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SHAREN

Pilot in Madaba Jordan

September 2026

Madaba pilot — six focus areas

From national heritage context and regulation to implementation, governance and expected impact.

1

National context

Historic urban areas & heritage constraints

2

Energy & legal framework

RE/EE, heritage, ESS/REC and pending storage bylaw

3

Selected ESS / REC approach

Adaptive public-sector model for Madaba

4

Beneficiaries & governance

Four-site cluster and coordination structure

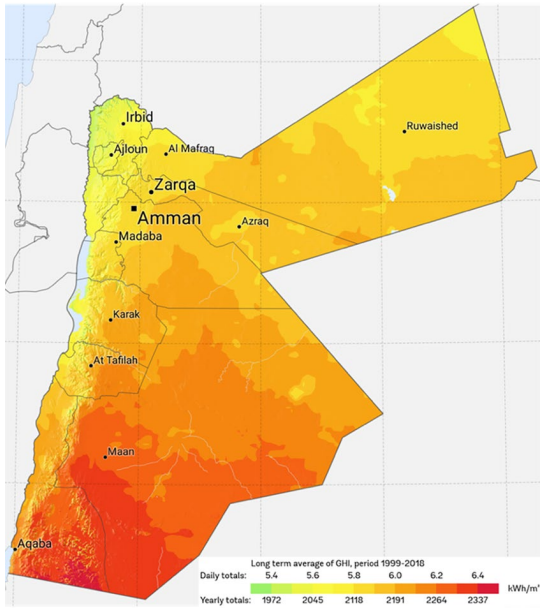
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Pilot implementation

Technical options, approvals and milestones

Jordan renewable energy sector: capacities and direction

Jordan has moved from early-stage renewables to a significant solar-and-wind contribution in the electricity mix.



Solar resource advantage

Madaba sits within Jordan's high-solar-resource context, supporting rooftop PV and distributed generation.

2,681 MW

installed renewable capacity from solar + wind projects

≈26.3%

renewables share in Jordan's electricity mix

31%

GHG-emissions reduction target in Jordan's NDC by 2030

Renewables moved from marginal to mainstream



Policy + solar resource + private-sector adoption drove a rapid expansion of PV and wind.

Renewable Energy and Energy Efficiency Law

Since 2012, Jordan's Renewable Energy and Energy Efficiency Law has established the legal foundation for the country's rapid growth in renewable energy and energy efficiency

Jordan renewable energy sector: latest official indicators

Updated national figures strengthen the case for SHAREN while highlighting the growing importance of grid flexibility and storage.

2.84 GW
Installed renewable-energy capacity on-grid • end-2024

26.3%
Renewable-energy share of total electricity generation • end-2025

40%
Renewable-energy target in electricity generation by 2035 • base scenario

96%
Smart-meter deployment • end-2025

Latest published capacity split (end-2024)

Solar PV: 2,194.8 MW • Wind: 622 MW

Storage is now a national priority

- Planned battery project: 100 MW with 4-hour storage
- Pumped-storage project: 450 MW
- Energy strategy also targets major storage deployment before 2030

What this means for SHAREN Madaba

Renewable deployment is mature
Jordan has moved from a marginal renewable contribution in 2014 to more than one-quarter of electricity generation by 2025.

Grid modernization is accelerating
Smart-meter coverage reached 96% by end-2025, supporting more advanced network management and future time-based operation.

Storage regulation is evolving
MEMR has introduced electricity-storage concepts into the legal framework and is advancing national storage projects.

Long-term ambition is higher
The 2025–2035 Energy Strategy targets 40% renewable electricity generation by 2035 under the base scenario, with a higher optimistic scenario.

Madaba can build on a strong national RE base, but project sizing and BESS must remain approval-led.

Latest official references used: MEMR 2024 capacity data; MEMR 2025 achievements; MEMR Energy Strategy 2025–2035; MEMR storage update (2026).

Jordanian framework: enabling renewable energy while adapting REC principles to existing rules

1. REC / ESS regulatory gap

Renewable Energy Communities are not yet explicitly defined in Jordanian legislation. The pilot therefore applies REC principles through available public-sector and grid-connection mechanisms.

2. Heritage conservation

Interventions on or near sensitive heritage assets require non-invasive design, low visual impact and coordination with the relevant heritage authorities and beneficiaries.

3. Energy & utility requirements

EMRC direction and JEPCO requirements shape the connection route. Capacity depends on 12-month consumption and the Grid Impact Study; a revised bylaw supporting PV storage integration is still awaited.

Current regulatory position

Proceed with a flexible grid-connected design while keeping BESS conditional until the revised storage bylaw, budget and JEPCO requirements are confirmed.

Madaba: A living historic city and a relevant Mediterranean demonstration case



Historic urban character

Madaba combines mosaics, churches, archaeological sites, tourism assets and active public services within a compact historic centre.

Energy opportunity

Strong solar resources and public buildings create an opportunity for distributed PV and shared renewable-energy benefits.

Heritage challenge

PV locations, mounting systems and associated equipment must minimize visual and physical impacts and remain compatible with heritage approvals.

The pilot is therefore a heritage-sensitive proof-of-concept, not simply a PV capacity installation.

Madaba as a heritage city

A living historic center where energy transition must protect cultural identity, archaeology and tourism value.



Visitors Center

Tourism gateway



Archaeological Park

Protected ruins



Burnt Palace

Byzantine heritage



Martyrs Church

Religious landmark

What makes Madaba a sensitive demonstration case?

- Known as the “City of Mosaics”, with Byzantine and Umayyad mosaic heritage.
- The Madaba Map and related archaeological sites create high cultural and visual sensitivity.
- Heritage tourism, religious landmarks and public services are concentrated in a compact urban center.

Sources: UNESCO Creative Cities Network; Ministry of Tourism and Antiquities / Visit Jordan; SHAREN LAP.

Heritage protection principles for PV integration

Madaba's energy transition must begin with heritage compatibility, then move to technical sizing and utility approval.

1 H

Protect heritage character

Keep Madaba's historic identity, mosaics, churches and archaeological value as the first design constraint.

2 V

Avoid visual & physical impact

Prevent direct intervention on protected assets and minimize visibility of PV panels, cables and equipment.

3 PV

Use suitable rooftops or nearby structures

Prioritize available rooftops, canopies and adjacent non-sensitive structures instead of archaeological footprints.

4 ✓

Finalize design after clear requirements

Freeze layouts only after heritage, structural, utility and grid-connection requirements are confirmed.

Design implications for the Madaba pilot

- No direct PV installation on the Archaeological Park footprint.
- Archaeological Park is treated as a linked beneficiary supplied from the Visitors Center.
- PV at Martyrs Church / Burnt Palace location must remain low-impact and approval-led.

Approval-safe design logic

✓ Heritage approval before final layout.

✓ Structural check before rooftop confirmation.

✓ JEPCO / GIS review before capacity freeze.

✓ RFP keeps flexibility for final approved design.

Key message: The pilot should be technically ambitious but approval-safe — heritage protection defines where and how PV can be integrated.

Three physical pilot locations in Madaba

Four beneficiary sites are organized across three locations. The Archaeological Park has no direct PV and is a linked beneficiary supplied from the Visitors Center under the final approved arrangement.



1 Visitors Center + restaurant

2 Archaeological Park

3 Burnt Palace + Martyrs Church



1 Madaba Visitors Center + Restaurant

PV HOST

Original preliminary PV layout. Generation host for the pilot; restaurant included within the campus.

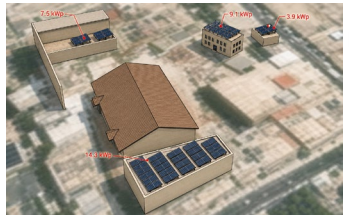
linked supply



2 Madaba Archaeological Park

NO DIRECT PV

Linked beneficiary. No PV on the protected archaeological footprint; supply linked from the Visitors Center.



3 Burnt Palace + Martyrs Church

ONE LOCATION

Two heritage beneficiaries at one physical location. Original preliminary PV layout retained for design development.

3 physical locations • 4 beneficiary sites • Archaeological Park = linked beneficiary with no direct PV

Jordan regulatory framework relevant to SHAREN Madaba

The pilot is designed around existing Jordanian mechanisms, heritage approvals and utility requirements while storage rules are still evolving.

1 Energy law

Renewable Energy & Energy Efficiency Law No. 13 of 2012, amended in 2024, provides the main legal basis for renewable-energy deployment.

2 Energy regulator

EMRC reviews licensing, applicable connection approach and regulatory compliance for the selected pilot configuration.

3 Utility interface

JEPCO confirms approved capacity, grid connection conditions and possible GIS-driven transformer/substation requirements.

4 Heritage approvals

Ministry of Tourism & Antiquities / Antiquities Directorate must clear interventions near archaeological and heritage assets.

5 Storage bylaw

PV+BESS remains conditional pending the revised bylaw expected to clarify/support storage integration, plus budget availability.

Available renewable-energy mechanisms and relevance to Madaba

1	Net Billing	Exported renewable electricity is compensated separately from grid imports.	General distributed RE mechanism
2	All-Import / All-Export	Generation and consumption are separated; all PV production is exported and supply continues through the grid.	Current preferred route for the pilot
3	Wheeling	Allows energy generated in one location to be allocated/used at another location, subject to approval and fees.	Relevant for multi-site concepts

Resulting design logic for the RFP

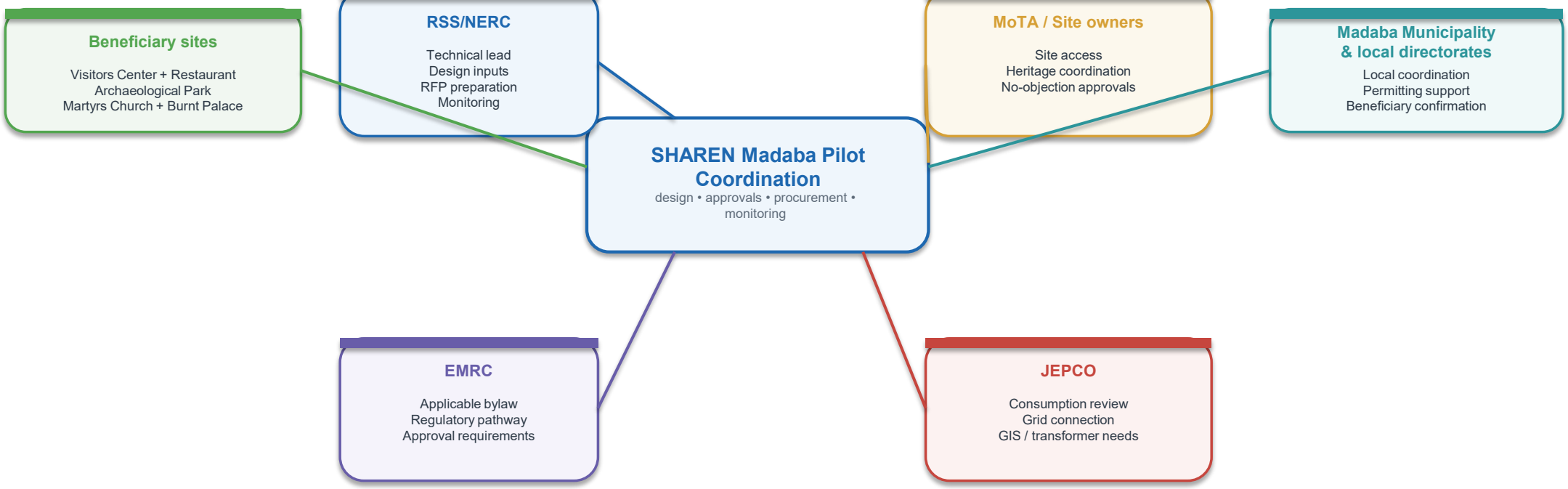
- ✓ **Keep two options: PV+BESS and PV-only.**
- ✓ **Freeze final capacity only after JEPCO consumption review and GIS.**
- ✓ **Exclude direct PV on the Archaeological Park footprint.**
- ✓ **Treat BESS as conditional until bylaw and budget clarity.**

Key message: Jordan enables renewable deployment, but Madaba needs an approval-safe REC/ESS model adapted to existing rules, utility limits and heritage protection.

Beneficiaries Engagement and Governance Structure

Clear roles, responsibilities and coordination mechanisms to keep the Madaba pilot approval-safe and implementation-ready.

Governance map



Coordination mechanism: regular technical coordination between RSS/NERC, beneficiaries, MoTA, EMRC and JEPCO, with strategic follow-up through the SHAREN partnership and Steering Committee.

Renewable Energy Community (REC) / Energy-Sharing Solution (ESS) Model

4 **Sites**
Four beneficiary sites

2 **Clusters**
Two generation clusters

All Import / All Export **Connection Mechanism**
Preferred utility mechanism

Cluster 1 — Visitors Center

Generation host

Madaba Visitors Center



- PV on the administration rooftop
- PV on adjacent canopies

Shared energy

Beneficiary sites

Loads served



- Visitors Center main load
- Restaurant within the campus
- Archaeological Park as a linked beneficiary

Key logic

Use available rooftop and canopy areas at the Visitors Center while avoiding direct PV installation on the protected archaeological footprint.

Cluster 2 — Martyrs Church

Generation host

Martyrs Church



- PV on available rooftop areas

Shared energy

Beneficiary sites

Loads served



- Martyrs Church direct load
- Burnt Palace as a linked beneficiary

Main principle

Preserve heritage character first, then integrate PV on the most suitable roof areas and keep the Burnt Palace as a protected linked beneficiary.

Technical concept: two grid-connected implementation scenarios

Technical scenarios

Option A

On-grid PV + BESS



- Preferred if legally approved.
- Storage supports flexibility and resilience.

BESS conditional on bylaw

Option B

On-grid PV without BESS



- Fallback if storage is delayed or not approved.

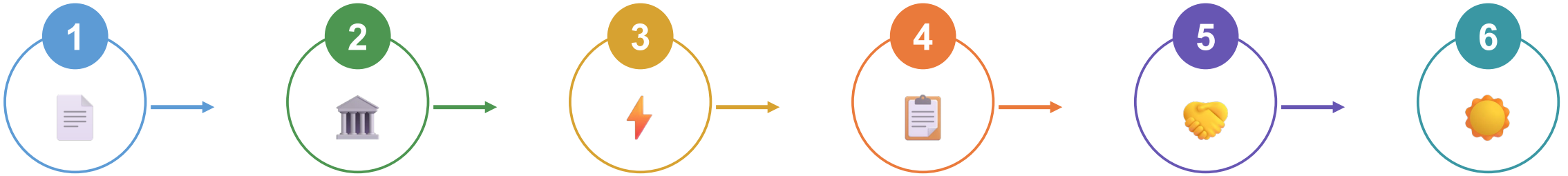
Practical All-Import / All-Export route

How the solution works

A simple flow from PV generation to approved beneficiary allocation.

1. **Generate PV energy**
   Visitors Center and Martyrs Church act as the two main generation hosts.
2. **Connect through JEPCO**
   Energy Sharing follows the All-Import / All-Export mechanism.
3. **Allocate to beneficiaries**
   Visitors Center + restaurant, Archaeological Park, Martyrs Church and Burnt Palace are served within the approved arrangement.
4. **Freeze the final design**
   Capacity, BESS scope and any transformer/substation need are confirmed after consumption review and GIS results.

Implementation pathway and key milestones



1 Local Action Plan

Identify sites, engage stakeholders and define community objectives in Madaba.

From community needs to a shared vision.

2 EMRC regulatory direction

Confirm the regulatory pathway for shared renewable energy in line with national policy.

Grid-connected options retained.

3 JEPCO technical review and GIS

Assess network capacity, connection options and suitable sites using GIS.

All-Import / All-Export.

4 Detailed design and approvals

Complete technical design, undertake environmental and social due diligence, and secure all approvals.

Capacity based on 12-month consumption.

5 Pilot RFP and procurement

Issue RFP, evaluate bids and award contract for pilot implementation.

Transparent, competitive process.

6 Installation, commissioning and monitoring

Install the system, commission and monitor performance and impacts.

One-year technical monitoring by RSS/NERC.

Key milestones



Main implementation challenges and mitigation logic

The pilot must balance heritage protection, regulatory uncertainty, utility requirements, cost and stakeholder coordination

Heritage compatibility

Treat visual impact, reversibility and site protection as design inputs from the beginning.

Governance & coordination

Maintain clear roles among beneficiaries, RSS/NERC, heritage authorities, EMRC, JEPCO and local/public stakeholders.

Regulatory & technical uncertainty

Keep PV+BESS and PV-only scenarios open until the storage bylaw, utility capacity and GIS requirements are confirmed.

Cost & replication

Use scenario-based procurement and document approvals, costs, barriers and performance so lessons can be transferred to other historic cities.

Expected contribution

Demonstrate that renewable-energy sharing can support public services and decarbonization while respecting heritage values and generating evidence for future REC frameworks.

Contribution to energy transition, heritage preservation and replication

Madaba provides a practical learning case for historic urban areas across the Mediterranean

1. Energy transition

Deploy a visible public-sector renewable-energy pilot and test shared-benefit principles using a feasible grid-connected pathway.

2. Heritage preservation

Demonstrate low-impact renewable-energy integration where design choices respond to archaeological, cultural and visual constraints.

3. Replication & policy learning

Generate practical evidence on governance, approvals, utility coordination, storage regulation and procurement for future Jordanian and Mediterranean REC models.



Main message: the value of Madaba is not only the installed kWp — it is the transferable governance, regulatory and heritage-integration learning.

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Thank you

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