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ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy

4.1 Financing Low Carbon Buildings

November 2024

ASEAN CENTRE FOR ENERGY ACE

EESL

HEAT

Supported by:

Federal Ministry for Economic Affairs and Climate Action

IKI INTERNATIONAL CLIMATE INITIATIVE

on the basis of a decision by the German Bundestag

WHAT WILL YOU LEARN?

- Low carbon buildings: Additional cost implications
- Building sector green finance opportunity and market size

- Financial and fiscal instruments for funding

- European Union taxonomy
- Blended finance
- Assessing risks and opportunities associated with energy efficiency investments

- Beneficial financing terms to developers and buyers
- Green loans
- Green mortgages
- Loans for retrofit and renovation of buildings

- Case examples

FINANCING LOW CARBON BUILDINGS

Issues and concerns

Financing of business-as-usual conventional buildings is traditionally well established. However, attracting finance for low carbon buildings can be a challenge due to the following reasons:

- **Lack of awareness about the concept of low carbon buildings**
- **Lack of confidence among stakeholders about low carbon technologies and building features delivering the claims of energy and cost savings**
- **Insufficient information about the extent of higher capital investment demanded by low carbon buildings**
- **Apprehension of builders about losing market share due to higher premiums for low carbon buildings, especially since the major financial benefit over the lifetime of the building is to the buyer and not to the builder**
- **Reluctance of prospective buyers to pay premiums for low carbon buildings due to lack of awareness about operational savings**
- **Buyer interest in energy savings reduces when buildings are not self-occupied, and the benefits of energy cost savings go to the tenants**
- **Absence of government incentives to at least partially offset the higher cost of low carbon (green) buildings**
- **Doubts about the market size that prevent banks and financial institutes evolving robust 'off-the-shelf' loan products for financing low carbon buildings and other sustainability projects**

LOW CARBON BUILDINGS

Cost implications

Green Residential Building

Reduces utility bills, waste output and maintenance costs

- Lowers operating expenses
- Improves resource efficiency

Saves more than 20% on energy and water consumption

Average 15%–20% reduction in utility bills for homeowners

Green buildings that incorporate recycling can reduce waste output by 90% and use 30% less energy, equating to a 5% increase in net operating income compared to traditional buildings

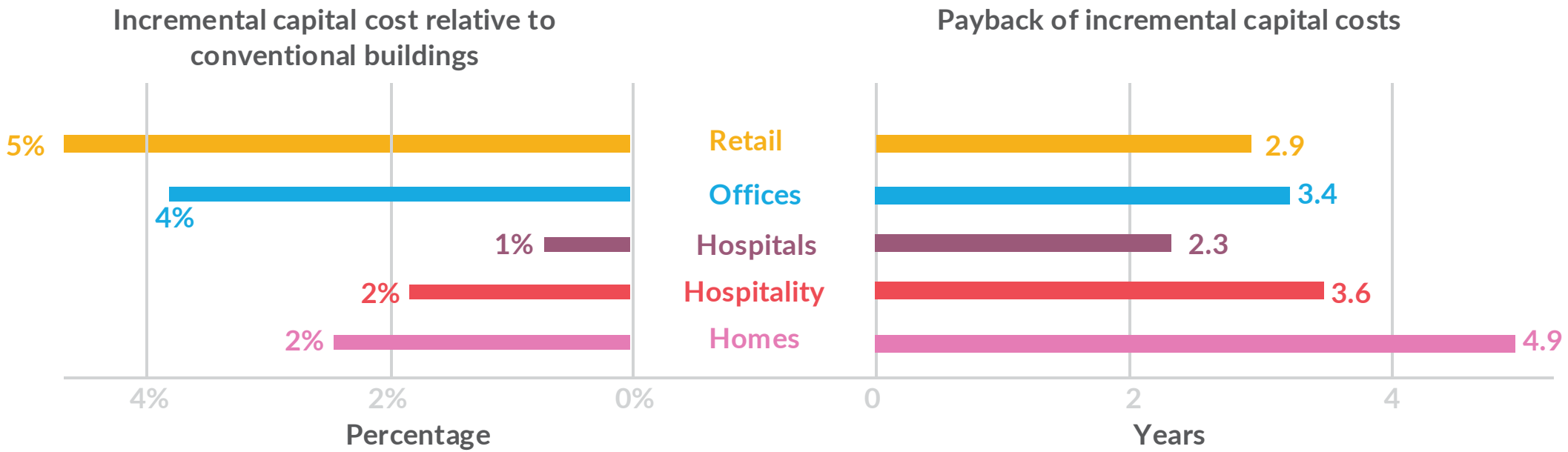
18%–37% lower operating costs than traditional buildings

Green Commercial Building

Source: International Finance Corporation, 2019

LOW CARBON BUILDINGS

Cost implications



The incremental costs in the range of 1% to 5% has payback periods in the range of 2.3 years to 4.9 years

Note: Incremental capital costs are the ratio of incremental cost over typical construction costs

Source: International Finance Corporation, 2023

LOW CARBON BUILDINGS

Case example: Additional cost and payback

In Indonesia, the EDGE-certified Citra Maja Raya development reported the additional cost of green measures to be **4.7%, with a payback period of 1.8 years**

The green measures included:

- **Optimum window sizing**
- **External shading**
- **Insulation of roof and external walls**
- **Natural ventilation**
- **Energy and water efficient systems**

The utility savings per year amount **to 30%**. Some residents reported that their monthly **utility bill decreased from an equivalent of USD55 in previous non-green housing to USD14**

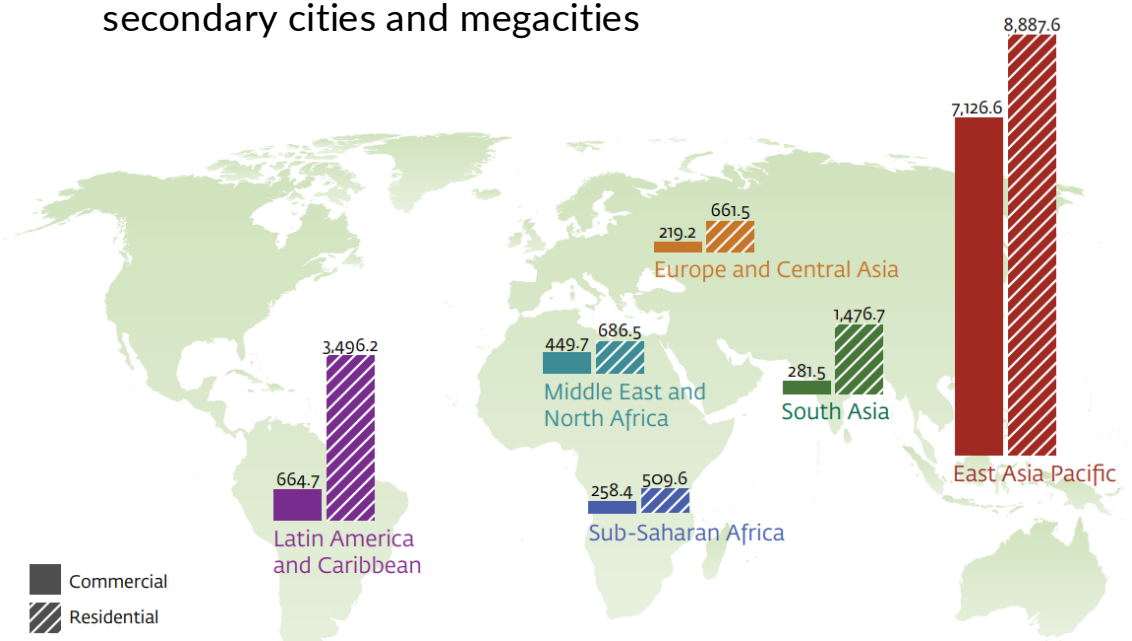
Citra Maja Raya Housing Estate, Indonesia

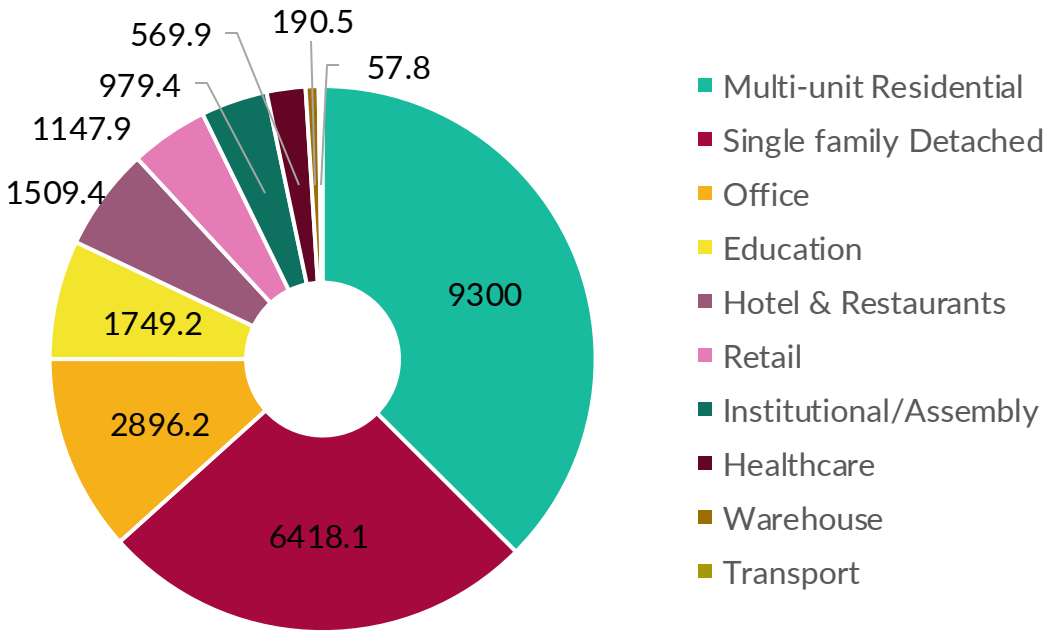
Image: https://www.kokogiovanni.com/2018/11/rumah-murah-cluster-sanur-persembahan-citra-maja-raya.html

MARKET POTENTIAL

Global projections for green buildings

- The market potential for green buildings is estimated to reach USD24.7 trillion by 2030 across emerging market cities with populations exceeding half a million, with the residential sector representing USD15.7 trillion of this opportunity
- The East Asia Pacific region alone presents a green building investment opportunity of USD16 trillion, accounting for over half of the total opportunity across all emerging markets
- South Asia holds a USD1.8 trillion investment potential in green buildings, primarily driven by rapidly growing secondary cities and megacities





Source: International Finance Corporation, 2019

FINANCING LOW CARBON BUILDINGS

Need of the hour: Innovative green financing for the building sector

- Banks and financial institutes play an important role in mobilizing funds to achieve climate change goals. Innovative financial products supporting the transition to a low carbon economy are being developed and gaining acceptance
- Presently, green financing in most countries is primarily focused on renewable energy, electric mobility, industrial energy efficiency, water and agriculture. Low carbon green buildings have yet to attract significant attention
- *Green bonds* appear to be gaining traction in the financial markets of both developed and emerging economies, and are expected to be the way forward for funding sustainability projects
- *Blended finance*, where investors with different risk tolerances participate in the same project, offers an effective way to secure capital for sustainability projects

FINANCING LOW CARBON BUILDINGS

Clarity on project transactions

- Who will invest in the assets?
- What are the minimum performance obligations?
- What are the minimum payment obligations?
- What is the payment mechanism and security structure?
- What happens to the assets at the end of the term of the contract?
- Have technical issues been addressed to eliminate disputes and uncertainties?
- Have user-specific technical and business problems been addressed?
- Baseline data, measurement and verification protocols?

Clarity on the above issues is a prerequisite for successfully implementing business models

FINANCING LOW CARBON BUILDINGS

Essentials for a contract

Energy efficiency projects are medium-term contract-driven businesses. Standard formats for energy services agreements help streamline business models, provide minimum safeguards to honor obligations and resolve disputes. Some of the prerequisites are:

- Precise definition of scope of services
- Clear delineation of responsibilities for all parties involved
- Establishment of baselines
- Enforce minimum and guaranteed performance standards
- Determine measurement and verification protocols
- Enforce minimum and guaranteed payment obligations
- Devise payment and security structure for suitable collateral and delayed payment risk
- Evolve clear-cut energy services billing procedures
- Put in place termination valuation formulas
- Take or pay protection for lenders
- Address potential areas of dispute

FINANCIAL INSTRUMENTS

Categories

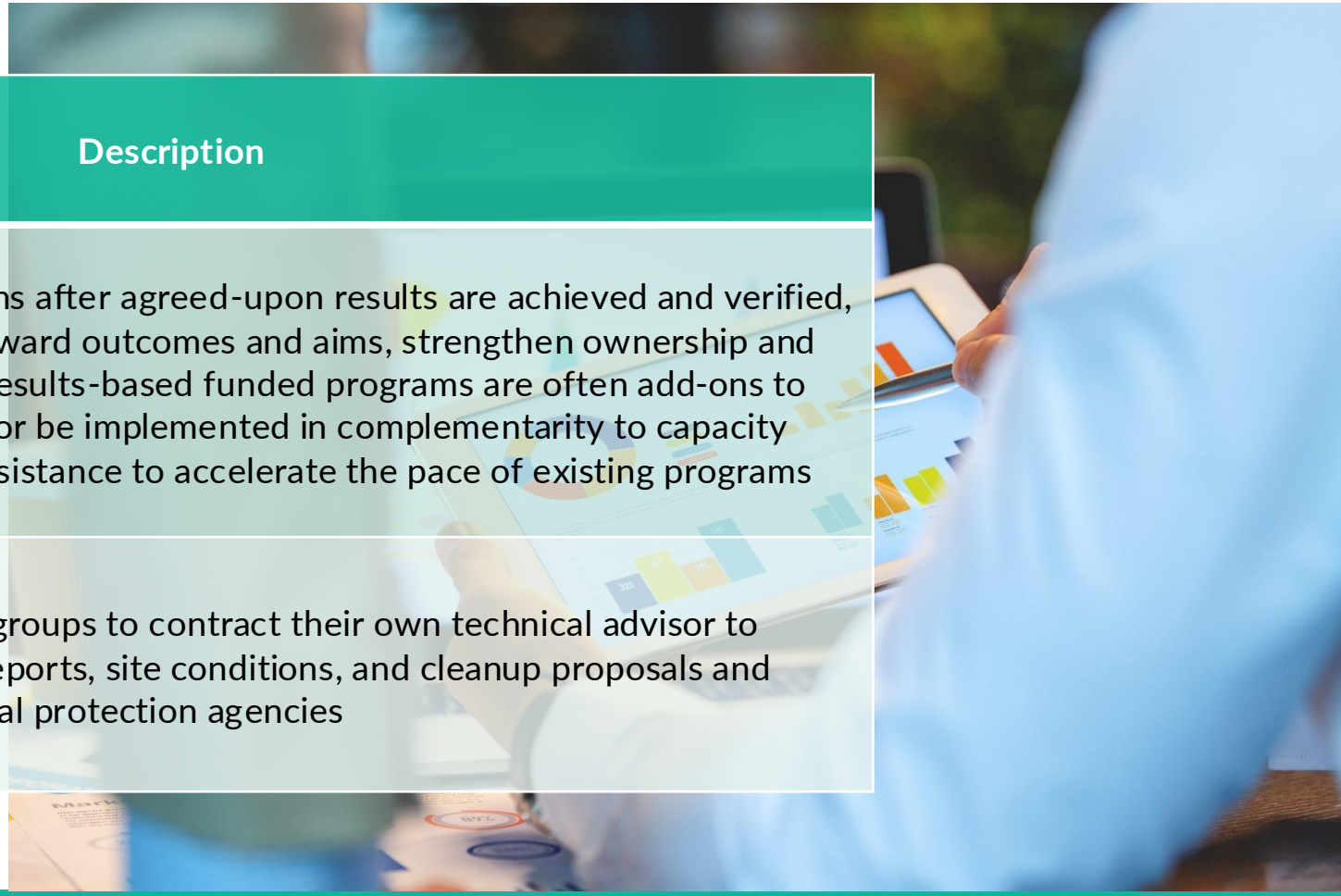
- The financial sector offers various instruments, both traditional and specialized, which can be categorized into grants, debts, equities, structured finance models, risk mitigation models, asset finance models and other innovative models packaged to meet the demands of the global sustainability drive
- Additionally, government bodies are offering incentives and disincentives through fiscal instruments
- Not all instruments have the same role in the net zero buildings transition. Some can only be used in certain contexts while others only allow for a subset of building improvement measures
- Overall, there is no one financial instrument that covers all the needs of a net zero transition. Reaching net zero in the buildings sector requires all building types, all technical elements, and all recipients to be served. Rarely will a standard financial instrument be able to address all issues adequately
- Considering the specific demands of sustainability projects, there is scope for innovation and customization of financial instruments. This modules gives an overview of financial and fiscal instruments that can be considered, depending on the customization required, with reference to the specific demands of the project

Source: LaSalle et al., 2022

FINANCIAL INSTRUMENTS

Grants from international bilateral agencies

Instrument	Description
Result-based grant	Rewards individuals or institutions after agreed-upon results are achieved and verified, which helps to shift the focus toward outcomes and aims, strengthen ownership and provide incentives to perform. Results-based funded programs are often add-ons to other programs and can include or be implemented in complementarity to capacity building activities or technical assistance to accelerate the pace of existing programs
Technical assistance grant	Provides funding to community groups to contract their own technical advisor to interpret and explain technical reports, site conditions, and cleanup proposals and decisions issued by environmental protection agencies

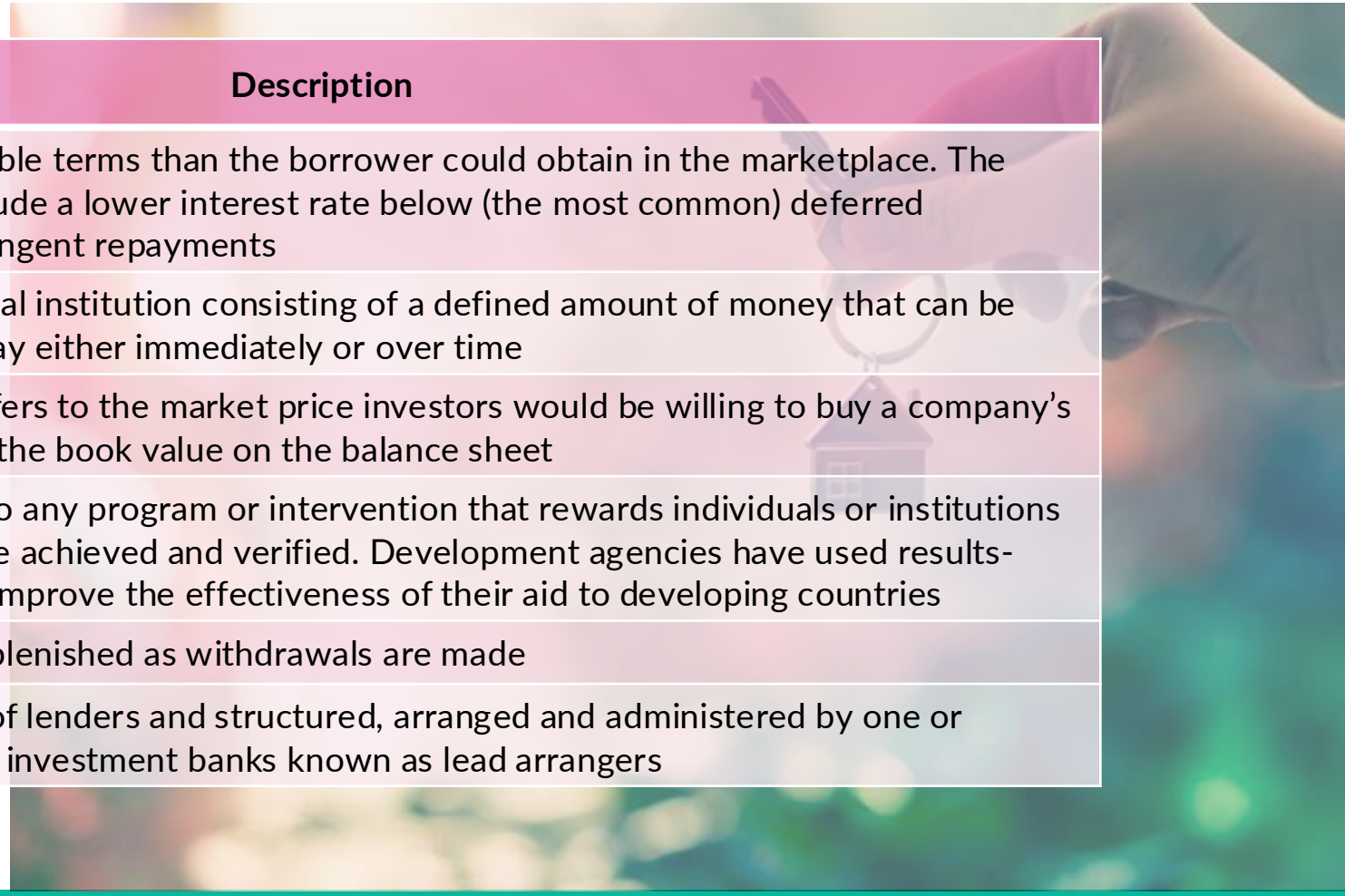


Source: Purnomo et al., 2024

FINANCIAL INSTRUMENTS

Debt financing

Instrument	Description
Concessional loan	A loan made on more favorable terms than the borrower could obtain in the marketplace. The concessional terms may include a lower interest rate below (the most common) deferred repayments or income-contingent repayments
Credit line	A flexible loan from a financial institution consisting of a defined amount of money that can be accessed as needed and repay either immediately or over time
Market-rate debt	The market value of debt refers to the market price investors would be willing to buy a company's debt for, which differs from the book value on the balance sheet
Results-based loan	An umbrella term referring to any program or intervention that rewards individuals or institutions after agreed-upon results are achieved and verified. Development agencies have used results-based financing as a tool to improve the effectiveness of their aid to developing countries
Revolving fund	A fund that is continually replenished as withdrawals are made
Syndicated loan	A loan provided by a group of lenders and structured, arranged and administered by one or several commercial banks or investment banks known as lead arrangers



Source: Purnomo et al., 2024

FINANCIAL INSTRUMENTS

Debt financing

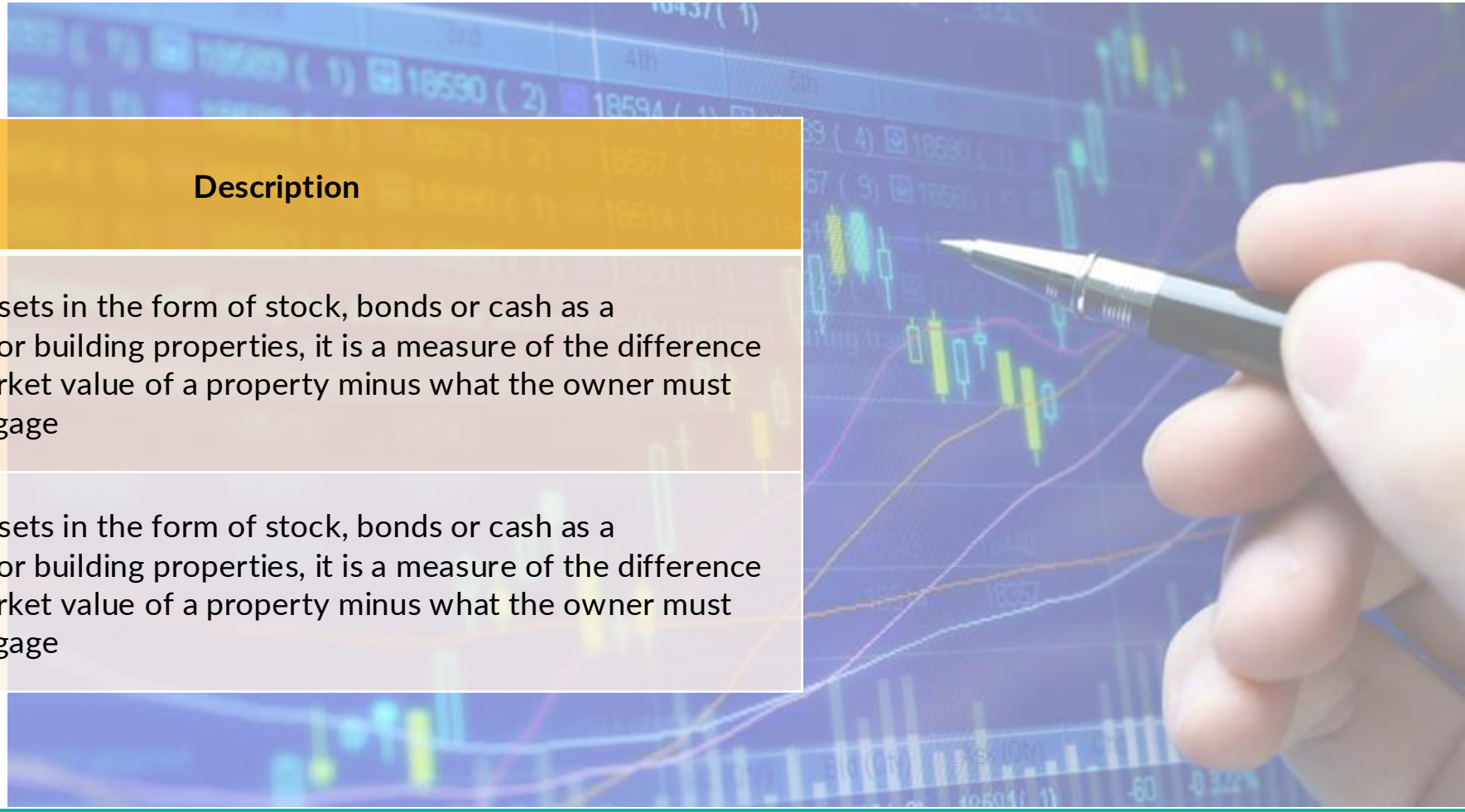
Instrument	Description
Green mortgage	A mortgage specifically targeted at green buildings. As an incentive for the borrower to either buy a green building or renovate an existing one to make it greener, the bank would offer either a lower interest rate or an increased loan amount
Catastrophe bond / insurance pool	Risk-linked securities that transfer a specified set of risks from a sponsor to investors
Green corporate / obligation bond	A green bond is differentiated from a regular bond in that it signifies a commitment to exclusively use the funds raised to finance or refinance green projects, assets or business activities
Green project / municipal bond	Any type of bond instrument where the proceeds will be exclusively applied to finance or refinance in part or in full new and/or existing eligible projects that provide clear environmental benefits, which are assessed and quantified by the issuer where feasible
Green sukuk	The green label indicates that the sukuk is compliant with green bond standards, principles and framework. The proceeds of green bonds are used to finance climate change mitigation, climate change adaptation and environmental projects

Source: Purnomo et al., 2024

FINANCIAL INSTRUMENTS

Equities

Instrument	Description
Private equity	Ownership of assets in the form of stock, bonds or cash as a 'shareholding'. For building properties, it is a measure of the difference between the market value of a property minus what the owner must pay on the mortgage
Public equity	Ownership of assets in the form of stock, bonds or cash as a 'shareholding'. For building properties, it is a measure of the difference between the market value of a property minus what the owner must pay on the mortgage



Source: Purnomo et al., 2024

FINANCIAL INSTRUMENTS

Structured finance

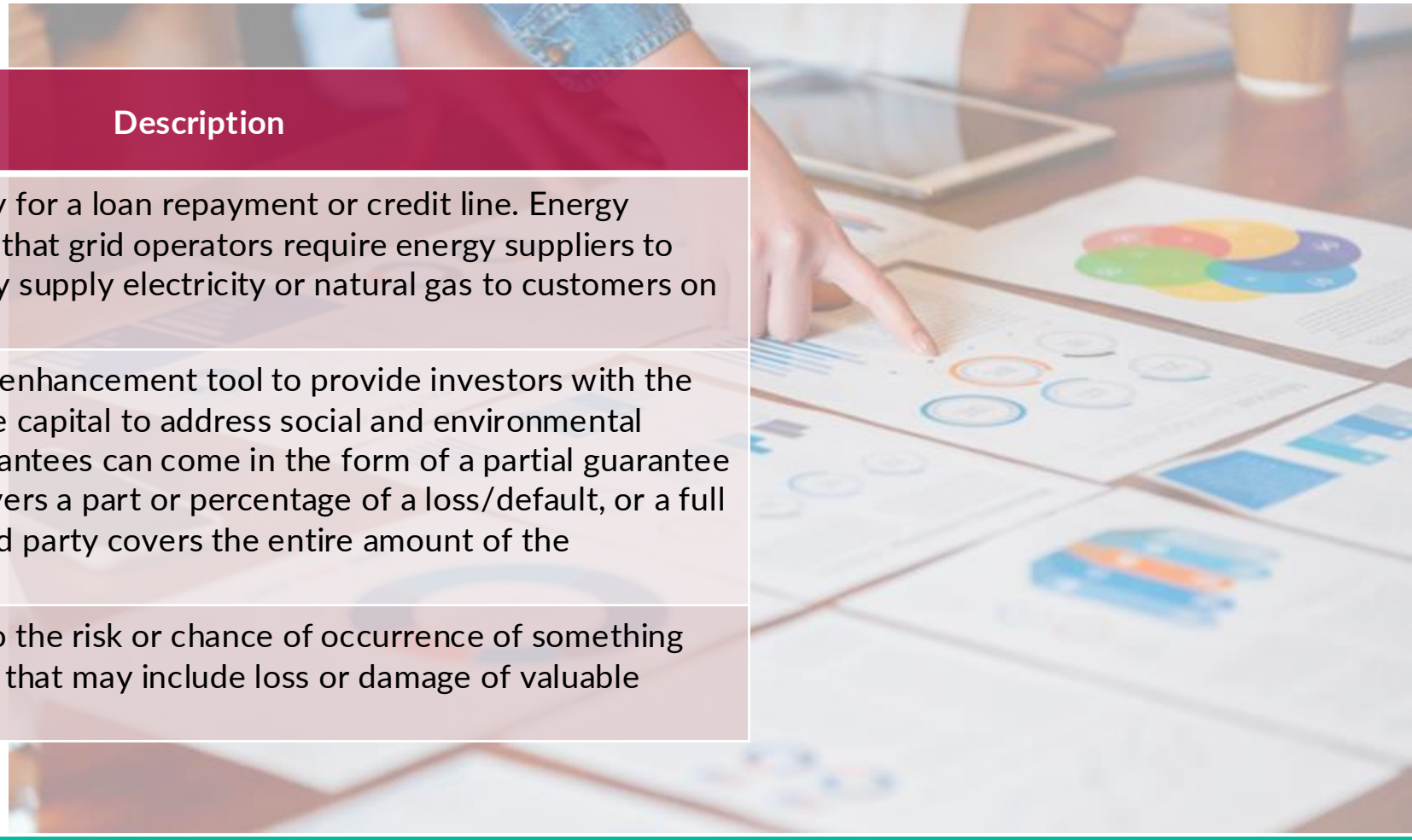
Instrument	Description
Aggregation platform	Platform for a group of companies or local institutions to partner together to buy energy from a single developer or multiple developers at smaller volumes while retaining the economic advantages of a high-volume purchase
Land banking / land readjustment	An effective tool in allowing local governments to take on regeneration projects through increased land values while engaging and involving the original residents and landowners as stakeholders
Pooled procurement for green financial product or building	Combines financial and other resources of purchasing authorities to improve efficiency and create greater purchasing power for green financial products or buildings
Securitization / Asset-backed securities (ABS)	A type of financial investment that is collateralized by an underlying pool of assets – usually one that generates a cash flow from debt, such as loans, leases, credit card balances or receivables

Source: Purnomo et al., 2024

RISK MITIGATION INSTRUMENTS

From banks and financial institutes

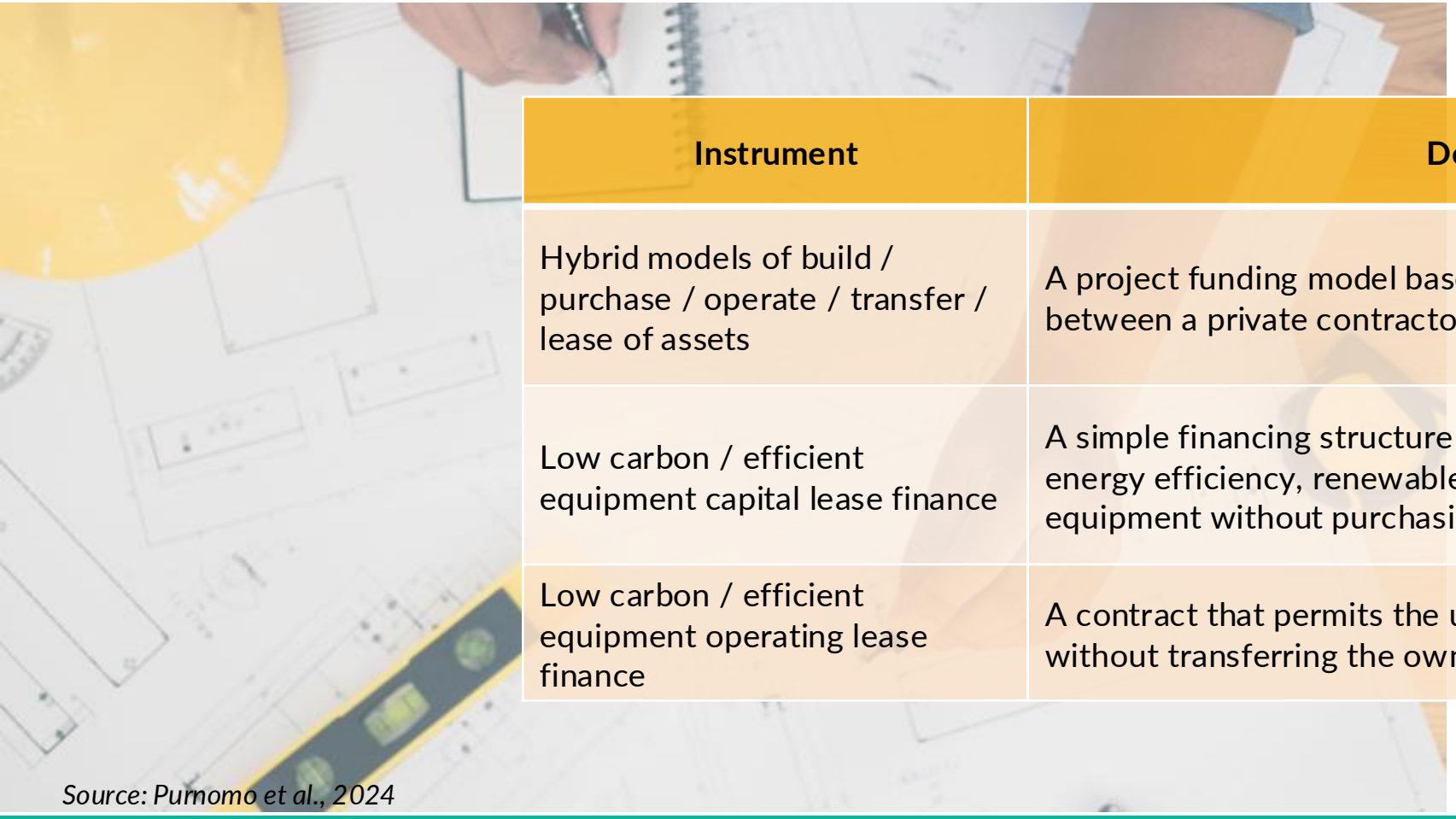
Instrument	Description
Collateral	Pledge to offer security for a loan repayment or credit line. Energy collateral is the money that grid operators require energy suppliers to post in order to actively supply electricity or natural gas to customers on that grid
Full or partial credit guarantee	A guarantee is a credit enhancement tool to provide investors with the ability to leverage more capital to address social and environmental challenges. Credit guarantees can come in the form of a partial guarantee where a third party covers a part or percentage of a loss/default, or a full guarantee where a third party covers the entire amount of the loss/default
Risk insurance product	Risk insurance refers to the risk or chance of occurrence of something harmful or unexpected that may include loss or damage of valuable assets



Source: Purnomo et al., 2024

ASSET FINANCE MODELS

Between customers and solution providers



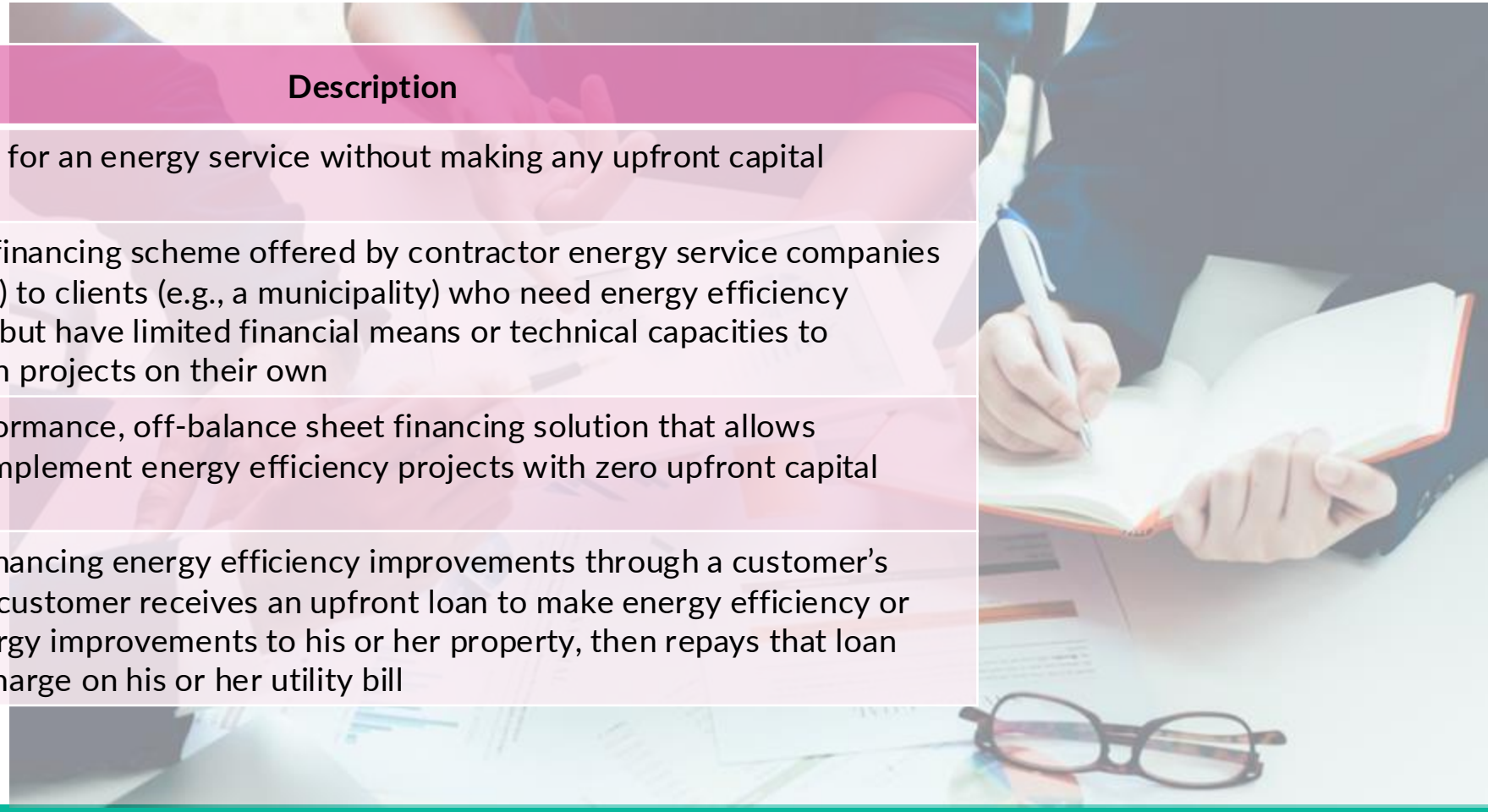
Instrument	Description
Hybrid models of build / purchase / operate / transfer / lease of assets	A project funding model based on a financial agreement between a private contractor and a public organization
Low carbon / efficient equipment capital lease finance	A simple financing structure that allows a customer to use energy efficiency, renewable energy or other generation equipment without purchasing it outright
Low carbon / efficient equipment operating lease finance	A contract that permits the use of an energy efficient asset without transferring the ownership rights of said asset

Source: Purnomo et al., 2024

OTHER INNOVATIVE MODELS

Between customers and solution providers

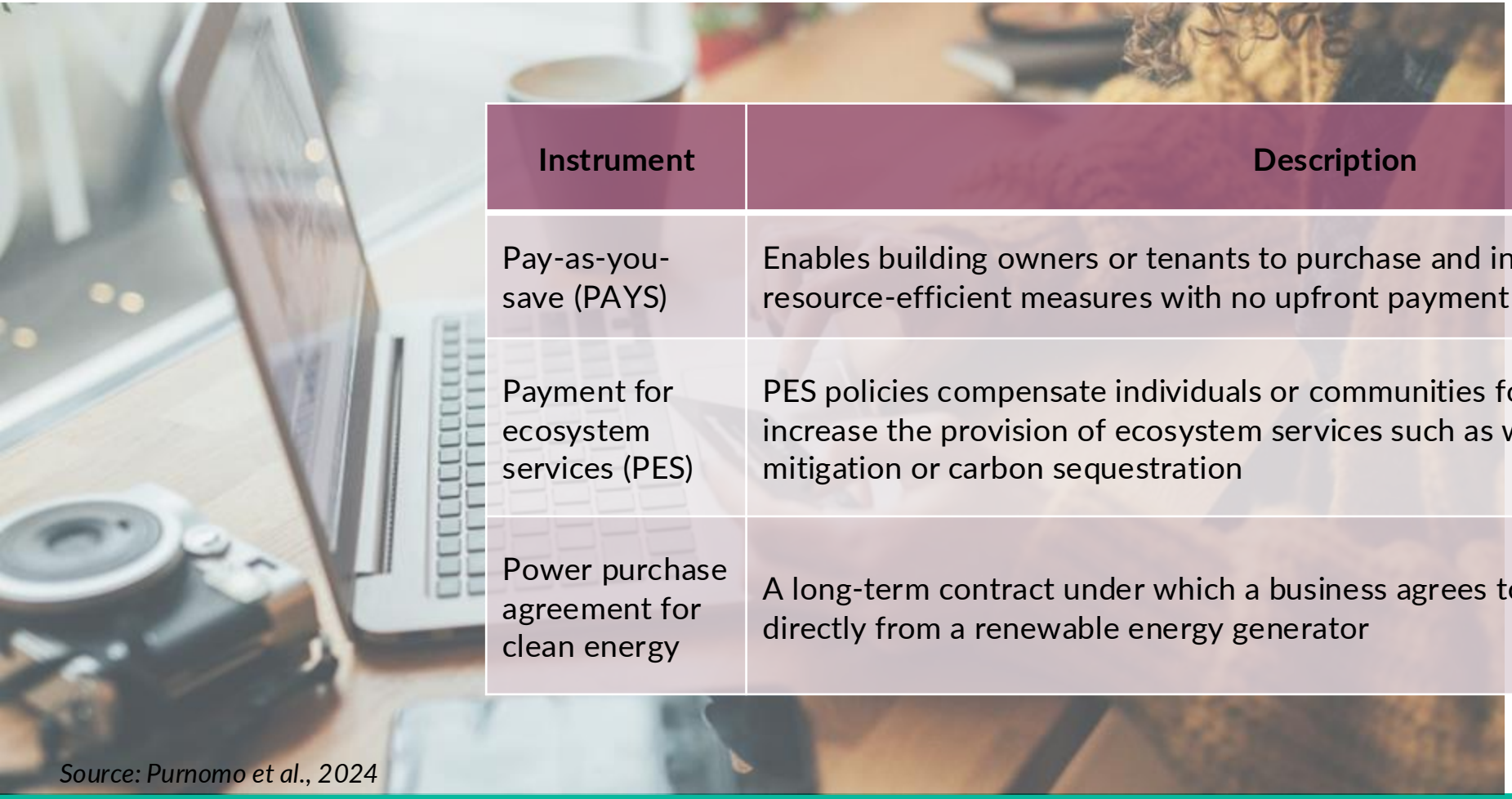
Instrument	Description
As-a-service model	Customers pay for an energy service without making any upfront capital investment
Energy performance contract (EPC) and ESCOs	An innovative financing scheme offered by contractor energy service companies (usually ESCOs) to clients (e.g., a municipality) who need energy efficiency improvements but have limited financial means or technical capacities to implement such projects on their own
Energy service agreement (ESA)	A pay-for-performance, off-balance sheet financing solution that allows customers to implement energy efficiency projects with zero upfront capital expenditure
On-bill financing (OBF) and repayment (OBR)	A method of financing energy efficiency improvements through a customer's utility bill. The customer receives an upfront loan to make energy efficiency or renewable energy improvements to his or her property, then repays that loan through a surcharge on his or her utility bill



Source: Purnomo et al., 2024

OTHER INNOVATIVE MODELS

Between customers and solution providers



Instrument	Description
Pay-as-you-save (PAYS)	Enables building owners or tenants to purchase and install money-saving resource-efficient measures with no upfront payment and no debt obligation
Payment for ecosystem services (PES)	PES policies compensate individuals or communities for undertaking actions that increase the provision of ecosystem services such as water purification, flood mitigation or carbon sequestration
Power purchase agreement for clean energy	A long-term contract under which a business agrees to purchase electricity directly from a renewable energy generator

Source: Purnomo et al., 2024

FISCAL INSTRUMENTS

With government bodies

Instrument	Description
Capital cost subsidy	A subsidy that covers a share of the upfront capital cost of an asset (e.g., a solar water heater)
Carbon credits and markets	A mechanism to reduce greenhouse gas (GHG) emissions by creating a market in which companies can trade in emissions permits
Energy / carbon tax	A type of penalty that businesses must pay for excessive GHG emissions
Feed-in-tariff	A payment made to households or businesses generating their own electricity using methods that do not contribute to the depletion of natural resources, proportional to the amount of power generated
Financial penalty	The obligation to pay a sum of money on conviction of a criminal or administrative offense
Property Assessed Clean Energy (PACE)	PACE initiatives allow local governments to support building owners carry out energy efficiency retrofits or install renewable energy in their properties. This entails conducting special assessments for eligibility and providing upfront funding for the improvement, which is paid back through property tax bills

Source: Purnomo et al., 2024

FISCAL INSTRUMENTS

With government bodies

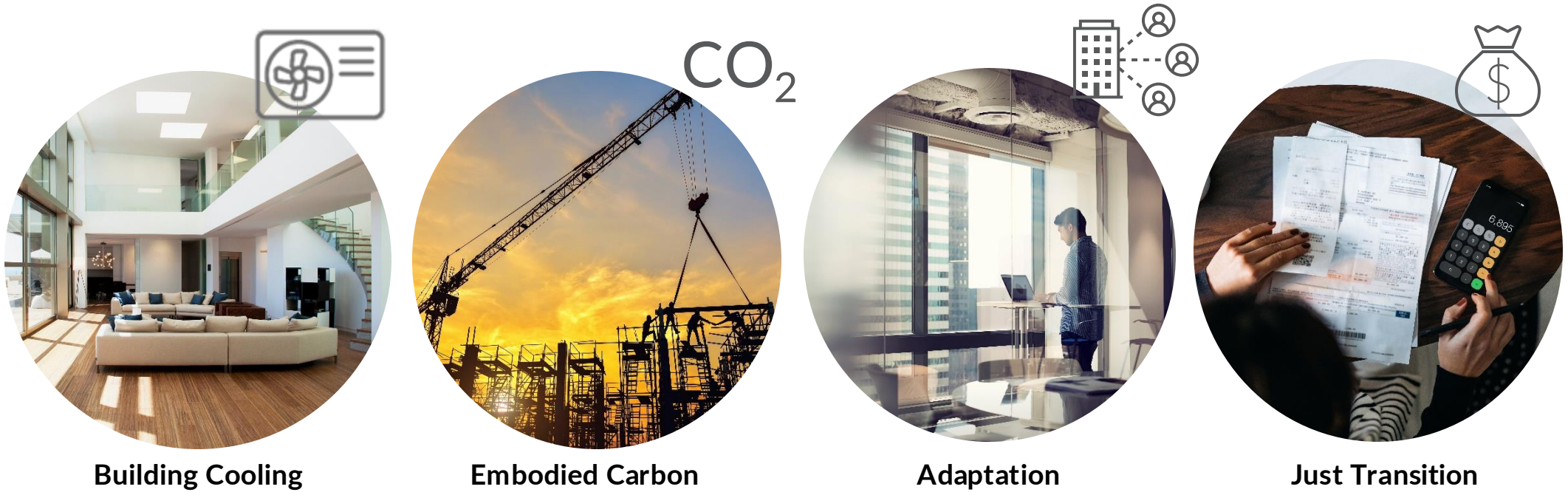
Instrument	Description
Service subsidies	Include payments, tax breaks or other forms of economic support given to individuals and industries. The subsidies are designed to promote infant industries, achieve universal access objectives (health, education and sanitation), and encourage more sustainable patterns of production and consumption (energy and transport), as well as respond to market failures and their potentially undesirable social and developmental consequences
Tax incentives	Include credits, rebates, reductions and exemptions for property owners to install energy-saving equipment and renewable energy systems, and meet green building certification standards. Tax incentives can be based on specific low embodied-carbon criteria such as energy efficiency building codes or green building certification standards
Tax or fee-based land-value capture (LVC)	The value of privately-held land often increases due to public investments in the area. LVC methods usually seek to harness a portion of these unearned rents to help finance public infrastructure or improvement projects. Betterment taxes can be implemented to levy tax on total land value or on the incremental value in the neighborhood of the public investment

Source: Purnomo et al., 2024

FINANCIAL INTERVENTIONS

High-impact thematic focus areas

To make significant impact in the buildings sector, financial instruments should address the following four thematic areas



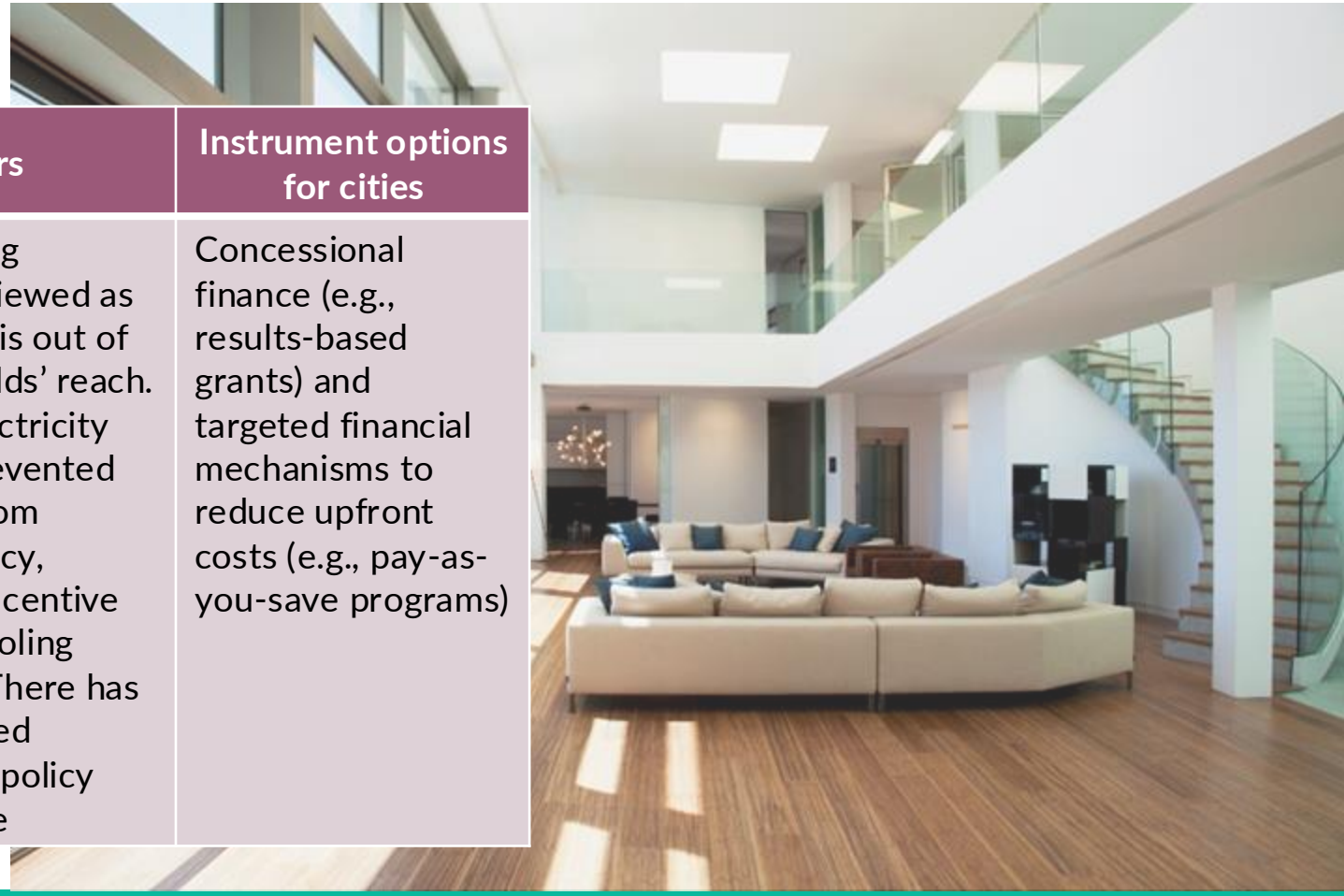
Building Cooling | **Embodied Carbon** | **Adaptation** | **Just Transition**

Source: Micale et al., 2023

FINANCIAL INTERVENTIONS NEEDED

Thematic area: Building cooling

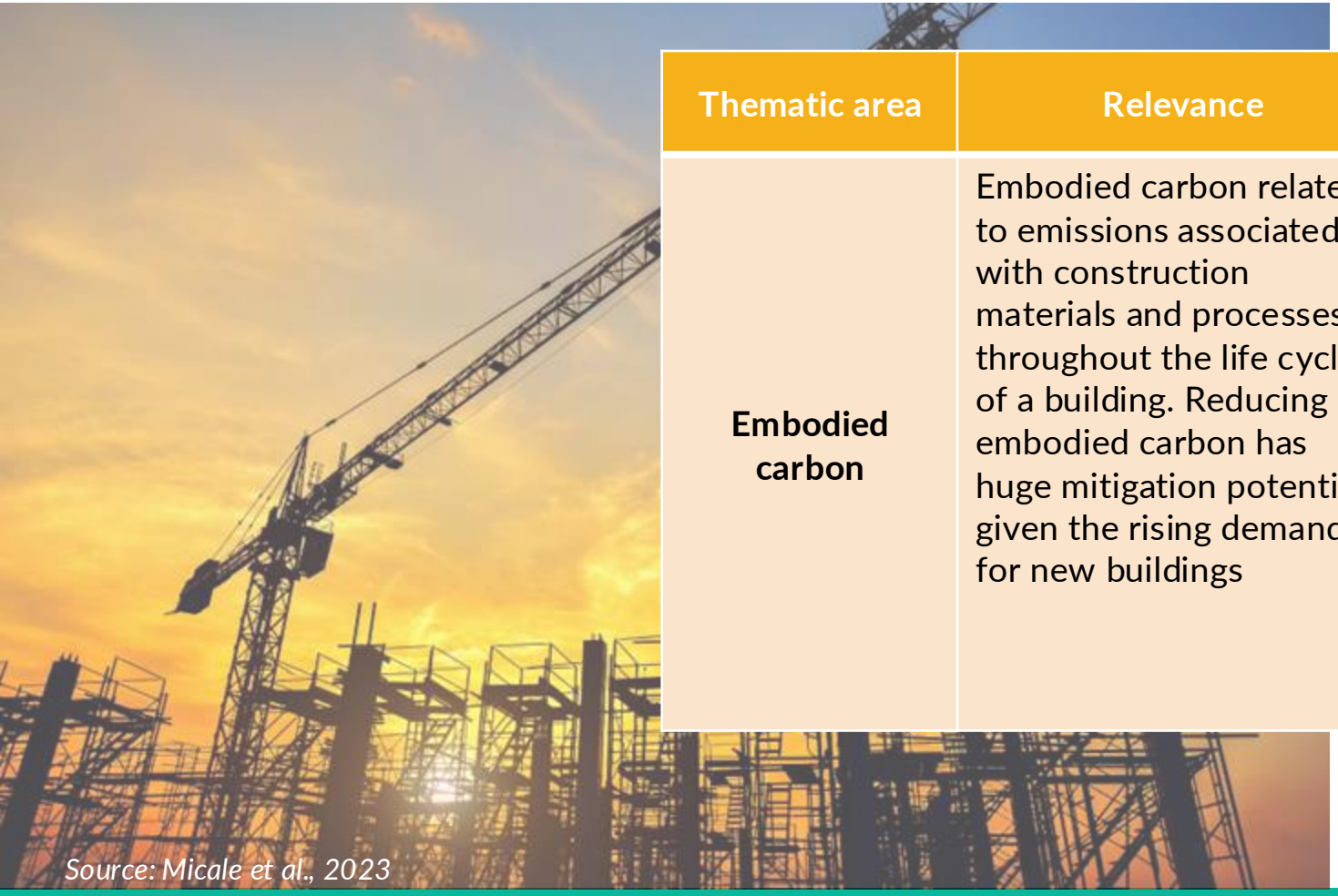
Thematic area	Relevance	Barriers	Instrument options for cities
Building cooling	Building cooling is the fastest-growing energy use in buildings. Meeting cooling energy demand without increasing emissions requires efficient cooling equipment, as well as thermal envelope and passive designs	Efficient cooling equipment is viewed as expensive and is out of many households' reach. Fluctuating electricity prices have prevented cost savings from energy efficiency, becoming an incentive for efficient cooling technologies. There has also been limited regulation and policy support to date	Concessional finance (e.g., results-based grants) and targeted financial mechanisms to reduce upfront costs (e.g., pay-as-you-save programs)



Source: Micale et al., 2023

FINANCIAL INTERVENTIONS NEEDED

Thematic area: Embodied carbon



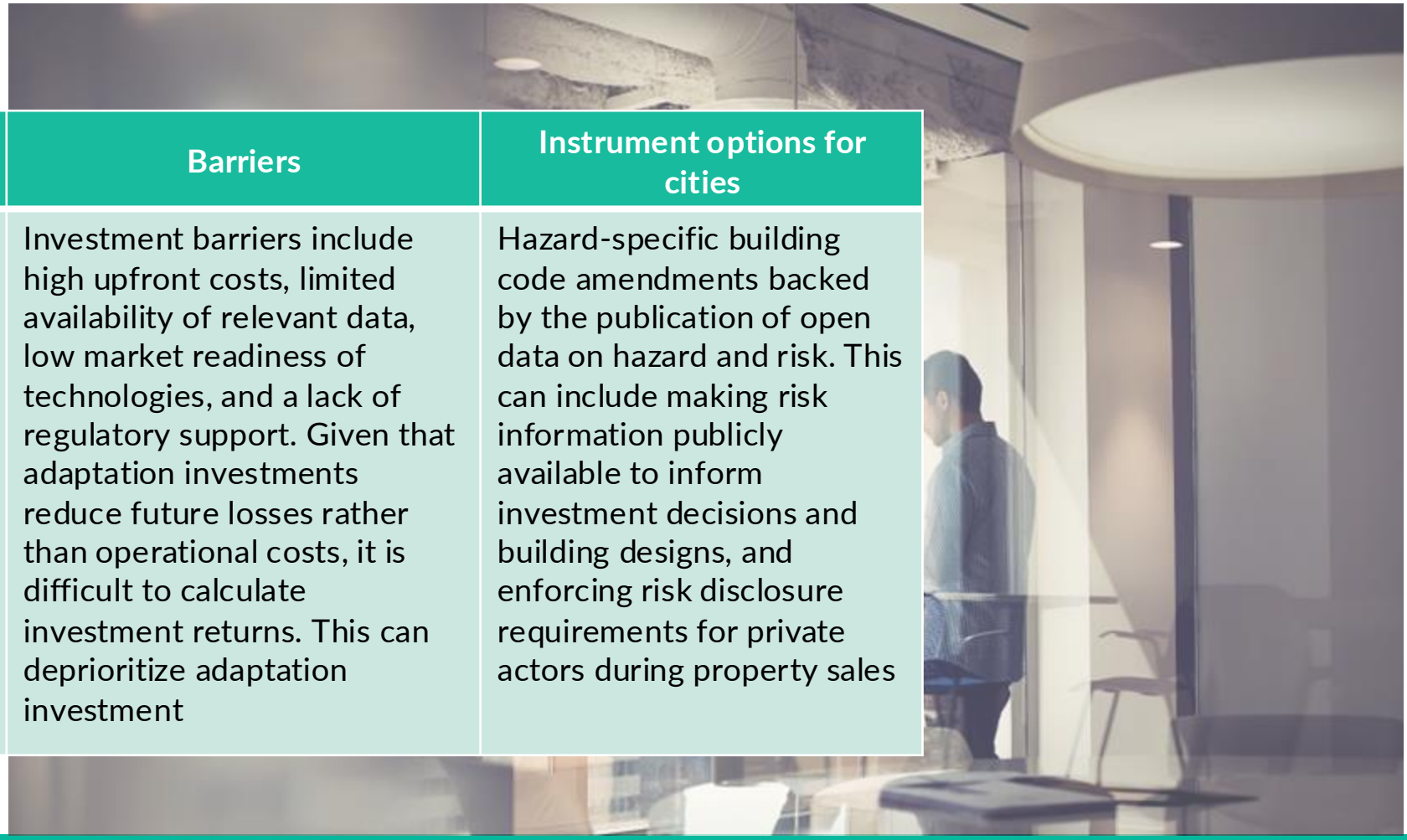
Source: Micale et al., 2023

Thematic area	Relevance	Barriers	Instrument options for cities
Embodied carbon	Embodied carbon relates to emissions associated with construction materials and processes throughout the life cycle of a building. Reducing embodied carbon has huge mitigation potential, given the rising demand for new buildings	Embodied carbon reduction is hindered by a lack of scalable, low carbon technical solutions, lack of awareness and expertise on existing solutions, and lack of performance data and examples of regulatory support for existing solutions	Skills development via workforce training, data benchmarks achieved through life cycle carbon calculation, and effective mandates such as embodied carbon building codes and reporting requirements

FINANCIAL INTERVENTIONS NEEDED

Thematic area: Adaptation for climate resilience

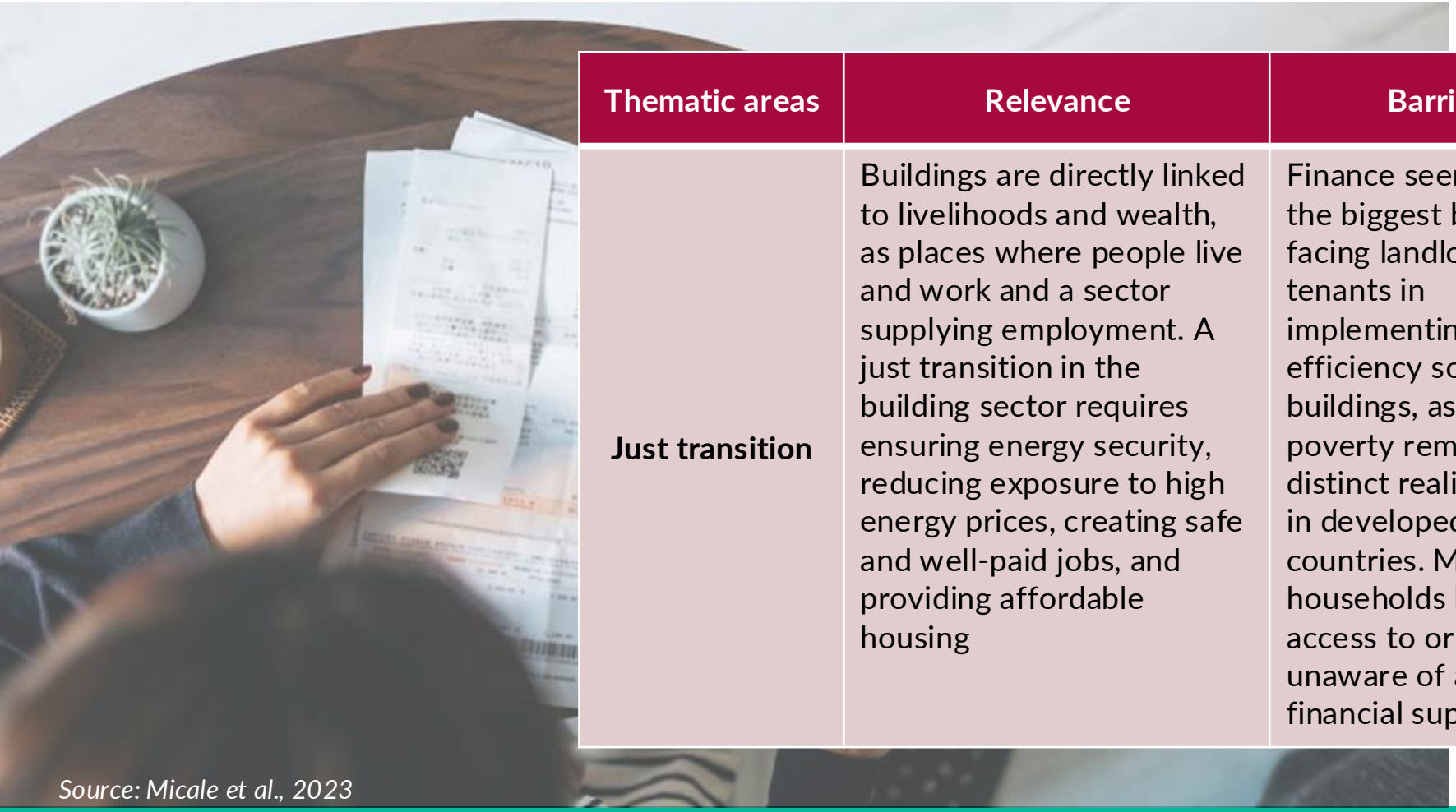
Thematic area	Relevance	Barriers	Instrument options for cities
Adaptation	Adapting buildings to become more climate resilient safeguards people, communities and economies	Investment barriers include high upfront costs, limited availability of relevant data, low market readiness of technologies, and a lack of regulatory support. Given that adaptation investments reduce future losses rather than operational costs, it is difficult to calculate investment returns. This can deprioritize adaptation investment	Hazard-specific building code amendments backed by the publication of open data on hazard and risk. This can include making risk information publicly available to inform investment decisions and building designs, and enforcing risk disclosure requirements for private actors during property sales



Source: Micale et al., 2023

FINANCIAL INTERVENTIONS NEEDED

Thematic area: Just transition ensuring energy security and decent livelihood



Thematic areas	Relevance	Barriers	Instrument options for cities
Just transition	Buildings are directly linked to livelihoods and wealth, as places where people live and work and a sector supplying employment. A just transition in the building sector requires ensuring energy security, reducing exposure to high energy prices, creating safe and well-paid jobs, and providing affordable housing	Finance seems to be the biggest barrier facing landlords and tenants in implementing energy efficiency solutions in buildings, as energy poverty remains a distinct reality, even in developed countries. Many households lack access to or are unaware of affordable financial support	Effectively designed subsidies to make low carbon projects financially viable. Subsidy pilot projects can help identify and test pro-poor solutions and eventually cut costs

Source: Micale et al., 2023

FINANCING LOW CARBON BUILDINGS

Financial barriers and impacted thematic areas

Barrier type	Barrier description	High-impact thematic focus			
		Cooling	Embodied carbon	Adaptation	Just transition
Financial barriers	Lack of access to affordable finance				
	Lack of awareness of funding options				
	Limited supply of dedicated financing instruments				
	Inability to pay for upfront cost				

Source: Micale et al., 2023

FINANCING LOW CARBON BUILDINGS

Investment risk and opportunity barriers and impacted thematic areas

Barrier type	Barrier description	High-impact thematic focus			
		Cooling	Embodied carbon	Adaptation	Just transition
Investment risk and opportunity barriers	Asset class has insufficient project scale				
	High investment costs compared to alternatives	■	■	■	■
	Low or fluctuating energy prices	■			
	Long payback on investment	■		■	■
	Perceived technical performance risk			■	
	Split incentive between landlords and tenants	■			
	Low priority investment			■	■
	Lack of awareness and appropriate information on opportunity		■	■	
	Lack of performance data		■	■	
	High or uncertain maintenance and operation costs				

Source: Micale et al., 2023

FINANCING LOW CARBON BUILDINGS

Market readiness barriers and impacted thematic areas

Barrier type	Barrier description	High-impact thematic focus			
		Cooling	Embodied carbon	Adaptation	Just transition
Market readiness barriers	Limited experience with technical solutions		■	■	
	Lack of expertise and skills		■	■	
	Limited supply of technical products		■	■	

Source: Micale et al., 2023

FINANCING LOW CARBON BUILDINGS

Regulatory barriers and impacted thematic areas

Barrier type	Barrier description	High-impact thematic focus			
		Cooling	Embodied carbon	Adaptation	Just transition
Regulatory barriers	Lack of building regulations support				
	Lack of standard technologies				
	Lack of information on standards and labeling				
	Long processes for application of permits and access to land				
	Social risk and community opposition				

Source: Micale et al., 2023

EU TAXONOMY

European Union's objectives for investments in sustainability projects

- The EU taxonomy for sustainable activities is a classification system that helps investors and companies understand which economic activities are environmentally sustainable
- The EU taxonomy is an element of the EU Renewed Sustainable Finance Strategy that aims to push the financial and industrial sectors toward more investments for climate neutrality in the EU. The objective of the EU taxonomy is to establish a classification framework to facilitate sustainable investment across six environmental objectives
- For investors, this provides the basis to identify which investments are sustainable and can be marketed as such, increasing transparency. Following the enacting of this regulation through the EU and its member states, only investments that comply with technical screening criteria for one of the six environmental objectives, five do-no significant harm standards (see next slide), as well as a set of common minimum social safeguards, can be communicated as sustainable
- Financial institutions are progressively expected to disclose to what extent their portfolios are taxonomy-aligned

Objectives

1. Climate change mitigation
2. Climate change adaptation
3. Sustainable use and protection of water and marine resources
4. Transition to a circular economy
5. Pollution prevention and control
6. Protection and restoration of biodiversity and ecosystems

Source: Programme for Energy Efficiency in Buildings, 2021

EU TAXONOMY

Implications for the building sector

- Technical screening criteria have been developed for economic activities in the building sector
- Other economic activities relevant to the building sector covered by the taxonomy are installation, maintenance and repair of renewable energy technologies, as well as instruments and devices for measuring, regulation and controlling of energy performance of a building. Manufacturing and mining criteria for other economic activities and environmental objectives will equally affect supply chains in the buildings sector
- The five accompanying do-no-significant harm standards concern: (i) minimum water use criteria for installations; (ii) circular economy elements such as re-use, recycling or material recovery of construction waste; (iv) pollution minimization; (v) and biodiversity protection through environmental impact assessments and, in the case of new construction, no construction on arable land, forest land or greenfield land of high biodiversity

Type of economic activity	Technical screening criteria
Construction of new buildings	• Primary energy demand of new construction is at least 10% lower than nearly zero energy building requirements in national measures • Energy performance certified by energy performance certificate • For buildings > 5000m²: life cycle global warming potential calculated, and level of performance is tested post-construction, both disclosed to investors and clients
Renovation of existing buildings	• As applicable in national regulations for major renovations • Reduction of primary energy demand of at least 30%
Acquisition and ownership	• Buildings built before 12/2020: at least Energy Performance Certificate (EPC) Class A, or within top 15% of national building stock expressed in primary energy demand • Buildings built after 12/2020: meet criteria for construction of new buildings • Large non-residential building with HVAC output >290 kW: operated efficiently through energy performance monitoring and assessment

Source: Programme for Energy Efficiency in Buildings, 2021

BLENDED FINANCE

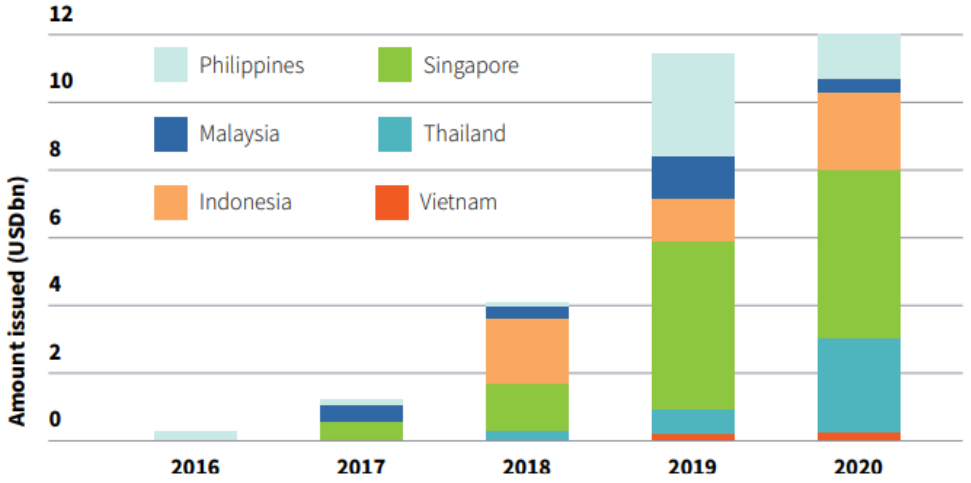
Financial risk mitigation for investors

- Blended finance lets investors choose different risk tolerances while participating in the same project. Often used in real estate transactions, it is proving to be an effective way to get capital to critical, but hard-to-fund projects. The approach can bring together philanthropy, government funding and private sector investors with different risk and return expectations. Those willing to take more risk can act as a capital cushion for investors who need to take less risk but are interested in financing high-impact projects
- Institutional investors (banks, insurers, asset managers, etc.) invest the major portion of the capital for profitable risk adjusted returns
- Concessionary investors (public development assistance and foundations) invest lesser amounts, accepting higher risk of loss or earn below market rate of return
- Finance domain specialists, often sponsored by development banks and private institutions, help match projects with investment capital
- Deserving projects receive finance and apply it to sustainable development programs
- Governments and central banks can work toward easing the access of blended finance to banks, financial institutes, and developers and builders with the specific mandate to provide green finance to low carbon buildings and meet the climate goals of the building sector

GREEN BONDS AND LOANS

The way forward

- Green bonds and loans are debt instruments used to finance projects, assets and activities that support climate change adaptation and mitigation, issued by governments, municipalities, banks and corporates. The green bond label can be applied to any debt format, including for example private placement, securitization, covered bond and sukuk
- Global best practices suggest that bonds and loans be issued in line with Green Bond Principles (GBP), Green Loan Principles (GLP), Climate Bonds Taxonomy and Standard, ASEAN Green Bond Standards, and country-specific guidelines. The key is that the use of proceeds (UoPs) is ring-fenced to only finance green assets, projects and activities
- While there is no single set of global definitions for eligible projects to be funded with green bond and loan proceeds, the Climate Bonds Initiative uses the Climate Bonds Taxonomy, which features eight UoP categories: energy; buildings; transport; water; waste; land use; industry; and information and communications technology



Growth in issuance of sustainability bonds in ASEAN countries, 2016–2020

Indonesia has issued green bonds (sukuks) in the form of:

- Sovereign national bonds
- Municipal bonds

Sources: Nguyet et al. 2021; Purnomo et al., 2024

GREEN MORTGAGES

Case example: Romania

- The Romania Green Building Council (RoGBC) created the SMARTER Finance for Families Program to convince banks to introduce green mortgages
- The program argues that green mortgages can deliver a triple win for developers, banks and home buyers
- A participating developer builds a more expensive green home on the condition that a participating bank will provide a larger loan to a green home buyer to cover the extra cost of building green. The bank books a larger and less risky loan, earning a higher return. The home buyer benefits with a lower monthly ownership cost for a superior home through a combination of preferential mortgage terms and utility savings
- Two participating banks, Raiffeisen Bank and Alpha Bank, offered a green mortgage discount of 75 and 50 basis points, respectively, on the conventional mortgage rate of 5.25%

Image source: https://greenhomes.solutions/news/10-000-green-homes

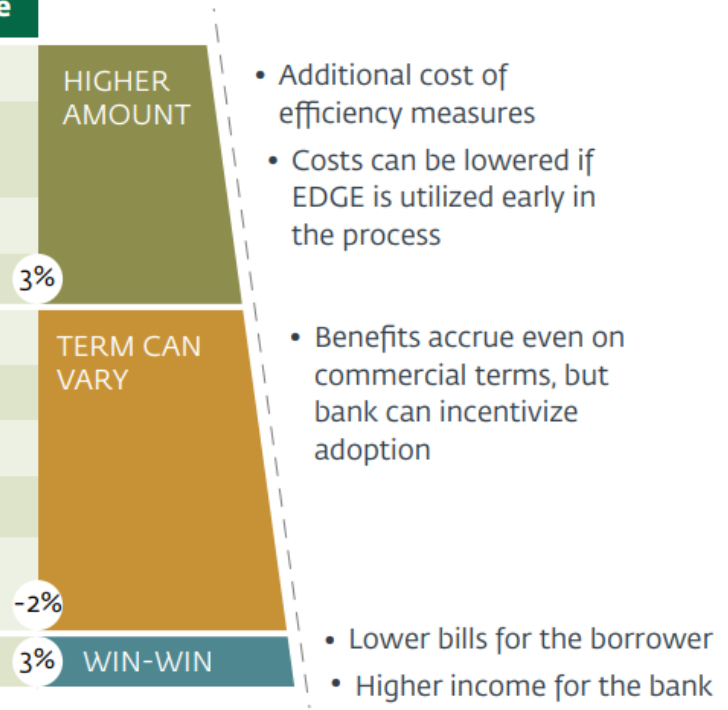
Source: International Finance Corporation, 2019

GREEN MORTGAGES

Comparison with standard mortgages

Green mortgages compare favorably with standard mortgages, despite higher initial costs. The utility savings result in a reduction in the monthly cost of ownership, benefiting both customers and banks – a win-win situation

	Standard building: Standard mortgage	Green building: Green mortgage
Base purchase cost	50,000	50,000
Green measures (3% higher costs)		1,500
20% down payment	(10,000)	(10,300)
Loan amount	40,000	41,200
Rate	11%	11%
Term	20 yrs	20 yrs
Monthly payment	$413	$425
Utility savings (20%)		(20)
Cost of monthly ownership	$413	$405
Bank income (yr 1)	4,371	4,502



Source: International Finance Corporation, 2019

VIETNAM

A glimpse of green credit programs

Proponents	Amount	Intended customers	Participants	Results
State Bank of Vietnam (SBV)	Approximately USD100m	SMEs with green projects	Vietcombank, BIDV, Agribank and Sacombank	• 26 projects: renewable energy, waste management and organic agriculture • The interest rates applicable to SMEs is 1%–3% lower than market interest rates • Banks participating in the program are refinanced from SBV at interest rates 1% lower than usual
Agribank and Vietnam Development Bank (VDB)	60% of the required capital (about USD18m)	Solar Power Plant TTC Phong Dien in Hue province	Agribank and Vietnam Development Bank	• Construction was from 2017 to 2018 • Agribank Thua Thien-Hue and Agribank Gia Lai branches will finance 30% of the total investment, while VDB Thua Thien-Hue and VDB Quang Tri will cover the rest
Vietcombank and Japan International Cooperation Bank (JICB)	USD200m	Solar and wind power projects in Vietnam	Vietcombank and Japan international Cooperation Bank	Limited results so far, as the cooperation agreement between Vietcombank and JICB was signed in May 2019
Agribank and Central Power Corporation (EVNCPC)	VND735bn	Central Power Solar Project in Khanh Hoa province	Agribank	The power plant was completed and put into operation in late May 2019

The focus is on small and medium-sized enterprises (SMEs), and solar and wind power plants. **The buildings sector is yet to attract any significant green funds**

Source: Davidson et al., 2020

INDONESIA

Case example: Green and affordable housing program

- Supported by the International Finance Corporation (IFC), the Ministry of Housing and Public Works aims to build 10,000 new houses with green certification across Sumatra, Java and Sulawesi (Indonesia's most populous islands) by 2024. This is part of IFC's Excellence in Design for Greater Efficiencies (EDGE) initiative, focusing on renewable energy and waste management for buildings
- The initiative provides grants for assessment based on climatic conditions, usage patterns, technology, and typical buildings in a given area to demonstrate the amount of energy and water savings achievable by implementing sustainable technologies
- The grants fund the assessment costs to calculate the savings and financing needs for green buildings. However, there is room to improve the deployment of grant-based instruments. First, data accuracy in relation to results-based grants remains a challenge, especially in generating evidence-based energy performance. Second, there is a lack of awareness of available grant facilities for green buildings, and a lack of understanding of the best options to use such grants

Source: Purnomo et al., 2024

Image source: https://ruangkantorku.com/ruang-kantor/altira-office-tower-sunter-jakarta-utara/

INDONESIA

Case example: Intervention by Central Bank

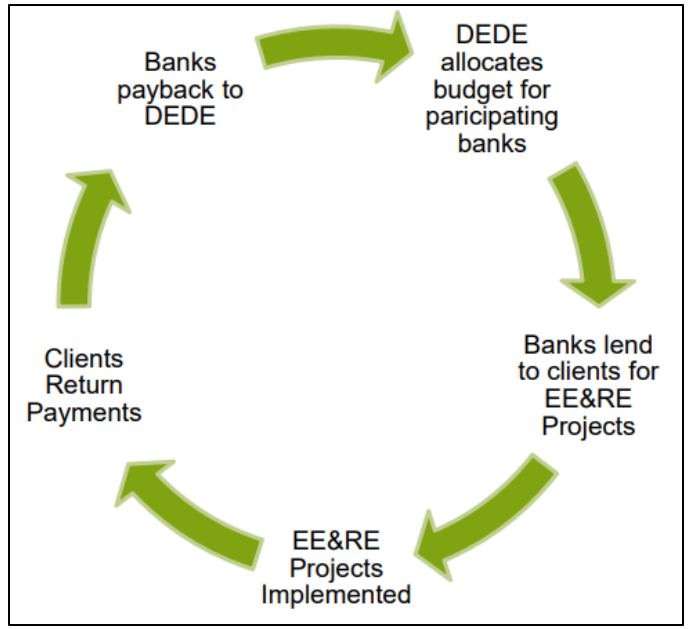
- The Indonesian Financial Services Authority (OJK) and the Central Bank of Indonesia have created a sustainable finance roadmap aimed at increasing green finance portfolios, including for buildings. This is designed to support banks in financing green buildings in their portfolios and also greening their own operations, including their office buildings. This regulation can support the development of the green building sector in major cities like Jakarta, where large commercial banks have started applying green standards in their office buildings
- The OJK Sustainable Finance Roadmap, adopted in 2021, contains guidance and policy directions for sustainable finance development in Indonesia, and is a realization of cooperation between OJK and the government, particularly the Ministry of Environment and Forestry. The objectives are to:
  - Ensure financial institutions operate sustainably, by obligating them to report emissions reductions pertaining to energy consumption as part of their annual mandatory sustainability reporting. This mandate, enforced under POJK 51/2017 has triggered major banks to invest in green building retrofit projects and invest in energy efficiency
  - Encourage capital market participants to raise funds through green-labeled instruments, regulated under POJK 60/2017. The OJK includes green buildings as among the projects eligible to access funds from green bond issuance. The OJK also provides clear regulations for local governments to issue municipal bonds

Source: Purnomo et al., 2024

THAILAND

Case example: Energy efficiency (EE) revolving fund for banks

- Launched in 2003, the general principle of the EE Revolving Fund (EERF) is that the revenue generated via repaid loans is made available for issuing new loans – hence the term revolving. This fund structure is sustainable in that it ensures a consistent inflow and outflow of monies for funding EE measures
- The EERF started as a partnership between the government and six participating banks (PBs), which later expanded to 11 banks. The EERF is managed by the Planning Division of the Department of Alternative Energy Development and Efficiency (DEDE)
- Initially, the EERF provided PBs with zero interest credit lines to jumpstart projects. When financing higher-volume projects, PBs used their own funds and mixed accordingly. The interest was subsequently set at 0.5% to cover administrative costs. Interest for on-lending to borrowers was set at a ceiling of 4% per annum. Although many of the PB borrowers requested higher amounts, the maximum loan amount was THB50 million (~USD1.4 million) per project in order to fund as many medium-sized projects as possible
- During 2003–2011, the EERF financed 294 projects totaling THB15,959 million (with THB7,232 million from the EERF and THB8,727 million from commercial banks). The impact assessment indicated reduction in oil imports of 320 KTOE/year and GHG emissions reduction of 0.98 million tCO_2eq.



Source: Grüning, 2012

POLICY INTERVENTIONS

Case example: Green building code implementation in Columbia

- In 2015, the Colombian government enacted the first mandatory green building code in Latin America. This includes minimum requirements for the construction of new residential and commercial buildings aimed at ensuring lower energy and resource consumption than conventional buildings. By establishing clear direction for public policy, the government raised awareness in the industry and successfully unleashed a wave of private sector investment in green buildings totaling USD9 billion to date, according to IFC estimates
- Policies included tax incentives for green technologies and certified green projects. This enabling environment gave banks confidence to launch green construction finance and green mortgages. In 2016, Bancolombia became the first bank in Latin America to finance green buildings by raising USD400 million in three bond issuances. In 2017, the Colombian Chamber of Construction (CAMACOL) started an aggressive educational program with its members to promote EDGE certification. By 2021, five banks were offering green building finance products—mainly green mortgages: Bancolombia, Davivienda, BBVA, Banco Bogotá and Caja Social
- In 2021, about 20% of Colombian new construction was certified as green, from virtually no green buildings in 2017. CAMACOL is now pushing members toward zero-carbon construction. Banks meanwhile are increasing their product offerings for green construction: BBVA, for instance, plans to launch preferential financing for EDGE Advanced buildings (higher resource efficiency)

Source: International Finance Corporation, 2023

GREEN CONSTRUCTION FINANCE

Case example: Concessional finance in Costa Rica

- In 2016, Costa Rican bank, Banco Promerica, obtained a USD30 million loan from the Dutch development bank, FMO, to launch a green construction finance and green mortgage program. Before the bank could launch a green mortgage program, it had to build a sufficient pipeline of certified green properties
- To incentivize developers to build green, the bank offered a discount on green construction finance. It charged 8.75% (instead of 9.25%), offered a 0.75% front-end fee (instead of 1%), and provided a four-year term (instead of three years). Depending on the project, the discount on the front-end fee covered most of the cost of the upfront requirement of green certification
- Promerica succeeded in building a sufficient supply of green properties to start offering green mortgages. It offered qualifying home buyers a 30-year fixed rate that was slightly higher than the market rate for 30-year variable-rate mortgages in the country. It aims to expand its mortgage portfolio, which is currently 10% of its business. To finance this expansion, the bank plans to securitize its green mortgage portfolio once it reaches USD20 million to USD30 million in size

Source: International Finance Corporation, 2019

LOW CARBON BUILDING FINANCING

Barriers

Financial Barriers

- Lack of access to affordable finance
- Lack of awareness of funding options
- Limited supply of dedicated financing instruments
- Inability to pay for upfront costs

Regulatory Barriers

- Lack of building regulation support
- Lack of technology standards
- Long processes for application of permits and access to land
- Social risk and community opposition

Market Barriers

- Limited experience with technical solutions
- Lack of expertise and skills
- Limited technical product supply

Investment Risk and Opportunity Barriers

- Asset class has insufficient project scale
- Higher investment costs compared to alternatives
- Long payback on investment
- Perceived technical performance risk
- Split incentive between landlords and tenants
- Low priority investment
- Lack of awareness and appropriate information on opportunity
- Lack of performance data
- High or uncertain maintenance and operation costs

Source: Purnomo et al., 2024

LOW CARBON BUILDING FINANCING

Opportunities for innovation in government policies

- Low carbon buildings are expected to be 5%–10% more expensive than conventional buildings
- The three main stakeholders involved in monetary transactions in the building sector are: (i) developers and builders; (ii) banks and financial institutes; and (iii) buyers. Banks and financial institutes are unlikely to have any issues in giving a 5%–10% higher loans to credit worthy developers and builders for low carbon buildings. However, the developers and builders need to be convinced that buyers will pay a higher price for the green features. There is a need for well-publicized demonstration projects in different parts of the country of low carbon commercial and residential buildings that can convince all stakeholders of the benefits of low carbon buildings. A compendium of recommended measures to make buildings compliant should be made available to developers, builders and architects
- Governments should consider policy initiatives to enable urban local bodies (ULBs) to provide higher 'floor area ratio' (FAR) (permissible total built-up area divided by the total area of the plot) as an incentive to developers and builders to compensate for the 5%–10% higher investment. This may enable builders to sell their low carbon buildings at the same price as conventional buildings. Higher FAR incentive can be very transformative, motivating more developers and builders to move away from constructing conventional buildings to low carbon buildings. Higher FAR will also enable ULBs to generate more revenue from building owners through property taxes
- Governments can reduce property registration duty for low carbon buildings as an incentive for property buyers. Since property registration duties constitute a significant portion of the total property cost, offering a discount can serve as a powerful motivator for property buyers to shift to low carbon buildings

LOW CARBON BUILDING FINANCING

Opportunities for policy interventions by central banks and government

- Unless green loans are available to developers, builders and property buyers as a standard product through normal banking channels, it is difficult to envisage proliferation of low carbon buildings on the scale required to achieve climate goals. Real scale-up may happen if all major banks offer concessional green loans and mortgages as standard off-the-shelf products to builders and developers. Access to blended finance can help ensure the competitiveness of these innovative loan and mortgage products
- Central banks should treat energy efficient green buildings as a priority sector for concessional loans, in the same way as it treats micro, small and medium-sized enterprises. A directive from central banks to commercial banks can help evolve options for green loans and mortgages in all major banks. This can also make banks active marketing agents for promoting energy efficient green buildings with developers and builders being presented with both options when they approach banks for credits and loans
- Central banks should explore the possibility of government-sponsored Super ESCOs offering a package along with loans from banks and financial institutes to cover additional investment of 5%–10% in low carbon buildings. The empaneled energy auditors (under the Super ESCO) can provide technical support and confirm the implementation of recommended measures for low carbon buildings
- Governments must work toward strict enforcement of energy efficiency and green building codes for all new constructions and promote retrofits in existing buildings, using carrot and stick policies with incentives and disincentives. Urban local bodies (ULBs) should make energy efficiency and green building features mandatory before approval of construction plans, and competent juries will have to be appointed in ULBs

Thank you!

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ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy | PROJECT

4.2 ESCO Business Models

November 2024

ASEAN CENTRE FOR ENERGY ACE

EESL

HEAT

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WHAT WILL YOU LEARN?

01 Concept of Energy Saving Companies (ESCOs)

02 ESCO Market Potential in the Building Sector

03 ESCO Business Models

04 Energy Performance Contract

05 Demand Aggregation and Bulk Procurement

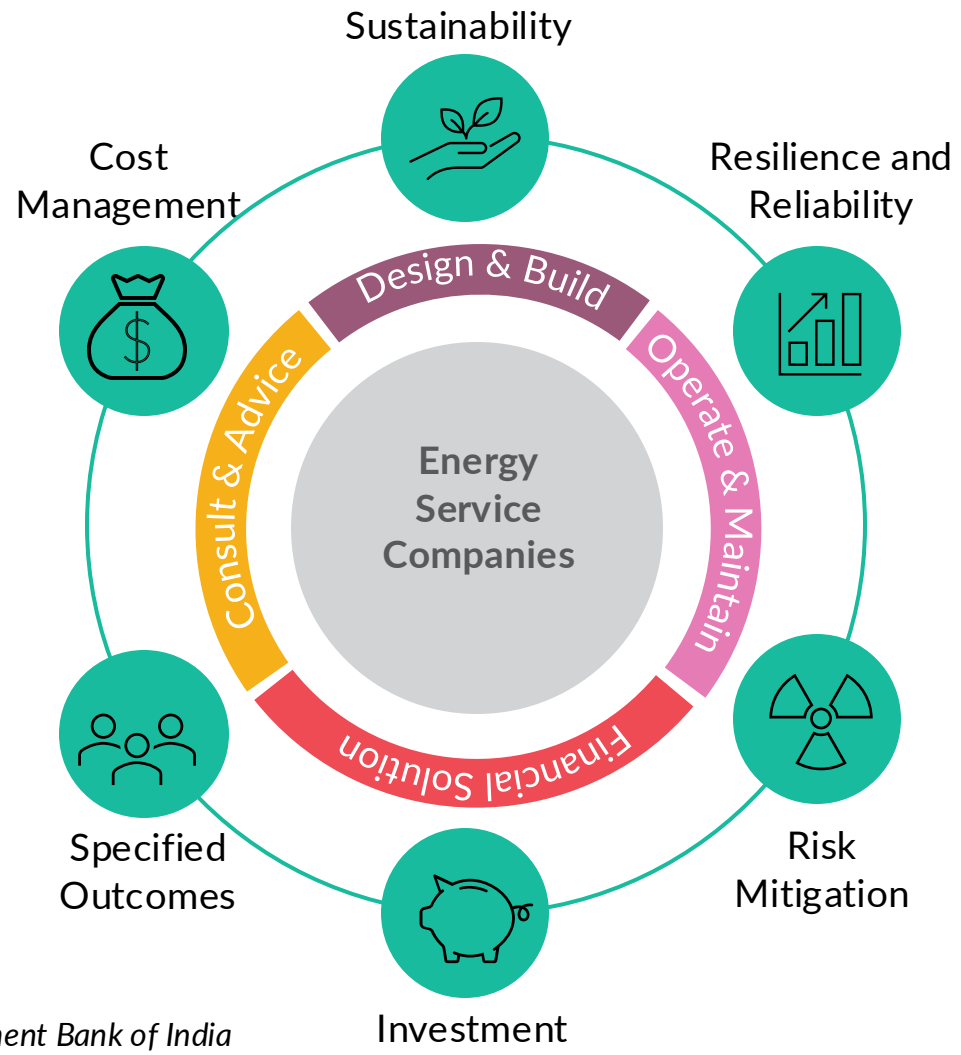
06 Case Studies on ESCO Projects

07 Opportunities, Challenges and Risks

ENERGY SERVICE COMPANIES

ESCOs: The concept and operating principles

- Energy service companies (ESCOs) develop, design, build and arrange financing for projects that save energy, reduce energy costs, and decrease operations and maintenance costs at their customers' facilities
- In general, ESCOs act as project developers for a comprehensive range of energy conservation measures and assume the technical and performance risks associated with a project
- ESCOs are distinguished from other firms that offer energy efficiency improvements in that they use the performance-based contracting methodology. When an ESCO implements a project, the company's compensation is directly linked to the actual energy cost savings
- The substantial energy efficiency retrofits and renewable energy technologies inherent in energy savings performance contract (ESPC) projects typically require a large initial capital investment and may have a relatively long payback period. Debt payments are tied to the energy cost savings guaranteed for the project, so the agency pays for the capital improvements of the ESPC project with the money saved by the project



Source: Small Industries Development Bank of India

MARKET POTENTIAL

For energy efficiency in buildings in Southeast Asia

- The percentage of primary energy used in buildings is estimated to be 37% in Cambodia, 38% in Indonesia, 15% in Thailand and 22% in Vietnam, which is an indicator of the market potential for energy efficiency improvement in buildings
- Like other markets around the world, the ESCO industry is still nascent across ASEAN countries. Many ESCOs suffer from a lack of scale and balance sheet strength, and a lack of contractual confidence for their services, such that many financially viable energy efficiency projects do not get financed
- Vietnam is proposing that the Vietnam Electricity (EVN) be made a Super ESCO
- Cambodia is in the process of discussions for developing a legal and regulatory framework for ESCOs

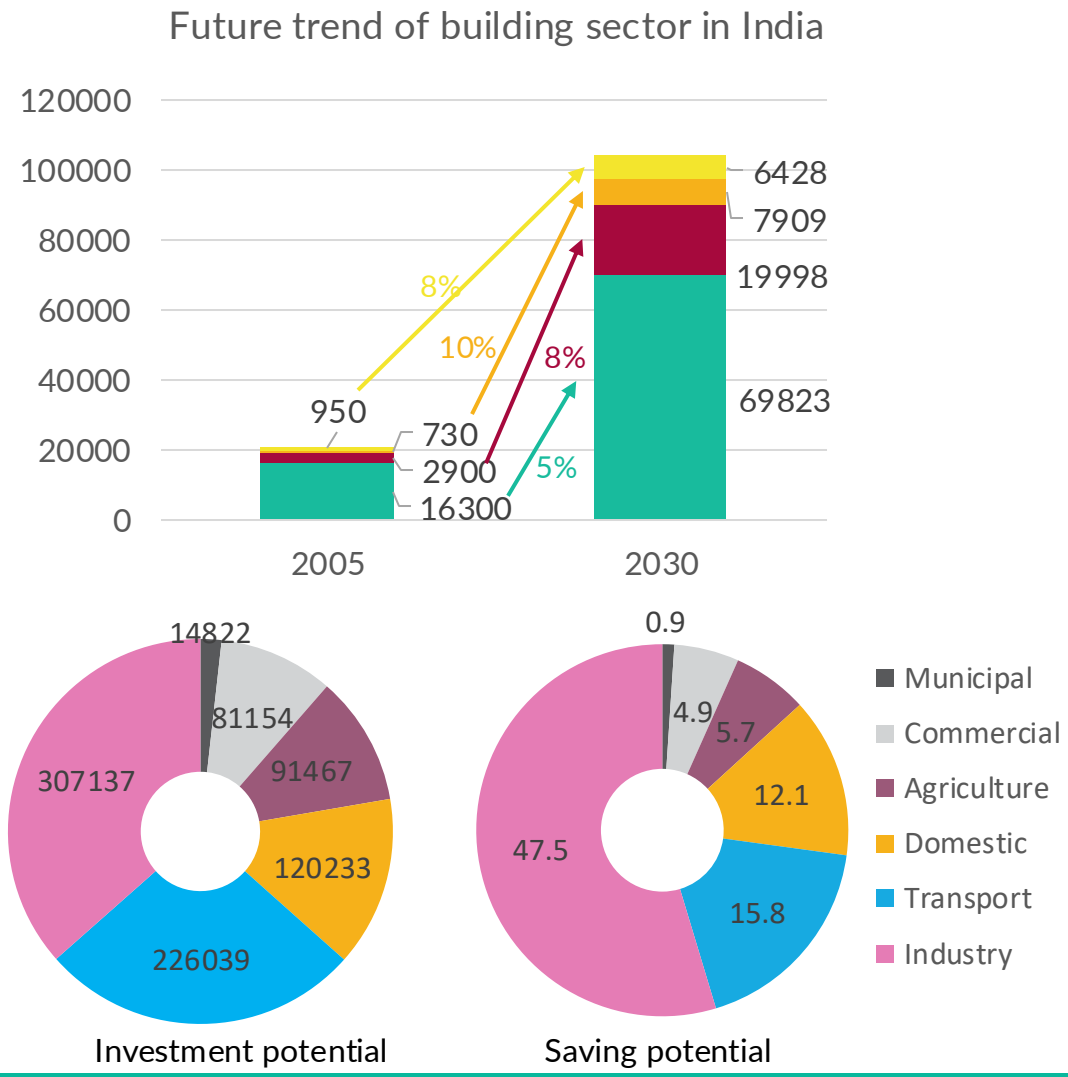
Country	Population '000s (2019)	Total final energy consumption Mtoe (2019)	Energy use per capita toe (2019)	% of primary energy used in buildings
Cambodia	16,250	6.6	0.4	37%
Indonesia	270,626	174.0	0.6	38%
Thailand	69,428	98.9	1.4	15%
Vietnam	95,545	64.1	0.7	22%

Source: Lister et al., 2020

MARKET POTENTIAL

For energy efficiency in buildings in India

- In 2019–2020, the primary energy demand was 810 Mtoe. The estimated energy saving potential is 47.5 Mtoe and 80 billion kWh of electricity
- The EE investment potential is estimated to be USD73 billion by 2031
- The overall constructed area is expected to increase by about 5 times from 21 billion square feet (2005) to approximately 104 billion square feet by 2030 at a CAGR between 5% and 10%
- Building energy consumption accounts for over 30% of electrical energy consumption in the country and is rising annually at 8%
- The ESCO ecosystem in India has received a boost due to the proactive measures of the government. However, it is yet to mature into a preferred option for financing of energy efficiency projects

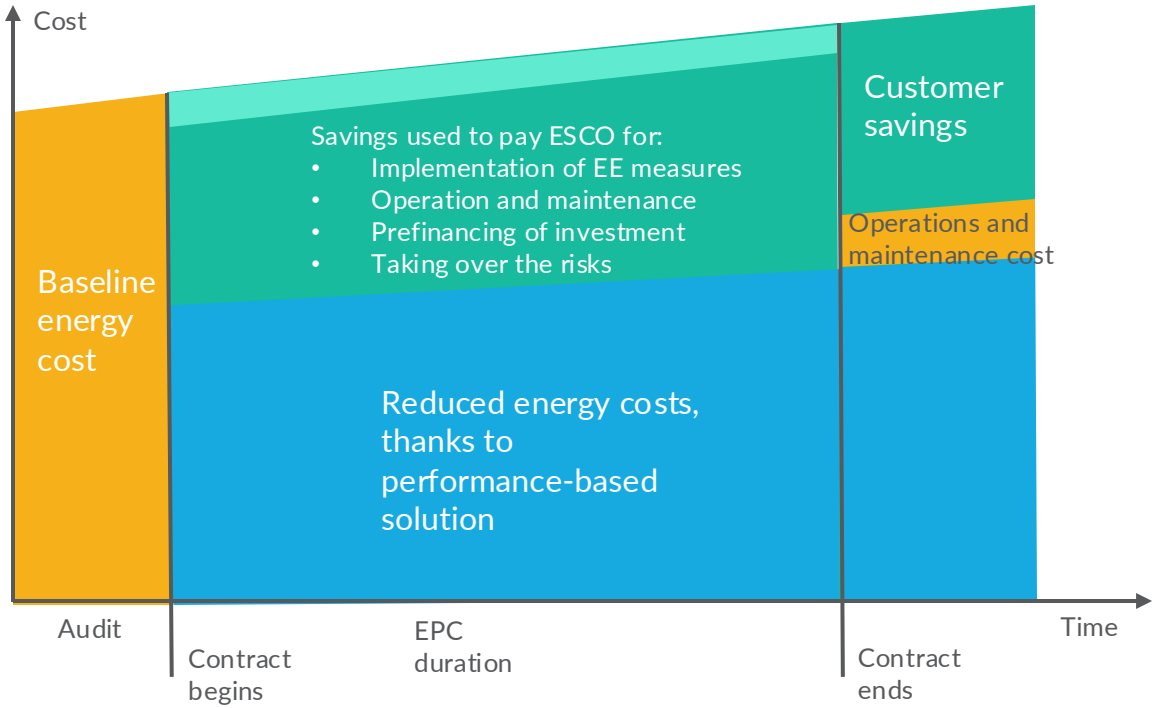


Sources: Garnaik, 2023; Energy Efficiency Services Limited

ESCO CONTRACT

Energy performance contract models

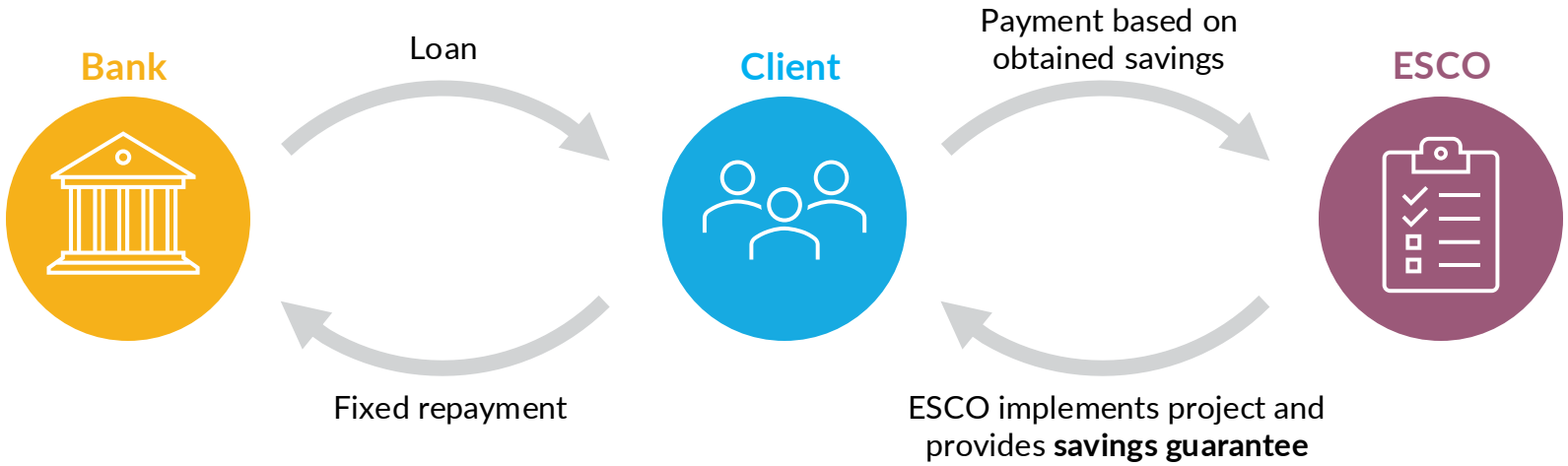
- Most agreements between customers and ESCOs are underpinned by energy performance contracts (EPCs). The EPC commits the ESCO to installing the necessary equipment, provides a performance guarantee and establishes the terms of any upfront or ongoing payments, which are intended to be less than the financial savings realized by the project. The two most common types of EPCs are: (i) guaranteed savings model or (ii) shared savings model
- The EPC provides the customer with a guaranteed level of energy savings and the ESCO with a reliable source of revenue. EPCs typically last from two to 20 years, depending on the measures implemented. Depending on the customer's preference and access to capital, the customer, the ESCO, or a combination of the two can be responsible for securing the finance for the project. A direct loan agreement with a third-party lender is an option for both parties



Source: International Energy Agency

ESCO CONTRACT

Guaranteed savings model

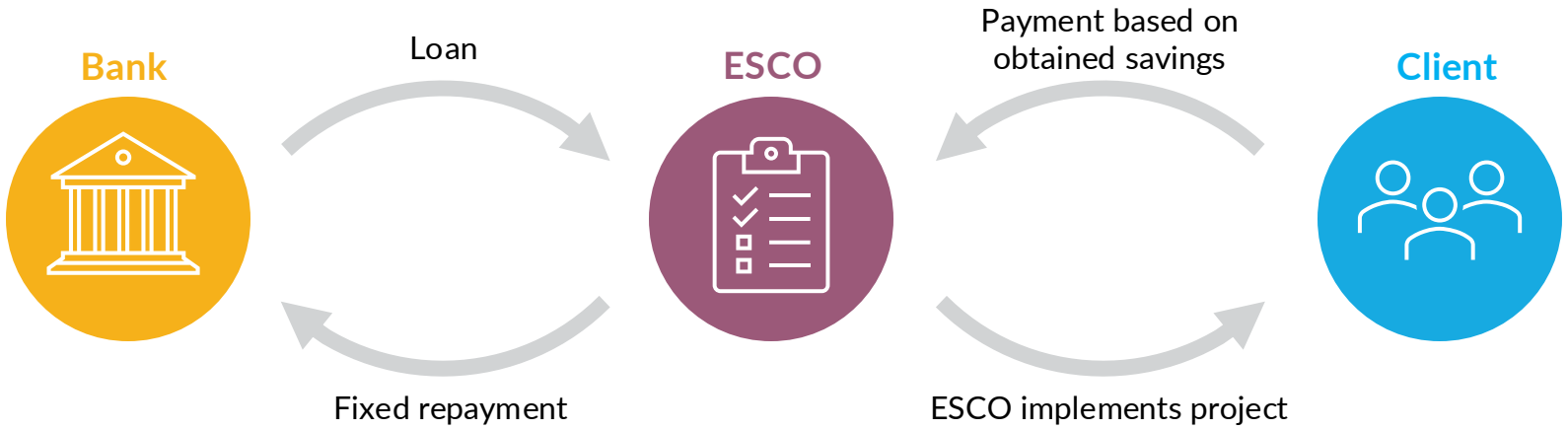


The ESCO takes on the technical risk. The client obtains a bank loan, or uses their own equity, to pay contractually-determined fees to the ESCO and the bank and keeps the difference

Source: International Energy Agency

ESCO CONTRACT

Shared savings model



The ESCO can provide financing, as well as project development and implementation costs, with the energy savings shared between the ESCO and the client over the contract period. This model requires the ESCO to have the capacity to borrow and to have projects with revenue streams that will ensure the loans can be repaid

Source: International Energy Agency

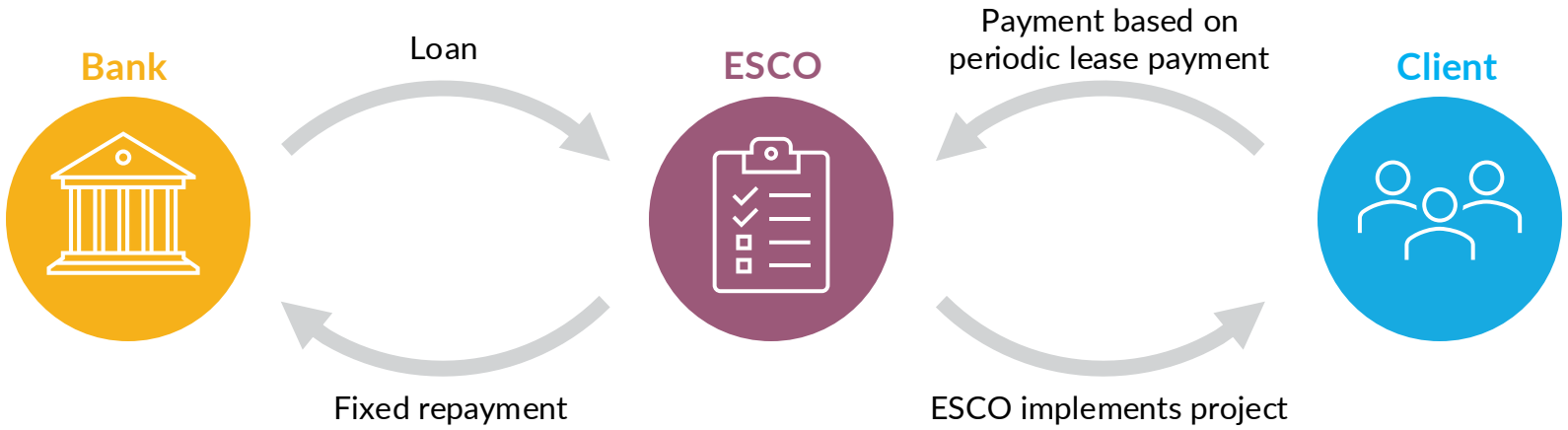
ESCO CONTRACT

Energy supply contracting or service model

The ESCO can provide financing, as well as project development and implementation costs, with the ESCO receiving payment for 'per unit' service delivered to the client over the contract period. This model requires the ESCO to have the capacity to borrow and to have projects with revenue streams that will ensure the loans can be repaid

ESCO CONTRACT

Leasing and purchase model



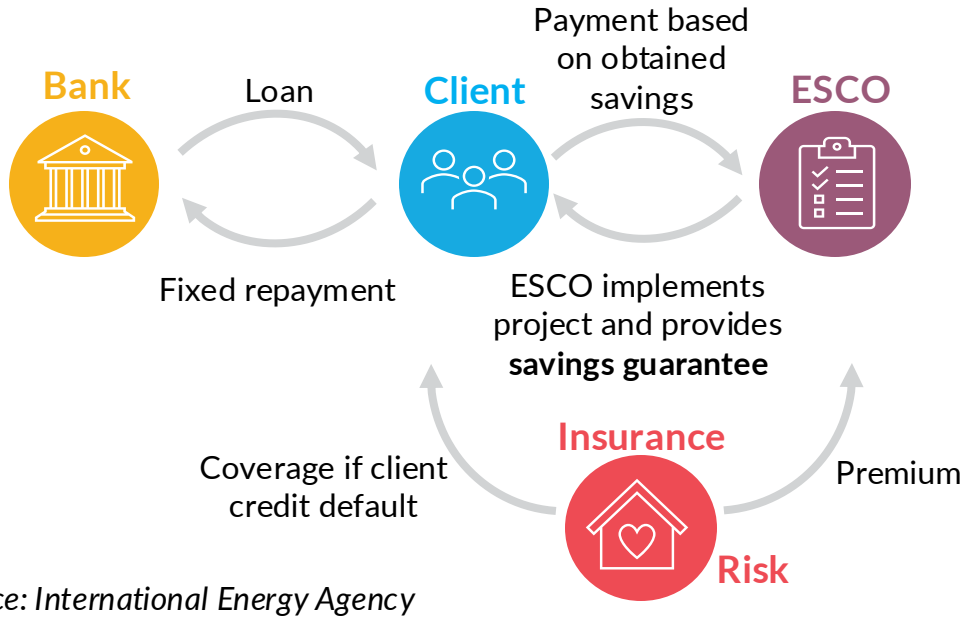
The ESCO can provide financing, as well as project development and implementation costs, with the ESCO leasing the equipment to the client and receiving periodic lease payment from the client over the contract period. At the end of contract period, the client buys the equipment

Source: Wijaya et al., 2021

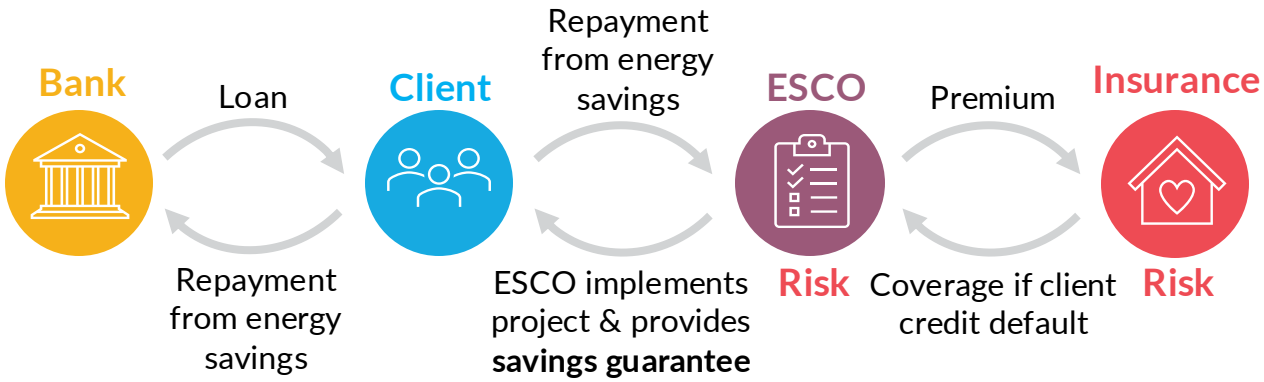
ESCO CONTRACT

Energy savings insurance and credit risk guarantee

Uncertainty associated with the performance of efficiency measures inhibits third-party energy efficiency financing globally. In response, energy savings insurance has emerged as a solution offered by a small number of financial institutions, private companies and insurance companies, to reduce the risk of an energy efficiency project



Source: International Energy Agency



Typically, there are two types of insurance packages offered by insurers – technical and credit:

- In the technical package, the insurance provider covers the ESCO or technology provider in the event that promised energy savings are not achieved, assuming the technical risk associated with efficiency projects
- In the credit package, the insurance provider assumes the credit risk of a project, thereby ensuring that repayments owing to the ESCO can continue to be made, in the case of customer credit default

ESCO REPAYMENT MODELS

Popular models

- **Upfront payment model**: This is the common 'sales model' where 100% payment is received by the ESCO from the end-user after supply of the technology. This model works if the ESCO offered price is less than the retail market price for the same technology (due to bulk procurement by the ESCO)
- **On-bill financing (OBF) model**: The consumer pays the ESCO through equated monthly instalments (EMIs), thus, reducing the upfront payment burden for the end-user. The EMIs are usually collected by electricity utility (distribution) companies through their monthly electricity bills on behalf of the ESCO through an agreement between the ESCO and the utility. The OBF model may require necessary approvals from country's regulatory authorities. The OBF is attractive when the EMI is less than the energy cost saving
- **Pay-as-you-save (PAYS) model**: The entire upfront investment of the project cost is borne by the ESCO. The project investment cost is recovered from the end-user in suitable instalments through a deemed energy saving approach. To ensure the repayment by the end-user, an ESCROW account is maintained, or alternatively a bank guarantee is taken
- **Engineering, procurement and commissioning (EPC) model**: The ESCO takes the responsibility of project design, procurement and commissioning of the project and gets 80%–90% of the project cost (technology cost and project management fees) after commissioning; and the balance is paid during the warranty period
- **Service model**: The ESCO charges a 'per unit' price of the delivered service (like electricity, steam, chilled water, electric vehicle, smart meter etc.). To ensure regular periodic repayment, the end-user is required to open an ESCROW account to be replenished by the client

M&V PROTOCOL

Quantification of energy cost savings

- The quantification of energy saving is important for success of the ESCO model. In the shared savings model, any disagreements between the client and ESCO on the quantum of savings will lead to failure of the model
- A measurement and verification (M&V) protocol is imperative for success of the ESCO model and should be part of the energy savings performance contract (ESPC)
- The M&V protocol should be simple and transparent, avoiding complex empirical calculations and assumptions
- Quantification based on measurements by site instrumentation is encouraged, although it may increase the initial cost of the project
- Any subjective corrections in the quantified energy savings and cost values should be by mutual agreement and be a part of the ESPC
- An independent verifier is encouraged to quantify the saving as per the M&V protocol

DEEMED SAVING APPROACH

Avoids the need for an M&V protocol

- A deemed saving approach, in which a fixed savings is agreed upon, irrespective of the utilization of the equipment, is a simple method, which can be adopted for standard, reliable technologies like energy efficient appliances
- In this approach, the quantum of energy savings is agreed upon based on previous test results following procedures recommended by equipment standards or star rating schemes for equipment, and assumed realistic operating hours
- The deemed saving approach is useful for mass promotion of energy efficient products as the end-user knows the fixed periodic payouts that must be made to the ESCO
- The deemed saving approach is also useful for the ESCO to explore demand aggregation and mass procurement of energy efficient products to reduce the cost of technology to the end-user

REDUCING COST OF TECHNOLGY

Demand aggregation and bulk procurement

- Affordability of proven and reliable technologies is key to generating market demand for energy efficient products
- Demand aggregation and bulk procurement have proven to reduce the cost of standard energy efficient technologies and enable speedy market transformation. They also have the potential to create a huge supply chain of the products and provide job opportunities
- The following are some of the attributes of successful demand aggregation and bulk procurement programs:
  - **Government ownership**: Governments can announce consumer-centric schemes for mass promotion of energy efficient products through public outreach programs with time-bound milestones and targets
  - **Promotion of standard technologies**: Standard and reliable technologies that can be promoted without the need for monitoring and verification, such as LED lamps, BLDC fans and air conditioners, are suitable
  - **Bulk procurement**: Public energy utilities or government-sponsored Super ESCOs are preferable for implementing the program through ESCO or non-ESCO models. Multiple suppliers are desirable to maintain price competitiveness and reliability of supplies. A fair assessment of the market demand is important to avoid being overburdened with unsold inventory

ESCO PROJECT IN HOTELS

Case example: Heat pumps for hot and chilled water

- In a reputed luxury hotel chain in India, water chillers operating at 7°C were being used for room cooling, and diesel-fired boilers were being used for generating hot water at 55°C for bathing, laundry and kitchen use
- The installation of eight heat pumps of differing capacities in four hotels on an ESCO basis led to the decommissioning of diesel-fired boilers and simultaneous reduction in load on the water chillers used for air conditioning
- The total annual energy cost savings were USD192,000 per year
- The total investment for the heat pumps were USD311,000
- The economics of heat pumps will vary at different locations, depending on the relative price of fuels and electricity

Heat pumps

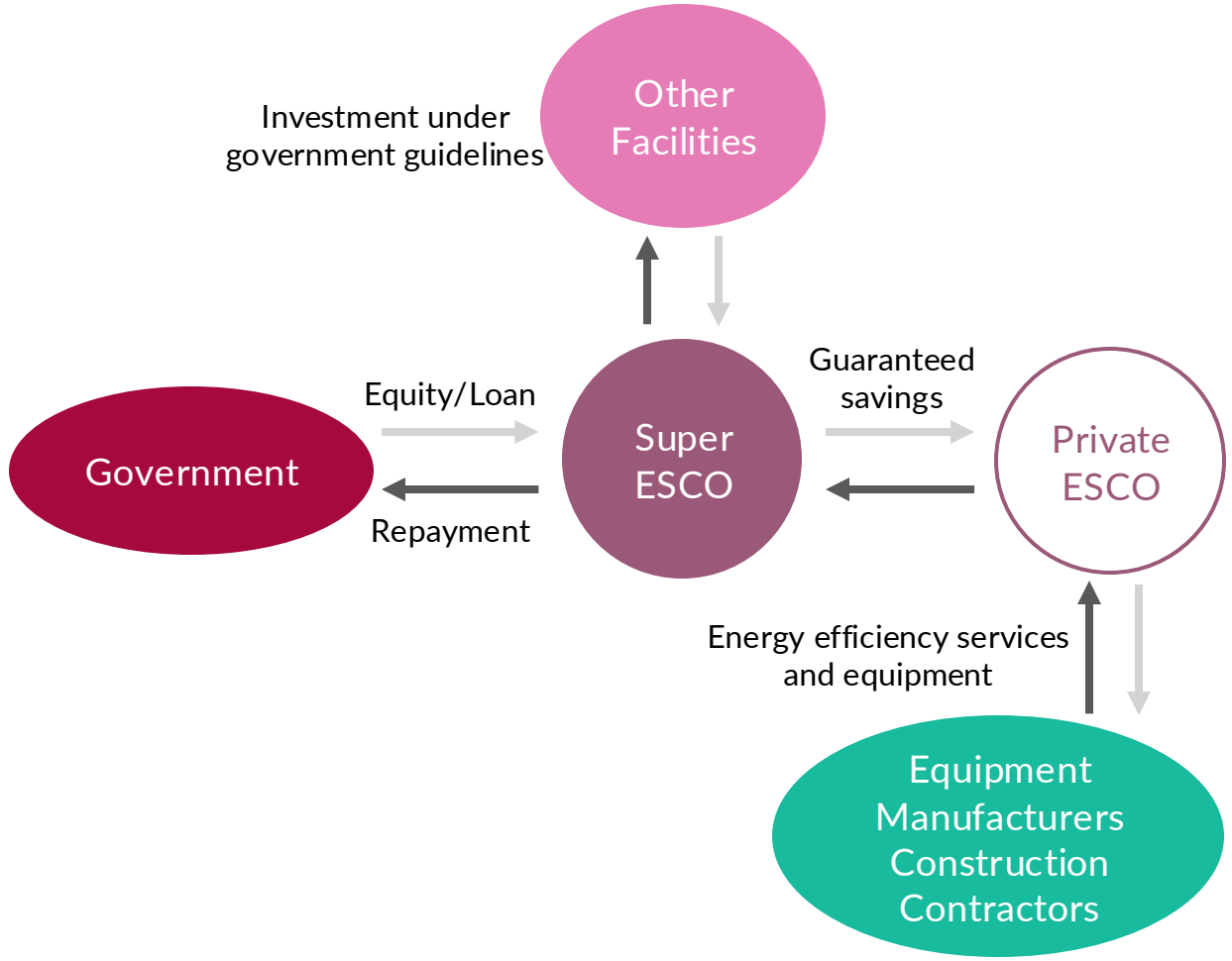
Associated storage tanks for hot and chilled water

Source: SEE-Tech Solutions, Nagpur, India

SUPER ESCOs

Government-sponsored entities

- Super ESCOs are governmental entities created to serve the public sector, develop the capacity of private ESCOs and facilitate project financing
- Super ESCOs are useful because existing programs designed to engage clients with ESCOs, such as energy audits programs, rebates, direct install programs, demand side management bidding or standard offer approach, rarely provide the full amount of funding required to cover implementation costs such as engineering, procurement and installation costs
- Clients may have the means to finance energy efficiency projects, but experience has shown that energy efficiency projects are not an imperative investment priority for many businesses. Easing access to external financing increases EE project implementation rate



Sources: International Energy Agency; Lütken et al., 2024

SUPER ESCOs

Initiatives around the globe

The US Federal Energy Management Program (FEMP)

Initiated in the 1990s, it is one of the earliest examples of a public institutional model close to the Super ESCO concept. The FEMP promotes energy efficiency and the use of renewable energy resources at federal sites

India's Energy Efficiency Services Limited (EESL)

EESL, led by the Ministry of Power, Government of India, was established in 2009 to implement large-scale energy efficiency programs in India under the National Mission on Enhanced Energy Efficiency (NMEEE) through innovative business models. EESL has completed building energy efficiency projects in 10,344 buildings, including railway stations. EESL has so far saved over 50 billion kWh of electricity in India. EESL also has a presence in Bangladesh, Malaysia, Myanmar, Thailand and Vietnam

Saudi Arabia's National Energy Services Company (NESCO)

Saudi Arabia's Public Investment Fund created the National Energy Services Company (NESCO), also known as Tarshid, in October 2017, with an initial capitalization of over USD500 million to increase the energy efficiency of government and public buildings, public streetlighting, etc.

Croatia's HEP ESCO

The World Bank supported the creation of the HEP ESCO within Hrvatska Elektroprivreda d.d. (HEP is the national power utility). The objective is to develop, finance and implement energy efficiency projects on a commercial, for-profit basis, using local businesses as key delivery agents. A niche market has been established in Croatia for financing energy efficiency projects in public buildings of local authorities (administration buildings, schools, etc.), hospitals and universities, and streetlighting

SUPER ESCOs

Initiatives around the globe (continued)

Belgium's FEDESCO:
FEDESCO is a 100% subsidiary of the Federal Participation and Investment Corporation, founded in 2005, to facilitate and finance energy efficiency projects in federal government buildings throughout Belgium. With a capital investment of EUR6.5 million and an additional EUR10 million in state guarantees, FEDESCO implements projects exclusively with the Federal Building Agency and enters into EPC contracts with public facilities without competition, using either internal funds or financing from commercial banks (with a state guarantee)

United Arab Emirates' Etihad ESCO:
Etihad ESCO was established in 2013 by the Dubai Electricity and Water Authority as a Super ESCO to make Dubai's built environment a leading example of energy efficiency for the region and the world. Etihad ESCO aims to develop energy efficiency projects targeting more than 30,000 buildings in Dubai with a goal of 1.7 TWh in energy savings by 2030. Etihad ESCO is fostering a viable ESPC market for ESCOs by executing building retrofits, increasing the penetration of district cooling, building the capacity of local ESCOs and facilitating access to project finance

Super ESCO of India

EESL's Success Story

ENERGY EFFICIENCY MARKET IN INDIA

Unlocking national potential for energy efficiency (UNNATEE)

Primary Energy Demand

810 million toe (2019-20)

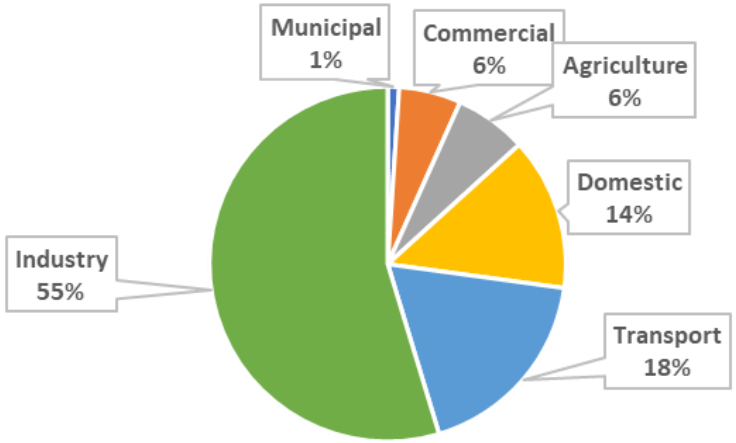
Energy Saving Potential

47.5 million toe and **89** billion units of electricity by 2031

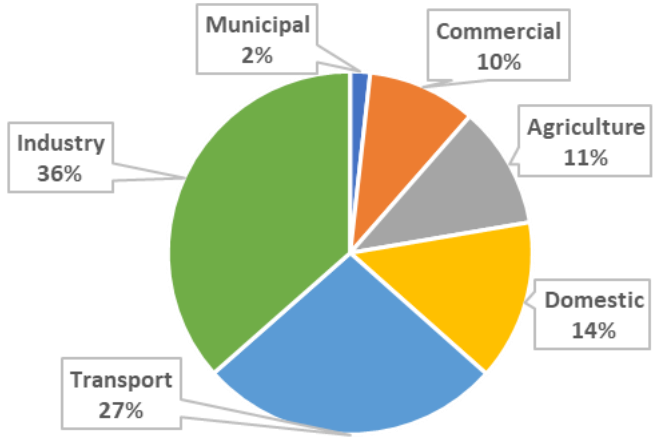
EE Investment Potential

73 billion USD by 2031

Saving Potential

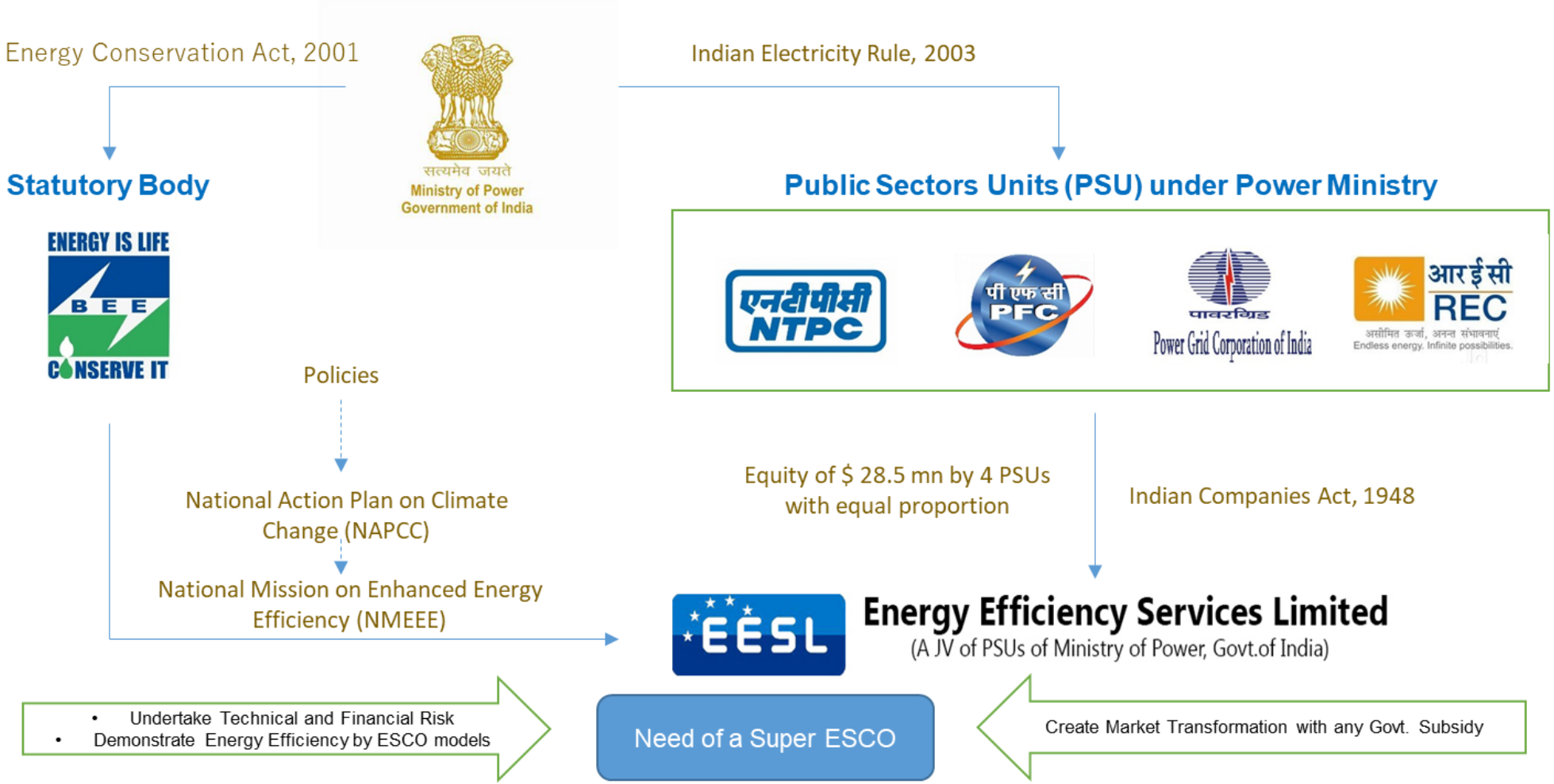


Investment Potential



INCEPTION OF EESL

Year 2009



INDIA'S SUPER ESCO

EESL's achievements (as of April 2023)

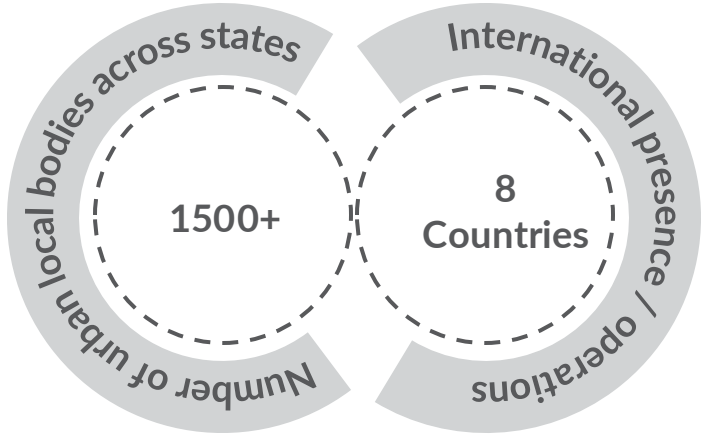
Founded in 2009, under the National Mission on Enhanced Efficiency (NMEEE)

India's Super ESCO

Estimated monetary savings of over

USD 2,800 million

Joint venture of 4 public sector enterprises and the Ministry of Power, Government of India



Estimated energy savings from EESL's interventions

54 billion kWh

per year with avoided peak demand of 10,740 MW

Estimated carbon footprint reduction

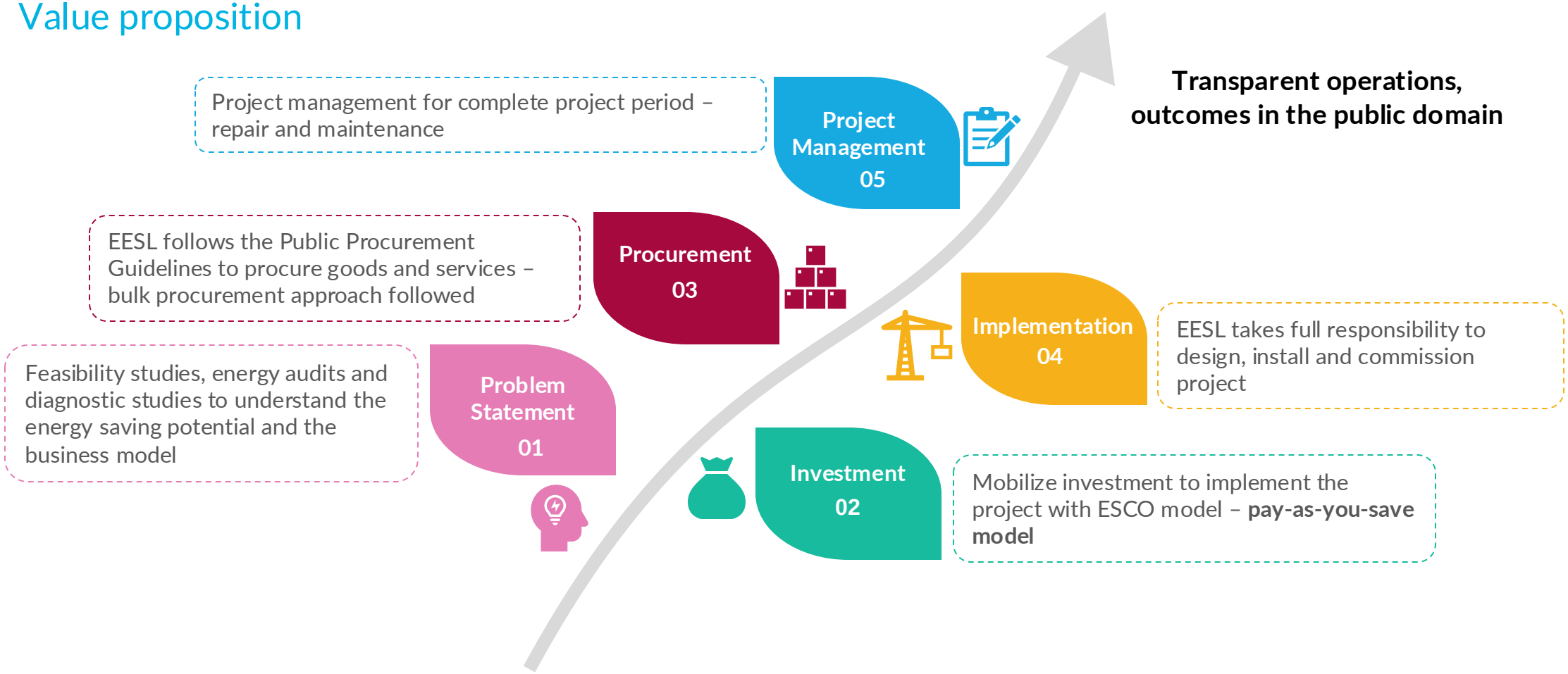
44 million ton

of CO_2 per year

Source: Garnaik, 2023

EESL, INDIA

Value proposition

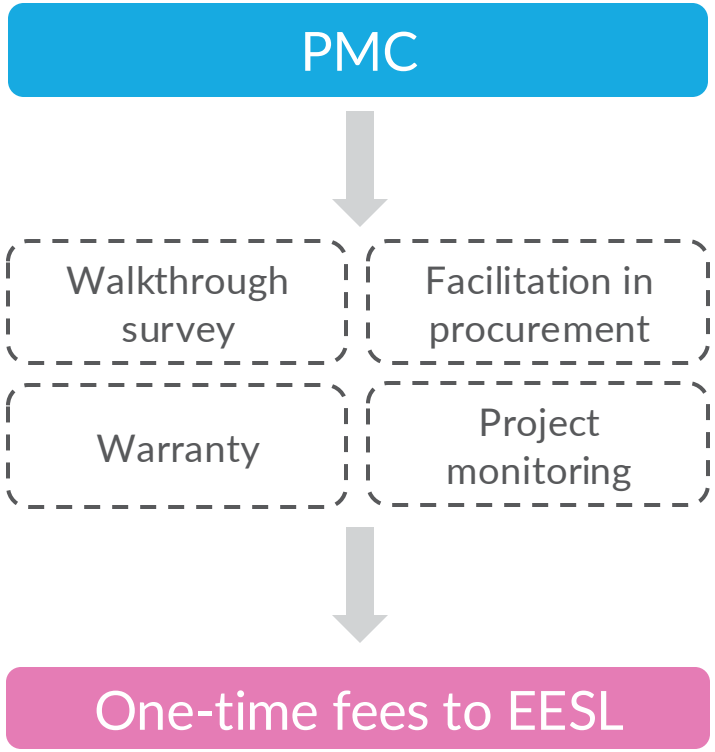


Source: Garnaik, 2023

EESL'S BUSINESS MODELS

Model 1: Project management cost (PMC) model, investment by client

- Clients express interest to purchase a particular energy saving equipment
- EESL aggregates the demand from many clients and negotiates a discounted price from reputed vendors
- EESL facilitates procurement and deployment of the equipment
- Clients pay 100% upfront cost with additional 10%–12% as EESL's PMC cost
- Warranty period is typically 3 to 5 years
- Typically, this model is used for demand aggregation, procurement and deployment of LED lights, fans, electric motors and unitary air conditioners

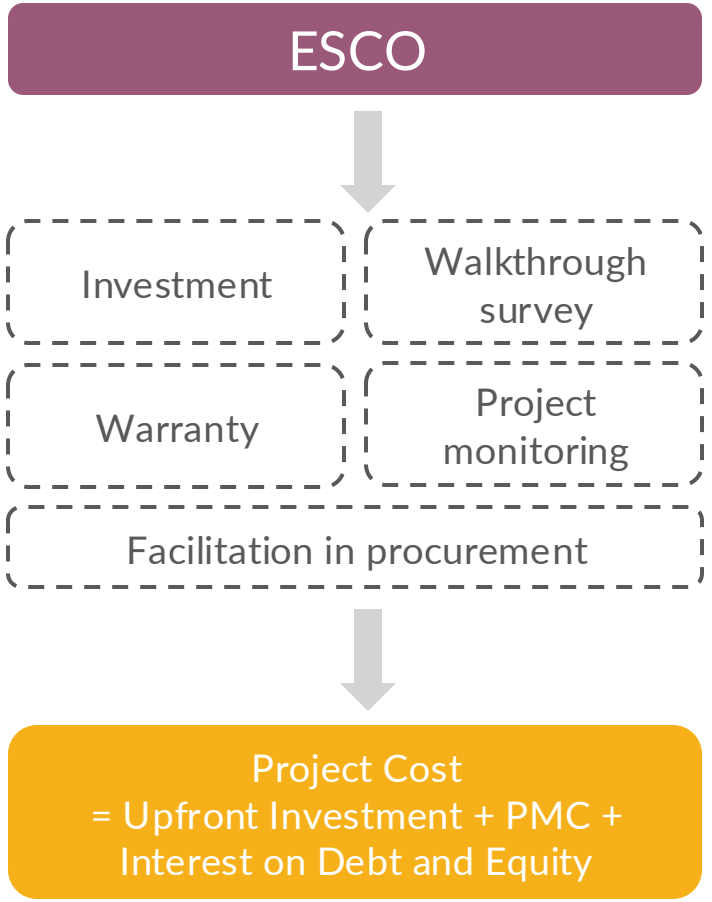


Source: Garnaik, 2023

EESL'S BUSINESS MODELS

Model 2: Investment by EESL

- Clients express interest to purchase a particular energy saving equipment
- EESL aggregates the demand from many clients and negotiates a discounted price from reputed vendors
- EESL facilitates procurement and deployment of the equipment
- Clients pay 100% upfront cost with additional 10%–12% as EESL's PMC cost, and interest on debt and equity
- Warranty period is typically 3 to 5 years
- Typically, this model is used for demand aggregation, procurement and deployment of LED lights, fans, electric motors and unitary air conditioners

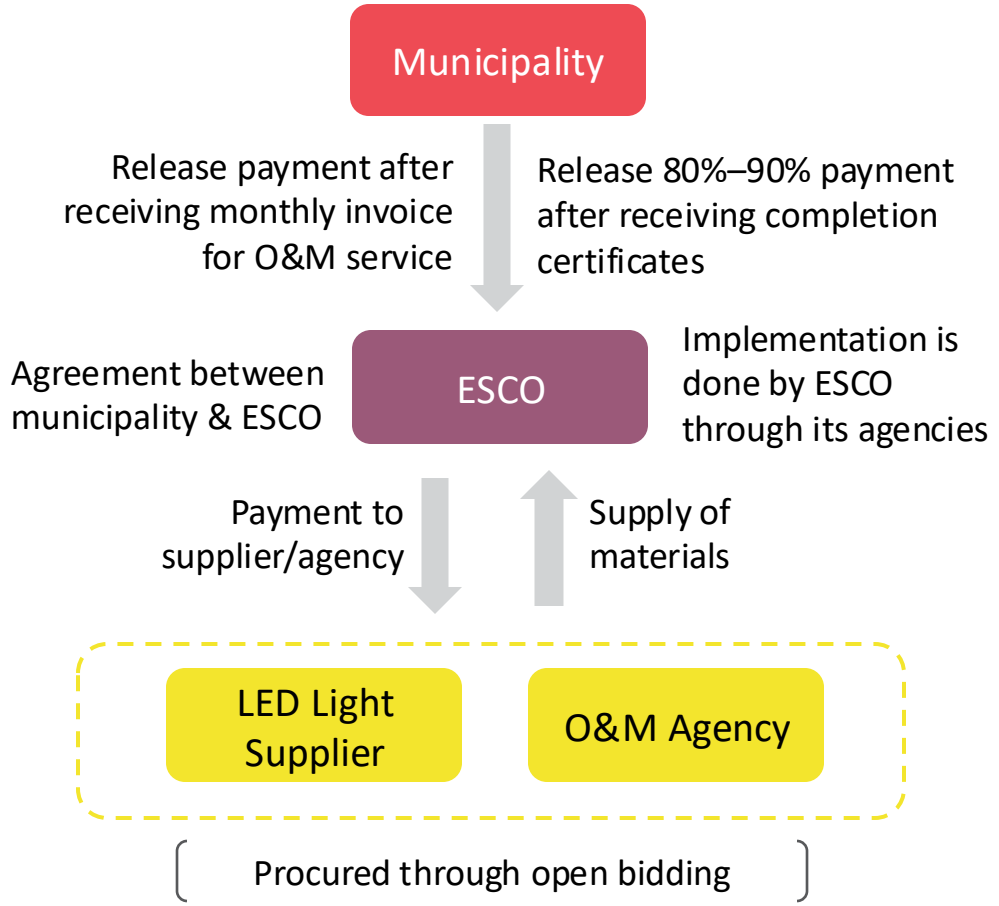


Source: Garnaik, 2023

EESL'S BUSINESS MODELS

Model 3: CapEx and OpEx model for streetlighting in urban local bodies (ULB)

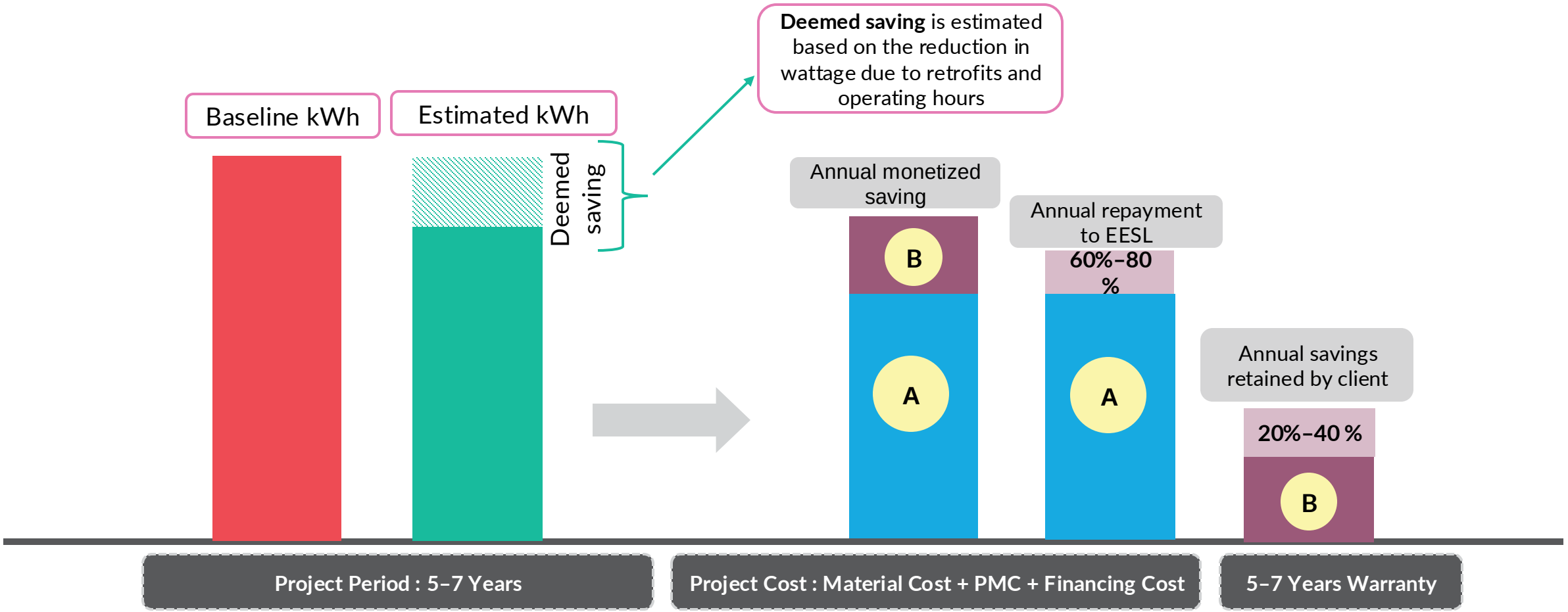
- Supply of materials (LED, CCMS and IDC) , installation and maintenance by EESL
- EESL enters into an agreement with ULB
- **Payment terms:**
  - 100% of light cost and IDC after price discovery and issuance of LoA to suppliers
  - 1% of materials cost as PMC
  - AMC as 1% of the material cost and 10% increment per year up to project period
  - AMC to be paid on monthly basis
  - Payment period is 45 days from invoicing
  - Provision of ESCROW account
- Warranty period is 7 years
- Supply and installation period is 6 months
- ULB financials only security of payments



Source: Garnaik, 2023

EESL'S BUSINESS MODELS

Model 4: Shared, deemed saving model



Source: Garnaik, 2023

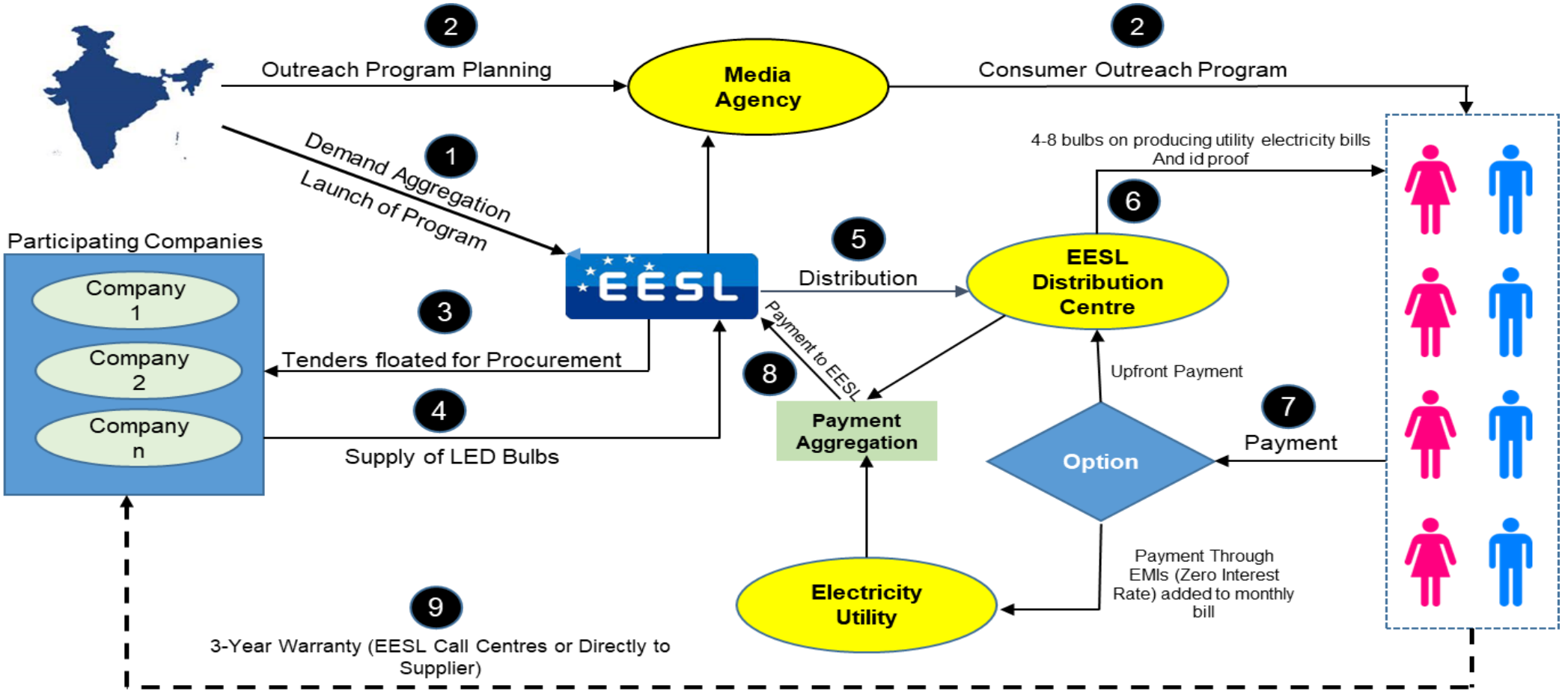
UJALA

India's Domestic Efficient Lighting Program

Source: Garnaik, 2023

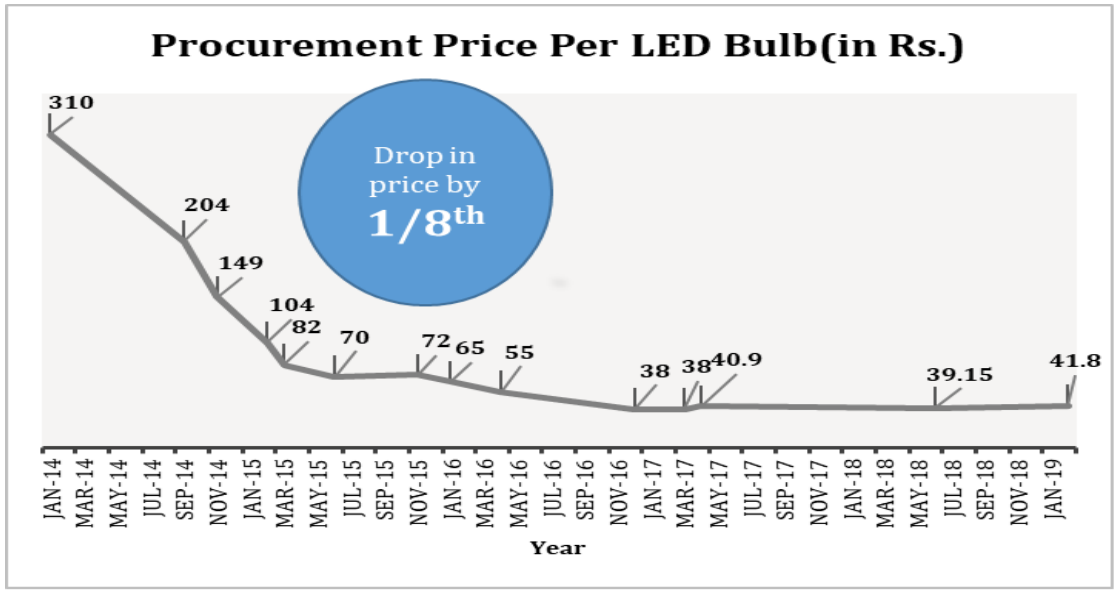
UJALA

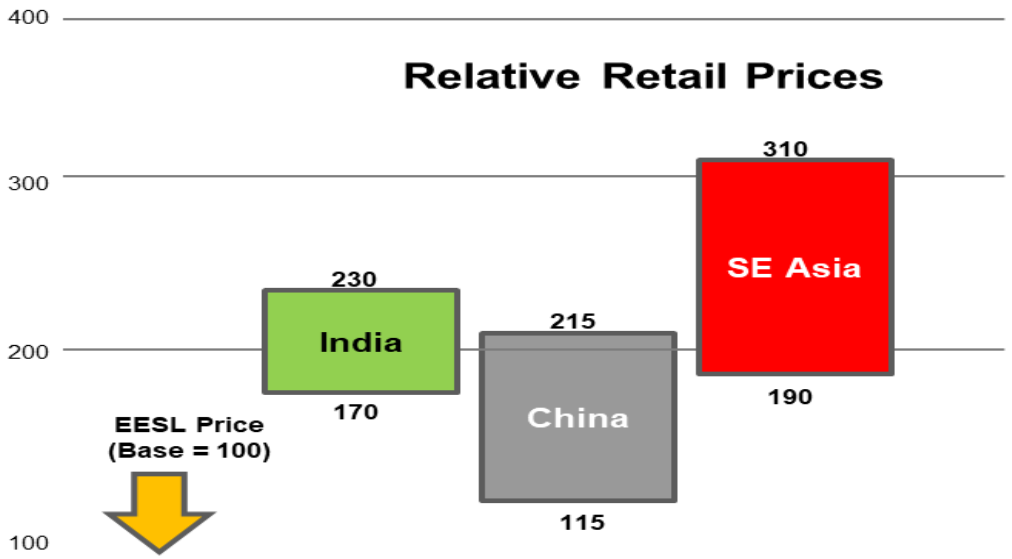
Operating model of India's Domestic Efficient Lighting Program



UJALA

Huge cost reduction with the same product quality!!!





- Investment done : $ **300** mn

EESL's price is much lower than the Retail Price in SE Asian Region

BULK PROCUREMENT OF LED LAMPS

Aggregation of demand and deployment by deemed saving approach

50-70 %

Energy Saving

Energy Saving is calculated on "Deemed Saving" approach by considering baseline wattage and hours of operation.

20-25%

Price Reduction

EESL adopts open public bidding process for Bulk Procurement

10-14%

Project Management Cost

EESL Project Management Cost depends upon the Project size, extent of involvement

More than 4 Million Lights have been deployed in Industries and Buildings by EESL worth 85 million USD

EESL provides various ranges of LED lights from 9 Watts to 190 Watts with 3-5 years warranty period. Typical supply period is one month to three months. Deployments of LED lights have been done in **10400 Buildings, 100 PSUs/Industries, 800 Railway Stations, 64 Airports** and **1200 Bank ATMs** across the country.

DEEMED SAVING APPROACH

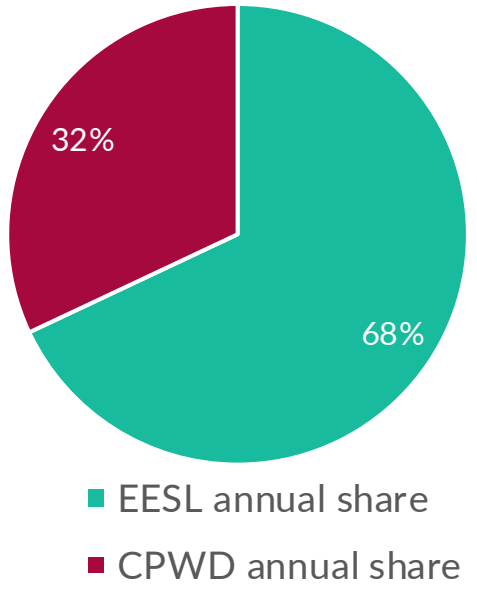
Promising energy saving products for bulk procurement

Technology	Application	Baseline	New Technology	Estimated Deemed Saving
LED Light	Domestic	100 W	9 W	91 W
	Streetlight	250 W	120 W	130 W
		400 W	190 W	210 W
		150 W	70 W	80 W
		70 W	35 W	35 W
BLDC Ceiling Fan	Buildings	80 W	30 W	50 W
Energy Efficient Air Conditioners	Buildings	1,800 W	1,050 W	750 W

EESL'S BUILDING PROJECT

Case example: ESCO model at CGO Complex, New Delhi, India

Particulars	Unit	Value
Estimated energy savings	kVAh	2,139,636
Fixed tariff	INR per kVAh	10
Estimated annual cost savings	INR per year	21,396,357
Investment	INR	48,475,430
EESL PMC fee	INR	4,483,977
Estimated capital cost	INR	52,959,408
Contract period	Years	5
Annual payout to EESL	INR	14,632,670
EESL Share	%	68
EESL quarterly repayment	INR	3,658,168
Number of quarterly repayments		20



Source: Energy Efficiency Services Limited

SUPER EFFICIENT AC PROGRAM

Case example: EESL's intervention for sustainable cooling

EESL ENERGY EFFICIENCY SERVICES LIMITED
A JV of PSUs under the Ministry of Power

ISEER 5.4
40% more efficient than 3-Star ACs

INR 39990
Price equivalent to 4-Star ACs

Cool: How EESL is meeting India's cooling needs in a sustainable manner

20-25%
Energy Saving

100000+ ACs
Deployed

gef ADB ASIAN DEVELOPMENT BANK UN environment

3-7 days
Delivery time in Tire-1 and Tire-2 cities

- About **30%** reduction in price in comparison to retail price
- Consumers could save about **INR2,000 and INR3,000 per year** compared to 5-star AC and 3-star AC, respectively
- **Hassle-free** service with complaint redressal support during program life, with **buyback option**
- Unlike conventional ACs, there is **no derating** of the cooling capacity even at high ambient temperatures, as high as 43°C
- Supports **India Cooling Action Plan** and **NITI Aayog @75** vision on energy savings and CO_2 emissions reduction
- Opportunity to scale up and create **manufacturing base** for more efficient products
- Optimizes investment on power infrastructure and synergizes with the ongoing demand side management program

STREETLIGHT NATIONAL PROGRAM

Case example: EESL's projects with urban local bodies (ULBs) for streetlighting

- Installation of **12.1 million** streetlights in over 1,600 ULBs in 20 states and 13,000 *gram panchayats* (village councils) in 3 states has transformed illumination in over **300,000 km** of roads in India with LED lights
- **7.8 billion units** of electricity saving and **1,355 MW** of peak demand reduction
- Energy cost saved by ULBs is about **USD750 million**
- Uptime of streetlights increased to **more than 95%**
- Reduction in price from **USD2.5/Watt to USD0.6/Watt** in six years due to bulk procurement of LED lamps
- **Eight-fold increment** in industrial production of LED lamps (that is from about 5,000 per day to 40,000 per day)
- Increase of sales of streetlights from less than 0.10 million lamps per month to more than **1 million lamps per month** in six years
- Improved **safety** on roads due to better illumination
- Significa stem

EESL created professional partnerships with ULBs and states

IMPACT OF BULK PROCUREMENT

Case example: ESCO market transformation in India (2016–2021)

Program	Outcome (by 2021)	Energy Saving Model	Approach	Business Model	Impact	
					Investment (million USD)	Technology Pricing (from base)
UJALA	360 million	Deemed Saving	Bulk Procurement	Upfront Payment	300	12%
Super Efficient AC	100,000	Star Rating / Deemed Saving	Bulk Procurement	Upfront Payment	72	75%
National Motor Replacement Program	12,000	Deemed Saving	Bulk Procurement	Upfront / EMI	6	80%
Streetlight National Program	12 million	Deemed Saving	Bulk Procurement	Annualized Payment	640	65%
MSME Program	24 Technologies	Measured Saving	Bulk Procurement	Upfront / EMI	8	75%–85%

EESL's INITIATIVES

Electricity savings achieved

360 million
LED Bulbs
UJALA

7.2 million
LED Tube Lights
UJALA

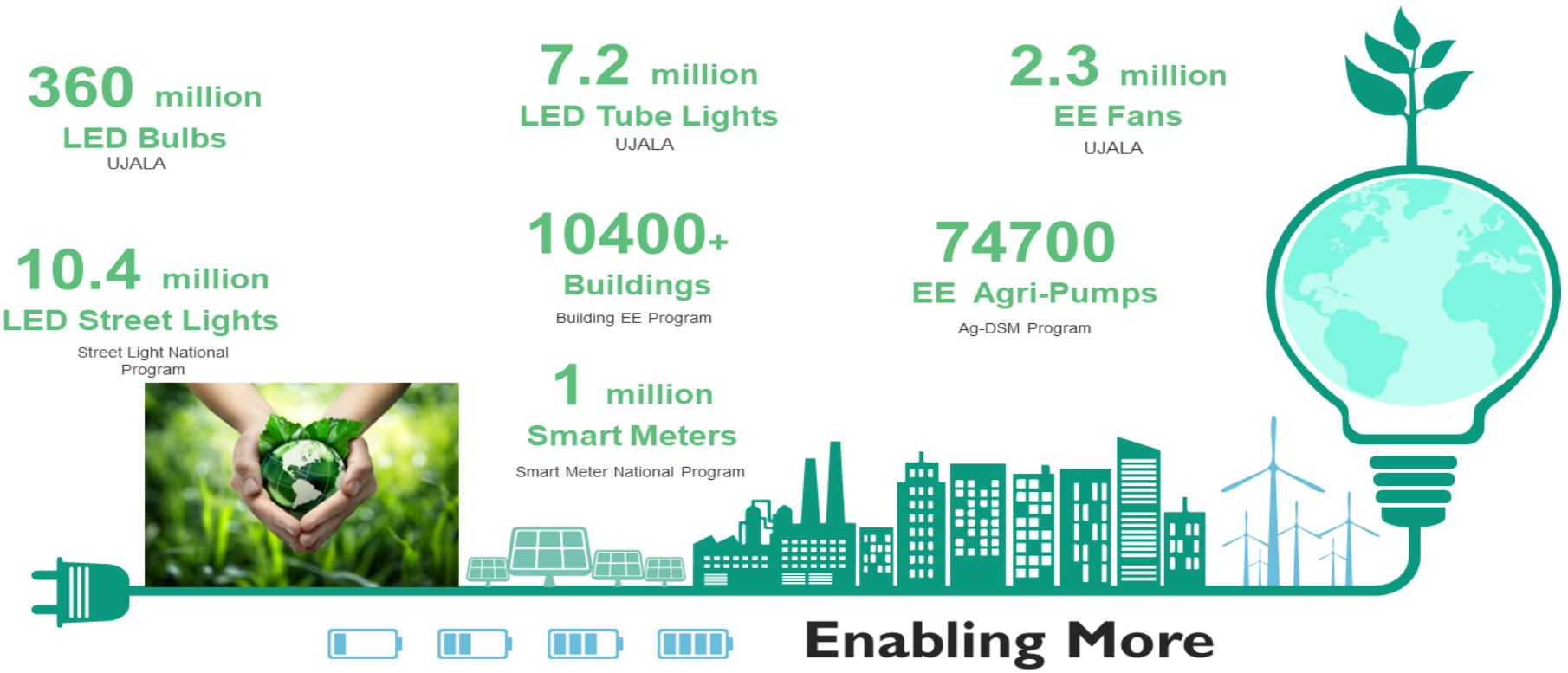
2.3 million
EE Fans
UJALA

10.4 million
LED Street Lights
Street Light National Program

10400+
Buildings
Building EE Program

74700
EE Agri-Pumps
Ag-DSM Program

1 million
Smart Meters
Smart Meter National Program



Energy Efficiency Business has resulted Electricity saving of over **45** billion kWh per annum

GGGI's INTERVENTIONS IN SE ASIA

Thailand: To reduce barriers to energy efficiency investment in SMEs

GGGI launched a project jointly with the Provincial Electricity Authority (PEA) called the Thai Auto Parts Supply Chain Development through Energy Efficiency (TAPEE) Program, targeting Thai auto-parts SMEs

The major activities are:

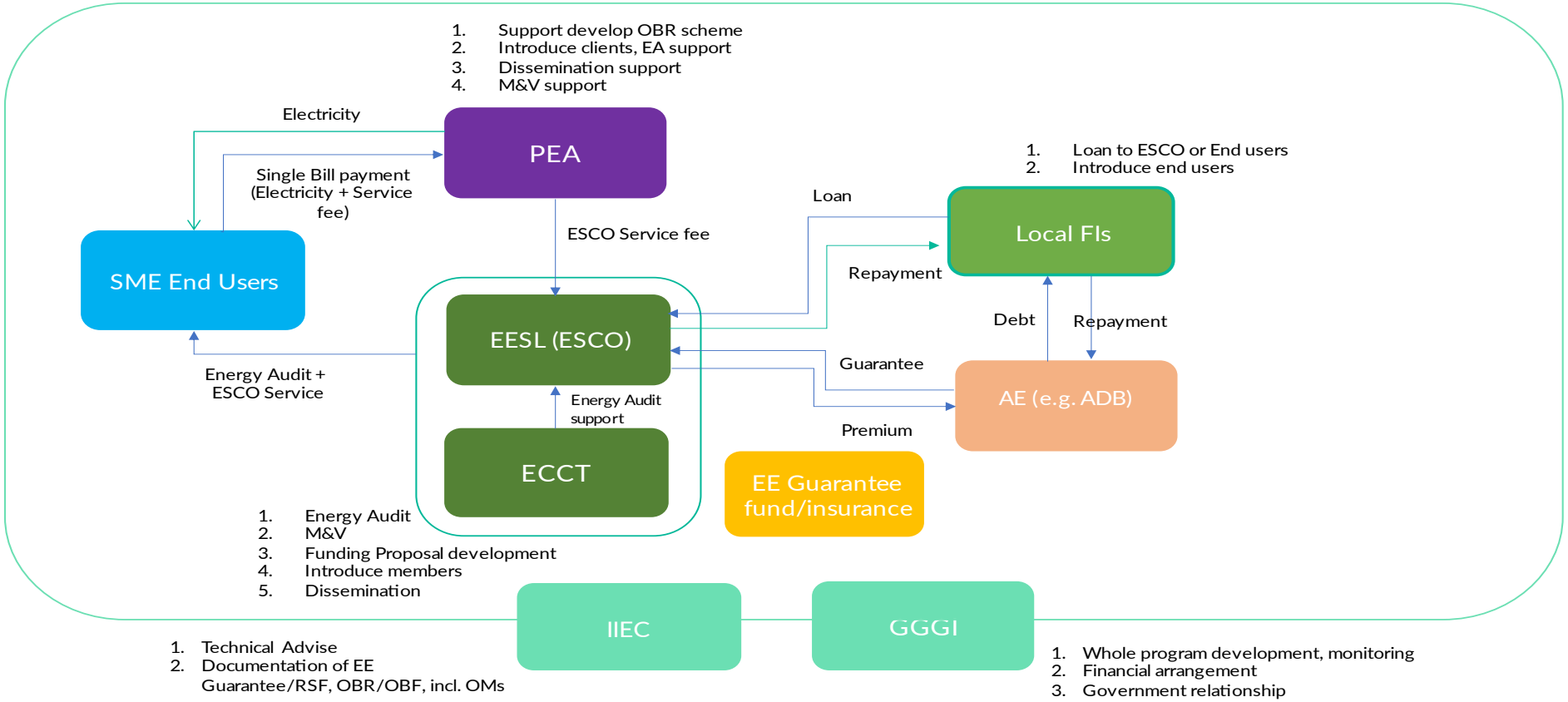
- Identification of 20 mid-to-large units and 200 small units for baseline data collection and energy audit
- Energy audit of selected SME units for identification of energy saving opportunities
- Collaboration with EESL, industry association, the Office of Natural Resources and Environmental Policy and Planning (ONEP) and PEA for energy audit work and demand assessment activities
- Identification of EE technologies with highest energy saving and replication potential – hence good investment opportunity
- Development of EE proposal with projected cost savings from EE upgrades
- Suggest mechanism for operationalizing on-bill financing (OBF) model to be adopted by PEA
- Development of guidelines, and support PEA in monitoring report of electricity bills, conducting M&V of projects and quantifying energy savings
- Mobilize ESCOs (domestic and international) to invest in EE projects of Thai auto-parts SMEs

Source: Kumar et al., 2017

GGGI's INTERVENTIONS IN SE ASIA

Thailand: To reduce barriers to energy efficiency investment in SMEs (continued)

Suggested Business model for TAPEE program



Source: Kumar et al., 2017

GGGI's INTERVENTIONS IN SE ASIA

Thailand: To reduce barriers to energy efficiency investment in SMEs (continued)

Outcomes

- Energy audit in 220 SMEs conducted
- Five standard technologies identified as replicable technologies with simple payback period of 1–3 years: IE3 motor, LED light, air compressor, energy efficient AC and VFD
- Draft OBF mechanism proposed to PEA
- Investment opportunities of over USD2 million identified
- EESL, the public ESCO of India committed to invest USD2 million in Thailand. EESL subsequently sensitized the local ESCO Association
- The program was announced by PEA on May 23, 2019 in a joint ceremony with GGGI, EESL and ECCT

Announcement of TAPEE Program in Bangkok, Thailand

Source: Kumar et al., 2017

ESCO BUSINESS

Challenges and risks

- **Energy efficiency not a priority:** Limited energy efficiency policy, lack of adequate enforcement at the state and municipal levels, absence of good governing practices, such as the provision of energy-related data in the public domain and support for the operation of ESCOs in different states, limit the widespread adoption of the ESCO model
- **Technological risks associated with energy conservation measures:** Technological risks associated with newer technologies like low-grade heat recovery is usually high when compared to mature and simple technologies such as LED lighting and pumps and motors – management buy-in becomes difficult in such cases
- **Challenges in baselining and M&V:** The main barrier in baselining is the lack of sufficient data. It is also very time consuming and means an upfront cost for ESCOs. Often, ESCOs do not budget sufficiently for long-term operations of the facility. M&V is heavily tied to baselining. An inadequate metering infrastructure is a significant challenge in the ESCO ecosystem and deserves urgent attention
- **Managerial attitudes toward ESCO operations:** Although funds are usually allocated for energy conservation projects in large industries, decisions pertaining to investments in energy efficiency are usually made at multiple thresholds – engineering, finance and others. Obtaining the buy-in from the engineering department is difficult at times, and the finance department may not fully understand energy conservation measures from a technical viewpoint. The poor flow of information leads to long delays in approvals. ESCO contracts are usually very detailed (to circumvent any disputes in M&V, sharing savings) – this also hinders contract approvals

Source: Kumar et al., 2017

ESCO BUSINESS

Challenges and risks (continued)

- **Preference for very short payback periods:** Pricing disincentives for energy efficiency investments, energy subsidies and price distortions impede the ESCO industry. If input energy costs are already quite low, end-users are not particularly motivated to install energy conservation measures that could reduce their energy bills through energy efficiency. The most preferred payback period is 1–3 years. This severely restricts the penetration of projects with longer paybacks
- **Ambiguous definition of ESCOs and lack of legal framework:** ESCOs do not have a standard definition. The ecosystem suffers from ambiguity in roles and capabilities of market actors. The lack of legal framework for the ESCO business adds to the risk in financial transactions and ownership of assets
- **A disconnect between ESCOs and end-users' preferred business model:** ESCOs have not experimented much with new ESCO models for project implementation. Shared savings is the most widely used ESCO model in the market today. ESCOs finance projects on their own balance sheets to mitigate financial risks, hindering the implementation of many projects
- **Lack of trust in the ESCO ecosystem:** There is a general feeling of mistrust among end-users and financiers who prefer to remain within the confines of small projects with conservative and safe returns instead of scaling up projects. They also prefer working with established ESCOs with proven track records, which often makes it difficult for new and deserving ESCOs to build their portfolios
- **Difficulty in availing financing:** ESCOs continue to be constrained by financial reasons. While large vendor ESCOs are better placed to finance shared savings projects, small ESCOs, with weak assets and collateral support, struggle to secure financing – bankers are uninterested in small-size projects and sometimes skeptical about ESCOs' non-standardized solutions. Bankers are reluctant to transition from traditional asset-based financing to future cash-flow-based financing, which is an important feature of international ESCO businesses. Financial schemes such as the partial risk guarantee fund (PRGF) are not being used to their fullest potential because of poor awareness of EE financing and heavy transaction costs

Source: Kumar et al., 2017 (with minor adaptation on the legal framework)

Thank you!

For more information, visit us at https://ALCBT.GGGI.ORG or scan the QR code below

IKI Independent Complaint Mechanism

Any person who believes they may be harmed by an IKI project or who wish to report corruption or the misuse of funds, can lodge a complaint to the IKI Independent Complaint Mechanism at IKI-complaints@z-u-g.org. The IKI complaint mechanism has a panel of independent experts who will investigate the complaint. In the course of the investigation, we will consult with the complainant so as to avoid unnecessary risks for the complainant. More information can be found at https://www.international-climate-initiative.com/en/about-iki/values-responsibility/independent-complaint-mechanism/.

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IKI INTERNATIONAL CLIMATE INITIATIVE
on the basis of a decision by the German Bundestag

GGGI

ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy | PROJECT

4.3 Sustainable Public Procurement

November 2024

ASEAN CENTRE FOR ENERGY ACE

EESL

HEAT

Supported by:

Federal Ministry for Economic Affairs and Climate Action

IKI INTERNATIONAL CLIMATE INITIATIVE

on the basis of a decision by the German Bundestag

WHAT WILL YOU LEARN?

01 Need for sustainable public procurement guidelines

02 Understanding standards, labels, certifications and environmental product declarations for sustainable equipment, appliances, building materials, etc.

03 Progress of sustainable procurement activities in ALCBT partner countries

SUSTAINABILITY

Four pillars of sustainability

ENVIRONMENTAL

- Environmental resource management
- Urban planning
- CO_2 reduction
- Alternative energies
- Water management
- Sustainable agriculture
- Marine resources management
- Protection of ecosystems
- Pollution and waste management
- Clean drinking water

SOCIAL

- Human rights
- Ethical supply chain
- Cultural and indigenous empowerment
- Food security
- Fair pay and labor law protections
- Local skills and employability development
- Anti-child labor and forced labor laws
- Fair trade
- Health and safety
- Gender equality including universal education, women-owned business
- Child mortality and maternal health
- Healthy lives and well-being for all

ECONOMIC

- Economic regeneration
- Sustainable economic development
- Emerging markets
- Development of small and medium-sized enterprises
- Total cost of ownership and life cycle costing
- Value for money
- Supply chain capacity development
- Poverty reduction

INSTITUTIONAL

- Business ethics
- Sustainable institutional development
- Governance and management
- Quality of teaching and learning
- Relations with the community
- Equality
- Encouraging strengthening systems
- Organization for Economic Co-operation and Development (OECD) MAPS assessment
- MAPS – sustainable public procurement module
- Use of country systems
- Policies and targets

Source: Asian Development Bank, 2021

SUSTAINABLE PROCUREMENT

United Nations sustainable procurement indicators

For a tender to qualify as sustainable procurement, it must meet the requirement of at least one indicator in each of the three pillars: environmental, social and economic

Pillar		Sustainable procurement Indicator	Examples of tender requirement
Environment 	1	Environment	Environmental management system, corporate environmental policy, waste management, policy on hazardous materials and chemicals
	2	Sustainable resource use	Ecolabels, circular design, energy-saving recycling, bulk packaging
	3	Climate change mitigation and adaptation	Energy efficiency, renewable energy purchasing, greenhouse gas reporting, offsetting, clean transportation and logistics, resilient infrastructure
	4	Protection of the environment, biodiversity and restoration of natural habitats	Ecolabels, sustainable or organic agriculture, forestry, fishing
Social 	5	Human rights and labor issues	Universal Declaration of Human Rights, International Labour Organization core conventions, freedom of association and collective bargaining, elimination of child and forced labor and discrimination at work, health and safety, fairly-traded goods
	6	Inclusion of persons with disability	Inclusion of disadvantaged groups such as persons with disabilities, inclusiveness and accessibility considerations in design, disability-inclusive suppliers

Source: Asian Development Bank, 2021

SUSTAINABLE PROCUREMENT

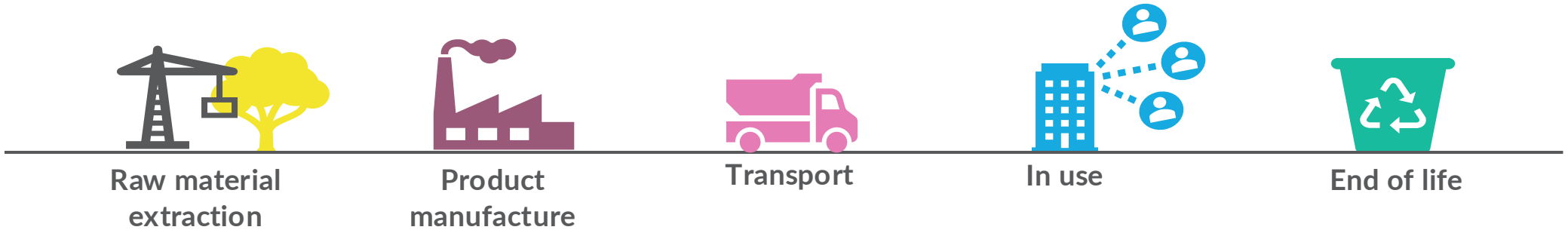
United Nations sustainable procurement indicators (continued)

Pillar		Sustainable procurement Indicator	Examples of Tender Requirement
Economy 	7	Gender equality and women`s empowerment	Gender mainstreaming, reserved procurement for women-owned businesses
	8	Social health and well-being	Avoidance of hazardous chemicals, labeling of chemicals
	9	Whole life cycle cost	Total cost of ownership, life cycle costing
	10	Local communities and small and medium-sized enterprises	Reserved labor for local communities, local materials and services, local micro, small and medium-sized enterprises
The following two indicators only serve for informational purposes and do not factor toward the classification of a sustainable procurement tender			
General 	11	Promoting sustainability throughout the supply chain	Extend sustainability requirements to tier-2 suppliers, identify and approve primary subcontractors
	12	Global compact	Considerations promoting vendors' participation in the UN Global Compact
	13	Suppliers' monitoring and auditing	Contract conditions and/or key performance indicators that stipulate verification of suppliers' environmental and social claims through spot checks and audit provisions

Source: Asian Development Bank, 2021

PRODUCT LIFE CYCLE

Five stages in the life of a product



- Every product consumes energy and water, and generates solid, liquid and/or gaseous waste products during the process of raw material extraction, product manufacturing, transportation, product utilization, and finally, during disposal of product at the end of its life, thus impacting the environment
- Preferring products with minimal impact on the environment is the way forward for sustainable development. This implies using products that consume less virgin raw materials, less energy and less water, and generate less solid, liquid and gaseous waste products during manufacturing; less carbon emissions during transportation and product distribution; less energy and water demand during utilization of the product; and finally, have minimal environmental impact during disposal at the end of its life – ideally the products should be reusable or recyclable

Source: Asian Development Bank, 2021

PUBLIC PROCUREMENT

Traditional procurement

1. Procuring agency defines specifications and requirements → 2. Tender is floated and bids are received → 3. Technical evaluation based on specifications → 4. Financial evaluation (selection based on initial cost)

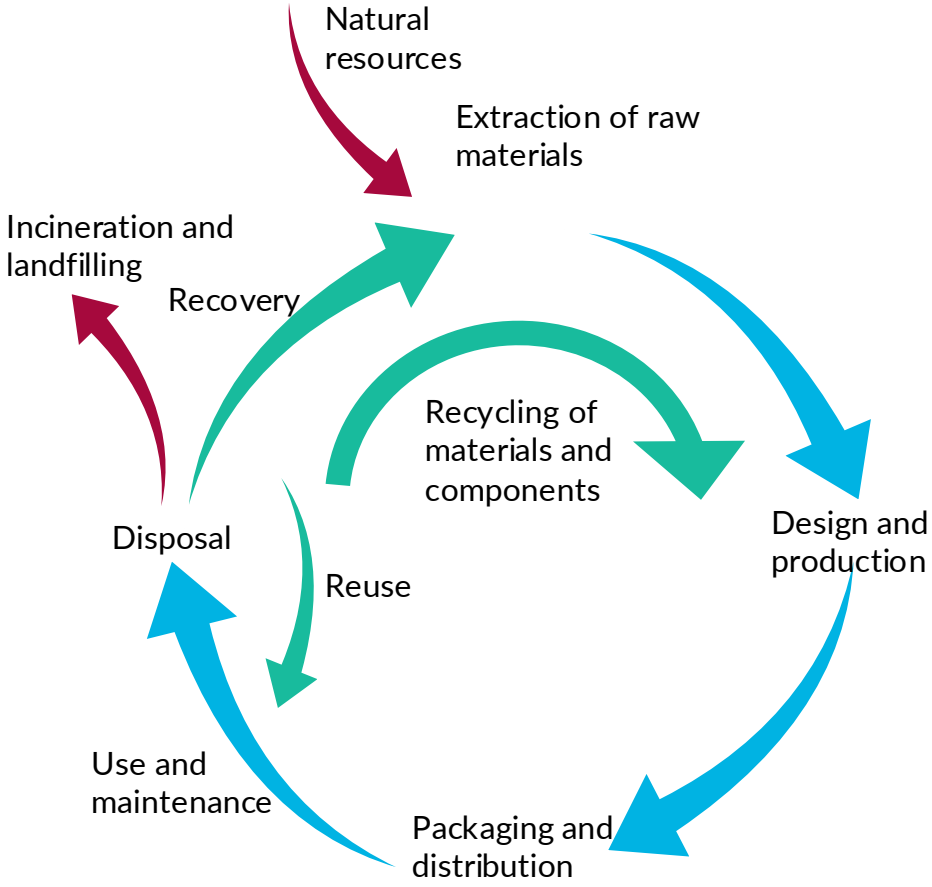
Traditional procurement has typically focused on cost and efficiency considerations. It does not usually factor in environmental, social, economic and institutional impact of the project, including the effects of the materials and processes used, on the community at large

Image source: https://sustainabledevelopment.in/wp-content/uploads/2020/06/1592393377Sustainable-Public-Procurement.pdf

SUSTAINABLE PUBLIC PROCUREMENT

Definition and implications

- Public procurement refers to the process by which public authorities, such as line ministries, departments and state-owned enterprises, purchase goods, works and services from the private sector
- Sustainable public procurement (SuPP) is a purchasing and investment process that considers the economic, environmental, social and institutional impacts of the entity's spending
- Procuring in a sustainable way involves looking beyond short-term needs and considering the longer-term impacts of each project and procurement. Organizations practicing SuPP meet their needs for goods, services, utilities and works not on a private cost–benefit analysis, but with a view to maximizing net benefits for themselves and the wider world
- SuPP allows governments to meet their needs for goods, services, utilities and works in a way that achieves value for money on a whole-life basis in terms of generating benefits not only for the organization, but also for the society and economy, while remaining within the carrying capacity of the environment



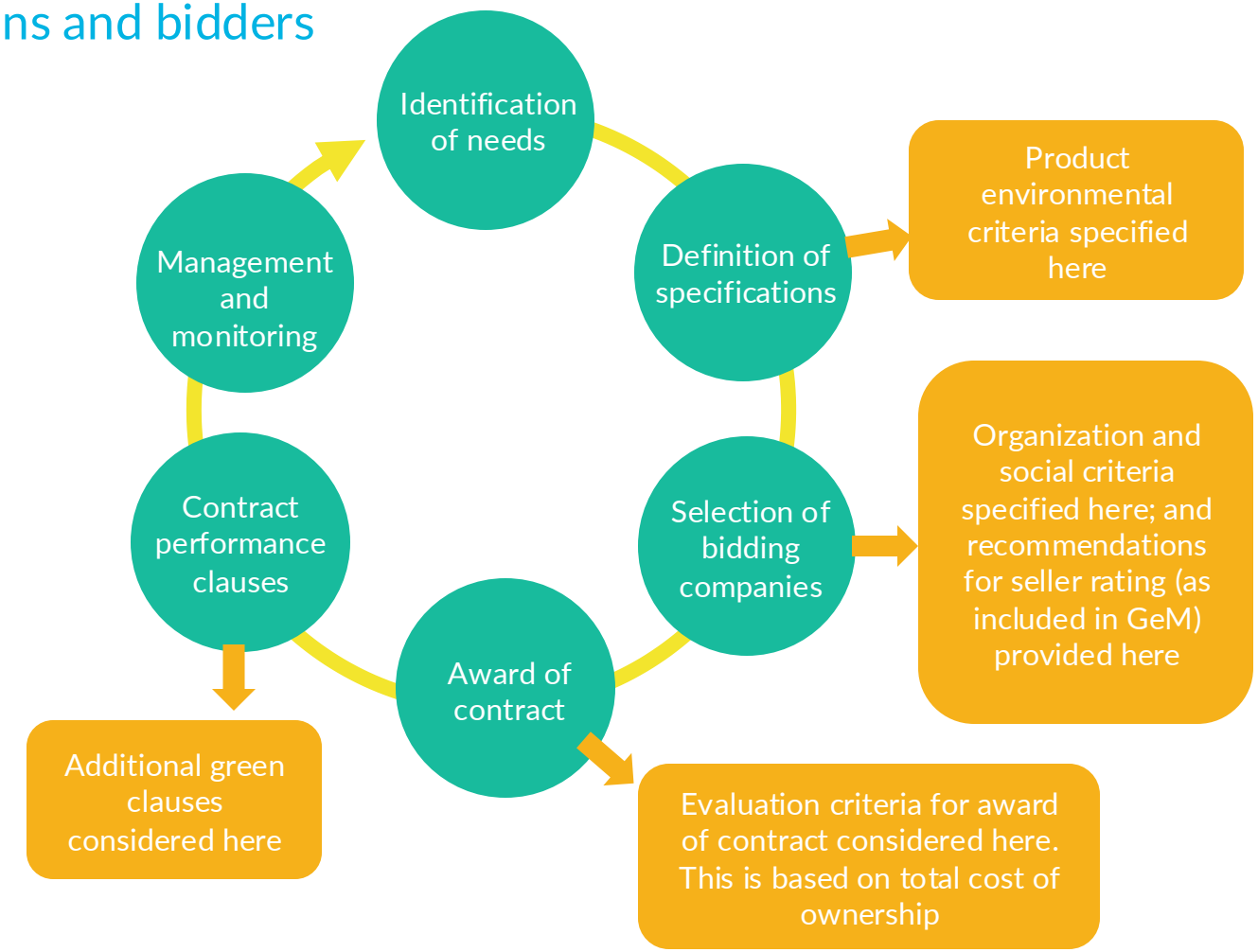
A typical product life cycle diagram

Sources: United Nations Environment Programme, 2021b; Asian Development Bank, 2021

SUSTAINABLE PUBLIC PROCUREMENT

Steps for critical assessment of solutions and bidders

- Assess the quality of proposed sustainable solutions
- Assess bidders' sustainability credentials and track records
- Assess and compare whole-life costs
- Select the most advantageous bid



Source: Asian Development Bank, 2021

Image source: https://sustainabledevelopment.in/wp-content/uploads/2020/06/1592393377Sustainable-Public-Procurement.pdf

SUSTAINABLE PUBLIC PROCUREMENT

Large canvas of benefits

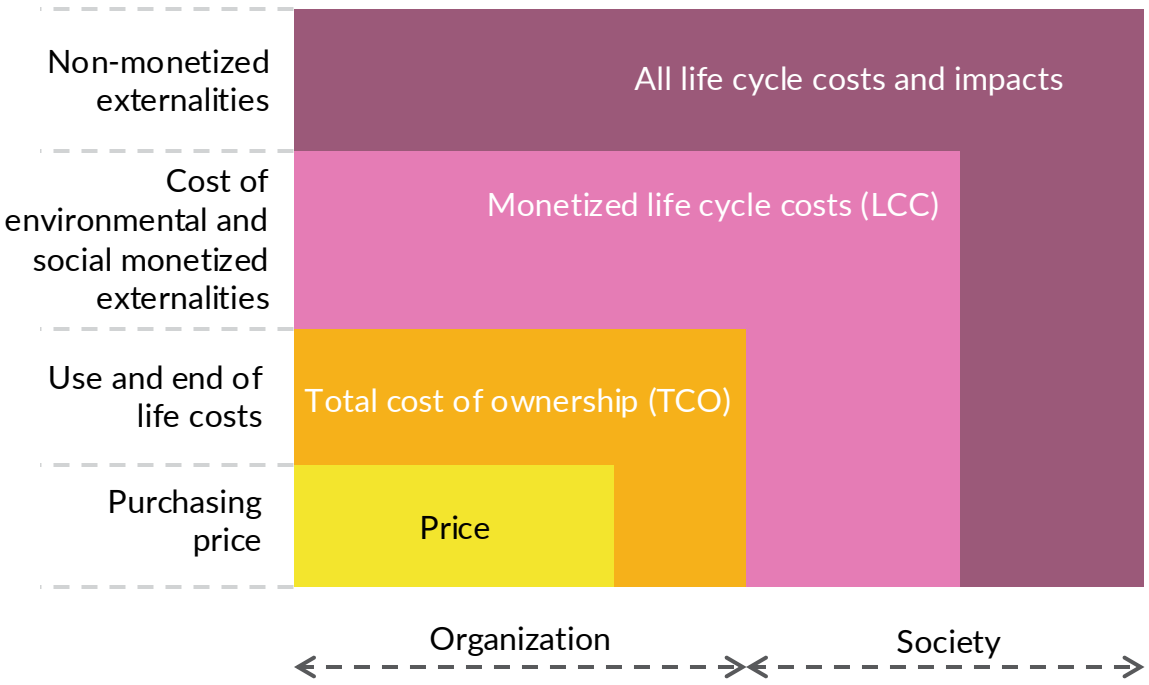
Countries making a commitment to invest their time, human and financial resources, and funding to SuPP implementation will have the opportunity to:

- Contribute to the delivery of the Sustainable Development Goals
- Contribute to national sustainable development objectives
- Improve environmental performance
- Contribute to a circular economy
- Deliver financial benefits
- Develop markets for more sustainable products and services
- Foster innovation
- Contribute to social equity
- Promote gender equality
- Bring political benefits

SUSTAINABLE PUBLIC PROCUREMENT

Life cycle assessment and life cycle costing

- Life cycle assessment (LCA) refers to the sustainability impacts during a life cycle that varies from product to product. A full assessment requires detailed data that is often not available
- Life cycle costing (LCC) is an economic assessment considering all agreed projected significant and relevant cost flows over a period of analysis expressed in monetary value. The projected costs are those needed to achieve defined levels of performance, including reliability, safety and availability
- LCC considers all the costs that will be incurred during the lifetime of the product, work or service. They include:
  - Purchase price and all associated costs (delivery, installation, insurance, etc.)
  - Operating costs, including energy, fuel and water use, spares, and maintenance
  - End-of-life costs (such as decommissioning or disposal) or residual value (i.e., revenue from the sale of a product)



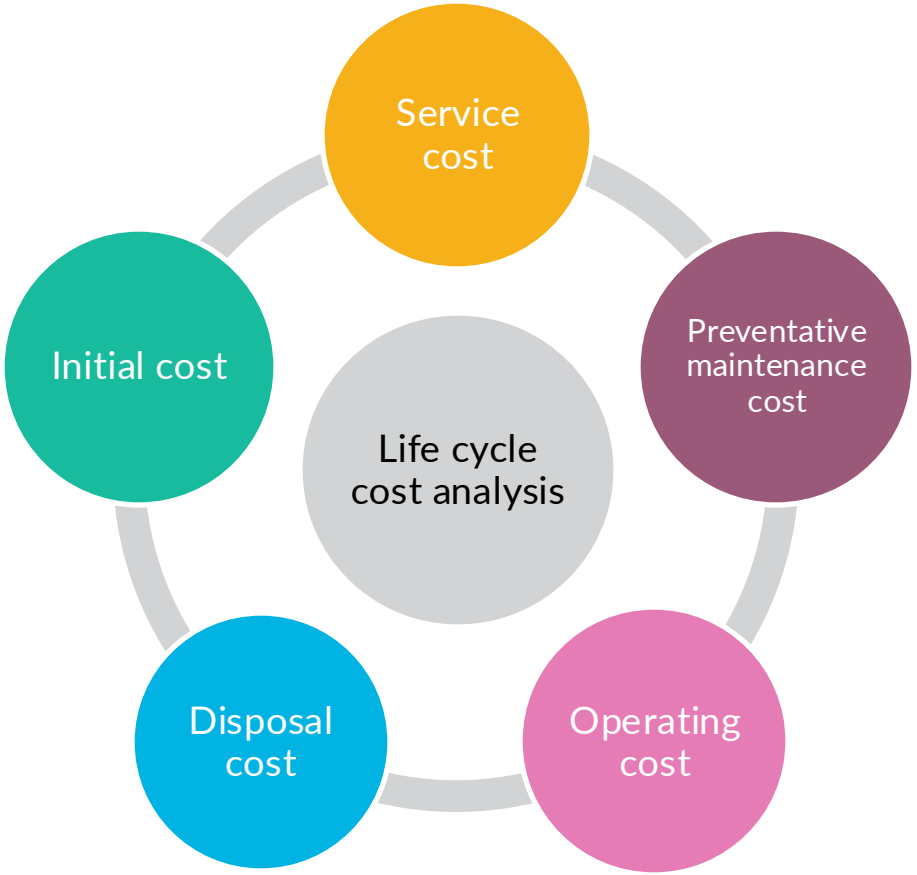
Source: United Nations Environment Programme, 2021b

Image source: UN Environment, ISO 20400

SUSTAINABLE PUBLIC PROCUREMENT

Life cycle costing

- LCC makes good sense regardless of a public authority's environmental objectives
- By applying LCC, public purchasers are accounting for the costs of resource use, maintenance and disposal, which are not reflected in the purchase price
- Often, this will lead to win-win situations whereby a greener product, work or service is also cheaper overall
- The main potentials for savings over the life cycle of a good, work or service are:
  - Savings on the use of energy, water and fuel
  - Savings on maintenance and replacement
  - Savings on disposal costs



Source: United Nations Environment Programme, 2021b

SUSTAINABLE PUBLIC PROCUREMENT

Financial benefits

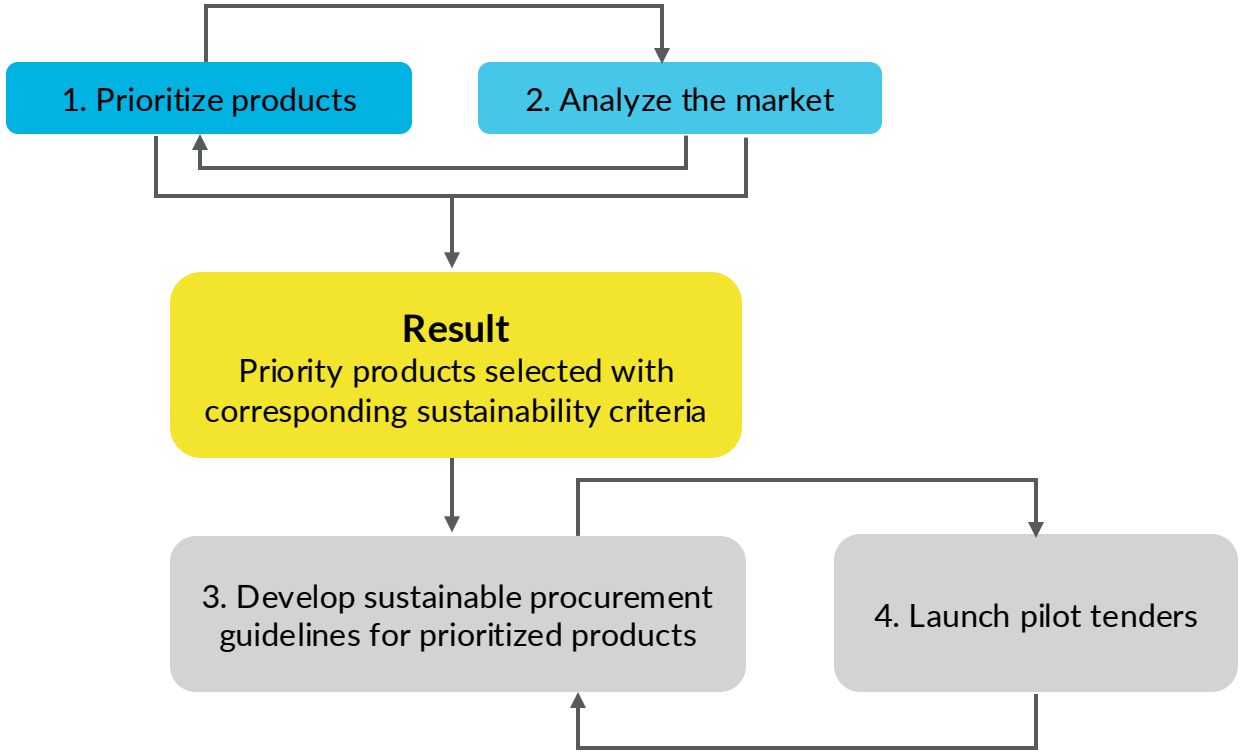
SuPP helps reduce total operating costs by procuring more efficient and sustainable goods, works or services that:

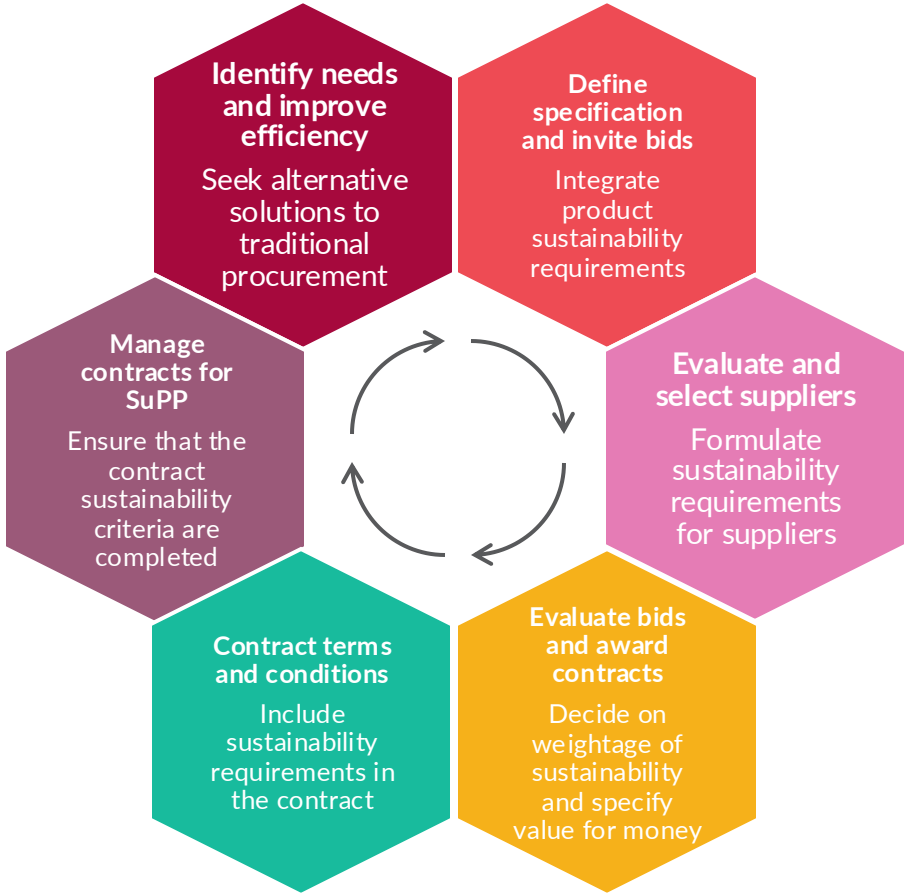
- Develop the market's capacities to deliver sustainable solutions
- Increase demand for sustainable solutions, which in turn increases market competitiveness
- Strive for innovative and more sustainable outcomes
- Lead to cost savings on a long-term basis by applying LCC and operation and maintenance considerations
- Minimize disposal costs and sustainable impacts of products at their end of life

Source: Asian Development Bank, 2021

SUSTAINABLE PUBLIC PROCUREMENT

Prioritizing products, investigating the market and developing guidelines

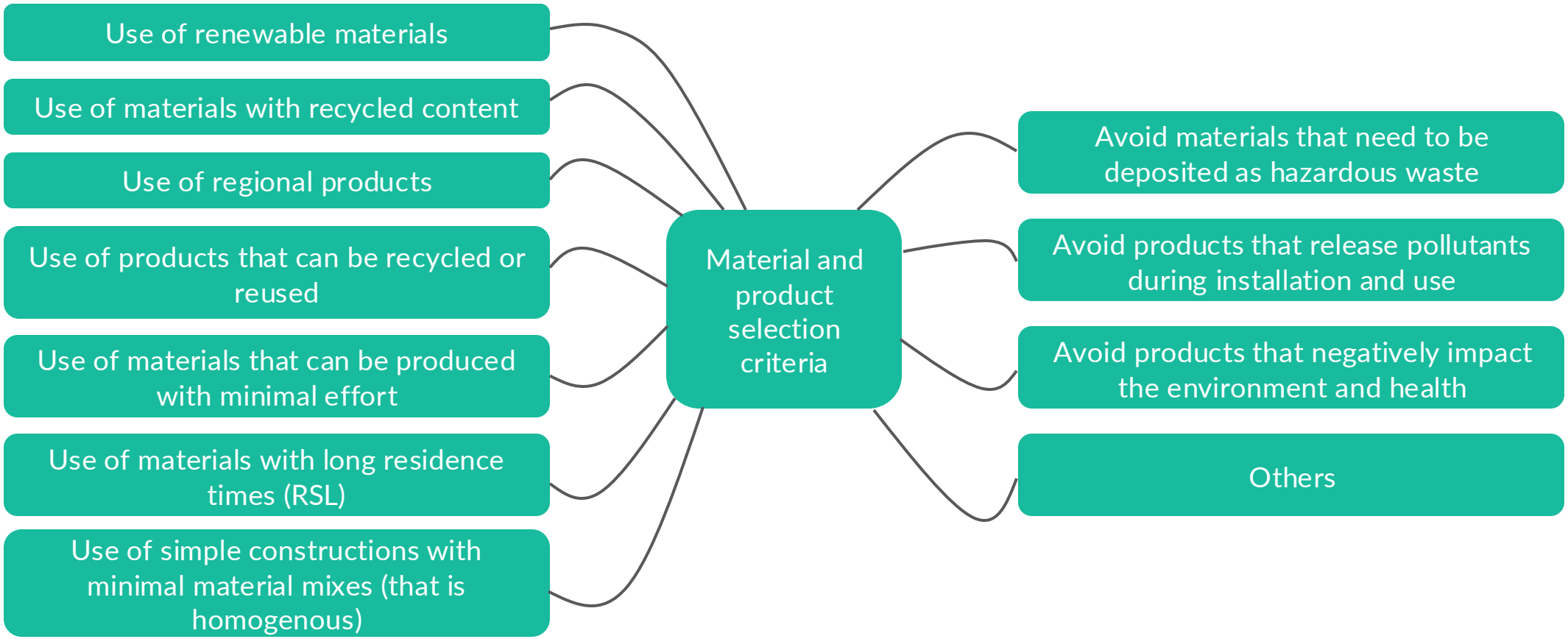




Source: United Nations Environment Programme, 2021b

BUILDING MATERIALS

Sustainability: Material and product selection criteria

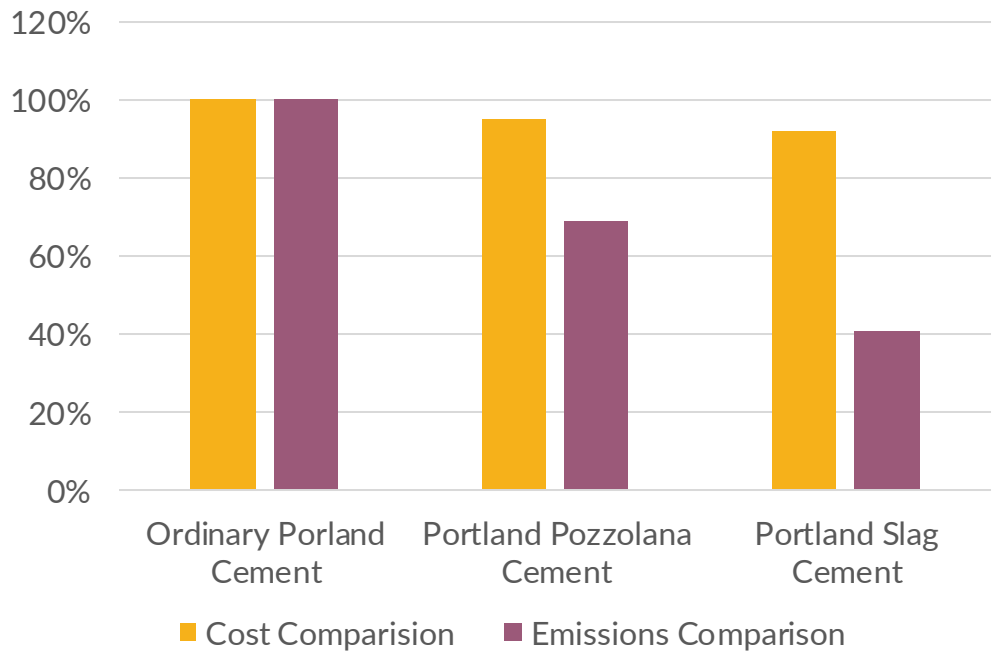


Source: SAICM Secretariat, 2023

CEMENT

Case example: India – Options, market penetration, emissions and comparative costs

Cement type	Description	Market penetration	Emissions intensity ($kgCO_2$/tonne)
Ordinary Portland Cement (OPC)	Regular cement made with a mix of clay or shale and limestone or chalk (to produce clinker) and gypsum	27%	740
Portland Pozzolana Cement (PPC)	Blended cement made with clinker mixed with fly ash	65%	511
Portland Slag Cement (PSC)	Blended cement made with clinker mixed with slag	7%	340



Sources: Global Cement and Concrete Association, 2022; Xynteo, 2024

GREEN PROCUREMENT INITIATIVES

International initiatives and benchmarks for green steel, cement and concrete

- The Industrial Deep Decarbonization Initiative (IDDI), an initiative under UNIDO, launched the Green Public Procurement Pledge in September 2022 to encourage governments to report environmental data and use low-emissions and near-zero emissions cement, concrete and steel in their construction projects. So far, nine countries have joined IDDI
- World Economic Forum's First Movers' Coalition (FMC), a public-private partnership launched in 2021, includes 65 global companies, which have committed to use their purchasing power to create markets in at least one of seven key sectors. So far, 18 companies have committed to the steel sector target. At COP27, the coalition launched cement and concrete as its latest sector with five companies as initial signatories
- The Climate Group's SteelZero and ConcreteZero initiatives are corporate partnerships with 25 and 22 companies, respectively that have committed to using net-zero steel and low- and net-zero emissions concrete. SteelZero, launched in 2020, is a partnership with ResponsibleSteel. ConcreteZero, launched in 2022, is a partnership with WBCSD and WorldGBC

Source: Gangotra et al., 2023

GREEN PROCUREMENT INITIATIVES

International initiatives and benchmarks for green steel, cement and concrete

Initiative/Policy	Type	Definitions and Benchmarks	Targeted Share of Purchases
FMC	Public-Private	Near zero emissions steel: 100–400 kg Co_2e/t Near zero emissions cement: 184kg CO_2/t Near zero emissions concrete: 70–144 kg CO_2/m^3	10% by 2030
IDDI	Public	Near zero emissions steel: 50–400 kg CO_2e/t Low emissions steel: 800–2,400 kg CO_2e/t Near zero emissions cement: 40–125 kg CO_2e/t Low emissions cement: 250–750 kg CO_2e/t	Signatories to decide
SteelZero	Private	Low emissions steel: 200–1,400 kg CO_2e/t Net zero steel: As close to zero as possible	50% low emissions by 2030 100% net zero by 2050
ConcreteZero	Private	Low embodied carbon concrete: 100–270 kg CO_2/m^3 Net zero concrete: As close to zero as possible with at least 90% mitigation	30% low carbon by 2025 50% low carbon by 2030 100% net zero by 2050
GSA Buy Clean	Public	Low embodied carbon concrete: 242–414 kg CO_2/m^3	100%
Buy Clean California Act	Public	Global warming potential limit for concrete reinforcing steel, hot-rolled steel, hollow structural steel, steel plate: 890–1,490 kg CO_2e/t	100%

Note: Range for steel, cement and concrete depends on scrap share, clinker ratio and concrete compressive strength, respectively

Source: Gangotra et al., 2023

SUSTAINABILITY STANDARDS AND LABELS

Internationally-recognized certifications

- ISO 14001 on Environmental Management Systems is the most common international standard providing assurances that environmental impacts are being measured and improved. More specific standards such as ISO 14020:2000 on Environmental Labels and Declarations, ISO 45001:2018 on Occupational Health and Safety Management, and ISO 20400:2017 on Sustainable Procurement establish guiding principles for the development and use of sustainable procurement practices and management
- SA800035 on Social Accountability from Social Accountability International and OHSAS 45001 on Occupational Health and Safety Management are increasingly being used for application of social sustainability criteria
- Other international sustainability standards and certifications include the Leadership in Energy and Environmental Design (LEED), Forest Stewardship Council (FSC) and the Marine Stewardship Council (MSC)
- The Global Ecolabelling Network (GEN) is a non-profit association for third-party environmental performance recognition and certification

Source: Asian Development Bank, 2021

SUSTAINABILITY

Ecolabeling: Industry standards and verification

Standard for Sustainable and Resilient Infrastructure

This is a global voluntary standard that integrates key criteria of resilience and sustainability into infrastructure development, taking into consideration governance, social and environmental factors. It is currently developed under International Social and Environmental Accreditation and Labelling (ISEAL) guidelines by the Swiss Global Infrastructure Basel Foundation (GIB) and the French bank Natixis. GIB and Natixis launched the SuRe standard on December 9, 2015

Health and Safety Management (OHSAS 18001)

OHSAS 18001 is one of the international standards for occupational health and safety management systems. It provides a framework for the effective management of occupational health and safety, including all aspects of risk management and legal compliance. It addresses occupational health and safety rather than any specific product safety matters

Environmental Management (ISO 14001)

ISO 14001 sets out the criteria for an environmental management system. It maps out a framework that a company or organization can follow to set up an effective environmental management system.
Designed for any type of organization regardless of its activity or sector, ISO 14001 can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved

Eco-Management and Audit Scheme

This is a voluntary environmental management instrument, which was developed in 1993 by the European Commission. It enables organizations to assess, manage and continuously improve their environmental performance. The scheme is globally applicable and open to all types of private and public organizations. To register with EMAS, organizations must meet the requirements of the EU EMAS- Regulation. Currently, more than 4,600 organizations and more than 7,900 sites are EMAS-registered

Source: Asian Development Bank, 2021

ECOLABELING

ISO classification type I

Type I Ecolabels (ISO 14024:1999)

- Only independent and reliable labels that consider the life cycle impact of products and services are called ecolabels, even if this term is commonly used in a broad and not always correct way
- This type of ecolabel is the most useful for procurement professionals. The ecolabels are based on ambitious criteria of environmental quality, and they guarantee that the awarded products respect the highest environmental standard in that market segment. The criteria are usually developed through the involvement of a large number of stakeholders and awarded after an independent process of verification
- Ecolabels take into account all adverse environmental impacts of a product throughout its life cycle, including energy and water consumption, emissions and disposal

ISO type I ecolabels

Source: Asian Development Bank, 2021

Image source: https://dldxedu.com/education-tips/3-types-eco-labels-know/

ECOLABELING

ISO classification type II

Type II Ecolabels – Self-Declared Environmental Claims (ISO 14021:1999)

- Labels belonging to this group do not share some of the usual characteristics of environmental labels, the main difference being that they are not awarded by an independent authority. These labels are developed internally by companies and can take the form of a declaration or a logo referring to a company's product
- Companies have developed their own environmental label or claim as consumers and procurement professionals are increasingly attentive to the environmental impact of what they procure. Therefore, providing information on the environmental performance of products and services is becoming a commercially interesting option for many firms. The self-declaration that a company voluntarily makes refers to an environmental aspect of a product, to a component of the product, or to its packaging; and/or is made on the product, on product packaging, in product literature, or in advertisement
- This kind of producer declaration can provide useful information for procurers, if all green claims are accurate and true. If the information conveyed in claims is vague, misleading or inaccurate, the consequence can be loss of trust in claims and labels in general

ISO type II ecolabels

Source: Asian Development Bank, 2021

ECOLABELING

ISO classification type III

Type III Ecolabels – Environmental Impact Labels (ISO 14025:2006)

- Type III ecolabels consist of qualified product information based on life cycle impacts. Environmental parameters are fixed by a qualified third party and then companies compile environmental information into the reporting format, which is independently verified. The impacts are expressed in a way that makes it easy to compare different products and sets of parameters for public procurement purposes
- Type III ecolabels do not assess or weigh the environmental performance of the products they describe. This type of environmental labels only shows the objective data, and their evaluation is left to the procurer. Type III ecolabels require exhaustive life cycle data sheets called environmental product declarations

ISO type III ecolabels

Source: Asian Development Bank, 2021

ECOLABELING

ECO LABEL: Criteria for building material and product certification

- Raw material extraction
  - Extraction management (only for natural products)
  - Extraction management (for all hard coating products)
- Raw material selection (for all hard coating products)
  - Absence of risk phrases on raw materials
  - Limiting the presence of certain substances in additives (only for glazed tiles)
  - Limiting the presence of asbestos and polyester resins in materials
- Finishing operations (only for natural products)
- Production process (for processed products only)
  - Energy consumption
  - Water consumption and use
  - Emissions to air
  - Emissions to water
  - Cement

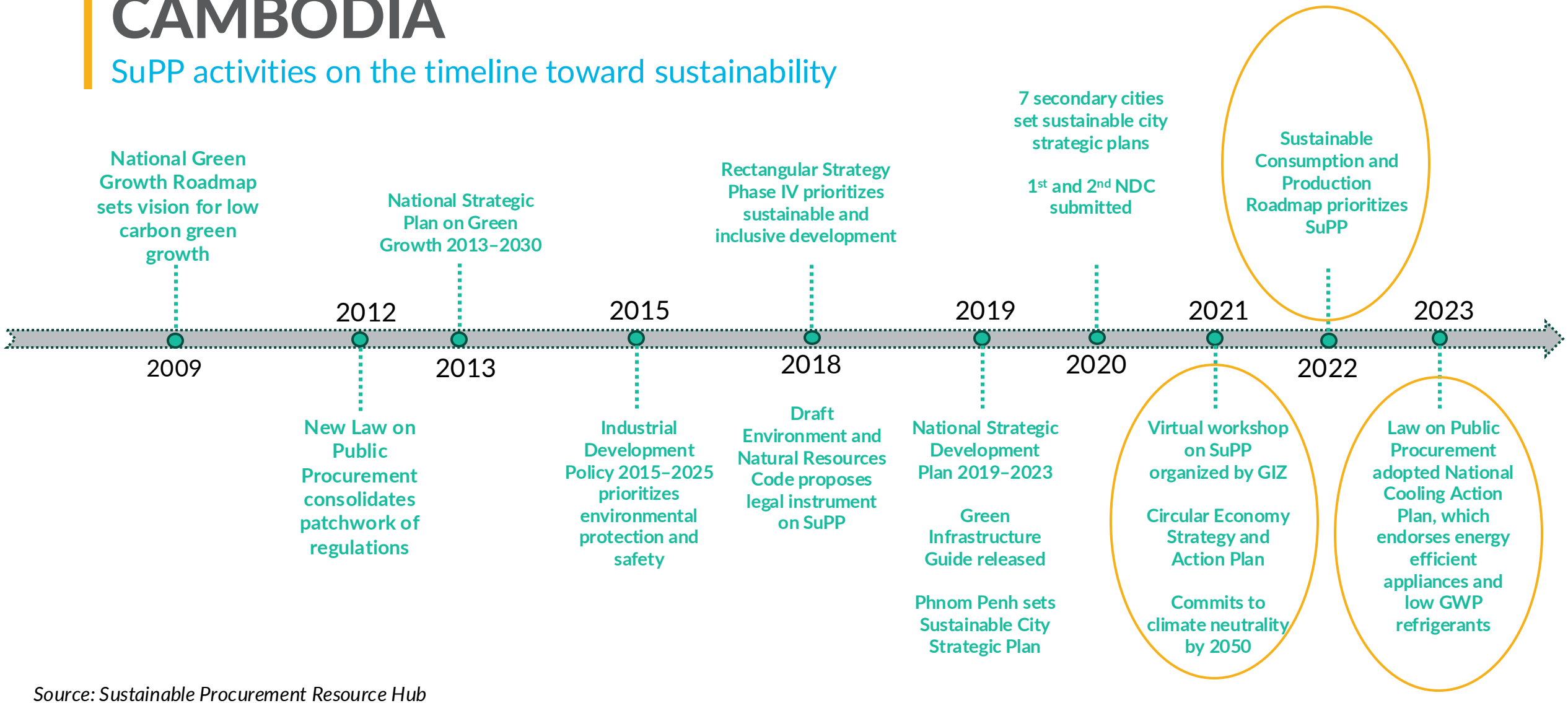
ECO LABEL certification from Ecological Certification Institute is based on ISO 14024 standard used in European Union countries, based on type 1 ecolabel. It is an optional environmental label, based on detailed life cycle analysis. Among the sectors available for certification, building construction materials is also included

- Waste management
  - Waste management (only for natural products)
  - Recycling of waste (only for processed products)
- Use phase
  - Release of hazardous substances (glazed tiles only)
- Packaging features
- Suitability for use
- Consumer information

Source: ECO LABEL

CAMBODIA

SuPP activities on the timeline toward sustainability



Source: Sustainable Procurement Resource Hub

CAMBODIA

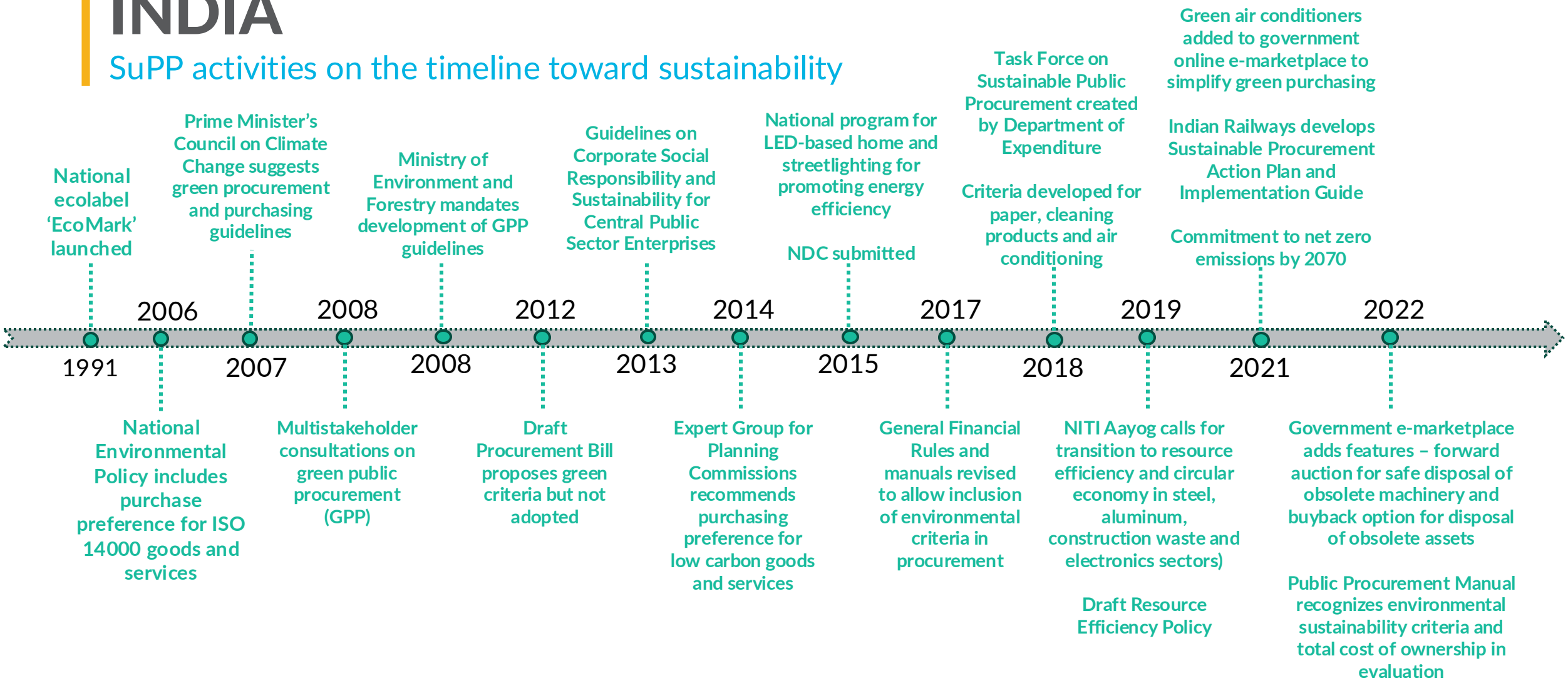
Progress on implementation of SuPP

- SuPP is recognized in Cambodia's Sustainable Consumption and Production Roadmap 2022–2035 as a key strategy to promote ‘sustainable investment’ - one of the roadmap's five key pillars. The roadmap calls for the set up of a sustainable (green) procurement standard under the National Council for Sustainable Development (NCSD) and Ministry of Economy and Finance, and design of environmental criteria and performance requirements for priority products and services
- A new Environment and Natural Resources Code has been adopted in May 2023, with a detailed section on ‘sustainable public procurement’. The code outlines a proposed mechanism for the design of green tenders that depends on the development of environmental standards and ecolabels. The NCSD is currently designing an ecolabeling program in Cambodia, in collaboration with relevant line ministries, with support from GIZ
- The NCSD is an interministerial body that is leading the implementation of SuPP in Cambodia. The adoption of the Public Procurement Law in May 2023, which includes provisions aligning public procurement with sustainable principles demonstrates Cambodia’s commitment to SuPP. However, results may only be visible after increasing awareness generation among stakeholders, ensuring effective cooperation between ministries and developing an e-procurement portal for greater transparency

Source: Sustainable Procurement Resource Hub

INDIA

SuPP activities on the timeline toward sustainability



Source: Sustainable Procurement Resource Hub

INDIA

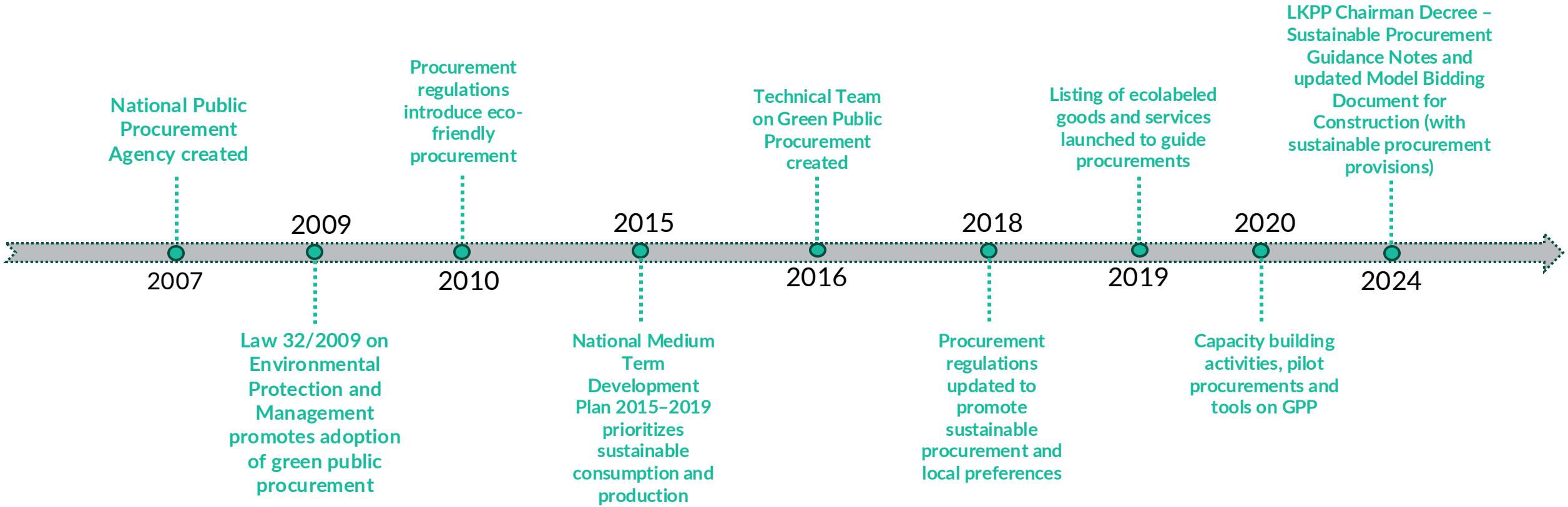
Progress on implementation of SuPP

- General Financial Rules and Manual opened the door for SuPP in the absence of procurement law reform
- Indian Railways and few other public agencies implemented SuPP over the past decade without central procurement support
- Task Force on Sustainable Public Procurement created in 2018 has seven priority spend categories to pilot SuPP implementation
- 2017 Public Procurement (Preference to Made in India) Order encourages inclusion of preferences in public procurements for domestic suppliers
- Government e-Marketplace includes sustainable products and services, making it simple for procuring entities to buy green and local. Presently, major building construction materials are not included
- GreenPro is a type 1 ecolabel for sustainable products, materials and technologies for the construction, operation and maintenance of buildings. Over 1,500 products have obtained GreenPro certification
- Introductory training modules on SuPP available since 2020

Source: Sustainable Procurement Resource Hub

INDONESIA

SuPP activities on the timeline toward sustainability



Source: Sustainable Procurement Resource Hub

INDONESIA

Progress on implementation of SuPP

- Green public procurement was first introduced in Law 32/2009 on Environmental Protection and Management, Articles 42(2)c and 43(3)a. The law identified procurement of environmentally sound goods and services as an 'economic instrument of the environment' to promote sustainable consumption and production (complementary to environmental taxes, levies, subsidies, permitting, labels, etc). The use of ecolabels are encouraged to identify environmentally-friendly goods and services
- In 2013, the 10-Year Framework of Sustainable Consumption and Production launched quick-win programs designed to advance SuPP
- Public procurement is now governed by Presidential Regulation 16/2018 as amended in No. 12/2021. It outlines SuPP as a core procurement objective (Articles 4,5). Article 19 requires the procuring entity to maximize the use of green industrial products and green criteria in technical specifications and terms of reference (TOR). Articles 19(1).d and 19(4) also clearly mention that the Commitment Making Officer (PPK) shall, in preparing technical specifications and TOR for goods and services, prefer ecolabeled products
- Ministerial Regulation No. 5 on the Procedure for Application of Eco-friendly Labels for Green Public Procurement (GPP) was adopted by the Ministry of Environment and Forestry in 2019. The regulation requires that procurements be made based on a list of ecolabeled goods and services in priority product categories: office paper, plastic files, wood for furniture, medical waste treatment equipment and air conditioners (as specified in Circular Letter No.16/2020). The list of products are to be updated annually and gradually expanded to other product categories with time. Three product categories were added in 2021: processed wood for construction, cement and eco-friendly concrete

Source: Sustainable Procurement Resource Hub

THAILAND

SuPP activities on the timeline toward sustainability

Source: Sustainable Procurement Resource Hub

THAILAND

Progress on implementation of SuPP

- Since 2005, Thailand has established a vision that the government sector should be a leader in green procurement in order to create a proper market of products and services that are environmentally friendly. This vision was pronounced in multiple policy documents, including the 20-Year National Strategy, 10th–13th National Economic and Social Development Plans, Environmental Quality Management Plan, and Pollution Control Plan. The green procurement concept aligns with the 'sufficiency economy philosophy' that underpins the country's development pathway toward green growth
- Over the years, the GPP Promotion Plan has expanded in its second (2013) and third phases (2017) to promote green purchasing more broadly, to all governmental units at national and local levels, universities, the private sector and the general public
- The National Roadmap for Sustainable Consumption and Production (SCP) 2017 sets a vision of Thailand as the leader in ASEAN on sustainable consumption and production by adopting the sufficiency economy concept and mobilizing through integration of social innovation by 2036. Ecolabeling and sustainable procurement are seen as key implementation tools to achieve the nation's ambitious SCP goals
- Public procurements in Thailand are regulated by the Public Procurement and Supplies Administration Act 2017, an act that specifically promotes green and social procurement. Procurements must obtain optimal benefits to the state agency conforming to the principles of value for money, efficiency and effectiveness, and accountability. Section 65 allows procurers to consider non-price criteria, including life cycle costs and suppliers promoted by the states, which include those 'creating innovation' or 'conserving energy or the environment'

Source: Sustainable Procurement Resource Hub

THAILAND

Progress on implementation of SuPP (continued)

- Since 2009, a green public procurement ‘recognition award’ has been given to best performing agencies based on results submitted to the Pollution Control Department (PCD)
- To access public procurement contracts, suppliers in Thailand are invited to qualify for recognized ecolabels or register on government procurement websites. There are two major platforms for green products in Thailand:
  - Green Basket, managed by PCD, that lists suppliers in 40 product categories to simplify green purchasing for government agencies
  - Thai Eco-Products Directory, operated by the Federation of Thai Industries. It was launched in 2022 to act as the central hub for green products and services in Thailand. The directory compiles data from 18 different Thai ecolabels in 13 product and service categories
- Green public procurement in Thailand is made simple by allowing procurers to choose from listings of verified green vendors. Ecolabels have a longstanding basis in the country. The Thailand Business Council for Sustainable Development (TBCSD) initiated the Thai Green Label, a type I ecolabel scheme in October 1993
- When the Government of Thailand started actively promoting GPP in 2005, the Green Cart was developed as a list for green public procurement products covering 17 products and 5 service categories. The Green Cart is both a catalogue and a set of criteria based on the Thai Green Label (for products) and the Green Leaf (for hotels). By 2018, the coverage of the Green Cart was expanded to 22 product and 6 service categories. Procuring agencies can check whether procuring products satisfy the Green Cart criteria

Source: Sustainable Procurement Resource Hub

THAILAND

Progress on implementation of SuPP (continued)

- The TBCSD and Thailand Environment Institute manage several ecolabels in the country:
  - Green Label for products and services based on a life cycle assessment
  - Carbon reduction labels granted to products or services with low emissions production processes, or buildings with low carbon emissions operations
  - Green Industry Mark for the manufacturing sector based on the concept of environmental management systems and cleaner technology
  - Green Leaf as a standard of environmental management systems for hotels based on existence of a green policy, green product procurement, energy management and local participation in environmental conservation activities at the area of the hotel's location
  - Private sector self-claimed ecolabels in the building materials sector, such as SCG Eco Value and Green Heart developed by the Siam City Cement Public Company Limited in 2017
  - Coolmode for textile companies that produce climate-friendly textile and garments that are cool, comfortable and easy to clean

Source: Sustainable Procurement Resource Hub

VIETNAM

Progress on implementation of SuPP

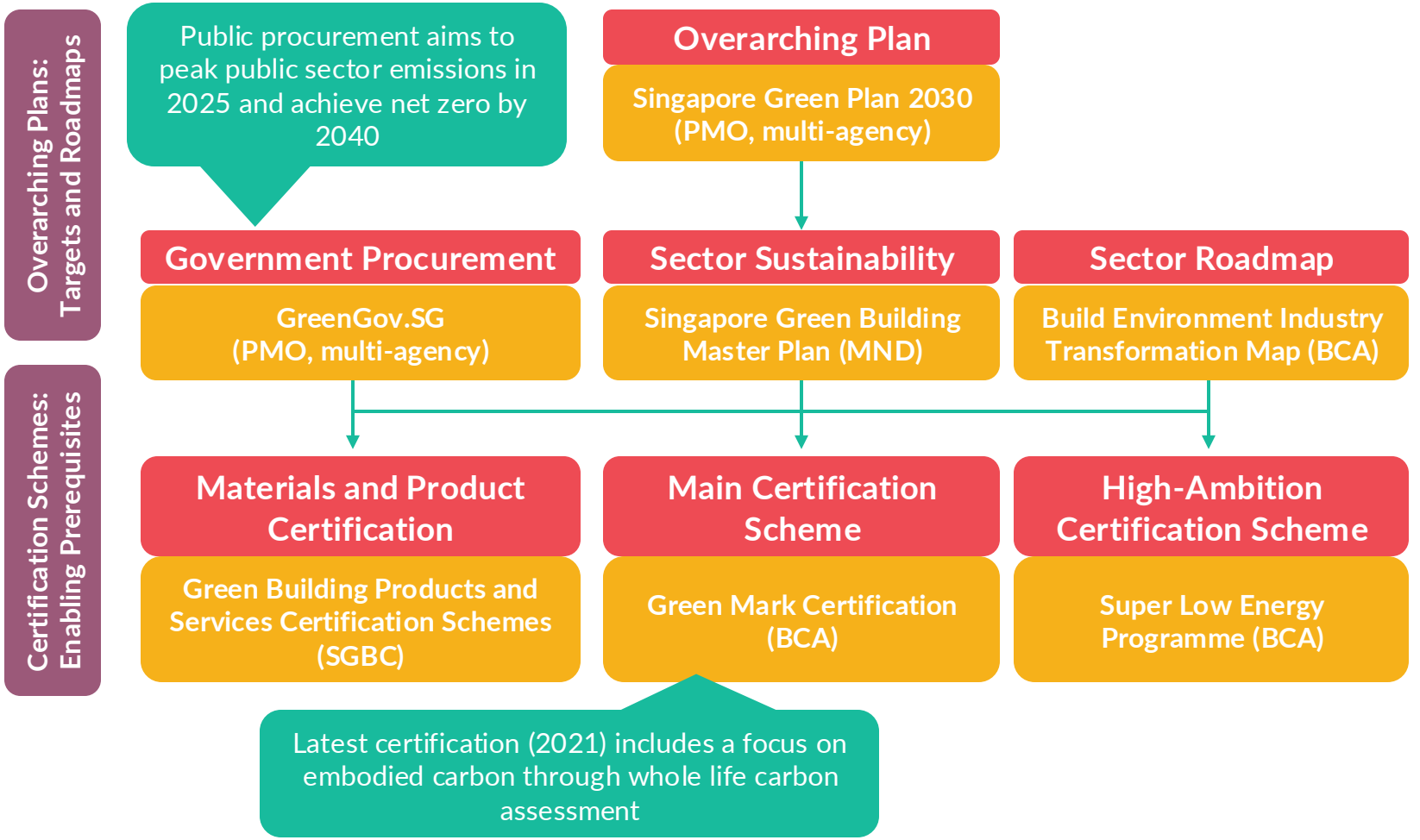
- Vietnam has only recently begun its official journey toward sustainable public procurement. The legal and regulatory frameworks are still being formulated
- Vietnam continues to adopt and adapt international best practices on public procurement reform, and it is active in discerning and complying with the good practices as suggested by more experienced countries. This includes establishing the legal framework for S/GPP to introduce practices in sustainability as one of the objectives for public procurement
- Various developments in legal applications are being proposed such as sub-decrees and guidelines on the implementation processes, which will enable S/GPP to reach its target of 35% of total public procurement by 2035, and 50% of total public procurement by 2050
- Sustainability is integrated into the general legal framework, but it is not yet a core principle or key objective of public procurement. The primary goal of public procurement in Vietnam is still focused on achieving the lowest cost in general, with commodity prices being the main consideration for decision-making. Currently, these financial factors involving low commodity costs, heavily influence estimates of public procurement and often dictate the approval of such procurements
- However, Article 10 of the recent Law on Bidding clearly enunciates the inclusion of sustainability into certain stages of the procurement cycle. The various elements of sustainability include: (i) Environment – environmental pollution prevention, environmental protection, sustainable resource use, and minimization and adaptation to climate change; (ii) Social – health, social welfare and occupational safety; and (iii) Economic – Sustainability throughout the supplier's supply chain, life cycle costs of services or goods, and other criteria

Source: SWITCH-Asia, 2024

MODEL SPP

Case example: Singapore

- Singapore presents a consolidated public procurement strategy involving multiple government ministries and enabling infrastructure, including an overarching roadmap, certification schemes and an embodied carbon calculator
- The targets for public procurement are more ambitious than targets for the wider industry



Source: Xynteo, 2024

ALCBT Project Countries: Progress on implementation of SuPP

- While legislations have been passed for SuPP, the implementation has been weak in all ALCBT project countries, except Thailand to some extent. In 2023, Cambodia has taken important steps by adopting the Public Procurement Law (with emphasis on sustainability) and the Environment and Natural Resources Code, has defined an institutional structure, and is currently designing an ecolabeling program
- The coverage of products and services in sustainable procurement programs is still too small to make a significant impact. Many energy and carbon intensive products must be added, supported by appropriate ecolabeling. Energy and carbon intensive building construction materials like cement and steel are yet to be included
- With reference to ISO 14024:1999, voluntary type II ecolabeling of more energy and carbon intensive products should be encouraged and supported
- Scoring methodology for tender evaluation should be improved to favor green products and services
- Mandates may be required for minimum green products and services procurement, as part of the total annual procurement by government agencies

Source: SWITCH-Asia, 2024

Thank you!

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ASIA LOW CARBON BUILDINGS TRANSITION PROJECT

Life Cycle Assessment for Transitioning to a Low-Carbon Economy | PROJECT

4.4 Carbon Trading

Cambodia, India, Indonesia, Thailand and Vietnam

November 2024

ASEAN CENTRE FOR ENERGY ACE

EESL

HEAT

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WHAT WILL YOU LEARN?

01 What are Carbon Markets and Key Milestones

02 Article 6 of the Paris Agreement and its Relationship to NDCs

03 Types of Carbon Markets

04 Carbon Pricing Instruments

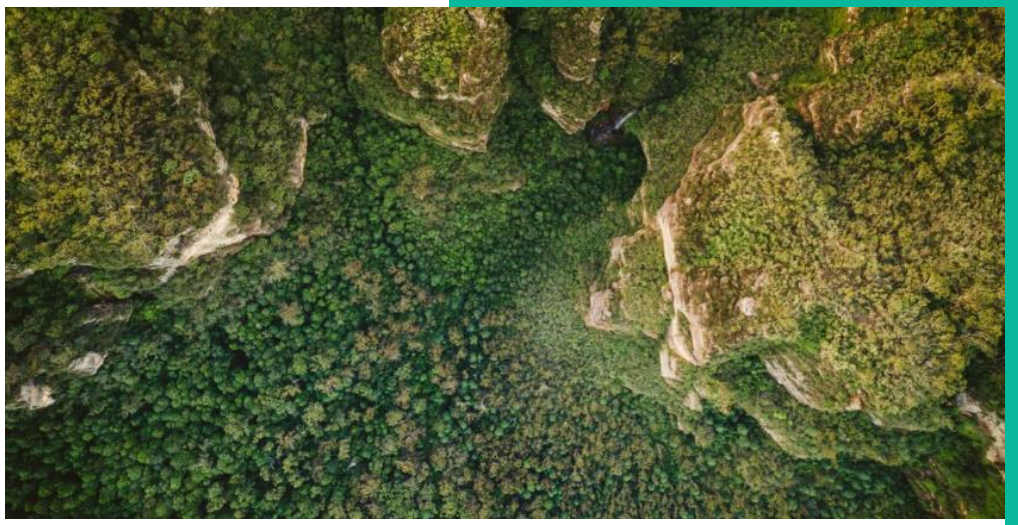
05 Carbon Taxation and Carbon Credit Trading

06 CDM, Standards and MRV

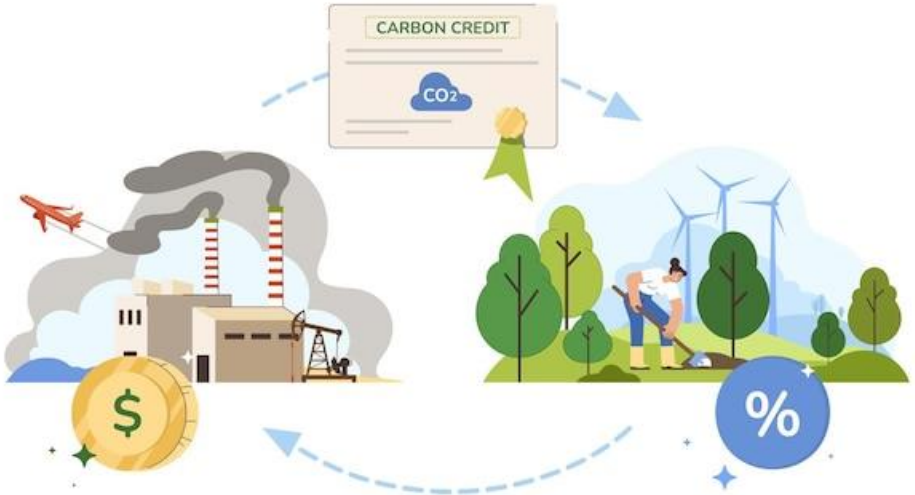
07 Government Initiatives for Carbon Trading

CARBON MARKETS

Introduction to carbon markets



- Carbon markets are ***carbon pricing mechanisms*** enabling governments and non-state actors to trade greenhouse gas (GHG) emissions credits
- ***Carbon markets turn emissions reductions and removals into tradeable assets*** *(Credits are generated from emissions reduction projects, such as energy efficiency and clean energy projects)*
- Carbon markets ***mobilize resources, reduce costs and incentivize climate action*** by enabling countries and companies to **trade carbon credits** through reduction and removal of GHG emissions and thus ***transition toward net zero emissions***



OVERVIEW OF CARBON MARKETS

Key milestones

Kyoto Protocol

- 37 industrialised economies and the EU commit to an average 5% reduction in GHG compared to 1990 levels over a 5-year period (2008-2012)

Doha Amendment

- Kyoto second commitment period (not fully ratified): reduce GHG emissions by at least 18% below 1990 levels over an 8-year period (2013-2020)

Paris Agreement

- All signatories - not just industrialised - committed to national carbon reduction targets
- Article 6 permits the sale of carbon credits by countries meeting targets to nations falling short

COP26 Glasgow

- 153 countries adopt 2030 targets: Nationally Determined Contributions (NDCs)
- Carbon 'rulebook' (Article 6) breakthrough
- New rules for carbon accounting, transfer mechanism and plans for a global carbon market

COP27 Egypt

- Move from planning to implementation
- Launch of the African Carbon Markets Initiative

CARBON MARKETS

Its relation to NDCs and Article 6 of Paris Agreement

Significant components of Article 6:

Article 6.2

Creates the ***basis for trading in GHG emissions reductions*** (or mitigation outcomes) across countries

Article 6.4

Establishes a ***mechanism for trading GHG emissions reductions*** between countries under the supervision of the COP

Article 6.8

Recognizes non-market approaches to promote mitigation and adaptation. It introduces ***cooperation through finance, technology transfer and capacity building***, where no trading of emissions reductions is involved

Article 6 Paris Agreement:

- *Allows countries to voluntarily cooperate with each other to achieve emissions reduction targets set out in their NDCs*
- *Countries will be able to transfer carbon credits earned from the reduction of GHG emissions to help one or more countries meet climate targets*

ARTICLE 6, PARIS AGREEMENT

How it supports carbon markets

- Corresponding adjustment requirements ***may extend beyond compliance markets to the voluntary carbon markets***, where demand is driven by the private sector's voluntary commitments to reduce emissions
- ***In 2023, 143 of 154 Parties stated in their NDCs that they plan to or will possibly use carbon credits from cooperative approaches under Article 6 as a means to finance climate action and achieve national targets***
- Thus, Article 6 ***establishes an international carbon market*** with **multilateral governance under the UNFCCC** setting ***common global standards and guidance for development and trading in emissions reductions and Internationally Transferred Mitigation Outcomes***

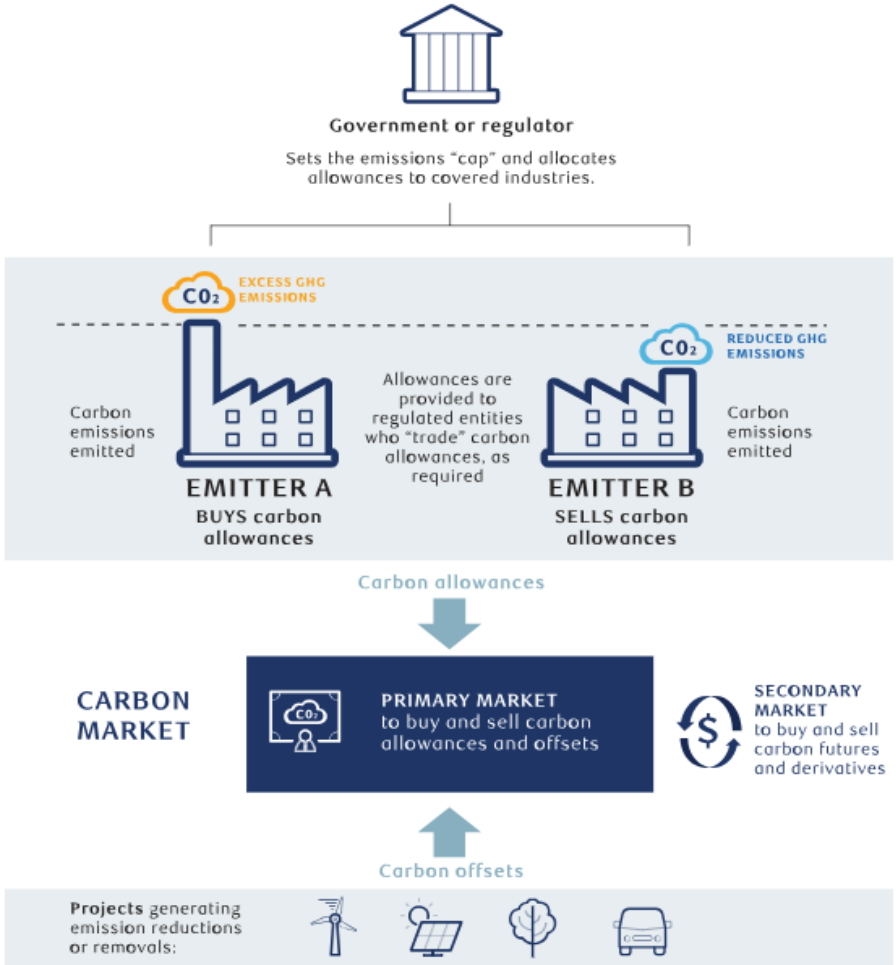
Article 6 Paris Agreement:

- *Article 6 pertains to the establishment of international compliance carbon markets governed by the rules of the Paris Agreement where countries can trade carbon credits*
- *The agreement on Article 6 established an accounting mechanism known as 'corresponding adjustment' to ensure that double counting does not occur*

CARBON MARKETS

Compliance and voluntary carbon markets

- Currently there exist two types of carbon markets: **compliance markets and voluntary markets**
- A compliance market is a market for **carbon offsets created by the need to comply with a regulatory act**. In a cap-and-trade emissions reductions market, actors buy and sell carbon offsets to comply with the cap or limit imposed on their emissions
- Some of the mechanisms are:
  - **Emissions Trading Schemes (ETS)**
  - **Clean Development Mechanism (CDM)**
  - **Joint Implementation (JI)**
  - **Carbon Tax**



Compliance carbon markets, cap and trade program

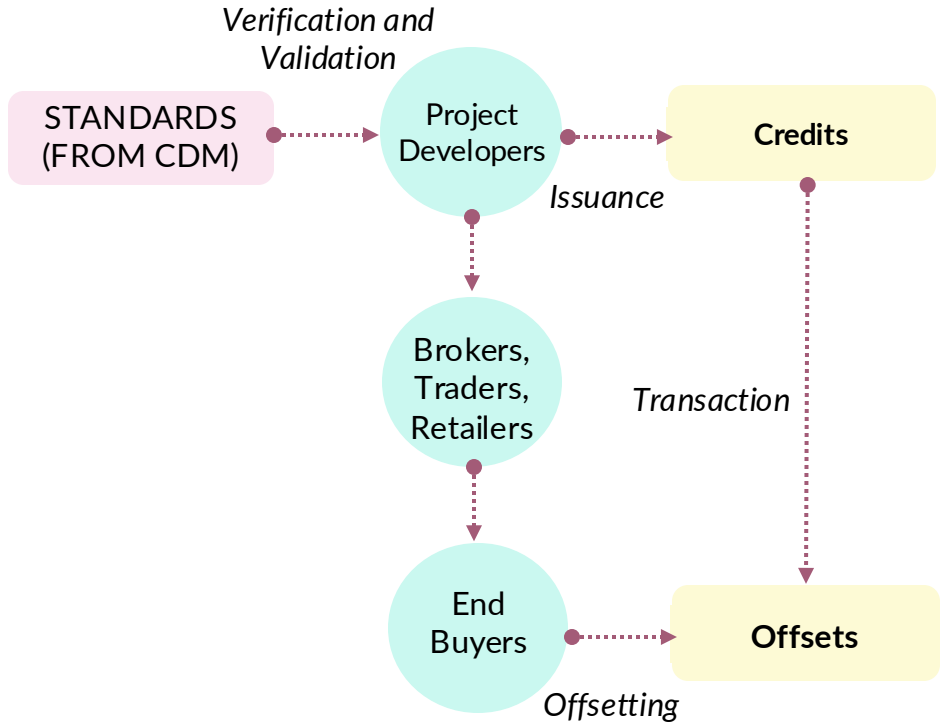
Source: The Carbon Market, a Green Economy Growth Tool, Ministère de l'Environnement et de la Lutte contre les changements climatique.;Quebec, Canada; https://www.environnement.gouv.qc.ca/changementsclimatiques/marche-carbone_en.asp

Image: Carbon markets are growing: Here's what you need to know https://www.rbcwealthmanagement.com/en-eu/insights/carbon-markets-are-growing-heres-what-you-need-to-know

CARBON MARKETS

Compliance and voluntary carbon markets (continued)

- The voluntary carbon market is a ***decentralized market where private actors voluntarily buy and sell carbon credits*** that represent certified removals or reductions of GHGs in the atmosphere
- Each carbon credit corresponds to ***one metric ton of reduced, avoided or removed CO_2 or equivalent GHG.*** It can be used by a company or an individual to compensate for the emissions of one ton of CO_2 or equivalent gases, becoming an offset. It is moved to a register for retired credits, or retirements, and it is no longer tradable
- Compliance markets are currently limited to specific regions. Voluntary carbon credits are significantly more fluid, unrestrained by boundaries set by nation states or political unions. ***Voluntary carbon credits also have the potential to be accessed by every sector of the economy instead of a limited number of industries***



Structure of the voluntary carbon market

Source: S&P Global Platts

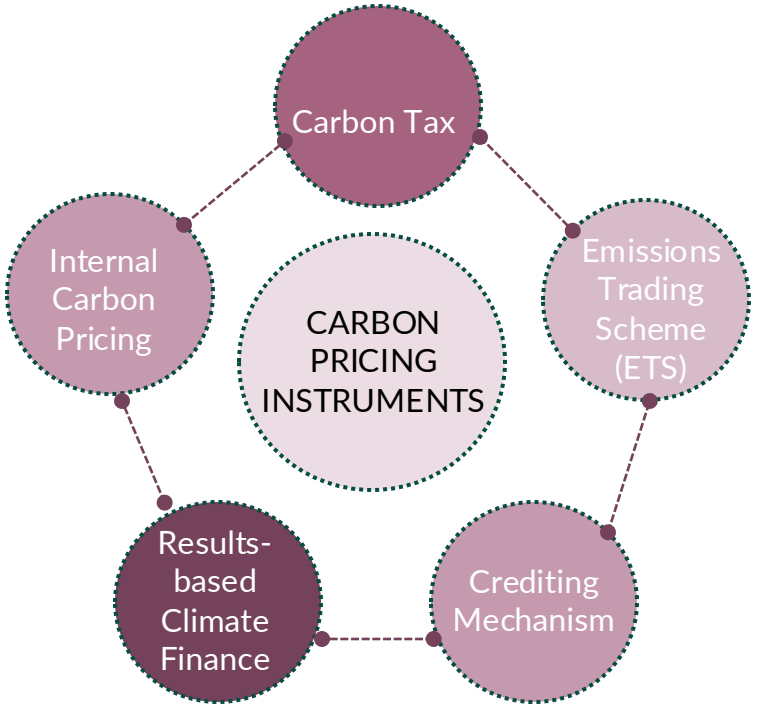
CARBON PRICING

The necessity for carbon pricing

Carbon pricing is an approach to reduce carbon emissions (also referred to as greenhouse gas or GHG emissions) that uses market mechanisms to pass the cost of emitting on to emitters – ***"Polluter Pays"***

Why price carbon?

- Can be an **effective policy to spur innovation**, create lasting economic growth and help nations foster a low carbon economy
- Can provide an **economically efficient means of reducing GHG emissions**
- **Sends a price signal** that could **influence** widely dispersed **economic decisions**



Carbon pricing instruments

Source: Carbon Pricing Leadership Coalition

CARBON TRADING INSTRUMENTS

Carbon pricing

Carbon Tax

Puts a ***direct price on GHG emissions*** for every ton of carbon pollution emitted. It thus creates a financial incentive to lower emissions by switching to more efficient processes or cleaner fuels (i.e., less pollution means lower taxes)

Emissions Trading Scheme (ETS)

Also known as a **cap-and-trade system**—sets a limit ('cap') on total direct GHG emissions from specific sectors and sets up a market where the rights to emit (in the form of carbon permits or allowances) are traded

Results-based Climate Finance (RBCF)

Entities receive funds when they meet pre-defined climate-related goals, such as emissions reductions

Internal Carbon Pricing

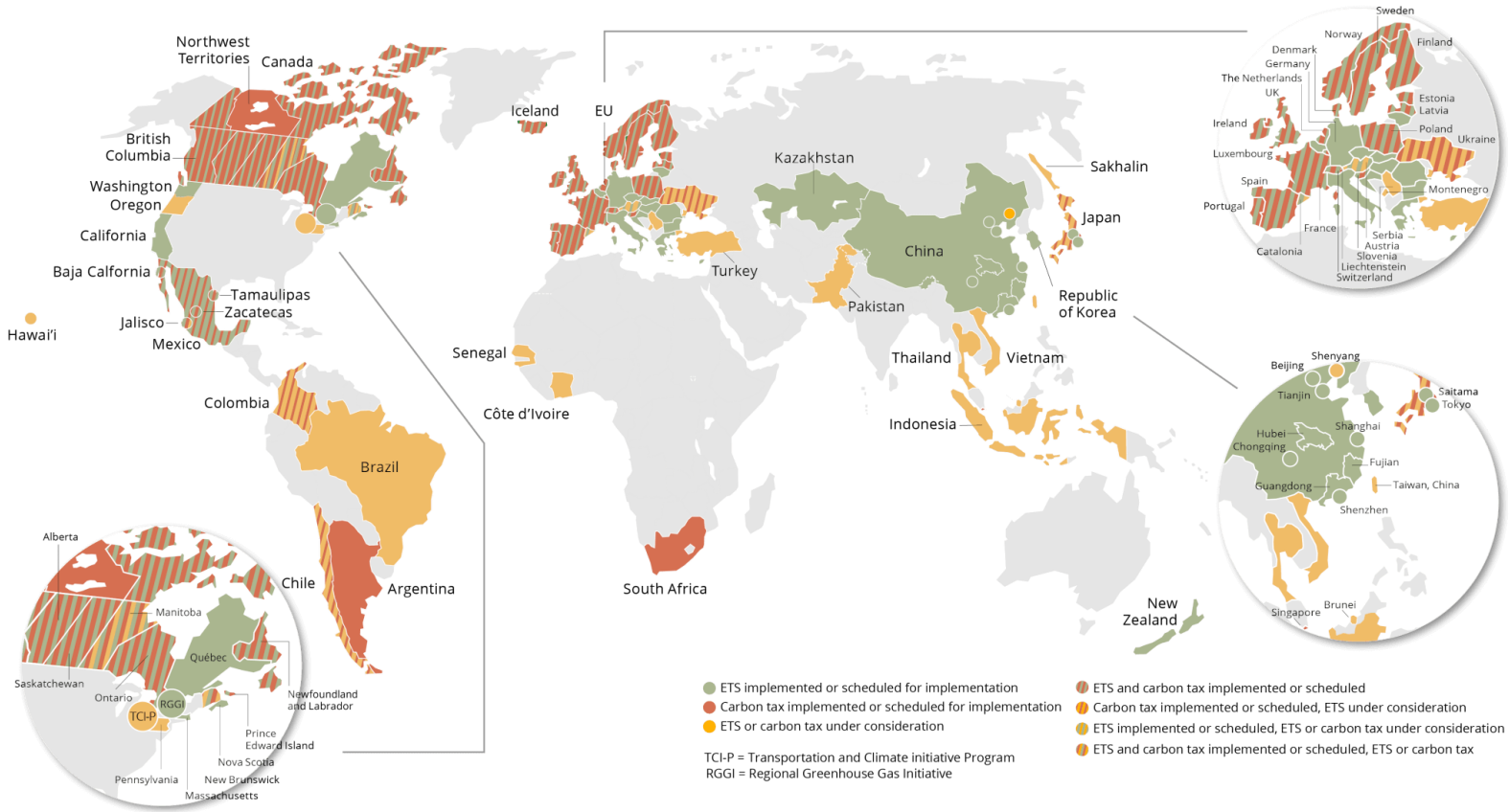
Governments and firms assign their own internal price to carbon use to factor this into their investment decisions

Image source: Unsplash

CARBON TAXATION

Global pricing initiatives

Carbon pricing initiatives are considered 'scheduled for implementation' once they have been formally adopted through legislation and have an official start date and 'under consideration' if the government has announced its intention to work toward implementation



Source: World Bank, 2023

CARBON TAXATION

International norms and examples

The main idea behind taxation schemes is to incentivize emitters to invest in more sustainable technologies

The abatement costs are hard to quantify, setting the right carbon tax is challenging

*Almost **one-third** of the carbon tax systems were introduced in the 1990s **by Scandinavian countries***

***Smaller countries**, including Estonia, Latvia, Liechtenstein, Switzerland, Iceland and Ireland **followed by 2010** and **Japan followed in 2012** as the first non-European country*

***In the last five years**, national taxation schemes have been implemented in Canada, Singapore and South Africa*

Canada: *Nationwide tax on oil, coal and gas*

UK: *Carbon tax has led electric utilities to switch away from coal*

Singapore: *Tax targeting GHG emissions from all fossil fuels used by facilities from the industry and power sector*

Source: Pérez and Rhode, 2020

CARBON CREDIT TRADING

Standards and measurement, reporting and verification (MRV)

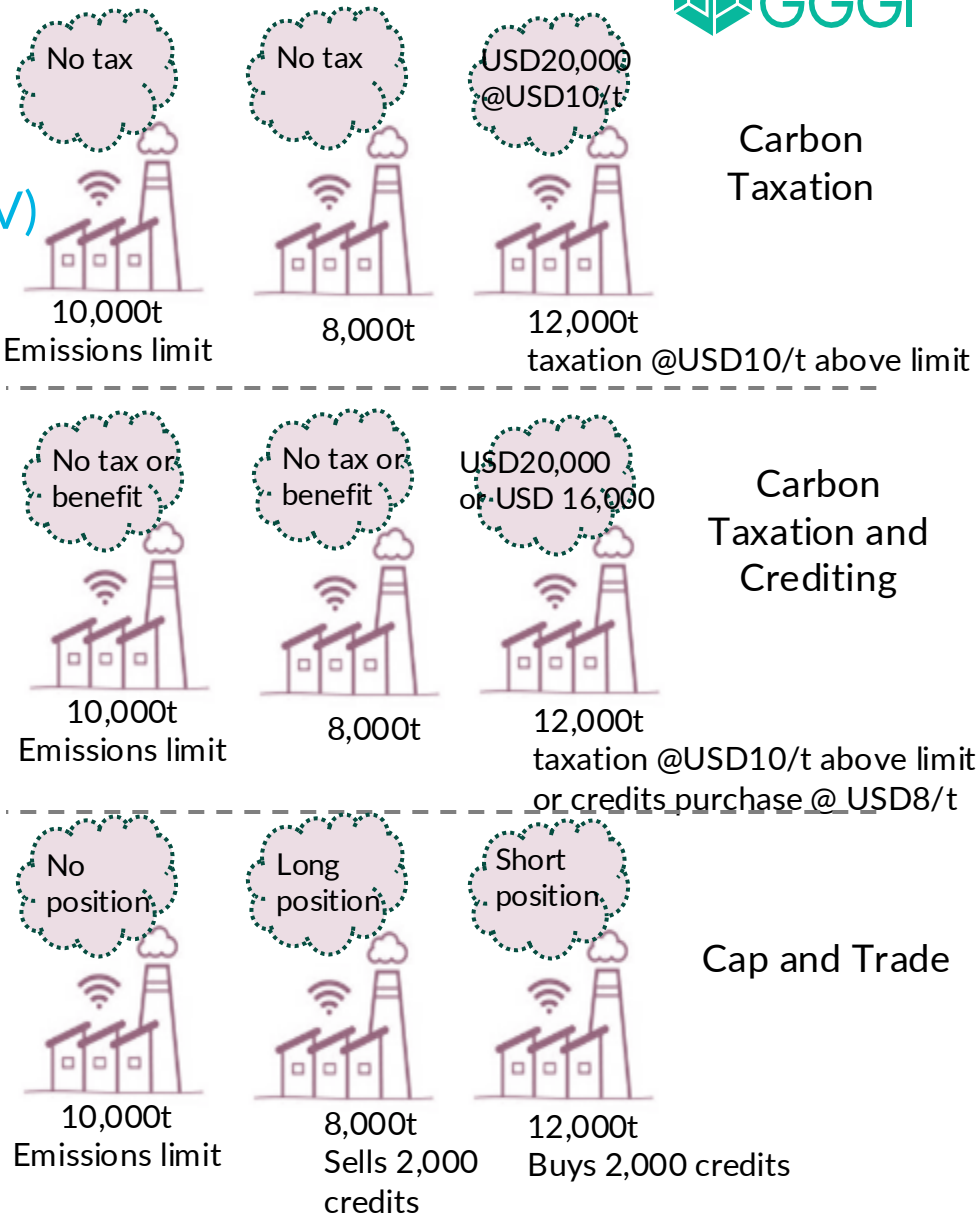
TIME PERIOD
Globally-agreed obligations or individual commitments
Paris Commitment – 2030
EU ETS Phase 4 2040

Units of CO_2e (Carbon Dioxide Equivalent)

- 1 ton CO_2 = 1 credit
- 1 ton CH_4 = 28 credits
- 1 ton N_2O = 265 credits
- 1 ton SF_6 (sulphur hexafluoride) = 23,500 credits

Standards

- UNFCCC for CDM
- EU for EU Trading Scheme
- Japanese Government for Joint Crediting Mechanism
- California Resources Board for California's Cap and Trade Program
- Verra and Gold Standards for Voluntary Carbon Markets



Source: Garnaik

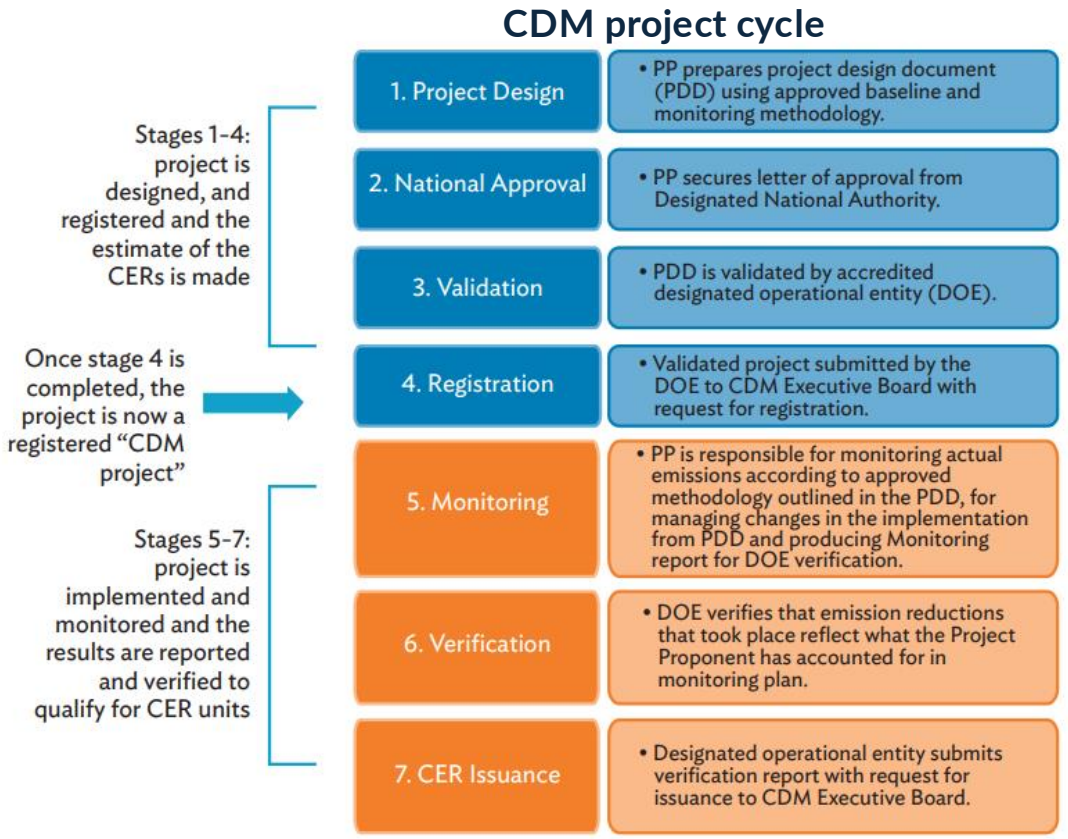
CLEAN DEVELOPMENT MECHANISM

Standards and MRV

Eligible CDM project types:

- Energy Industries (Renewable / Non Renewable
- Energy Distribution
- Energy Demand
- Manufacturing Industries
- Chemical Industries
- Construction
- Transport
- Mining / Mineral Production and Solvent Use
- Fugitive Emissions from Fuel (Solid, Oil, Gas)
- Waste Handling and Disposal
- Reforestation / Afforestation
- Agriculture and Metal Production

Source: Asian Development Bank, 2016



CER – certified reductions; CDM – Clean Development Mechanism; PP – Project Participants
Note: the CDM project cycle can be broken in two main sections

Source: UNFCC, 2014, What is CDM; http://cdm.unfcc.int/about/index.html

GOVERNMENT INITIATIVES

Cambodia: Initiatives for carbon trading

Cambodia enacted regulations on December 14, 2023, to implement Article 6 of the Paris Agreement within its borders

These include:

Article 6 Operations Manual

This manual provides a framework for issuing and transferring Internationally Transferred Mitigation Outcomes (ITMOs), which are referred to as authorized Greenhouse Gas Emissions Reductions (GHG ERs)

Positive List Inclusion

Projects must align with the updated Nationally Determined Contributions (NDCs)

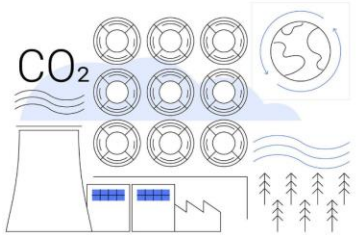
Source: Ministry of Environment, Government of Cambodia, 2024

Criteria for GHG ER projects

Positive list inclusion

Domestic use preservation

Authorization period



Eligible carbon mechanisms

Verification and additionality

Environmental integrity

Alignment

GOVERNMENT INITIATIVES

Cambodia: Initiatives for carbon trading (continued)

Various initiatives to reduce carbon emissions and achieve neutrality

Asia's Low Carbon Building Transition Project (ALCBT)

Launched in May 2024, this project aims to transition Cambodia's building sector to low carbon buildings. The goal is to reduce energy consumption and GHG emissions

REDD+ Program

The government has developed the REDD+ Program in several provinces to help reduce emissions from deforestation and forest degradation

Decarbonization

Cambodia is decarbonizing its transport and power sector

Source: Ministry of Environment, Government of Cambodia, 2024

Image source: earth journalism.net

GOVERNMENT INITIATIVES

India: Initiatives for carbon trading

Carbon Credit Trading Scheme (CCTS)

Finalized in June 2023 and scheduled to begin in 2025–2026, this scheme aims to trade GHG emissions using carbon credit certificates. The CCTS has two mechanisms – compliance mechanism and offset mechanism

Perform, Achieve and Trade Scheme (PAT)

Launched in 2012, the scheme covers 13 energy-intensive sectors with *1,333 designated customers*

Renewable Energy Certificates (RECs)

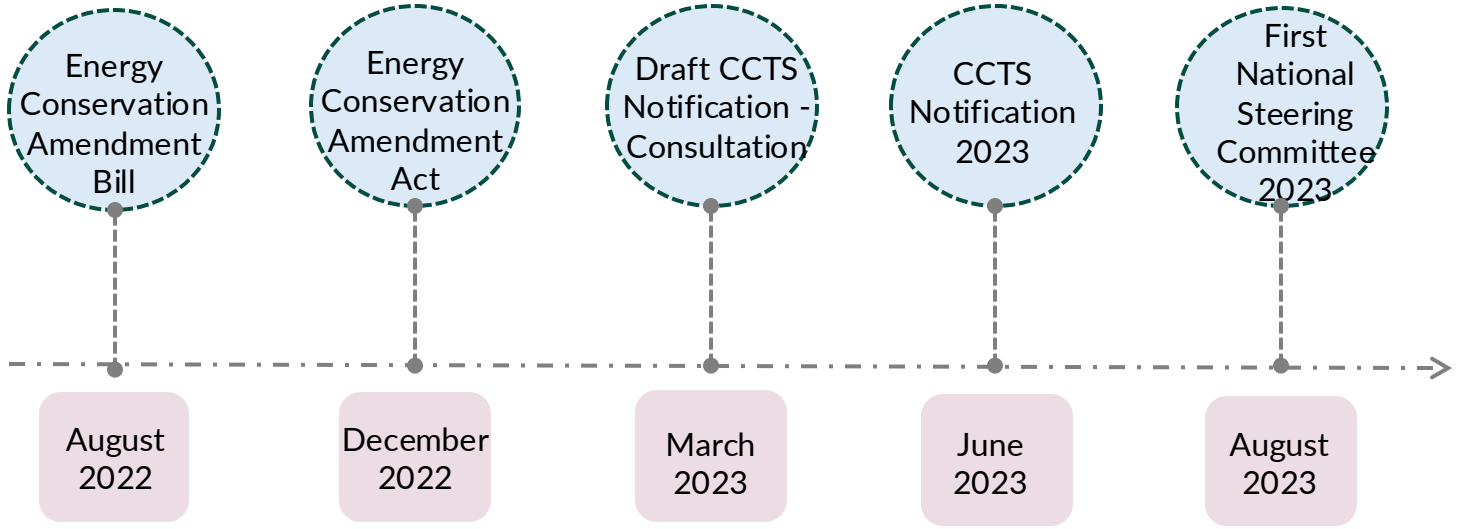
Launched in 2010, it covers 13 sectors including distribution licensees, captive consumers and open access users. *A total of 1,117 projects registered (~5,607MW)*

Green Hydrogen Energy and Battery Energy Storage System (BESS)

This is an accelerated movement to create an enabling environment through policy, research and market transformation

GOVERNMENT INITIATIVES

India carbon markets: Key milestones



Current Approach under PAT

$$SEC = \frac{\text{Total Energy Input to the Plant Boundary (TOE)}}{\text{Equivalent Product or Output (t)}}$$

Transition

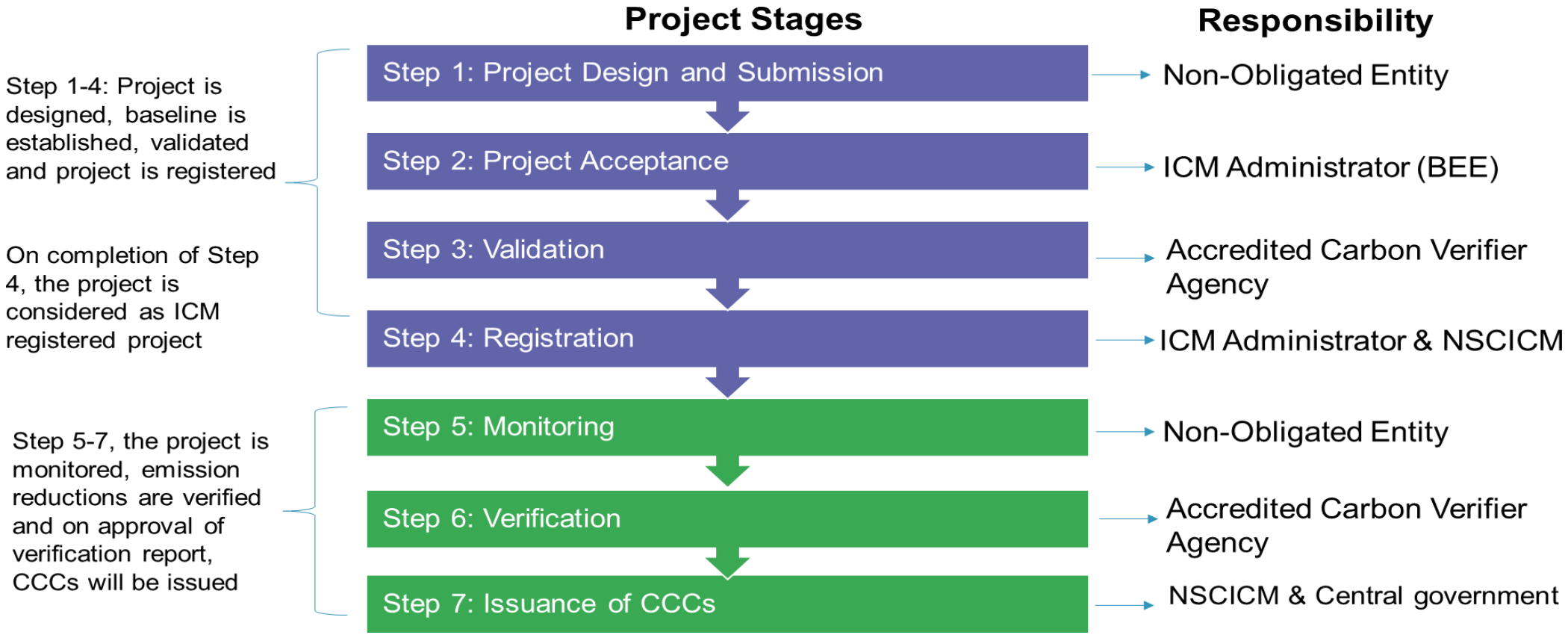
Proposed for Compliance Mechanism Approach under CCTS

$$SGE = \frac{\text{Total GHG Emissions from DCs } (tCO_2eq)}{\text{Equivalent Product or Output (t)}}$$

Source: Garnaik

CARBON MITIGATION PROJECTS

India: Project stages and responsible agencies



Source: Garnaik

GOVERNMENT INITIATIVES

Indonesia: Initiatives for carbon trading

Presidential Regulation on Carbon Pricing and Indonesia Carbon Exchange (IDX Carbon)

On September 26, 2023, the Indonesian Stock Exchange launched the Indonesia Carbon Exchange to achieve the NDC and GHG emissions control in national development

Indonesian Economic Value of Carbon Trading Scheme

In February 2023, the Ministry of Energy and Mineral Resources launched the Indonesian Economic Value of Carbon (NEK) Trading Scheme. This mandatory, intensity-based ETS is for the power sector and targets coal-fired power plants connected to the Perusahaan Listrik Negara (PLN) grid

GOVERNMENT INITIATIVES

Indonesia: Initiatives for carbon trading (continued)

Issuing PTBAE-PUs

PTBAE-PUs are emissions allowance for the energy and forestry sector. This is applied to the power plant subsector in the energy sector, and mangrove and peat land located within or outside the forest area in the forestry sector. In January 2023, to kickstart carbon trading, the Ministry of Energy and Mineral Resources issued PTBAE PUs for the power plant subsector to 99 coal power plants consisting of 42 power producers

Indonesia's Voluntary Carbon Markets

In 2022, Indonesia launched a voluntary carbon market that allows companies to trade carbon credits. Projects that generate credits include renewable energy, energy efficiency, and land-use changes, including forest conservation (REDD+)

GOVERNMENT INITIATIVES

Thailand: Initiatives for carbon trading

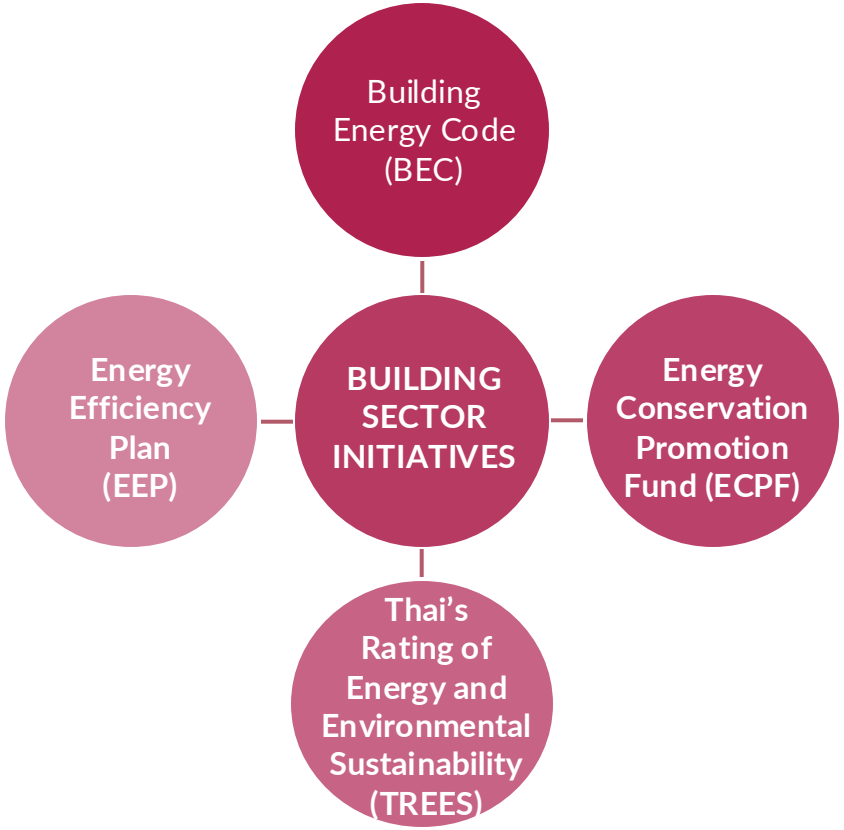
The Thailand Greenhouse Gas Management Organization (TGO) has developed the ***Thailand Voluntary Emissions Trading System*** (Thailand V-ETS) to promote GHG emissions reduction under the domestic voluntary carbon market

Thailand Carbon Offsetting Program

Organizations can offset their carbon emissions by purchasing carbon credits generated by approved ***Thailand Voluntary Emissions Reduction*** (T-VER) projects

Thailand Emissions Trading Scheme *(under development)*

A national carbon trading system to align with its commitment to carbon neutrality by 2050 is being developed. The framework is expected to be like the EU ETS, where emitters trade emissions permits to meet the cap



GOVERNMENT INITIATIVES

Vietnam: Initiatives for carbon trading

Carbon Credit Management Mechanism

On May 7, 2024, Prime Minister Pham Minh Chinh issued a directive to establish a carbon credit management mechanism. The directive aims to help businesses understand the carbon market and meet their NDC targets

Vietnam's National Carbon Market

Vietnam is working on **establishing a national carbon market**, which is expected to be operational by 2027, under the management of the **Ministry of Natural Resources and Environment.** The government has been developing a legal framework to support emissions trading, starting with pilot projects in the energy and industrial sectors. This will **eventually extend to the building sector, especially for large commercial and residential buildings**

GOVERNMENT INITIATIVES

Vietnam: Initiatives for carbon trading (continued)

Vietnam Voluntary Carbon Market

Vietnam is developing a **voluntary carbon market to encourage businesses and organizations** to reduce their emissions and trade carbon credits. Renewable energy projects, forest conservation and energy efficiency in the built environment can generate carbon credits that can be traded in this market

Joint Crediting Mechanism (JCM)

Vietnam participates in the Joint Crediting Mechanism with Japan, where both countries collaborate on low carbon projects. In this mechanism, **Vietnam earns carbon credits through energy-saving projects, including in the building sector**, which can be traded or used to meet emissions targets

National Carbon Credit Exchange

Vietnam plans to establish a national carbon credit exchange that will begin operations in 2028. Before the full rollout, the government will run a pilot carbon trading platform starting in 2025

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