Energy Efficiency Database and Investment Platform in ASEAN

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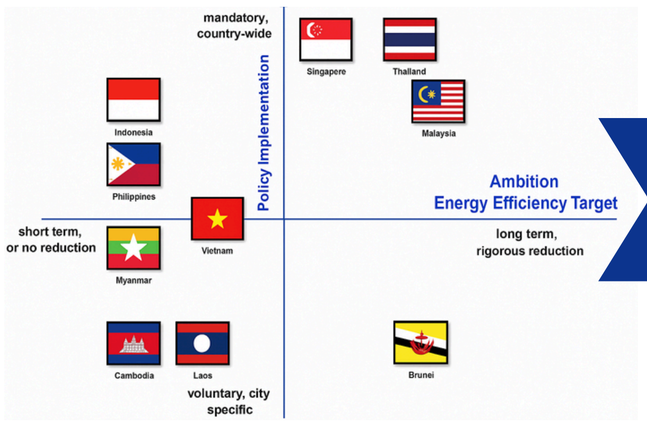
01 Project Objective

Keywords: Building Energy Efficiency | Energy/Carbon/Financial Calculator | ASEAN Building Policy Framework

- **Project goal**: Develop an energy efficiency database and investment platform to promote low-carbon buildings in ASEAN.
- **Key activities:** Analyze regional policies, standards, and financing; create assessment tools and data frameworks; and facilitate project matchmaking.

02 Regulatory Landscape

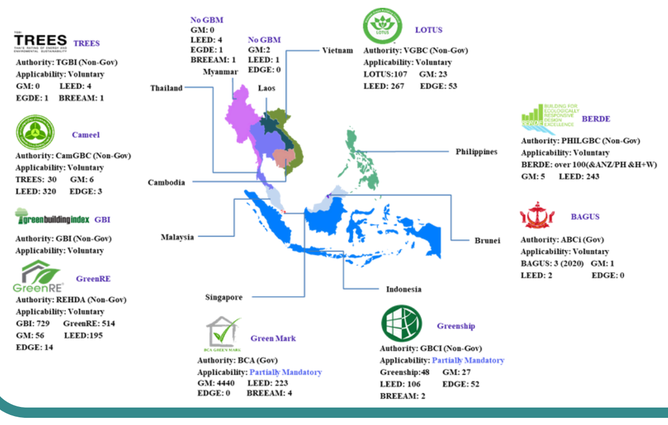


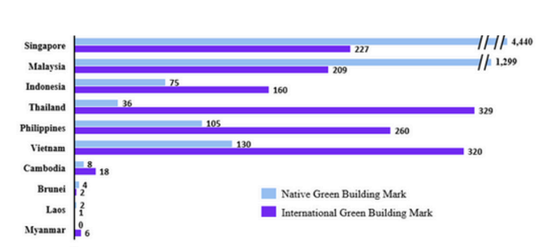
Regulatory opportunites and risks in ASEAN

Singapore and Thailand provide strong policy foundations for retrofits, while others rely on weak or voluntary frameworks. This unevenness creates investment risks but reveals opportunities for platforms to bridge regulatory gaps, improve data access, unlock financing across ASEAN.

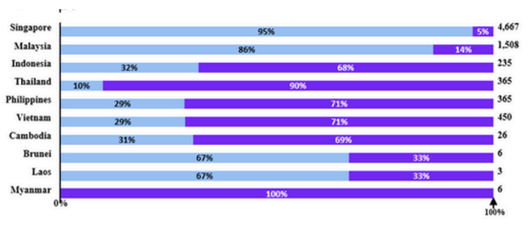
	Energy Efficiency Target	Building Energy Code	Green Building Certificate
Opportunity	Strong national EE targets (e.g. Singapore) signal commitment to retrofit investment	Well-structured mandatory energy codes with enforceable standards and institutional backing can drive scalable retrofit adoption.	Green certification systems improve market transparency and can unlock financial incentives such as tax benefits, rental premiums, or access to green financing.
Risk	Targets often lack actionable roadmaps or enforce mechanisms after setting ambitious objectives	Inconsistent enforcement and fragmented local implementation reduce the effectiveness of existing building regulations.	Low uptake and limited financial incentives especially in emerging markets reduce the business case for certification, while high upfront costs and lack of technical support further deter adoption.

Green Building Certification in ASEAN (Left); Local vs International Standards Certifiled Buildings (Right)





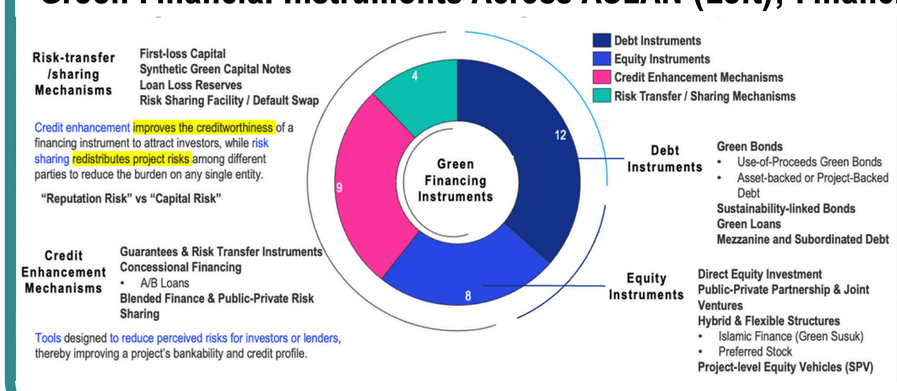
- **Singapore** and **Malaysia** dominate in green building certifications.
- **Cambodia, Brunei, Laos** and **Myanmar** are still in early stage, building local green building certification framework.



- **Singapore** and **Malaysia** mainly adopt local green building marks.
- **Vietnam, the Philippines**, and **Indonesia** rely more on international standards.
- **Thailand** shows low local but high international certification uptake.

03 Financing Options

Green Financial Instruments Across ASEAN (Left); Financial Instruments for Retrofitting Purpose (Right)



Country	Available Options
Singapore	Energy Efficiency Fund (E2F): Grant Resource Efficiency Grant: Grant Grants for EE Grants: Grant ESCO
Malaysia	EE Project Financing and Guarantee: Guarantee Fiscal Incentive; Tax Incentive, Allowance Green Technology Financing Scheme (GTFS): Guarantee & Subsidy ESCO MESITA Fund
Indonesia	PT SMI – State Infrasturcture Fund Secured Loan & ESCO PPP Plaform: Viability Gap Fund
Thailand	EE Improvement Incentives: Tax Incentives Public ESCO Investment Fund ENCON Fund: Grants EE Revolving Fund: Credit Lines via Banks

Country	Available Options
Thailand	EE Improvement Incentives: Tax Incentives Public ESCO Investment Fund ENCON Fund: Grants EE Revolving Fund: Credit Lines via Banks
Philippines	Board of Investment: Tax Incentives Green Loans: Commercial Bank Financing Credit Gurantee Facility: For Green Loan Risk Sharing Facility: Gurantee
Vietnam	PPP Plaform: ESCO Risk Sharing Facility: Partial Credit Gurantee
Cambodia	Clean Energy Revolving Fund

04 Platform Development

Passive Design - Main thermal transimission

Building Envelope | **Building Orientation** | **Material Selection**

Fenestration Thermal & Solar | **Fenestration Thermal & Fenestration Solar**

Total Thermal Transmission through Passive Design

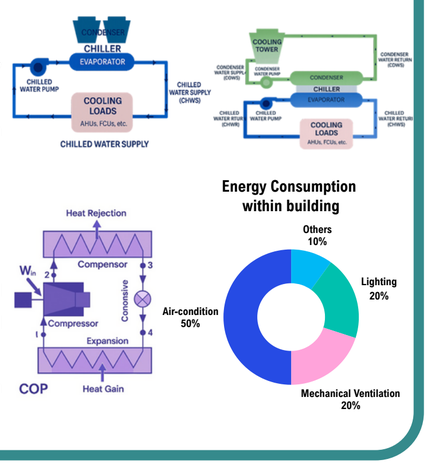
Building Energy Components - AVMV & Lighting

Air-Conditioning and Mechanical Ventilation (ACMV)

- ACMV is widely used in tropical countries and ASEAN reports.
- It accounts for over 70% of building energy use and 15% of global energy consumption.
- The calculation assumes a single full-load chiller, excluding ventilation and part-load performance.
- Upgrading to high-efficiency chillers **can cut AC energy use by over 40%.**

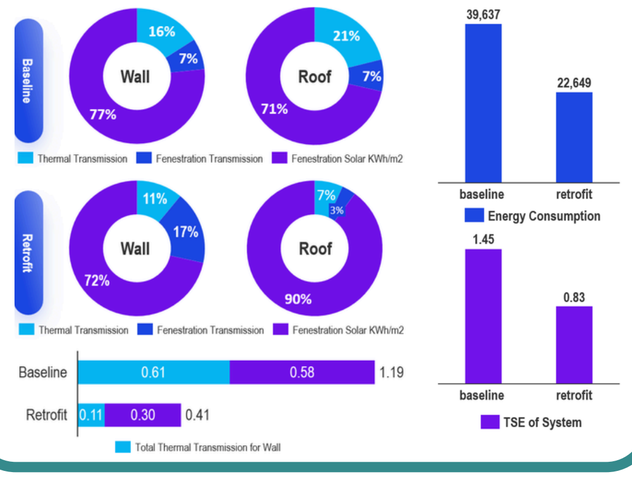
Lighting

- The second-most important sector for building energy consumption
- Billions of inefficient fixtures (incandescent, halogen, fluorescent) are still installed globally. Replacing these with LEDs offers immediate, substantial savings up to **90%**.
- The calculation uses single-replacement assumptions, substituting each lighting source within the building with more efficient lighting fixtures.



Passive Design ACMV

Assuming the same building dimension of 40m x 40m x 30Floors x 3m (height).
Baseline vs Retrofit of passive design and AC system



Calculator Inputs & Outputs		
General Inputs	Country & City & Building Orientation Select	NA
	Roof & Vertical Façade Area Input	m²
	WWR & SWR Input	NA
	Indoor Temperature Set Input	℃
Material Parameter Inputs	Material of each layer in Wall & Roof Select	NA
	Thickness of each layer Input	m
	Material of fenestration in Wall & Roof Select	NA
	Indoor shading types select	NA
General Outputs	Average Temperature in the day	℃
Material Parameter Outputs	R-factor for Wall, Roof, Fenestration	m²·K/W
	U-factor for Wall, Roof, Fenestration	W/m²·K
Energy Outputs	Total thermal transfer for Wall, Roof in the day	kWh/m²
	Energy savings per year	kWh

Regulatory Landscape Research

1. Evaluate Energy Efficiency Targets across ASEAN Countries
2. Evaluate Building Energy Codes and Green Building Standards
3. Evaluate MEPS and Energy Management Program

Financing Options Evaluation

4. Evaluate Energy Efficiency Financing Options
5. Evaluate Carbon-related Financing Mechanisms

Energy Efficiency Calculator Development

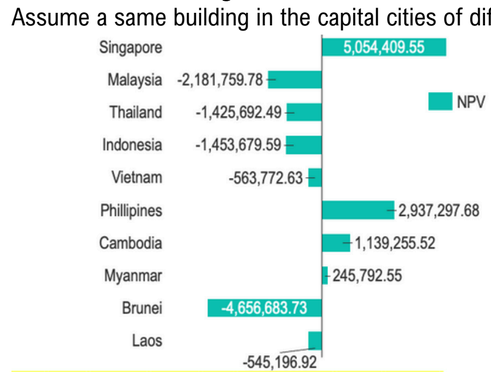
6. Understand Technical Principles of Energy Consumption Calculation
7. Establish Retrofitted-related Database

Investment Platform Development

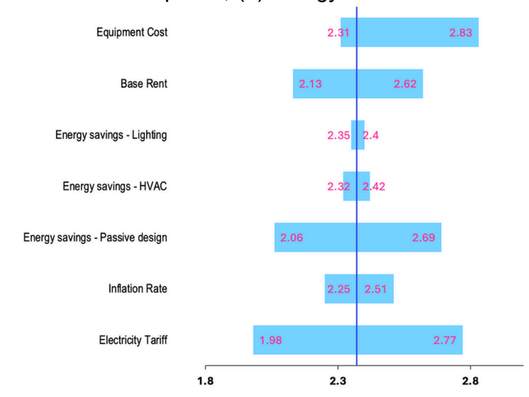
8. Further Integrate Financial Analysis in the Platform

Financial Analysis

Assume a same building in the capital cities of different countries:



Most ASEAN countries find it difficult to achieve direct financial return from green building rettrofit projects.
Singapore, however, is able to generate returns due to: (1) High Energy Prices; (2) High capitalized value
For Philippines, Cambodia, Myanmar: (1) Cost uncertainty; (2) Financing Structure Assumptions; (3) Energy Prices due to their Energy Structure



The figure above examines how our assumptions may influence the results, highlighting that **cost uncertainty** and related assumptions can introduce variability in our outcomes. Regarding **financing structure**, we also explored the difference between project ROI and equity ROI, and found a significant gap between their baseline values.