

Utility-Scale Solar and Storage for Grid Resilience

A Strategic Framework for Jamaica's 2027 Energy Transition

Geordi Duncan — May 2026, Second Edition

Companion to *Rethinking Jamaica's Energy Infrastructure: A Distributed Resilience Model* (December 2025). This second edition incorporates the December 2025 to May 2026 procurement pipeline, post-Melissa grid data, and the storage technology advances that have changed what is operationally possible.



Executive Summary

Six months ago, the case for utility-scale solar and storage in Jamaica was theoretical. Today it is in procurement. SunTerra Energy has secured IDB-backed financing for a 50 MW solar park in Trelawny at US\$0.0599/kWh, with a path to 200 MW including battery storage. The Generation Procurement Entity is preparing a tender for 220 MW of new renewables paired with 110 MW / 220 MWh of lithium-ion battery storage — the largest single procurement of its kind in the English-speaking Caribbean. Jamaica Public Service has announced a US\$300 million investment programme including 133 MW of solar and 171.5 MW of battery storage to replace ageing thermal capacity at Hunts Bay. Combined, more than 500 MW of utility-scale solar and over 1 GWh of battery storage are now in advanced planning or development.

This is not the gap. This is the floor.

The argument that follows is no longer that Jamaica *should* build utility-scale solar and storage. The country has decided to. The argument is what comes next. A statutory target of 50 percent renewable energy by 2030, a hurricane corridor that demands distributed rather than centralised generation, and a 2027 licence renegotiation that will reset the rules of the electricity sector all converge on the same conclusion: the current pipeline is necessary but insufficient.

A coordinated programme of ten additional utility-scale solar plus storage sites, sequenced over five years and designed around grid sectioning capability, would complete the architecture the country needs. This document also addresses, directly, the concern raised in public dialogue that renewables "are not there when the grid needs them." That concern was defensible five years ago. It is no longer defensible against current operational evidence from grids running 60 to 75 percent instantaneous renewable penetration with grid-forming storage providing the inertia and frequency response that thermal plants used to deliver.

500+

MW Solar in Pipeline

Utility-scale solar in advanced planning or development as of May 2026

1 GWh

Battery Storage

Grid-scale storage committed across three major procurement programmes

50%

Renewable Target

Statutory target for renewable energy penetration by 2030

2027

Licence Window

JPS all-island licence expiration — the policy reset moment

Where Jamaica Stands Today

Three procurement movements in the six months between December 2025 and May 2026 have reshaped what was a policy question into an execution question. Understanding the pipeline is the precondition for understanding what remains to be built.

SunTerra Trelawny

50 MW solar park contracted at **US\$0.0599/kWh** — approximately 30 percent below the 2018 Paradise Park PPA and one fifth of the marginal cost of the thermal generators it displaces. Phase one cost: US\$56 million, of which US\$43 million is IDB blended finance. Commissioning targeted Q4 2027, aligned with the JPS licence expiration. Designed to scale to 200 MW with co-located battery storage.

Generation Procurement Entity Tender

Approximately **220 MW of new renewable capacity** paired with 110 MW / 220 MWh of lithium-iron-phosphate battery storage — the largest single co-procured renewable plus storage award in the English-speaking Caribbean. The procurement design is itself a policy statement: storage is a co-equal grid asset, not an afterthought.

JPS Hunts Bay Replacement

A **US\$300 million investment programme** covering 133 MW of new solar and 171.5 MW of battery energy storage, explicitly framing storage as a thermal replacement. This marks a significant shift in posture for the incumbent utility, which has historically positioned renewables as a constraint to be managed.

i Adding the three movements together produces approximately **503 MW of new utility-scale solar** and approximately **1.1 GWh of battery storage** in the development pipeline as of May 2026 — in addition to Paradise Park, Content Solar, Wigton and BMR wind assets, and the existing small hydro fleet. The 50 percent renewable target by 2030 is no longer aspirational. It is achievable, provided the pipeline is delivered on schedule and complemented by the additional capacity this document proposes.

The Procurement Pipeline at a Glance

The three active procurement programmes, combined with existing operational assets, establish the baseline from which the proposed programme builds.

Programme	Solar Capacity	Storage	Capital	Status
SunTerra Trelawny (Phase 1)	50 MW	TBD Phase 2	US\$56M	Financing closed; construction 2026
SunTerra Trelawny (Phase 2)	150 MW	Co-located BESS	TBD	Contingent on new licence framework
GPE Second Tranche Tender	220 MW	110 MW / 220 MWh LFP	TBD	Tender preparation underway
JPS Hunts Bay Replacement	133 MW	171.5 MW BESS	US\$300M	Announced; development stage
Paradise Park (operational)	51 MW	—	Contracted 2018	Operational (post-Melissa repair)
Content Solar (operational)	36 MW	—	—	Operational
Pipeline Total	~503 MW new	~1.1 GWh	~US\$356M+	Advanced planning / development

The Q4 2027 commissioning of SunTerra Trelawny Phase 1 aligns directly with the July 2027 expiration of the existing JPS all-island licence, giving the new licensing framework a recent, bankable benchmark for utility solar economics in the Jamaican market.

Answering the Operational Question

At the May 2026 HEDE National Resilience Dialogue Series, a senior utility executive characterised renewables as "not there yet" and "not there when the grid needs them." This concern is shared widely and deserves a direct, evidence-based response rather than dismissal. The technical objection has two components: first, that variable renewable generation cannot provide the synchronous inertia that thermal plants supply automatically; second, that intermittency makes solar and wind unreliable for grid services that require firm dispatch.

Both objections were defensible against the technology base of five years ago. Neither is defensible against the operational evidence available in 2026.

The Inertia Objection

Thermal generators provide grid stability through the rotating mass of their turbines, which absorbs and releases energy in response to frequency excursions. Modern grid-forming inverters paired with battery storage now provide synthetic inertia at faster response times than the steam turbines they are replacing.

The Hornsdale Power Reserve in South Australia — 150 MW / 194 MWh — responds to frequency excursions in **under 100 milliseconds**, compared with multi-second response times typical of thermal spinning reserve. South Australia routinely operates at 70 percent or higher instantaneous renewable penetration with no thermal spinning reserve scheduled.

The Intermittency Objection

The argument that solar and wind cannot dispatch firmly conflates the resource with the system. Unsupported solar generation is indeed intermittent. Solar generation paired with battery storage of appropriate duration is dispatchable on the same timescales as thermal generation — and faster on sub-second timescales.

Four-hour lithium-iron-phosphate batteries shift midday solar to evening peak, provide morning ramp support, and respond to contingency events within milliseconds. Jamaica's demand profile — tourism and commercial load concentrated in daylight hours, residential peak in early evening — is well-matched to solar plus storage.

Hurricane Resilience: An Architectural Answer

There is a legitimate hurricane-specific concern that deserves separate treatment from the broader intermittency argument. After Hurricane Melissa, the 51 MW Eight Rivers Solar Park sustained significant damage to its panel arrays. The objection that renewables are not there when the grid needs them — in the immediate aftermath of a Category 5 hurricane — is empirically observable rather than theoretical.

The answer to this objection is architectural, not technological. Concentrating renewable capacity in one or two large facilities creates exactly the concentration risk that Melissa exposed.

1

Distribute Capacity

Ten geographically separated sites, each engineered for Category 5 wind loads, reduce the probability that any single storm eliminates a critical share of the renewable fleet.

2

Enable Grid Sectioning

Co-located storage at each site enables isolation and independent energisation of portions of the network during emergencies — demonstrated at small scale by JPS using Maggoty Hydro in St. Elizabeth following Melissa.

3

Rebuild Faster

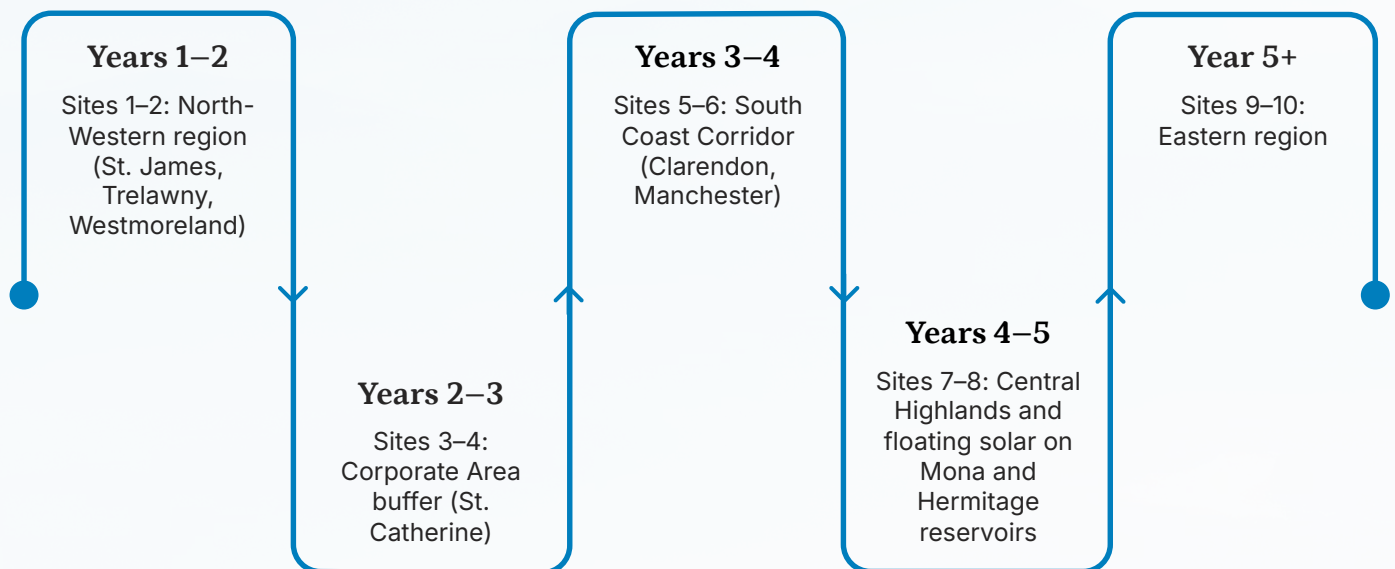
Solar arrays, properly engineered, can be reconstructed in months. Transmission backbone damage took weeks to fully restore for some western parishes after Melissa. The relative timeline argues for distributed renewable plus storage, not against it.

- ❑ JPS's use of the Maggoty Hydro facility to create a temporary microgrid in St. Elizabeth following Melissa was a small-scale demonstration of exactly this grid sectioning capability. The proposed ten-site programme institutionalises it at island scale.

The Proposal

Building on the pipeline already in motion, this document proposes a coordinated programme of ten additional utility-scale solar farms, each comparable in size to Paradise Park (51 MW), paired with co-located battery energy storage. Combined with the existing pipeline, this would bring Jamaica to approximately 1,000 MW of utility-scale solar and over 3 GWh of co-located storage by 2031.

Component	Specification
Solar Generation	10 sites × 51 MW = 510 MW total capacity
Battery Storage	10 sites × 200 MWh = 2 GWh total storage
Land Requirement	Approximately 200 acres per site (2,000 acres total)
Capital Investment	Approximately US\$1.04 billion (US\$640M solar plus US\$400M BESS)
Timeline	5 years, with 2 sites commissioned per year
Annual Generation	Approximately 850 to 900 GWh per year at 19 to 20 percent capacity factor
Implied PPA Price	US\$0.05 to US\$0.06/kWh based on SunTerra Trelawny benchmark



The programme begins in the North-West to capture post-Melissa momentum, tourism recovery, and SunTerra contractor continuity, before moving through the Corporate Area buffer, South Coast Corridor, Central Highlands, and finally the East.

Strategic Siting Principles

Site selection must optimise for grid impact, not merely land availability. Jamaica's current grid topology features a ring structure with the Corporate Area as the primary load centre, connected by 138 kV and 69 kV transmission lines that proved vulnerable to Category 5 wind loads during Hurricane Melissa.

Grid Injection Points

Each site should be located near existing substations to minimise new transmission infrastructure requirements. Priority locations include the Old Harbour to Corporate Area corridor and the western parishes where tourism load concentrates. Co-locating new generation with existing transmission assets reduces both capital cost and time to commissioning.

Sectioning Capability

The current grid's linear dependency means transmission failures cascade into widespread blackouts. Distributed utility-scale installations with storage can enable grid sectioning — the ability to isolate and independently energise portions of the network during emergencies.

Land Availability

Priority categories include government-owned lands through the National Land Agency, former bauxite company lands, sugar estate remnants in Westmoreland and Clarendon, and reservoir surfaces suitable for floating solar. Marubeni Corporation — a JPS shareholder — constructed one of the world's largest floating solar installations in Taiwan, expertise deployable on Mona and Hermitage reservoirs.

Region	Sites & Rationale
Corporate Area Buffer	2–3 sites. Serve Kingston / St. Andrew load; reduce Hunts Bay dependency.
South Coast Corridor	2–3 sites. Complement Paradise Park and SJPC; strengthen south coast backbone.
North and Western Region	2 sites. Tourism load; co-locates with SunTerra Trelawny pipeline; grid edge resilience.
Central Highlands	1–2 sites. Grid backbone; reduced hurricane exposure.
Eastern Region	1 site. Underserved grid edge; agricultural land available.

Battery Technology: The Storage Revolution Since Paradise Park

When Paradise Park was contracted in 2018, lithium-iron-phosphate cells cost roughly US\$200/kWh at the pack level, sodium-ion was a laboratory curiosity, iron-air was a venture-funded thesis, and grid-forming inverters were not yet commercially deployed at scale. By 2026 each of those conditions has changed materially. The technology specification for a Jamaican storage programme designed in 2026 should not be the technology specification of the 2018 Paradise Park PPA.



CATL TENER Stack — LFP Utility Benchmark

The 9 MWh containerised system uses 587 Ah lithium-iron-phosphate cells engineered for five years of zero capacity degradation — a meaningful improvement on the typical 2 to 3 percent annual fade of earlier-generation lithium products. Approximately 45 percent improvement in volume utilisation, 50 percent improvement in energy density, and 30 percent construction cost reduction versus prior generation. First Latin American deployment: 1 GWh in Chile. The obvious default specification for four-hour storage at each Jamaican site.



Gotion Gnascent — Sodium-Ion at Utility Scale

180 Ah sodium-ion cell with cycle life exceeding 20,000 cycles. The 5 MW / 18.8 MWh Grid Gen2 system is deployed with gigawatt-scale production capacity targeted Q4 2026. Two specific advantages for Caribbean deployment: wider operating temperature range with reduced cooling requirements (relevant in Jamaica's tropical climate), and no thermal runaway behaviour — a meaningful safety margin for storage sited in hurricane corridors.



Form Energy Iron-Air — Multi-Day Duration

Up to 100 hours of discharge duration at projected costs below US\$20/kWh. First commercial pilot operational at Cambridge Energy Storage Project in Minnesota. Xcel Energy has contracted 300 MW at the retiring Sherco coal plant. Agreements covering more than 75 GWh including 12 GWh with Crusoe and 30 GWh with Google. For Jamaica: addresses extended grid recovery from major storm events that diesel currently covers.

Completing the Storage Architecture

Lithium and sodium-ion batteries address daily cycling. Two additional technologies complete the grid services architecture that thermal retirement will leave unserved.

Vanadium Redox Flow — Long-Duration Baseload

The established long-duration option for grid stabilisation. The electrolyte does not degrade — the same vanadium stock can be reused indefinitely. Cycle life exceeds 20,000 cycles, depth of discharge can be 100 percent without lifetime impact, and the chemistry is inherently safe with no thermal runaway risk. The trade-off is upfront capital intensity and larger footprint than lithium. For specific sites where 8 to 12 hour duration is the design requirement, VRFB is the technically correct answer.

Flywheels — The Inertia Layer

The most direct functional replacement for synchronous inertia provided by thermal generators. Beacon Power's Stephentown plant provided 20 MW of frequency regulation to the New York grid for over a decade. Amber Kinetics deploys 4-hour duration flywheel systems with zero degradation over a 20-plus year design life. Response time is sub-cycle — faster than any battery technology. The strongest deployment case in Jamaica is at substations performing frequency regulation and synthetic inertia services, not at solar sites themselves.

Technology Selection for the Jamaica Programme

Use Case	Recommended Technology	Rationale
Daily cycling at solar sites	CATL TENER (LFP) or Gotion Gnascent (Na-ion)	Mass-produced, bankable, established service base; sodium-ion preferred at tropical sites for thermal and safety profile
Long-duration energy shifting (8–12 hours)	Vanadium redox flow battery	Indefinite electrolyte life, 100% DoD, inherent safety
Multi-day grid recovery	Form Energy iron-air	100-hour duration at sub-US\$20/kWh; addresses post-hurricane scenarios diesel currently covers
Synthetic inertia and frequency response	Flywheels and grid-forming inverters	Sub-cycle response, zero degradation; direct functional replacement for retiring thermal inertia

- ✓ The triple stack of solar generation, lithium or sodium storage for daily cycling, and flywheels for sub-second response is the architectural answer to the operational objection that renewables cannot replace thermal grid services.

Benefits

1 Renewable Energy Target Achievement

Jamaica's current renewable energy penetration stands at approximately 12 to 14 percent against a statutory target of 50 percent by 2030. The proposed 510 MW of new solar capacity, generating an estimated 850 to 900 GWh annually, would contribute substantially toward closing this gap.

Combined with the existing GPE pipeline (220 MW), JPS Hunts Bay programme (133 MW), SunTerra Trelawny phase one (50 MW) and existing wind and hydro assets, this programme would make the 2030 target achievable rather than aspirational.

2 Grid Stability and Reliability

The 2 GWh of distributed battery storage, combined with grid-forming inverters and a flywheel layer, provides the full suite of grid services beyond simple energy shifting: frequency regulation, fast frequency response, synthetic inertia, voltage support, and ancillary services historically provided by thermal generators. The Hornsdale operational record demonstrates that battery response is materially faster than thermal response for the contingency events that drive grid frequency excursions.

3 Hurricane Resilience Through Distribution

Ten distributed sites reduce the probability that any single storm eliminates a critical share of renewable capacity. Co-located storage enables rapid restoration of service to surrounding areas even before full transmission connectivity is restored. Centralised generation creates concentrated risk. Distributed generation with storage creates an island of grid sectioning capability around each site.

4 Fossil Fuel Import Displacement

Jamaica currently imports virtually all of its energy feedstock. Each gigawatt-hour of solar generation displaces approximately US\$80,000 to US\$100,000 in fuel imports at current LNG prices. The proposed programme could reduce annual fuel import expenditure by US\$70 to US\$90 million at full deployment, improving Jamaica's balance of payments and reducing vulnerability to global commodity price shocks.

5 Electricity Cost Reduction

The SunTerra Trelawny benchmark of US\$0.0599/kWh sets a new floor for Jamaican utility solar pricing — roughly 30 percent below the 2018 Paradise Park PPA. Against a current blended retail rate of approximately US\$0.36/kWh, the displacement value at the wholesale level is substantial. As solar plus storage displaces more expensive thermal generation in the dispatch merit order, average generation costs decline, with savings flowing to ratepayers or funding grid modernisation.

Challenges and Constraints

The programme is feasible. It is not without constraint. Each of the following challenges has a known mitigation pathway, but none should be understated.

Capital Mobilisation

US\$1.04 billion represents approximately 5 percent of Jamaica's annual GDP — a substantial investment that cannot be funded from domestic sources alone. Post-Melissa, Jamaica's debt capacity is constrained, requiring creative structuring to avoid sovereign balance sheet impact. The SunTerra Trelawny project demonstrates that the structure is feasible: special purpose vehicle, IDB blended finance, equity participation through a Caribbean-focused private equity vehicle, and a 20-year PPA providing the cash-flow basis for project debt.

Land Acquisition

Securing 2,000 acres of appropriately located land involves navigating complex land tenure issues, competing agricultural uses, community concerns, and environmental considerations. Jamaica's land administration systems can be slow, and title clarity is not universal. Early engagement with the National Land Agency and systematic site assessment should precede any financing commitment. Floating solar on reservoirs offers a partial answer.

Grid Integration Complexity

Adding 510 MW of variable renewable generation to a grid with approximately 1,000 MW of total installed capacity requires sophisticated integration planning. The existing transmission network was not designed for bidirectional power flow or high renewable penetration. Grid studies must precede each site development. The Australian Energy Market Operator has developed world-leading expertise in managing grids with 40 percent and higher renewable penetration; technical assistance partnerships could accelerate Jamaica's learning curve.

Regulatory Uncertainty

The Government's July 2025 notification that it will not renew the JPS all-island licence under existing terms creates both opportunity and uncertainty. Solar projects typically require 20-year power purchase agreements to achieve bankable economics. Until the post-2027 licence framework is clarified, investors face sovereign and regulatory risk that may require credit enhancement or government guarantees. The SunTerra Trelawny structure — phase one approval with phase two contingent on the new licence framework — is a sensible template for staging risk.

Hurricane Exposure

Distributed siting reduces concentration risk, but utility-scale solar remains vulnerable to extreme weather. Design specifications must account for Category 5 wind loads, and insurance or contingent financing mechanisms must be in place for rapid reconstruction. The Caribbean Catastrophe Risk Insurance Facility and parametric insurance products can provide rapid liquidity following storm damage. The lesson of Melissa is that Category 5 wind loads must be designed into every panel mounting, inverter housing, and battery enclosure — not retrofitted after the fact.

Financing Pathways

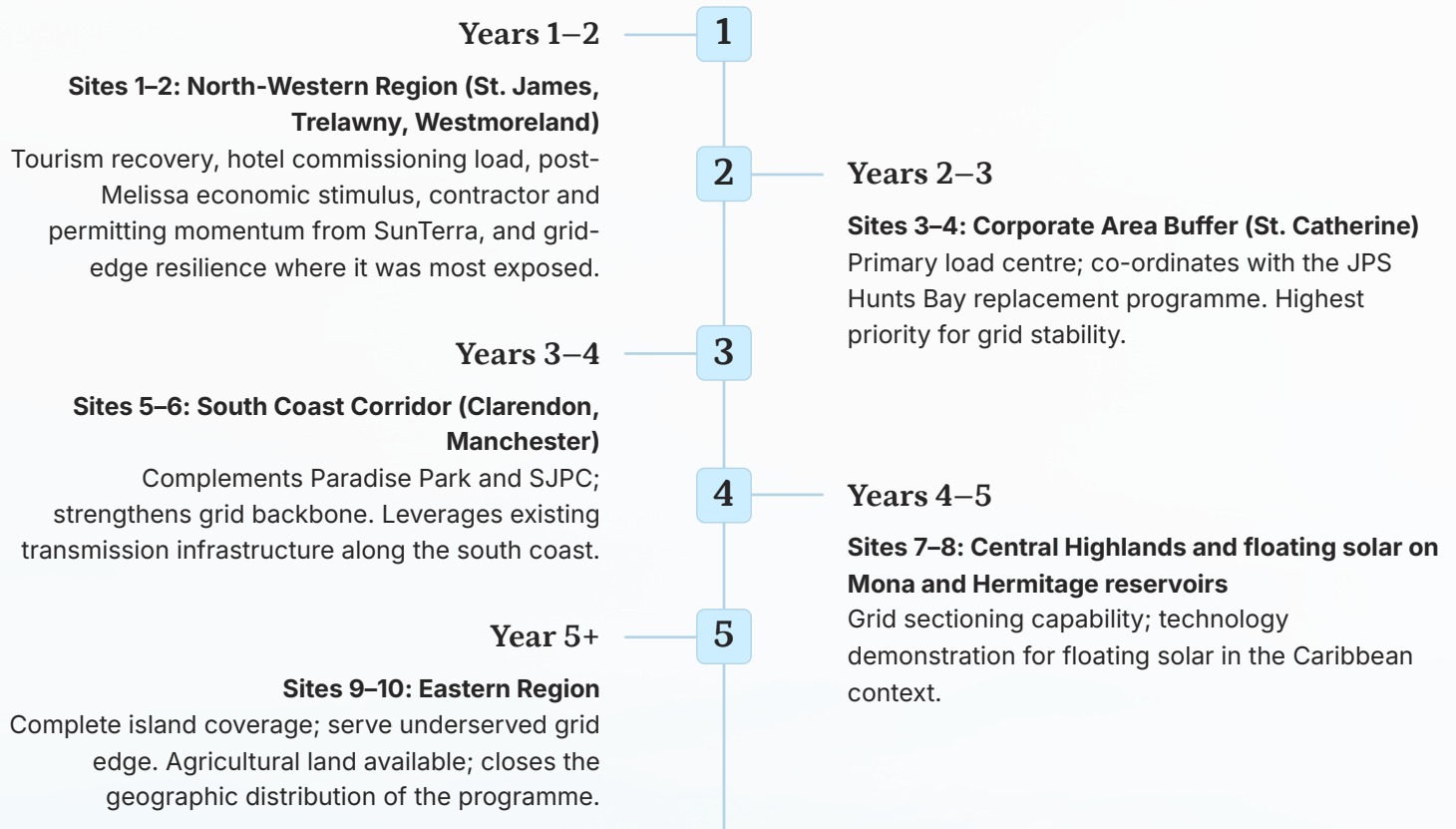
The scale of investment exceeds any single funding source. A blended capital stack combining concessional, commercial, and domestic capital offers the most viable path forward. The structure has been validated by the SunTerra Trelawny financing close, which combined IDB-backed concessional debt, blended structuring, and private equity participation through the Caribbean Venture Capital Fund.

Source	Indicative Amount	Terms and Structure
Green Climate Fund	US\$200–250M	Concessional loans (0.75 to 2 percent), 20-year tenor, grants for technical assistance
IDB Invest Blended Finance	US\$150–200M	Senior debt plus concessional tranche; 15 to 20 year tenor
Caribbean Development Bank	US\$100–150M	Concessional sovereign or quasi-sovereign lending
JSE Green Bond Plus	US\$200–250M	Multiple tranches; J\$ and US\$ denominated; 10 to 15 year tenor
JICA Co-financing	US\$100–150M	Concessional yen loans via IDB framework
Commercial / Sponsor Equity	US\$100–150M	IPP developers, infrastructure funds, regional private equity, JPS participation

- ✔ Jamaica's December 2025 agreement securing **US\$6.7 billion** in post-Hurricane Melissa recovery financing from multilateral partners demonstrates that capital access at scale is achievable. The JSE Green Bond Plus platform, launched in January 2025 with IDB Invest support, provides a domestic channel for green financing that did not previously exist. These developments create a more favourable environment for the proposed programme than would have existed even twelve months ago.

Implementation Sequencing

Two sites per year, sequenced to begin in the North-West to capture post-Melissa momentum and SunTerra contractor continuity, before moving to the Corporate Area buffer, South Coast, Central Highlands, and finally the East. The sequencing assumes that the SunTerra Trelawny project, GPE second tranche, and JPS Hunts Bay programme proceed in parallel.



CORPORATE AREA BUFFER
2-3 SITES

SOUTH COAST CORRIDOR
2-3 SITES

NORTH AND WESTERN REGION
2 SITES

CENTRAL HIGHLANDS
1-2 SITES

EASTERN REGION
1 SITE

PROGRAMME OVERVIEW
5-YEAR DELIVERING
510 MW SOLAR
2 GWh STORAGE

Conclusion

This document was first drafted in January 2026 as a companion to *Rethinking Jamaica's Energy Infrastructure*. In the months since, the policy environment has shifted in important ways. SunTerra Trelawny moved from announcement to financing close. The Generation Procurement Entity prepared a co-procurement tender of unprecedented scale for the region. JPS announced a US\$300 million programme that, for the first time, framed battery storage as a thermal replacement rather than a renewable accommodation.

What has not changed is the scale of the gap. The 50 percent renewable target by 2030 requires more capacity than the current pipeline will deliver. The hurricane resilience the country needs requires distribution that the current pipeline does not yet build. The grid services that thermal retirement will leave unserved require a storage and inertia architecture that the current pipeline has not yet designed.

The objection raised in public dialogue — that renewables are not there when the grid needs them — was a defensible 2019 statement. It is not a defensible 2026 statement.

Hornsedale, the AEMO operational record, South Australia's instantaneous penetration data, Beacon Power's decade of frequency regulation service, the Cambridge Energy Storage Project commissioning, and the CATL TENER deployment in Chile all describe a technology base where solar plus storage plus flywheels delivers the grid services thermal plants used to deliver — faster, more cleanly, and at lower lifetime cost. The question is not whether the technology works. The question is whether Jamaica builds the architecture that takes advantage of it.

Policy Window

The 2027 licence renegotiation creates a once-in-a-generation opportunity to reset the rules of the electricity sector around a renewable-first architecture.

Political Will

Post-Melissa reconstruction has created the political conditions for infrastructure investment at a scale that would have been difficult to mobilise in normal circumstances.

Capital Pathways

The JSE Green Bond Plus platform, US\$6.7 billion in multilateral recovery financing, and the SunTerra Trelawny precedent demonstrate that the financing structure is bankable.

Mature Technology

CATL, Gotion, Form Energy, and flywheel deployments globally demonstrate that the technology specification is mature, commercially available, and bankable through established multilateral frameworks.

The remaining question is institutional. Whether Jamaica's ministries, regulators, utility, and procurement bodies can sequence ten additional projects across five years — building on the three currently in motion — is a question of execution rather than feasibility. The answer to that question will be written by the OUR, the GPE, JPS, the Ministry of Science, Energy, Telecommunications and Transport, and the multilateral partners who have signalled willingness to underwrite the transition. This document is offered as a strategic framework for that work.

Comments and feedback: geordiduncan@gmail.com

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About This Document

Purpose and Scope

This document is a policy brief prepared for an energy-sector and multilateral-development audience. It is the second edition of a strategic framework first circulated in January 2026, updated to incorporate the December 2025 to May 2026 procurement pipeline, post-Melissa grid data, and advances in storage technology that have materially changed what is operationally possible in the Jamaican context.

The document does not constitute investment advice, legal opinion, or regulatory guidance. It is offered as an analytical framework to inform the institutional deliberations that will shape Jamaica's energy transition in the period leading to and following the 2027 licence renegotiation.

Author

Geordi Duncan is the author of *Rethinking Jamaica's Energy Infrastructure: A Distributed Resilience Model* (December 2025), of which this document is a companion and second edition. Comments, corrections, and feedback are welcomed at geordiduncan@gmail.com.

Key Dates

- **December 2025** — First edition published; SunTerra Trelawny announced
- **January 2025** — JSE Green Bond Plus platform launched
- **February 2026** — SunTerra IDB financing expected to close
- **May 2026** — HEDE National Resilience Dialogue; second edition published
- **Q4 2027** — SunTerra Trelawny Phase 1 commissioning target
- **July 2027** — JPS all-island licence expiration
- **2030** — Statutory 50% renewable energy target
- **2031** — Proposed programme full deployment