MINISTRY OF ENERGY TRANSITION
AND WATER TRANSFORMATION

Advancing System-Level Energy Efficiency: Policy Harmonization and Innovative District Energy Services in Malaysia

Harnessing Technology and Governance for Sustainable Energy Future

67th Meeting of the APEC Expert Group on Energy Efficiency and Conservation (EGEEC 67)

30th July 2026, Shenzhen, China

System-Level Energy Efficiency

Why It Matters Beyond Individual Buildings

System-level energy efficiency refers to the holistic optimization of energy use across entire districts and sectors — not just individual buildings. It requires coordinated policy frameworks and integrated technology adoption to achieve meaningful, large-scale impact.

Core Concept

Districts & Sectors

Key Challenge: Fragmented policies and the absence of integrated monitoring systems continue to hinder progress. Without unified governance and real-time data, optimizing energy flows across interconnected districts remains difficult and inefficient.

Malaysia-wide, spanning urban districts and sectors

Policy Harmonization Framework in Malaysia

Federal Level

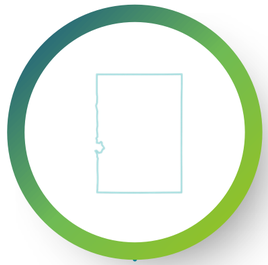
Key Policies

National energy efficiency Policy and Action Plan (NEEAP) 2026-2035 , renewable energy targets and federal incentive programs driving top-level policy direction.

State Level

Implementation

State governments adopt federal mandates into regional energy plans, coordinating local agencies and utilities.



Local Level

Local Governance

Local authorities enforce building codes, monitor compliance, and implement district-level energy efficiency programs.

Majlis Negara bagi Kerajaan Tempatan (MNKT) - *National Council for Local Government*

Governance Coordination Role

The National Council for Local Government (Majlis Negara bagi Kerajaan Tempatan) serves as the central body coordinating local government policies between federal and state governments in Malaysia, playing a pivotal role in aligning energy efficiency initiatives across all jurisdictions.

3 Levels

Federal → State → Local

The Council facilitates structured communication channels between federal ministries, state authorities, and local councils — ensuring consistent policy implementation, harmonized energy regulations, and unified monitoring standards across Malaysia's diverse administrative regions.

Malaysia-wide Policy Harmonization

Innovative District Energy Services in Malaysia

In Malaysia, space cooling accounts for up to 40% to 60% of a commercial building's energy consumption. To combat this, the nation has been promoting District Cooling Systems (DCS) and financial innovations like Cooling-as-a-Service (CaaS) driven jointly by the Low Carbon Cities Framework (LCCF) and the GTALCC (Green Technology Application for the Development of Low Carbon Cities) project.

1. Large-Scale Urban Precincts

🏢 KLCC District Cooling (Kuala Lumpur)

The Innovation: Operated by Gas District Cooling (GDC) Malaysia (a PETRONAS subsidiary), one of the iconic large-scale district cooling plants in the region.

How It Works: Uses gas-fired co-generation/trigeneration combined with Thermal Energy Storage (TES). Produces electricity and uses waste heat to drive absorption chillers, piping chilled water across the 100-acre KLCC development (Petronas Twin Towers, Suria KLCC, Convention Centre).

Impact: Eliminates individual building chillers/cooling towers, cutting peak electricity demand and urban heat island effects.

🏢 Megajana District Cooling (Cyberjaya)

The Innovation: A joint venture between ENGIE South East Asia and Cyberview Sdn Bhd. Malaysia's first dedicated township-wide district cooling system.

How It Works: Serves dozens of multi-tenant commercial buildings, universities, and data centers across Cyberjaya through multiple centralized plants connected to a massive underground reticulation network.

Key Feature: Integrated TES tanks charge by chilling water at night during off-peak tariff hours. During peak afternoon hours, stored chilled water is released to cool the city, relieving grid pressure.

2. State-Level & Transit-Oriented Rejuvenation

🚉 Shah Alam Seksyen 14 Rejuvenation (TNEC & PKNS)

The Innovation: A major urban rejuvenation partnership between TNB (via TNEC) and PKNS (Selangor State Development Corporation).

How It Works: Rather than retrofitting old individual cooling systems across government and commercial buildings in Shah Alam's central hub (Plaza Alam Sentral, SACC Mall, PKNS HQ), a centralized DCS plant supplies chilled water across the precinct.

Impact: Demonstrates how state agencies and national utility companies can collaborate on green urban renewal, reducing state carbon footprints while improving asset values.

🚆 KL Sentral District Cooling

The Innovation: Developed by TNEC, this centralized plant serves Malaysia's primary transit hub, including office towers, hotels, and the transportation terminal.

Key Feature: High-density urban cooling designed specifically for transit-oriented developments (TODs), optimizing space utilization by removing cooling towers from high-value real estate rooftops.

3. Innovative Business & Financial Models

💡 Cooling-as-a-Service (CaaS) & Pay-Per-Use Models

The Concept: Promoted by specialist ESCOs like KJTS Group, ENGIE, and Johnson Controls, CaaS transforms cooling from a heavy capital expenditure (CAPEX) into an operational service (OPEX).

How It Works: Building developers/owners do not buy, own, or manage chillers. The service provider designs, finances, installs, operates, and maintains the entire cooling plant. The client pays a fixed tariff per unit of cooling consumed (e.g., Ringgit per Refrigeration Ton-Hour / RTh).

Why It's Innovative: Removes financial barriers for property owners, aligns performance incentives (the service provider earns more by making equipment hyper-efficient), and integrates real-time IoT monitoring.

Online Monitoring Systems

BEDOS

Building Energy Data and Optimization System: monitors building energy consumption and optimizes usage in real time.

EMIS

Energy Management Information System: aggregates and analyzes energy data across sectors to support informed policy decision-making.

- Real-time energy monitoring
- Data-driven policy enforcement
- System-level energy insights

Implementation Strategies for Advancing Energy Efficiency

A coordinated multi-pronged approach is essential to realize system-level energy efficiency across Malaysia's public and private sectors.

Intergovernmental Coordination

Strengthen coordination via Majlis Negara bagi Kerajaan Tempatan to align federal, state, and local energy efficiency policies.

District Energy Pilot Projects

Invest in innovative district energy infrastructure pilots including solar district cooling and waste heat recovery networks.

Expand BEDOS & EMIS Deployment

Scale up BEDOS and EMIS across public and private sectors for real-time monitoring and data-driven policy enforcement.

Capacity-Building & Engagement

Promote stakeholder engagement and capacity-building programs focused on data-driven energy management practices.


Thank You