Draft policy brief on accelerating the deployment of energy storage to advance clean energy transition: TEC/2026/33/4

UN environment programme | CTCN UN Climate Technology Centre & Network

6. Policy and regulatory frameworks

Technology cost reductions will not be sufficient to scale storage. Policymakers and regulators are encouraged to provide the frameworks that **recognise storage as a multifunctional resource**, **enable operators to provide, and be paid for, system services**, and **create predictable routes from planning to investment.**

6.1. Establishing enabling conditions

Many electricity laws were designed around **a centralised, one-way system of generators, networks and consumers**, and were finetuned during decades, while the rapidly changing power system contexts demand regulatory evolution at a challenging speed. **Storage can act as load when charging, supply when discharging and, in some cases, a network or consumer-side resource and a provider of ancillary services for power stability**. This makes it challenging to get the right policy and regulatory approach in place to **enable storage operators to play the most beneficial role they possibly can in a given energy system**. If storage is forced into only one category of operation, projects may face duplicative licensing, inappropriate charges or restrictions on ownership. Flexible, adapted legal frameworks are therefore needed to **recognise this multifunctional role and clarify the treatment of stand-alone, co-located, behind-the-meter and network-owned assets.**

6.1. Establishing enabling conditions

Clear institutional responsibilities are equally important. **Ministries, regulators and system operators can be optimized with well-defined roles in planning, procurement and market participation, while safety and environmental authorities need the mandate and capability to oversee installation and end of life**. Where regulated network companies own storage, safeguards should prevent discriminatory dispatch or crowding out of competitive services.

Integrated planning allows **the identification of the system needs before a solution is specified**. **Technology-neutral assessments** can compare storage with **network reinforcement, interconnection and demand response while recognising that location and timescale shape value**. **Scenario analysis** can be used to address uncertainty in demand growth, renewable deployment and fuel prices. Procurement can then translate the identified need into measurable requirements for response, duration, availability and location.

6.1. Establishing enabling conditions

Planning also benefits from being iterative. **Storage economics** can change as **equipment costs fall, ancillary-service markets saturate and renewable penetration rises**. **Periodic flexibility assessments** can reveal these changes and reduce the risk of procuring too much of one service while another remains unmet. They can also show where **better forecasting, shorter dispatch intervals or improved system operation provide lower-cost flexibility** before new infrastructure is built.

A national target that is not spatially resolved may encourage **projects where connection is easiest rather than where value is highest.** Locational signals or targeted tenders can direct assets towards **constrained substations, renewable-rich zones or areas with reliability needs**. This is especially relevant in distribution systems, where charging from electric vehicles and cooling loads can create local peaks before they appear as a national adequacy problem.

6.2. Symptoms of slow storage deployment

Storage deployment may remain slow even where technology costs are falling and policy interest is growing. The underlying constraint is often **not a single regulatory gap**, but the accumulation of barriers across the project-development chain. These barriers become visible through three broad groups of symptoms: **institutional and administrative uncertainty, difficulty capturing market value**, and **limitations in implementation capacity and inclusion**.

Institutional and administrative symptoms include ambiguous legal classification, fragmented mandates and lengthy permitting and connection procedures. Because storage can act as load, generation, network infrastructure and a provider of system services, it may not fit comfortably within regulatory categories developed for a more conventional power system. Different authorities may consequently apply different requirements or interpret responsibilities inconsistently. Developers can face overlapping approvals, sequential procedures and uncertainty over ownership, operation and end-of-life obligations. Limited capacity among permitting authorities, inspectors and emergency services can add further uncertainty, particularly where technologies and associated safety risks are evolving rapidly.

6.2. Symptoms of slow storage deployment

Market and revenue symptoms arise when **the services storage can technically provide do not translate into accessible and predictable revenues**. Participation rules may **exclude storage from certain energy, balancing, ancillary-service or capacity arrangements, or prevent smaller and distributed resources from participating through aggregation**. Storage may also face **network charges, taxes or levies when electricity is both withdrawn and reinjected**, increasing costs in ways that do not always correspond to its actual use of the system.

Weak temporal and locational signals can further obscure the value of charging during periods of abundant renewable generation, discharging during scarcity or locating storage in constrained parts of the network. Even where participation is possible, projects may depend on **volatile energy-price differences or relatively small ancillary-service markets**. Revenues can therefore decline as markets saturate or remain too uncertain to support long-term financing. This creates **a recurring gap between the value storage may provide to the power system and the revenue an individual project can capture**.

6.2. Symptoms of slow storage deployment

Capability and inclusion symptoms are particularly visible where **storage markets, institutions and project pipelines are at an early stage**. **Limited system data and modelling** may prevent planners from identifying the location, duration and response characteristics of the flexibility required. Procurement processes may consequently rely on **incomplete specifications, unclear allocation of risks or capacity targets** that do not adequately reflect operational performance. Developers and financiers then **face additional due diligence, contract negotiation and project-preparation costs.**

These transaction costs weigh most heavily on smaller projects, distributed applications and countries with limited deployment pipelines. The effects can extend to **consumers**. High upfront costs may restrict access to behind-the-meter storage, while tariff structures may transfer a greater share of network costs to users unable to invest in their own assets. **In mini-grid and off-grid contexts, projects with high social and development value may remain commercially unviable where consumers cannot support full cost recovery.** Storage deployment can therefore increase without its reliability, affordability and resilience benefits being distributed equitably.

6.2. Symptoms of slow storage deployment

The symptoms frequently reinforce one another.
Regulatory uncertainty increases project-development costs; connection delays postpone revenue; weak market signals reduce financing prospects; and limited institutional capacity slows the resolution of each problem.

The result can be a technically viable project that cannot progress, or a socially valuable application that does not meet conventional investment criteria.

The following subsections examine these barriers in their respective regulatory and market contexts before drawing out principles that can be adapted across different power-system structures.

6.3. Connection, permitting and charging rules

Administrative conditions can be as consequential as technology costs. In the United States, **2 061 GW** of generation and storage was actively seeking transmission interconnection at the end of 2025, including about **749 GW of storage**. The queue declined by 10% during 2025, but **the median time from request to commercial operation exceeded five years** for projects completed that year. Most queued projects will not be built, yet the figures show **why transparent studies, firm milestones and co-ordinated network planning matter.** (Lawrence Berkeley National Laboratory, Queued Up: 2026 Edition).

Connection reform should **standardise data requirements, publish timelines and costs, manage speculative applications and treat hybrid renewable-storage projects efficiently**.

Permitting should be streamlined without weakening environmental and community safeguards. Procedures must also reflect **technology differences: pumped-storage hydropower has longer development periods and broader environmental interfaces than modular batteries**, while **thermal storage may fall under building and heat-planning rules.**

Connection agreements should **not impose network charges on storage operators both for the charge and discharge of their assets**. **Network tariffs, taxes and levies should reflect cost causation, losses and congestion**. Reform should nonetheless protect vulnerable consumers to prevent that exemptions could shift network costs onto users who cannot invest in distributed energy resources.

6.4. Safety, quality and lifecycle governance

Safety frameworks should cover **the full project chain, from product certification and commissioning to emergency response and end-of-life collection**. **Internationally compatible standards** can reduce costs, but standards alone do not ensure safe deployment. **Competent inspectors, trained operators and co-ordination with emergency services** are needed to translate technical requirements into practice. Lifecycle rules should encourage repair, repurposing and recycling and assign responsibility for decommissioning.

A risk-based approach can be preferable to blanket restrictions. Requirements can reflect chemistry, system size, siting and exposure rather than treating all installations alike.

Early engagement with local authorities and communities can address concerns over **fire safety and land use while avoiding inconsistent rules that delay sound projects**.

Standardised permit packages can reduce burden for mature technologies; **monitored demonstrations** can build the evidence needed to regulate emerging solutions.

6.5. Design markets around services and system value

Storage will be deployed where market and procurement arrangements reveal its value and offer sufficient revenue certainty.

Assets should be eligible, directly or through aggregation, to participate in energy, balancing and capacity arrangements whenever technically capable.

Performance-based requirements allow technologies to compete while ensuring that the procured response and availability meet the system need.

FERC Order No. 841 provides an influential example. It required US regional market operators to establish participation models allowing electric storage to provide all capacity, energy and ancillary services for which it is technically capable, and to be dispatched as both a wholesale buyer and seller. (US Federal Energy Regulatory Commission, Order No. 841).

UN environment programme | CTCN UN Climate Technology Centre & Network

6.5. Design markets around services and system value

Rules could permit value stacking across compatible services, with clear metering and settlement to avoid double counting. **Temporal and locational signals tend to improve charging and siting decisions**. Where sophisticated wholesale markets do not exist, tenders or regulated contracts can approximate these signals.

The objective does not need to aim at reproducing a market model from another jurisdiction, but **at favouring that the services identified in planning have a credible buyer and payment mechanism.**

Short-term energy and balancing revenues may be too volatile to finance capital-intensive or longer-duration assets. Competitive tenders, availability payments or cap-and-floor arrangements may be appropriate depending on market maturity. Support could **remunerate verified performance, preserve competition and be reviewed as the system evolves.** Otherwise, **temporary support** can become detached from the underlying need.

The EU electricity-market reform illustrates the move towards **system-wide flexibility planning**. Regulation (EU) 2024/1747 establishes **national flexibility-needs assessments and indicative objectives for non-fossil flexibility, including storage and demand response**. It links planning evidence with **the possible design of support schemes rather than treating storage targets in isolation**. (Regulation (EU) 2024/1747).

6.5. Design markets around services and system value

Distributed assets bring another layer of market design. **Aggregators can combine household batteries, electric vehicles and flexible loads into a resource** large enough to serve the system, but participation requires **proportionate metering, data access and settlement**. **Consumer consent and cybersecurity are essential**. Without **co-ordination**, the technical flexibility of distributed assets remains fragmented and may instead increase local peaks through simultaneous charging.

Decarbonisation outcomes should remain visible. Arbitrage based only on price does not always align with emissions or network needs. **Better temporal signals and information on congestion and the generation mix** can improve operating decisions. **Support schemes** should **avoid rewarding cycling for its own sake** and **assess whether storage reduces curtailment, displaces high-emitting generation or provides a defined reliability service**.

6.6. Systemic innovation for storage deployment

Experience across different power systems points to a small number of principles that are more transferable than individual and specific policy instruments:

1. **Governments should plan for the flexibility service before choosing the technology.**
2. **Market and procurement arrangements should allow technically capable assets to combine compatible revenues, while providing longer-term certainty where short-term markets cannot remunerate adequacy or resilience.**
3. **Storage policy should be developed alongside grid, renewable-energy and electrification planning rather than as a separate capacity programme.**

Implementation also matters. **Connection rules, licensing and safety requirements** need to be clear enough for projects to progress without weakening public safeguards. **Distributed resources should be able to participate through aggregation under proportionate data and consumer-protection rules**. Finally, policy frameworks should address **sustainability and inclusion from the outset**, because **retrofitting recycling obligations, workforce capability or access provisions after deployment has scaled is likely to be more costly and less effective.**

These principles do not imply a single market model. **Vertically integrated systems may rely more heavily on integrated resource planning and competitive procurement**, whereas **liberalised markets may use price signals and service markets. The common test is whether the framework identifies a genuine system requirement, creates a credible route to recover efficient costs and assigns responsibility for delivery.**

7. Country contexts and development priorities

In developing countries, storage is more than an integration technology. It can **expand access, reduce imported-fuel dependence, improve essential services and strengthen resilience**. Yet **high financing costs, weak utilities and small project sizes** can prevent projects with **high social value from becoming financially viable**.

7.1. Start from diverse country and system contexts

There is no single developing-country storage pathway. Priorities differ among rapidly growing interconnected systems, capacity-constrained grids, Small Island Developing States and remote communities. Some systems need **utility-scale flexibility to integrate solar and wind**; others need **decentralised storage to provide a basic level of reliable service**. **Policy design should begin with local demand, grid conditions, institutional capability and development priorities.**

This diversity affects technology choice and policy sequence.

In a growing interconnected system, the first priority may be **operational data and competitive procurement for balancing**. In a remote diesel system, the relevant comparison is **the full delivered cost of fuel**, including transport and volatility. In a fragile setting, **modularity, ease of maintenance and the ability to power a clinic or water system during disruption** may matter more than maximising market revenue. These objectives should be explicit before projects are selected.

7.2. Expand access through reliable energy services

Renewable mini-grids and stand-alone systems combined with storage can extend service beyond the main grid, shift solar electricity into evening hours and reduce diesel consumption. **System sizing should reflect current and expected demand, including productive uses**, rather than present household consumption alone. **Storage that is oversized relative to demand** can raise tariffs and replacement costs without improving long-term viability.

The objective is reliable energy services, not battery deployment in itself. Storage-enabled electricity can support medical equipment, water pumping and agricultural processing. These uses improve welfare and can create anchor loads that strengthen revenue. In energy-access settings, **the most effective intervention is rarely a storage asset in isolation**. Storage creates greater development value when combined with **efficient appliances, productive-use equipment and a delivery model adapted to local income and demand**. For example, **a solar-storage system may improve electricity availability, but pairing it with cold storage, water pumping or agricultural processing can also strengthen livelihoods and increase asset utilisation.**

7.2. Expand access through reliable energy services

Mini-grids are a great example of the value of this integration, as by using storage entire communities are enabled to rely mostly on renewable energy. **Renewable-based mini-grids, and solar PV mini-grids** in particular, could **provide electricity access to as many as half a billion people worldwide**, the scale required to help achieve Sustainable Development Goal 7 (ESMAP, 2022).

Realizing this potential, in developing countries depends on the reliability that battery storage brings, allowing **solar generation to be delivered as a round-the-clock service** rather than an intermittent one. This ensures essential services that rural development deepens on are powered reliably.

IRENA's forthcoming assessment of **solar PV mini-grids with battery storage in selected West African counties** finds that **decentralized renewables must work alongside grid extension to close the access gaps**. However, access is **progressive process where communities move from stand-alone systems to mini-grids and eventually national grid as they incomes and demand grow**.

Storage-enabled mini-grids provide the dependable, scalable step that sustains this trajectory, and are therefore best planned **as one step in a longer electrification process rather than as permanent, stand-alone asset.**

7.2. Expand access through reliable energy services

When planning and regulating them, however, it is recommended that **the eventual arrival of the national grid is anticipated to maximise synergies**. **Interconnection, asset compensation or transition to a distribution franchise should be addressed in advance**. **Technical standards** should enable interoperability, while **tariffs and concessions should balance affordability, service quality and battery replacement**.
Public support is likely to remain necessary where social benefits are high but commercial demand is limited.

Quality assurance is central to sustainability.
Certification, warranties, monitoring and clear responsibility for end-of-life collection can reduce stranded assets. **Local technician training** should be part of infrastructure delivery.
In weak-grid areas, community or public-facility storage may support critical loads more efficiently than separate household systems, although **targeted grid reinforcement** should remain part of **the comparison**.

7.2. Expand access through reliable energy services

Quality infrastructure also affects finance.
Standardised testing and certification reduce uncertainty over performance and replacement, making **operating-cost and revenue assumptions** more credible to lenders.
IRENA has found that **inadequate quality infrastructure** can lead to failed investments and lost production, while **stronger standards and monitoring** can lower risk and support market development.
Requirements should mature with the market without **excluding smaller developers through disproportionate compliance costs**. (IRENA, Quality Infrastructure for Smart Mini-grids, 2020).

Blended finance and other de-risking instruments will be instrumental in overcoming the high upfront capital and the elevated cost of capital that constrain mini-grid and storage deployment in many developing markets.
The volume of battery storage required to meet access ambition open opportunity in developing region to move **from exporting raw mineral towards local manufacturing of high value-added battery components**.
Smart local content strategies, supported by regional co-operation, can **reduce foreign-exchange risk, create jobs and lower system costs as the domestic market matures**.

7.3. Deploy storage beyond mini-grids: rural and off-grid applications

The role of storage in rural electrification extends beyond mini-grids. **Solar home systems, stand-alone systems for public facilities and dedicated installations for productive uses** can provide reliable services where grid extension or a larger mini-grid is not yet viable.

Stand-alone solar systems also serve as a back-up solution in weak-grid zones, where frequent or lengthy outages and voltage fluctuations undermine an existing connection.

Around 775 million people were connected to such unreliable grids in 2020, a figure projected to approach **one billion by 2030**, and **an estimated 186 million are expected to use off-grid solar to complement a weak grid (ESMAP et al., 2022)**.

The relevant design question is the service required and the least-cost way of providing it.

In a household system, this may be evening lighting and communications; in **a clinic or school, reliability and continuity may be more important than daily energy volume.**

7.3. Deploy storage beyond mini-grids: rural and off-grid applications

IRENA's off-grid work emphasises **the need to combine enabling policy, suitable finance and viable business models rather than treating equipment delivery as the end point**.
Storage can also **support telecommunications, water pumping and cold chains, linking electricity access with local economic activity**. IRENA estimates that **global off-grid renewable power capacity reached 11.1 GW by the end of 2024**, nearly twice its 2015 level. The statistics cover uses ranging from solar home systems to rural schools, clinics and remote commercial facilities, illustrating the diversity of applications that policy and quality frameworks need to accommodate. (IRENA, Off-grid Renewable Energy Statistics 2025).
Because stand-alone systems place large volumes of small batteries, safe end-of-life management and extended producer responsibility are especially important to prevent **an e-waste burden as deployment scales** .

For productive uses, storage should be sized together with the load and the renewable resource. Cold storage, irrigation and processing equipment can improve livelihoods and raise asset utilisation, but they may also require complementary finance for appliances and enterprise development.
An access programme that finances generation and batteries **without addressing demand, maintenance and replacement risks leaving technically sound systems economically fragile.**

7.4. Make affordability, equity and resilience explicit

Lower system cost does not automatically mean affordable service. **Regulation determines whether fuel savings, avoided outages or deferred investment reach consumers**. **Procurement** should consider **lifecycle cost, efficiency and degradation rather than initial price alone**. **Pay-as-you-go finance, leasing and storage-as-a-service** can reduce upfront barriers, but support must **preserve maintenance and replacement funding.**

Affordability and utility sustainability must be considered together. **Very low tariffs** may protect consumers in the short term but leave no provision for replacement, while **full cost recovery** may be beyond the means of low-income users. **Transparent public support** can bridge this gap where storage provides wider benefits, such as **avoided diesel subsidies or reliable health services**. **The question is not whether support exists, but whether it is targeted, fiscally durable and linked to service quality**.

Equity also requires attention to who invests and who pays for shared infrastructure. **Wealthier grid customers may install batteries and reduce purchases**, shifting network costs to those unable to do so. **Tariff reform** should reward useful flexibility while maintaining fair contributions to the grid. **Public programmes** can prioritise hospitals, schools and water systems; **community-scale assets may distribute benefits more widely than individual subsidies**.

Projects should **engage communities in needs assessment, siting and benefit sharing**. Local value creation should be grounded in realistic capabilities. **Installation, controls, operations, maintenance and recycling** may offer earlier opportunities than **cell manufacturing**. **Skills strategies** should include **local enterprises and groups under-represented in the energy workforce**.

7.4. Make affordability, equity and resilience explicit

The storage impulse should also be assessed **through its implications for employment and skills development**. While **battery manufacturing** can provide strategic industrial opportunities in selected countries, a broader set of employment opportunities is likely to **emerge across project development, engineering services, installation, software and controls, operations and maintenance, battery repurposing and recycling**.
Workforce-development strategies should therefore focus on **building capabilities across the entire storage value chain rather than concentrating exclusively on manufacturing activities**.
Such an approach is likely to produce more geographically distributed economic benefits while supporting long-term market development. (IRENA and ILO, Renewable Energy and Jobs: Annual Review 2025, 2026)

For SIDS and other climate-vulnerable settings, **decentralised renewables with storage can reduce fuel exposure and maintain essential services during disruption**. IRENA's analysis of least-electrified SIDS highlights the **economic, health and well-being gains of decentralised solutions and the importance of customised capacity building and results-based finance**. Resilience still needs to be **designed through critical-load definitions, islanding capability and climate-appropriate siting**. (IRENA, Small Island Developing States at a Crossroads, 2024).

7.5. Align climate finance with project and market realities

Translating sustainable-development objectives into investable projects requires **financing frameworks that address the specific risk, scale and revenue characteristics of storage in developing-country settings**.

The challenge, however, is not simply a shortage of capital. The financing challenge is not only a shortage of capital. **It is a mismatch between project risk, scale and revenue and the requirements of commercial finance**. **Currency and regulatory risk, weak off-takers demand and limited operating history raise the cost of capital**. Storage may also create value for utilities, consumers and the wider economy without one actor being able to pay for the whole benefit.

Small mini-grid and public-facility projects face high transaction costs. **Standard specifications and portfolio aggregation** can create investable scale. Equally important is **early-stage preparation**: **demand data, feasibility studies, environmental assessment and bankable contracts**. **Grants and project-preparation facilities can therefore be as catalytic as construction finance.**

Public finance remains essential where markets do not serve last-mile communities. IRENA estimates that about **USD 30 billion per year** is required **between 2021 and 2030 for grid, mini-grid and stand-alone renewable generation and associated networks to reach universal electricity access**. **Public resources can bridge affordability gaps, strengthen the enabling ecosystem and de-risk private capital.** (IRENA, Public Finance for Universal Energy Access, 2024).

7.5. Align climate finance with project and market realities

MDBs and climate funds should deploy concessional resources against defined barriers. **Guarantees, subordinated debt and local-currency finance** can address risks commercial financiers cannot reasonably absorb. **Results-based disbursement can reward verified reliability rather than equipment installation**. **Demonstration support** should include monitoring and dissemination so that early projects establish a track record for replication.

Finance also needs to strengthen utilities and institutions. **Payment security, procurement quality and operational capability** can be more decisive than project-level subsidies. **Public finance** should crowd in private capital where possible, **with transparency on concessionality and additionality**, and should be reviewed as markets mature.
The wider financing landscape shows why concessionality matters.

Global energy-transition investment reached **USD 2.4 trillion** in 2024, but remained concentrated in **advanced economies and China.** Renewable-energy investment reached **USD 807 billion**, while **grants accounted for less than 1% of transition finance**. In many developing countries, **market-rate debt can raise tariffs or public liabilities even as technology costs fall. Low-cost debt and grants** should target **public goods that commercial capital will not finance**, including **early-stage preparation, institutional capacity and access for low-income users.** (IRENA and CPI, Global Landscape of Energy Transition Finance 2025).

7.5. Align climate finance with project and market realities

Currency risk deserves particular attention **because projects generally earn local-currency revenue while equipment investment costs and debt may be denominated in foreign currency**.

Local-currency lending, hedging and guarantees can prevent exchange-rate movements from overwhelming sound project economics.

Portfolio aggregation can then diversify risk and reduce due-diligence costs, provided **common contracts do not erase important differences in local demand and operating conditions.**

7.6. Treat technology transfer as capability development

Technology transfer extends beyond hardware. It includes **system design, controls, installation, maintenance, safety, testing and recycling**. Capacity is required across ministries, regulators, utilities, financiers and the local workforce, with content tailored to each function. A regulator assessing stacked revenues needs different expertise from a technician maintaining a remote mini-grid.

Country ownership is strongest when training is linked to real planning, procurement and project development. **Long-term institutional partnerships, regional centres and South-South cooperation** can support **shared standards and specialist expertise**.

Open load data, resource assessments and transparent modelling can improve preparation and allow countries to define their own needs rather than rely only on vendor proposals.

Capability development should be judged by institutional practice rather than workshops delivered. Useful indicators include whether **a utility can specify performance in a tender**, whether **a regulator can assess competing value streams** and whether **local technicians can diagnose and safely repair equipment**.

Regional power pools and development banks can help **smaller markets share testing facilities, model documentation and scarce expertise**.

7.7. Embrace capacity building as enabling "infrastructure"

Human and institutional capabilities are as important as the physical asset. **Storage decisions** cut across **power-system planning, network operation, regulation, procurement, finance and safety**. A one-off training course cannot substitute for **institutions that can update models, evaluate tenders and oversee projects** throughout their operating lives. Capacity-building programmes should therefore be **anchored in national processes and designed around the decisions that institutions are expected to make**.

Planning capability is especially important because **storage needs change with renewable deployment, demand and network development.**

IRENA's approach combines tools and training with hands-on support for national teams, placing country ownership at the centre of the planning process. The same principle can be applied to regulators and utilities: practical work on actual tariff reviews, connection studies or procurement documents is more likely to leave durable capability than generic instruction. (IRENA, Capacity Building for Energy Planning and Modelling).

Regional institutions can help countries share scarce expertise. **Power pools, standards bodies and development banks** can support **common technical requirements, model contracts and specialist training**, while **national institutions** retain **responsibility for decisions**. This can lower costs for smaller markets and improve interoperability without imposing a single technology pathway.

7.8. Strengthen storage in NDCs and national energy planning

Despite the growing recognition of energy storage as a critical enabler of the energy transition, storage remains underrepresented in many climate and energy planning processes. While a growing number of countries reference storage in Nationally Determined Contributions (NDCs), Long-Term Low-Emission Development Strategies (LT-LEDS), Technology Needs Assessments (TNAs) and national energy plans, these references are **often qualitative and are rarely accompanied by quantified deployment targets, flexibility assessments or investment roadmaps**.

As renewable penetration increases, countries will increasingly benefit from moving beyond general commitments towards **more structured approaches that identify system flexibility needs and assess the potential contribution of storage alongside grids, demand response and other flexibility resources**. This can help ensure that **storage deployment is grounded in system requirements rather than technology-specific ambitions.**

Storage can be integrated into **NDC implementation plans, electricity-sector master plans, grid-development strategies and electrification programmes**. **Linking storage needs to investment planning and project pipelines** can improve **policy credibility and facilitate access to international finance**. In this context, storage planning should be viewed not as a separate exercise, but as **an integral element of broader energy-transition planning.**