

Low Carbon Cities and Carbon Market Development Project (LCCP)

Project Operations Manual

March 2026

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Acronym	Definition
ACG	World Bank Anti-Corruption Guidelines
AFS	Audited Financial Statements
AML	Anti-Money Laundering
BESS	Battery Energy Storage System
BOT	Bank of Thailand
CFT	Countering the Financing of Terrorism
CME	Coordinating and Managing Entity (operated by KTB)
CTC	Clean Tech Company (private contractor / bidder)
DA	Designated Account
DFIL	Disbursement and Financial Information Letter
dMRV	Digital Monitoring, Reporting and Verification
ECOP	Environmental Code of Practice
EE	Energy Efficiency
EPC	Engineering, Procurement and Construction (performance-based contract)
ERPA	Emission Reductions Purchase Agreement

Acronym	Definition
ERC	Energy Regulatory Commission
ESCP	Environmental and Social Commitment Plan
ESF	World Bank Environmental and Social Framework
ESHS	Environmental, Social, Health and Safety
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESS	Environmental and Social Standards
E&S	Environmental and Social
EXIM	Export–Import Bank of Thailand
FI	Financial Intermediary
FRF	Fixed Rate Factor (THB/kWh — the per-unit electricity rate used to calculate PEMC Service Fees)
GM	Grievance Mechanism
GRM	Grievance Redress Mechanism
HPS	High-Pressure Sodium (lighting technology)
IBRD	International Bank for Reconstruction and Development
IEC	International Electrotechnical Commission
IFR	Interim Financial Report
IPMVP	International Performance Measurement and Verification Protocol
ISA	International Standards on Auditing
kWh / MWh	Kilowatt-hour / Megawatt-hour
kWp / MW	Kilowatt-peak / Megawatt
KTB	Krung Thai Bank
KYC	Know Your Customer
LCC	Low Carbon Cities

Acronym	Definition
LCCP	Low Carbon Cities and Carbon Market Development Project
LED	Light Emitting Diode
MEA	Metropolitan Electricity Authority
MoF	Ministry of Finance
MRV	Monitoring, Reporting and Verification
NDC	Nationally Determined Contribution
NPV	Net Present Value
OA	Operating Account
OHS	Occupational Health and Safety
PDMO	Public Debt Management Office (Ministry of Finance; chairs the LCC Steering Committee)
PEA	Provincial Electricity Authority
PEMC	Performance-Based Energy Management Contract (the standard output-based contract used for Component 1 solar PV subprojects under the LCC Program)
PMU	Project Management Unit
POM	Project Operations Manual
PoA	Program of Activities
PPA	Power Purchase Agreement
PR	Performance Ratio
PSO	Public Sector Organization
PV	Photovoltaic
RE	Renewable Energy
RFP	Request for Proposals
SEA/SH	Sexual Exploitation and Abuse / Sexual Harassment
SEP	Stakeholder Engagement Plan
SOE	Statement of Expenditure
tCO₂e	Tonnes of Carbon Dioxide Equivalent

Acronym	Definition
TIS	Thai Industrial Standards
VER	Verified Emission Reductions
VERPF	Verified Emission Reduction Payment Facility
VVB	Validation and Verification Body
WA	Withdrawal Application
WB	World Bank

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Document Map

This table lists every Annex to the POM, its purpose, the authority it governs, and its governing hierarchy. Where an Annex conflict with the POM body, the Annex prevails for its topic area; where an Annex conflicts with the Legal Agreements, the Legal Agreements prevail. See Section 1.2 for full document precedence rules.

Annex	Purpose	Governing authority	Prevails over POM body on
Annex A	Technical specifications — rooftop solar PV (public buildings)	EXIM/PMU; CTC contractual	Solar PV technical requirements
Annex A-II	Technical specifications — building energy efficiency (EE retrofits)	EXIM/PMU; CTC contractual	Building EE technical requirements
Annex B	Technical specifications — LED street lighting retrofit	EXIM/PMU; CTC contractual	LED street lighting requirements
Annex C	Digital MRV system requirements and protocols (single technical authority)	EXIM/PMU + KTB/CME	All MRV data, substitution, and audit rules
Annex D	VER Payment Facility (VERPF) — rules, pricing schedule, and payment formula	KTB/CME	VERPF pricing, payment triggers, wind-down
Annex E	Commercial guidance — risk allocation, contract structures, permitted bid variables	EXIM/PMU	Contract risk allocation and commercial positions
Annex F (F.1–F.2)	Environmental and Social Management System (single E&S reference). F.1 = EXIM ESMS (with sub-annexes F-1 through F-9). F.2 = KTB semi-annual E&S monitoring. Note: internal sub-annex numbering uses F-1, F-2 etc. to avoid collision with top-level Annexes.	EXIM (F.1); KTB (F.2)	All E&S screening, categorization, incident reporting, GRM
Annex G	Financial management and disbursement procedures (single FM reference)	EXIM/PMU	All disbursement, payment, and FM procedures
Annex H	CME Operations Manual (issued separately by KTB). Must be completed before first ERPA execution. Covers: issuance cycle,	KTB/CME	All CME operations, issuance, and payment procedures

Annex	Purpose	Governing authority	Prevails over POM body on
	payment triggers, dispute resolution, wind-down.		
Annex I	Standard templates and forms — EPC/PEMC, eligibility checklists, reporting, ERPA, and procurement record forms (use without bespoke modification unless approved)	EXIM/PMU	All standard forms and contract templates
Annex J	Terms of Reference — LCC Steering Committee (membership, mandate, operating procedures, conflict-of-interest rules)	PDMO (Chair)	Steering Committee governance, meeting procedures

Note on Annex F sub-annex numbering: The ESMS (Annex F.1) contains internal sub-annexes referenced as F-1 through F-9 (Exclusion List, Risk Categorization, Screening Format, ESAP Template, Contractor Pack, Material Incidents Template, Monitoring Report, Supply Chain Requirements, E&S Policy). These are distinct from top-level Annexes A through J. In the event of a citation discrepancy, this Document Map takes precedence over references in the body text.

1. Executive Summary

The Thailand LCC Project aims to scale up low-carbon investments in public assets in participating cities and agencies, and to operationalize a national mechanism for the crediting and monetization of emission reductions. It is financed with a World Bank IBRD loan to EXIM Bank of Thailand for US\$200 million backed by a sovereign guarantee as well as counterpart contribution and parallel technical assistance.

Project objective and approach. The Low Carbon Cities and Carbon Market Development (LCC) Project supports Thailand’s transition toward low-carbon urban development by accelerating investments in energy efficiency, renewable energy, and other emissions-reducing upgrades in public-sector assets, while simultaneously establishing the institutional and technical foundations for a national carbon crediting mechanism. The Project is designed to reduce greenhouse gas emissions, lower public-sector energy expenditures, and demonstrate scalable delivery models that can be replicated across cities and asset classes. It combines investment financing with results-based carbon payments and targeted technical assistance to address both near-term implementation barriers and longer-term market development needs.

Investment delivery and institutional arrangements. Under the Project, eligible Public Sector Organizations (PSOs) implement performance-based asset upgrades, such as energy-efficient lighting, building retrofits, rooftop solar PV, and other clean technologies, through competitive RFP selection of qualified private Clean Tech Companies (CTCs). Export–Import Bank of Thailand (EXIM) serves as the Financial Intermediary for investment delivery, supported by a dedicated Project Management Unit (PMU), while Krung Thai Bank (KTB) acts as the Coordinating and Managing Entity (CME) for carbon-related functions. Investments are structured to emphasize verified performance outcomes, sound fiduciary controls, and compliance with the World Bank Environmental and Social Framework, including the application of EXIM’s Environmental and Social Management System to all subprojects. For the avoidance of doubt, the designation of EXIM as Financial Intermediary under this POM refers solely to EXIM’s role as the IBRD Borrower and on-lending conduit. Nothing in this POM restricts KTB from providing independent commercial lending to PSOs, CTCs, or private asset owners in its normal banking capacity.

Carbon crediting, MRV, and scalability. A core innovation of the Project is the establishment of a national carbon crediting mechanism and associated digital Monitoring, Reporting, and Verification (dMRV) system to enable transparent, high-integrity issuance of Verified Emission Reductions (VERs). Verified credits generated from eligible subprojects may receive payments through a dedicated VER Payment Facility, creating an additional revenue stream that strengthens project economics and incentivizes performance. Beyond immediate emissions reductions, the Project aims to catalyze a broader domestic carbon market by building institutional capacity, standardizing methodologies, and demonstrating bankable low-carbon investment models that can be scaled to additional cities, sectors, and financing partners over time.

1.1 How to Use this Project Operations Manual (POM)

This POM is the single governing document for the LCCP. It serves three distinct user groups — use the routing guide below to go directly to what you need.

If you are...	Your primary sections	Your primary annexes
A PSO RFP manager or contract officer	§4 Eligibility §5 RFP Process §6 Permits §7 Contract Management	Annex A/B (technical specs) Annex C (dMRV) Annex I (templates)

An EXIM/PMU fiduciary or FM officer	§8 Financing and FM §9–10 MRV and Reporting	Annex G (FM procedures) Annex F (E&S)
A KTB CME operator	§3.3 Roles §4.1.4 VERPF Eligibility §7.1 ERPA §8.2 Conditions Precedent	Annex D (VERPF) Annex C (dMRV) Annex H (CME Ops Manual — issued separately by KTB)
A Steering Committee member or WB supervisor	§1 Executive Summary §3 Governance §10 Reporting	Annex J (Steering Committee TOR) Annex F (ESMS)

Where a topic is governed by an Annex, the Annex prevails for that topic: Annex C for MRV; Annex D for VERPF; Annex F for E&S; Annex G for FM/disbursement; Annex I for templates.

Annex H (KTB CME Operations Manual) is issued separately by KTB and is not physically embedded in this POM. The POM requires Annex H to be completed and consistent with Annex D and the Project Agreement before the first ERPA is executed.

1.2 Definitions, Abbreviations, and Document Precedence

For purposes of this POM, the following core terms are used consistently throughout the document. Where terms are defined in the Financing Agreement, Project Agreement, or other Legal Agreements, those legal definitions prevail.

Document precedence. In the event of inconsistency: (i) Legal Agreements and applicable laws/regulations prevail; (ii) this POM provides operational guidance; (iii) Annexes provide the authoritative detailed procedures/protocols for their topics (Annex C MRV; Annex F E&S; Annex G FM/disbursement; Annex I templates).

Updates in the contents of this POM. This document is version 6 (v6), dated March 22, 2026. Previous version: v5 (March 22, 2026). Version history is maintained by EXIM/PMU. The provisions of the POM are agreed between EXIM (borrower and implementing agency), KTB (project implementing entity) and the World Bank. The POM cannot be materially changed, amended, waived, or revoked without prior World Bank written consent. Material changes that alter KTB's roles, obligations, or the VERPF pricing schedule require KTB's prior written consent. Other changes require World Bank no-objection and advance notification to KTB of not less than 15 business days before effectiveness. EXIM and KTB will share policy updates with the World Bank if they require changes to the POM.

Term / Abbreviation	Meaning in this POM
PSO	Public Sector Organization (asset owner / implementing entity for public facilities).
EXIM / PMU	EXIM Bank of Thailand acting as the Project Management Unit (PMU) / Financial Intermediary functions as set out in Section 3 and Annex G.
Steering Committee	Program-level governance body providing strategic direction and oversight, as defined in Section 3.2.

CTC	Clean Tech Company (private bidder/contractor) delivering works/services under an EPC/energy services arrangement and complying with MRV and E&S requirements.
EPC	Engineering, Procurement and Construction (or equivalent performance-based delivery contract) used for implementation of eligible investments.
VER	Verified Emission Reductions (carbon credits) generated from eligible investments under the national crediting mechanism.
VERPF	VER Payment Facility (Component 2a) that makes results-based payments in exchange for verified emission reduction rights, subject to eligibility and verification.
CME / KTB	Coordinating and Managing Entity operated by Krung Thai Bank (KTB) (Component 2b) for the national crediting mechanism (rules, registry arrangements, dMRV operations, issuance cycles).
dMRV / MRV	Digital Monitoring, Reporting and Verification system and related procedures; Annex C is the technical protocol.
ERPA / VER Purchase Agreement	Agreement governing the purchase/assignment of VER rights and results-based payment conditions, as applicable to Component 2.
Annex G	Financial management, disbursement and payment procedures (single procedural reference).
Annex F	ESMS and E&S screening guidance including the Exclusion List (single E&S screening reference).
Annex I	Standard templates and forms to be used without bespoke modification unless approved.

The manual describes the LCC program’s financing mechanisms, risk management strategies, and operational procedures, providing a scalable model for achieving energy cost savings and emissions reductions. A central feature of the program is its financial intermediary structure: the Export–Import Bank of Thailand (EXIM Bank) offers financing to winning Clean Tech Company bidders, and specialized instruments are used to manage risk and recycle capital.

1.3 Regulatory and Legal Status

The following table summarizes the status of key regulatory and legal prerequisites. This table is a living reference — EXIM/PMU updates it quarterly and reports to the Steering Committee at each semi-annual meeting.

Regulatory / legal item	Status and operational notes	Current status
MOF derivative classification of carbon credits	Carbon credits classified as derivatives under MOF ruling. Legal title to VERs is cognizable under Thai law; ERPA chain is enforceable under Thai contract law.	In force

BOT authorization for KTB CME and broker-dealer role	BOT has approved KTB to operate as CME and broker-dealer for carbon credits under a sandbox. No expiry date currently set.	Active — sandbox approved
Gold Standard PoA registration	PoA registration target: May 2026. First monitoring period target: August 2026. First credit issuance target: September 2026. Status as of March 2026: registration in progress.	Target: May 2026
dMRV platform	Platform operational and signed. Gold Standard has confirmed acceptance of dMRV-generated data for verification under the applicable PoA methodology.	Operational
Multi-year ESCO commitment authority for PSOs	Legal mechanism confirmed in writing by the relevant authority. Applicable to all first-tranche PSOs.	Confirmed
BOT sandbox formalization pathway	No expiry date currently set. BOT has not issued permanent formal guidance on carbon credit operations by supervised banks. EXIM/PMU to monitor quarterly and engage BOT on formalization pathway.	Monitoring — no expiry set
Tax treatment of VER sale proceeds	No ruling has been issued by the Thai Revenue Department on VAT or corporate income tax applicable to VER sale proceeds. Asset owners executing ERPAs must obtain independent Thai tax advice before signing. EXIM/PMU to pursue Revenue Department ruling as condition precedent to first VERPF payment.	PENDING — action required
Article 6 / corresponding adjustments	VERs are sold into the international voluntary carbon market without corresponding adjustments. No ITMO designation applies. Thailand has an established Article 6.2 pathway if future upgrade is sought (precedent: Bangkok e-bus programme, Switzerland bilateral, January 2024 — Thailand's first ITMO transfer).	Voluntary market — no CA required

Action required — tax opinion on VER proceeds: No ruling has been issued on VAT or corporate income tax on VER sale proceeds. All carbon revenues flow directly to the asset owner (no revenue sharing). Asset owners must obtain independent Thai tax advice before executing ERPAs. EXIM/PMU must obtain a Revenue Department ruling or binding tax legal opinion as a condition precedent to the first VERPF payment, and must notify all potential ERPA sellers of the open tax status in writing before they sign.

2. Program Background and Rationale

2.1 Objectives and Scope of the LCC Program

Project Development Objective (PDO). The PDO is to scale up low-carbon investments in public assets in participating cities and agencies, and to operationalize a national mechanism for the crediting and monetization of emission reductions.

Components. The Project consists of the following components;

- Component 1: Clean Energy Upgrades in Public Assets, financed by IBRD for US\$185 million and supported by parallel technical assistance (not IBRD financed)

- Component 2: VER Payment Facility and National Carbon Crediting Mechanism, financed by IBRD for US\$15 million and Krung Thai Bank (KTB) financing contribution. It comprises two sub components : Component 2(a) — VER Payment Facility (IBRD-financed results-based payments) and Component 2(b) — National carbon crediting mechanism (system-building and operations, not IBRD-financed). For the avoidance of doubt: (a) Component 2(b) costs are borne by KTB/counterpart resources and are not IBRD-financed; (b) KTB is not obligated to absorb project-level losses from VERPF disbursement shortfalls; and (c) minimum VERPF sizing and pipeline eligibility standards are maintained to protect KTB's administrative cost recovery. A dedicated cost-recovery provision addressing these arrangements shall be included in the EXIM–KTB Subsidiary Agreement.

Theory of Change. The project is designed to address the underlying barriers that prevent Thailand from scaling distributed low-carbon investments in cities. Public entities face fiscal and capital constraints that limit their ability to upgrade public facilities, and both public and private actors lack a national system that can verify, aggregate, and monetize emission reductions. The project responds by introducing a replicable financing model for upgrading public assets and by establishing a national mechanism that can measure and convert verified emission reductions into predictable financial value. These interventions are expected to generate measurable energy savings and emission reductions, demonstrate the viability of standardized approaches, and build the foundation for a scalable and financially sustainable model for urban decarbonization. Over time, these results are expected to support broader systemic transformation that extends beyond the life of the project.

The project addresses two related market failures through two reinforcing mechanisms that work in tandem to unlock distributed low-carbon investments at scale. First, it overcomes the challenges of city-level PSOs in mobilizing capital to finance low carbon investments by channeling funds through EXIM that then on-lends to cleantech service providers under standardized, performance-based contracts to implement energy upgrades for public facilities. This enables PSOs to procure long-term energy services as operating expenditures rather than capital investments, and leverages EXIM's capacity to apply uniform appraisal standards and credit risk management across all subprojects. As a result, PSOs can undertake efficiency and solar investments off-budget, a large portfolio of upgraded public assets is created under common standards, and a consistent flow of high-quality VERs is generated.

Second, the project establishes a national carbon crediting mechanism and the Verified Emission Reductions Payment Facility (VERPF) at KTB that aggregates VER rights, standards MRV and creates predictable demand for high-integrity carbon credits. Private building owners and firms invest in eligible low-carbon technologies using their own or commercial financing. Upon third-party verification of results, they receive results based payments (financed by IBRD funds transferred from EXIM to KTB) in exchange for transferring the VERs to the CME (Coordinating and Managing Entity, the institutional role KTB will play in operating the national carbon crediting mechanism and VERPF)

Together, these mechanisms turn small, fragmented mitigation actions into a financeable asset class and reduce transaction costs for both public and private actors. Doing so will enable scaling-up of distributed clean energy investments in line with Thailand's climate commitments. EXIM's FI platform and KTB's carbon crediting operations work in tandem to ensure that the supply of VERs and the demand from carbon markets grow in a mutually reinforcing way. Progress toward the PDO will be measured through three outcome indicators:

1. Net greenhouse gas emissions per year (tCO₂e/year)
2. Total private capital mobilized (US\$)
3. National carbon crediting mechanism established and operational (Yes/No), as evidenced by the results-based payments made for VER rights through the mechanism

The Program is a national program aimed at accelerating sustainable energy investments in urban areas by mobilizing private sector expertise and financing. The primary objectives of the LCC program are to:

- **Generate Energy Cost Savings** – Modernize public infrastructure (such as street lighting and public facilities) to cut electricity consumption, thereby reducing operating expenses for municipalities and public agencies. Cost savings are used to repay project investments, creating a self-sustaining financing mechanism.
- **Demonstrate Scalable Models** – Pilot and establish *financially sustainable business models* (shared-savings Energy Performance Contracts, on-bill financing, etc.) that can be replicated and scaled up across Thailand for various low-carbon technologies and sectors. These models will also reflect sound operational activities for any potential environmental and social risks at the subproject and institutional levels.
- **Demonstrate the financial product, Leverage Private Capital and Expertise** – Engage Clean tech companies, private developers and financial institution to finance, implement, and maintain the projects, thus minimizing the need for public budget outlays and tapping into technical know-how and efficiency of the private sector.
- **Strengthen Local Capacity and Market** – Build capacity within municipalities and local industries for project development, procurement, and MRV of low-carbon projects. The program aims to expand the domestic market for energy services, renewable energy solutions, and associated financial and insurance products in the local financial market.
- **Reduce Greenhouse Gas (GHG) Emissions** – Achieve substantial CO₂ emissions reductions through energy efficiency (EE) improvements and renewable energy (RE) installations in cities and industrial estates, contributing to Thailand’s climate commitments and urban air quality improvements.

The scope of LCC covers urban energy efficiency and renewable energy subprojects implemented by PSOs. Initial focus areas include:

- **Municipal Street Lighting Retrofits:** Replacing outdated high-pressure sodium or mercury vapor street lamps with efficient LED luminaires across cities, improving lighting quality and safety while using 50–70% less energy.
- **Rooftop Solar PV Installations:** Deploying solar photovoltaic systems on public buildings (e.g. offices, schools, hospitals) and facilities to generate clean electricity on-site, reducing grid consumption.
- **Enabling EV charging:** Maximizing the rooftop space available in public buildings to using excess electricity generated to enable EV charging, particularly at schools, where parking and public space is available for charging.
- **Building Energy Efficiency Retrofits:** Installing and upgrading energy-consuming systems in public buildings under performance-based contracts, including HVAC and chiller plant upgrades, LED interior lighting retrofits, building management and control systems, thermal insulation improvements, and other eligible energy conservation measures (ECMs). Projects are structured on a zero-capital-expenditure basis: the CTC finances upfront costs and recovers its investment from verified energy cost savings over the contract term. Eligible measures must achieve a demonstrable reduction in grid electricity or thermal energy consumption, be measurable under the digital MRV framework (Annex C), and be implemented under a standard shared-savings EPC or output-based PEMC consistent with the commercial guidance in Annex E.

- **Industrial Estate Renewable Projects:** Implementing large-scale solar PV and “private wire” distribution (mini-grids) within industrial estates (through IEAT) to supply multiple facilities with renewable power.

In addition to public-sector investments, the Project also supports private asset owners through a national carbon crediting mechanism operated by KTB under Component 2. Private asset owners or project developers finance their low-carbon subprojects, whether through own equity, commercial bank lending, or other sources, and receive results-based payments from the VER Payment Facility (VERPF) once their emission reductions are verified and transferred to KTB, as described in the World Bank Project appraisal document (PAD). Participation in the CME carbon crediting mechanism does not require use of the VERPF — private parties may register and generate VERs independently, with VERPF payments available as an additional incentive where eligible.

Other project types are envisioned to be included in future phases. Each subproject under LCC adheres to the program’s common financing and implementation framework, even as technical specifics vary.

2.2 Market Context and Demand for Low-Carbon Investments

Thailand’s push for low-carbon urban development comes amid favorable market trends and pressing needs. Energy consumption in cities has been rising with economic and population growth, straining municipal budgets and infrastructure. At the same time, clean technology costs have fallen, for instance, solar PV equipment and LED lighting have become highly cost-effective, with short payback periods when deployed at scale. The Thai government’s policies and targets reflect this opportunity: national power development plans set ambitious goals for renewable energy (solar capacity in particular) and promote energy efficiency across sectors. The market barriers described above — financing constraints, tenor mismatches, and public budgetary and contracting restrictions — are the additionality rationale for the carbon crediting component. The existence of favorable economics does not preclude additionality where systemic barriers prevent implementation.

In the solar energy sector, Thailand has seen rapid expansion of utility-scale projects driven by feed-in-tariffs and competitive auctions. However, uptake of distributed solar (e.g. on rooftops in cities) has been slower due to regulatory hurdles and financing constraints. Municipal entities generally lack capital budgets for solar investments and have historically been restricted from entering power purchase agreements spanning multiple years.

The LCC program addresses these barriers by providing an alternative model, allowing cities to access solar through clean tech company-delivered projects financed by operational savings rather than upfront capital.

Similarly, there is significant potential in energy efficiency improvements. For example, Thailand has millions of streetlights nationwide, many of which still use old technologies. Upgrading to LEDs can yield energy savings of 50% or more, but the challenge has been financing the large upfront investment. The LCC’s shared-savings approach allows these retrofits to proceed with private financing. Pilot projects in some Thai cities and international experience have demonstrated the feasibility of LED performance contracting, building confidence among stakeholders.

Building energy efficiency in the public sector represents an equally substantial opportunity. Thailand has over 400,000 government-owned buildings consuming an estimated 15–20 TWh per year. HVAC and chiller systems in government office buildings, hospitals, and schools typically operate at 30–40% below best-available efficiency, and many were installed before modern performance standards were established. Studies by DEDE and international technical assistance programs estimate economically viable savings potential of 20–35% of current consumption through HVAC upgrades, interior LED retrofits, and building management systems — achievable under shared-savings EPC structures with payback periods of 5–10 years and no upfront capital outlay for the PSO. The LCC Program’s extension of the shared-savings EPC model to building EE provides a standardized, bankable delivery vehicle for

this market that has been absent to date, creating conditions for private CTCs to scale public-sector building retrofit services across Thailand.

Thai clean tech companies and suppliers have grown in capability; local firms offer integrated services for auditing, installation, and maintenance, supported by an active Energy Service Company (clean tech company) Association and government energy conservation fund programs. This increasing market maturity means a pool of qualified clean tech companies exists to participate in LCC RFPs, ensuring competitive bids and successful outcomes.

Nonetheless, financing clean tech companies-led public-sector energy efficiency projects in Thailand remains highly constrained due to structural mismatches between project requirements and traditional banking practices. Clean tech projects typically require long tenors of 8–12 years, yet Thai banks offer much shorter loan durations and impose collateral requirements incompatible with clean tech companies’ asset-light model. Additional hurdles include perceived municipal payment risks and bank concentration limits, which inflate costs and restrict access to capital. Against this backdrop, receivable-based financing for energy performance contracts presents a transformative opportunity. While factoring for long-term receivables is nascent in Thailand, with the LCC Project, EXIM Thailand is pioneering it in a more structured way through subloans to clean tech companies backed by standardized, verified, and predictable energy savings-based payments. By introducing enhanced credit appraisal methods and pooling receivables into bankable assets, this innovation can unlock private financing and bridge critical funding gaps—creating a scalable pathway for low-carbon investments by clean tech companies and city-level PSOs.

The LCC Program is designed to address financing and contracting constraints that prevent public sector organizations from implementing cost-effective low-carbon investments, and to channel private capital into urban energy infrastructure at scale consistent with Thailand’s NDC commitments.

The Project uses a Financial Intermediary (FI) structure in which EXIM Thailand originates, appraises, and supervises a portfolio of standardized sub-loans to CTCs across multiple PSOs and subprojects. This structure enables consistent application of fiduciary, environmental, and social requirements through EXIM’s Environmental and Social Management System. EXIM’s role as FI is governed by the Loan Agreement with IBRD and the procedures set out in Annex G.

2.2A Implementation Timeline

The following milestone schedule reflects the actual project sequencing as of March 2026.

Date	Milestone	Notes
Dec 2025	IBRD Board approval	US\$200M IBRD loan to EXIM; MoF sovereign guarantee; KTB CME designation confirmed
Dec 2025	MOF derivative ruling in force	Carbon credits classified as derivatives; ERPA chain legally enforceable
Dec 2025	BOT sandbox approved for KTB	KTB authorized as CME and broker-dealer; no expiry date set
Dec 2025	dMRV platform operational	Signed, deployed, and Gold Standard-confirmed for verification
Apr 2026	First-tranche RFPs issued	[Target] ~US\$100M first tranche; competitive RFP issued first week of April 2026
May 2026	Gold Standard PoA registered	[Target] PoA registration complete; VPA framework active

May 2026	First contracts signed	[Target] First EPC/PEMC contracts executed with CTCs
Aug 2026	First installation and monitoring period complete	[Target] First sub-project commissioned; monitoring data collection begins
Sep 2026	First VER issuance	[Target] First Gold Standard credits issued; VERPF fully operational

2.3 LCC Implementation Strategy Overview

The LCC program employs a public-private partnership implementation strategy centered on performance-based contracting and innovative financing. Key elements of the strategy include:

- **Bundling and Scale:** Individual project opportunities (e.g. retrofitting streetlights in one district or installing solar on a group of buildings) are bundled by PSOs into larger RFP packages. Bundling achieves economies of scale, attracting capable clean tech companies and reducing average costs. For example, Bangkok’s LED retrofit program aggregates tens of thousands of streetlights across multiple districts into one tender, and a provincial administration might package solar installations across dozens of schools into a single project, or a municipality might bundle HVAC and interior LED upgrades across a portfolio of public buildings under a single shared-savings EPC. This approach ensures sufficient scale to be attractive to bidders and financiers that meet project and national requirements.
- **Off-Budget, Shared-Savings Financing:** Rather than funding projects through capital budgets, PSOs enter into Energy Performance Contracts (for efficiency projects) or long-term Energy Supply Contracts (for renewable projects) with clean tech companies. Under these agreements, the clean tech company finances and implements the project, and the PSO pays the clean tech company from achieved savings or energy deliveries over a term of several years.

Payments to the clean tech company are structured to be always less than the PSO’s baseline energy cost, guaranteeing net savings to the PSO from year one. This off-budget financing model was enabled by Thai policy adjustments allowing multi-year obligations paid from energy savings. It ensures that public entities can improve infrastructure without upfront expenditures or increasing debt, paying only for results.

- **A new clean tech financing model for public assets:** the LCC Project introduces a structured, scalable financing approach centered on performance-based contracts and PSO receivables. It features a dedicated loan appraisal framework that evaluates projected cash flows rather than traditional corporate metrics, provides extended tenors with standardized structures to simplify transactions, and a portfolio-based strategy enabling EXIM to systematically grow the PSO–clean tech segment. This innovative method lowers barriers for private sector participation, creates a replicable market architecture, and accelerates clean energy investments in public infrastructure.
- **Competitive Selection via RFP:** Each project or bundle is implemented through a transparent RFP process instead of traditional lowest-bid tenders. The RFP allows evaluation on best value, considering technical quality, lifetime savings, and guarantees, rather than solely lowest initial price. This is important for performance-based projects. The RFPs include detailed technical requirements and draft contract terms so bidders can price the risk appropriately. Market soundings or pre-qualification may be conducted for large projects to ensure a field of capable bidders.

- **Digital MRV and Verification:** A digital MRV system is built into every project to ensure transparency and accountability. See Annex C (Digital MRV System Requirements and Protocols) for architecture, device specs, data quality rules, substitution/estimation procedures, and verification workflow. Program KPIs and reporting cadence are defined in 9.2.

Subsequent sections of this POM set out the step-by-step procedures for each phase of the implementation cycle, from project preparation and RFP issuance through contract management, MRV, and performance verification.

3. Institutional Arrangements and Governance

Implementation of the LCC program requires clear definition of the institutional framework and responsibilities of each entity. The program operates through a collaborative structure involving national agencies, local authorities, financial institutions, private companies, and oversight bodies. This section outlines the key stakeholders and their roles in governance and execution of the program.

3.1 Key Implementing Agencies and Stakeholders

- **Public Sector Organizations (PSOs):** These are the public sector project hosts. PSOs include city municipalities, like BMA (Bangkok Metropolitan Administration), provincial administrative organizations, and specialized agencies and IEAT (Industrial Estate Authority of Thailand) for industrial zone projects. Each PSO identifies and prepares subprojects under the LCC program (such as a city's streetlight retrofit or an industrial estate's solar plant), conducts the RFP, and signs the performance contract with the clean tech company.
- **EXIM Bank of Thailand:** EXIM Thailand serves as the financial intermediary for the LCC program. It manages the dedicated and ring fenced credit line that provides loans to clean tech companies for project implementation. Once a clean tech company is selected by a PSO, EXIM appraises the clean tech company's loan application (performing credit due diligence on the firm and reviewing the project's cashflows, risk mitigants and reviewing the level of environmental and social risks) and, upon approval, enters into a Loan Agreement with the clean tech company to fund the project capital costs. EXIM typically disburses funds in tranches linked to project milestones or expenditures.
- **Clean Tech Companies and Contractors:** These are private companies (or consortiums) that implement the projects on the ground. Examples include specialized clean tech companies, engineering procurement and construction (EPC) contractors, renewable energy developers, and equipment suppliers teamed with local partners. Clean tech companies are responsible for end-to-end project execution: they design the solution, invest capital (sourced from EXIM loan and their own equity if required), obtain necessary permits, procure and install equipment, operate & maintain the systems over the contract period and provide access and information to assess performance.

Clean tech companies bear the performance risk, their payments depend on achieving the contracted energy savings or output, and they may face financial penalties or reduced payments if targets are not met. Many leading clean tech companies in Thailand have experience with performance contracting in the private sector; LCC significantly scales up their involvement in public-sector projects. Clean tech companies coordinate with other stakeholders during implementation (e.g. working with utilities for grid interconnection, with city traffic police when replacing streetlights, etc.). Each project will typically have a single clean tech company (or lead contractor) accountable to the PSO, even if that clean tech company subcontracts portions of the work. This single point of responsibility is important for performance accountability.

- **Insurers:** Insurance companies may offer energy savings or performance-related insurance products to CTCs on a voluntary basis. Where a CTC elects to obtain performance insurance, it may name the PSO and EXIM as additional insureds or loss payees. Performance insurance is not a requirement under the LCC program but may be recognized by EXIM as supplementary credit enhancement when structuring the sub-loan.

Where a CTC elects to obtain performance insurance, the insurer may coordinate with EXIM and the clean tech company during project structuring to determine coverage terms and may require MRV data access to underwrite the risk.

- **Coordinating and Managing Entity (CME) – Krung Thai Bank:** To monetize GHG emission reductions, the program has designated KTB as its CME. KTB will act as the CME, managing VERPF disbursements and carbon-related functions in accordance with the Project Agreement and the EXIM–KTB Subsidiary Agreement. KTB, as CME, aggregates emission reduction rights from participating subprojects, arranges third-party verification and issuance, and facilitates the sale or transfer of VERs to eligible buyers in accordance with applicable program rules and the BOT Sandbox conditions. For the private sector, KTB may sign Emission Reduction Purchase Agreements (ERPAs) with clean tech companies or private asset owners (see Annex D and Annex I) to purchase the rights to emission reductions through results-based payments from the VERPF after verification and transfer, as described in the PAD. KTB retains the right to decline an ERPA for any subproject that fails CME eligibility criteria (Annex D) or KTB’s internal risk assessment, provided such decisions are documented and reported to EXIM/PMU.

The CME is responsible for registering projects for carbon credits, managing the dMRV for verification, and handling issuance and sale of credits. Gold Standard serves as the initial international registry for the PoA and KTB will work closely with Gold Standard to register the Program of Activities, Program Designs and verifications. The Steering Committee (§3.2.4(d)) may approve additional registries or dual-certification pathways — including T-VER — following World Bank no-objection, provided such pathways meet program integrity standards and do not risk double-counting against Thailand’s NDC. This arrangement injects carbon finance into projects and centralizes carbon market expertise to generate sufficient scale to reach the international markets. The CME’s role is key to the LCC’s aim of leveraging carbon revenues as a supplementary funding source for low-carbon city projects.

VERs generated under the LCCP are sold into the international voluntary carbon market without Article 6 corresponding adjustments. No ITMO designation applies to this project. Buyers receive Gold Standard VERs that are not deducted from Thailand’s NDC. Thailand has an established Article 6.2 bilateral pathway if the project seeks to upgrade VERs to ITMO status in the future — the Bangkok e-bus programme/Switzerland agreement (January 2024) established Thailand’s first ITMO transfer precedent and DCCE serves as the Article 6 competent authority for any future authorization.

- **Low Carbon City Steering Committee:** The LCC Steering Committee provides program-level strategic oversight and governance, chaired by the Public Debt Management Office (PDMO) with membership drawn from key national agencies. The Committee meets semi-annually to review consolidated progress reports and take stock of program-wide performance, and is authorized to make program-level decisions including on the expansion of participating PSOs and the selection of carbon markets for VER sales. Full membership, mandate, and Terms of Reference are set out in Section 3.2 and Annex J.
- **World Bank.** The LCC is partly financed by the World Bank through a loan to EXIM Thailand as described above. As such, the World Bank provides the LCC Project with implementation support to reach the Project’s development objectives. Applicable World Bank policies and procedures apply, and implementation support will be carried out within that framework—

including the planning and conduct of implementation-support missions, required reporting, and WB no-objection processes for key approvals.

The LCC program’s institutional arrangement is a public-private collaboration with clearly delineated roles: PSOs define and own projects, EXIM finances them, clean tech companies implement them, KTB provides CME services, and the LCC Steering Committee provides the enabling environment and oversight. Where a CTC voluntarily obtains performance insurance, the insurer plays a supplementary risk mitigation role. provide risk mitigation and value-add services, KTB provides CME services, and the LCC Steering Committee provides the enabling environment and oversight.

3.2 LCC Steering Committee

3.2.1 Establishment and Chair. The LCC Steering Committee (“Steering Committee”) was established in 2024 as the program-level governance body for the LCC Project. It is chaired by the Public Debt Management Office (PDMO) of the Ministry of Finance. PDMO’s role as chair reflects its mandate as the sovereign counterpart on external financing and its authority to consolidate public-sector financial reporting, making it the appropriate institutional anchor for program-level accountability to the World Bank and other stakeholders.

3.2.2 Membership. Core members are: PDMO (Chair), EXIM Bank (Secretary and implementing FI), Krung Thai Bank (CME), Department of Climate Change and Environment (DCCE), Ministry of Finance (Budget Bureau or designate), and Ministry of Energy or DEDE. Participating PSOs (initially BMA and IEAT, and any subsequently admitted PSOs) attend as standing observers and present subproject performance updates. The World Bank attends as a non-voting observer. Additional ministries, agencies, or technical experts may be invited on an ad hoc basis by the Chair. Full membership terms and selection criteria are set out in Annex J (Terms of Reference).

3.2.3 Meeting Cadence and Quorum. The Steering Committee meets semi-annually, with meetings timed to align with the close of each six-month reporting period and to enable timely submission of the semi-annual progress report to the World Bank. Extraordinary sessions may be convened by the Chair with a minimum of fifteen (15) days’ notice when urgent program-level decisions are required. Quorum requires attendance of the Chair (PDMO) or a designated deputy, EXIM Bank, and at least two other core members. Decisions are taken by consensus or, where consensus cannot be reached, by majority vote of core members present, with the Chair holding a casting vote.

3.2.4 Functions and Decision-Making Authority. The Steering Committee performs the following functions: (a) receives and reviews the consolidated semi-annual progress report prepared by EXIM/PMU, and approves the report for submission to the World Bank; (b) reviews program-level KPIs against targets and takes stock of delivery, financial, environmental, social, and carbon performance; (c) decides on the admission of additional PSOs into the program, subject to eligibility criteria in Section 4 and applicable World Bank no-objection requirements; (d) decides on the carbon markets and sales channels into which VERs generated under the program may be sold, taking into account market integrity, pricing, and Thailand’s NDC commitments; (e) approves material amendments to program rules, eligibility criteria, or VERPF pricing structures that fall outside EXIM’s or KTB’s delegated authority; (f) resolves escalated operational or inter-agency issues that cannot be resolved at the EXIM/PMU level; and (g) reviews and approves the annual program work plan and budget where applicable.

3.2.5 Reporting to the World Bank. EXIM/PMU is responsible for preparing and circulating the draft consolidated semi-annual progress report to all Steering Committee members not less than ten (10) business days before each scheduled meeting. Following the meeting, PDMO, as Chair, formally transmits the approved report to the World Bank within fifteen (15) calendar days of the meeting date. The report covers program-level KPIs, financial management and disbursement status, environmental and social compliance, MRV and verification cycle status, and any material issues or risks requiring World Bank attention. Where the World Bank has requested a specific no-objection on

a Steering Committee decision, PDMO coordinates the no-objection request through the appropriate channel.

3.2.6 Secretariat. EXIM/PMU serves as the Secretariat of the Steering Committee. Secretariat functions include: convening meetings and preparing agendas in consultation with the Chair; compiling inputs from PSOs and KTB into the consolidated progress report; circulating draft reports and minutes; maintaining an action log; and ensuring that World Bank no-objection requirements are tracked and fulfilled on a timely basis. The Secretariat does not have voting rights. The full Terms of Reference for the Steering Committee, including operating procedures, conflict-of-interest rules, and amendment procedures, are set out in Annex J.

3.3 Roles and Responsibilities

The PDMO, as Chair, bears overall accountability for Steering Committee decisions. EXIM/PMU is accountable for implementation compliance. KTB is accountable for CME operations and VERPF disbursements. Each entity’s specific decision rights and reporting obligations are set out in §3.2 and Annex J. EXIM will establish and maintain a dedicated PMU (or Project Team) responsible for day-to-day project coordination, fiduciary management, monitoring and reporting, and liaison with the World Bank and other stakeholders. The World Bank typically conducts semi-annual implementation support missions to provide technical support. These missions include reviewing the use of project funds and ensuring compliance with key policy requirements, such as environmental and social safeguards and fiduciary standards. The frequency of missions may be adjusted based on project performance and specific needs. Throughout this manual, “PMU” refers to this EXIM-based implementation team. A public summary of findings of such missions will be available (the Implementation Status Report) on the World Bank website.

Each stakeholder has specific responsibilities at different stages of the project cycle. The table below summarizes the primary roles:

Project Phase	PSO (Public Asset Owner)	EXIM/PMU (Financial Intermediary & Program Coordination)	Clean Tech Company (CTC / ESCO) or private asset owner	Insurer	KTB (as CME)
Program setup & eligibility framework	Confirms asset participation and eligibility	Establishes program rules, templates, eligibility criteria, and financing framework	—	—	Supports carbon program setup
RFP preparation & issuance	Prepares and issues RFPs for subprojects	Reviews RFPs for consistency with program rules, templates, and financing requirements	—	—	—
Bid evaluation & award	Evaluates bids and selects preferred bidder	Confirms compliance with program rules and bankability requirements	Submits bids	—	—

Project Phase	PSO (Public Asset Owner)	EXIM/PMU (Financial Intermediary & Program Coordination)	Clean Tech Company (CTC / ESCO) or private asset owner	Insurer	KTB (as CME)
Contract signing (EPC / ERPA)	Signs EPCs (Component 1) or supports ERPA execution (Component 2)	Confirms use of standard templates and financing conditions	Signs EPC / ERPA	Provides coverage (optional, at CTC election)(where required)	Executes ERPAs and manages Component 2 contracts
Subproject financing (Component 1)	—	Appraises subprojects, executes sub-loan agreements, and manages disbursements	Draws sub-loan and implements works	—	—
Implementation & commissioning	Oversees works at asset level	Monitors implementation progress and compliance with financing conditions	Implements works and commissions systems	Provides coverage	—
Operations, monitoring & MRV	Oversees asset operations	Consolidates reporting and monitors compliance with MRV and financing requirements	Operates systems and submits MRV data	—	Oversees MRV for Component 2
Performance-based payments (Component 1)	Authorizes EPC payments based on verified performance	Processes payments and manages loan repayment flows	Repays the EXIM loan with proceeds from the EPC	Pays claims if triggered	—
Verification, issuance & VER payments (Component 2)	—	Transfers funds and oversees fiduciary compliance	Delivers emission reductions (private asset owner)	—	Verifies, issues, and pays for VERs
Program oversight & escalation	—	Escalates operational or fiduciary issues to the Steering Committee as needed; the	—	—	—

Project Phase	PSO (Public Asset Owner)	EXIM/PMU (Financial Intermediary & Program Coordination)	Clean Tech Company (CTC / ESCO) or private asset owner	Insurer	KTB (as CME)
		Steering Committee receives escalated issues and makes program-level decisions			

- **PSO (Municipality/Agency):** Their responsibilities include the following:
 - identifies project opportunities;
 - secures necessary internal approvals; prepares RFP (often with support from its facilities management team and/or consultants);
 - conducts RFP and selects clean tech company;
 - signs Energy Performance Contract with clean tech company;
 - facilitates clean tech company’s access to sites and data; monitors implementation progress; verifies that installations are completed and functional;
 - makes regular payments to clean tech company as per contract, subject to performance verification;

PSO contract continuity obligations. Because Component 1 contracts run for 10–15 years, PSO staff turnover is a material contract risk. Each PSO shall: (a) designate a named Contract Focal Point for contract administration and MRV coordination, and notify EXIM/PMU and the CTC in writing within fifteen (15) calendar days of any change; (b) maintain a Contract File containing the executed EPC/PEMC, commissioning records, dMRV access credentials, sub-loan correspondence, and insurance certificates, and ensure the incoming Focal Point receives and acknowledges this file; (c) conduct a structured handover briefing with the incoming Focal Point, the CTC, and EXIM/PMU within thirty (30) calendar days of any change; and (d) upon request, provide written confirmation that the successor Focal Point acknowledges the PSO’s obligations. Failure to comply may constitute a PSO breach and trigger a remediation notice from EXIM/PMU. Where a PSO participates in the carbon crediting component, it grants the CME the rights necessary to register, bundle, verify, and transfer VERs generated from the subproject, including execution of any required assignment or consent documentation prior to ERPA signature.

- **EXIM Bank:** Their responsibilities include the following:
 - appraises winning clean tech company’s loan application post-bid;
 - negotiates and signs Loan Agreement with clean tech company, including conditions precedent (such as assignment of contract proceeds);
 - disburses loan funds in phases upon evidence of work progress or completion milestones;
 - monitors clean tech company’s financial health and project performance through reports;

- in case of any default or issues, coordinates with PSO for remediation; where the CTC has obtained performance insurance, coordinates with insurer as applicable;
- ensures environmental and social risk management for subprojects (in line with any funding requirements) is undertaken (this may involve reviewing a clean tech company's safeguards plans or getting confirmation from PSO that no significant issues are present). This includes carrying out the commitments in the Environmental and Social Commitment Plan
- **clean tech company (Contractor):** Their responsibilities include:
 - during RFP:
 - attends pre-bid meetings, conducts site visits,
 - prepares a proposal offering a technical solution and financial terms (savings share or energy tariff) as per RFP;
 - after award:
 - finalizes project design and work plan;
 - obtains all necessary permits and licenses (with PSO assistance as needed);
 - arranges project insurance (construction insurance, third-party liability); performance insurance is optional and may be arranged at the CTC's election;
 - works with EXIM to fulfill loan conditions and then draws down loan to purchase equipment and mobilize resources;
 - executes the project engineering, procurement, and construction on schedule and to specifications;
 - tests and commissions the installations in presence of PSO representatives;
 - provides training to PSO staff as required;
 - ensures a robust dMRV system is installed and transmitting data, ensures connectivity to the designated dMRV platform, and provides the CME with timely access to MRV data in the format and at the frequency specified in Annex C and the relevant ERPA;
 - during the performance period, carries out O&M and periodic measurement and verification of savings/output as per contract and MRV plan;
 - submits invoices or payment requests to PSO based on verified performance; if any shortfall issues arise, works with EXIM/PMU and the PSO on resolution; where the CTC has voluntarily obtained performance insurance, coordinates with insurer on claims as applicable;
 - participates in any verification by third parties (e.g. for carbon credits or audits);
 - at contract end (or handover point):
 - ensures a smooth transfer of assets/knowledge to the PSO with all documentation.

The clean tech company must also comply with any safeguard measures (worker safety, waste disposal, etc.) and maintain detailed project records (equipment specs, maintenance logs, etc.) for review.

EXIM Bank also:

- aggregates data from all projects to track overall program targets (total MW of solar installed, number of streetlights upgraded, energy saved, GHG reduced, etc.);
- prepares consolidated progress reports for the Steering Committee, World Bank and any donors;
- manages any program-level communication (public awareness campaigns on LCC benefits, recognition for participating cities, etc.).

EXIM effectively acts as the central coordinator and support unit ensuring that all actors perform their roles and that the program stays on track across multiple locations.

- **Krung Thai Bank - Coordinating and Managing Entity (CME):**
 - VER facilitation role for carbon revenue under the program, including aggregation, verification, and transfer of VERs on behalf of program participants, enabled by the Bank of Thailand sandbox approved in December 2025
 - facilitator for PSOs to monetize emission reductions
 - VER transfer facilitator for private asset owners.
 - Prior to implementation:
 - advises on eligibility of projects for carbon credits and helps ensure the project design (and MRV setup) meets requirements of the chosen carbon standard;
 - drafts and signs ERPAs with project owners (private asset owners) locking in terms for emission reduction purchase (e.g. volume, price, payment schedule);
 - registers the project or bundles of projects with Gold Standard;
 - after project commissioning:
 - oversees the monitoring period and compiles data (from the MRV system) to prepare documentation for verification/issuance;
 - facilitates third-party verification by accredited auditors; upon issuance of credits, handles their sale to buyers;
 - channels agreed payments back to the project entity (if not already prepaid); and maintains records for all carbon transactions.
 - The CME also ensures no double counting of emissions and that all safeguards under carbon standards are met (sometimes social/environmental safeguards are cross-checked in certain standards). In LCC, the CME's role is transactional and technical, and provides the program with additional revenue and international visibility. Double counting is prevented through: (i) exclusive registration of each VER in the Gold Standard (or Steering Committee-approved) registry; (ii) corresponding adjustment under Thailand's NDC where required for international transfers (ITMOs); and (iii) contractual prohibition on parallel registration of the same emission reduction under T-VER or other domestic schemes without CME consent. The Steering Committee shall determine, in consultation with DCCE, whether VERs sold internationally require corresponding adjustments under Article 6 of the Paris Agreement. DCCE serves as the Article 6 competent authority for such determinations. KTB's CME role is transactional and technical with respect to IBRD-funded VERPF operations. This does not restrict KTB from providing commercial lending to private participants in its normal banking

capacity, provided such lending is conducted separately from VERPF disbursements and subject to KTB’s standard credit processes.

The collaboration under the LCC Project is formalized through a set of complementary agreements, each serving a distinct purpose aligned with the roles and responsibilities of the participating institutions. A Loan Agreement between EXIM and the World Bank establishes the terms of project financing and sets out EXIM’s obligations with respect to implementation, fiduciary management, reporting, and compliance with applicable policies and standards. A Subsidiary Agreement between EXIM and KTB governs the domestic on-lending and operational arrangements between the two national institutions, clearly defining their respective roles in investment delivery and carbon-related functions. In parallel, a Project Agreement between KTB and the World Bank sets out KTB’s responsibilities for activities it implements directly under the Project, including financial management, reporting, and oversight of the carbon crediting and payment functions.

Together, these agreements provide a coherent legal and institutional framework that reflects the different mandates of each entity while ensuring that all Project activities are governed by consistent standards and accountability arrangements. Regular coordination meetings at both project and program levels will be held to ensure alignment across institutions, address implementation issues, and maintain a shared understanding of objectives and responsibilities. This layered but coordinated governance structure underpins the effective implementation of the LCC Project and provides confidence to all stakeholders that the program is being managed transparently, efficiently, and in line with agreed roles and safeguards.

3.4 Regulatory Dependency Tracker

EXIM/PMU maintains this tracker and updates it quarterly. Status is reported at each Steering Committee meeting.

Dependency	Responsible	Status (Mar 2026)	If not resolved
MOF carbon credit classification	MOF/SEC	In force	N/A — resolved
BOT KTB CME authorization	BOT	Active sandbox — no expiry	VERPF cannot operate. Monitor quarterly.
BOT sandbox formalization	BOT + KTB	Monitoring — no permanent guidance yet	KTB to engage BOT on pathway
Gold Standard PoA registration	KTB CME	Target: May 2026	N/A — resolved
dMRV platform GS acceptance	KTB CME	Confirmed	N/A — resolved
Multi-year ESCO authority for PSOs	MOF + PSOs	Confirmed in writing	No contract without written authority
Tax ruling on VER proceeds	Revenue Dept	PENDING — no ruling	Block first VERPF payment. Notify ERPA sellers.

DCCE ITMO authorization protocol	DCCE	Not applicable — voluntary market only	Monitor if scope changes to ITMOs
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4. Project Preparation and Approvals

Before launching RFP and implementation, PSOs must carry out thorough preparation of each subproject and secure all necessary approvals. Project preparation ensures that the proposed investments are feasible, bundled optimally, and aligned with the program’s requirements, while approvals (internal and external) ensure that the project has legal and budgetary authorization to proceed under the LCC model. This section details the preparatory steps and approval processes.

4.1 Eligibility Criteria and Exclusion List

This section defines who and what may participate in the Thailand Low Carbon City (LCC) Project and identifies activities that are not eligible. Eligibility is applied at origination and re-confirmed at approval and prior to each disbursement/payment. Detailed E&S screening and requirements are provided in Annex F, and financial eligibility and documentation requirements are provided in Annex G.

4.1.1 Eligible Implementing Entities (Public Sector Organizations)

- The PSO is a public sector organization with legal authority to enter into an EPC and related agreements and to commit budgetary payments for the contract term.
- The PSO designates a focal point/team to manage RFP, contract administration, and reporting, including MRV coordination.
- The PSO confirms asset ownership/control and access rights for installation and O&M for the contract period.
- The PSO commits to transparency and integrity measures in the RFP and contract management processes (Section 5.4).

4.1.1A PSO Readiness Assessment (condition of admission)

Admission of a PSO into the Program is conditional on completion of a PSO Readiness Assessment, to be conducted by EXIM/PMU prior to the PSO’s first RFP issuance. The Assessment shall confirm: (a) **Legal authority**: the PSO has obtained a written legal opinion or internal authorization confirming its authority to enter into multi-year EPCs/PEMCs and to commit budgetary resources for the full contract term; (b) **Designated contract team**: the PSO has named a Contract Focal Point and at least one supporting staff member with defined responsibilities for RFP management, contract administration, MRV coordination, and payment authorization; and (c) **Budget coding confirmation**: the PSO has confirmed with its finance department that PEMC Service Fee payments will be classified as operating expenditure under the applicable budget code, and has obtained any required Budget Bureau or internal approval for multi-year operating commitments. The completed Assessment shall be filed in the subproject record and is a condition precedent to EXIM/PMU approval of the PSO’s first RFP package.

For each PSO’s first procurement cycle, EXIM/PMU shall co-manage the RFP process, including direct review of the draft RFP package, participation in the pre-bid meeting, and sign-off on the bid evaluation report prior to award. In addition, EXIM/PMU shall deliver a minimum two-day contract management training to the PSO’s Contract Focal Point and supporting staff before contract signing. Training shall cover: PEMC payment mechanics and MRV data review; the PSO’s obligations under the Tripartite Agreement; contract variation and default procedures; and E&S reporting requirements under Annex F. EXIM/PMU shall document completion of both the co-management engagement and the training as conditions precedent to contract signing for the first cycle. This first-cycle support

requirement applies to all PSOs admitted to the Program, including those with prior energy project experience.

4.1.2 Eligible Public-Sector Subprojects under Component 1

Component 1 eligibility applies to public sector subprojects financed through EXIM sub-loans and implemented under Energy Performance Contracts (EPCs).

- The subproject is within the LCC scope (e.g., rooftop solar PV, LED street lighting, building energy efficiency retrofits (HVAC upgrades, interior LED, building management systems, and other eligible ECMs), and other eligible EE/RE investments as approved) and aligns with the applicable technical specifications (Annexes A, A-II, and B)
- A preliminary technical and financial assessment demonstrates expected energy savings and/or generation, feasibility, and value-for-money.
- The PSO has (or will obtain) required permits/approvals (including grid interconnection, building permits, and municipal clearances as applicable).
- The subproject can be implemented using the standard EPC/RFP approach, including integration of digital MRV equipment and protocols (Annex C).
- The subproject is screened as Low or Moderate E&S risk, is not on the exclusion list for the project, and is eligible under the ESMS (Annex F).

4.1.3 Eligible Clean tech companies and Contractors

- Legally registered entity with demonstrated relevant experience (design, installation, commissioning, O&M) for the targeted technologies.
- Demonstrated financial capacity to pre-finance investments under the EPC and meet performance-security/insurance requirements where applicable.
- Not subject to sanctions or debarment; complies with integrity requirements (anti-corruption, conflict of interest, anti-collusion).
- Capability to comply with E&S and OHS requirements (Annex F) and with data/cyber requirements for the digital MRV system (Annex C).
- Willingness to use the standard contract templates and reporting requirements (Annex I).

4.1.4 Eligible Private Subprojects and Sellers under Component 2 (VERPF)

Component 2 eligibility applies to private subprojects receiving performance-based payments (VERPF).

- The Seller/Project Developer is legally registered, has the legal right to generate and transfer the emission reductions/VERs, and passes KYC/AML/CFT and sanctions screening.
- The subproject falls within the eligible technology and methodology scope of the CME program (Annex H) and can be monitored through the digital MRV requirements (Annex C).
- The monitoring plan, baseline approach, and verification/issuance pathway are defined prior to ERPA signature; no double counting of ERs is permitted.
- The subproject meets applicable E&S eligibility and screening requirements under the ESMS (Annex F).
- The subproject is supported by an ERPA using the standard template and pricing schedule (Annex D and Annex I), including clear payment triggers tied to verified/issued ERs.

4.1.5 Project-wide Exclusion List

All subprojects financed or implemented under the LCC Program must comply with the Exclusion List set out in Annex F (Environmental and Social Safeguards). Activities included in the Exclusion List are not eligible for financing or implementation under the Program under any circumstances.

4.1.6 Eligibility Documentation and Record keeping

- In case of inconsistency, the IBRD Loan Agreement/ Disbursement and Financial Information Letter (DFIL), the Environmental and Social Management System (ESMS), and the Environment and Social (E&S) instruments prevail.
- Eligibility determinations must be documented at origination, confirmed at approval, and re-confirmed prior to each disbursement/payment.
- Maintain an eligibility file for each subproject (Component 1) and each ERPA/payment cycle (Component 2) using the checklists and templates in Annex I.

5. RFP Process

PSO selection of Clean Tech Companies is carried out through a competitive Request for Proposals (RFP) process designed to ensure best-value outcomes, transparent competition, and clearly defined performance obligations. Given the programmatic nature of the LCC Project and the expected volume of similar subprojects, the use of standardized RFP documents and contract templates is essential to efficient implementation. Accordingly, the core structure, eligibility criteria, commercial terms, performance requirements, and environmental and social provisions of the RFPs will be largely standardized, with a limited number of parameters tailored to the specific investment type, site characteristics, or asset category.

In practice, the majority of each RFP, expected to comprise approximately 90 percent standardized content and 10 percent project-specific customization, will be drawn from approved templates. This approach minimizes transaction costs, reduces procurement timelines, and ensures consistency in risk allocation, performance measurement, and safeguard application across subprojects. By avoiding bespoke, one-off procurement designs for each investment, the Project can maintain quality and integrity while scaling efficiently across multiple PSOs and asset classes.

This section describes the step-by-step process from RFP preparation through bid evaluation and contract award, along with the controls and procedures in place to ensure fairness, integrity, and compliance with applicable procurement and fiduciary requirements. The RFP process described in this section applies to Component 1 subprojects procured by PSOs. Private asset owners participating in Component 2 select and engage their own contractors on commercial terms and are not subject to the PSO RFP process. Component 2 eligibility is governed by §4.1.4 and Annex D.

5.1 RFP Preparation and Advertisement

Define Project Scope and Lots: Based on the project preparation (Section 4), the PSO finalizes what will be included in the RFP. This includes the technical scope (e.g. number of facilities, performance targets), the financing mechanism (explicitly stating the clean tech company finances upfront and will be repaid from savings), and any division into lots or packages. For instance, if a project is too large for one clean tech company or covers different technologies, the PSO might split it into multiple lots (e.g. Lot 1: LED retrofits, Lot 2: Solar PV) or procure in phases. However, bundling into a single RFP is often preferred for scale and simplicity, unless having multiple lots increases competition. This decision should be made prior to issuing the RFP.

Award concentration limit. To promote competition and manage delivery risk, the standard LCC RFP shall include a maximum-award concentration rule: no single proposer may be awarded contracts for more than two (2) Lots or Batches within a single RFP package. Where a proposer achieves the highest-ranked financial proposal across more than two Lots, BMA or the relevant PSO shall award that proposer the two Lots with the highest total installed capacity (or highest NPV benefit where capacity is comparable) and shall consider the next-ranked technically-qualified proposer for remaining Lots. This rule is a required provision of all Component 1 solar PV RFPs and shall be reflected in the Instructions to Bidders. Deviations require EXIM/PMU review and documentation in the procurement record.

Prepare RFP Document: The PSO prepares a comprehensive RFP document using the LCC Standard RFP Package (see Annex I: Standard Templates & Forms). At minimum, the RFP shall include: (i) Instructions to Bidders (ITB) and Bid Data Sheet; (ii) Terms of Reference / Technical Specifications; (iii) draft Energy Performance Contract (EPC) including the savings/payment mechanism; (iv) bid evaluation and qualification criteria; and (v) standard forms (bid submission, price schedule, declarations, and E&S compliance forms). The PSO should consult internal technical, legal, and financial departments to ensure accuracy and completeness.

Advertising and Outreach: The PSO then proceeds to advertise the RFP widely, to attract qualified bidders and ensure competition. A clear invitation for proposals is published, summarizing the project and eligibility (e.g. "Municipality X invites proposals from qualified Clean tech companies to retrofit approx. 20,000 streetlights to LED under a shared-savings contract...").

In addition to passive advertisement, it is beneficial to conduct market outreach: the PSO can directly notify known clean tech companies and energy firms of the bidding opportunity (as long as the information sent is identical and no one gets preferential information). Ensuring that reputable local and international Clean tech companies are aware of the tender will result in better competition and outcomes.

5.2 Proposal Submission and Evaluation

Hierarchy and Governing Document for Evaluation Procedures: For each PSO-run RFP process, including BMA rooftop solar PV procurements, the PSO-issued Request for Proposals (RFP) and the executed contract govern the bid submission, evaluation, and award procedures. This Project Operations Manual (POM) provides program-level minimum controls and reporting requirements. Where a PSO-issued RFP is more specific than this POM, the PSO-issued RFP and the executed contract shall prevail.

Bid Receipt and Opening: On the bid submission deadline, the PSO shall receive bids and conduct bid opening procedures in accordance with the PSO-issued RFP and applicable rules. Where bid security is required, the PSO shall verify that the bid security is present, valid, and in the required form. For two-envelope tenders, the PSO shall open the technical proposals first; financial proposals shall remain sealed until technical evaluation is completed.

Technical Evaluation: Technical proposals shall be evaluated against the mandatory technical and eligibility requirements stated in the PSO-issued RFP. Unless the RFP expressly provides a scored technical evaluation, technical evaluation shall be on a pass/fail (responsive/non-responsive) basis. Only technically responsive bids shall proceed to financial opening and evaluation.

Financial Evaluation: The PSO shall open the financial proposals of technically responsive bidders and evaluate them strictly in accordance with the PSO-issued RFP and the applicable standardized financial model. For BMA rooftop solar PV procurements under the output-based, tariff-indexed EPC model, financial proposals shall be ranked solely on the evaluated Net Present Value (NPV) benefit to the PSO (higher is better). If an RFP expresses NPV as a cost (NPV of PSO payments), the lowest evaluated NPV cost shall rank first. All calculations, clarifications, and any corrections shall be documented and retained with a complete audit trail.

Overall Ranking and Award Recommendation: Where technical evaluation is pass/fail, the award recommendation shall be based solely on the financial evaluation among technically responsive bidders, using the ranking metric stated in the RFP (e.g., highest evaluated NPV benefit). Where a PSO-issued RFP uses a weighted scoring method, the PSO shall apply the weights and normalization stated in the RFP and maintain a complete audit trail of scoring.

Bid Evaluation Report and Approval: The PSO shall prepare a bid evaluation report summarizing the evaluation process, responsiveness determinations, the financial evaluation results, and the

recommended award. The report and all supporting documents shall be filed in the RFP record and made available for review by EXIM/PMU and auditors as required.

Notification of Award: Once approved, the PSO issues a Letter of Intent / Notification of Award to the winning bidder. This letter states that the PSO intends to award the contract to them, contingent on any remaining steps (like furnishing of performance security, finalizing contract details, etc.). The PSO also notifies the other bidders of the result – typically providing the name of the winning bidder and possibly the evaluated outcome.

Unsuccessful bidders may request a debrief; the PSO should be prepared to give a brief explanation of why their bid was not selected (without revealing competitors' confidential information). Transparent communication at this stage helps maintain trust and positions unsuccessful bidders to possibly compete in future LCC tenders.

Performance Security and Other Conditions: The winning bidder will likely be asked to provide a Performance Security (bank guarantee or bond) as stipulated in the RFP (often around 5-10% of project value). This security protects the PSO in case the contractor fails to perform or complete the project. The bidder must submit this within a specified time (e.g. 10 days from award letter) or risk forfeiting the award (and their bid security).

If the bidder has not yet formally applied for EXIM loan, they will now do so immediately, EXIM will fast-track the credit approval given the prior arrangements, but the bidder must furnish required documents to EXIM (detailed financials, project implementation plan, etc.) so that the Loan Agreement can be signed in parallel with the EPC. The PSO and EXIM coordinate at this stage; often EXIM might have given a preliminary okay during bid evaluation for that bidder.

Upon completion of evaluation, the PSO shall prepare the Bid Evaluation Report as specified above and proceed to contract award. Where the evaluation metric is highest NPV benefit, the selected proposal need not represent the lowest nominal price; the award decision shall be based solely on the evaluated financial metric and technical compliance as set out in the PSO-issued RFP.

5.3 Contract Award and Signing

With the winning bidder selected and notified, the process moves to formalizing agreements and achieving financial close. This stage consolidates all the preparatory work into binding contracts, so careful attention is required to ensure all obligations and conditions are properly captured.

Finalization of Contract Terms: Typically, the RFP's draft Energy Performance Contract (EPC) (or relevant agreement) is used as the basis for the final contract. The PSO and the winning clean tech company meet to review any minor outstanding items. Since bidders were required to accept the draft contract as part of their proposal (or flag exceptions), there should be no major negotiations at this stage – doing so could undermine the fairness of the tender.

However, practical updates will be made: for example, inserting the agreed numbers from the winning proposal (e.g. the exact savings share percentage, the contract duration, the list of facilities and equipment specs as per the bid, etc.), and attaching the bidder's technical proposal or parts of it as legally binding schedules. Any clarifications or commitments made during evaluation can be written into the contract. If the clean tech company proposed any enhancements that the PSO finds beneficial and are within scope, those can be incorporated. Both parties' legal teams review the final document for consistency and completeness.

Alongside the main contract, other agreements are prepared as needed:

- **The Loan Agreement between EXIM and the clean tech company** (Contract 2 in the LCC contract sequence) is negotiated in parallel. EXIM will outline the loan amount (often up to a certain percentage of project cost, e.g. 80% debt), interest rate, repayment schedule (which might align with the clean tech company's cash flow from the project), security (usually the

assignment of project receivables and perhaps a company guarantee or collateral), and any conditions (like maintaining any performance insurance the CTC has elected to obtain). Often, the PSO will acknowledge the loan agreement via a direct agreement clause in the EPC, agreeing to pay the clean tech company's invoices into an assigned account or acknowledging that the project's receivables are pledged to EXIM until refinancing.

- **The Performance Guarantee (Security)** from the clean tech company is collected by the PSO. This is usually a bank guarantee valid through the implementation period (and sometimes through the performance period, or a separate smaller guarantee for O&M phase might be required). The contract references this security as remedy for default in implementation.
- If applicable, the **Emission Reduction Purchase Agreement (ERPA)** (Contract 4) between the clean tech company /private asset owner and the CME is finalized. For public sector PSOs like BMA, they may not sign an ERPA as they may choose to retain credits; but for private-hosted projects (like IEAT's industrial estate scenario), the clean tech company or asset owner may sign an ERPA with KTB, subject to CME eligibility assessment and KTB internal approval. ERPA execution timing is at the CME's discretion, subject to project MRV readiness, KTB internal approval, and ERPA eligibility confirmation under §4.1.4. No minimum or maximum timing requirement applies, but ERPAs must be executed before the first VERPF payment request. The ERPA would specify the volume of credits anticipated based on calculations (and previous experience with the technology when possible), and the payment schedule (e.g. payment on commissioning as a lump sum).
- Performance insurance is optional. Where a CTC elects to obtain performance insurance, it should provide confirmation of coverage within 30 days of contract signing. Performance insurance is not a mandatory condition for sub-loan approval, EPC execution, or VERPF eligibility, but may be recognized by EXIM as supplementary credit enhancement at its discretion.

Once all terms are ready, the PSO issues a Letter of Award / Contract Signing invitation to the clean tech company.

Communication and Disclosure: After contract signing, the PSO should publicly disclose the outcome as per transparency requirements. This transparency helps in demonstrating the fairness and success of the process.

The contract award stage concludes the RFP phase. The project now transitions to the implementation phase, where the clean tech company will carry out the work as per the signed agreement, and the roles of monitoring and contract management come to the fore (detailed in Section 8 and Annexes). From a governance perspective, it is crucial that the PSO sets up a contract management team or officer at this point to manage the relationship with the clean tech company, verify milestones, and administer the contract (including handling payments and any variations). Section 8 and Annex F provide guidance on effective contract management and oversight to ensure the project delivers the intended results during implementation and operation.

5.4 Integrity and Transparency Measures

Maintaining the highest standards of integrity is vital throughout the LCC RFP process, given the involvement of public funds (through future payments) and the innovative nature of the contracts. The program embeds several measures to prevent fraud, corruption, or unfair practices, in line with Thai regulations and international best practices:

- **Conflict of Interest Declarations:** Members of evaluation committees and project teams will formally declare any potential conflicts of interest. For example, if an official has a relative in one of the clean tech company companies, they should recuse themselves. The RFP documentation will include these declarations, and any identified conflicts will be managed

(usually by excluding that person from decision-making). Similarly, bidders are often required to declare that they have no conflict (e.g. they didn't consult in project prep, etc., unless appropriately walled off). This ensures decisions are made on merit.

- **Strict Confidentiality and Non-Collusion:** The PSO must maintain confidentiality of bid information during evaluation. Evaluators sign confidentiality agreements. Moreover, the RFP includes an affidavit bidders must sign attesting that the prices and terms in their proposal were arrived at independently, without collusion with competitors. Evidence of collusion (such as identical bid patterns or complaints of bid rigging) can lead to disqualification and reporting to authorities. Given that the clean tech company market in Thailand may have a limited number of players, extra vigilance is needed to ensure they are truly competing. The PSO might, for instance, do a cost reasonableness analysis (comparing bids with independent estimates) to detect if all bids seem artificially high or aligned.
- **Transparency in Communication:** All clarification questions from bidders and the PSO's answers are documented in writing and shared with *all* prospective bidders (usually by issuing an official Q&A or addendum). This way, no bidder gets exclusive information. Pre-bid meetings are minuted and the minutes (including all questions and responses) are distributed to all who have obtained the RFP.
- **PV supplier screening & evidence:** For PV packages, the evaluation committee shall (i) confirm receipt of the bids, (ii) require an evidence pack (facility list by tier, country-of-origin/chain-of-custody support, signed audit/records undertakings) from the recommended bidder before award, and (iii) incorporate remedies (holds, replacement/substitution, corrective action) in the Letter of Award and Contract Data. Non-submission or material deficiency is grounds for non-award.

6. Permits and Regulatory Compliance

All LCC subprojects must comply with applicable Thai laws and regulations. This section outlines the typical regulatory requirements for two common categories of LCC projects: (1) projects implemented on public-sector sites (such as municipal buildings and streetlighting) and (2) projects in industrial estates (like IEAT's solar PV mini-grid), which often involve additional industrial and energy regulatory considerations. While specifics may vary by location and project, the following provides a general roadmap of compliance.

6.1 Permitting for Public Sector EE/RE Projects (Municipal Buildings and Streetlighting)

Permitting for public-sector EE/RE projects on municipal buildings and streetlighting is generally straightforward because the sites are in the public domain and often exempt from some private-sector requirements. Key steps relate to building and construction permits, electrical and grid approvals, energy regulatory thresholds, basic environmental management, and occupational health and safety. Where physical works are involved (e.g., rooftop PV, strengthening or replacing poles), Thai building codes and local ordinances apply, with designs vetted by licensed engineers and simple modification permits or written approvals issued by the relevant Public Works office. Streetlighting retrofits using existing poles often require no new construction permits, but new poles, foundations, or control cabinets may trigger municipal engineering and traffic coordination.

Grid-connected PV systems require interconnection approval from the utility (including submission of technical designs and, where relevant, bi-directional meters or settings to ensure no export if surplus feed-in is not allowed), and the RFP/contract should clarify that systems are purely for self-consumption. Under the Energy Industry Act, most distributed municipal rooftop systems will fall

below licensing thresholds and be used for on-site consumption, so only notifications (if any) are required. Environmental impacts are typically minor and positive, so EIAs are not triggered, but good practices are still needed for handling waste (especially hazardous waste from old lamps, asbestos roofs, or batteries) and are further detailed in Annex F (Safeguards Guidelines).

Clean tech companies must meet Thai labor and occupational safety requirements (e.g., fall protection on rooftops and poles, road-safety measures for night works) and maintain appropriate workmen's compensation and third-party liability insurance, which the PSO should verify. If works affect heritage buildings or protected areas, the PSO must obtain clearances from the Fine Arts Department or other relevant authorities and may need to adopt special design solutions. While not formal permits, advance public notification and coordination with traffic police help manage short-term disruptions during streetlight upgrades and build community support.

Municipal LCC projects face a relatively light regulatory burden focused on internal building approvals, utility interconnection, and standard safety and environmental practices; because the PSO has jurisdiction, many steps can be expedited if planned early. The clean tech company should submit permit and interconnection applications immediately after contract signing, with the Implementation Roadmap (Annex A) sequencing these tasks in parallel with other mobilization activities to avoid bottlenecks.

Permit exemptions for rooftop solar PV on public buildings (B.E. 2567–2568). Two regulatory exemptions materially reduce the permit burden for Component 1 solar PV subprojects on public buildings. First, under Ministry of Industry Regulation B.E. 2567 (2024), installation of rooftop solar PV systems outside industrial estate areas is exempt from the factory operating license (Ror Ngor 4), eliminating a significant administrative step for most public building sites. Second, under Ministry of Interior Regulation No. 72 B.E. 2568 (2025), installation of rooftop solar panels is exempt from the building modification permit requirement provided that the panel weight does not exceed twenty (20) kilograms per square meter. This weight limit is a binding design constraint: the CTC must design all systems to comply with the 20 kg/m² limit to retain eligibility for the exemption. CTCs must verify at the time of detailed survey whether each site qualifies under both exemptions and must document the applicable regulatory basis in the permitting record.

Batch grid connection coordination with MEA. For multi-site solar PV procurements within MEA jurisdiction (applicable to BMA and other Bangkok-area PSOs), the PSO should coordinate with MEA to establish a Batch Processing Framework covering all sites in a given procurement package rather than seeking individual grid connection permits site by site. This approach, pioneered under the BMA LCCP procurement for 302 sites, significantly reduces the timeline and administrative burden for utility interconnection, allows MEA to allocate hosting capacity across the batch, and facilitates coordinated meter management. PSOs procuring within PEA jurisdiction should pursue an analogous portfolio-level coordination approach with the relevant PEA office. CTCs must design Zero Export Controllers at all sites in accordance with ERC regulations applicable to government agency buildings.

Permitting for building energy efficiency retrofits. Building EE retrofits (HVAC, interior LED, building management systems, and similar ECMs) generally carry a lighter permitting burden than solar PV installations because they involve works entirely within the building envelope and do not require utility interconnection approval or ERC licensing. Key requirements are: (a) internal building approvals from the relevant facility management authority or building owner (including work permits for electrical and mechanical works); (b) compliance with the Ministerial Regulation on Building Safety for any structural penetrations or load-bearing changes associated with chiller or air-handling unit replacements; (c) licensed electrical engineer sign-off for any switchboard or distribution board modifications; and (d) confirmation that any refrigerant handling involved in chiller replacement is performed by licensed technicians in accordance with Thai industrial safety regulations. Environmental permits and EIA are not triggered by routine building EE retrofits. CTCs should submit a permitting plan to the PSO within thirty (30) days of contract signing, identifying any approvals required and the responsible party for each.

6.2 Permitting for Industrial Estate Projects (IEAT Solar PV Mini-Grid Case)

Permitting for industrial estate projects under IEAT, such as the planned 50–70 MW captive solar PV mini-grid, is more complex than for municipal projects because of the project scale, private ownership, and operation of an internal power network. Key domains include land use and IEAT approvals, environmental assessment, construction permits, factory/industrial licensing, ERC power licenses, grid interconnection, and industrial safety. IEAT must approve any major installation on estate land or roofs, with clear land-use rights, easements, and agreements (often via an clean tech company -owned SPV) documented to allow construction and operation of PV and mini-grid infrastructure. Depending on size and design, a project-specific EIA/EMP may be required, even if the estate already has an umbrella EIA, with IEAT’s environmental unit and Ministry of Industry rules guiding how construction impacts, waste, and potential risks (e.g., glare, erosion, batteries) are managed.

Normal building and construction permits will apply for ground-mounted arrays, control rooms, and cabling works, and IEAT/the local authority will review structural and civil designs, trenching, and any high-structure or airport-adjacent issues. Factory Act implications must be checked with DIW (especially for large storage or equipment housed within existing factories), and host factories may need to amend their factory licenses to reflect added equipment and updated safety plans.

The most critical regulatory interface is with the Energy Regulatory Commission and PEA/MEA as grid operators. A large private plant and mini-grid may require a power generation license and possibly a distribution license, although IEAT’s special status and “captive use” structure can allow the project to sit under IEAT’s existing arrangements or be framed as a service rather than electricity sales. In all cases, the clean tech company and IEAT need a clear regulatory strategy and early engagement with ERC to confirm whether full licenses, simplified registration, or pilot-scheme approvals apply. Interconnection to MEA/PEA’s grid at the estate substation requires a detailed technical review, zero-export or limited-export conditions, robust protection (anti-islanding, reverse power relays, voltage/frequency controls), power-quality compliance, and a formal interconnection agreement. Fire and industrial safety requirements (lightning protection, firefighting systems, emergency procedures, PPE, ESA reviews) are enforced through IEAT’s safety systems and periodic inspections.

Because ownership and incentives (e.g., BOI promotion) affect licensing and tax treatment, the clean tech company /IEAT must also align corporate structuring and asset transfer plans with the permitting strategy. The Implementation Roadmap in Annex A sequences EIA, ERC licensing, IEAT approvals, interconnection studies, and construction permits in parallel starting immediately after clean tech company selection, so that all clearances are obtained by the time construction and commissioning ramp up. With early planning and coordinated action, this more complex industrial permitting landscape remains manageable and fully compatible with LCC’s clean-energy, safety, and environmental objectives.

7. Contract Management Framework for the LCC Project

This Section summarizes the Project’s contract architecture at an operational level. **Detailed commercial guidance** (risk allocation, must-have clauses, negotiables) is provided in **Annex E**, and **standard templates and forms** are provided in **Annex I**. The Project’s approach is to maintain standardized, bankable documentation and to avoid bespoke negotiation, except for the limited bid variables expressly permitted in the relevant RFP and template schedules.

7.1 Contract Architecture Summary

Contract / Instrument	Core Parties	Purpose	Cashflow / Payment Trigger	Template / Guidance Reference
(1) Energy Performance Contract (EPC) / Performance-Based Services Agreement	PSO ↔ Clean Tech Company	Defines scope, performance obligations, MRV requirements, and payment formula (shared savings or output-based).	Periodic payment based on verified performance (MRV-derived savings or generation), per executed contract formula.	Template: Annex I. Commercial guidance: Annex E. MRV rules: Annex C.
(2) EXIM Sub-Loan / Financing Agreement	EXIM ↔ Clean Tech Company	Provides debt financing for eligible subproject CapEx and implementation costs, with required covenants and controls.	Disbursement in tranches against agreed milestones/eligible expenditures; repayment from project cashflows per financing terms.	Procedures: Annex G. (Subproject appraisal/checklists: Annex I.)
(3) Performance Insurance Policy (Energy Savings / Output Guarantee Insurance)	Insurer ↔ Clean Tech Company (with PSO/EXIM as beneficiary/loss payee where applicable)	Backstops performance shortfalls and stabilizes project cashflows, consistent with EPC performance obligations and MRV.	Claim payment triggered by verified under-performance relative to the insured guarantee, subject to policy terms.	Optional commercial guidance: Annex E §E.4.
(4) Emission Reduction Purchase Agreement (ERPA) – Component 2 (Private Subprojects)	Private Asset Owner/Seller ↔ CME (KTB)	Enables results-based payments from the VER Payment Facility in exchange for transfer of verified VER rights, per program rules.	Results-based payment only after verification/issuance and transfer of VER rights, per VERPF rules and ERPA.	Rules: Annex D. Template: Annex I. CME operations: Annex H. MRV: Annex C.

Note: The exact combination of contracts for a given subproject depends on the component and structure (public sector EPC-financed subproject under Component 1 versus private subproject under Component 2).

Tripartite Agreement (required for all Component 1 solar PV subprojects with EXIM financing). Prior to execution of the EPC/PEMC contract, a Tripartite Agreement must be entered into among the PSO, the CTC, and EXIM Bank. This agreement is a required condition precedent to contract commencement and is not subject to negotiation. The Tripartite Agreement must at minimum: (a) recognize the assignment of the right to claim PEMC Service Fees from the PSO to EXIM Bank as

security for the sub-loan; (b) require the PSO to provide simultaneous notice to EXIM Bank in the event of any default notice issued to the CTC; (c) prohibit the PSO from terminating or materially amending the contract without EXIM Bank's prior written consent; and (d) expressly confer Step-in Rights on EXIM Bank as described below.

Step-in Rights mechanics (required minimum terms). Upon the PSO issuing a default notice to the CTC, EXIM Bank must receive simultaneous notification. The CTC shall have a cure period of not less than thirty (30) and not more than sixty (60) calendar days. If the default cannot be cured within that period, EXIM Bank shall have an additional period of ninety (90) to one hundred and twenty (120) calendar days in which to exercise its step-in rights, whether by curing the default itself, procuring a substitute CTC, or taking such other action as it deems necessary to preserve the sub-loan security. During the period in which EXIM Bank is exercising or actively pursuing step-in rights, the PSO shall suspend its right to terminate the contract. These timelines are minimum standards; individual Tripartite Agreements may provide longer cure or step-in periods subject to EXIM Bank credit policy. Deviations from the minimum timelines require EXIM/PMU approval and must be documented in the subproject file. For Component 1 EE and LED subprojects where system ownership transfers to the PSO upon installation, EXIM will specify in the sub-loan agreement whether a Tripartite Agreement or a direct contractual assignment of PSO receivables is required, based on loan amount, security structure, and credit assessment.

Battery Energy Storage Systems (BESS): contractual and MRV treatment. BESS installations are eligible under Component 1 when co-located with solar PV or as standalone peak-demand/backup systems for eligible PSO facilities. Program parameters: (a) The CTC bears the obligation and cost of mid-life BESS replacement (typically Year 12, based on 4,000-cycle design life at one full cycle per day), which must be provided for in the EPC/PEMC and reflected in the CTC's financial model submitted to EXIM. (b) The Decommissioning Bond (Annex A, §A.5) applies to BESS at the same 2% rate calculated on the BESS component of total system CAPEX. (c) BESS charge and discharge cycles must be separately metered and logged at 15-minute intervals; the M&V plan must specify how BESS-assisted generation interacts with the Guaranteed kWh calculation and Deemed Generated Energy formula to avoid double-counting. Before any ERPA is executed for a solar-plus-BESS subproject, KTB as CME must confirm in writing whether BESS dispatch is: (i) excluded from VER calculations entirely; (ii) treated as time-shifting solar generation with no net VER impact; or (iii) subject to a separate BESS dispatch methodology. This written determination must be recorded in the subproject file and must precede the inclusion of any BESS-related carbon revenue in the CTC's financial model submitted to EXIM. (d) Minimum State of Health (SoH) of 80% of initial rated capacity at Year 10 (or such other period specified in the PEMC) is required as a contract performance parameter; degradation below this threshold triggers a corrective action obligation on the CTC analogous to the solar PR guarantee mechanism.

PEMC reference tariff, escalation, and tariff-change review. For all Component 1 subprojects structured as output-based PEMCs, the following tariff parameters are required minimum standards and shall be reflected in every RFP, EPC/PEMC, and EXIM sub-loan agreement. (a) **Reference tariff ceiling.** The Fixed Rate Factor (FRF) proposed by the CTC shall not exceed the applicable blended utility tariff at the time of proposal submission: for BMA-jurisdiction buildings, the MEA blended tariff (currently 4.20 THB/kWh); for provincial sites, the applicable PEA tariff schedule. The PSO shall state the reference tariff in the RFP Instructions to Bidders and shall update it if the tariff changes between RFP issuance and contract signing. (b) **Escalation mechanism.** The FRF shall escalate annually at the lower of: (i) the actual MEA/PEA tariff change for the relevant tariff category, or (ii) the Thai Consumer Price Index (CPI) change for the preceding calendar year, subject to an annual cap of 3.0% and a floor of 0%. The escalation formula and data source shall be specified in the executed EPC/PEMC and verified by EXIM/PMU at each annual payment cycle. (c) **Tariff-variance review trigger.** If the applicable MEA/PEA tariff for the relevant billing category changes by more than fifteen percent (15%) in either direction relative to the reference tariff stated in the executed contract, either party may invoke a Contract Review within sixty (60) calendar days of the tariff change taking effect. (d)

Resolution path. Upon invocation of a Contract Review, EXIM/PMU shall convene the PSO, the CTC, and the insurer (where applicable) within thirty (30) calendar days. Parties shall first attempt renegotiation of the FRF to restore the original risk allocation. If renegotiation fails within ninety (90) days of the review trigger, the CTC may invoke the tariff-change force majeure provision in the executed EPC/PEMC, subject to the terms of that clause. Where a performance insurance policy covers tariff-change revenue risk, the insurer’s consent to any FRF adjustment is required before the amendment takes effect. Deviations from this framework require EXIM/PMU approval and must be documented in the subproject file.

7.2 Contract Sequencing and Interaction

The Project’s contracting sequence is designed to keep procurement fair, accelerate financial close, and ensure that payments are strictly linked to verified performance.

Step	Milestone / Output	Primary Owner	Minimum Documentation / Reference
1	PSO issues RFP package including draft EPC and mandatory schedules	PSO	RFP package templates and minimum forms (Annex I); integrity controls (Section 5.4)
2	Bid evaluation and award recommendation	PSO	Bid evaluation report and audit trail (Section 5); recordkeeping requirements (Section 5 and Annex I)
3	EPC signature (based on template; populated only with bid variables and site-specific schedules)	PSO + Clean Tech Company	Executed EPC template (Annex I); MRV requirements (Annex C)
4	EXIM credit committee subproject appraisal and sub-loan signature (if applicable)	EXIM + Clean Tech Company	Eligibility file and checklists (Annex I); FM/disbursement rules (Annex G)
5	Performance insurance bound/effective (optional, at CTC election)	Clean Tech Company	Insurance requirements reflected in EPC/financing covenants; guidance (Annex E)
6	Implementation, commissioning, MRV onboarding	Clean Tech Company + PSO	Commissioning evidence; MRV onboarding and availability rules (Annex C)
6a	Baseline Lock-In Certificate co-signed (EE and solar PV subprojects where baseline is measured rather than stipulated)	Clean Tech Company + PSO	CTC submits Contract Detailed Energy Audit results and proposed baseline; PSO reviews and co-signs Baseline Lock-In Certificate confirming agreed baseline and IPMVP methodology for each ECM. Required before Performance Period commences. (Annex A-II §A-II.5; Annex C mandatory IPMVP options)
7	Performance period operations: reporting, verification, invoicing	Clean Tech Company + PSO	Reporting cadence and approval workflow (Section 9); MRV protocols (Annex C)

Step	Milestone / Output	Primary Owner	Minimum Documentation / Reference
8	(Component 2 only) Verification/issuance cycle and VERPF payment	CME (KTB) + Seller	VERPF rules (Annex D); ERPA template (Annex I); CME ops (Annex H)

7.3 Governing documents, precedence, and “no bespoke negotiations”

Standardization principle. The Project relies on standardized templates and rules to protect procurement integrity and enable scale. As a result, executed contracts shall be based on the standard templates referenced in Annex I, and the commercial positions and risk allocation shall be consistent with Annex E.

No bespoke negotiation beyond bid inputs. After award, changes are limited to: (i) inserting the winning bidder’s offered variables (e.g., savings share, tariff factor/share, term), (ii) site lists, technical schedules, commissioning plan, and (iii) other information expressly designed as “bid variables” in the RFP/template. Material departures from the template approach are not permitted unless explicitly approved under applicable rules and documented in the procurement file.

8. Financing and Financial Management

This Section provides a high-level overview of financing structures and funds-flow under the Project. All detailed financial management procedures, disbursement rules, documentation requirements, internal controls, accounting, and audit arrangements are governed by Annex G, which serves as the single authoritative procedural reference for financial management and disbursement.

8.1 Funds-Flow

The Project uses two primary funds-flow channels, depending on the component and type of subproject:

- IBRD → EXIM Bank of Thailand (DA/OA) → (i) Sub-loans to Clean Tech Companies under Component 1
- IBRD → EXIM Bank of Thailand (DA/OA) → (ii) Transfers to KTB for results-based payments under the VER Payment Facility (Component 2)

Component 1 – Public Sector Performance-Based Investments

- IBRD proceeds are on-lent by EXIM to eligible Clean Tech Companies under sub-loan agreements at market based, non-subsidized terms that remain competitive. Pricing will follow EXIM’s risk-based framework, referenced to a THB base rate (e.g., Minimum Retail Rate - MRR) plus a risk margin. Loan terms will typically include tenors of 10- 12-years, interest-only during construction, and amortization thereafter. Security will consist of the assignment of PSO receivables under the Tripartite Agreement.

Portfolio concentration. EXIM shall maintain sub-loan concentration limits in accordance with its internal credit policy, including a maximum single-PSO exposure limit and a maximum single-technology-type concentration limit. EXIM shall report sub-loan portfolio concentration — by PSO, by technology type, and by geographic area — in each Interim Financial Report (IFR) submitted to the

World Bank. Where a proposed sub-loan would cause the portfolio to exceed any concentration limit, EXIM shall seek World Bank no-objection before proceeding.

- Financing terms may be adjusted over time to reflect market conditions, however, at no time will the interest rate from EXIM to Clean tech companies be subsidized and potentially undercut a commercial rate in a similar transaction.
- Financial covenants include minimum equity contributions, limits on leverage, minimum project-level coverage ratios and standard default and cure provisions.
- Sub-loans finance eligible capital expenditures and implementation costs for performance-based subprojects executed under signed EPCs with participating PSOs.
- Repayment is supported by performance-based payments under the EPC, subject to verified results.

Component 2 – Results-Based Payments for Verified Emission Reductions

- IBRD proceeds are on-lent by EXIM to Krung Thai Bank (KTB), acting as the Coordinating and Managing Entity (CME), for operation of the VER Payment Facility (VERPF). Note: EXIM on-lends these funds to KTB on commercial, non-grant terms under the EXIM–KTB Subsidiary Agreement; transfers to KTB are not made on a non-repayable (grant) basis.
- Payments are made only after verification, issuance, and transfer of Verified Emission Reduction (VER) rights in accordance with the applicable program rules and ERPA.

Component 2 operating statement: Component 2 comprises (a) the IBRD-financed VER Payment Facility (VERPF), which provides, results-based payments to eligible private asset owners/participants in exchange for verified emission reduction (VER) rights; and (b) the national carbon crediting mechanism operated by KTB as the Coordinating and Managing Entity (CME), which establishes program rules, dMRV/registry arrangements, verification/issuance cycles, and stakeholder outreach.

IBRD financing is used solely for VERPF results-based payments under (a). CME operating functions under (b) are part of the Project scope but are financed from counterpart resources and/or carbon-market revenues, and must be implemented consistently with the ESMF and this POM. Annex G is the single procedural reference for FM/disbursement and payment processing; Annex C is the technical MRV protocol; Annex F is the E&S screening reference; Annex I contains the standard templates/forms.

A schematic representation of funds-flow is illustrated below:

- IBRD → EXIM (DA/OA) →
 - Sub-loans to clean tech service providers (Component 1)
 - Transfers to KTB-CME for VERPF payments (Component 2)

8.2 Conditions Precedent to Disbursement

Across all components, no funds may flow unless the following minimum conditions are satisfied. Detailed documentation, verification steps, and approval workflows are set out in Annex G. The DFIL governing EXIM–KTB fund transfers shall be shared with KTB for review not less than 30 calendar days prior to execution of the Subsidiary Agreement. KTB may raise operational concerns within 15 calendar days of receipt; EXIM and the World Bank will address material concerns before Subsidiary Agreement signing.

For Component 1 sub-loans:

- Signed Energy Performance Contract (EPC) based on the standard template (Annex I);

- Completion of environmental and social screening and clearance in accordance with Annex F;
- Confirmation of required permits and authorizations for the subproject;
- Evidence of performance insurance coverage, where the CTC has elected to obtain such insurance (not a mandatory condition precedent);
- Completion of EXIM independent subproject credit appraisal and eligibility confirmation;
- Establishment of MRV arrangements consistent with Annex C;
- Satisfaction of any additional conditions specified in the sub-loan agreement and Annex G.

For Component 2 VERPF payments:

- Execution of an ERPA based on the standard template (Annex I);
- Verification and issuance of emission reductions in accordance with Annexes C and D;
- Transfer of VER rights to the CME, as required under the ERPA;
- Compliance with VERPF operational rules and approval processes;
- Satisfaction of all payment authorization and documentation requirements set out in Annex G and Annex H.

Tax opinion on VER proceeds (Component 2 — additional condition): No disbursement under Category 2 (VERPF) shall be made until EXIM/PMU has obtained either a Revenue Department ruling or a binding Thai tax legal opinion on the VAT and corporate income tax treatment of VER sale proceeds under the LCCP. EXIM/PMU must notify all potential ERPA sellers of the open tax status in writing before any ERPA is executed. As of March 2026 no such ruling has been issued.

8.3 Payment Mechanisms

Payments under the Project are strictly performance-based and linked to verified outputs:

- **Component 1:** Payments to clean tech company under EPCs are calculated in accordance with the performance and payment formula set out in the executed contract (e.g., shared savings or output-based formula), based on verified results from the MRV system (Annex C).
- **Component 2:** VERPF payments are made on a results-based basis following verification, issuance, and transfer of VER rights, in accordance with the ERPA and program rules (Annex D).

Detailed payment calculations, invoicing procedures, verification steps, and approval authorities are governed exclusively by Annex G and the applicable contract templates.

8.4 Reference to Templates and Procedures

- Commercial structures, risk allocation, and permitted bid variables: Annex E
- Standard contracts and term sheets: Annex I
- Financial management, disbursement, accounting, and audit procedures: Annex G
- MRV requirements: Annex C
- VERPF rules and issuance: Annex D

9. Monitoring, Reporting, and Verification (MRV)

Section 9 establishes the program’s monitoring, reporting, and verification requirements for all subprojects, including performance-based energy management services contracts. The digital MRV system is the authoritative source of performance data for payment verification, performance assessment, and audit. Detailed technical MRV protocols, including data interval requirements, buffering/backfill rules, data substitution rules, and audit trail requirements, are defined in Annex C and shall govern.

9.1 Reporting Responsibilities and Frequency: Clean tech service providers (including clean tech companies delivering rooftop PV and other eligible measures) are responsible for submitting progress reports and performance reports to the relevant PSO in accordance with the PSO-issued RFP/contract and the reporting templates referenced in this POM. PSOs are responsible for reviewing submissions, confirming completeness and compliance, and transmitting required summaries to EXIM/PMU as applicable. At minimum, reporting shall include:

- monthly progress reporting during installation and commissioning
- monthly performance reporting during the performance period for payment verification;
- annual performance summaries for guarantee assessment and program reporting; and
- E&S/OHS reporting and incident reporting in accordance with Annex F.

9.2 Verification and Approval Workflow: Performance verification for payment purposes shall be based on MRV data and the executed contract formula. PSOs shall review MRV-derived performance reports and supporting documentation prior to approving invoices or performance-based payments. Where independent verification is required (e.g., annual verification cycles or spot checks), PSOs and the CME shall coordinate verification scheduling and evidence requirements. Any corrections to MRV data used for payment or performance assessment shall follow Annex C protocols and be recorded with an auditable trail.

9.3 Compliance and Remedies. Failure to maintain MRV compliance, submit required reports, or cooperate with verification and audit requests may result in payment suspension, corrective action requirements, or other contractual remedies as provided in the executed contracts and this POM. Serious incidents and material non-compliance shall be escalated immediately in accordance with Annex F.

9.4 MRV Dispute Resolution

Where the PSO and CTC dispute an MRV-derived payment figure, the following escalation path applies: (a) the disputing party notifies the other and EXIM/PMU in writing within ten (10) business days of receiving the payment report; (b) EXIM/PMU convenes a technical review within fifteen (15) business days; (c) if unresolved, EXIM/PMU appoints an independent technical expert within thirty (30) calendar days; (d) the expert's determination is binding on both parties and shall be reflected in the next payment cycle. The existence of a dispute does not suspend undisputed payment amounts.

9.5 Payment Suspension for MRV Non-Compliance

EXIM/PMU may suspend Component 1 performance-based payments where: (a) the CTC fails to maintain MRV monitoring availability at or above 98% for two consecutive months; (b) the MRV platform is disconnected or data is unverifiable for more than fourteen (14) days without approved substitution rules; or (c) the CTC fails to cooperate with a scheduled verification or audit. KTB/CME may suspend VERPF payments under Component 2 on the same grounds for ERPA sellers. Suspension is lifted upon demonstrated restoration of MRV compliance. Suspended payments do not accrue interest during the suspension period unless the suspension is subsequently determined to have been wrongful.

9.6 Verified Data Package Sign-Off

For each payment cycle, a Verified Data Package must be approved before any payment is processed. Under Component 1, the EXIM/PMU Portfolio Manager approves the Verified Data Package within five (5) business days of receipt from the CTC; failure to approve or reject within that window constitutes deemed approval. Under Component 2, the KTB CME approves the Verified Data Package prior to submitting a VERPF payment request to EXIM; KTB certifies in each payment request that the data package is complete, accurate, and has been validated by the VVB. Only data from Verified Data Packages approved through this workflow may be used for payment determination. Annex C and Annex I contain the data package template and required contents.

10 Program-Level Monitoring and Reporting

This section sets out program-level monitoring and reporting requirements that sit above individual subproject reporting. Program-level reporting consolidates PSO and Clean Tech Company (CTC) reporting to provide decision-ready information to the Steering Committee, EXIM/PMU management, and the World Bank. Technical MRV calculations and substitution rules are governed by Annex C; E&S compliance reporting is governed by Annex F; and reporting templates are provided in Annex I. Section 10 and Annex I constitute the authoritative reporting framework — where requirements elsewhere in the POM appear to duplicate Section 10, the Section 10 calendar and Annex I templates prevail. Full consolidation of reporting requirements into a single section is planned as the first POM update task post-effectiveness.

Responsibilities and workflow.

- **Clean tech companies** submit site- and package-level progress reports to the PSO and EXIM/PMU in accordance with the applicable contract and the reporting calendar below (using Annex I templates).
- **PSOs validate operational information** (asset list, commissioning status, service availability) and confirm any issues affecting performance (e.g., access constraints, outages, changes in operating hours).
- **EXIM/PMU consolidates reporting** into (i) quarterly program dashboards, (ii) semi-annual program reports (the primary World Bank supervision instrument, prepared and transmitted per Section 3.2.5), and (iii) annual program reports, and escalates material issues to the Steering Committee.

Key performance indicators (KPIs) – program level

KPI	Definition / unit	Primary data source	Reporting frequency
Energy savings	MWh saved (annual and cumulative) for EE measures, disaggregated by subproject type (solar PV generation / building EE savings / LED streetlighting savings) in quarterly dashboard and annual report	CTC reports + MRV calculations (Annex C)	Quarterly / Annual
Renewable generation	MWh generated and installed capacity (MW)	dMRV platform + commissioning records	Quarterly / Annual
GHG emission reductions	tCO ₂ e reduced (annual and cumulative)	MRV protocol (Annex C) + grid EF assumptions	Quarterly / Annual

Portfolio coverage	# of facilities/assets upgraded, disaggregated by PSO, package, and subproject type (solar PV / building EE / LED streetlighting)	CTC progress reports + PSO validation	Quarterly
Private capital mobilized	THB invested by CTCs (and any co-financing), disaggregated by package	EXIM/PMU FM records (Annex G) + CTC reporting	Quarterly / Annual
E&S compliance	% subprojects with completed screening/instruments; incidents and GRM status	E&S screening files (Annex F)	Quarterly
MRV cycle performance	# of verification cycles completed; % data gaps resolved; verification lead time	dMRV + verifier reports	Semi-annual / Annual

Reporting calendar and outputs

Output	Prepared by	Audience / approval	Timing
CTC site/package progress report (Annex I template)	CTC	PSO + EXIM/PMU; issues escalated as needed	Monthly (during installation) and quarterly (during O&M)
Program quarterly dashboard (portfolio status, delivery, risks)	EXIM/PMU	Steering Committee; World Bank (for information)	Quarterly
MRV reporting package for verification cycle	EXIM/PMU + CME/KTB as applicable	Independent verifier; EXIM/PMU approval workflow per Section 9	Per verification cycle (as defined in Section 9 / Annex C)
Semi-annual program report (KPIs, FM status, E&S compliance, MRV/verification cycle, material risks)	EXIM/PMU (draft); PDMO (transmittal to WB)	Steering Committee (approval); World Bank (receipt within 15 days of SC meeting)	Semi-annually (June–July and December–January)
Annual program report (KPIs, lessons learned, pipeline)	EXIM/PMU	Steering Committee; World Bank; relevant ministries (as applicable)	Annually
E&S compliance summary (screening coverage, incidents, GRM)	EXIM/PMU with PSOs	Steering Committee; World Bank	Quarterly (or per Annex F incident timelines)

All program-level monitoring data must be stored in a secure program repository/MIS managed by EXIM/PMU, with access controls and versioning. Where data are used for payment determination, only the verified data package approved through the MRV workflow in Section 9 (and calculated per Annex C) may be used.

Annex A: Technical Specifications – Rooftop Solar PV Systems (Public Buildings)

This Technical Specifications Annex provides the requirements and standards for designing, installing, and commissioning grid-connected rooftop solar photovoltaic (PV) systems on public buildings in Thailand under the LCC program. These specifications become an integral part of the Energy Performance Contract (EPC) with the clean tech company, ensuring that all PV installations meet quality, performance, and safety criteria suitable for long-term operation (at least 25 years). The Contractor/clean tech company shall execute the works as a turnkey solution, delivering fully functional PV systems that reliably produce the expected energy.

A.1 Scope of Work

The Contractor's scope includes all tasks to provide a complete rooftop solar PV installation on designated buildings, including but not limited to:

- **Design & Engineering:** Conduct structural assessment of roofs; develop array layout maximizing use of available area while avoiding shading; design electrical single-line diagrams from modules to point of interconnection; size all components (modules, inverters, cabling, protections) to meet output requirements.
- **Equipment Supply:** Procurement and delivery of all equipment and materials: PV modules, inverters, mounting structures, DC and AC cabling, combiner boxes, junction boxes, meters, monitoring devices, protective devices (surge protectors, disconnects, fuses, breakers), etc.
- **Installation & Construction:** Secure mounting of PV modules to roof (with appropriate roof sealing to prevent leaks); wiring and conduit installation; inverter placement (preferably near existing electrical rooms); integration with building's electrical system including connection to main distribution board; implementation of grounding and lightning protection for the PV system.
- **Permitting & Approvals:** Obtaining any necessary building modification permits (noting that many Component 1 public building sites will qualify for exemptions from both the factory operating license and the building modification permit under the regulations documented in Section 6.1 — the CTC must verify exemption eligibility at the time of detailed survey and document the applicable regulatory basis); coordinating with the relevant utility (MEA for BMA-jurisdiction buildings; PEA for provincial sites) for interconnection approval and meter change; preparing and submitting documents to ERC for license exemption notification if required.
- **Testing & Commissioning:** Perform insulation resistance tests, continuity tests, polarity checks; commission inverters per manufacturer procedure; test the shutdown and protection systems; measure initial performance (voltage, current, power at inverter output); conduct a performance ratio test under standard conditions to verify system output meets expectations; and upon completion of all tests, run the system in continuous stable operation for a minimum of fifteen (15) consecutive days with uninterrupted data transmission to the dMRV platform before formal acceptance may be issued. The 15-day stability period is a required condition of acceptance for all Component 1 solar PV subprojects and cannot be waived by the PSO without EXIM/PMU approval.
- **Training & Handover:** Train the building facility staff on basic operation and safety (how to read the inverter display, what to do in event of an alarm, etc.); provide a user manual and as-built drawings; hand over all warranty certificates, test reports, and a maintenance plan.

- **Operation & Maintenance (O&M):** (If included in contract) Carry out periodic cleaning of modules, preventative maintenance on inverters, tightening of connections, and timely repairs for the duration specified (which may be the whole EPC term or an initial few years). Ensure the monitoring system is functioning and data is being collected to the dMRV platform.

The Contractor is responsible for complete integration of the PV system with the building's electrical network, ensuring that solar energy is utilized on-site safely and any export to grid is controlled per regulations. Each system must be capable of either net metering or preventing backflow as required by the prevailing utility rules (currently, public buildings typically configure for zero export unless enrolled in a net-billing program).

A.2 Design Life and Performance Requirements

- **Lifetime and Degradation:** Systems shall be designed for a minimum 25-year operating life. For all Component 1 solar PV subprojects, the following degradation parameters are contractually locked and shall be incorporated into every EPC/PEMC: the system degradation rate in Year 1 shall not exceed two percent (2%); thereafter the annual degradation rate shall not exceed zero point five percent (0.5%) per year on a straight-line basis; and at Year 15, generation capacity must be not less than ninety percent (90%) of initial commissioned capacity. The CTC's annual generation guarantee shall be adjusted downward in accordance with this schedule.
- **Guaranteed Capacity:** The installed DC capacity (kWp) must meet or exceed the contracted capacity. Underperformance tolerance is not allowed – the clean tech company must slightly oversize if needed to account for normal losses so that contractual output is achieved. The AC capacity (inverter size) should be appropriately matched (often slightly below DC size since modules rarely produce nameplate under field conditions consistently).
- **Performance Ratio (PR) Guarantee:** For all Component 1 solar PV subprojects, the CTC must guarantee a minimum system Performance Ratio (PR) of not less than seventy-eight percent (78%), evaluated on a weather-corrected basis (Weather-Corrected PR) using solar irradiance data from the dMRV platform, adjusted for Bangkok's tropical climate. This 78% floor is a contractually locked minimum standard and applies throughout the Performance Period. The CTC shall design systems to exceed this floor and shall maximize PR through quality equipment selection, minimized DC voltage drop, adequate panel ventilation, and appropriate cleaning frequency.
- **Availability:** The system is expected to be operational (available) >99% of daylight hours, aside from scheduled maintenance. Inverter or system downtime must be minimized. The clean tech company should plan redundancy or fast repair to meet this.
- **Safety Performance:** Zero tolerance for safety incidents – the system must operate without electrical hazards (e.g., no live parts accessible, proper insulation). The clean tech company must adhere to safety standards (see Section C.4) to ensure safe operation throughout life.

All equipment and workmanship warranties specified herein are enforceable – meaning if, for instance, a module underperforms within warranty period, the clean tech company must replace it or claim manufacturer warranty, at no cost to the PSO. Warranties: modules (typically 10-year product, 25-year performance warranty), inverters (at least 5-year warranty, ideally extendable to 10), mounting structures (at least 10-year anti-corrosion), workmanship (1 year or more against installation defects).

A.3 Applicable Standards and Codes

The PV system design, equipment, installation, and testing shall conform to the latest editions of relevant Thai and international standards. Where Thai standards exist, those take precedence;

otherwise, internationally recognized standards (IEC, IEEE, etc.) apply. Key standards include but are not limited to:

- **Solar PV Modules:** Must be certified to Thai Industrial Standards Institute (TISI) standards or their IEC equivalents:
 - TIS 1843 (crystalline silicon terrestrial PV modules) – equivalent to IEC 61215 (design qualification and type approval).
 - TIS 2580 (PV module safety qualification) – equivalent to IEC 61730.
 - Thin-film modules, if used, shall meet TIS 2210 – equivalent to IEC 61646 (though thin-film use should be justified).
 - The contractor must provide certificates or accredited lab test reports for modules proving compliance.
- **Inverters:** Must meet utility interface and safety standards:
 - IEC 62116 for anti-islanding protection.
 - IEC 61727 for grid connection performance.
 - Alternatively, compliance with MEA/PEA specific requirements for grid-tied inverters (which often reference IEEE 1547 as well). Evidence of type-test certification required.
- **Electrical Installation:** Follow Thai laws (e.g., Electrical Engineering Practice Act) and relevant standards:
 - Thai Wiring Rules (per Metropolitan/Provincial Electricity Authority regulations).
 - IEC 60364-7-712 – Requirements for solar PV power supply systems in buildings.
 - PV arrays and wiring must comply with PEA/MEA distribution code; e.g., each module string must have proper over-current protection if necessary, isolation, etc.
 - The connection to building network must comply with PEA/MEA Requirements for Parallel Interconnection of Renewable Energy (which incorporate safety relay settings, etc.).
- **Component Standards:** All electrical components should carry appropriate IEC or equivalent:
 - Switchgear, breakers: IEC 60947 series.
 - Fuses: IEC 60269.
 - Cables: Thai TIS standards or IEC 60502 for power cables (suitable for outdoor PV use, UV resistant for rooftop DC cables).
 - Connectors: IEC 62852 (photovoltaic connectors safety).
 - Surge Protective Devices: IEC 61643.
- **Structural and Wind Load:** Rooftop mounting structures must be engineered to withstand Thai wind loads:
 - Comply with Thailand Building Control regulations for wind speed (for example, typically up to ~150-160 km/h wind gusts in central Thailand, higher in typhoon-prone regions).

- Use ASCE 7-16 or local wind code for calculating pressures on modules. Typically design for at least 150 kg/m² uplift force or as per DPT (Dept. of Public Works) guidelines.
- Structures should be aluminum or hot-dip galvanized steel (min 80 micron galvanization). Corrosion protection crucial for humid climate.
- Attachment to roof must be reviewed by a licensed structural engineer to ensure roof integrity (especially for older buildings). Provide calculations.
- **Occupational Health & Safety:** Follow Thai Labour Ministry safety notifications for construction work at height and electrical work:
 - All installers must use personal protective equipment (PPE), lifelines, etc., on rooftops.
 - One person on site to have safety supervisor training.
 - Comply with NFPA 70E or Thai equivalent for electrical safety (lock-out/tag-out during commissioning, etc.).
- **Environmental Compliance:** No hazardous materials, but if any waste (packaging, wire clippings) must be cleaned. If existing roofing or building materials contain or are suspected to contain asbestos-containing materials (ACMs), the CTC must immediately stop works in the affected area, notify the PSO and EXIM/PMU within 24 hours, and follow the Asbestos Management Protocol in Annex F before resuming works. ACM remediation must be performed by a licensed contractor compliant with Thai Department of Industrial Works Notification No. 2 B.E. 2548 (2005). No ACMs may be disturbed, drilled, cut, or removed without an approved remediation plan.
- **Supply-chain conformance.** In addition to technical standards, PV equipment suppliers shall comply with the PV supply-chain integrity requirements of Annex F and the Contract's Clause X – PV Supply-Chain Integrity. Evidence of tiered traceability to manufacturing facilities and countries of origin, and acceptance of audit/records access, is required prior to equipment submittal approval and as a condition of shipment/payment.

In case of any conflict between standards, the more stringent requirement shall apply. The PSO reserves the right to reject equipment or work that doesn't conform to these standards and codes.

A.4 System Components and Execution Details

- **PV Modules:** Must be Tier-1 quality, mono- or poly-crystalline silicon (or high-performance thin film if specified). Efficiency $\geq 17\%$ for crystalline (as of current market). Modules to have IEC 61215 and 61730 as above, plus tests for:
 - Fire safety: at least Class C fire rating (per UL 1703 or IEC 61730).
 - Hail impact: able to withstand 25 mm hail at 23 m/s (IEC 61215 testing includes this).
 - Each module flash-test data to be provided; all modules in array should be of same make/model and batch ideally.
- **Inverters:** Three-phase string inverters or central inverter as appropriate. Must provide output at 230/400 V, 50 Hz synchronized to grid. Features:
 - THD < 5%; power factor > 0.99 at full load (capable of adjustable power factor if needed for utility).
 - Efficiency > 97% (Euro efficiency). MPPT range suitable for module configuration.

- Ingress Protection: outdoor units at least IP65, indoor IP20 fine but usually roof or near roof environment can be hot/humid, so IP65 preferred.
- Communication: must have RS485/Ethernet or wireless to connect to monitoring system.
- Protections: integrated ground fault detection, anti-islanding (trip time <2 sec on loss of mains), over/under voltage, frequency trip per PEA/MEA specs.
- **Mounting Structure:** Tilt angle will depend on roof (if flat roof, recommend 5–15° tilt facing south to maximize annual yield; if pitched roof, follow roof angle). Mounting must ensure:
 - Roof penetrations are properly sealed (use of flashing, waterproof sealant). Alternatively, ballasted mounts on flat roof if roof can take weight, to minimize penetrations.
 - Materials: Aluminum alloy or galvanized steel, stainless steel fasteners (SS304 or better). No plain steel or wood.
 - Wind uplift: secure attachment with adequate number of anchors; use rail and clamp systems that are certified (many have wind tunnel tests).
- **DC Cabling & Combiner:** Strings preferably run to a combiner box (with fuses on each string positive) and a DC disconnect near the inverter. Cable sizing to keep voltage drop < 1.5% on DC runs. Use double-insulated solar cable (TÜV certified PV1-F or IEC 62930 cable). Route cables in UV-resistant conduits or tray; avoid lay on roof without protection.
- **AC Cabling:** From inverter AC isolator to main distribution board (MDB). Size for <1.5% drop. Use color coding (Red/Yellow/Blue phases, Black neutral, Green/yellow earth).
 - Provide an AC disconnect at point of interconnection as required by utility (usually a load-break switch or breaker).
 - If multiple inverters, synchronize outputs and combine onto a suitable panelboard with breakers for each inverter.
- **Earthing:** All metallic frames and structures must be bonded to the grounding system of building. Follow IEC 60364 for earthing arrangement (likely TN-S system in building). Resistance to earth < 5 ohm typically. Use proper gauge copper for earthing (at least 16 mm² main, 6 mm² bonding modules).
 - Lightning protection: If building has lightning rods, bond PV frames to that network so they are at same potential. If not, consider adding surge arresters and possibly air terminals if array is extensive (but typically existing building lightning system suffice).
 - SPD: Install surge protection devices on DC combiner (Type 2 SPD for DC) and on AC side (Type 2 SPD at inverter AC output) to protect against surges/lightning.
- **Metering & Monitoring:** Provide a generation meter (kWh meter) on the solar output. If net-metering is applied, the utility will install a bi-directional meter at grid interconnection; the generation meter is for internal tracking and MRV.
 - Also install a Pyranometer on one representative array plane to record solar irradiance (for PR calculation) – optional but recommended for MRV.
 - The system must integrate with the LCC digital MRV platform: likely supply a data logger or inverter with communication to send generation data in real-time to the central server (via GPRS or internet). The Contractor shall coordinate with the KTB's ICT team to configure data transmission (possibly via Modbus TCP or API).

- Provide at least 1 year of cellular data service for the logger if needed (or ensure building's internet can be used).
- **Testing & Commissioning:** The Contractor to submit a commissioning test plan for approval. At commissioning, conduct:
 - Open circuit and short circuit tests on representative strings (to check module health).
 - Inverter startup tests: ensure it connects to grid and starts exporting power.
 - Safety trip test: intentionally disconnect grid to ensure inverters shut down within 2 seconds (anti-island test).
 - Measure initial power output vs. irradiance to verify system is performing (e.g., at 1000 W/m², cell temp 50°C, expecting say 90% of STC due to temperature).
 - Submit a Commissioning Report including test results, inverter settings screenshots, insulation resistance test results for DC cabling (should be >1 MΩ).
- **Handover Documents:** including:
 - As-built schematics (single line diagram, layout of panels).
 - Equipment datasheets and warranties.
 - Copy of all permits and approvals (utility interconnection agreement, etc.).
 - Maintenance manual (basic cleaning recommended every 6 months, etc.).
 - Training attendance sheet (to ensure building staff trained).

The Contractor's compliance with these specifications will be monitored. The PSO or its technical advisor may inspect works at any time. Any deviations from these requirements must be pre-approved in writing by the PSO's engineer; otherwise, corrections at Contractor's cost will be enforced.

A.5 Maintenance and Warranty Responsibilities

Because rooftop PV performance directly affects the energy savings and carbon reduction goals, proper maintenance is crucial. The clean tech company shall:

- Perform routine cleaning of panels at least 2–4 times a year (frequency depending on dust conditions – Bangkok might require quarterly cleaning due to pollution).
- Inspect and tighten electrical connections annually.
- Monitor output via the MRV system daily; dispatch crew if any inverter is down or output deviates significantly from expected (possible fault or dirt).
- Respond to any system fault within 48 hours, as required by contract's performance maintenance clause.
- **Warranty:** If any component fails within its warranty, clean tech company to coordinate replacement free of charge. For example, if an inverter fails in year 4 (within typical 5-year warranty), clean tech company replaces it and configures the new unit, such that downtime is minimized (should have some spare inverter capacity or a spare unit on hand for quick swap ideally).
- Maintain records of maintenance and repair (these records may be requested by the PSO or insurer to verify that O&M obligations are met – per Annex I (Standard Templates & Forms), reporting templates will include maintenance logs).

Decommissioning Bond (required for all Component 1 solar PV subprojects where the CTC retains system ownership during the contract term). Because solar PV equipment remains the property of the CTC throughout the Performance Period, every EPC/PEMC for Component 1 solar PV must include a Decommissioning Bond accumulated by the CTC over the life of the contract at a minimum rate of two percent (2%) of total system value. The bond is a separate financial security instrument, distinct from all insurance policies, and shall be earmarked exclusively for: (a) decommissioning and safe removal of solar panels, inverters, BESS, and associated equipment at end of contract if the PSO does not exercise its retention option; (b) solar panel recycling with a target recovery rate of not less than eighty percent (80%) by weight, consistent with Gold Standard end-of-life requirements; and (c) restoration of each site to an appropriate condition. The default accumulation mechanism is an annual cash deposit by the CTC into a ring-fenced escrow account held by the PSO or a mutually agreed financial institution (or, where approved by EXIM, a bank guarantee of equivalent value acceptable to EXIM in lieu of cash deposit). Custody, release conditions, and the accumulation schedule shall be further specified in the executed contract and Annex G (Financial Management). Failure to establish or maintain the Decommissioning Bond is an event of default.

All in all, by adhering to these technical specifications, the installed PV systems will be safe, reliable, and performant, contributing to the LCC program's success by generating clean electricity and reducing grid consumption for years to come. The clean tech company's acknowledgement of this Annex (by signing the contract) means they accept these requirements and will be held responsible for fulfilling them in totality.

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Annex B: Technical Specifications – LED Street Lighting Retrofit

This annex describes the technical requirements and performance standards for retrofitting existing streetlights under the LCC program with new energy-efficient LED luminaires. The Contractor (clean tech company) shall supply, install, test, and commission LED streetlight fixtures on existing poles, ensuring equal or improved lighting levels compared to the old lamps, while achieving significant energy savings. These specifications form part of the contract and are contractually binding. No deviation is allowed without written consent from the Employer (usually the municipality or Department of Highways, etc. depending on jurisdiction).

B.1 Scope of Work

For each designated street or area, the scope includes:

- **Inventory Verification:** Conduct a field survey of existing street lighting infrastructure. Document the quantity, wattage, mounting height, pole spacing, arm length, road width, and condition of existing lights and poles. Note any poles that are not functioning or any electrical issues in circuits (to fix concurrently if minor).
- **Lighting Design & Photometric Analysis:** Using the inventory data, perform a lighting design simulation (e.g., with DIALux or similar software) to determine appropriate LED luminaire specifications for each road type. The design must meet Thai roadway lighting standards (often referencing GAT/MEA guidelines or international standards like CIE 140/ ISO 13201 for road lighting).
 - Ensure the design achieves at minimum the same average illuminance and better uniformity than existing lighting. Specific targets:
 - For main roads: e.g., Average illuminance ≥ 20 lux (assuming that was achieved before), Uniformity (min/avg) ≥ 0.4 as required by MEA standard for that category.
 - For secondary roads: e.g., ≥ 10 lux, uniformity ≥ 0.3 , etc. (Actual values to align with road class, see Thai street lighting standard or IESNA RP-8 guidelines).
 - Lamp selection: Typically, if replacing 250W HPS, one might use ~90-120W LED; if 400W HPS, ~150-180W LED, etc., subject to photometric design confirming it meets levels.
- **Luminaire Supply:** Provide LED streetlight luminaires that:
 - Are constructed of die-cast aluminum or similar durable housing, IP66 or higher for ingress protection (fully sealed against dust and water).
 - Have high-efficiency LED chips (luminaire efficacy ≥ 120 lumens/watt or latest industry standard).
 - Color Temperature ~4000K neutral white (range 3000–4500K acceptable as specified by BMA) for good visibility and color rendering; CRI ≥ 70 or as specified.
 - Rated life: $\geq 50,000$ hours (L70 at 50k hours at least).
 - Surge protection: inbuilt SPD 10kV/5kA at minimum.
 - Have certifications: TIS (if applicable) or IEC/EN standards for safety (IEC 60598-2-3 for road luminaires), electromagnetic compatibility (CISPR 15 / EN 55015), and

performance tested per IES LM-79 (photometric) and LM-80/TM-21 (LED chip lumen maintenance).

- **Dimming/Controls (if required):** If the project includes smart controls or dimming, specify luminaires with 0-10V or DALI dimmable drivers and NEMA socket for smart photocell/controller. LCC may not mandate smart controls, but if including a pilot of smart lighting, ensure compatibility with central control system. In any event, standard photocell or time-based controls to turn lights on/off are to be provided/reused on each circuit.
- **Removal of Old Lamps:** Safely remove existing HPS/MV lamp fixtures from poles. Dispose of all removed lamps and ballasts as per hazardous waste rules (HPS & MV contain mercury) – deliver to a licensed hazardous waste handler. Provide disposal certificates. Poles and brackets remain (unless any are structurally unsound, in which case notify PSO for replacement – replacing poles was likely not in scope unless identified and agreed).
- **Installation of LED Lights:** Mount new LED luminaires on existing outreach arms (may require a reducer or adapter if arm end doesn't fit the new fixture's spigot size; typical spigot 1.5-2 inch adjustable). Adjust tilt angle as per lighting design (often 0 to -5 degrees tilt for roadway). Replace photocell if old or not compatible (often new LED fixtures come with their own photocell).
 - Electrical connection: Use existing circuit wiring. If the old system had series circuits or transformers (unlikely in modern setups), convert to parallel if needed. Ensure each luminaire has proper fuse (e.g., 6A fuse in pole base or inline).
 - Balance loads across phases if 3-phase circuits.
- **Circuit and Panel Work:** Check the condition of streetlight panel controlling that circuit. Replace any burnt contactors, and adjust timer if needed. Ensure earthing of each pole is intact (measure earth resistance at randomly selected poles; should be < 10 ohm perhaps).
- **Quality and Safety:** All wiring at pole top to be insulated and weatherproof. Use heat-shrink or appropriate connectors. No exposed conductors. The luminaire should have internal wiring neatly tied and drivers fixed securely.
 - Work only on de-energized circuits (coordinate outages with city's electrical dept or do daytime when off, or if must work hot use proper insulated tools and PPE – but generally, circuits will be off via breaker).
 - Use bucket trucks or scaffolding for height; ensure traffic safety with cones/barriers when working roadside.
- **Testing & Commissioning:** After installation, perform night-on testing:
 - Verify each light comes on (walkthrough or drive-through inspection).
 - Measure illumination levels with a lux meter at critical points to confirm meeting specs (spot-check a sample of streets). For formal contract compliance, a lighting measurement survey might be done on representative roads showing average and min lux achieved – should meet the design target.
 - Check uniformity visually and instrumentally; check correlated color temp matches spec (e.g., lights are indeed ~4000K, not overly cool/blue or too warm).
 - Ensure photocell or timers turn lights off in day.
 - If smart controls implemented, test remote on/off/dim and monitoring system.

- **Handover & Training:** Provide the PSO with an updated inventory of installed lights (with GPS coordinates or pole IDs, wattage of new LED, etc.). Train city electrical staff on any new equipment (like how to replace a driver or photocell, how to use any control software if installed).
 - Provide warranty documents (the clean tech company typically will warranty workmanship for 1-2 years, plus manufacturer warranties which are 5+ years on LED luminaire and driver).
 - An operation manual or datasheet for the luminaires and any control gear.

B.2 Performance and Warranty Requirements

- **Lighting Performance:** New LED luminaires shall provide roadway illumination levels that meet or exceed the requirements for the road category as per MEA (Metropolitan Electricity Authority) Road Lighting Standards or Thai Department of Highways standards.
 - For example, for minor roads (Category 5), maybe average 10 lux, min 2 lux; for major arterials (Category 3), average 20 lux, min 5 lux, uniformity etc. The contract should specify the target values by road type.
 - Uniformity (Min/Avg) and Glare (Threshold Increment) must be within standard limits to ensure visibility and safety.
 - Color rendering index (CRI) of LEDs should be ≥ 70 (higher CRI improves visibility of objects and people).
 - Correlated Color Temperature (CCT) should be in “neutral white” range $\sim 4000\text{K}$ (some municipalities prefer 3000K to reduce glare; we follow the PSO’s directive – Bangkok likely around 4000K).
- **Energy Savings Guarantee:** The clean tech company should guarantee a minimum percentage of energy reduction (for instance, at least 50% energy savings compared to baseline consumption for that lighting network). This will be verified via measured load after retrofit vs before (taking into account hours of operation).

Baseline: measure a sample of existing lamp wattages including ballast draw (e.g., a 250W HPS actually draws $\sim 275\text{W}$ with ballast). New system: measure LED fixture wattage. Ensure at least 50% reduction in kW. If LED chosen doesn’t yield that, clean tech company must take measures (either additional dimming late at night or a more efficient model) to reach contractual savings.
- **System Reliability:** The LED system should be essentially maintenance-free for at least 5 years aside from cleaning or minor part replacements. We expect fewer than 1% of fixtures to fail per year in first 5 years. clean tech company to rectify any failures under warranty promptly.
 - Provide a 5-year manufacturer’s warranty for LED luminaires (including LED modules and drivers), covering manufacturing defects, premature LED failure or excessive lumen depreciation beyond L70, and color shift beyond spec.
 - If more than, say, 10% of LEDs in a fixture fail or lumen output drops below warranted level within 5 years, manufacturer to replace the fixture (that’s typically in LED warranties).
- **Drivers and Controls Warranty:** LED driver and any control node: minimum 5-year warranty. Photocells typically 1-2 years – clean tech company might hold spares.

- **Workmanship Warranty:** clean tech company to warranty installation workmanship for at least 1 year. Any installation defect causing outage (e.g., loose wiring connection) found within that period, clean tech company fixes at own cost.
- **Spare Parts:** The clean tech company should hand over some spare parts to PSO: e.g., 2-5% of luminaires as spares, photocells, perhaps a couple of LED drivers. Or commit to stocking them and replacing quickly under warranty.
- **Compliance Checks:** After, say, 3 months of operation, a joint inspection might be done to confirm all is well. Also, if part of MRV, the smart controllers might feed operational status (some LED streetlights have failure detection). The clean tech company has to maintain the specified performance for the duration of the EPC; since typically payments are tied to energy savings, any outage that reduces savings also reduces clean tech company payment, thus incentivizing them to fix quickly.

B.3 Technical Standards and Testing

Applicable standards include:

- **Illuminating Engineering Society (IES) LM-79:** for luminaire photometric testing. clean tech company should provide photometric reports (from independent lab) for the proposed LED fixtures, showing light distribution, lumen output, etc. This helps verify they will meet design.
- **IES LM-80 and TM-21:** for LED chip lumen maintenance projections. The LED manufacturer's LM-80 data plus TM-21 calc should indicate e.g. L70 > 50,000 hrs at operating temperature.
- **ANSI C136 series:** standards for roadway lighting equipment (if relevant, e.g., ANSI C136.2 for surge, C136.41 if dimming receptacles, etc.).
- **IEC 60598-1 & 60598-2-3:** general luminaire standards and particular for road and street lighting.
- **Electrical safety:** Compliance with relevant TIS or IEC for insulation, grounding, etc. Luminaires likely Class I devices (with ground).
- **Environmental:** LED fixtures should be RoHS compliant (no hazardous substances).
- **Ingress Protection:** IP66 (waterproof against heavy rain) for optical chamber, IP65 or better for driver compartment; Impact resistance IK08 or better (to handle vandalism or stones).
- **Heat Management:** Should operate in ambient up to 40°C (Thai nights can be 30°C+, days hotter if poles in sun in day, though lights off then). Drivers typically rated up to 50-60°C case temp.

During commissioning, the clean tech company and PSO can select random lights to open and inspect:

- Check LED module and driver model matches submittals.
- Check workmanship: proper sealing, gasket in place, wires dressed.
- **Photometric audit:** measure illuminance on road at sample points to confirm meets design levels (taking into account measurement tolerance). If any area is under-lit vs spec, clean tech company must remedy, possibly by adjusting tilt, swapping for a higher wattage fixture in that location, etc.
- **Circuit testing:** ensure no overload on any circuit breaker; measure circuit current after LED install, should be significantly lower than before, and well within breaker rating (if too low maybe consider downsizing breaker to maintain proper protection levels, though often not critical).

- **Burn-in period:** Typically run the lights for a week or so and monitor for any early failures (infant mortality of LED components). Replace any that fail immediately.

B.4 Ongoing Monitoring and Reporting

As part of MRV (Annex C, digital MRV may also cover streetlights if smart nodes used), but if not, some monitoring still implemented:

- The clean tech company is required to provide periodic performance reports e.g., quarterly, summarizing energy consumption of the street lighting circuits before vs after retrofit (from utility bills or measurements). These show achieved savings.
- If smart controllers are installed, they might report lamp status (on/off, malfunction). The clean tech company should maintain access to that data and share with PSO. If not, the PSO's usual maintenance crews plus clean tech company's warranty support will rely on night patrols to identify outages.
- The contract likely includes an SLA that any failed light during the performance period must be replaced within 48 hours (especially on main roads) or a short timeframe to minimize dark spots.
- The clean tech company keeps maintenance logs: date of each inspection, cleaning (if any), repairs done, and provides them to PSO at contract end or upon request.

By meeting these Annex B specifications, the street lighting retrofits will achieve:

- Substantial energy reduction (often 50-60%) with maintained or improved lighting quality.
- Enhanced public safety (better illumination uniformity, less lamp outages due to long LED life).
- Reduced maintenance burden on the city (no lamp replacements for ~5-10 years).
- Contribute to LCC targets with verifiable savings for MRV and carbon crediting (if accounted as avoided grid electricity usage).

This Annex, like others, is enforceable. The clean tech company confirms by contract signature that all requirements are understood and will be complied with. Any non-compliance discovered (e.g., substandard product used, or not meeting light levels) will trigger remedies such as replacement, penalties, or payment deductions as per contract conditions.

Annex C: Digital MRV System Requirements and Protocols

This annex specifies the Digital Measurement, Reporting, and Verification (MRV) requirements for all projects under the Thailand LCC Program. It outlines the standardized approach to measure energy savings and renewable energy generation, record data securely, and report results for verification and payment purposes. Compliance with these MRV requirements is mandatory for Contractors and forms part of the contract obligations.

C.0 Minimum MRV Technical Requirements (Mandatory)

C.0.1 Single Source of Truth and Auditability: The centralized digital MRV platform designated under the project shall be the authoritative source of performance data for payment, performance assessment, insurance claims (where applicable), and audit. The MRV platform shall maintain a complete audit trail of data ingestion and any approved corrections. For clarity, "digital MRV" as used in this POM encompasses IoT sensors, smart meters, and cloud-based platforms. The requirement for digital MRV does not preclude paper-based supporting documentation (e.g., site access logs,

maintenance records) from complementing the digital record, provided the digital platform remains the single authoritative source for performance data used in payment determinations.

C.0.2 Data Interval: The MRV system shall capture and record performance data at intervals no greater than fifteen (15) minutes (or more frequently if specified in a PSO contract).

C.0.3 Local Buffering and Backfill: Site data acquisition devices shall provide local storage sufficient to retain at least fourteen (14) days of data during communications outages and shall automatically backfill the MRV platform upon reconnection.

C.0.4 Monitoring Availability: The clean tech company shall ensure monitoring availability of not less than ninety-eight percent (98%) on a monthly basis, measured as the proportion of expected readings successfully received by the MRV platform. Persistent MRV failures may constitute a breach and may result in payment suspension until data integrity is restored.

C.0.5 Cybersecurity Baseline and Access Control: The MRV system shall implement good-practice cybersecurity controls, including unique user authentication, role-based access, secure credential management, encryption in transit, and logging of access and changes.

C.0.6 Connectivity Cost Responsibility: The clean tech company is responsible for providing all communications equipment (e.g., gateways, SIM cards, routers) and bearing the cost of connectivity and data transmission for the duration of the contract performance period, unless the executed contract expressly allocates otherwise.

C.0.7 Outage and Data Substitution Rules: Payments and performance assessment shall be based on MRV-recorded data. The first priority is recovery through backfill from local buffers. Any substitution/estimation is permitted only if defined in advance in the executed contract/M&V protocol, is conservative (does not overstate performance), and is documented in the MRV platform with an auditable record and, where required, validated by the independent verifier. If no approved substitution rule applies, missing data shall be treated as zero for payment purposes until corrected.

C.1 MRV System Architecture and Data Acquisition

Each LCC subproject shall implement a robust digital MRV system comprising field measurement devices, communication infrastructure, and a central data platform. The designated dMRV platform for the Program is [Verdana/platform name to be confirmed in the Annex H CME Operations Manual]. The CME shall maintain a current list of approved sensor specifications, integration protocols, and data submission formats on the platform.

- **Field Devices:**
 - Electricity smart meters or energy loggers installed at key points to measure:
 - For EE retrofits (like buildings or streetlights): baseline consumption vs. post-retrofit consumption on the same circuit or facility.
 - For solar PV: energy output of PV system (plus possibly import/export at point of interconnection to compute net savings).
 - Meters should be of accuracy class 1.0 or better (preferably 0.5S for main measurement). They must record kWh (and preferably kW demand and power factor if needed).
 - Any sensors needed for context, e.g., for building HVAC projects, temperature sensors could be integrated, but in LCC's current focus (lights, PV) this may not be needed beyond energy data.
- **Communication & Logging:**

- Each meter or data logger should connect to a Gateway device that collects readings at short intervals (e.g., every 15 minutes for building loads, every 5 minutes for solar output).
 - Communication options: cellular GPRS/3G/4G, Ethernet if site has internet, or LoRaWAN/LTE-M if using modern IoT meters. The system should work reliably in the local environment (cell coverage is usually fine in cities).
 - Data is transmitted to the cloud-based central MRV platform in near real-time. If connectivity is temporarily lost, the local device should buffer data and send when back online (so no data gaps).
- **Central Platform:**
 - The program’s cloud platform (managed by KTB or its IT provider) aggregates data from all projects. It likely uses a web-based dashboard and a database.
 - The platform must be secure (user authentication, data encryption). It should use blockchain or hashing to ensure data integrity and tamper-evidence for critical measurements.
 - The platform calculates energy savings and emissions reductions automatically by comparing baseline and actual measurements as per agreed formulas (see Section E.3).
 - The platform is also configured to send alerts (via email/SMS) to responsible parties if data indicates an anomaly or underperformance (e.g., solar output suddenly zero during sunny period indicating a system fault).

C.2 Measurement Points and Baseline Establishment

To accurately calculate savings, baseline measurements are needed:

- **Baseline Period:** For retrofit projects, ideally measure energy consumption in the baseline state for a period before implementation (e.g., one year utility bills or sub-meter readings). Where not available, use engineering estimates but then adjust after initial run (“tuning period”). The baseline must be documented and agreed by PSO, clean tech company, and validator.
 - For lighting, baseline could be “existing HPS fixture wattage * hours of operation (as controlled by timer)”.
 - For a building, baseline may be energy meter readings for same months of previous year, normalized for weather if needed.
- **Post-implementation Measurement:** After the project, measure the new consumption similarly.
- **Independent Variables:** If energy use depends on factors like weather or occupancy, those should be measured too (e.g., degree days for HVAC projects). In current LCC focus (lights and PV), the variables are:
 - Lights: hours on (should be consistent, but anyway measured by a photocell or known fixed schedule).
 - PV: solar irradiance (affects output; needed for calculating expected vs actual).
- **Mandatory IPMVP Option by subproject type:** All M&V plans must follow IPMVP. The following options are mandatory and cannot be varied without EXIM/PMU written approval.

- HVAC/chiller upgrades — Option B. Baseline: 12 consecutive months pre-retrofit metered data. Routine adjustments for cooling degree-days (nearest TMD station). Non-routine adjustments: conditioned area change >5%; occupancy schedule change >10%; addition of major heat-generating loads.
- Interior LED lighting — Option A. Baseline from audited fixture inventory verified by photometric measurement of >10% of fixtures, confirmed in Contract Detailed Energy Audit certificate co-signed by the PSO.
- BMS/controls — Option B. Minimum 6 months pre-retrofit data (calibrated to annual using billing records where 12 months unavailable).
- LED streetlighting — Option A. Baseline from audited lamp inventory and metered operating hours; post-installation measured by circuit-level energy loggers.
- Solar PV — Baseline is zero generation. Performance measured as actual kWh vs Guaranteed kWh, normalized for irradiance using the PR methodology in Annex A.
- Composite ECM packages — Integrated M&V plan required specifying savings disaggregation by measure type. Plan reviewed by EXIM/PMU before Baseline Lock-In Certificate is issued.
- **Calibration:** All measurement equipment must be calibrated:
 - Meters should have a recent calibration certificate (or be new within factory calibration validity). They should comply with IEC 62053-22 (class 0.5S) or -21 (class 1).
 - If any sensor (like irradiance sensor) is used, ensure it's a proper pyranometer (ISO 9060 Second Class or better for accuracy within 5%).
 - Regular calibration check or cross-check once during project if long term (maybe halfway through some random meters could be checked with portable standard).

The clean tech company is responsible for installing and commissioning the MRV meters and verifying they log correctly and compare expected values (e.g., cross-check a clamp meter reading to ensure meter reading is sane).

C.3 Data Reporting and Verification

- **Data Reporting Frequency:** The system collects raw data every few minutes, but for reporting, it will aggregate to hourly and daily totals. The MRV platform should generate:
 - Daily reports for internal monitoring,
 - Monthly summary for billing and performance review,
 - Cumulative reports for program tracking (quarterly or annual for KTB).
- **Content of Reports:** Each project's report will include:
 - Baseline energy use (kWh) for the period (adjusted to period conditions if needed),
 - Actual energy use (kWh) for same period,
 - Energy saved (baseline minus actual),
 - Percentage savings,
 - Renewable energy produced (if applicable),

- GHG emissions avoided (tons CO₂) using emission factor (provided by TGO, 0.475 kgCO₂/kWh (0.475 tCO₂/MWh), as published by TGO in January 2026 — this is the locked LCCP program baseline. Annual TGO updates require Steering Committee notification before adoption).
- Any notes on data issues or adjustments (e.g., “Streetlight circuit 3 was off for 2 days due to maintenance, savings calculation adjusted to exclude downtime”).
- Operational alerts: “X out of Y devices are functioning. 2 LED failures detected and replaced” etc. (if such granular data is captured).
- **Data Accessibility:** The PSO and clean tech company will have access to an online dashboard for their project. KTB and oversight can view all projects. Data is accessible in near real-time to foster transparency; at least monthly data should be easily downloadable (e.g., CSV files).
- **Verification Process:**
 - On a periodic basis, an independent verifier (appointed by KTB or required by carbon credit process) will audit the data. They will:
 - Check meter calibration status,
 - Possibly perform on-site spot measurements to corroborate the MRV data (for instance, measuring a sample of lights with a power meter to see if the logged values align).
 - Review the baseline and adjustment calculations are per protocol.
 - Check integrity of data (using blockchain logs or checking for any inconsistent patterns that might indicate tampering).
 - The verifier will produce a verification report confirming the reported savings and emission reductions are accurate within a certain confidence level. If discrepancies are found, they recommend corrections. For carbon credits, this is needed to issue credits. For program oversight, it assures funders that savings are real.
- **Anomaly Handling:** If data is missing or obviously erroneous (e.g., a meter malfunction giving zero readings when clearly system was on), the MRV protocol defines how to fill the gap:
 - Possibly use the average of similar days, or use baseline as fallback if measuring savings, erring on side of under-crediting savings to be conservative.
 - The incident is logged, and the clean tech company must fix the measurement device promptly.
- **Link to Payments:** The monthly or quarterly performance report from MRV directly feeds into clean tech company payment calculations. Essentially, the MRV platform can produce a “Payment Report” stating: “Verified energy savings for quarter = X kWh. Per contract, PSO pays clean tech company THB Y (based on agreed rate or share).” The PSO’s contract manager uses that to approve invoice. Ideally, this is automated enough to avoid disputes (the methodology was agreed upfront).
- **Tamper Prevention and Detection:** The system uses security such that:
 - Meters are sealed. If a seal is broken, it's flagged.
 - Data irregularity triggers investigation (e.g., if usage pattern changes beyond plausible range not explained by known factors, the KTB may ask for an audit).

- Baked-in blockchain: every data point is hashed; altering past data would break the chain and be evident.
- Only authorized persons can access the raw data, and even they cannot edit historical records (system design should restrict it).

By having a rigorous MRV in place, the LCC program ensures that reported savings and emissions reductions are credible and transparent, building confidence among stakeholders (government, financiers, international partners). It also allows data-driven management: if MRV shows a project underperforming, program managers can intervene (e.g., ask clean tech company to check equipment, adjust something, or in worst case use penalties if they miss guaranteed savings).

All Contractors must familiarize themselves with the MRV procedures in this Annex C. During project inception, the KTB's MRV team will work with each clean tech company to integrate their project into the central platform, including provisioning loggers and setting up accounts. Compliance with MRV is not optional – failure to provide data or maintain the MRV system can be considered a breach of contract (since without data, savings cannot be verified and payments may be withheld).

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Annex D: Verified Emission Reduction Payment Facility

Consistent with the PAD, IBRD funds under Component 2 are used solely to finance results-based payments to private asset owners. CME operating costs, including dMRV platform, registry interface, verification contracts, and market transactions, are financed from KTB's own resources.

The VERPF is a performance-based, scalable financing mechanism to unlock private-sector investment in low-carbon technologies by monetizing VERs at scale. These actors often face difficulties accessing capital for low-carbon upgrades and lack the scale or institutional capacity to independently develop projects that meet the rigorous standards of international carbon markets. The VERPF addresses these constraints by offering a guaranteed offtake mechanism for high-quality VERs, thereby reducing market risk and catalyzing distributed investment in climate-relevant technologies.

The VERPF is designed as a replicable delivery mechanism for small-scale carbon finance, addressing a market gap where high transaction costs, uncertainty in carbon pricing, and limited technical capacity prevent otherwise viable low-carbon investments. The mechanism has been structured to minimize downside risk by paying subsidies only after physical assets are installed, linked to a verified digital MRV platform. The CME may require evidence of project performance security (e.g., insurance, performance bond, or escrow) as part of its ERPA screening, based on project risk profile and size. The model assumes only a single recycling cycle of VER proceeds and does not depend on carbon price upside to function.

While the initial allocation VERPF is modest, it is deliberately structured as a platform-building phase rather than a one-time results based payment fund. The VERPF standardizes the full delivery chain, engineering protocols, sensor specs, MRV integration, subsidy disbursement logic, and performance insurance, for carbon credit generation by private asset owners. By reducing transaction costs and establishing templates for replication, the VERPF lays the foundation for larger-scale uptake.

KTB, acting as the CME, serves as custodian and selling agent for VERs generated on public assets. PSOs remain the beneficial owners of those VERs and receive the net sale proceeds in accordance with the arrangements set out in the PAD. Under the Project, no disbursements from the VERPF are made to PSOs; VERPF resources are reserved exclusively for results-based payments to eligible private asset owners under Component 2. For these private asset owners, the CME will purchase VERs directly using VERPF resources and then sell them into eligible carbon markets.

VERPF delivery summary. Projects follow a standardized path: technology screening and sensor specs from dMRV onboarding and eligibility confirmation to performance-based disbursement to verification and recycling of proceeds. Verification cycles shall be no less frequent than every 18 months and shall be timed to align with ERPA payment schedules. Annual cycles are preferred. The CME may extend to 18 months for any given cycle with EXIM/PMU prior notification. The full step-by-step table is provided in the table below.

VERPF Operating Steps

Stage	Key Action/Requirement	Responsible Actor(s)	Safeguard or Design Feature
1. Market Outreach	National workshops, roadshows, industry group clinics with SMEs and asset owners	CME / KTB (with World Bank technical support)	
2. Eligibility Screening	Define qualifying technologies and corporate governance requirements	CME (Guidelines)	Minimum project size threshold

Stage	Key Action/Requirement	Responsible Actor(s)	Safeguard or Design Feature
3. Sensor Requirements	Pre-certified sensors installed during asset deployment	Asset Owner + dMRV firm	kWh meters (solar), power meters (motors), GPS & battery sensors (EVs)
4. Technical Design Review	Confirm compliance with international design standards for sensor placement and data quality (ISO 50001 energy management; IPMVP Option A/B/C as applicable per Annex C §C.2; Gold Standard Monitoring Report requirements; and, where T-VER methodology applies, DEDE TGO standards)	dMRV firm (technology service provider engaged by CME, e.g., Verdana or approved equivalent; CME retains governance responsibility)	
5. dMRV Platform Linkage	Sensor commissioning and real-time data feed to platform	dMRV firm + Asset Owner	Automated anomaly alerts; integrity controls via quarterly reviews and 10% spot audits
6. Optional: Performance Insurance	Performance insurance is optional. Where a project participant elects to obtain performance insurance, it may be submitted to the CME as supporting documentation; it is not a condition of VERPF eligibility or disbursement	Asset Owner, Reviewed by CME	Performance insurance is optional; where obtained, template policies may be benchmarked against local and international insurer terms
7. Baseline and Forecasting	Estimate 10-year VER generation based on standard methodology	CME	Transparent baseline; conservative assumptions; VER volume capped at pre-agreed level
8. Subsidy Calculation	Calculate payment for each verification cycle as: verified emission reductions (tCO ₂ e) × applicable payment rate (US\$/tCO ₂ e) defined in the VERPF schedule. No payment is made for unverified or forecasted VERs	CME Finance Unit	Disbursed only after dMRV linkage and eligibility confirmation
9. Disbursement	Payment is disbursed after each verification cycle, once the emission reductions have been verified, the VERs have been transferred to KTB's account, and all ERPA conditions have been met.	EXIM + CME	Pro-rata adjustments for underperformance >5%; clawback provisions for fraud

Stage	Key Action/Requirement	Responsible Actor(s)	Safeguard or Design Feature
10. Verification & Recycling	Annual performance report submitted for VER issuance; proceeds recycled into VERPF	CME + Gold Standard + VVBs	Pooling mechanism supports new cycles; system designed for sustainability, not price speculation

Under the Project, VERPF disbursements are strictly results-based: no subsidies are paid before verified emission reductions are achieved and transferred to KTB.

The CME prepares an annual performance report synthesizing a full year of live sensor data. This report is submitted to Gold Standard to originate the VERs, providing an audit-ready verification of actual emission reductions. Any anomalies or under-performance identified in the annual review trigger targeted technical assistance, funded by the VERPF's pooled reserve fund and insurance facility (covering up to 10 percent of total subsidy exposure).

These safeguards help ensure that VERs issued under the facility are both environmentally credible and financially sound. No disbursement is made until sensor-verified performance is demonstrated, and CME retains the right to claw back funds in the case of fraud or data manipulation.

Note on "dMRV firm" in the VERPF Operating Steps table. "dMRV firm" refers to the technology service provider engaged by the CME to operate the digital MRV platform. For the initial program phase this is Verdana or an approved equivalent designated in the Annex H CME Operations Manual. The CME retains full responsibility for platform governance and data integrity regardless of which technology vendor is engaged. Where a new technology vendor is engaged or the platform designation changes, the CME shall notify EXIM/PMU in writing and update the Annex H CME Operations Manual accordingly.

D.1 VERPF Payment Pricing Schedule and Payment Formula

Purpose. This section defines the VERPF payment rates (US\$/tCO₂e or THB/tCO₂e) used to calculate performance-based payments to eligible private subprojects under Component 2.

Payment formula. For each eligible private subproject and monitoring period: VERPF Payment = (Verified ERs delivered/assigned to CME for the period, in tCO₂e) × (Applicable VERPF Rate) × (any applicable adjustment factor), subject to any caps defined below.

Pricing schedule. The VERPF rates shall be transparent, published to participating entities, and applied consistently across eligible private subprojects. Rates may be differentiated by technology type and/or size band, provided the differentiation is defined ex-ante.

Governance and updates.

- **Initial rates:** The initial VERPF rates are set out in Table D-1 and apply upon POM effectiveness.
- **Changes:** Any rate changes require (i) Steering Committee approval (§3.2.4(e)); (ii) World Bank no-objection under applicable legal agreements; and (iii) prior notification to KTB not less than 30 days before effectiveness. Changes apply prospectively only to ERPAs signed after the effective date.
- **Prospective application:** Updated rates apply only to ERPAs signed after the effective date of the update, unless otherwise agreed in writing and permitted by the legal agreements.
- **Disclosure:** KTB will disclose the current schedule and any revisions to all eligible participants.

Table D-1: VERPF Payment Rates

Technology Category	Eligible Subproject Types / Notes	Rate (US\$/tCO ₂ e)	Currency & FX Rule
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[1] Solar PV (rooftop)	Private rooftop PV (commercial/industrial)	US\$10	[USD or THB; FX reference date]
[2] Solar PV (ground/estate)	Industrial estate PV / mini-grid cases	US\$10	[To be confirmed in Subsidiary Agreement]
[3] Industrial EE (motors/drives)	Motor replacement, VSDs, pumps, compressors	US\$10	[To be confirmed in Subsidiary Agreement]
[4] Industrial EE (process)	Boilers, steam, waste heat recovery, process optimization	US\$10	[To be confirmed in Subsidiary Agreement]
[5] Other eligible low-carbon measures	As approved under program rules	US\$10	[To be confirmed in Subsidiary Agreement]

Note: The final schedule must align with the Disbursement Categories and Eligible Expenditures defined in Annex G and the legal agreements. The rates in this table are the minimum reference prices for IBRD-funded VERPF payments only. For self-funded VER purchases by KTB in its broker/dealer capacity under the BOT Sandbox, KTB retains full flexibility on pricing based on prevailing market conditions and commercial procedures.

VERPF Pricing Design Safeguards: The VERPF pricing incorporates several safeguards to ensure financial soundness and fairness. First, reference market prices, are used as a baseline when setting payment rates, keeping them conservative to avoid over-commitment. Second, a buffer reserve mechanism is applied; for example, not pre-paying 100% of expected credits, or setting aside a portion of emission reductions – to mitigate the risk of under-delivery or carbon price fluctuations. Third, the rates are subject to periodic review so that adjustments can be made if market conditions or performance outcomes diverge from assumptions. These design safeguards help protect the VERPF from volatility and ensure payments remain aligned with results delivered.

D.2 Use of VERPF Resources, Recycling, and Wind-Down Arrangements

VERPF resources are used only for: (i) performance-based incentive payments to eligible Sellers under ERPAs (financed from IBRD-funded transfers under Category 2); and (ii) facility operating costs (e.g., verification/registry fees) financed from carbon sale proceeds and/or counterpart resources. Use of IBRD loan proceeds for costs other than incentive payments is not permitted unless explicitly allowed under the legal agreements and approved by the World Bank. The requirements in this Annex — including ring-fenced accounts, EXIM reporting, and IBRD fiduciary compliance — apply exclusively to VER purchases funded from VERPF/IBRD resources. KTB’s self-funded carbon credit transactions conducted in its broker/dealer capacity under the BOT Sandbox are governed by KTB’s internal policies and BOT Sandbox conditions, and are not subject to this POM.

Recycling of carbon proceeds. Where the CME sells VERs acquired under ERPAs:

- sale proceeds shall be deposited into the dedicated VERPF account (or another ring-fenced account/ledger as specified in the EXIM–KTB agreement);
- allowable program costs (e.g., verification/registry fees) and CME administration margin may be deducted only if explicitly agreed in the ERPA and consistent with the EXIM–KTB Subsidiary Agreement. The applicable CME administration margin rate and deduction mechanics are set out in the executed ERPA and Annex H. Until Annex H is finalized and published, the CME administration margin shall be zero unless a specific rate is separately agreed in the executed ERPA and disclosed to the Seller in writing before ERPA signature; and

- the remaining net proceeds shall be retained for recycling to support future performance-based payments and program sustainability, in accordance with agreed governance rules.

DRAFT

Annex E: Commercial Guidance for LCC Contracts

This annex provides practical commercial guidance for structuring LCC project contracts in both the public sector (e.g., city-led projects like BMA’s rooftop solar) and the private/industrial sector (e.g., IEAT’s solar mini-grid). It covers recommended contract provisions, risk allocation, and best practices to ensure bankable and fair agreements. The guidance in this annex should be reflected in tender documents and draft contracts provided to bidders. Clear upfront articulation of these commercial terms ensures that all bids are based on the same assumptions and that contractors price in these requirements properly.

E.1 Risk Allocation Principles

- **Technical Performance Risk -> clean tech company:** The clean tech company is responsible for delivering the promised energy savings or output. Contracts include performance guarantees (minimum savings or output) and link payments to actual performance (shared savings or tariff per kWh delivered). If performance falls short, the clean tech company’s revenue is reduced and they must make up shortfalls (through insurance claims or remedies). This incentivizes Clean tech companies to design conservatively and maintain systems diligently. The PSO should not bear technical risk of the solution not performing as advertised.
- **Operational Risk -> clean tech company (with support):** The clean tech company typically handles operation & maintenance (O&M) at least during the performance period. For example, in lighting retrofits, if many LEDs start failing prematurely, clean tech company fixes them under warranty, ensuring light levels remain. However, the PSO can support by granting quick access for repairs, etc. In some cases, after an initial O&M term, the PSO might take over – but if performance payments still ongoing, clean tech company remains responsible for outcomes.
- **Asset Ownership and Handover:** Clarify who owns the equipment during and after contract.
 - **For lighting:** after installation, the new lights likely become property of PSO immediately (since installed in PSO infrastructure). But clean tech company still obligated to maintain/replace under performance guarantee. At end, PSO definitely owns them.
 - **For solar:** often clean tech company owns the system during contract (they may even remove it if contract terminated for default). However, many public sector contracts transfer ownership to PSO at end of term for free (so that PSO enjoys remaining life benefits). Some could allow clean tech company to remove at end if agreed, but that’s rare because removing panels 10 years old has limited value and PSO would want them to continue.
 - **Thus, contract should state clearly:** “All equipment installed becomes the property of the PSO upon installation (or at end of contract, whichever specified), but the clean tech company bears all risk and responsibility for it through the contract term.” This prevents any disputes on who fixes something if it breaks (it’s clean tech company’s duty even if technically PSO property).

E.2 Payment and Incentive Structures

- **Shared Savings vs Fixed Tariff:** The PSO should choose a model that best suits project type:
 - Government building retrofits often use Shared Savings EPC – PSO pays a percentage of actual savings. This inherently adjusts if savings are a bit lower/higher, aligning interest.

- Streetlighting could also do shared savings or a fixed annual service fee that is guaranteed to be less than previous energy cost (some municipalities prefer predictable fees; if so, then clean tech company guaranteeing a minimum savings difference is key).
- Solar PV typically done as PPA (energy purchase) at a rate lower than grid. The contract must clarify if rate is fixed or escalates. Often a fixed low rate (e.g., 2.50 THB/kWh flat for 10 years) is offered. This gives PSO immediate savings as long as grid tariff stays above that. If grid tariff falls below PPA rate (unlikely historically, but possible if huge policy changes), contract might have a re-opener to adjust PPA rate formula, or allow termination with buyout to clean tech company.
- **clean tech company Insurance & Guarantees:** Performance insurance is optional under the LCC program. Where a CTC elects to obtain performance insurance, the EPC should specify the coverage terms, beneficiary designation, and renewal obligations. EXIM may treat the existence of performance insurance as supplementary credit enhancement when structuring the sub-loan, but may not require it as a condition of lending.
- **Revenue from Carbon Credits:** When carbon credits are monetized:
 - Carbon credits generated under Component 2 flow directly to the asset owner as VER sale proceeds under the ERPA. No revenue is deducted or intermediated by KTB, PEA/MEA, or any other party. See Annex D and §8.2 for VERPF payment mechanics. Tax treatment of VER proceeds is pending a Revenue Department ruling — see §1.3.
 - In private case, the private asset owner receives the revenue as a lump sum payment upon completion and third party verification of the investments.
- **Contract Tenor and Exit:** Guidance on how long contracts should be for optimal results:
 - Typically 5-8 years for streetlights or building retrofits (to allow clean tech company to recoup and profit but not so long that tech becomes outdated).
 - For solar, often 10-15 years since payback is longer, but given financing involvement, likely around 10 years align with EXIM loan assumptions.
 - If PSO wants to terminate early (for convenience), contract should stipulate a buyout formula: essentially remaining debt + a reasonable profit. Possibly reference amortization schedule of project financial model. It's good to outline that formula to avoid dispute. This rarely happens, but it's a safeguard (e.g., if a facility closes or government reorganizes and no longer needs service).

E.3 Energy Performance Contract (clean tech company–PSO Shared Savings Agreement)

Key considerations for contract

1. Commercial Model: Shared Savings & Off-Balance Sheet

What the contract does

- clean tech company designs, finances, installs, and maintains ECMs.
- Client pays no capex; clean tech company recovers investment via a share of verified energy cost savings.
- Contract is framed as off-balance sheet for the Client (opex funded from savings, not debt).

Key issues & tradeoffs

- Shared savings ratio (X% to clean tech company vs Client)
 - Higher clean tech company share → stronger clean tech company incentive + easier to attract financing, but less early fiscal relief for Client.
 - Lower clean tech company share → more fiscal savings for Client but may shorten measure scope, lower quality, or push clean tech company to squeeze O&M.
- Off-balance sheet status vs control
 - Strong “pay-from-savings only” language protects Client (no savings, no payment), but financiers may seek tighter remedies (step-in, escrow, change-in-law protection).
 - If you soften off-balance sheet language (e.g., minimum take-or-pay), you improve bankability but risk reclassification as a lease/debt in public accounts.
- Performance-based vs simple service contract
 - Pure performance EPC maximizes alignment but is more complex to administer (M&V disputes, adjustments).
 - A hybrid (fixed service fee + variable performance bonus) can simplify cashflow but weakens the “paid purely from savings” narrative.

2. Baseline, Audits & M&V (DMRV Plan)

What the contract does

- Three audit layers: Pre-Bid, Bidder’s, and Contract Detailed Audit.
- Baseline precedence: Contract Detailed Audit → Bidder’s Audit → Pre-Bid.
- Baseline is “locked in” via a Baseline Lock-In Certificate; post-commissioning, savings are measured against this with routine/non-routine adjustments.
- DMRV Plan (IPMVP-style) and digital MRV platform (CME/KTB) are the authoritative source for savings and payments.

Key issues & tradeoffs

- Baseline precedence
 - Strong precedence of the Contract Detailed Audit protects technical accuracy but creates a renegotiation moment before NTP (if $\geq \pm 5\%$ variance).
 - Using earlier audits (pre-bid) as binding is simpler, but risks misaligned expectations and more disputes later.
- Adjustment rules (routine & non-routine)
 - Adjustment rules reduce disputes but increase complexity and require better data.
 - Simpler rules but can create winners/losers if usage changes materially.
- Independent verifier/expert
 - Binding expert determination speeds resolution and is lender-friendly but reduces Client’s leverage in a disputed period.
 - Advisory-only opinions give flexibility but can prolong disputes and undermine the “data decides” principle.

3. Scope of ECMs & No Upfront Cost

What the contract does

- clean tech company responsible for full turnkey delivery: design, equipment, installation, commissioning, financing, training.
- Client provides access, outages, and coordination; clean tech company must comply with site rules.
- Client pays only from achieved, verified savings.

Key issues & tradeoffs

- Scope depth vs savings target
 - Broad ECMs (HVAC, PV, LEDs, controls) → higher capex, longer payback, bigger carbon/savings impact.
 - Narrow ERM scope → shorter payback but may leave large “stranded” potential and future lock-in.
- No upfront cost vs co-financing
 - Zero capex is attractive, but clean tech company will price risk (higher saving share, longer term).
 - Allowing some co-financing can reduce clean tech company risk and lower the share of savings ceded.

4. Term, Extensions & End-of-Term Handover

What the contract does

- Performance Period starts at Project Completion Date and runs for [] years.
- Parties can extend by mutual agreement; can keep or change sharing ratios/guarantees.
- At Contract End, equipment is handed over in working order, and 100% of savings accrue to Client.

Key issues & tradeoffs

- Length of Performance Period
 - Longer term (e.g., 10–15 years) → lower annual repayment, more measures become viable, but longer lock-in and more political risk for Client.
 - Shorter term (5–7 years) → faster budget relief afterward, but higher required savings share for clean tech company and/or reduced scope.
- End-of-term conditions
 - Strong handover obligations (condition, remaining warranty, training) protect Client but may increase clean tech company pricing.
 - Ability to extend with a lower clean tech company share can be a good compromise: clean tech company keeps a small tail, Client gets most of the upside.

5a. Output-Based Solar PV Model: Locked Commercial Parameters (Component 1)

Applicability. The following parameters apply to all Component 1 subprojects structured as output-based Performance-Based Energy Management Contracts (PEMCs) where the CTC is compensated based on verified electricity generation (kWh × FRF), as distinct from shared-savings EE contracts. They

are not default positions or guidance — they are required minimum standards. PSOs may not issue RFPs with materially weaker terms without EXIM/PMU approval and documentation in the procurement record.

Payment formula. The Service Fee for each payment cycle shall be calculated as: Service Fee = Generated and Verified Electricity (kWh) × Fixed Rate Factor (FRF, THB/kWh). Generated and Verified Electricity is determined solely from dMRV system data. No advance payments shall be made. No payment shall accrue for data that is estimated, unverified, or substituted by manually entered values except as permitted under the data reconciliation protocol in Annex C. The FRF proposed by the CTC shall not exceed the Reference Tariff ceiling established by the PSO at the time of proposal submission.

Liquidated Damages (LD) for performance shortfall. The standard LD formula for all Component 1 solar PV subprojects is: $LD = (\text{Guaranteed kWh} - \text{Actual kWh}) \times \text{FRF}$. The annual LD amount shall not exceed fifteen percent (15%) of the annual Service Fee (annual cap). Where verified annual performance falls below the threshold level triggering the maximum annual LD for three (3) consecutive years, the PSO has the right to terminate the contract upon written notice, in addition to any other remedies available. These parameters are required minimum standards; individual contracts may include higher LD caps or shorter consecutive-year triggers, but may not weaken them below these floors.

Liquidated Damages for installation delay. For delays to the agreed installation schedule attributable to the CTC, Liquidated Damages shall accrue at a rate of zero point five percent (0.5%) of NPV value per week of delay. The total installation-delay LD shall be capped at ten percent (10%) of NPV value. These parameters apply across all Component 1 solar PV subprojects and shall be reflected in the RFP and executed PEMC.

Deemed Generated Energy. Where the PSO causes an inability to generate electricity at a site — including building closure, denial of access, or grid disconnection attributable to the PSO — the CTC shall have the right to claim Deemed Generated Energy calculated as: $\text{Deemed kWh} = \text{Irradiance} \times \text{Installed Capacity} \times \text{Guaranteed PR} \times (1 - \text{Cumulative Degradation Rate})$. The PSO shall pay the Service Fee for Deemed Generated Energy. Generation stoppages attributable to the CTC, Force Majeure, or equipment failure do not qualify as Deemed Generated Energy.

dMRV metering standard. Revenue-Grade meters of Class 0.5 accuracy shall be required at all Component 1 solar PV sites. Data shall be recorded at intervals of not more than fifteen (15) minutes. Meters shall be calibrated annually by an independent accredited body. KTB, as dMRV platform administrator and independent verifier, provides the primary binding data for all payment calculations, performance evaluations, and carbon credit generation. Disputes regarding dMRV data shall be referred to KTB in the first instance; if unresolved, to an independent technical expert.

Carbon credit pathway for building EE and LED streetlighting subprojects. Solar PV subprojects generate credits under the Gold Standard Program of Activities using methodology VM0002 or an equivalent approved methodology. For building EE (HVAC, interior LED, BMS) and LED streetlighting subprojects, the applicable methodology differs: building EE measures typically use Gold Standard METH0001 (Energy Efficiency — Technologies and Practices to Displace Decentralized Thermal Energy Consumption) or applicable T-VER methodologies; LED streetlighting uses a grid-emission-factor approach consistent with the applicable standard. The CME (KTB) must confirm in writing, prior to ERPA execution for any EE or LED subproject: which registered methodology applies; whether the Program of Activities registration is complete; and the estimated annual VER volume. Until such written confirmation is issued, no carbon revenue assumptions may be included in a CTC's financial model submitted to EXIM for credit appraisal. If no registered methodology is available at sub-loan signing, the carbon revenue line must be excluded from the base-case financial model, and the appraisal must demonstrate viability on energy savings alone.

5. Guaranteed Savings and Shortfall Remedies

What the contract does

- clean tech company provides a Guaranteed Energy Savings level per year.
- If verified savings < guarantee (not due to Client or force majeure), clean tech company must:
 - Pay the monetary value of the shortfall / offset against future invoices, or
 - Implement corrective ECMs at its cost.
- Excess savings are shared per Schedule 4.
- Where performance insurance has been obtained by the CTC on a voluntary basis, it may name EXIM as additional insured/loss payee. Performance insurance is not a required element of the guarantee structure.

Key issues & tradeoffs

- Level of guarantee vs clean tech company pricing
 - Higher guarantee (e.g., 30–35% savings) → stronger comfort for Client/EXIM, but clean tech company will price risk (higher share of savings, tighter conditions, more exclusions).
 - Lower guarantee → less insurance / risk premium but less downside protection for Client.
- Cash compensation vs remedial works
 - Cash compensation gives immediate budget protection but may leave physical performance suboptimal.
 - Mandatory remedial works improve long-term efficiency but may drag out disputes and delay financial closure on shortfalls.
- Performance insurance coverage (optional)
 - Wide coverage (% of guarantee, long duration) is lender-friendly, but premiums are embedded in savings share.
 - Narrow coverage (e.g., only for early years or catastrophic shortfall) lowers premiums but leaves more tail risk with Client and lender.

6. Compensation, Tariffs & Escrow

What the contract does

- Shared savings model: clean tech company receives X% of verified cost savings each period.
- Monetary savings based on actual tariffs (unless otherwise agreed in DMRV Plan).
- Clear invoicing, review, and payment timelines, interest on late payments.
- Option for escrow or tripartite mechanism with utility/EXIM to route payments.
- Client withholds taxes; clean tech company responsible for corporate tax.

Key issues & tradeoffs

- Tariff treatment (actual vs fixed baseline tariff)
 - Using actual tariffs aligns economics with real bills and keeps clean tech company indifferent to tariff changes (they share upside/downside).

- Fixing a contractual “baseline tariff” gives predictability but creates distortions if tariffs spike or fall.
- Escrow / tripartite vs direct payment
 - Escrow/tripartite (Client pays baseline; delta goes automatically to clean tech company/EXIM) greatly reduces payment risk and is very bankable, but can be administratively and politically more complex.
 - Direct Client→clean tech company billing is simpler but increases counterparty credit risk and may require stronger default/step-in rights.
- Adjustment for unusual conditions
 - Formal adjustment mechanisms prevent either party from opportunistically benefiting from usage changes unrelated to ECMs, but they require good data and trust.

7. Digital MRV, Independent Verification & Dispute Handling

What the contract does

- clean tech company provides all on-site dMRV hardware; CME/KTB runs central platform.
- Platform data is authoritative basis for savings and payments, with substitution rules.
- Independent verifiers (VVB/expert) can audit calculations; their findings carry heavy weight.
- Structured process: Performance Reports, Client review window, dispute process.

Key issues & tradeoffs

- Data ownership and access
 - Centralized data via CME ensures integrity and consistency across projects, but Clean tech companies may push back on transparency or cyber requirements.
- Authority of verifier
 - Making verifier’s determination “final & binding absent manifest error” reduces litigation risk but limits Client’s ability to challenge borderline calls.
- On-site equipment ownership & handover
 - clean tech company-owned hardware avoids early Capex for Client but raises end-of-term risks if handover is poorly defined.
 - Mandatory end-of-term transfer protects continuity but may increase clean tech company costs.

8. Maintenance & Operations, Client Behavior & No-Forced-Labor Clause

What the contract does

- clean tech company handles full maintenance of ECMs during Performance Period (preventive + corrective).
- Client operates facilities consistent with saving assumptions and doesn’t override systems.
- If Client’s actions reduce savings, clean tech company can claim deemed savings per M&V rules.

- Specific clause requiring no forced-labor in PV supply chains; strong remedies (suspension, replacement, corrective action, potential default).

Key issues & tradeoffs

- Allocation of operational risk
 - Strong clean tech company maintenance obligations are good for Client but must be balanced with clear boundaries where Client misuse/neglect is responsible.
- Deemed savings for Client-caused underperformance
 - Protects clean tech company and lenders but can be politically sensitive if Client perceives paying for “virtual” savings.
- Forced-labor clause
 - Good ESG alignment; may restrict clean tech company’s supplier choices and increase cost/lead times.
 - Strong enforcement tools (suspension/replacement at clean tech company cost) protect the program but could delay implementation if due diligence flags issues.

9. Representations, Warranties & Insurance

What the contract does

- clean tech company reps: corporate authority, technical capability, licenses, compliance with laws, feasibility of ECMs.
- Client reps: authority to sign, budget/appropriation capacity, accuracy of data provided, compliance with laws.
- clean tech company maintains CAR, third-party liability, workmen’s comp, professional liability (if needed), Performance insurance is optional and at the CTC's election and is not mandatory.
- Client continues normal property insurance; insurance proceeds used to repair/replace ECMs.

Key issues & tradeoffs

- Strength of reps/warranties
 - Tighter reps (e.g., on data accuracy, authority) help clean tech company/lenders but can be difficult for a PSO subject to annual budgets and shifting rules.
- Insurance stacking & deductibles
 - Overlapping policies (Client property + clean tech company CAR/performance) can lead to disputes over who claims what and in what order; clarity on priority is critical.
- Coverage limits
 - Higher limits provide comfort but cost more; calibrate to realistic loss scenarios (e.g., fire at PV array, major inverter failure).

10. Dispute Resolution, Governing Law & Step-In Rights

What the contract does

- Tiered mechanism: amicable negotiation → expert determination for technical issues → arbitration (TAI/THAC) in Bangkok.

- Governing law: Kingdom of Thailand; Thai courts available for interim measures and award enforcement.
- Step-in rights (for lenders or substitute clean tech company) defined separately; allow third party to take over clean tech company's obligations in default.

Key issues & tradeoffs

- Expert determination vs direct arbitration
 - Expert route for technical disputes lowers cost and speeds resolution but requires good expert-selection rules.
- Arbitration forum & language
 - Bangkok & English are lender-friendly and align with international practice; some agencies may prefer Thai language, which could exclude international players.
- Step-in rights
 - Strong, clearly drafted step-in rights are critical for EXIM/other lenders; they preserve project continuity but slightly dilute Client's control in default scenarios (since lender chooses substitute clean tech company).

E.4 Performance Insurance Contract (Energy Savings Guarantee Insurance Policy)

Performance insurance is optional under the LCC program. CTCs are not required to obtain it. The guidance below applies where a CTC elects to obtain coverage. Key considerations for the contract

1. Purpose of the Policy & Who It Protects

What this policy does

- It is Energy Savings Shortfall Insurance: if verified savings are below the Guaranteed Savings in the EPC, the insurer pays part of the gap.
- Insured = clean tech company.
- Additional Insureds / Loss Payees = PSO Client and EXIM Bank (the lender).
- It's meant to backstop the EPC guarantee, stabilize EXIM's debt service, and protect the PSO from clean tech company underperformance.

Key issues & tradeoffs

- Who is the "real" beneficiary?
 - Strong EXIM focus → payouts prioritized to cover loan shortfalls (bankability up, but PSO might feel secondary).
 - Strong PSO focus → payouts channeled first to PSO to make them whole on savings; EXIM is indirectly protected via a still-solvent clean tech company.
- How explicit is the payout waterfall?
 - Clear hierarchy (e.g., "first EXIM up to missed debt service, then PSO for uncompensated savings") avoids nasty fights when a big claim hits.
 - Vague wording gives flexibility but risks PSO–EXIM tensions at the worst possible moment.

2. Coverage Period & Alignment with EPC Term

What the policy says

- Coverage runs from a Commencement Date to End Date, typically:
 - The first 3–5 years of operation *or*
 - The full EPC Performance Period.

Key issues & tradeoffs

- Shorter coverage (e.g., first 3 years)
 - Pros: Lower premiums; focuses on early technical risk when things usually break or underperform.
 - Cons: Leaves later years (when equipment ages and performance might degrade) uninsured; could clash with a 10–15 year EPC.
- Full-term coverage
 - Pros: Strong comfort for EXIM and PSO; simplifies messaging (“guarantee fully insured”).
 - Cons: Expensive; insurer will bake in degradation risk and long-term uncertainty; may force tighter exclusions/conditions.

3. Guarantee Structure: Guaranteed Savings, Shortfall, Limits & Deductible

What the policy does

- Takes the Guaranteed Savings schedule from the EPC (Schedule A).
- Every year:
 - Actual Savings (per DMRV) vs Guaranteed Savings → if Actual < Guaranteed → Shortfall = Guaranteed – Actual.
- Insurer pays an Insured Percentage of the Shortfall, subject to:
 - Annual cap (YearlyCap)
 - Aggregate cap (MaxPayout)
 - Deductible/retention (e.g., first 10% of shortfall borne by clean tech company).

Key issues & tradeoffs

- Size of guarantee vs coverage
 - Higher guaranteed savings in EPC → bigger potential shortfalls → higher premiums and more pushback on exclusions.
 - Conservative guarantees → easier, cheaper insurance but weaker story to PSO/EXIM.
- Deductible / retention
 - Higher retention (e.g., clean tech company eats first 10–20%) → insurer protects against big shocks only; clean tech company has strong incentive to perform.
 - Low or zero retention → clean tech company risk offloaded; premiums higher, and insurer more aggressive on enforcement/exclusions.

- Insured Percentage
 - 100% of shortfall covered = “hard guarantee,” very lender-friendly but pricey.
 - 70–90% coverage = risk sharing; clean tech company still has skin in the game, premiums more manageable.

4. Link to EPC: DMRV, Baseline & Technical Alignment

What the policy does

- Relies on the same Baseline, DMRV Plan, and verified savings used in the EPC.
- Insurer gets:
 - Verification reports; or
 - Direct access to the digital MRV platform.
- Insurer can appoint its own verifier but must use the agreed methodology.

Key issues & tradeoffs

- Single source of truth vs parallel math
 - Using project DMRV as binding for insurance avoids “two sets of numbers” and reduces disputes.
 - If insurer insists on extra adjustments or alternative interpretation, you risk EPC and policy diverging.
- Who appoints/verifies?
 - If verifier is aligned with EPC (CME/VVB), consistency is high but insurer will want some right of audit.
 - Insurer-appointed verifier improves insurer comfort but might delay payout and create a second fight over numbers.

5. Exclusions – Where the Cover Stops

What the policy excludes

Key Excluded Causes include:

- Client actions/usage changes not properly adjusted in baseline.
- Facility expansions/major changes outside DMRV assumptions.
- Force majeure & physical damage (should be covered under CAR/property/BI).
- Tariff changes driving monetary deltas without kWh underperformance.
- clean tech company’s willful misconduct/gross negligence/fraud.
- Measurement equipment failure.
- Double dipping (other guarantees/compensation).
- Excluded technologies (if any)
- Regulatory changes affecting achievable savings.

Key issues & tradeoffs

- Client behavior & facility changes
 - clean tech company/insurer need protection from PSO-induced changes, but if exclusions are too broad, PSO/EXIM may feel they have “insurance that never pays.”

- Ideal: tight coupling with EPC adjustment rules so that once the baseline is fairly adjusted, remaining shortfall is mostly insurable.
- Tariff and regulatory risk
 - Excluding tariff/regulation risk keeps the cover purely “technical performance” – clean, but in the real world, PSO’s pain is in Baht, not kWh.
 - You can negotiate partial tariff protection (e.g., use a reference tariff band) but that changes risk from “engineering” to “macro”, which insurers price heavily.
- Measurement equipment failure
 - Strict exclusion puts pressure on clean tech company to keep meters perfect; but if DMRV fails, both EPC and insurance can fall into limbo.
 - Workable compromise: allow reconstruction rules (substitution/estimation) if meters fail for short periods and the clean tech company can prove performance.

6. Claims Mechanics, Loss Payees & Subrogation

What the policy does

- Annual cycle:
 1. clean tech company submits Statement of Savings + verification report.
 2. Insurer verifies, may appoint an expert, may adjust for Excluded Causes.
 3. Once agreed, pays EXIM and/or PSO as loss payees, per agreed structure.
 4. Insurer gains subrogation rights against third parties (equipment OEMs, subs), but not against PSO (except for willful misconduct).

Key issues & tradeoffs

- Payout routing
 - “EXIM first” structure: great for lender risk; may leave PSO relying more on EPC remedies if claim is insufficient.
 - “PSO first” structure: politically attractive; lenders may demand extra security elsewhere.
 - Middle path: a clear formula (e.g., first to cure any clean tech company default toward PSO under EPC; any remainder to EXIM’s loan).
- Speed vs thoroughness
 - Insurer rights to verify and appoint a consultant protect against bad claims but can slow money arriving when everyone is already stressed.
 - For credibility, you want tight timelines (e.g., 30 days for review + 30 days for payout) and a small, clearly defined set of reasons for delay.
- Subrogation
 - Good for program economics (insurer can chase OEMs/subs and recycle some money).
 - Need explicit no-subrogation against PSO and EXIM, to avoid the absurd scenario where the insurer pays PSO then sues PSO.

7. Duties of the clean tech company – Moral Hazard Control

What the policy requires from clean tech company

- Proper installation, operation, and maintenance of ECMs.
- Early notification of adverse performance trends.
- Active mitigation of potential shortfalls.
- No material change of scope/DMRV method without insurer consent.
- Full record-keeping and site access.
- Compliance with EPC; early termination/default can kill coverage.

Key issues & tradeoffs

- How strict are the “duty” clauses?
 - Stricter duties = stronger moral hazard control, cheaper premiums, but more chances for insurer to deny claims on technicalities.
 - More forgiving wording is clean tech company-friendly but will be priced or limited by the insurer.
- Change management
 - Requiring insurer consent for any material project change keeps the underwriting risk stable but can slow down operational improvements or extra ECMs.
 - You can negotiate thresholds (e.g., changes that affect guaranteed savings by >5% need insurer sign-off).

8. Premium & Pricing Flexibility

What the policy does

- clean tech company pays premium (often capitalized into the project economics).
- Payment can be upfront or annual installments; non-payment can trigger suspension/cancellation.

Key issues & tradeoffs

- Upfront vs spread-out premium
 - Upfront: higher initial cash need (or financed), but less risk of mid-term cancellation for non-payment.
 - Annual: smoother cashflow but introduces risk that insurer cancels if clean tech company gets into trouble.
- Scope changes & premium adjustment
 - If you enlarge ECM scope or guarantees, insurer will likely endorse and increase premium. The contract should provide a clear mechanism for doing this without full re-underwriting.

9. Termination & Continuity for PSO/EXIM

What the policy does

- Normal expiry at End Date.

- clean tech company can cancel with notice (potential refund).
- Insurer can cancel for:
 - Non-payment,
 - Material breach,
 - Misrepresentation (subject to Thai law).
- Policy may continue for Additional Insureds even if clean tech company is insolvent (if negotiated that way).

Key issues & tradeoffs

- Cancellation protections for PSO/EXIM
 - If insurer can easily cancel or terminate on clean tech company default, the moment of highest need (clean tech company in trouble) is exactly when coverage disappears.
 - PSO/EXIM should push for:
 - No cancellation without notice to them, and
 - Survival of cover for their interests even if clean tech company goes bankrupt, at least for shortfalls already incurred.
- Early EPC termination
 - If EPC terminates, any performance insurance the CTC obtained would also typically terminate. EXIM's residual exposure is covered by the PSO receivables assignment and Tripartite Agreement step-in rights.
 - A more sophisticated setup might allow run-off coverage for shortfalls up to termination date, even if EPC ends mid-year.

10. Governing Law, Disputes & Interface with EPC Disputes

What the policy does

- Governed by Thai law, jurisdiction Thai courts (or arbitration if chosen).
- Disputes over claims can go to court/arbitration, with EPC and expert findings as reference.

Key issues & tradeoffs

- Consistency with EPC dispute mechanisms
 - Ideally: if EPC M&V dispute is settled by an expert or arbitration, the insurer recognizes that outcome for savings data.
 - If the policy allows the insurer to re-litigate the same technical dispute, you can end up with contradictory outcomes.
- Arbitration vs court
 - Arbitration: more flexible and lender/investor-friendly, but can be expensive.
 - Courts: familiar but slower and less specialized.

E.5 Emission Reductions Purchase Agreement (ERPA) (Seller – CME (KTB))

Key Considerations

- Align the ERPA with the VERPF rules (pricing schedule, buffer/reserve rules, review cycle) and with the CME operating procedures (Annex D and Annex H).
- Define carbon rights clearly (who owns the ERs/VERs, when title transfers, and how registry transfers are executed).
- Specify the evidence required for payment (verification report and/or registry issuance/transfer record) and the timing from evidence to payment.
- Include robust representations on exclusivity and no double sale/double counting, with remedies if breached.
- Clarify responsibilities for monitoring, verification scheduling, and registry account setup; specify treatment of verification/registry costs.
- Include E&S and integrity covenants (ESMS compliance, OHS, anti-corruption, sanctions, KYC/AML), with clear suspension/termination rights.
- Address assignment/resale rights and confidentiality/data-sharing (including access to digital MRV data).
- Provide clear default, termination, and dispute resolution provisions; address force majeure and change-in-law risks, including regulatory authorization/sandbox contingencies.

1. Purpose & Basic Structure

What this agreement does

- CME (KTB as Buyer) runs a VER Purchasing Facility and buys verified emission reductions (ERs) from eligible projects (the Seller).
- Project = some GHG-reducing activity (EE, PV, etc.) whose ERs are:
 - Monitored under a Monitoring Plan,
 - Verified by an accredited VVB, and
 - Included under CME's PoA / program with a standard (Gold Standard, T-VER, etc.).
- CME then aggregates & monetizes these ERs on the market; Seller gets a fixed price per tonne on a results-based basis.

Key tradeoffs

- Pure pay-for-performance vs. "support + performance"
 - Pure RBF (no advances, pay only per verified tonne) is clean, low risk for CME, but may be too thin to mobilize some private projects.
 - Adding elements like small advances, technical support, or higher carbon price increases participation but shifts more risk to CME/program budget.

2. Volume, Exclusivity & Registration

What the contract says

- Seller agrees to sell all ERs from the Project during the term (often "all ERs during crediting period") exclusively to the CME.
- Option to cap with a Maximum Quantity (X tCO₂e).
- CME is responsible for program/PoA registration; Seller must provide project documents and cooperate to be included under PoA / T-VER / GS.

Key issues & tradeoffs

- All ERs vs capped quantity
 - “All ERs” simplifies accounting, ensures no leakage/double counting, and maximizes CME volume.
 - A cap protects program budget if the project wildly overperforms but may frustrate Seller if they have to find another buyer for the “overflow.”
- Exclusivity
 - Strong exclusivity protects CME’s environmental integrity and monetization plans, but the Seller is locked in to CME pricing.
 - A soft exclusivity (e.g., only for ERs generated under the PoA / in certain years) gives Seller optionality but complicates double-count prevention.
- Registration risk allocation
 - If CME takes primary responsibility for PoA registration and inclusion, Seller’s burden is lighter, but CME owns the institutional risk with the standard/regulator.
 - If Seller bears some registration conditions precedent (e.g., if project fails validation, CME has no payment obligation), Seller’s project risk increases.

3. Carbon Price & Payment Mechanics

What the contract does

- Sets a fixed Carbon Price (USD or THB per tCO₂e) in Clause 3.1. The Carbon Price in Clause 3.1 refers to the applicable rate in Table D-1 of Annex D for VERPF-funded purchases. Table D-1 prices are the minimum reference prices for VERPF-funded payments. For self-funded purchases, the Carbon Price is as negotiated and stated in the executed ERPA; KTB may negotiate market-based prices independently.
- Payment only after:
 - ERs are monitored,
 - Verified by VVB, and
 - Delivered (typically issuance into CME’s registry account / title transfer).
- Payment in Thai Baht or US Dollars as specified in the executed ERPA, often within 30 days of delivery or invoice. VERPF-funded payments shall be in THB consistent with EXIM’s disbursement currency. KTB’s self-funded payments may be in any mutually agreed currency.
- Option for advance payments that are offset against future ER deliveries.

Key issues & tradeoffs

- Fixed price vs dynamic/market-linked price
 - Fixed price is simple, bankable for Seller, and aligns with “grant-like” incentive design; CME bears all market risk (if VER prices collapse or spike).
 - Market-linked price (e.g., floor + upside share) better aligns with evolving carbon prices but is harder to administer and can feel speculative for project owners.
- Pay-on-verification vs early (pre-verification) disbursement

- Strict “pay only on issuance” protects program integrity but may mean long delays between performance and cash to Seller.
- Allowing preliminary dMRV-based payments (with true-up after formal issuance) improves cashflow but introduces reconciliation and clawback risk.
- Advance payment option
 - Pros: helps finance capex, especially for SMEs; can be powerful to kickstart projects.
 - Cons: creates credit risk for CME – if project underperforms or collapses, CME may need to recover or write off the unused portion.
 - Design choices: conservative advance amount (% of expected ERs), security (guarantee, reserve), and clear clawback rules.

4. Title, Additionality & Double Counting

What the contract does

- Defines Emission Reductions, VERs, Monitoring Plan, etc.
- On Delivery, all rights and title to delivered ERs (and associated attributes) pass to CME.
- Seller reps:
 - They own the ERs.
 - No double counting/no double selling.
 - Project is additional and compliant with law.

Key issues & tradeoffs

- Scope of attributes
 - If contract says all environmental attributes (incl. RECs, SDG labels, etc.) transfer, Seller can’t later monetize those separately.
 - You can carve out certain attributes (e.g., local renewable energy certificates) if desired, but that complicates marketing and risks overlapping claims.
- Double counting risk
 - Strong reps + indemnities protect CME; but if enforcement is too harsh, some Sellers might be deterred from joining.
 - You may want proportional remedies (e.g., if Seller inadvertently registers under another program, they must fix and compensate CME, but not automatically terminate the whole deal unless egregious).

5. Monitoring, Verification & Delivery Risk

What the contract does

- Seller must implement the Monitoring Plan (meters, data QA/QC, reports).
- CME arranges verification by a VVB, pays or allocates verification fees per 5.2.
- Delivery = issuance into CME’s account (or clear transfer of title post-verification).
- If credits are not issued or verified, no ERs are “delivered,” thus no payment.

Key issues & tradeoffs

- Responsibility split
 - Seller handles onsite monitoring & data; CME handles verifiers, registry, and program interface.
 - If monitoring fails (Seller side), Seller loses ERs for that period; if registry or standard fails (CME side), it's less clear who bears the loss.
- Verification frequency
 - Annual verification: lower transaction cost, bigger lump sums, but slower cash.
 - Semi-annual or quarterly: better cashflow, more admin cost. You can layer: dMRV-based interim indications, annual formal verification.
- Failure to verify or issue due to external changes
 - If standard rules change, registry closes, or national Article 6 rules evolve, strictly speaking no issuance = no payment.
 - For a public program like LCC, you may want a good-faith clause: CME will attempt to find an alternative way to recognize and reward reductions (e.g., switch standard, pay off dMRV).

6. Risk Allocation: Regulatory, Methodology & Program Changes

What the contract does

- Baseline, methodology, and Monitoring Plan are set in Schedules.
- Updates (e.g., grid emission factors, methodology revisions) must follow standard rules; price stays fixed.
- Program wind-down or PoA standard changes trigger negotiation / potential termination with payment for delivered ERs.

Key issues & tradeoffs

- Methodology changes
 - If new version of methodology is more conservative (fewer ERs), Seller is structurally worse off at a fixed price; CME is protected.
 - You could include grandfathering or limited transitional protections for early signers, but that complicates alignment with the standard.
- National policy / NDC interactions
 - If national rules later restrict export/issuance, Seller might feel unfairly penalized.
 - Program-design choice: either treat this purely as a legal risk (no issuance, no payment), or commit to domestic recognition (e.g., T-VER Premium) so that there is always a path to issuance.

7. Advance Payments & Under-Delivery

What the contract does

- Optional advance payment against future ERs:
 - First ERs produced go to repay the advance.

- If total ERs by end are less than advance-equivalent, Seller must refund or CME can draw on security.

Key issues & tradeoffs

- Scale of advance
 - Larger advances make the program more catalytic but demand stronger risk controls: guarantees, security, or cross-default with loans.
 - Small advances (e.g., 10–20% of expected ERs) are safer but may not be enough to move the needle for capex-heavy projects.
- Security mechanisms
 - Cash collateral, bank guarantee, or subordinated claim against project cash flows can secure the advance.
 - Security makes legal drafting heavier but protects CME from pure grant-like loss if project completely fails.

8. Seller & Buyer Representations, Warranties & Indemnities

What the contract does

- Seller reps: project ownership, emissions rights, law compliance, additionality, data accuracy, ongoing operation.
- Buyer covenants: maintain PoA, engage verifiers, pay on time, cover registry interactions and (probably) fees.
- Indemnities:
 - Seller indemnifies CME against double selling, third-party claims on ERs, fraudulent data.
 - Buyer indemnifies Seller for losses caused by CME's misuse of credits or misrepresentation.

Key issues & tradeoffs

- Strength of Seller warranties
 - Strong warranties are key for environmental integrity, but smaller project owners might not fully understand the implications or have the legal comfort.
 - You may want a tiered approach: very strict on core points (ownership, double counting, fraud); more flexible (best-efforts) for soft areas (e.g., “no policy that might affect additionality”).
- Scope of indemnities
 - Broad indemnities can be scary for Sellers; narrow them to direct losses, exclude consequential/indirect damages, and cap overall exposure if needed to keep them in the program.

9. Term, Termination & Program Wind-Down

What the contract does

- Term runs through the Crediting Period plus a bit for issuance and payment.

- Termination:
 - By mutual consent.
 - For breach (double selling, non-payment, non-cooperation, etc.).
 - For force majeure (long-lasting).
 - If LCCP/program is wound down.
- On termination:
 - ERs already delivered → must be paid.
 - Advances and under-delivery → reconciled per 3.4.
 - Seller may regain freedom to sell future ERs elsewhere if Buyer fails obligations.

Key issues & tradeoffs

- Right to exit for Seller
 - Sellers need the confidence that if Buyer stops paying or program stalls, they can exit and take project to another platform.
 - But uncontrolled exits can create double counting risk if ERs have already been associated with LCCP/NDC claims.
- Program wind-down
 - If the PoA or standard is discontinued, you need a clean, fair mechanism:
 - Pay for all ERs already verified.
 - Optional one-off settlement for dMRV-proven but not yet issued ERs.
 - Clear statement about when Seller is free to re-register project elsewhere.

10. Dispute Resolution, Assignment & Miscellaneous

What the contract does

- Disputes: negotiate → optional mediation → arbitration in Bangkok (TAI rules), Thai law.
- CME can assign rights to a successor CME / climate fund; Seller generally cannot assign without consent.
- Standard clauses on notices, amendments, waivers, severability, confidentiality, language, counterparts.

Key issues & tradeoffs

- Consistency with other LCC documents
 - Arbitration forum, governing law, and language should be aligned with EPCs and insurance policies to avoid fragmentation.
- CME assignment rights
 - Broad assignment rights allow flexibility (e.g., moving VERPF to a climate fund or SPV), but Sellers may worry about facing an unknown counterparty.
 - Simple fix: allow assignment only to public or regulated entities and require notice; keep Seller's commercial terms unchanged.

- Confidentiality vs transparency
 - Need enough confidentiality to reassure private Sellers (energy data, financials), but also enough transparency for program MRV and World Bank reporting.

ANNEX F. Environmental and Social Management System for the Project

The Export-Import Bank of Thailand (EXIM), the Borrower, and Krungthai Bank (KTB), the Project Implementing Entity (PIE) will implement the Low Carbon Cities and Carbon Market Development Project (LCCP), the Project. The Borrower will ensure that the Project, and the PIE will ensure that Part 2 of the Project, is carried out in accordance with the World Bank Environmental and Social Framework (ESF), relevant Environmental and Social Standards (ESSs) and this Environmental and Social Commitment Plan (ESCP).

This Annex outlines the implementation arrangements, clearly defines the roles and responsibilities of the Borrower and PIE, and offers comprehensive guidance for ESCP action items. The subsequent sections present the duties of the Borrower and PIE in distinct sub-sections to facilitate easy reference.

F.1. Roles and responsibilities of EXIM

EXIM has a robust Environmental and Social Management System (ESMS) including Sustainable Development Policy¹, Environmental and Social procedures and organizational structure², and stakeholder engagement. Most of EXIM's ESMS components are in line with WBG ESF requirements except for the following:

- Sub-project risk categorization
- Exclusion list for sub-project screening
- Requirements for sub-project level ES instruments (ESMP/ESCAP, etc.),
- Monitoring and supervision, and
- Reporting, including incident reporting.

These additional requirements are added into EXIM's existing ESMS and a **"Project ESMS"** is developed as described in following. EXIM will adopt and use Project ESMS during implementation of the LCCP.

Introduction

This Environmental & Social Management System (ESMS) is for Low Carbon Cities and Carbon Market Development Project (LCCP) ("the Project") and is financed by the World Bank as a Financial Intermediary (FI) operation in which Export-Import Bank of Thailand (EXIM) is the borrower ("the Borrower") and implementing FI, and the Ministry of Finance (MoF) provides a sovereign guarantee.

The purpose of the Project ESMS is to ensure that sub-projects deliver climate benefits while preventing, minimizing, or mitigating adverse E&S risks, and to assign clear accountability for compliance in line with E&S Policy (see Annex I). The Project E&S supplementary gap filling measures applies to all subprojects financed or on-lent by EXIM under the LCC Project.

Implementation is anchored in the World Bank Environmental and Social Framework (ESF), including the specific requirements for FI operations under ESS9 (for Component 1 activities), and is

¹ Available at <https://www.exim.go.th/th/Sustainable-Development-Policy.aspx>

² EXIM Thailand, Sustainability Report, 2024. Available at: www.exim.go.th

complemented by Project's Environmental & Social Commitment Plan (ESCP) and Stakeholder Engagement Plan (SEP), and all relevant national permits and regulations.

Institutional roles and responsibilities

Below summarizes the roles for each actor under the Project:

- **EXIM:** acting as Borrower and FI, operates the ESMS, screens and classifies all candidate subprojects, determines the proportional E&S instruments to be prepared, incorporates E&S covenants in sub-loan agreements, supervises implementation, maintains the Project grievance mechanism (GM), and reports to the World Bank in accordance with the ESCP.
- **MoF:** fulfills the functions of guarantor and provides policy level oversight; it does not undertake day-to-day implementation but may receive copies of periodic reports as stipulated in the Guarantee Agreement.
- **PSOs:** are responsible for site access and permitting, for conducting local stakeholder engagement consistent with the SEP, and for supervising contractor E&S performance during construction and operation of public assets.
- **Clean tech service providers:** and their contractors prepare and implement sites specific Environmental and Social Management Plans (ESMPs) or Environmental and Social Codes of Practice (ESCOPs), together with Occupational Health and Safety (OHS) plans, maintain a dedicated labor grievance mechanism, submit periodic environmental, social, health, and safety (ESHS) reports, and comply with codes of conduct that address risks of sexual exploitation and abuse/sexual harassment (SEA/SH).
- **Lender's Technical Advisor (LTA)** that is appointed by EXIM to review sub-loans and monitor E&S performance, among others, of the sub-loan beneficiaries, in accordance with terms of reference that have been approved by the Bank, that are consistent with the ESSs and will require the LTA to participate in training on the ESSs.

Objectives

The Project ESMS is set out to identify, assess, manage, and monitor the E&S risks and impacts of sub-projects on an ongoing basis under the Project, taking into account the national and local laws and regulations in Thailand and the requirements of the World Bank. As such the key objectives are:

- To integrate E&S considerations into the lifecycle of loans to eligible sub-projects (sub-borrowers) to ensure that E&S risks and impacts are consistently identified, screened, and managed;
- To set out the responsibilities for E&S risk and impact identification, assessment, decision-making, as well as monitoring and escalation; and
- To work with sub-borrowers to manage E&S risks and impacts and support ongoing capacity building in the implementation of the Project.

Applicable Standards and Guidelines

The following are the standards at a minimum that the ESMS will apply to all transactions:

- Exclusion List (see Annex A: Exclusion List);
- Applicable local, provincial and national laws and regulations (see Applicable Thai Legal Framework below); and
- Screening out of any substantial and high-risk activities (see Annex B: Environmental and Social Risk Categorization Guidance).

Substantial and High-Risk activities are also described below. Also see Annex B: Environmental and Social Risk Categorization Guidance. This also includes descriptions of the types of activities that would be eligible under the ESMS (Low and Moderate Risk activities).

Applicable Thai Legal Framework

All sub-projects must comply with applicable Thai national and local law, including occupational safety, health and environment (OHS&E) legislation, the Factory Act, the Enhancement and Conservation of National Environmental Quality Act, the Labor Protection Act, and the Gender Equality Act. Compliance with these requirements is confirmed by sub-borrowers as part of the ESDD process (Annex C) and incorporated as a covenant in the sub-loan agreement (Annex D).

Scope

The provisions of the Project ESMS are applicable to all lending to sub-projects under the Project, with no exceptions.

Project ESMS Communication & Disclosure

Ensuring awareness of relevant stakeholders (see the Stakeholder Engagement Plan) of the existence of the ESMS which supports its implementation, including to all relevant personnel at EXIM and KTB.

The Project ESMS is available here:

EXIM will ensure that the ESMS is disclosed and available to relevant parties.

Training

EXIM will:

- Provide training to relevant Borrower and PIE staff, which are involved in the Project, regarding ESF requirements of the Project.
- Borrower and PIE will organize trainings for Project's ESF requirements to:
- Orientation for Clean Tech Companies (CTCs).
- Training for public sector organizations such as relevant BMA and IEAT officers.

Environmental & Social Procedure

The overall summary of the process of E&S review under the ESMS is set out below:

Phase 1 – Screening and Appraisal

- Screen against exclusion list activities
- Categorize
- Conduct an E&S appraisal of the sub-project

Phase 2 – Closing

- Confirm commitments in the loan agreement (and any actions required)

Phase 3 – Monitoring

- As part of regular monitoring follow-up on E&S aspects and also any E&S issues reported by the sub-project

Figure 1 E&S Review Process

Details are further set out in the sections below.

Phase 1: Screening and Appraisal

Entity	Responsibilities	Documents
Loan Officer	<ul style="list-style-type: none"> • Screen a sub-project’s activities against the Exclusion List (in Appendix A). <ul style="list-style-type: none"> • If any excluded activities are identified, then the loan should proceed no further. • If no exclusion list activities are identified, then the application can proceed to the next Phase. • Categorization should be undertaken (see Annex B: Environmental and Social Risk Categorization Guidance) of the sub-borrower also see Table 1 below. <ul style="list-style-type: none"> ○ Where “high” or “substantial” risk activities are identified, the sub-project processing should not proceed. • EXIM uses its ESDD checklist to check compliance with local laws and identify gaps. <ul style="list-style-type: none"> • The sub-borrower must be able to demonstrate compliance with applicable local, provincial and national laws and regulations in Thailand (including permits and approvals) and the requirements under the Project. • Where compliance cannot be demonstrated, an E&S Action Plan (ESAP) must be agreed with the sub-borrower in order for the sub-loan to proceed. The plan must specify all of the necessary actions to bring the sub-borrower into compliance. A target completion date for each specified action must also be agreed. A template is included in Annex D Template Environmental and Social Action Plan. • ESDD also identifies the need for ESMP (for low to moderate risk activities) or ESCOP (for low risk activities) (see Annex E for contractor package regarding templates) 	<p>Completed screening assessment refer to Annex C Screening and Appraisal Format</p>

Entity	Responsibilities	Documents
	<ul style="list-style-type: none"> EXIM reserves the right to withhold financing if the procurement outcome by the PSOs does not align with the standards or the version approved by EXIM. 	
EXIM E&S Focal Point	<ul style="list-style-type: none"> Provide input and support where required in screening of the sub-loan, including categorization and identifying any gaps to be addressed. 	-
Credit	<ul style="list-style-type: none"> This is the last part of evaluation, and is required to confirm: <ul style="list-style-type: none"> No exclusion list activities (including high/substantial risk activities) The E&S risks have been appropriately understood, including the category, and where necessary an ESAP and relevant requirements have been captured Reject to provide loan (Exclusion List/categorization/non-compliance issue) 	Reviewed screening assessment refer to Annex C Screening and Appraisal Format

Table 1 E&S Categorization

Category	Definition	Notes
High Risk	High Risk means any business activity which is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented, and which includes, for the avoidance of doubt, activities involving (a) involuntary resettlement, (b) risk of adverse impacts on ethnic minorities, (c) significant risks to or impacts on the environment, community health and safety, biodiversity, cultural heritage, or (d) significant occupational health and safety risks (risk of serious injury or fatality to workers).	Not allowed to proceed under the ESMS.
Substantial Risk	Substantial Risk means any business activity that is not as complex as High-Risk activities, however, has some significant risks and impacts with the possibility of avoiding or reversing but with substantial investment and time and may give rise to limited degree of social conflict, harm, human security risk.	Not allowed to proceed ESMS.
Moderate Risk	Moderate Risk means any business activity that has potentially limited adverse environmental or social risks and/or impacts that are few in number, generally site-	Allowed, but requires review (see Annex C).*

Category	Definition	Notes
Low Risk	<p>specific, largely reversible, and readily addressed through mitigation measures. Impacts are often site-specific without likelihood of impacts beyond the activity’s footprint and routine safety precautions are expected to be sufficient to prevent accidents.</p> <p>Low Risk means any business activity minimal or negligible risks to and impacts on human populations and/or the environment with few or no adverse risks and impacts and issues.</p>	Allowed but should be straightforward to review (see Annex C). *

Note – also see Annex B for further detail.

***Annex C is not applicable for Part 2 activities.**

Phase 2: Closing

Entity	Responsibilities	Documents
Loan Officer	<ul style="list-style-type: none"> • Review legal documentation in relation to E&S related definitions, representations and undertakings, including the incorporation of any actions required to address gaps. Include followings in the loan agreement: i) hiring LTA; ii) E&S Action Plan (developed as per Annex D template upon completion of ESDD); iii) Annex E. Contractor’s reporting templates (ESMP/ESCP, Code of conduct, etc.); iv) incident reporting requirements as per ESCP; v) GRM requirements; vi) Supply Chain Requirements (as per Annex H); vii) WB ESF, ESSs and ESCP requirements. • Key inclusions of the legal agreement with the sub-borrowers are: <ul style="list-style-type: none"> ○ Not to engage in any activities on the Exclusion List ○ To comply with all legal requirements. ○ To report to EXIM if there is a substantial change in the nature of the operations. ○ To report to EXIM if there are any material E&S incidents. ○ (If required) to address any gaps identified. 	Legal Agreement with E&S inclusions for the sub-borrower
Credit	<ul style="list-style-type: none"> • Ensure that the legal agreement with the borrower meets ESMS requirements on E&S aspects. 	Legal Agreement with E&S inclusions for

Entity	Responsibilities	Documents
		the sub-borrower

Phase 3: Monitoring

Entity	Responsibilities	Documents
Loan Officer/LTA	<ul style="list-style-type: none"> • Ensure there is reporting of material adverse E&S events. Annex F: Material E&S Incidents and Report Template for EXIM to formally report these types of incidents . Examples of material E&S incidents may include: <ul style="list-style-type: none"> ○ Major injuries or fatalities (employees, the general public or contractors); ○ Strikes or significant employee disputes; ○ Regulator action in relation to E&S matters; ○ Spills, pollution incidents, fires, explosions; and ○ etc. • The category will determine the extent of monitoring and oversight required of the sub-loan during the post-financial close monitoring phase. Monitoring will be as follows: <ul style="list-style-type: none"> ○ Low risk sub-loans do not require monitoring. ○ Medium risk sub-loans require straightforward follow-up to find out if there have been any significant changes in business activities, confirm ongoing compliance with the exclusion list and local requirements and any actions required to be addressed have been closed out. Monitoring will be undertaken semi-annually. • In the event of non-compliance in relation to E&S matters (including material issues reported or a grievance raised) EXIM will seek to resolve the issue with the sub-borrower in order to address the issue. Actions will be documented, and EXIM will work with the sub-borrower to ensure that corrective actions are implemented. If the issue cannot be addressed through engagement, EXIM may seek to remedy the situation through available clauses in the loan documentation. Material developments will be reported to World Bank. 	<p>Annex F: Material E&S Incidents and Report Template</p> <p>An example (that can be tailored) is included as Annex E: Contractor E&S Implementations Pack for annual monitoring.</p>

Reporting

Material Adverse Events/Incident Reporting

Borrower notifies the WB of any incident or accident relating to the project which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers, including those resulting in death or significant injury to workers or the public; acts of violence, discrimination or protest; unforeseen impacts to cultural heritage or biodiversity resources; pollution of the environment; dam failure; forced or child labor; allegations of sexual exploitation or abuse (SEA), or sexual harassment (SH); or disease outbreaks. Borrower notifies the WB no later than 48 hours after learning of the incident or accident and provide available details upon request from WB. Types of reportable incidents and reporting content are provided in Annex F. For initial incident reporting format, and incidents related to SOGI and SEA/SH, reach out to WB for further guidance.

Borrower arranges for an appropriate review of the incident or accident to establish its immediate, underlying and root causes, and prepares, agrees with the WB, and implements a Corrective Action Plan that sets out the measures and actions to be taken to address the incident or accident and prevent its recurrence. For incident reporting format and incidents related to SOGI and SEA/SH reach out to WB for further guidance.

Borrower provides review report and Corrective Action Plan, which is implemented through relevant parties and overseen by Borrower, to the WB no later than 10 days following the submission of the initial notice, unless a different timeframe is agreed to in writing by the WB.

Routine Reporting

Borrower and PIE to prepare regular monitoring reports on the environmental, social, health and safety (ESHS) performance of the Project, including but not limited to the implementation of the ESCP, status of preparation and implementation of E&S documents required under the ESCP, stakeholder engagement activities, performance of the grievance mechanism(s) and ESMS implementation. Regular reports are submitted to the WB through the Project Steering Committee semi-annually. Annex G provides sample regular reporting format.

Organizational Capacity and Competency

EXIM will maintain existing staffing arrangement, including a Project director and Environmental and Social focal point (FP) assigned for implementing of this Project, and ensure the PIE maintains the existing staffing arrangement within the PIE assigned for implementing Part 2 of the Project, all with clearly defined roles and responsibilities, and leverage internal coordination mechanism to support management of environmental, social, health and safety (E&S) risks and impacts of the Project, satisfactory to the WB.

EXIM will appoint and maintain a Lender's Technical Advisor (LTA) for monitoring of E&S performance, among others, of its Sub-loan Beneficiaries, in accordance with terms of reference acceptable to the Bank, that are consistent with the ESSs and will require the LTA to participate in training on the ESSs.

EXIM will assign and maintain clear management responsibility for E&S compliance at a senior level (e.g. the Project director or manager will have oversight of E&S risk management).

Stakeholder Engagement Plan

EXIM will implement existing internal and external stakeholder engagement policies and practices consistent with ESS10, which will include measures to, inter alia, provide stakeholders with timely, relevant, understandable and accessible information, and in a culturally appropriate manner, free of manipulation, interference, coercion, discrimination and intimidation.

The POM outlines the Project key stakeholders including who are members of the Low Carbon Cities and Carbon Market Development Project Working Group and Steering Committee; relevant private

sector actors, and CSOs that may be impacted by or have a direct or indirect impact or interest in the project.

Borrower and PIE will conduct stakeholder engagement following inclusive consultation principles consistent with ESS 10 including:

- *Conduct of Transparent engagement:* Carry out internal consultations in a transparent manner, devoid of manipulation, interference, coercion, or intimidation throughout the Project life cycle.
- *Informed participation and feedback:* conduct wider project information dissemination targeting relevant stakeholders in accessible and appropriate format; obtain stakeholder feedback, suggestions, needs/expectations and address concerns in a timely manner.
Inclusive engagement: Conduct periodic stakeholder identification and analysis to enhance consultation and build effective relationships with Sub-loan Beneficiaries especially small and medium-sized enterprises (SMEs) to have equal and fair access to funding and information from Borrower. *Information Disclosure:* Borrower and PIE will ensure timely and transparent information disclosure about the project in accessible manner through the Borrower's website, with summaries in Thai language as appropriate. Borrower's website shall maintain information on the Project throughout the Project implementation period. *Documentation:* Borrower and PIE will document all stakeholder engagement activities (attendance, topics discussed, feedback received) and how concerns are responded to. These will be summarized in annual reports to the Bank and used to improve project implementation.
- *Adaptive management of stakeholder engagement:* Review internal and external communication procedures on the project at least annually and update it if necessary to reflect any new stakeholders (e.g. if new municipalities join the project or new concerns emerge from stakeholders) or a change in engagement strategy. Any significant changes in stakeholders or consultation process shall be cleared with the Bank and disclosed to stakeholders.
- *Resources:* Borrower and PIE will allocate sufficient resources for stakeholder consultations and focal point to oversee stakeholder consultations to build and maintain client and public trust and support, manage expectations, and ensure that stakeholder input is considered in project decisions

Grievance and redress mechanism

EXIM will publicize, maintain, and operate an accessible grievance and whistleblowing mechanism, to receive and facilitate resolution of concerns and grievances in relation to the Project, promptly and effectively, in a transparent manner that is culturally appropriate and readily accessible to all Project stakeholders, at no cost and without retribution, including concerns and grievances filed anonymously, in a manner consistent with ESS10. EXIM will also manage SEA/SH risks during implementation, all in a safe, confidential, and survivor-centered manner.

EXIM will make CTCs to establish a site-level intake system and cooperate with EXIM's grievance redress mechanism. CTCs will consolidate and maintain records of grievances and resolutions and shall report back to EXIM Bank as per its loan agreement.

Site-level GRM should include followings:

- Different ways in which users can submit their grievances, which may include submissions in person, by phone, text message, mail, email or via a web site;
- A log where grievances are registered in writing and maintained as a database;
- Publicly advertised procedures, setting out the length of time users can expect to wait for acknowledgement, response and resolution of their grievances;

- Transparency about the grievance procedure, governing structure and decision makers; and
- An appeals process (including the national judiciary) to which unsatisfied grievances may be referred when resolution of grievance has not been achieved.
- **World Bank Grievance Redress Service (GRS) and Accountability Mechanism.** Affected individuals and communities who believe they are adversely affected by a World Bank-supported project may submit complaints to the Project GM or directly to the World Bank's GRS. Complaints may be submitted through the GRS website (<https://www.worldbank.org/grs>) or by email to grievances@worldbank.org. Affected people may also submit complaints to the World Bank Inspection Panel / World Bank Accountability Mechanism (<https://www.inspectionpanel.org>). These mechanisms are independent of the Project-level grievance channels.

Review and Update of the ESMS

The Project ESMS will be updated and reviewed:

- In the first year after initial deployment by EXIM, and thereafter annually.
- If there are modifications in the Applicable Standards under the ESMS (for example significant changes to local legalization).
- Incorporation of feedback from the SEP/Grievance Mechanism.
- Documentation of lessons learnt and/or good practice based on implementation.

Note that revisions will need to be communicated to all relevant partners such World Bank.

Annex A: Exclusion List

These are a list of activities that form part of the Project ESMS where any involvement would trigger a “no go” on providing a loan to a sub-borrower.

- Production or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements, or subject to international

bans, such as pharmaceuticals, pesticides/herbicides, ozone depleting substances, PCBs, wildlife or products regulated under CITES.

- Production or trade in weapons and munitions³.
- Production or trade in alcoholic beverages (excluding beer and wine)².
- Production or trade in tobacco².
- Gambling, casinos and equivalent enterprises².
- Production or trade in radioactive materials. This does not apply to the purchase of medical equipment, quality control (measurement) equipment and any equipment which is considered to be the radioactive source to be trivial and/or adequately shielded.
- Production or trade in unbonded asbestos fibers or use of asbestos-containing materials. This does not apply to purchase and use of bonded asbestos cement sheeting where the asbestos content is less than 20%.
- Drift net fishing in the marine environment using nets in excess of 2.5 km in length.
- Production or activities involving harmful or exploitative forms of forced labor⁴/harmful child labor⁵.
- Commercial logging operations for use in primary tropical moist forest.
- Production or trade in wood or other forestry products other than from sustainably managed forests.
- Sub-loans involving any transaction that will require acquisition of private land, physical relocation of households or displacement of livelihoods.
- Activities involving major construction and civil works that would cause significant adverse impact and in line with WB ESF policies (e.g. higher risk activities).
- High and Substantial risk sub-loans (following the definitions of World Bank's Environmental and Social Framework (also see Annex B).

Annex B: Environmental and Social Risk Categorization Guidance

Categorization

This document is intended to provide guidance on the categorization of sub-borrowers. Whilst this guide provides an overview to the characteristics and some examples of each category, categorization should be considered on a case by case basis factors such as location, environmental & social context, scale, and magnitude of impacts need to be considered.

Table B1 - Categories

Category	Definition	Example Activities
High and Substantial Risk	High Risk means any business activity which is likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented, and which includes, for the avoidance of doubt, activities	Examples may include: <ul style="list-style-type: none"> • Large-scale acquisition of land. • Permanent loss of income or assets involving multiple households.

³This does not apply to project sponsors who are not substantially involved in these activities. "Not substantially involved" means that the activity concerned is ancillary to a project sponsor's primary operations.

⁴Forced labor means all work or service, not voluntarily performed, that is extracted from an individual under threat of force or penalty.

⁵Harmful child labor means the employment of children that is economically exploitive, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health, or physical, mental, spiritual, moral, or social development.

Category	Definition	Example Activities
Moderate Risk	<p>involving (a) involuntary resettlement, (b) risk of adverse impacts on indigenous peoples, (c) significant risks to or impacts on the environment, community health and safety, biodiversity, cultural heritage, or (d) significant occupational health and safety risks (risk of serious injury or fatality to workers).</p> <p>Substantial Risk means any business activity that is not as complex as High Risk activities, however, has some significant risks and impacts with the possibility of avoiding or reversing but with substantial investment and time and may give rise to limited degree of social conflict, harm, human security risk.</p>	<ul style="list-style-type: none"> • Direct impact on traditional landowners or clan groups, including resettlement of communities. • Refinery construction and operation. • Operations that involve large scale extraction of minerals, coal or building materials, via underground or open-pit mining. • Development of large mineral processing facilities/integrated mills. • Large hydropower developments. • Large scale electric power transmission and distribution. • Large infrastructure projects, including development of new ports and harbours, airports, road, rail, and mass transit systems.
	<p>Moderate Risk means any business activity that has potentially limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures. Impacts are often site-specific without likelihood of impacts beyond the activity's footprint and routine safety precautions are expected to be sufficient to prevent accidents.</p>	<ul style="list-style-type: none"> • Activities Installation of rooftop solar projects; • Small-scale processing of agricultural produce e.g. rice. • Building of small warehouses or renovation of existing physical premises with no involuntary resettlement, land acquisition and restrictions on land use; • Acquisition of assets such as industrial machines, medium sized tools and equipment.
	<p>Low Risk means any business activity minimal or negligible risks to and impacts on human populations and/or the environment with few or no adverse risks and impacts and issues.</p>	<ul style="list-style-type: none"> • Office based activities such as marketing, consultancy, etc. • Working capital needs (loans for payment of salaries, marketing costs, audit and accounting costs); • Restaurants and other food premises.

Annex C Screening and Appraisal Format

EXIM's ESDD together with exclusion list and risk categorization described in this ESMS.

Annex D Template Environmental and Social Action Plan

An Environmental and Social Action Plan (ESAP) should be tabular in format and designed to address the gaps identified in the sub-loan assessment (Annex C) and should be incorporated into the loan documentation. The aim is for the ESAP to be as succinct as possible, but clear, and set realistic timelines with clarity on what is required.

Reference No.	Action Description AND Related Standards/Requirement	Completion Indicator	Due Date (DD/MM/YYYY or defined number of days linked to an event)
1	<i>e.g. Obtain a waste management license for the disposal of hazardous wastes to meet e.g. Water Use Regulations.</i>	<i>Waste disposal license obtained</i>	<i>30 days prior to disposal of waste</i>
2	<i>e.g. Ensure that all workers have written contracts that explain their rights and obligations and have had these contracts explained to them this should be in line with Labor Code.</i>	<i>Contracts signed by all workers</i>	<i>Prior to loan disbursement.</i>
<i>etc.</i>	<i>etc.</i>	<i>etc.</i>	<i>etc.</i>

Annex E: Contractor E&S Implementations Pack

Purpose and Use: This Implementation Pack provides the minimum contractor-facing templates and clauses that PSOs shall attach to their procurement documents and include in executed contracts (including rooftop PV EPCs). Clean tech companies shall complete and implement these templates on each site, and PSOs shall retain them for supervision and audit.

Site-Specific ESMP/ESOP (Rooftop Solar PV on Public Buildings)

Project and Site Information

Sub-project name/code:

Site name and address:

PSO:

Clean tech company:

Reporting period (if applicable):

Site E&S/OHS focal point (name/contact):

Permit status (roof access, electrical works, utility approvals):

Risk Summary and Key Activities

Key works (roof access, lifting, electrical tie-in, commissioning, O&M):

Key risks (working at height, electrical hazards, falling objects, fire risk, waste, community safety, traffic safety risks, noise, sexual exploitation and abuse, lack of or weak grievance mechanism, use of child and forced labor). The minimum age for employment of workers shall be 18 years.

Mitigation Measures and Monitoring Commitments (Contractor shall implement and record evidence)

- 1) Working at height: Fall protection (harness/anchors), edge protection, permit-to-work, trained workers only.
- 2) Electrical safety: Lock-out/tag-out, qualified electricians, insulated tools, testing before energization, fire prevention controls.
- 3) Lifting and logistics: Safe lifting plan, exclusion zones, rigging checks, trained operators.
- 4) Waste management: Segregation, licensed disposal for hazardous waste (e.g., damaged modules, packaging, oils), records retained.
- 5) Dust/noise/community nuisance: Work-hour controls, housekeeping, traffic/pedestrian control and signage where applicable.
- 6) Roof integrity and waterproofing: Protection of roof membrane, sealing and reinstatement, leak checks after installation.
- 7) Worker welfare and labor conditions: Contracts, fair and non-discriminatory recruitment processes, no child/forced labor, worker accommodations (if any) meet minimum standards.
- 8) Community and worker grievance mechanisms: See Templates F-1.3 and PSO GRM requirements.

Monitoring and Reporting

Daily/weekly site checks (use checklist below).

Monthly E&S/OHS reporting to PSO as part of progress reporting.

Immediate incident reporting per Template F-1.5.

Sign-off

Prepared by (Contractor E&S/OHS): _____ Date: _____

Reviewed by (PSO E&S focal point): _____ Date: _____

Code of Conduct (including SEA/SH)

All clean tech company personnel and subcontractors shall sign and comply with this Code of Conduct. Zero tolerance applies to harassment, exploitation, and abuse.

Minimum commitments:

Treat all persons with respect; no harassment, discrimination, intimidation, or violence.

Prohibition of sexual exploitation⁶ and abuse⁷ (SEA) and sexual harassment⁸ (SH).

Prohibition on photographing, filming, or recording children using any device, including mobile phones including social media without consent and authorization of the Borrower.

⁶ **Sexual exploitation:** Any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially, or politically from the sexual exploitation of another.

⁷ **Sexual Abuse:** the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions

⁸ **Sexual Harassment:** unwelcome sexual advances, requests for sexual favours, and other verbal or physical conduct of a sexual nature.

No child labor and no forced labor; no trafficking; no retention of IDs.

Follow all safety rules, wear PPE, and comply with site access requirements.

No alcohol/drugs at site; no weapons.

Participate in trainings and orientation that will be provided related to the environmental and social aspects of the Contract, including on health and safety matters, and SEA/SH.

No retaliation against anyone who raises a concern in good faith about any behavior prohibited by this Code of Conduct. Such retaliation shall be a violation of this Code of Conduct.

Acknowledgement:

Name: _____ Signature: _____ Date: _____

Worker Grievance Redress Mechanism (Worker GRM)

Channels (at least two must be provided):

Supervisor/HR contact: _____

Anonymous box / hotline / email: _____

Principles:

Confidentiality and non-retaliation.

Simple intake, prompt acknowledgement, documented resolution.

Escalation to PSO if unresolved or sensitive.

Minimum Log Fields:

Date received:

Issue type:

Description:

Complainant (anonymous allowed):

Action taken:

Outcome/closure date:

Site Safety Inspection Checklist (Weekly or as required)

Checklist (tick/record issues and corrective actions):

- Working at height controls in place (harness, anchors, edge protection)
- Electrical lock-out/tag-out used where applicable
- PPE available and used
- Fire extinguisher available and accessible
- Lifting operations controlled and exclusion zones in place
- Housekeeping and waste segregation adequate
- Signage/barriers in place to protect staff/public
- First aid and emergency contacts posted

Corrective actions required (what/who/when): _____

Annex F: Material E&S Incidents and Report Template

- **Initial Incident Reporting**

The Borrower will reach out to WB to request **initial incident reporting** template. Initial incident reporting will include following points:

- Date and time of the incident
- Name of the contractor
- Type of incident (as indicated in Annex 1 below)
- Short description of incident
- Short description of initial actions taken

Annex 1: Reportable Incident Types

The following are incident types to be reported using the environmental and social incident response process:

Fatality: Death of a person(s) that occurs within one year of an accident/incident, including from occupational disease/illness (e.g., from exposure to chemicals/toxins).

Lost Time Injury: Injury or occupational disease/illness (e.g., from exposure to chemicals/toxins) that results in a worker requiring 3 or more days off work, or an injury or release of substance (e.g., chemicals/toxins) that results in a member of the community needing medical treatment.

Acts of Violence/Protest: Any intentional use of physical force, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, deprivation to workers or project beneficiaries, or negatively affects the safe operation of a project worksite.

Disease Outbreaks: The occurrence of a disease in excess of normal expectancy of number of cases. Disease may be communicable or may be the result of unknown etiology.

Displacement Without Due Process: The permanent or temporary displacement against the will of individuals, families, and/or communities from the homes and/or land which they occupy without the provision of, and access to, appropriate forms of legal and other protection and/or in a manner that does not comply with an approved resettlement action plan.

Child Labor: An incident of child labor occurs: (i) when a child under the age of 14 (or a higher age for employment specified by national law) is employed or engaged in connection with a project, and/or (ii) when a child over the minimum age specified in (i) and under the age of 18 is employed or engaged in connection with a project in a manner that is likely to be hazardous or interfere with the child's education or be harmful to the child's health or physical, mental, spiritual, moral or social development.

Forced Labor: An incident of forced labor occurs when any work or service not voluntarily performed is exacted from an individual under threat of force or penalty in connection with a project, including any kind of involuntary or compulsory labor, such as indentured labor, bonded labor, or similar labor-contracting arrangements. This also includes incidents when trafficked persons are employed in connection with a project.

Unexpected Impacts on heritage resources: An impact that occurs to a legally protected and/or internationally recognized area of cultural heritage or archaeological value, including world heritage sites or nationally protected areas not foreseen or predicted as part of project design or the environmental or social assessment.

Unexpected impacts on biodiversity resources: An impact that occurs to a legally protected and/or internationally recognized area of high biodiversity value, to a Critical Habitat, or to a Critically

Endangered or Endangered species (as listed in IUCN Red List of threatened species or equivalent national approaches) that was not foreseen or predicted as part of the project design or the environmental and social assessment. This includes poaching or trafficking of Critically Endangered or Endangered species.

Environmental pollution incident: Exceedances of emission standards to land, water, or air (e.g., from chemicals/toxins) that have persisted for more than 24 hrs or have resulted in harm to the environment.

Dam failure: A sudden, rapid, and uncontrolled release of impounded water or material through overtopping or breakthrough of dam structures.

Other: Any other incident or accident that may have a significant adverse effect on the environment, the affected communities, the public, or the workers, irrespective of whether harm had occurred on that occasion. Any repeated non-compliance or recurrent minor incidents which suggest systematic failures that the task team deems needing the attention of Bank management.

- **Investigative reporting**

Borrower reaches out to WB to receive the reporting template for investigation findings. Investigation findings should include followings:

- Investigation findings
- Corrective actions from investigations
- In case of fatality, reason for fatality (see Annex 2 for fatality types)
- Financial support/compensation type
- Supplementary narrative

Annex 2: Definition of fatality/injury immediate causes

1. **Caught in or between objects:** caught in an object; caught between a stationary object and moving object; caught between moving objects (except flying or falling objects).
2. **Struck by falling objects:** slides and cave-ins (earth, rocks, stones, snow, etc.); collapse (buildings, walls, scaffolds, ladders, etc.); struck by falling objects during handling; struck by falling objects.
3. **Stepping on, striking against, or struck by objects:** stepping on objects; striking against stationary objects (except impacts due to a previous fall); Striking against moving objects; Struck by moving objects (including flying fragments and particles) excluding falling objects.
4. **Drowning:** respiratory impairment from submersion/emersion in liquid.
5. **Chemical, biochemical, material exposure:** exposure to or contact with harmful substances or radiations.
6. **Falls, trips, slips:** falls of persons from heights (e.g., trees, buildings, scaffolds, ladders, etc.) and into depths (e.g., wells, ditches, excavations, holes, etc.) or falls of persons on the same level.
7. **Fire & explosion:** exposure to or contact with fires or explosions.
8. **Electrocution:** exposure to or contact with electric current.
9. **Homicide:** a killing of one human being by another.
10. **Medical Issue:** a bodily disorder or chronic disease.
11. **Suicide:** the act or an instance of taking, or attempting to take, one's own life voluntarily and intentionally.
12. **Others:** any other cause that resulted in a fatality or injury to workers or members of the public.

Vehicle Traffic

13. **Project Vehicle Work Travel:** traffic accidents in which project workers, using project vehicles, are involved during working hours and which occur in the course of paid work.
14. **Non-project Vehicle Work Travel:** traffic accidents in which project workers, using non-project vehicles, are involved during working hours and which occur in the course of paid work.
15. **Project Vehicle Commuting:** traffic accidents in which project workers, using project vehicles, are involved while travelling to (i) the worker's principal or secondary residence; (ii) the place where the worker usually takes his or her meals; or (iii) the place where he or she usually receives his or her remuneration.
16. **Non-project Vehicle Commuting:** traffic accidents in which project workers, using non-project vehicles, are involved while travelling to (i) the worker's principal or secondary residence; (ii) the place where the worker usually takes his or her meals; or (iii) the place where he or she usually receives his or her remuneration.
17. **Vehicle Traffic Accident (Members of Public Only):** traffic accidents in which non-project workers/members of the public are involved in an accident while travelling for any purpose.

Annex G Regular E&S Monitoring Report

Semi-Annual Environmental & Social Monitoring Report for Name of FI and Project

Name of Organization			
Completed by (name):			
Position in organization:		Date:	
Reporting period	From:		To:

Introduction

IBRD's *Legal Agreement(s)* requires *EXIM* to prepare a comprehensive **Semi-Annual** Environmental and Social Performance Report (AEPR) describing (i) the implementation and operation of the Environmental and Social Management System (ESMS), and (ii) the environmental and social performance of the sub-borrowers/clients of the Financial Institution. This document comprises IBRD's preferred format for E&S performance reporting. The following template may be supplemented with annexes as appropriate to ensure all relevant information on project performance is reported.

Notes:

- Please provide responses to all questions and as detailed information as possible to avoid follow-up requests. If information is not available, please provide a brief explanation. Please ensure all documents were required (as indicated) are attached to your AEPR.
- A selected number of questions (indicated with *) requires the provision of client specific information. If you are not allowed as per the local legislation to share information such as the name of the client, please indicate so and use 'Client 1, 2, 3, ..' instead of the name.

Part 1: Client's Representation Statement by authorized representative

I (name) in my role of (position) and representing EXIM certify that

- Beyond what is reported in this AEPR for the current reporting period, to the best of my knowledge and belief, after due inquiry I confirm:
- There are no material social and environmental risks and issues in respect of the relevant financing operations other than those identified through the application of the ESMS.
- EXIM has not received nor is aware of (a) any existing or threatened complaint, order, directive, claim, citation or notice from any authority, or (b) any material written communication from any person concerning the failure by any client/sub-borrower to undertake its operations and activities in accordance with the E&S requirements.
- We have not amended, waived or materially restricted the scope or effect of the ESMS.
- There have been no changes in the scope of the relevant financing operations since the legal agreement with IBRD has been signed.
- We are using all reasonable efforts to ensure the continued operation of the ESMS to identify, assess and manage the social and environmental performance of the relevant financing operations in compliance with the E&S requirements.
- If a client/sub-borrower has not undertaken its activities in accordance with the E&S requirements, we have (a) agreed with the client/sub-borrower to undertake corrective actions to remedy these, (ii) if the client/sub-borrower failed to implement the corrective actions used all reasonable efforts to dispose of the client/sub-borrower.
- We have informed IBRD during the reporting period of all proposed activities we have become aware of and ensured that the ESMS has sufficient capacity to eliminate *High* and *Substantial* risk projects and review the E&S performance of *Moderate* and *Low* risk activities.
- We have informed IBRD of all social, labor, health and safety, security or environmental incident, accidents or circumstance in relations to any client/sub-borrower in accordance with the legal agreements.
- All information contained in this AEPR is true, complete and accurate in all respects at the time of submission and no such document or material omitted any information the omission of which would have made such document or material misleading.

Signature

Date

Part 2: Development and Implementation of Environmental and Social Management System

A) POLICIES AND PROCEDURES

2.1) Does your organization have a functioning ESMS which was approved by senior management during the reporting period?

Yes No Date of Approval:

If yes, please attach a copy of the ESMS to this report.

2.2) If there has been an ESMS already in place and agreed upon with IBRD, have there been any revisions/updates to the ESMS (policy and/or procedures) adopted by your organization during the reporting period?

Yes No

If yes, please provide the details of the revisions made and reasons for the same

Please attach a copy of the revised ESMS.

2.3) Please describe your loan/credit review process and how E&S assessments have been incorporated into this process (only in case it was not provided earlier)

Credit Review Process:

E&S Assessment Process (including assessment of compliance with Exclusion List, national laws and the Environmental and Social Standards, if applicable):

2.4) Please provide two sample internal E&S assessment reports (ESDDs) conducted for projects considered in the year under review.

Documents provided:

2.5) Please provide the following information regarding the E&S Risk profile of the portfolio supported by IBRD and E&S assessments undertaken.

Type of Financing	Number of Loans in Portfolio	Number of Loans screened for E&S issues to date	Number of Loans screened for E&S issues during the reporting period	Number of Loans/Clients categorized as – Only Moderate or Low are eligible for this WB financing	Number of Accidents/Incidents reported by clients during the reporting period	Number of field visits conducted by staff to review E&S aspects during loan appraisal	Number of field visits conducted by staff to review E&S aspects after loan appraisal (monitoring)
SME finance MSME				M L			

2.6) Please give details of any transactions rejected on environmental, health, safety or social grounds during the reporting period.

Number of Loans/Clients:

Details including name of clients and reasons for rejection:*

2.7) Please provide details of loans/clients in portfolio that have become Non-Performing Loans (NPLs) due to E&S issues during the reporting period (indicate if information is not available).

Number of Loans/Clients:

Details including name of clients and reasons for becoming NPL's:*

B) E&S CAPACITY

2.8) Please provide the name and contact information of the Environmental and Social Officers or Coordinator who has the overall responsibility for the implementation of ESMS and specifically for IBRD portfolio.

Name:

Contact Information:

Position:

2.9) Please provide details of any other core persons in the organization involved with ESMS implementation (name, contact details, position), (including internal staff and external consultants if utilized).

2.10) Please describe the training or learning activities the Environmental and Social Officers/other E&S staff, as well as other staff attended in the year under review.

- *E&S staff:*
- *Other staff:*

2.11) Please provide information on your training programs available to new and existing staff, training materials developed and budget allocation for ESMS development and implementation during the reporting period:

- *Training Programs:*
- *Budget allocation (e.g. including for external consultants, training etc):*

C) MONITORING

2.12) Do you require clients to provide any E&S reports?

Yes No Sometimes

If yes, describe the monitoring requirements:

If yes, please provide two of such reports provided within the last year.

2.13) Please describe how you monitor the E&S performance of clients after disbursement, including compliance with national laws and applicable Environmental and Social Standards and implementation of corrective action plans (only required if not provided earlier already).

Monitoring Procedure:

Please provide three sample monitoring reports conducted for projects by staff to review environmental and social aspects.

Documents provided:

(i)

(ii)

(iii)

2.14) Please give details of any material adverse environmental and social issues associated with clients during the reporting period. Include details of any major accidents/incident, non-compliances, fines levied, negative media attention, complaints raised against your clients etc.

(i)

(ii)

(iii)

D) REPORTING AND AUDITING

2.15) Please describe your internal process for reporting social and environmental issues to Senior Management, including which information is provided. (If your internal reporting process had already been discussed and agreed upon with IBRD, please provide details on where it is included in your ESMS).

If newly developed or revised, describe your Reporting Process and information provided:

Indicate in which section of the ESMS your reporting mechanism is included:

2.16) Has your organization conducted any internal audit of the implementation of the ESMS?

Yes No

If yes, please provide the following details of the audit:

Date of audit:

Findings of the audit:

Recommendations from the audit:

- **EXTERNAL COMMUNICATION MECHANISM**

2.17) Do you have a mechanism in place to receive, register and respond to external communication regarding your activities? Describe the mechanism and how often it has been used.

Yes No

If yes, please provide the following information:

Description of mechanism including how you screen, assess and address concerns received, as well as track and document them internally:

Number of complaints/inquiries to date:

Number of complaints/inquiries received during the reporting period:

Key issues raised in complaints/inquiries:

Annex H Supply Chain Requirements

EXIM to have oversight adding supply-chain due-diligence steps and contractual no-forced-labor clauses for contractors and key suppliers, with remedies for non-compliance. Need to identify the steps and language (and be back to back with the language to be included in loan agreement between EXIM and ESCOs and contracts between PSOs and ESCOs).

Annex I E&S Policy

The Sustainable Development Policy of EXIM Thailand⁹ defines how it operates as a responsible development bank by balancing economic growth, social responsibility, and environmental protection. The policy aligns the EXIM's mandate with the United Nations Sustainable Development

⁹ Available at <https://www.exim.go.th/th/Sustainable-Development-Policy.aspx>

Goals (SDGs) and internationally recognized sustainability standards to ensure long term- value creation for Thailand's economy, society, and environment. EXIM Thailand's sustainability approach is guided by:

- The Environment, Social and Governance (ESG) Framework
- The Sustainable Banking Network (SBN) Framework
- ISO 26000 on social responsibility
- The Principles for Responsible Banking

These frameworks provide a consistent and internationally accepted basis for governance, operations, and financial services.

Building on ISO 26000, EXIM Thailand has established nine core values that guide institutional culture and staff conduct:

- Accountability and transparency
- Ethical behavior
- Respect for stakeholder interests
- Respect for the rule of law and international norms
- Respect for human rights
- Strong social and environmental risk governance
- Innovation for sustainable development

These values underpin decision making- at all organizational levels. The policy is implemented through three integrated frameworks:

1. *Responsible Financial and Business Management*: EXIM Thailand integrates ESG principles across lending, guarantees, insurance, investment, and funding activities. Key commitments include promoting green and sustainable finance, equitable access to finance, innovation driven financial products, responsible portfolio management, digital and data- enabled- banking, environmental management (including resource efficiency and pollution prevention), customer protection, data privacy, and impact measurement using Social Return on Investment (SROI).

2. *Creating Balanced Social and Environmental Value*: The Bank systematically manages social and environmental risks by embedding them into daily operations. This includes fair labor practices, human rights protection, community development, enterprise wide- risk management, contractual safeguards, grievance and complaint mechanisms, performance evaluation, monitoring, and transparent sustainability reporting.

3. *Good Corporate Governance for Sustainable Banking*: Strong corporate governance is recognized as the foundation of sustainability. The Board of Directors and senior management are responsible for integrating sustainability into strategy, ensuring fair and ethical business conduct, preventing corruption, promoting stakeholder participation, linking sustainability to performance management, and reporting in line with international standards. The policy is reviewed annually by the Board.

Through this policy, EXIM Thailand aims to:

- Strengthen its role as a sustainable development bank
- Enhance resilience through effective ESG risk management
- Deliver long term- economic, social, and environmental benefits

- Maintain alignment with national priorities and global sustainability standards

EXIM Thailand will implement, the Low Carbon Cities and Carbon Market Development (LCC) Project (“the Project”) that supports Thailand’s transition toward low-carbon urban development by accelerating investments in energy efficiency, renewable energy, and other emissions-reducing upgrades in public-sector assets, while simultaneously establishing the institutional and technical foundations for a national carbon crediting mechanism. The Project is designed to reduce greenhouse gas emissions, lower public-sector energy expenditures, and demonstrate scalable delivery models that can be replicated across cities and asset classes. It combines investment financing with results-based carbon payments and targeted technical assistance to address both near-term implementation barriers and longer-term market development needs.

In support of this EXIM adopts **the Project Environmental and Social Management System (ESMS)** with the following policy objectives:

- There will be no financing of excluded activities, as defined in this Project ESMS;
- Committing that the operations of sub-borrowers are adequately assessed against the environmental & social requirements as defined by the applicable environmental & social national and local laws and regulations in Thailand and require compliance;
- Environmental and social risk management is adequately integrated into the credit review cycle to ensure they are all screened for environmental & social risks and impacts;
- Ensuring that there a designated people with roles and responsibilities to support the implementation of the Project ESMS;
- Ensure that updates to the Project ESMS are made as required; and
- EXIM reports as required to our stakeholders on Project ESMS implementation.

F.2. Roles and responsibilities of KTB

KTB has a robust Environmental and Social Management System including E&S policy, procedures, operational capacity, and stakeholder engagement¹⁰. The LCC project will rely on KTB’s ESMS, supplemented by the requirements in this section (Section F.2 of POM E&S Annex), for implementation of Part 2 activities of the LCC Project.

KTB will maintain existing staffing arrangements, including a Project director and Environmental and Social focal point (FP) (or equivalent) assigned for this Project, with clearly defined roles and responsibilities to support management of E&S risks and impacts of Part 2 of the Project. In accordance with Project Agreement, KTB as Project Implementing Entity (PIE) will implement Part 2 of the Project in accordance with Section F.2 of the POM ES Annex, the ESCP, ESSs, WBG EHS Guidelines and Good International Industry Standards (GIIPs).

KTB will ensure that all Verified Emission Reductions (VERs) purchased under Part 2(a) of the Project have been issued under an approved registry and meet all stakeholder consultation, safeguards, and due diligence requirements to identify and manage environmental and social risks and impacts. Gold Standard serves as the initial international registry for the PoA. The Steering Committee (§3.2.4(d)) may approve additional registries or dual-certification pathways — including T-VER — following World Bank no-objection, provided such pathways meet program integrity standards and do not risk double-counting against Thailand’s NDC. To this end, the PIE will: (a) only enter into Emission Reduction Purchase Agreements (ERPA) and related purchase transactions for VERs that have been issued under the Gold Standard or a Steering Committee-approved registry and that comply with the ERPA eligibility and safeguarding requirements specified in this section; (b) ensure that all VER purchase transactions under Part 2(a) are executed and recorded through the applicable approved registry; and (c) maintain documentation, satisfactory to the Bank, evidencing that each VER purchased under Part 2(a) has been

¹⁰ Available at <https://krungthai.com/en/sustainability/esg-policy/social/fairness#>

certified and transacted in accordance with the applicable registry standards and the ERPA requirements, including evidence of registration, issuance, third-party verification, and registry transfer.

Public sector and Private sector subprojects receiving VERPF payments under Component 2 are subject to the same E&S eligibility rules, exclusion list, and risk classification requirements under KTB's ESMS & this Annex.

In its role as CME, KTB will:

- Apply its own exclusion list and E&S eligibility rules, exclusion list, and risk classification threshold specified in this POM ES Annex during: i) a preparation of **new** Program of Activities (PoA) or revision of approved POA and before inclusion of Voluntary Program Activity (VPA) into the POA; and ii) before Emission Reductions Purchase Agreement (ERPA) signature. High and Substantial E&S risks subproject will not be eligible for financing under Thailand LCC project;
- maintain E&S screening records in the subproject file, available for audit, and World Bank review;
- ensure ERPAs include appropriate E&S covenants and remedies consistent with Project ESMS; and
- refuse eligibility / withhold payments for any subproject found non-compliant with E&S eligibility requirements; and

prior to ERPA execution, obtain from the Seller: (i) a completed ESMS screening declaration (Annex F Screening Format); (ii) confirmation of no exclusion list activities; and (iii) where the subproject is Moderate risk, an agreed Environmental and Social Action Plan. These declarations are conditions precedent to ERPA signature and must be filed in the subproject record.

- EXIM retains overall responsibility for E&S oversight as per ESCP of the Project.

E&S Oversight Accountability for Private Subprojects (Component 2). The following accountability framework applies to EXIM/PMU oversight of KTB's private subproject E&S screening: (a) What is checked: exclusion list compliance, risk categorization, E&S declaration completeness, and incident reports filed by KTB; (b) What is unacceptable: excluded activities proceeding, High/Substantial risk subprojects approved, undisclosed material E&S events; (c) Who is responsible: KTB for screening and record-keeping; EXIM/PMU for oversight and audit; World Bank for review; (d) Consequences of non-compliance: payment suspension, ERPA cancellation, and escalation to the Steering Committee. KTB shall report any material E&S incident to EXIM/PMU within 5 business days of becoming aware.

Eligibility, screening and risk classification. As above, only subprojects assessed as Moderate or Low risk are eligible for financing under the LCC Project. High -risk- and Substantial-risk activities are excluded. *See Table 1 above.* Exclusions include:

- Subprojects requiring involuntary acquisition of land or assets, or physical resettlement of households or businesses, regardless of compensation offered. Legally acquired land for willing-seller/willing-buyer transactions does not trigger this exclusion, provided no involuntary element is involved.
- Significant risks to or impacts on the environment, community health and safety, biodiversity, or cultural heritage;
- Risk of significant retrenchment;
- significant occupational health and safety risks to workers (e.g. through chemical, physical or biological risks); and

- Risk of adverse impacts on Indigenous People.

Screening is carried out by KTB’s E&S focal point during: i) a preparation of new Program of Activities (PoA) or revision of approved POA and before inclusion of Voluntary Program Activity (VPA) into the POA; and ii) before Emission Reductions Purchase Agreement (ERPA) signature. The screening will consider site sensitivity, the nature and scale of the activities (construction and operation), the labor profile and OHS risks, traffic and public -interface risks, waste and hazardous materials management, cultural heritage considerations, and community dynamics. Screening records will be maintained for WB review and reported in regular reporting.

Under Component 2 it is required that all Verified Emission Reductions (VERs) purchased have been issued under the Gold Standard, and therefore meet all stakeholder consultation, safeguards, and due diligence requirements to identify and manage environmental and social risks and impacts in accordance with the Gold Standard. To this end, the KTB will:

- Only enter into Emission Reduction Purchase Agreements and related purchase transactions for VERs that have been issued under the Gold Standard or a Steering Committee-approved registry and that comply with the ERPA eligibility and E&S requirements specified in this POM;
- Ensure that all VER purchase transactions under Part 2(a) are executed and recorded through the Gold Standard registry; and
- Maintain documentation, satisfactory to the Bank, evidencing that each VER purchased under Part 2(a) has been certified and transacted in accordance with the Gold Standard and the ERPA requirements, including evidence of registration, issuance, third-party verification, and registry transfer.

Regular reporting and incident reporting as described under the Project ESMS are applicable for Part 2. KTB will prepare and submit the reports to Steering Committee to be shared with WB.

KTB will undertake **E&S monitoring** on a select basis and report findings in the regular reports to the WB on bi-annually basis.

KTB will use its **GRM** and report to WB as part of its regular reporting to WB.

KTB, as PIE, is responsible for implementing Project ESCP. KTB will report regarding ESCP implementation as part of its regular reporting to WB.

Annex J KTB Semi-Annual E&S Monitoring Report

Thailand Low Carbon City (LCC) Project – Component 2 (VER Payment Facility)

1. Basic Information

Krung Thai Bank (KTB)

Organization

Project

Thailand LCC Project – Component 2 (VER Payment Facility)

Completed by

Position

Date

Reporting Period

From: ___ To: ___

2. Introduction

KTB prepares this report in accordance with the Project Agreement, ESCP, and POM E&S Annex. It covers ESMS implementation, subproject/VPA performance, exclusion list compliance, and risk classification.

3. Representation Statement

KTB confirms that all VERs are issued under Gold Standard, all VPAs screened, no High/Substantial risks financed, and all incidents reported.

4. Portfolio Summary

Type	Total	Screened	Low	Moderate	Rejected
Energy					
Efficiency					
Retrofits for Buildings					
Solar PV					
Transition to Electric Vehicles					
LED retrofits for public lighting					

5. VPA Tracking

VPA ID	PoA	Type	Location	Risk	ERPA	GS Issued

7. Incidents and E&S Issues

Client/VPA	Incident	Severity	Action	Status

8. External Communication / GRM

Indicator	Number
Total complaints	
This reporting period	
Resolved (%)	

9. ESCP Implementation

Action	Status	Remarks
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Annex G: Financial Management and Disbursement Procedures

This Annex forms an integral part of the Operations Manual, setting binding financial management (FM) and disbursement requirements for the Financial Intermediary (FI) operation, where the Borrower on-lends Bank loan proceeds to a participating financial institution (the FI) to extend sub-loans and/or performance-based finance to eligible beneficiaries.

1. Purpose, Scope, and References

Purpose. To define the policies, minimum controls, systems, and reporting needed to (i) safeguard program funds, (ii) ensure that disbursements are used only for eligible expenditures, and (iii) provide reliable, timely financial information for decision-making.

Scope. Applies to: the Borrower/Ministry of Finance (MoF), the FI (EXIM), CME (KTB) any participating PSOs and private clean tech service providers that receive sub-finance.

Bank Policy/Directive for Investment Project Financing; Anti-Corruption Guidelines (ACGs); Disbursement Guidelines for IPF (Feb 2017 or as updated); Borrower Instructions for e-Disbursement via Client Connection; Financial Management Practices Manual; applicable Loan Agreement and Disbursement & Financial Information Letter (DFIL). Where requirements differ, the Loan Agreement and DFIL prevail.

2. Institutional FM Arrangements

Ministry of Finance (MoF) – Guarantor: Provides a sovereign Guarantee to the World Bank for EXIM's repayment and performance obligations. MoF does not manage day-to-day implementation but may set policy oversight and receives copies of key reports per the Guarantee Agreement.

EXIM (Borrower & FI): EXIM is the Borrower under the IBRD Loan Agreement and simultaneously the Financial Intermediary (FI) implementing the Project. EXIM is responsible for all fiduciary, technical, and reporting functions originally attributed to a separate PMU. These include planning, budgeting, disbursement, accounting, IFR preparation and submission, external audit coordination, portfolio monitoring, and compliance with this Annex and the DFIL.

KTB (CME and VERPF manager): KTB will act as the CME, managing VERPF disbursements and carbon-related functions for VERs generated by private asset owners eligible for payments under the VERPF, in accordance with the Project Agreement and the EXIM–KTB Subsidiary Agreement.

PSOs/Clean tech companies (beneficiaries): Maintain books and records to support eligibility and results; comply with financing and RFP requirements; permit verification and audit access.

Key roles within EXIM.

- **Project Director (EXIM):** Overall accountability for Project delivery and compliance with Loan & Guarantee Agreements.
- **FM Manager (EXIM):** Maintains DA/OA, prepares and signs IFRs/WAs, performs DA reconciliation, maintains project CoA mapping, and ensures internal control adherence.
- **Portfolio Manager (EXIM):** Oversees sub-loan pipeline, eligibility screening, credit approvals, disbursements/collections, arrears management, and portfolio reporting.
- **Internal Audit (EXIM):** Conducts risk-based reviews per J10 and reports to EXIM Audit Committee.

3. Flow of Funds & Account Structure

Legal agreements. The Project is governed by: (i) the Loan Agreement between IBRD and EXIM (as Borrower); (ii) the Guarantee Agreement between IBRD and MoF (as Guarantor); and (iii) the DFIL. Where requirements differ, the Loan Agreement and DFIL prevail.

Designated Account (DA).

- *Holder:* EXIM (as Borrower).
- *Currency/Bank:* USD DA opened by EXIM.
- *Ceiling & reporting:* As specified in the DFIL.
- *Operating Account (OA):* THB OA(s) maintained by EXIM for local payments.

Flow of funds.

- World Bank → (Advance/Reimbursement/Direct/SC) → EXIM DA (USD)
- EXIM DA → EXIM OA (THB) (as per approved cash forecasts)
- EXIM → sub-loans/performance-based payments to Clean tech companies upon meeting contractual and eligibility conditions
- EXIM → KTB funds transfer to make performance-based payments to private asset owners, under the VERPF upon meeting contractual and eligibility conditions

Component 2 (VERPF) – Dedicated Account, Forecasting, and Replenishment

- *Dedicated account:* KTB shall maintain a ring-fenced VERPF account (and sub-ledger) used exclusively for Project-funded VERPF transactions. No commingling with other funds is permitted.
- *Forecasting:* KTB will prepare a quarterly rolling forecast of expected VERPF payments (based on the eligible pipeline, monitoring periods, and expected verification/issuance schedule). EXIM will review the forecast and use it as the basis for WA requests and transfers to KTB.
- *Replenishment:* VERPF disbursements may operate under either of two mechanisms, or a combination of both, as agreed between EXIM and KTB and confirmed consistent with IBRD DFIL requirements: (a) Ex-ante advance: EXIM transfers funds to the KTB VERPF account based on KTB's projected payment schedule, with replenishment made against documentation of actual payments and reconciliation of the VERPF account; or (b) Ex-post reimbursement: KTB makes VERPF payments to private asset owners from its own operational funds and submits verified payment documentation to EXIM for reimbursement. The applicable mechanism shall be specified in the EXIM–KTB Subsidiary Agreement and confirmed consistent with IBRD DFIL requirements before first disbursement. Where the ex-ante advance mechanism applies, EXIM will transfer funds to the KTB VERPF account with a target float of approximately sixty (60) days of projected VERPF disbursements based on KTB's quarterly rolling forecast. KTB may request a reduction in the advance amount, subject to EXIM/PMU agreement and consistency with IBRD DFIL requirements; any such request shall be made in writing with supporting forecast documentation. EXIM and the World Bank FM team shall confirm whether a reduced-advance or just-in-time disbursement approach is feasible under the applicable DFIL before the Subsidiary Agreement is executed.
- *Documentation and reconciliation:* KTB shall provide EXIM with (i) VERPF account bank statements, (ii) a transaction listing by subproject/ERPA, (iii) proof of payments to Sellers, and (iv) links to verification/issuance evidence. EXIM shall reconcile these to the WA line items and maintain an index for audit and Bank review.
- *Unused balances:* Any unused VERPF balance at project closing shall be handled as per the Loan Agreement/DFIL and the EXIM–KTB agreement (e.g., used to settle eligible outstanding obligations, and/or returned/refunded as required).

- *Reflows.* (principal/interest/fees/penalties) → EXIM → applied per Loan Agreement; not automatically eligible for Bank financing unless stated

3A. Disbursement Conditions (Conditions Precedent): The following conditions apply to withdrawals/disbursements and must be satisfied before the Borrower (EXIM) submits Withdrawal Applications (WAs) for the relevant disbursement category. These conditions are binding as per the Loan Agreement/DFIL and related project agreements.

- *Condition for Category 1 / Component 1 (Sub-loans):* No disbursement under Component 1 / Category 1 shall be made until EXIM's Environmental and Social Management System (ESMS) has been updated, adopted, and operationalized in a manner acceptable to the World Bank, including (i) staffing/roles, (ii) screening tools and exclusion list, and (iii) monitoring and reporting procedures.
- *Condition for Category 2 / Component 2 (VERPF Transfers and Payments):* No disbursement for VERPF-related payments under Component 2 (Category 2) shall be made until: (i) a dedicated, ring-fenced VERPF bank account has been opened at KTB; (ii) the CME Readiness Milestone has been achieved, including any required BOT sandbox; and (iii) a subsidiary agreement between EXIM and KTB (defining KTB's role as CME and fund manager) has been executed and is effective, in form and substance acceptable to the World Bank.

CME Readiness Milestone (definition and evidence). The CME Readiness Milestone is achieved when KTB, in its CME role, has demonstrated operational readiness to originate, verify, receive/hold, and transfer eligible VERs/ERs under the program in an auditable manner, including the ability to execute ERPA payments only upon verification/issuance evidence.

- CME governance and staffing are in place, with roles and delegations documented (Annex H).
- Standard ERPA template, pricing schedule, and payment calculation rules are adopted and disclosed (Annex D and Annex I).
- Digital MRV platform and data governance arrangements are operational for the relevant technology types (Annex C).
- E&S screening and covenants for Component 2 are integrated into application/ERPA processes consistent with the ESMS (Annex F).
- Registry arrangements are operational (accounts opened, issuance/transfer procedures defined), and verification/issuance workflow is documented (Annex H).
- Financial controls for Category 2 are operational (ring-fenced VERPF account, reconciliation process, payment register, and audit access).
- Any required BOT sandbox or equivalent authorization allowing the CME to hold/trade/transfer VERs for the facility is obtained and remains valid.

Contingency protocol for delayed regulatory authorization (e.g., BOT sandbox delays). If the required authorization is delayed, the Project will continue non-financial readiness activities (pipeline development, MRV deployment, baseline and monitoring preparation, validation/registration steps where feasible), but Category 2 disbursement and VERPF payments will not commence until the CME Readiness Milestone is achieved. The CME may sign conditional ERPAs that clearly state any conditions precedent to payment/ transfer and will maintain a queue of eligible projects so that verification/issuance and payments can be executed promptly once authorization is obtained. Where KTB's ability to implement Component 2(a) VERPF operations is constrained by BOT Sandbox conditions or other applicable regulatory requirements, any resulting delay in VERPF launch shall not constitute non-compliance with this POM, provided KTB is using best efforts to obtain necessary regulatory clearances and notifies EXIM/PMU and the World Bank in writing within 15 calendar days of identifying the constraint. Pending full VERPF activation, KTB may conduct market development, pipeline origination, and ERPA negotiations with eligible participants using its own operational resources. Such activities do not constitute use of IBRD funds and are not subject to VERPF disbursement rules, but must be consistent with the ESMS (Annex F) and documented for EXIM/PMU review.

- Continue originating and screening private subprojects (including ESMS screening), maintaining an auditable eligibility file for each candidate project.
- Deploy and test MRV systems and monitoring plans so that data collection can begin immediately.
- Proceed with validation/registration steps permitted under the applicable standard/registry while awaiting authorization.
- Do not request or draw Category 2 IBRD funds, and do not make VERPF payments from the dedicated account until authorization and readiness are confirmed.
- Once authorization is obtained, prioritize early verification/issuance cycles to accelerate first payments and revenue recycling, consistent with Annex D and Annex H.

EXIM shall document satisfaction of these conditions in its first WA under the relevant category and maintain evidence on file for audit and Bank review.

3B. Eligible Expenditures and Ineligible Expenditures

Principle. Loan proceeds may be used only to finance Eligible Expenditures that fall within the Disbursement Categories defined in the Loan Agreement/DFIL, meet the Project's eligibility requirements (including E&S requirements in Annex F), and are supported by adequate documentation. In case of any inconsistency, the Loan Agreement/DFIL prevails.

Eligible Expenditures – Category 1 (Component 1: Sub-loans). Eligible Expenditures under Category 1 include disbursements by EXIM under signed sub-loan/financing agreements to eligible Beneficiaries/Clean tech companies (and, where applicable, direct payments to their suppliers/contractors) for costs required to implement eligible subprojects, including:

- goods, works, non-consulting services, and consulting services directly related to the design, supply, installation, commissioning, and operation of eligible energy efficiency and renewable energy investments;
- MRV-related equipment and systems required for measurement and verification under the EPC and the Project's digital MRV requirements (Annex C), when included in the approved subproject scope and budget;
- any other subproject expenditures explicitly permitted by the Loan Agreement/DFIL and reflected in the approved subproject appraisal and disbursement plan.

Eligible Expenditures – Category 2 (Component 2: VERPF Transfers/Payments). Eligible Expenditures under Category 2 include transfers by EXIM to the dedicated VERPF account at KTB for the sole purpose of making results-based incentive payments under ERPAs for verified/issued emission reductions (VERs/ERs) from eligible private subprojects. IBRD loan proceeds under Category 2 shall not be used for CME institutional or system-development costs. VERPF operating costs (e.g., verification/registry fees, platform hosting) shall be financed from carbon sale proceeds and/or counterpart resources unless explicitly permitted under the legal agreements and approved by the World Bank. All Category 2 payments must be documented in an audit-ready manner and traceable from verification/issuance evidence to payment records.

Ineligible Expenditures. The following are not eligible for financing from loan proceeds:

- expenditures associated with activities on the Project exclusion list or otherwise prohibited under Annex F / EXIM's ESMS;
- land acquisition, involuntary resettlement compensation, or other activities triggering prohibited E&S impacts not eligible under the ESMS;
- fines, penalties, interest, commitment charges, late payment fees, and exchange-rate losses;
- expenditures not supported by adequate documentation (e.g., missing contracts, invoices, acceptance certificates, proof of payment, verification reports, or required approvals);

- expenditures incurred outside the eligible period (including outside any retroactive financing window) or not compliant with agreed procurement/contract procedures;
- taxes/duties

Eligibility assurance. EXIM, as Borrower, is the single point of assurance for expenditure eligibility and must maintain an auditable eligibility file for each subproject and each Category 2 payment cycle.

4. Disbursement Categories & Percentages (illustrative – to be confirmed in DFIL)

- Category 1: Sub-loans under Component 1 – 100% of amounts disbursed by EXIM to eligible sub-projects (inclusive/exclusive of taxes per Loan Agreement).
- Category 2: Transfer of results-based payments to KTB, who will act as CME managing VERPF disbursements.

Exact categories, percentages, and allocation amounts are binding as per the DFIL and Loan Agreement.

5. Disbursement Methods

- Disbursement methods are as specified in the DFIL. The Project is expected to use Advance and Reimbursement as the primary methods. Direct Payment and Special Commitment may be used only where permitted under the DFIL and agreed with the World Bank. EXIM uses Client Connection for Withdrawal Applications (WAs).
- Minimum application size/thresholds and DA reporting frequency: as stated in DFIL.

Documentation type.

- Statement of Expenditure (SOE): The applicable SOE threshold and documentation requirements for VERPF payments are specified in the DFIL. Until the DFIL is finalized, KTB shall apply full documentation for all VERPF payment requests. EXIM/PMU will notify KTB of the operative threshold upon DFIL execution. For expenditures below the documentation threshold once established.
- Full documentation: For contracts above the threshold and for direct payments; includes signed contracts, invoices, acceptance certificates, and proof of payment.

6. On-Lending Terms & Sub-Loan Agreements (FI Modality)

- **Loan Agreement (IBRD–EXIM).** Specifies currency, interest/base rate, front-end fees, maturity, financial covenants, eligible expenditures, and fiduciary requirements.
- **Guarantee Agreement (IBRD–MoF).** Sets out the sovereign guarantee obligations and any reporting/notification requirements of MoF. MoF does not execute Project payments.
- **Sub-loan/financing agreements (EXIM–Beneficiaries).** Must include: eligible uses; disbursement schedule; performance/M&V milestones; reporting; repayment; covenants; events of default; step-in and assignment clauses; sanctions & ACG undertakings; audit access; record-keeping; E&S commitments (per ESMS); and World Bank supervision rights. IBRD proceeds will be on-lent by EXIM to eligible Clean Tech Companies under market-based, non-subsidized terms, with pricing tied to a THB base rate (e.g., MRR) plus a risk margin and typical tenors of 10–12 years. Financing terms may adjust to market conditions but will never be subsidized, and standard covenants—such as minimum equity, leverage limits, coverage ratios, and default provisions—will apply.
- **Transfer agreement (EXIM-KTB).** Transfer of funds from EXIM to KTB to make payments to private asset owners for their VERs under the VERPF.

7. Sub-Project Eligibility, Appraisal, and Approval

Eligibility screen (all must pass):

- Within Program scope/components and disbursement categories.
- Environmental and Social requirements met (per ESF instruments and FI's ESMS).
- Economic/financial viability demonstrated (NPV/IRR or cost-effectiveness per technology); adequate counterpart funding if applicable.
- No prohibited activities; no double-financing; assets are not subject to sanctions or debarment.
- Credit appraisal (EXIM): KYC/AML/CFT, capacity to repay, collateral/security (if applicable), portfolio risk limits, and sensitivity tests. EXIM is developing a loan appraisal toolkit that will define credit appraisal procedures, including financial and risk parameters such as minimum equity contribution, leverage and coverage ratios, and debt service coverage ratio (DSCR) where applicable. It will also outline acceptable security structures (eg assignment of PSO receivables and performance guarantees), ESMS screening and exclusion criteria, and provide guidelines and templates for assessing the projected cash flows from energy savings, evaluating clean tech companies' contract terms, and structuring repayment schedules accordingly. Given its existing CTC clients, EXIM has experience in appraisal of such loans, and a toolkit will be finalized within six months from the start of project implementation.
- Approval authority: Documented in EXIM credit policy; maintain minutes and checklists in sub-loan file.

Decommissioning Bond monitoring (applies to all Component 1 sub-loans where a Decommissioning Bond is required under Annex A §A.5). Prior to sub-loan signing, EXIM must confirm that the Decommissioning Bond escrow account or approved bank guarantee has been established in the required form, with the PSO or a mutually agreed financial institution as custodian, and that the CTC has acknowledged the annual deposit schedule. The sub-loan agreement must include: (a) a covenant requiring the CTC to maintain the Decommissioning Bond at the required level (minimum 2% of total system CAPEX) throughout the contract term; (b) a requirement for the CTC to provide EXIM with annual confirmation of the bond balance and escrow account status; (c) a provision that failure to establish or maintain the Decommissioning Bond at the required level constitutes an event of default under the sub-loan agreement; and (d) covenants requiring CTCs to maintain dMRV connectivity and provide the CME with timely data access as required by Annex C and the applicable ERPA. EXIM ensures that EPC/PEMC contracts similarly include these dMRV connectivity and data access obligations. EXIM portfolio managers must verify Decommissioning Bond status as part of each annual sub-loan review and record the outcome in the sub-loan monitoring file.

Minimum subproject size thresholds. To ensure transaction costs are proportionate to scale, the following minimums apply. Subprojects below these floors will not be opened as sub-loan files without EXIM/PMU written approval:

- **Rooftop solar PV:** Minimum 50 kWp contracted installed capacity or CAPEX of THB 5 million, whichever is higher.
- **Building EE retrofits (HVAC, LED interior, BMS):** Minimum CAPEX of THB 10 million per subproject bundle, or minimum contracted annual energy cost saving of THB 1.5 million per year.
- **LED streetlighting:** Minimum 500 luminaires per procurement package.
- **Multi-technology bundles:** Aggregate CAPEX of THB 10 million or above; individual technology minimums do not need to be met separately.

Thresholds are program minimums; EXIM may apply higher internal floors. EXIM/PMU will review annually and may recommend adjustments to the Steering Committee.

Sub-loan security structure by technology type. Must be specified in each sub-loan agreement:

- **Solar PV (output-based PEMC):**Assignment of PSO PEMC Service Fee receivables to EXIM, supported by the Tripartite Agreement (Section 7.1). Performance insurance is optional. Where the CTC has elected to obtain performance insurance naming EXIM as additional insured, this is recognized as supplementary credit enhancement.
- **Building EE retrofits (shared-savings EPC):**EXIM must structure security using one of: (a) PSO direct payment undertaking — PSO commits to a scheduled payment stream not less than sub-loan debt service; (b) savings escrow — PSO directs defined savings into a ring-fenced escrow from which debt service is drawn; or (c) PSO institutional guarantee where the PSO is creditworthy and the legal framework permits multi-year payment commitment. Choice must be documented in the credit appraisal and approved by EXIM's credit committee. Performance insurance is optional; where obtained by the CTC, recognized as supplementary credit enhancement.
- **LED streetlighting:**Assignment of PSO service fee receivables under the EPC, supported by the Tripartite Agreement. Performance insurance is optional; where obtained by the CTC, recognized as supplementary credit enhancement.

8. Internal Controls & Segregation of Duties. *Minimum controls include:* maker-checker for payments; dual signatories on DA/OA; system access controls; sequential payment voucher numbering; three-way match (contract-invoice-acceptance); periodic bank reconciliations; surprise cash counts (if petty cash used); asset register; change management for IT systems; and annual FM risk assessment with mitigation plan. KTB may satisfy Annex G minimum control requirements through its existing BOT-regulated banking systems and internal governance framework, provided KTB provides EXIM/PMU with a written confirmation that applicable controls are in place and submits to periodic EXIM/World Bank audit of VERPF-related transactions. Separate KTB-specific FM procedures for the VERPF account are set out in Annex H.

9. Accounting Policies, CoA Mapping & Records

- **Standards:** EXIM keeps project books on an accrual basis per local GAAP/IFRS; EXIM consolidates on the same basis.
- **Currency/revaluation:** Transactions recorded in original currency; revaluations per IFRS/local GAAP; FX gains/losses recognized in Sources & Uses.
- **Chart of Accounts:** Maintain project-specific cost centers and accounts by component, category, and sub-project to enable granular reporting and audit.
- **Record retention:** Minimum 10 years after project closing or longer if required by national law/Loan Agreement.

10. Internal Audit & Fiduciary Assurance: The FI's Internal Audit will conduct risk-based audits covering: (i) eligibility and end-use of funds; (ii) sub-loan appraisal and monitoring quality; (iii) compliance with this Annex; (iv) portfolio quality (arrears/NPL); and (v) IT/general controls. Reports and management responses are shared with EXIM's Project Management Unit (PMU) within 30 days of issuance.

11. External Audit

- **Project Audited Financial Statements (AFS) – EXIM as Borrower.** EXIM prepares and submits annual Project AFS (covering all components, DA reconciliation, and explanatory notes) audited by an independent auditor acceptable to the Bank under ISA or standards acceptable to the Bank. Submission is due within six (6) months of EXIM's fiscal year-end, via the Bank's agreed channel.
- **Public disclosure:** After submission and acceptance, EXIM will make the audited project financial statements publicly available in accordance with the World Bank's Access to Information Policy and applicable Thai disclosure requirements.

- **Entity AFS linkage.** If the Bank requires, EXIM's Entity AFS will include a note disclosing the Project and a reconciliation to the Project AFS; alternatively, a separate auditor's opinion on the Project schedules may be provided.
- **VERPF (Category 2) audit coverage:** The annual Project audit shall include the dedicated VERPF account at KTB and provide assurance that (i) transfers received and payments made were eligible and supported by verification/issuance evidence, (ii) funds were used only for Project purposes, and (iii) the VERPF account is properly reconciled. Auditors shall have access to KTB records and supporting documentation as stipulated in the EXIM–KTB agreement. The following must be retained for a minimum of 10 years after project financial close: (i) all signed ERPAs and amendments; (ii) VERPF payment authorizations and bank records; (iii) VER issuance and transfer documentation; (iv) E&S screening records and incident reports; (v) sub-loan agreements and disbursement records; (vi) MRV data packages used for payment determination; (vii) audit reports. Supporting operational records (e.g., meeting minutes, draft documents) should be retained for 5 years. These retention requirements align with IBRD Loan Agreement retention requirements.
- **MoF (as Guarantor)** may receive copies of the AFS and management letter as per the Guarantee Agreement.

12. Financial Reporting (IFRs)

- **Preparer & submitter:** EXIM prepares and submits IFRs directly to the World Bank; MoF (Guarantor) is copied as required.
- **Frequency & deadlines:** Semiannual (each semester), due 45 days after semester-end. EXIM may also prepare quarterly internal IFRs for management and cash forecasting.
- **Content (minimum).**
 - Sources and Uses of Funds (by financing source and cumulative)
 - Uses by Component and Disbursement Category
 - VERPF Statement (Category 2): Opening VERPF balance at KTB; advances/transfers received; payments made by subproject/ERPA; any facility operating costs (if applicable and financed from carbon proceeds/counterpart resources); closing balance; and reconciliation to KTB bank statements.
 - DA Activity/Reconciliation Statement
 - Cash Forecast for Next Two Quarters (basis for DA advance)
 - Sub-Loan Portfolio Report (approvals, disbursements, collections, restructurings, arrears aging, NPL ratio)
 - Contract Monitoring Statement (commitments vs disbursements)
 - Notes and Significant Accounting Policies

13. Disbursement Procedures & Documentation

- **Authorized Signatories & e-Disbursement.** EXIM provides the Authorized Signatory Letter (ASL) and uses Client Connection to submit Withdrawal Applications (WAs).
- **Preparation of WAs.** EXIM compiles WAs with SOEs or full documentation; performs internal quality review; submits to the Bank.
- **Supporting documents.** Contract copy (if above threshold), invoices, acceptance certificates, proof of payment, M&V milestone evidence for performance-based payments, and sub-loan schedule extracts. Maintain a cross-reference index linking WA line items to supporting documents
- **Category 2 supporting documentation (VERPF):** For each WA covering Category 2, EXIM shall retain: (i) KTB VERPF account statement and transaction listing, (ii) list of ERPAs paid with

amounts and ER quantities, (iii) proof of payment to Sellers, and (iv) verification/issuance evidence (VVB reports and/or registry issuance records) sufficient to demonstrate that payments were made only for verified ERs under eligible subprojects.

- **Replenishment.** Based on IFR cash forecasts and DFIL frequency (typically monthly or quarterly) and subject to DA reconciliation.

14. Sub-Loan Disbursement Controls

- **Conditions precedent:** Signed sub-loan agreement; procurement plan/contract(s) cleared; E&S clearances; insurance (if required); bank account details verified; tax status confirmed.
- **Milestone-based tranches:** Align to physical progress and M&V milestones; retainage allowed if specified.
- **End-use verification:** Site visits, photo geo-tags, asset registers, and verifier reports.
- **Funds flow integrity:** Payments made directly to suppliers/contractors where feasible to reduce misuse risk.

15. Carbon Revenue & Other Income Accounting: Any carbon credit proceeds accruing to public entities or the FI will be recorded as Other Income (or liability if acting as agent) in the project/FI books per the governing agreements. Carbon proceeds do not finance eligible expenditures unless explicitly authorized by the Loan Agreement; where used for performance-based payments, related flows and verification documents must be clearly cross-referenced.

16. Fraud, Corruption, and Sanctions Controls

- All parties shall comply with the Bank's Anti-Corruption Guidelines. The FI will:
- Screen all counterparties against the Bank's Sanctions Lists prior to contract signature and before major payments.
- Include ACG clauses and audit access in all sub-loan agreements and contracts financed with Bank proceeds.
- Maintain a grievance/complaints log and whistleblower channel; report allegations to EXIM's PMU within 5 business days.

17. Retroactive Financing : Permitted for eligible payments made within the defined look-back period and subject to all FM requirements. Retroactive claims are flagged in the WA and supported with full documentation.

18. Financial Close-Out: Within 4 months after the Closing Date, EXIM (through its Project Management Unit (PMU)) submits a final WA, DA reconciliation, lists of outstanding commitments, asset registers, and an inventory of records retained. Any ineligible expenditure identified must be refunded to the Bank or replaced with eligible expenditures.

19. Roles & Deadlines

- **Semiannual IFRs (semester):** EXIM → World Bank (within 45 days of semester-end); copy MoF per Guarantee Agreement. EXIM may produce quarterly internal IFRs as needed.
- **Annual Audit:** EXIM → World Bank (within 6 months of FY-end); copy MoF
- **Replenishments (WAs):** EXIM → World Bank per DFIL (e.g., monthly/quarterly)
- **Portfolio Reports:** Monthly internal; quarterly with IFR

20. Additional Detail Inserts

- **Designated Account controls:** DA and OA operated under dual signatories; threshold matrix for payment approval; daily bank balance monitoring; monthly DA/OA reconciliations approved by FM Manager; segregation of setup vs approval rights in e-banking; annual review of signatory mandates.

- **Sub-loan disbursement tranching.** Typical tranches: (i) Advance ($\leq 20\%$) upon contract effectiveness and evidence of mobilization; (ii) Progress payments against verified milestones; (iii) Retainage (5–10%) released upon final acceptance and M&V achievement for a minimum stabilization period (e.g., 3–6 months). Any advance must be covered by an advance payment guarantee.
- **Arrears management protocol:** Automated aging buckets; early-warning triggers at 15/30/60/90 days; restructuring policy; NPL recognition rules; provisioning and write-off policy aligned with EXIM credit manual.
- **FM cross-checks:** Each payment voucher must cite Package ID, method, prior/post review status, and Bank STEP reference where applicable; FM verifies that contract value and cumulative disbursements reconcile to the contract register.
- **IT systems & audit trail.** Core banking/project ledger integration; unique sub-project IDs; immutable document repository with access logs; quarterly user-access review; backup/DR procedures and annual DR test.
- **Change Control.** Revisions to this Annex require prior no-objection from the World Bank where they affect fiduciary arrangements or DFIL-referenced items.

Annex H: CME Operations Manual (Issued Separately)

This Project Operations Manual (POM) provides the governing procedures for project implementation, oversight, fiduciary compliance, and reporting. Detailed operational procedures for the Coordinating and Managing Entity (CME)—including end-to-end processes for project registration support, MRV administration, verification workflow coordination, credit issuance facilitation, registry interactions, payment workflow coordination, data quality controls, exception handling, and CME internal controls—are issued as a standalone CME Operations Manual (Annex H).

Status and authority. The standalone Annex H is the operational reference for day-to-day CME execution. Annex H is an operational manual that supplements (and does not create obligations beyond) the Project Agreement between KTB and the World Bank and the EXIM–KTB Subsidiary Agreement. Where Annex H and the Project Agreement or Subsidiary Agreement conflict, the latter prevail. Updates to Annex H are operational in nature and do not require World Bank no-objection unless they materially alter KTB’s obligations under the Project Agreement. Where Annex H describes implementation steps, those steps must be applied in a manner consistent with this POM, the legal agreements, and any controlling program documents. In the event of inconsistency, the order of precedence stated in this POM and the applicable legal agreements shall govern.

Interfaces with this POM. Annex H is implemented in coordination with:

- (a) the digital MRV requirements (Annex C / relevant MRV annexes),
- (b) the independent verification procedures (Annex D),
- (c) financial management and disbursement procedures (Annex G), and
- (d) monitoring and reporting requirements (Section 9 and Annex I).

Access. Annex H is maintained as a controlled document with versioning. The current effective version is distributed to EXIM, the CME, and other authorized program stakeholders and is referenced by version/date in program reporting.

Annex I: Standard Templates & Forms

Purpose. This Annex provides standard templates and minimum required forms to ensure consistent, auditable implementation of the Project. Where separate template files are issued (e.g.,

editable Word/Excel forms), those files are deemed part of this Annex and control in case of inconsistency.'

I.1 Standard RFP Package Structure: Each PSO-issued RFP for EPC / performance-based contracting shall include, at minimum:

- 1) Invitation / Advertisement Notice
- 2) Instructions to Bidders (ITB) and Bid Data Sheet
- 3) Scope of Work / Terms of Reference / Technical Specifications (including minimum equipment specs and performance targets)
- 4) Draft performance-based contract template appropriate to the sub-project type, including (as applicable): (i) baseline and M&V plan aligned to Annex C (for energy efficiency / street lighting); (ii) output-based, tariff-indexed payment mechanism based on Verified Energy Generated and an Applicable Tariff Factor (for rooftop solar PV); (iii) invoicing, verification, and reconciliation procedures; and (iv) environmental, social, and OHS obligations consistent with Annex F and applicable law. Model Contract Term Sheets include:
 - (a) Rooftop PV output-based, tariff-indexed EPC (as per the BMA rooftop PV model);
 - (b) EE shared-savings EPC (baseline-based savings with shared savings or fixed service-fee structure, as applicable; covers building energy efficiency retrofits including HVAC upgrades, interior LED, building management systems, and other ECMs, as well as LED street lighting);
 - (c) Solar PV PPA (if legally and commercially appropriate), using a fixed or escalated tariff per kWh delivered.
- 5) Evaluation and Qualification Criteria (including technical, financial, and E&S compliance requirements)
- 6) Standard Forms: Bid Submission Form; Price Schedule / Financial Offer; Bid Security / Declaration (if applicable); E&S Compliance Declaration (Annex F); Anti-Corruption / Sanctions Declaration; and Form of Contract (EPC) – final execution version

I.2 Subproject Eligibility & Appraisal Checklists (EXIM): Minimum checklist items to be retained in the subproject file:

- Eligibility against program scope and disbursement category
- E&S screening outcome and risk classification (Annex F)
- Procurement method and compliance check
- Technical appraisal summary (including expected savings/ERs and key risks)
- Insurance/performance guarantee arrangements (if required)
- Disbursement plan and milestones

I.3 VERPF Private Subproject Application – Minimum Data Fields (KTB/CME): Minimum data required before ERPA signature:

- Project description, location, technology, commissioning date
- Baseline and monitoring plan summary and MRV readiness (Annex C / Annex H)
- E&S screening confirmation (Annex F)
- ERPA terms: volume, price/rate, payment trigger, delivery/assignment terms

- KYC/AML and sanctions screening results
- Expected verification/issuance schedule

I.4 Reporting Templates (Minimum): The following logs/templates shall be used (or equivalent approved formats):

- Maintenance Log (date, asset ID, activity, downtime, corrective action, technician)
- MRV Exception Log (data gaps, meter faults, corrective actions)
- Monthly/Quarterly Performance Summary (energy savings, generation, availability)
- VERPF Payment Register (ERPA ID, period, verified ERs, rate, payment amount, payment date, evidence references)

Annex J: Terms of Reference – LCC Steering Committee

J.1 Purpose and Mandate. These Terms of Reference (ToR) govern the composition, mandate, operating procedures, and accountability arrangements of the LCC Steering Committee (“Steering Committee”) established under the Thailand Low Carbon Cities and Carbon Market Development Project (LCC Project, P181082). The Steering Committee provides strategic oversight and program-level governance for the LCC Project throughout its implementation period. It operates as an inter-agency coordination and decision-making body, ensuring that the LCC Project remains aligned with Thailand’s national climate commitments, fiscal governance framework, and the legal agreements with the World Bank.

J.2 Composition

- **Chair:** Public Debt Management Office (PDMO), Ministry of Finance. PDMO provides the Chair in its capacity as the sovereign counterpart to the IBRD Loan Agreement and as the coordinating body for external financing reporting within the Ministry of Finance. The Director-General of PDMO or a designated Deputy Director-General serves as Chair. In the Chair’s absence, a written designation is required to appoint an acting chair from among the core members.
- **Core Members (voting):** (a) PDMO (Chair); (b) Export–Import Bank of Thailand (EXIM) — represented by its President or a designated Senior Vice-President, also serving as Secretariat; (c) Krung Thai Bank (KTB) in its role as CME — represented by its President or a designated Senior Vice-President; (d) Department of Climate Change and Environment (DCCE), Ministry of Natural Resources and Environment — represented by the Director-General or designate, responsible for policy coordination on Thailand’s NDC and carbon market strategy; (e) Ministry of Finance (Budget Bureau or Fiscal Policy Office designate) — responsible for public financial management and PSO fiscal compliance oversight; and (f) Ministry of Energy / Department of Alternative Energy Development and Efficiency (DEDE) — responsible for renewable energy policy and technical standards.
- **Standing Observers (non-voting):** (a) Each participating PSO (currently BMA and IEAT, and any subsequently admitted PSOs) attends as a standing observer and presents subproject-level performance updates; (b) the World Bank attends as a non-voting observer, consistent with its role in implementation support, no-objection processes, and fiduciary oversight. Additional agencies or technical experts may be invited on an ad hoc basis by the Chair.

J.3 Functions and Decision-Making Authority: The Steering Committee is vested with the following authorities and functions:

- **Semi-annual reporting review and WB submission.** The Steering Committee receives, reviews, and approves the consolidated semi-annual progress report prepared by EXIM/PMU covering all program KPIs, financial management, environmental and social compliance, MRV

and verification cycle status, and any material risks. Following approval, PDMO formally transmits the report to the World Bank within fifteen (15) calendar days of the meeting date.

- **PSO expansion decisions.** The Steering Committee decides whether additional PSOs are admitted to participate in the LCC program, evaluating proposals against the eligibility criteria in Section 4 of the POM. Admission is subject to applicable World Bank no-objection requirements as specified in the legal agreements. The Steering Committee may also decide to remove a PSO from the program in cases of persistent non-compliance, subject to due process and notification.
- **Carbon market strategy decisions.** The Steering Committee determines the carbon markets and sales channels into which VERs generated under the program may be sold or transferred, including decisions on international voluntary markets (e.g., Gold Standard, VCS/Verra), domestic markets (e.g., T-VER, SET carbon market), and Article 6 bilateral arrangements. In doing so, the Steering Committee takes into account prevailing market prices, environmental integrity standards, Thailand's NDC accounting framework, and any regulatory requirements. DCCE provides advisory input on NDC-consistency before any decision on Article 6 pathways.
- **Program rules and POM amendments.** The Steering Committee reviews and endorses material amendments to the POM, program eligibility criteria, VERPF pricing structures, and other program-level rules, subject to World Bank no-objection as required by the legal agreements. Minor operational updates delegated to EXIM/PMU do not require Steering Committee endorsement.
- **Escalation and issue resolution.** The Steering Committee receives and resolves escalated operational, financial, or inter-agency issues that EXIM/PMU cannot resolve at the working level within the timelines set out in the POM. The Secretariat maintains an issues log and ensures that each escalated item is assigned an owner and a resolution timeline.
- **Annual work plan and budget.** The Steering Committee reviews and approves the annual program work plan and budget for the following year, as presented by EXIM/PMU at the December–January semi-annual meeting.

J.4 Meeting Procedures.

- **Frequency and notice.** The Steering Committee meets twice per year, generally in June–July (covering the January–June reporting period) and in December–January (covering the July–December reporting period), to allow timely submission of semi-annual reports to the World Bank. Meeting dates are confirmed by EXIM/PMU Secretariat in writing not less than twenty-one (21) calendar days in advance, together with a draft agenda and key documents. Extraordinary sessions may be convened by the Chair with a minimum of fifteen (15) days' notice when urgent program-level decisions cannot wait until the next scheduled meeting.
- **Quorum.** Quorum requires the attendance of the Chair (PDMO) or a written-designated acting Chair, plus at least three (3) other core members. If quorum is not achieved, no binding decisions may be taken. A reconvened meeting may be called within fifteen (15) calendar days with the same agenda.
- **Standard agenda items.** Each semi-annual meeting includes at minimum: (1) review and approval of the consolidated semi-annual progress report; (2) review of KPI dashboard and delivery pipeline; (3) financial management update including disbursement status and IFR overview; (4) environmental and social compliance summary; (5) MRV and carbon crediting cycle update; (6) any PSO expansion proposals and admission decisions; (7) any carbon market strategy updates or decisions; (8) escalated issues requiring Steering Committee decision; (9) actions from prior meeting; and (10) any other business including preparation for upcoming World Bank supervision missions.
- **Voting.** The Steering Committee takes decisions by consensus wherever possible. Where consensus cannot be reached, decisions are taken by majority vote of core members present and voting, with the Chair holding a casting vote in the event of a tie. Abstentions are recorded but not counted as votes for or against.

- **Minutes and decisions.** The Secretariat circulates draft minutes within ten (10) business days of each meeting. Minutes are confirmed by the Chair and circulated to all members and the World Bank observer within fifteen (15) business days of the meeting. Decisions recorded in the minutes constitute the official record and are binding on all implementing entities within their respective areas of authority.

J.5 Secretariat Functions. PDMO serves as Secretariat. The Secretariat is responsible for: (a) confirming meeting dates and preparing agendas; (b) consolidating inputs from all PSOs, KTB, and EXIM program teams into the draft semi-annual progress report; (c) distributing draft documents to members not less than ten (10) business days before each meeting; (d) recording decisions and preparing meeting minutes; (e) maintaining an action log and tracking completion of agreed actions between meetings; (f) managing the process for any World Bank no-objection requests arising from Steering Committee decisions; (g) maintaining the official repository of Steering Committee records including minutes, decisions, and approved reports for not less than ten (10) years after project closing; and (h) coordinating Steering Committee input into World Bank supervision missions and implementation status reviews.

J.6 Relationship to World Bank Supervision and Reporting. The semi-annual progress report approved by the Steering Committee constitutes the primary program-level reporting instrument submitted to the World Bank for the purposes of implementation support missions, results tracking, and project supervision. PDMO, as Chair, is responsible for the formal transmission of each approved report. The Steering Committee meeting schedule is designed to enable the World Bank's semi-annual implementation support missions to be informed by, and where possible scheduled after, the Steering Committee's review. EXIM/PMU shares the Steering Committee meeting minutes with the World Bank observer promptly following confirmation by the Chair. The World Bank's non-voting observer status does not constitute a restriction on the Bank's right to raise issues, provide guidance, or request clarifications under the applicable legal agreements.

J.7 Conflict of Interest and Confidentiality. Any member who has a direct financial interest in a specific matter before the Steering Committee shall declare that interest to the Chair in advance and shall abstain from voting on that matter. The Secretariat records declared conflicts in the minutes. Members treat non-public program information shared in Steering Committee meetings as confidential and do not disclose it outside official channels without the Chair's authorization, except as required by Thai law or the applicable legal agreements with the World Bank.

J.8 Amendment of Terms of Reference. These Terms of Reference may be amended by a vote of not less than four of the six core members at a duly convened meeting, subject to World Bank no-objection where such amendments affect provisions referenced in the Loan Agreement, Guarantee Agreement, or POM. The Secretariat maintains version control of this Annex J and ensures that the current effective version is distributed to all members and the World Bank observer within ten (10) business days of any amendment taking effect.