inconsistencies or gaps?	• Are World Heritage protections integrated into zoning and impact assessment frameworks? Is there a formal coordination mechanism with Site Managers and national heritage authorities? • Are the conclusions of impact assessments, including recommended mitigation measures, fully integrated into permits when they are granted? • Do planning approvals subject to conditions aim to safeguard heritage/World Heritage? • Are spatial planning permits aligned with conservation guidelines? • Are the conclusions of impact assessments incorporated into the planning permission, so that they are mandatory inclusions in the 'Environmental and Social Management Plan' or similar plans?
3. Construction — Installation	• Are planning controls in place to monitor interventions and take action if necessary to avoid irreversible interventions or excavation in archaeologically, visually or otherwise sensitive zones?	• Have technical planning conditions been based on input from Site Managers and other relevant heritage/environmental agencies? • Are contractors aware of specific restrictions and obligations?	• Are compliance inspections coordinated with heritage authorities during construction?
4. Operation	• Is there a plan to monitor landscape, visual, ecological and other relevant impacts over time, including effects on World Heritage? • For larger developments, is grid connection infrastructure (e.g., substations, lines) monitored for visual/spatial impacts? • Are operating licences granted with specific operational timeframes and requirements for post-operational recovery or removal?	• Are land use databases updated to reflect installed infrastructure and its buffer requirements?	• Are operating licenses periodically reviewed to reflect changing conservation priorities or cumulative impacts on World Heritage properties?
5. Repowering Replacement Decommissioning	• Have you planned for future technology upgrades or removals with minimal impact to cultural or natural attributes of the landscape? • Are impacts of the transition from older to newer infrastructure assessed?	• Is recycling and deconstruction guidance integrated into spatial policies for renewable energy?	• Are approvals for repowering contingent on updated screening and site compatibility assessments? • Is there an obligation to renew planning permits (including relevant heritage permits?
6. Recovery	• Are recovery zones or rehabilitation requirements, including who is responsible, defined in planning conditions?	• Are recovery and recycling plans coordinated across regional or national levels to address broader land-use sustainability goals?	• Is post-project land use monitored and aligned with long-term spatial planning for World Heritage protection and sustainable development?

Checklist

National decision-makers

National-level decision-makers play a crucial role in aligning the energy transition with a State Party's commitments under the World Heritage Convention. They help ensure that World Heritage considerations are integrated into national policies, sector strategies, and regulatory frameworks.

Project Phase	Proposed Location and Alternatives	Information Sources	Approvals Process
1. Concept	• Have national energy policies and programmes undergone a Strategic Environmental Assessment process that includes World Heritage considerations? • Do national energy or development strategies specifically consider World Heritage properties and the need for their protection and preservation? • Have planning agencies been instructed to apply the Precautionary Principle for siting near sensitive heritage locations, including World Heritage properties?	• Are relevant ministries using guidance from UNESCO, the Advisory Bodies, and national heritage institutions in their considerations for renewable energy policies and strategies? • Have cross-sectoral information-sharing mechanisms been set up?	• Have all sectors been instructed to apply heritage-related screening at early stages of project conceptualisation? • Has the need to safeguard heritage (including World Heritage) been clarified for all project proponents?
2. Planning	• Are sectoral policies, including the potential sensitivity of World Heritage for wind and solar energy installations, taken into account in site selection and routing? • Are large-scale project alternatives being assessed to avoid harm to heritage values, including for World Heritage?	• Are up-to-date heritage databases (with values, attributes, maps, etc.) made available across planning agencies? • Has capacity been built within ministries to access and interpret World Heritage guidance?	• Are planning approval frameworks aligned with procedures implementing the World Heritage Convention? • Have review procedures been developed for potentially impactful projects (including the obligation to carry out World Heritage focused impact assessments), including coordination with Site Managers and national Focal Points? • Do decision-making procedures require prior notification to the World Heritage Centre under Paragraph 172 of the Operational Guidelines when potential impacts to OUV are identified?
3. Construction — Installation	• Have national construction standards been updated to include considerations for protecting and conserving World Heritage properties, their buffer zones and wider settings? • Are contractors held to protocols for working in or near heritage-sensitive areas, including World Heritage?	• Are field-level implementation guidelines available that include heritage-sensitive construction practices? • Have ministry inspectors received relevant training to understand potential impacts on heritage, including World Heritage?	• Are approvals for installation tied to adherence to best practice construction codes for heritage-sensitive areas, including World Heritage properties?
4. Operation	• Are national monitoring tools in place to measure operational impacts on the visual, acoustic, and ecological setting of World Heritage properties?	• Is there a reporting mechanism to track operational changes (e.g., noise, glint/glare, flicker vibrations) that may affect OUV over time?	• Are operating licenses or permits structured to allow periodic review based on emerging impacts on the OUV of World Heritage properties?
5. Repowering Replacement Decommissioning	• Do long-term infrastructure policies require repowering projects to avoid increasing cumulative impacts on World Heritage properties?	• Have national energy and environment departments integrated guidance on the end-of-life handling of infrastructure near heritage areas, including World Heritage properties?	• Are procedures in place for multi-sectoral review of repowering proposals, including input from national and local heritage authorities?
6. Recovery	• Does national legislation enable post-project rehabilitation of landscapes, with specific focus on preserving and enhancing the attributes of OUV of World Heritage properties?	• Have awareness-raising campaigns highlighted the relationship between energy transition, sustainability, and World Heritage?	• Does recovery plans include consideration for heritage values (including World Heritage)?

Checklist

Energy sector professionals and utility-scale project proponents

Energy sector professionals and proponents of large-scale projects are key actors in shaping the renewable energy transition. Their decisions on site selection for utility-scale projects, design, and technology choice can significantly affect World Heritage properties. Awareness about the World Heritage system, information about World Heritage that might be impacted by specific projects, and early dialogue with World Heritage stakeholders, provide vital input for informed decision making, and ensure timely and cost-effective project planning and implementation.

Project Phase	Proposed Location and Alternatives	Information Sources	Approvals Process
1. Concept	• Have you checked if the planned project area has a connection with a World Heritage property (including its buffer zone or wider setting)? • Are alternative locations being considered to avoid negative impacts on World Heritage?	• Have you consulted relevant national/ regional heritage databases (that also include information on World Heritage properties) to inform site selection? • Have you reviewed World Heritage guidance materials and technical tools?	• Are risks to the OUV of World Heritage properties identified and flagged for heritage-sensitive projects? • Are you aware of the need to notify authorities and the World Heritage Centre where relevant?
2. Planning	• Are site and technology alternatives evaluated using a mitigation hierarchy (in order to avoid or minimize negative impacts on OUV)? • Are landscape-scale impacts and cumulative effects on OUV considered in choosing project location? • Has transmission infrastructure been considered in addition to the energy project area?	• Have you taken into consideration the OUV and attributes of the World Heritage properties your project might affect? • Is the relevant information about the World Heritage property concerned and local planning guidance included in the project's design analysis?	• Have you confirmed whether a World Heritage focused impact assessment is required? • If yes, does it conform to the 2023 'Guidance and Toolkit on Impact Assessments in a World Heritage Context' (See also the 'Assessing Impacts' section of this), including consideration of indirect and cumulative impacts?
3. Construction — Installation	• Do decisions for installation (including transport of infrastructure components) avoid damage to tangible and intangible attributes of heritage (including sensitive flora/fauna, archaeological heritage, historic building fabric, social processes, sense of place, etc.)? • Have heritage-sensitive construction techniques been specified? • Have you ensured that all contractors and sub-contractors are aware of necessary measures to preserve World Heritage through 'Environmental and Social Management Plans' and other site management tools?	• Have construction teams been briefed on site-specific sensitivities and mitigation measures identified during the impact assessment procedure? • Are they trained in heritage-friendly construction practices?	• Is compliance with mitigation and monitoring plans (that are outcomes of the impact assessment procedure) included in contractual and permitting obligations? • Are relevant updates reported to local authorities and heritage managers?
4. Operation	• Are operational practices in place to minimize identified visual, acoustic, and ecological impacts in the context of World Heritage properties? • Are buffer measures in place to reduce risk of technological intrusion into heritage settings, including World Heritage properties?	• Have those responsible for operation been required to monitor actual impacts on heritage (including World Heritage) and compare them to predictions made during the impact assessment process? • Are there indicators in place that trigger an action when monitored impacts cause concern? • Are changes in visibility, noise, and cumulative effects tracked and reported to the relevant authorities?	• Are operations reviewed regularly for compliance with heritage-related permit conditions? • Are there triggers for adaptive management if impacts exceed thresholds?
5. Repowering Replacement Decommissioning	• Is the project re-evaluated before upgrading or replacement to assess evolving impacts on heritage, including World Heritage? • Do decommissioning plans minimize disturbance to heritage assets, including World Heritage?	• Are the findings of relevant impact assessments revisited with updated data to assess current risks and ensure preservation of heritage values, including the OUV of World Heritage properties? • Are best practices shared across project portfolios?	• Are decommissioning actions aligned with national heritage and sustainability goals? • Is there provision for recycling and minimal-impact removal strategies, aligned with the recommendations of relevant impact assessments?
6. Recovery	• Are former infrastructure sites restored to their natural or cultural condition, in alignment with World Heritage protection goals? • Are visual scars and access routes rehabilitated?	• Are results of restoration and lessons learned communicated to heritage stakeholders and professional networks? • Are outcomes documented for future planning reference?	• Are post-project evaluations shared with authorities, including compliance reporting on impact assessment outcomes? • Is the site free of residual impacts on heritage (including World Heritage)?

Checklist

Impact assessment professionals
Experts that are commissioned to undertake impact assessments in a World Heritage context play a crucial role in identifying, evaluating, and mitigating potential effects of wind and solar energy projects on World Heritage. Their work ensures that decisions are informed by a thorough understanding of the Outstanding Universal Value of World Heritage properties, as well as its underlying attributes, and that World Heritage considerations are integrated into every stage of the assessment process.

Project Phase	Proposed Location and Alternatives	Information Sources	Approvals Process
1. Concept	• Have you checked whether the planned project area has a connection with a World Heritage property (including its buffer zone or wider setting)? • Have you assessed whether less sensitive alternative locations are feasible to reduce potential impacts on the OUV of World Heritage properties?	• Have you checked the UNESCO World Heritage website for information, as well as relevant national/regional heritage databases, maps, and spatial planning documents to identify and understand World Heritage properties? • Have you consulted with Site Managers to collect all available relevant information on the World Heritage property concerned, its attributes in particular?	• Have you confirmed whether an Environmental or Heritage Impact Assessment is required under national law or under the World Heritage Operational Guidelines (in line with Paragraphs 110 and 118bis)?
2. Planning	• Are location-based alternatives and design options systematically evaluated to reduce potential impacts on the attributes of OUV? • In site selection and design scenarios, has the supportive role of a World Heritage buffer zone been considered for the site itself, as well as potential landscape-level sensitivities in the wider setting? • Are alternatives turbine height, lighting, or panel reflectivity being considered to reduce operational impacts?	• Are you familiar with the more general 2022 *"Guidance and Toolkit for Impact Assessments in a World Heritage Context"*, and the suggested methodologies included? • Have you established early dialogue with the Site Manager and heritage authorities?	• Have you provided a screening or scoping report to proponents, regulators and other relevant national authorities and the World Heritage Centre that addresses the potential impacts of the planned project on World Heritage? • Have you clarified with the relevant national authorities if the World Heritage Centre should be notified (in line with Paragraph 172 of the World Heritage Operational Guidelines)?
3. Construction — Installation	• Have pre-construction and site preparation phases been included in the impact assessment? • Have construction footprints, access requirements and transmission infrastructure been analysed for physical or visual intrusions on World Heritage related attributes and OUV? • Have alternatives been proposed to reduce impacts (e.g. rerouting access roads, avoiding vegetation clearance near key features)?	• Has the monitoring of construction phase impacts against baseline conditions been ensured? • Are known cultural or natural heritage sensitivities mapped and shared with contractors to guide low-impact construction?	• Have recommendations for heritage-specific mitigation measures been identified and included in the 'Environmental and Social Management Plan', and formally adopted as part of approval conditions in the construction permit? • Have relevant authorities and the Site Manager reviewed these measures?
4. Operation	• Have the visual, acoustic and/or ecological impacts of the operational infrastructure been evaluated in relation to the attributes of the concerned World Heritage property, and its resident or transitory populations, inhabitants or users? • Are planned mitigation measures implemented and monitored, in line with an Environmental and Social Management plan? • Have use patterns for long-term use and maintenance of the site been assessed?	• Is there a monitoring framework in place for long-term assessment of impacts on the attributes of the concerned World Heritage property, and its OUV? • Have you coordinated with the Site Managers to determine if attributes of the World Heritage site will be affected during the operation phase? • Is an effective adaptive management framework in place, informed by results of monitoring?	• Are mitigation or adaptation measures related to the operation of the infrastructure enforceable under national regulations or permit conditions? • Are there procedures in the project operation management for periodic review of heritage values and attributes (including the OUV of World Heritage properties) based on monitoring outcomes?
5. Repowering Replacement Decommissioning	• If planned by the project proponent, have repowering options or decommissioning been assessed? • Have solutions been proposed to avoid or minimise disturbance during equipment replacement or removal? • Have decommissioning plans included site restoration options aligned with heritage conservation needs?	• Have you reviewed and updated baseline and attribute data for re-assessing potential impacts during repowering? Have you re-engaged with Site Managers for updated guidance related to the concerned World Heritage property?	• Are there mechanisms to require reassessment of potential impacts under revised conditions or technologies? • Are impact assessment revisions or additions submitted for significant changes to the original project design or location?
6. Recovery	• If planned by the project proponent, have you also assessed the proposed long-term landscape rehabilitation measures that restore conditions or appearance aligned with heritage values, including the attributes and OUV of the concerned World Heritage property? • Are there post-project audits to assess recovery of heritage-sensitive environments?	• Have you documented lessons learned and shared findings on impact avoidance and mitigation success with the relevant authorities and World Heritage stakeholders? • Has a final monitoring report been provided to heritage and planning authorities and archived for future reference?	• Have you ensured that proposed final recovery and closure activities comply with national and international recommendations and guidelines? • Have you encouraged the State Party to share final project outcomes with the World Heritage Centre?

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