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BRIEF

Business Models and Finance to Enhance Energy Efficiency in AI and Data Centres in Emerging Economies

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KEY MESSAGES

- The rapid growth of AI and digital infrastructure is driving a sharp increase in energy demand and creating new challenges, particularly in emerging economies where power systems are often limited or under strain.

- Energy efficiency solutions, including advanced cooling, retrofits, and AI-optimized operations, can dramatically reduce data centre energy use, but remain underused due to regulatory, financial, and technical barriers.

- Innovative business models, such as Energy-as-a-Service, AI-as-a-Service, and outcome-based pricing, offer scalable pathways to reduce energy intensity while enabling digital growth.

- Targeted financial tools, including green bonds, Super Energy Service Company (ESCO), and blended finance, are essential to unlock investment in efficient digital infrastructure and support climate-aligned growth in emerging markets.

- Governments and development institutions have a key role to play in integrating energy efficiency into national digital strategies, de-risking investment, and building local capacity for sustainable AI infrastructure.

A New Frontier in Digital Energy Demand in Emerging Economies

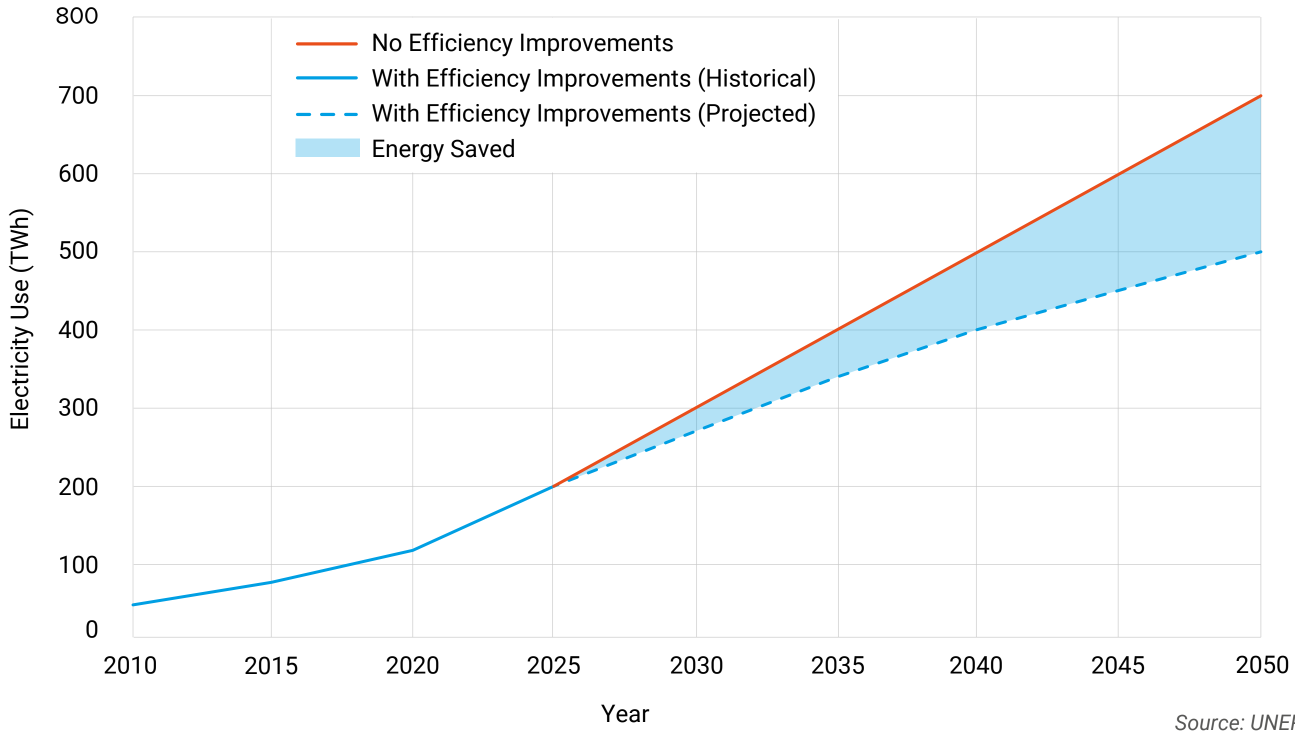
The rapid rise of artificial intelligence (AI), cloud computing, and digital services is fuelling a surge in electricity demand from data centres, particularly in emerging economies. While digital infrastructure is essential for development, the energy it consumes risks overwhelming fragile power systems, competing with other energy uses, driving up costs, and undermining climate goals.

According to the IEA, global data centres consumed around 460 TWh in 2022, corresponding to about 2% of global electricity demand. With AI adoption expanding rapidly, total energy use could double by 2026, surpassing 1,000 TWh[1], primarily driven by AI training workloads and large-scale inference systems.

AI models are especially power-intensive, with training alone for a single large model demanding hundreds of MWh, and inference workloads becoming a major contributor as deployment scales. These trends pose significant risks for power systems in emerging economies already grappling with access, reliability, and affordability issues.

As AI and digital infrastructure continue to grow, new financing models and business strategies are essential to ensure this expansion is energy-efficient, climate-aligned, and inclusive.

Projected Data Center Electricity Consumption in Emerging Economies (2010–2050)
Estimated electricity demand under two scenarios: with and without widespread adoption of energy efficiency measures (e.g. advanced cooling, shared infrastructure, workload optimization).



Source: UNEP-CCC

Note: Based on global data from IEA (2023) and regional extrapolations. Projections beyond 2025 are influenced by uncertainties in AI adoption, efficiency improvements, and infrastructure growth in emerging markets. AI-related energy savings estimates presented here are indicative only and should not be interpreted as suggesting that AI alone can deliver the projected reductions. Actual savings depend on adoption rates, infrastructure design, and supportive policy environments. With efficiency measures—such as advanced cooling (e.g., liquid immersion), shared infrastructure, and workload optimization—substantial reductions are possible, but outcomes will vary by region and implementation.

Emerging Data Centre Markets in Developing Countries

While North America, China, and Europe have traditionally led the sector, developing countries are rapidly becoming key data centre hubs, driven by digital transformation, government incentives, strategic locations, and rising AI and cloud demand.

Many developing nations are offering tax breaks, land subsidies, and energy incentives to attract foreign investments. Countries in Latin America, Africa, and Southeast Asia offer key connectivity advantages to North America, Europe, and Asia-Pacific markets. By 2025, an estimated 10 GW[2] of data centre capacity is expected to break ground. Developing regions are expected to contribute at least 10–15% of this total: for example, Africa is projected to add roughly 400 MW by 2025 (and 1.3 GW by 2027), while Southeast Asia is on track to build 5.2–6.5 GW by 2030.

Once considered secondary markets, developing economies are now playing an increasingly important role in the next phase of digital infrastructure growth.

Table 1. Examples of AI and data centre developments across the Global South.

Region	Countries and Cities	Services	Business Environment
Asia	India (Mumbai, Hyderabad, and Bangalore)[3] Malaysia (Johor), Indonesia,[4] Thailand, Vietnam	Cloud infrastructure Digital services	Cost-efficient energy sources Increased international local investment
Latin America	Brazil[5] Mexico[6] Colombia Chile	AI Cloud infrastructure	Favourable economic policies Abundant renewable energy resources
Middle East[7]	Dubai Riadh Istanbul	AI Cloud infrastructure Blockchain 5G Smart City Applications	Strong digital connectivity Tax incentives Strategic trade positions
Africa	South Africa (Johannesburg, Cape Town) Kenya Nigeria	AI Cloud Infrastructure	Key technology hubs development Government-backed digital transformation Growing Fintech sectors

These examples underscore the strategic rise of emerging markets in the global data centre and AI landscape.

Challenges and Barriers to Financing Efficient AI and Data Centres in Emerging Economies

Despite proven technologies, several challenges persist:

Lack of Standardized Energy Efficiency Regulations and Strategic Integration

There is a global gap in consistent policies incentivizing energy-efficient digital infrastructure. Many AI-driven data centres in developing markets do not fall under traditional energy efficiency reporting frameworks, making it difficult to monitor and regulate their energy usage. Regions such as the EU, Australia, China, and parts of the US and UK have introduced various frameworks and initiatives, some mandatory, others voluntary, that encourage or require data centres to report on energy usage and efficiency metrics, with the EU recently moving toward mandatory reporting for large data centres. In contrast, many countries in Africa, Southeast Asia, and Latin America currently lack binding regulations specific to data centre energy consumption, and globally, mandates focused explicitly on AI-related energy reporting are still emerging.

Compounding this challenge is the lack of integration between data centre planning and broader digital transformation strategies. While many developing countries are advancing national broadband and AI agendas, they often fail to incorporate energy efficiency, clear regulatory frameworks, or sustainability targets into their infrastructure roadmaps. Workforce development for sustainable data centre operations is also overlooked, limiting local capacity to manage and scale low-carbon digital infrastructure.

To ensure sustainable data centre growth, policies must prioritize energy efficiency, carbon reduction, and innovation. In developing countries, where universal electricity access remains a priority, regulations should also account for energy equity, ensuring that digital expansion supports, rather than competes with, broader access goals. Without such integrated approaches, the rising electricity demand of AI and cloud infrastructure risks undermining both climate and development objectives.

Limited Financial Incentives

Unlike renewable energy projects, energy-efficient infrastructure upgrades in data centres often do not qualify for financial incentives in many emerging countries. This lack of support slows adoption rates and makes efficiency improvements financially challenging for operators. Many older data centres in developing regions may struggle to secure financing for retrofits, as they often do not qualify for incentives that are targeted at new infrastructure. International financial institutions such as the multilateral development banks and regional development banks are beginning to address this gap by offering low-interest financing for sustainable digital infrastructure projects, but widespread accessibility remains an issue.

Extreme Weather Events

Data centres are increasingly at risk of extreme weather events, including heatwaves, flooding, and wildfires. Rising temperatures can strain cooling systems, while storms and power outages can disrupt operations. In regions such as Southeast Asia, where monsoons and flooding are common, and in the Middle East and Africa, where extreme heat can drive up energy demand, data centres must integrate climate resilient infrastructure to ensure operational continuity. Without climate-adaptive infrastructure, data centres may face service interruptions, increased cooling costs, and physical damage.

Legacy Infrastructure

Many existing data centres in emerging markets are inefficient due to outdated cooling, power, and processing systems. Traditional air-based cooling systems, still used in many older data centres, can consume up to 40% of total facility power, significantly reducing overall energy efficiency compared to modern liquid or immersion cooling solutions. In tropical and high-temperature regions such as Southeast Asia and Sub-Saharan Africa, cooling requirements are even more energy-intensive, making efficiency improvements a priority.

In this way, older data centres often operate with Power Usage Effectiveness (PUE) values around 1.8, indicating that for every unit of energy used for computing, an additional 0.8 units are consumed by support systems like cooling and power distribution. In contrast, newer facilities achieve PUE values as low as 1.1, reflecting more efficient energy use. However, retrofitting older data centres in emerging economies poses financial, technical, and even environmental challenges, as operators must balance upgrade costs with affordability constraints and potential regulatory requirements. To overcome these barriers, it is essential to implement targeted financial incentives, provide technical support, and establish flexible regulatory frameworks that enable progressive efficiency improvements while reflecting local realities.

Policy and Market Instruments for Scaling Energy-Efficient AI Infrastructure in Emerging Economies

Sustainable growth of AI and data centre infrastructure in emerging economies hinges on unlocking targeted financing and enabling market innovation. Governments and development partners must adopt integrated policy and financial strategies that support energy-efficient digital infrastructure while incentivizing innovative business models.

The following instruments provide a roadmap for action:

1. Expand Green Financing Mechanisms

Targeted financial tools can help scale investments in both newly built, high-efficiency data centres and the retrofitting of legacy infrastructure. Governments, development finance institutions, and climate funds should prioritize instruments such as green bonds and sustainability-linked loans, which tie financing terms to performance benchmarks like energy efficiency or emissions intensity. Performance-based incentives, including grants or concessional loans, should be made available to facilities that demonstrate verifiable improvements in energy performance, particularly through metrics such as Power Usage Effectiveness (PUE) or Carbon Usage Effectiveness (CUE). In parallel, carbon credit schemes can support data centres investing in renewable energy or advanced cooling solutions by enabling them to generate tradable offsets. For example, ING and Aligned Energy issued the data centre industry's first sustainability-linked loan, with terms tied directly to operational energy performance targets.

2. Catalyse Energy-as-a-Service and Energy Service Company (ESCO) Business Models

Governments can catalyse the adoption of Energy-as-a-Service and Energy Service Company (ESCO) models to address upfront capital constraints. These third-party, performance-based approaches allow external providers to finance, install, and maintain energy-saving technologies, recovering their costs through long-term savings. According to the 2025 Global ESCO Market report, the sector reached USD 15.7 billion in annual project investment, with the U.S. and China accounting for ~83% of global deployment. Projections suggest the global ESCO market will grow from US $30 billion in 2022 to nearly US $60 billion by 2032 (7.2% CAGR). Further, energy efficiency projects under ESCO contracts typically deliver returns of 10–15 % IRR, with median payback periods around 3.9 years—significantly outperforming typical corporate bonds and aligning with infrastructure finance timeframes.

Policymakers can accelerate the development of this market by creating standardized energy performance contracts (EPCs), establishing national ESCO registries, and offering public risk-sharing mechanisms. Notably, Super ESCOs, such as Etihad ESCO in Dubai, demonstrate how public leadership can help scale energy retrofits across the digital infrastructure sector.

3. Promote Commercial Models That Incentivize Efficiency

Business practices that align operational costs with energy use such as metered power pricing, can incentivize customers to reduce consumption. Usage-based cloud and colocation services also encourage more efficient infrastructure through shared, scalable deployment. In AI applications, outcome-based pricing models that link payment to actual results can help reduce computational waste.

Table 2 below on AI Business Models for Energy Efficiency highlights a diverse range of commercial strategies that can shape energy consumption in AI services. Models such as Usage-Based Pricing and Outcome-Based Pricing directly incentivize efficiency by linking costs to computational precision or performance outcomes. Meanwhile, AI-as-a-Service (AIaaS) and Platform Ecosystems leverage shared infrastructure, reducing redundant processing and improving energy utilisation at scale. Though models like Freemium and Transactional approaches may offer less predictable energy outcomes, they remain relevant for expanding access and encouraging experimentation. As AI demand grows, aligning business models with energy-saving incentives will be key to scaling sustainably in emerging markets.

AI business models shape energy outcomes by aligning costs with usage. Models such as Usage-Based Pricing and Outcome-Based Pricing directly align energy consumption with output, reducing waste. As demand grows, aligning commercial models with energy incentives will be critical for sustainable AI deployment in emerging markets.

Table 2. AI Business Models for Energy Efficiency

Business Model	Description	Energy Efficiency Impact	Key Benefit
Subscription (SaaS)	Recurring access to AI platforms and tools	20–30% reduction in individual user energy use vs. on-premise	Shared resources reduce overhead, easy access and scalability
Usage-Based Pricing	Charged per API call, data unit, or query	Up to 40% reduction in unnecessary processing	Encourages precise, efficient AI use
AI-as-a-Service (AIaaS)	Pay-per-use access to AI tools hosted in the cloud	25–35% reduction in training energy	Shared infrastructure, scalable AI deployment
Outcome-Based Pricing	Payment tied to measurable outcomes (e.g., cost savings)	15–50% energy savings depending on task	Incentivizes efficient computation and waste reduction
Data Monetization	Selling insights from AI-processed data	Low to moderate; depends on processing pipeline efficiency	Generates value from data while encouraging efficiency
Transactional Models	Fee per task or transaction (e.g., resume scan)	Generally low; high volume, short tasks limit efficiency gains	Enables flexible, pay-as-you-go service model
Platform Ecosystems	AI-powered platforms connecting users and services	10–20% baseline energy savings	Reduces redundant resource use via shared infrastructure
AI Model Marketplaces	Online platforms that allow developers and companies to buy, sell, or access pre-trained AI models and datasets.	Up to 30% reduction by avoiding repeated large-scale training	Saves energy by reusing models, lowers development overhead
Low-Code/ No-Code AI Platforms	Platforms that enable users to build and deploy AI models with minimal coding, using pre-built templates and automated model tuning.	20–40% reduction in development-related energy use	Accelerates development, reduces redundant compute and training

4. De-risk Private Investment in Emerging Markets

High perceived risk continues to limit capital flows into sustainable infrastructure, particularly in lower-income countries. Public institutions can help address this by offering political risk insurance, investment guarantees, and blended finance mechanisms that combine public, donor, and private funding. Aligning national initiatives with international green finance taxonomies also improves credibility and eligibility for climate-aligned funding. A relevant example is Brookfield Asset Management's multi-billion-dollar investment in AI infrastructure, underpinned by a combination of equity and concessional finance.

5. Enable Public-Private Partnerships (PPPs)

Public-private partnerships (PPPs) remain a powerful tool to mobilize investment and technical capacity. Governments can unlock private sector engagement by creating frameworks that streamline procurement and licensing, enable co-investment schemes, and secure long-term tenancy or offtake agreements with public agencies. For instance, the U.S. Energy Savings Performance Contracts (ESPCs) allow federal entities to collaborate with private service providers for energy upgrades without upfront costs, using realized energy savings to repay investments over time.

6. Embed Energy Efficiency in National Digital Strategies

Energy efficiency and green finance should be core elements of digital economy planning. National cloud, broadband, and AI policies must integrate efficiency standards and emissions targets. Data centre incentives should be linked to renewable energy use and energy reporting obligations. Equally important is investment in workforce development for green IT, cloud operations, and sustainable procurement to ensure local capacity to manage the shift toward low-carbon digital infrastructure.

7. Invest in Local Capacity and Market Readiness

Building institutional and business capacity is critical to support sustainable digital infrastructure. Governments should train public officials in evaluating green data centre proposals and using climate finance tools. Regional platforms should be created for sharing best practices, technical metrics, and procurement standards. Support should also be extended to startups and SMEs with access to scalable, energy-efficient business models.

Table 3. Data Centre Business Models for Energy Efficiency

Business Model	Description	Energy Efficiency Impact	Key Benefit
Wholesale Colocation	Clients rent dedicated space and power with custom infrastructure	Moderate efficiency: energy use depends on client optimization; typical PUE ~1.6–1.8	Scalability and control for large enterprises
Retail Colocation	Shared infrastructure with pay-as-you-go access	High efficiency: shared cooling and load management can reduce PUE to ~1.2–1.4	Cost-effective, energy-optimized access for SMEs and startups
Cloud Services (IaaS, PaaS, SaaS)	Infrastructure or platforms provided as-a-service with usage-based pricing	Moderate efficiency: major cloud providers achieve PUE ~1.1–1.2, improving backend energy use by up to 20%	Outsourcing IT reduces capital and operational costs
Metered Power Pricing	Clients charged based on real-time energy consumption	High efficiency: reported 10–20% reduction in energy use due to direct consumption incentives	Aligns cost with actual energy use, encouraging efficiency
Hybrid/Cloud Models	Mix of on-premises and cloud-hosted systems	Moderate efficiency: varies widely, but hybrid models can improve energy use by 10–15% compared to on-premises only	Flexible balance of control and scalability
Enterprise (Private)	In-house facilities managed for internal use	Low to moderate efficiency; often PUE >1.6 due to lack of central-ized optimization	Full control over infrastructure, potentially less energy efficient
Immersion Cooling Services	Third-party providers offer im-mersion cooling technologies to retrofit or design data centres with high energy efficiency.	High efficiency: cooling energy use can be reduced by up to 90% compared to traditional air cooling	Advanced cooling tech drastically reduces energy costs

These models illustrate how infrastructure and pricing approaches influence energy use. Models like Retail Colocation and Cloud Services promote higher efficiency through shared resources and optimised backend systems, while Metered Power Pricing directly encourages reduced consumption by aligning costs with actual energy use. In contrast, Enterprise and Wholesale Colocation models offer more control but can be less efficient without targeted optimisation. Emerging approaches such as Green Power Purchase Agreements and Bare Metal as a Service provide new pathways for sustainability, showing that business model choice plays a critical role in driving-or hindering-energy efficiency in digital infrastructure.

Conclusions: Financing the Future of Sustainable AI Infrastructure

As emerging economies scale up digital infrastructure to meet growing demand for AI and cloud services, the energy footprint of data centres presents an urgent challenge and an opportunity. Without targeted interventions, rising electricity demand could outpace grid capacity, undermine climate commitments, and widen energy access gaps. Yet, with the right mix of policy, finance, and business innovation, these same trends can accelerate the shift toward sustainable and inclusive digital development.

Governments and development partners must act swiftly to embed energy efficiency in national digital strategies, de-risk private investment, and mainstream tools like green bonds, ESCOs, and outcome-based pricing. Addressing legacy infrastructure, integrating AI into climate planning, and building local capacity will be essential to ensuring that energy-efficient models are viable and scalable across diverse market conditions.

Photo: Adobe Stock

End notes

1. This figure refers to total annual electricity consumption, measured in terawatt-hours (TWh), indicating the amount of energy used over time.
2. This figure refers to installed capacity; the maximum power demand data centers can draw at any one time.
3. Amazon Web Services, Google, and Microsoft are investing billions to establish hyperscale data centres in cities such as Mumbai, Hyderabad, and Bangalore.
4. Indonesia's data centre market is expected to reach $3 billion by 2026, driven by a CAGR of 12.95%, with Jakarta emerging as a major cloud computing hub.
5. Grupo FS plans to invest $1.8 billion in constructing three state-of-the-art data centres across Brazil to support growing AI and cloud demands. Leading global data center operators, including Ascenty, Equinix, and ODATA, are expanding their presence in Brazil to cater to the increasing demand for hyperscale infrastructure. The Brazilian data centre market is projected to grow at a CAGR of around 13% over the next five years.
6. The number of companies developing artificial intelligence in Mexico grew by 965% between 2018 and 2024, indicating a significant increase in AI adoption. Colombia and Chile are witnessing increased investments due to a strong economic growth supporting digital transformation.
7. Hyperscale providers such as Google Cloud, Amazon Web Services, and Oracle Cloud are establishing regional data centres to cater to both local and international clients.
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