Two Transition Pathways for Thailand

Policy priorities for solar-system readiness and electric vehicle (EV) capability building

Based on Collaborative Regional Capacity Building Workshop

"Driving Clean Energy Innovation: Strategic Policy Pathways and Market Integration in Thailand and Beyond,"

Institute for Environment and Sustainability (IES), Lee Kuan Yew School of Public Policy, National University of Singapore and Energy Research Institute (ERI), Chulalongkorn University

21 July 2026, Bangkok

Executive Overview

Thailand's low-carbon transition is entering a new phase in both the electricity and transport sectors. In solar photovoltaic (PV), on-grid capacity reached approximately 12.75 GW in 2025, while the draft Alternative Energy Development Plan targets around 41.76 gigawatts (GW) by 2037. In electric mobility, EV 3.0 and EV 3.5 have accelerated vehicle adoption and attracted substantial manufacturing investment.

In the solar sector, new instruments – including household rooftop buyback, tax incentives, Utility Green Tariffs, peer-to-peer pilots, solar-plus-storage and a proposed Direct power purchase agreement (PPA) pilot – are widening participation. Yet these initiatives are being introduced within an enhanced single-buyer system in which distribution grids, data arrangements, storage rules and flexibility markets are still evolving.

In the automotive sector, the next challenge is to convert market growth and assembly investment into stronger domestic engineering capabilities, competitive suppliers, reliable charging services, workforce development, consumer confidence and effective battery lifecycle management. Rapid adoption and new investment alone will not guarantee durable industrial value or a resilient mobility ecosystem.

The central policy priority is therefore to move beyond deployment and adoption towards system readiness and capability building. Solar progress should be measured not only by installed capacity, but also by connection speed, network performance, curtailment, cost allocation and lifecycle management. EV progress should likewise be assessed through domestic value creation, supplier participation, charging reliability, technical and workforce capability, consumer outcomes and readiness for battery reuse and recycling.

Part I

From Solar Expansion to System Readiness

Five priorities for the next phase

1	Adopt a shared solar-ecosystem roadmap linking deployment targets, grid investment, market reform, data governance and end-of-life responsibility.

2	Make distribution grids the "first mile" through anticipatory planning, faster digital connections, active management and flexibility.
3	Create a transparent pathway from pilots to rules for, third-party access, Direct PPA, storage, peer-to-peer trading, aggregators and virtual power plants.
4	Build a national distributed-energy-resource data and forecasting framework before high penetration makes fragmented information an operational risk.
5	Establish lifecycle and inclusion safeguards: traceable modules, testing and certification, collection and recycling, equitable access, and domestic skills.

Why Thailand's next solar phase is different

Thailand is no longer managing a single solar market. Utility-scale plants, household rooftops, corporate green-power products, storage, energy communities and digital trading platforms create different connection, pricing, data and consumer-protection needs. The enhanced single-buyer model can accommodate innovation, but only if new mechanisms are designed as a coherent architecture rather than as isolated exceptions.

Policy priorities

1. Create one accountable solar-ecosystem roadmap

A cross-agency roadmap should translate the 2030 and 2037 ambitions into common milestones for generation, distribution capacity, flexibility, data, market reform and circularity. It should clarify institutional ownership while preserving the regulator's independence and the utilities' operational responsibilities.

- Use announced review cycles and transparent triggers for adjusting quotas, buyback rates and support; policy stability should mean predictable evolution, not permanent subsidy.
- Publish a dashboard covering connection times, queue size, congestion, curtailment, forecast accuracy, system cost, consumer outcomes, local capability and PV waste flows.
- Coordinate the Ministry of Energy, Energy Regulatory Commission (ERC) / Office of the Energy Regulatory Commission (OERC), Electricity Generating Authority of Thailand (EGAT), Metropolitan Electricity Authority (MEA), Provincial Electricity Authority (PEA), Department of Alternative Energy Development and Efficiency (DEDE), industrial-standard and waste authorities, meteorological services and knowledge partners around the same milestones.

2. Modernise distribution grids before congestion becomes the constraint

Distribution networks should be treated as the first mile of a decentralizing power system. National averages can obscure urban and industrial hotspots; Thailand should sequence reforms by local levels of distributed-resource penetration.

- Mandate scenario-based distribution plans that combine solar targets with EV charging, data-center demand, cooling loads, industrial development and storage.
- Digitalize applications and queue management; create simple, time-bound pathways for small compliant systems and more rigorous pathways for higher-impact projects.
- Publish hosting-capacity information in priority areas and require utilities to evaluate non-wire alternatives - storage, demand response and managed charging - alongside network reinforcement.

- Integrate flexibility into distribution planning, treating storage, demand response and managed EV charging as core planning resources rather than alternatives.
- Align utility incentives with reliability, efficient utilization and speed of connection, rather than rewarding capital expenditure alone.

3. Turn regulatory experimentation into a coherent market architecture

Household buyback, Utility Green Tariffs, Direct PPAs, peer-to-peer trading and storage can expand clean-power choice, but each depends on common rules for network use, balancing, settlement, backup supply and consumer protection.

- Publish sandbox results and a formal "graduate, revise or close" decision for each pilot, including the evidence and timeline for wider adoption.
- Clarify battery energy storage system (BESS) licensing, charging and discharging treatment, safety and grid-code requirements, participation in ancillary services, and protection against double network charging.
- Complete transparent third party-access and wheeling rules before scaling Direct PPAs, with clear allocation of congestion, balancing, stranded-cost and backup-supply risks.
- Start flexibility procurement with measurable commercial and industrial loads, then expand to aggregators, batteries, smart EV charging, virtual power plants and residential resources.

4. Treat data governance and forecasting as core infrastructure

Smart meters and digital platforms create value only when data are accurate, interoperable, secure and linked to operational decisions. Thailand should establish the institutional framework before distributed resources become too numerous and fragmented to manage efficiently.

- Create a national distributed energy resources (DER) registry with common identifiers, location, capacity, equipment characteristics, ownership and operational status.
- Set minimum metering, forecasting and communications requirements proportionate to asset size and market role; use forecast-error and data-quality metrics in performance monitoring.
- Establish authorized application programming interfaces (APIs) and data-sharing protocols across transmission, distribution, renewable forecasting, meteorological services, aggregators and market platforms.
- Give participants a reason to share data through solar health checks, benchmarking, improved solar maps and faster connection services, while protecting privacy and commercial confidentiality.
- Develop governance arrangements that clearly define data ownership, access rights, interoperability, cybersecurity, and institutional responsibilities to enable trusted multi-stakeholder data sharing.

5. Build lifecycle governance, domestic capability and public legitimacy

Thailand already has more than 30 million installed modules with an estimated mass above 800,000 tonnes. Repowering and premature degradation mean that end-of-life policy cannot wait for nominal 25- or 30-year lifetimes.

- Introduce module traceability from installation to transfer, reuse and disposal; connect installer and vendor registration to a durable digital record.

- Adopt certified testing and grading to distinguish reusable modules from waste, define transfer of liability, and prevent unsafe second-hand markets.
- Develop producer or owner responsibility, collection points and financing for transport, sorting, recycling and residual disposal, including household systems.
- Use public-rooftop aggregation, standardized leasing or PPA contracts, targeted finance and workforce programmes to broaden access and develop local installation, operation, maintenance, repair and recycling capabilities.

What overseas experience suggests – and what not to copy

China	Stable legal direction coordinated infrastructure and industrial capability can create scale. Thailand should adopt predictable policy evolution, while avoiding abrupt subsidy changes, overcapacity, and weak market discipline.
Vietnam	Rapid procurement can outrun transmission, dispatch, bankable contracts and institutional capacity. Generation targets should not advance without matched grid investment, transparent approvals and safeguards against speculative project development.
Singapore	Public-sector demand aggregation, value-linked export compensation and clear revenue streams for flexibility can lower transaction costs. These principles are transferable but must be adapted to Thailand's larger and more diverse system.

A practical implementation sequence

Timing	Priority actions
0-12 months	Agree on the solar ecosystem roadmap and scorecard; establish the DER registry and data-governance framework; publish sandbox evaluations; initiate regulatory frameworks for BESS, third-party access (TPA), and Direct PPAs; initiate household PV end-of-life rulemaking.
1-3 years	Publish hosting-capacity maps; expand advanced metering infrastructure (AMI), forecasting and digital grid visibility; implement streamlined connection procedures; launch commercial and industrial (C&I) flexibility procurement, dynamic tariffs, and public rooftop aggregation pilots.
3-5 years	Scale aggregators and flexibility markets; strengthen transmission-distribution coordination; implement nationwide PV collection and recycling systems; periodically review market support using transparent, evidence-based criteria.

Conclusion. Thailand has an opportunity to avoid the connection delays, curtailment and policy reversals experienced in faster but less coordinated solar booms. The highest-value action is not a single new subsidy or technology. It is a credible, sequenced governance pathway that aligns generation, grids, markets, data, consumers and the full PV lifecycle. Success will depend on coordinated action across regulators, utilities,

policymakers, industry, researchers, and consumers. Ultimately, achieving a reliable, flexible, and durable solar ecosystem is as much an institutional and governance challenge as it is a technological one.

Part II

From EV Adoption to Industrial Capability

Five priorities for the next phase

1	Reward domestic value rather than final assembly alone, including local engineering, software, testing, certification, supplier development and technology transfer.
2	Build shared technical and workforce infrastructure for batteries, power electronics, software-defined vehicles, safety, cybersecurity and high-voltage servicing.
3	Govern charging as an interoperable and reliable service, using common standards, operational data and building-readiness requirements.
4	Establish battery and vehicle lifecycle governance early, covering traceability, diagnostics, repair, warranties, second-life applications, collection and recycling.
5	Combine predictable policy evolution with focused implementation, using announced incentive reviews and mission-oriented teams for urgent ecosystem bottlenecks.

Why Thailand's next EV phase is different

Thailand is no longer creating an EV market from scratch. It is managing the interaction of new manufacturers, established component suppliers, charging operators, utilities, software and data providers, training institutions and consumers. The key challenge is that local production does not automatically create local value. Early assembly has relied substantially on imported components and systems, while many Thai Tier 1, Tier 2 and Tier 3 suppliers face difficulties meeting the speed, cost, software, certification and quality requirements of new manufacturers. At the same time, consumers increasingly require dependable charging, after-sales service, battery-health information, repair options and confidence that warranties will remain valid if firms leave the market.

Policy priorities

1. Make localisation progressive, firm-specific and auditable

Investment incentives should recognise domestic value created through design, engineering, calibration, software, testing, certification, maintenance and data services – not only the number of locally assembled physical parts.

- Link incentives to progressive commitments on supplier participation, local testing, workforce development, technology transfer and higher-value functions.
- Publish transparent indicators distinguishing nominal local content from domestically generated value.
- Support supplier diagnostics, standards compliance, finance and partnerships that help Thai firms qualify for new manufacturers' supply chains.

- Encourage common platforms and components where they improve production scale and supplier access.

2. Treat engineering, testing and skills as shared infrastructure

Thailand needs capabilities extending beyond conventional mechanical production. Priority areas include batteries and battery-management systems, power electronics, embedded software, systems integration, functional safety, cybersecurity, intelligent vehicles and high-voltage maintenance.

- Develop shared laboratories, simulation facilities and testing and certification services accessible to manufacturers, small and medium-sized enterprises (SMEs), universities and vocational institutes.
- Create competency-based, stackable training pathways for engineers, technicians, regulators, inspectors, emergency responders and existing automotive workers.
- Link public training support to certification, job transition, supplier qualification and productivity rather than attendance alone.
- Require locally relevant validation for connected and automated systems, reflecting Thailand's road and traffic conditions.

3. Regulate charging quality, not only charger numbers

Charging availability affects adoption, but infrastructure value depends on location, uptime, utilisation, payment interoperability, transparent pricing and commercial viability.

- Establish common service-quality, safety, payment and data requirements for charging operators.
- Publish indicators covering charger uptime, utilisation, failure rates, geographic access and user complaints.
- Require new and substantially renovated buildings to provide electrical readiness for future charging.
- Use managed charging, differentiated tariffs and fleet aggregation where they can reduce peak demand without undermining service reliability.

4. Build a national battery and vehicle lifecycle system

Battery reuse, repair and recycling should be governed before large waste volumes emerge. The framework should also protect second-hand buyers and consumers facing expensive battery replacement.

- Introduce battery identification, state-of-health assessment and traceability across first use, resale, repair, repurposing and recycling.
- Clarify responsibilities for manufacturers, importers, dealers, owners, dismantlers and recyclers.
- Establish standards for warranties, diagnostic-data access, high-voltage repair, transport, storage, fire safety and emergency response.
- Treat battery diagnostics, repair, second-life use and recycling as potential domestic service and industrial markets.

5. Make policy adjustment predictable and implementation more agile

Thailand's consultative EV governance supports credibility and investor confidence, but rapid technological and market change requires faster action on clearly defined bottlenecks.

- Announce gradual incentive phase-out schedules and evidence-based review cycles to avoid abrupt demand shifts.

- Use continuous or multidimensional performance criteria where possible, rather than thresholds that encourage firms to optimise narrowly for eligibility.
- Create focused, time-bound implementation teams for supplier upgrading, charging interoperability, battery standards and workforce transition.
- Prepare consumer, warranty and supplier protections for market consolidation or manufacturer exit.

What overseas experience suggests – and what not to copy

China	Large-scale incentives, infrastructure investment and industrial coordination can create markets and technological capability. Thailand should adopt predictable policy sequencing while avoiding abrupt subsidy withdrawal, excessive capacity and incentives that weaken market discipline.
Indonesia and Vietnam	Indonesia demonstrates the speed possible through resource leverage and central direction, while Vietnam illustrates the agility – and concentration risk – of a national-champion model. Thailand should preserve the credibility of consensus-based coordination while creating more agile mechanisms for urgent implementation tasks.
Singapore	Operator licensing, building readiness, utilisation-based charger deployment and structured workforce conversion demonstrate the value of integrated governance. These functions are transferable, but Singapore's vehicle controls, housing structure and administrative capacity cannot be reproduced directly.

A practical implementation sequence

Timing	Priority actions
0-12 months	Publish an EV ecosystem scorecard; define charger-service and data standards; map priority skills and supplier gaps; initiate battery-passport and diagnostic pilots; announce incentive-review and phase-out principles.
1-3 years	Expand shared testing and certification facilities; implement competency-based training pathways; introduce progressive localisation agreements; strengthen building readiness and managed-charging pilots; establish battery collection and second-life standards.
3-5 years	Scale domestic engineering, software and testing functions; integrate charging flexibility into power-system planning; implement nationwide battery and vehicle lifecycle arrangements; revise support using pre-announced evidence-based triggers.

Conclusion. Thailand has already demonstrated that coordinated incentives can create an EV market and attract manufacturers. The highest-value next step is not another isolated subsidy or assembly target, but a sequenced governance pathway that connects investment, domestic capability, suppliers, charging, workers, consumers and the full vehicle lifecycle.

Overall conclusion

Thailand has made significant progress in expanding solar PV and accelerating electric-vehicle adoption. The next phase, however, will depend less on deployment targets alone and more on whether policy can translate growth into reliable systems, stronger domestic capabilities and durable public value.

For solar PV, this means improving distribution-grid readiness, market rules, data governance, flexibility and end-of-life management. For electric mobility, it means deepening domestic engineering and supplier capabilities, strengthening charging services, supporting workforce transition, protecting consumers and establishing battery lifecycle arrangements. In both sectors, policy credibility will require clear long-term direction, transparent review mechanisms and timely investment in the institutions and infrastructure needed before bottlenecks become binding.

Thailand's priority should therefore be to move from accelerating adoption towards building the systems and capabilities that can sustain the transition over the long term.

POLICY BRIEF CONTRIBUTORS

- Chunhua Ye, Research Fellow, Institute for Environment and Sustainability (IES), Lee Kuan Yew School of Public Policy (LKYSPP), National University of Singapore (NUS)
- He Liuyang, Postdoc Fellow, Institute for Environment and Sustainability (IES), Lee Kuan Yew School of Public Policy, National University of Singapore
- Chakorn Loetnithat, Senior Researcher, Thailand Development Research Institute (TDRI)
- Phimsupha Kokchang, Researcher, ERI, Chulalongkorn University

OTHER CONTRIBUTORS TO THE WORKSHOP

- Viboon Sricharoenchaikul, Director, ERI, Chulalongkorn University
- Tan Soo Jie Sheng, Director, IES, LKYSPP, NUS
- Peggy Teo, Manager, IES, LKYSPP, NUS
- Er Siew Ming, Assistant Manager, IES, LKYSPP, NUS
- Siripha Junlakarn, Researcher, ERI, Chulalongkorn University
- Supawat Vivanpatarakij, Researcher, ERI, Chulalongkorn University
- ERI workshop organising and technical team, Chulalongkorn University
- IES workshop research and reporting team, National University of Singapore