ACCELERATING INDIA'S GREEN TRANSITION: UNLOCKING THE POWER OF ENERGY EFFICIENCY

CASE OF COOLING-AS-A-SERVICE

urbs.
URBAN SYSTEMS

OVERVIEW

This document outlines the challenges hindering the adoption of energy-efficient cooling systems by asset owners in India and introduces URBS' Cooling as a Service (CaaS) as a comprehensive solution. By realigning risks and incentives, and utilizing innovative contracting, URBS' CaaS addresses these barriers and fosters the adoption of sustainable, energy-efficient technologies. This approach drives the creation of lasting value in the sector.

March 20, 2024

Version 1.2

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1.
GLOBAL GREEN TRANSITION: THE NEED AND GAP IN WIDESPREAD ENERGY EFFICIENCY IMPLEMENTATION

THE NEED FOR ENERGY EFFICIENCY IN INDIA.

The global green transition hinges on the widespread adoption of energy-efficient technologies. This need is particularly urgent in India, one of the world's fastest-growing economies and a major emitter of CO2 emissions. India's expanding population and its pursuit of an $11 trillion economy by 2035 will further intensify its already immense energy demand. This escalating demand, visualized in Figure 1, underscores the critical need for energy efficiency solutions to ensure sustainable development and mitigate the impacts of climate change.

Rising temperatures in India create an additional challenge, leading to a surging demand for cooling. However, relying on traditional cooling systems, often heavily dependent on fossil fuels, would exacerbate the energy crisis. This emphasizes the necessity of prioritizing energy efficiency within the cooling sector. While vital, the widespread adoption of these solutions faces constraints under traditional investment models.

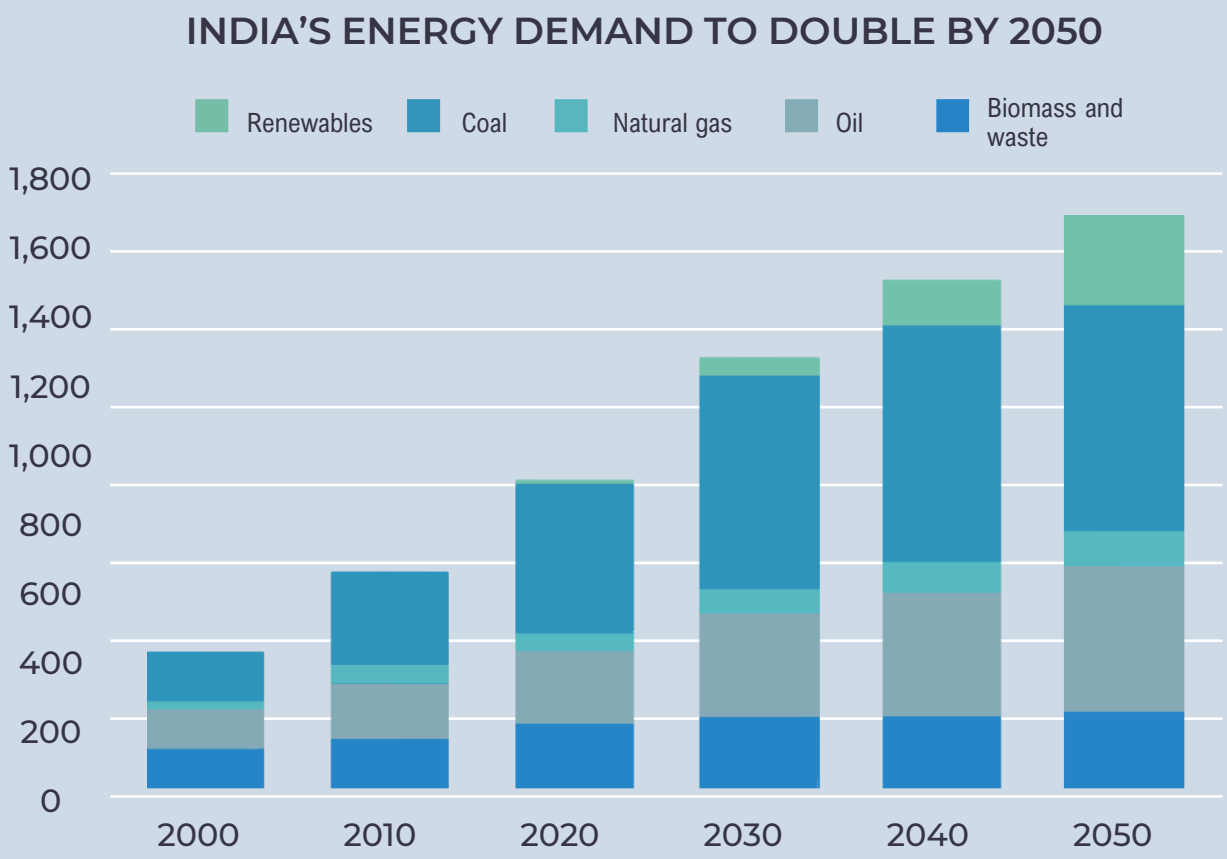


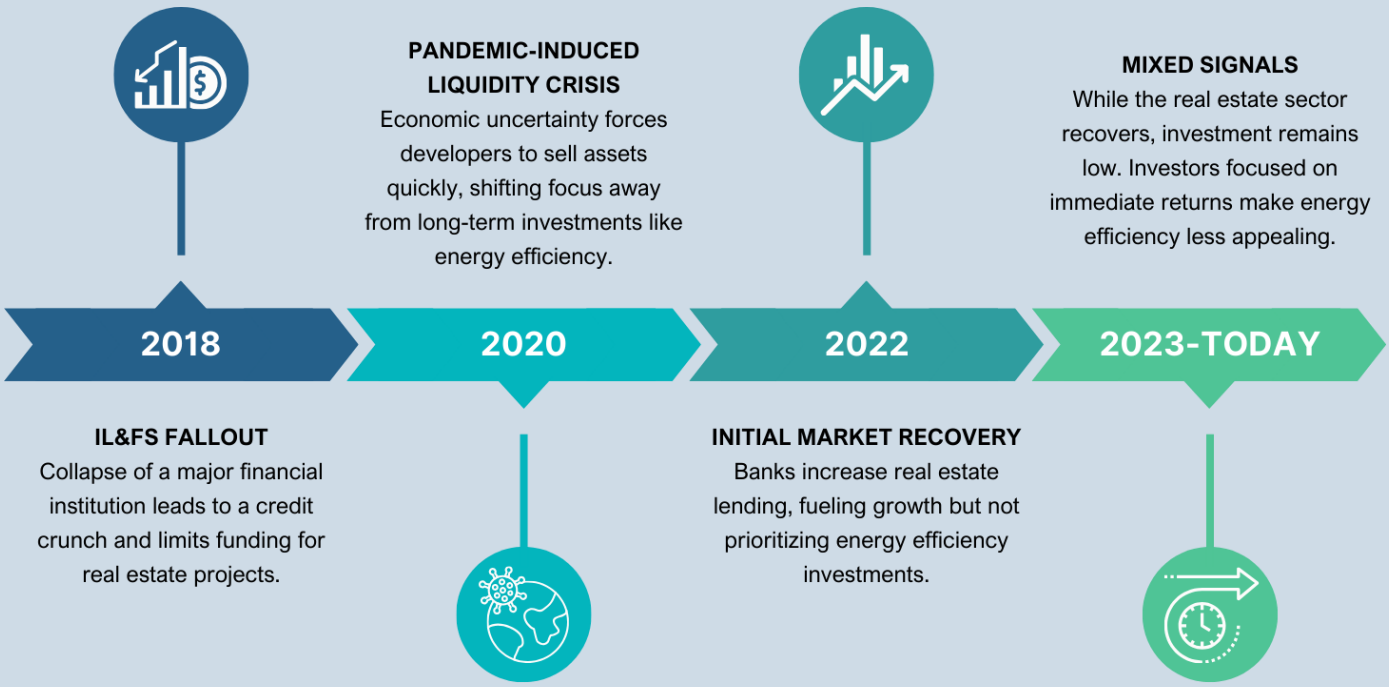
Figure 1: India's Energy Demand from 2000-2050 (Adapted from https://tinyurl.com/2ks8v3cb)

INDIA'S NET-ZERO INVESTMENT GAP.

The "Energy Efficiency Gap," a term coined by Eric Hirst and Marilyn Brown in 1990, highlights the obstacles impeding the widespread adoption of energy-efficient technologies and practices. Despite the growing urgency of transitioning to sustainable energy solutions, a substantial gap persists between the funding needed and the actual investment.

According to the Climate Policy Initiative, the global net-zero investment gap for energy-efficient buildings amounts to a staggering $731 billion USD annually. This reflects the costs required to achieve Paris-aligned scenarios by 2050. Unfortunately, progress towards closing this gap remains slow, with only a mere 2% of the needed investment being realized.

The situation in India is particularly concerning. While investments in green financing and energy efficiency initiatives increased in 2020, a mere 1.4% was allocated to green buildings. This glaring disparity underscores the urgent need for India to realign investment strategies. Only then can the nation catalyze the adoption of energy-efficient solutions to meaningfully accelerate its progress toward its sustainability goals.



THE INDIAN CREDIT CRUNCH (2010-2018).

Constrained by new regulations and the weight of bad loans on their books, banks outsourced part of their lending activity to shadow banks. These non-banks initially played a key role in ensuring credit to risky sectors such as real estate. However, these shadow banks were much more under-capitalized and under-regulated compared to traditional banks. The IL&FS implosion exposed the vulnerabilities of the shadow banking sector, leading to difficulty in raising capital. This created a widespread liquidity squeeze in sectors such as real estate that were dependent on the shadow banks. The graph illustrates the decline in both bank and non-bank lending during this period.

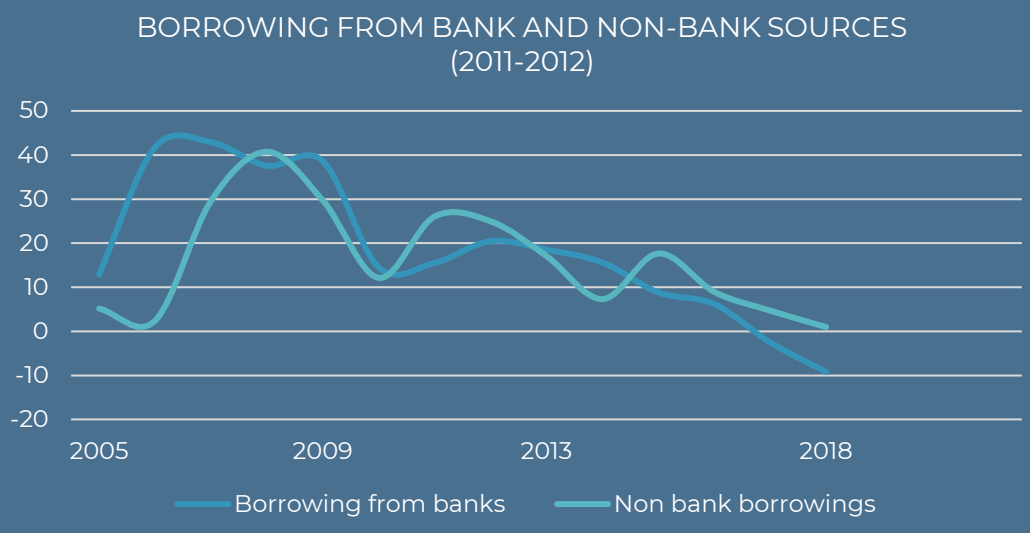


Figure 2: Credit flows to non-financial private sector from both bank and non-bank sources have dried up

SKEWED INCENTIVES.

The credit crunch has dramatically skewed incentives for real estate investors. Facing slow sales and limited funding from banks and NBFCs, developers have turned to selling portions of their properties (strata sales) to generate immediate cash. This need for liquidity pushes developers to offer significant portions of their office space (25-40%) for sale. The focus on short-term survival has lead developers to prioritize immediate cash flow over long-term ownership considerations, potentially impacting decisions about building quality and energy efficiency.

CURRENT SCENARIO.

Bank credit continues to represent the predominant portion of total credit extended to the non-financial sector. Among G-20 economies, India has the highest share of bank lending to the non-financial sector. This worsening of credit flow in the real estate sector, which already incentivized short-term gains, was further exacerbated by a decrease in institutional investments. In 2023, institutional investments in the Indian real estate sector fell 12% to $4.3 billion – the lowest since 2019.

Institutional investors play a crucial role in driving the adoption of energy efficiency equipment within the real estate sector. Their strategic investment approach and long-term outlook make them well-suited to embrace energy efficiency measures and decarbonization initiatives. This extended investment horizon is particularly beneficial for energy-efficient equipment, enabling asset owners to capitalize on long-term operational expense (Opex) reductions. By aligning with energy efficiency initiatives, institutional investors enhance the sustainability of their portfolios while maximizing long-term returns. Their involvement is pivotal in catalyzing the transition towards a more sustainable and efficient real estate market.

Among G-20 economies, India has the highest share of bank lending to the non-financial sector

2.
SCALING ENERGY EFFICIENCY SOLUTIONS: THE SERVITIZATION MODEL

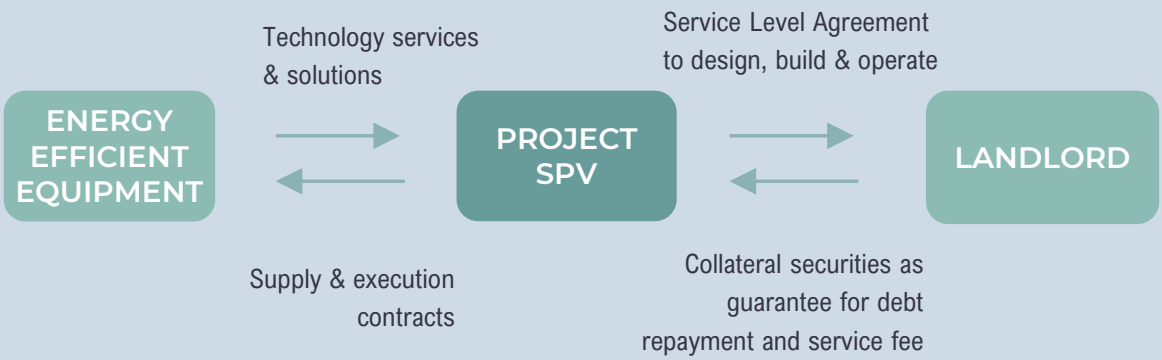
THE POWER OF SERVITIZATION.

While traditional models struggle to bridge the gap between promising solutions and real-world impact, servitization offers a transformative approach. By prioritizing the delivery of ongoing energy savings instead of selling technology outright, this model breaks down financial barriers, aligns incentives, and fosters collaboration. This is the power of servitization: accelerating the deployment of energy-efficient technology and enabling a rapid, sustainable future for the energy sector.

Within this framework, specialized contracts like Cooling as a Service (CaaS) offer even more targeted solutions. CaaS contracts involve a steady series of payments from the user to the lessor/Technology Integrator in exchange for the use and benefits of the equipment. To mitigate the risk for the integrator, a crucial element can be built into the contract: the ability to collateralize a portion of the user's real estate. In the event of a payment default, this collateral allows the integrator to recover losses by potentially selling the designated portion of the property.

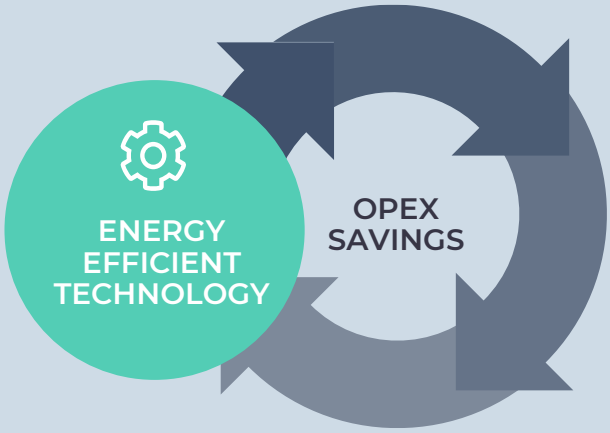
Servitization models shift the focus from the outright sale of equipment to the delivery of ongoing services. This collaborative approach, as illustrated below, fosters a shared responsibility for project success and incorporates mechanisms to minimize risk.

FLOW OF SERVICES.



FINANCING SERVITIZATION.

As servitization is still an emerging concept that differs from the traditional market, financing this solution must be equally as innovative. Energy Performance Contracting (EPC) is a financing method for enhancing capital improvements by utilizing the financial benefits derived from operational expenditure savings (OpEx) to fund energy upgrades. Here, an Energy Saving Company (ESCO) invests in improvements, guaranteeing savings that then cover the project costs. This reduces risks for the client, often making projects possible when upfront capital is unavailable.



Two central EPC models dominate:

1. Guaranteed Savings: The ESCO promises a minimum cost reduction, assuming all performance risk. The client's savings are fixed, making this appealing for risk-averse entities.

2. Shared Savings: Both ESCO and client share the financial benefit of achieved efficiency gains. This balances risk and often motivates greater savings than the guaranteed minimum.

Risk allocation defines these models. Guaranteed savings transfer more project risk to the ESCO, who needs strong technical expertise and access to financing. Shared saving models distribute the risk in exchange for the possibility of greater returns by both parties.

Additional contracting models such as 'chauffage' contracts, the 'first-out' approach, Build-Own-Operate-Transfer (BOOT) contracts, and leasing agreements offer various structures and approaches for energy performance arrangements, each with distinct risk and benefit profiles. Selecting the right model depends on a project's specifics, financing available, and the client's risk tolerance.

Source: Joint Research Centre European Energy Efficiency Platform

BRIDGING THE INVESTMENT GAP.

The limited adoption of energy-efficient technologies promoted in the cleantech sector can be partly attributed to the constraints of traditional partnership funding models. Typically, private intermediaries operate within a 10-year partnership structure, seeking high-risk, high-return investments with quick exits within 3-5 years. But energy-efficient solutions, requiring extended development timelines and significant capital for effective scaling, can struggle to align with these investor expectations. Market factors often exacerbate this mismatch by favoring solutions with lower upfront costs, hindering the widespread adoption of energy efficiency even when a clear long-term economic and environmental case exists.

A publication on the 'Cleantech Bubble' by economists at MIT reveals a stark mismatch between traditional VC funding and the needs of many cleantech companies. Focused on rapid returns in high-growth markets, the VC model struggled to accommodate the capital-intensive, longer-term development cycles often required for innovations in new materials, systems, and processes.

The publication suggests that alternative investment models, such as those offering "patient capital" from impact investors and diversified funding sources beyond traditional VCs, may better support the longer-term and capital-intensive nature of cleantech innovation.

> Long-term investing has never been more important than today. Many of society's most intractable problems—from addressing the environmental ills of the planet to revitalizing decaying infrastructure in developed and developing nations alike, to ensuring national security, to the hunger for innovation to stimulate economic growth—resist easy solutions. Rather, they can only be addressed with the thoughtful application of time and money.
>
> - Patient Capital, Josh Lerner & Victoria Ivashina

*Venture Capital and Cleantech: The Wrong Model for Clean Energy Innovation, Dr. Benjamin Gaddy Dr. Varun Sivaram Dr. Francis O'Sullivan. https://energy.mit.edu/wp-content/uploads/2016/07/MITEI-WP-2016-06.pdf

3.
SCALING SERVITIZATION: BARRIERS TO IMPLEMENTATION

MARKET BARRIERS TO ENERGY EFFICIENCY ADOPTION.

The widespread adoption of servitization faces inherent challenges within the current investment and market environment. Risks associated with specialized investments, contractual structures, and financial hurdles all necessitate new approaches to achieve energy efficiency's full potential. These challenges include the informational asymmetry, the hold-up problem, and the misaligned incentives problem.

THE HOLD-UP PROBLEM

In contracting theory where one party invests heavily in upfront assets, they become vulnerable to exploitation by the other party, who could threaten non-payment to renegotiate unfair terms. This fear of contractual opportunism hinders mutually beneficial projects.

MISALIGNED INCENTIVES

Existing incentives often focus on short-term gains instead of long-term benefits of energy efficiency, misaligning with the needs of markets and the true potential of clean technology.

INFORMATIONAL ASYMMETRY

Unclear performance data for energy-efficient technologies makes investors reluctant to finance them, fearing promised savings won't materialize.

INFORMATIONAL ASYMMETRY (TECHNOLOGY RISK).

Performance uncertainty poses a major barrier to financing innovative energy-efficient technologies. Even when solutions have solid track records elsewhere, a lack of familiarity in a specific market raises perceived risk. These concerns translate into higher financing costs for developers and investors, undermining the economic advantages that greater efficiency promises. This market aversion toward less established solutions, even when evidence exists, impedes widespread deployment and the full realization of energy efficiency's benefits.

THE HOLD-UP PROBLEM (CREDIT RISK).

The hold-up problem describes a situation in which potential collaborators, despite having the capability for efficient cooperation, may abstain from working together due to concerns about uneven bargaining power and the potential for opportunistic behavior after a contract is formed. This results in suboptimal economic outcomes, causing long-term underinvestment and inefficiencies fueled by the fear of exploitation.*

Within the contractual framework of an Equipment as a Service (EaaS) contract between a Technology Integrator and a developer, a hold-up problem arises when supplying capital-intensive, energy-efficient equipment essential for the developer's operations. The Integrator relies on economic rents generated from energy savings and operational and maintenance (O&M) cost reductions to finance its more capital-intensive, longer-life energy-efficient system. Acknowledging the immovable nature of these fixed assets, the developer retains residual control rights, allowing them to exploit the situation by leveraging nonpayment or default threats on the Equipment as a Service (EaaS) contract.

Given the impracticality of reclaiming the energy-efficient system without incurring a loss to its value, the integrator faces credit risk, placing it in a precarious position. The developer's ability to exploit this power asymmetry leaves the integrator vulnerable, as the developer can leverage it to negotiate more favorable terms or concessions, thereby creating a 'Hold-up' scenario for the Integrator.

INCENTIVES PROBLEM (STAKEHOLDER MISALIGNMENT RISK).

Real estate developers have resorted to liquidating their inventory to sustain liquidity amidst the credit crunch. This has further tilted the incentive landscape toward short-term gains, in addition to the institutional investments dwindling to a five-year low. Consequently, the majority of asset ownership have shifted to retail investors, which exhibit time-inconsistent preferences. This skewed structure presents a substantial barrier to the widespread adoption of energy-efficient technologies. By placing an emphasis on short-term gains, the existing framework fails to adequately acknowledge the long-term benefits associated with enhanced efficiency, such as decreased operational costs and amplified sustainability impact.

* “Evidence shows that suppliers refrain from investing in energy efficiency (EE) measures because they fear that a buyer with greater bargaining power will use EE-related cost reductions to push prices down—in the purchase bargaining process—and thereby further reduce the supplier’s profit margin; this dynamic leads to inefficient levels of investment in EE due to the so-called holdup problem.” Energy Efficiency Contracting in Supply Chains under Asymmetric Bargaining Power, Ali Shantia, Sam Aflaki & Andrea Masini.

4.
URBS' COOLING-AS-A-SERVICE: A MODEL FOR INDIA'S COOLING CHALLENGE

IDENTIFYING THE OPPORTUNITY

POTENTIAL IN THE INDIAN MARKET.

India's burgeoning market offers a unique opportunity for early adopters of sustainable building design. Market analysis reveals a significant rental premium for 'green' buildings in regions with limited supply, demonstrating the high demand for such spaces. As the adoption of sustainable construction practices expands, this premium will naturally adjust. However, India's current low rate of certified green buildings positions energy efficiency providers favorably in a rapidly growing sector.

The urgent need for efficient cooling solutions adds another dimension to this opportunity. Legacy cooling systems place a massive strain on India's energy grids. With a projected market size of $30 billion by 2030 and a total investment potential of $1.5 trillion by 2040, the demand for sustainable cooling alternatives is substantial. Efficiency providers offer solutions that go beyond cost reductions. For cities like Mumbai, with less than 20% of buildings currently green-rated, this presents a significant supply gap that efficiency-focused models can fill. The savings achieved through such upgrades attract tenants, increase the market appeal of properties, and benefit both developers and energy efficiency providers. This alignment of incentives drives collaborative, transformative change.

> **40%** of respondents, most of which are developers, plan to delay or postpone their adoption of ESG criteria due to the current macroeconomic and geopolitical climate, believing ESG is costly and that payback periods can be long.
>
> - The Green Building Premium: Does it Exist?
> CBRE Research, March 2023

*"When people lack information or are inattentive to the operating costs of energy-using durables, they will sub-optimally invest in efficiency even under carbon pricing policies. We demonstrate that mental gaps in information acquisition about operating costs may be an important driver of investment inefficiencies..." Do Consumers Acquire Information Optimally? Experimental Evidence from Energy Efficiency, Andrea La Nauze & Erica Myers, National Bureau of Economic Research

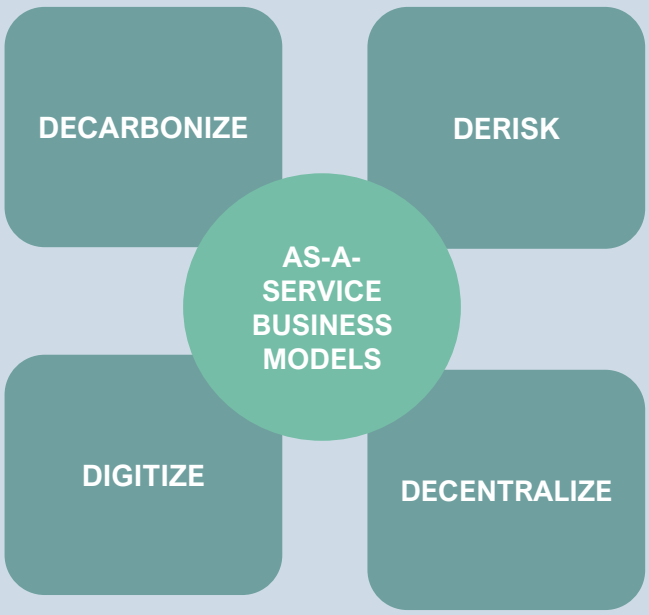
THE FUTURE OF COOLING: URBS' COOLING-AS-A-SERVICE

Urbs' Cooling-as-a-Service (CaaS) model offers a compelling approach to capitalize on the opportunities within the Indian market. By addressing the technical and financial challenges prevalent in traditional cooling solutions, it provides an end-to-end solution focused on cost efficiency, convenience, and thermal comfort that meets international standards. This approach aligns incentives: Urbs takes on ownership and maintenance of cooling equipment, while customers pay a recurring fee based on usage. This structure motivates the company to prioritize energy efficiency, leading to greater operational savings and financial returns for customers.

Urbs' distinct advantage lies in its commitment to utilizing best-in-class cooling technologies and its deep expertise in the building industry. This enables the company to implement highly innovative and energy-efficient cooling solutions. Urbs couples this with a customer-centric approach, offering hassle-free, tailored experiences. With increasing concerns about climate change and energy costs, Urbs' CaaS model offers a compelling solution for businesses, industries, and residential customers seeking sustainable, efficient, and cost-effective cooling.

Implement proven and efficient best-in-class cooling technologies from the Nordic countries, such as chillers & pumps.

Data-driven and measurable by using software & AI controls to make investments transparent and scalable.



Cooling assets are run on renewable energy sources installed on-site, reducing dependence on the grid.

Clean technologies reduce carbon emissions and thus reduce financial and climate risk on all stakeholders.

PRICING STRATERGY OF CAAS.

The pricing structure of Urbs' CaaS hinges on two primary factors: the initial setup fee, ranging from 10% to 20% of the contract amount, and the CaaS risk premium. This approach is intricately tied to the credit risk assessment of both the developer and the tenant, as well as the covenants inherent in the contractual agreements. Our risk rating model meticulously considers several factors in determining the initial setup fee and the risk premium. When evaluating the CaaS pricing, the credit rating of the developer is scrutinized, taking into account whether they are a listed or non-listed entity, their corporate governance practices, historical default incidents, and any penalties imposed by RERA. Simultaneously, the credit rating of the tenant is assessed, considering various pertinent factors.

RISK ASSESSMENT OF DEVELOPER	RISK ASSESSMENT OF TENANT
Corporate Governance: The adherence to sound corporate governance practices.	**Financial Stability**: The tenant's financial health and stability.
Financial History: Any history of financial defaults or irregularities.	**Payment History**: Past payment behavior and history of meeting financial obligations.
RERA Compliance: Penalties or issues related to non-compliance with Real Estate Regulatory Authority (RERA) regulations.	**Industry Standing**: The tenant's reputation and position within their industry.
Market Reputation: The developer's standing and reputation within the real estate market.	**Operational Performance**: How well the tenant's business is performing.
Project Track Record: The history of successful completion and delivery of previous projects.	**Credit History**: The tenant's credit history and creditworthiness.
Financial Stability: Overall financial health and stability of the developer.	**Long-Term Viability**: The tenant's prospects for long-term success and stability.

COMMERCIAL MARKET DRIVERS

The financial viability of CaaS is evaluated using two primary metrics: payback period and unlevered Internal Rate of Return (IRR). These metrics are majorly influenced by variables such as building type and Energy Performance Index (EPI), which quantifies a building's energy intensity (kWh/m²). To ensure transparency and minimize discrepancies, CaaS assessments adhere to well-established benchmarks established by the Bureau of Energy Efficiency (BEE) in India. This standardized approach provides a dependable basis for financial evaluations.

ASSESSMENT MATRIX SAMPLE

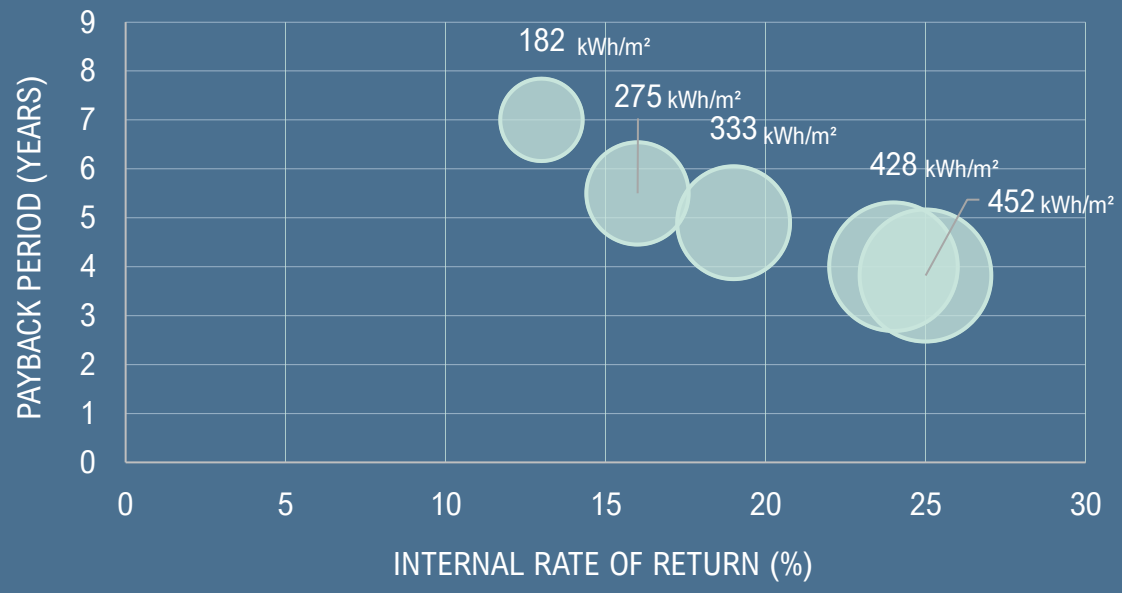


Figure 2 displays metrics for diverse building types (Office, Shopping Malls, Hospital, Hotel, BPO) with associated Energy Performance Index (EPI) ranging from 182 to 452. The variations in both Payback Period (3.82 to 7 years) and Internal Rate of Return (IRR) (13% to 25%) are influenced by the EPI.

The commercial sector offers a ripe opportunity for CaaS. With high energy usage and a clear need for efficiency upgrades, this mature market segment is primed for our solution. India's inadequate air conditioning standards contribute heavily to energy waste, with even top-performing units lagging behind international efficiency benchmarks. As the International Energy Agency reports, India's average air conditioner rating is a mere 3.2 SEER, significantly lower than leading economies like the US, Europe, and China.

RESIDENTIAL MARKET DRIVERS & OPPORTUNITY.

Residential electricity consumption is rapidly outpacing growth in other sectors in India, with projections suggesting that homes will account for 85% of the country's floor space by 2050. This growth, coupled with rising incomes and a focus on comfort, creates a significant opportunity for Cooling as a Service (CaaS), with its potential for higher profit margins.

Delhi as a Case Study: In Delhi, electrified households consume an average of 250-270 kWh, comparable to electrified households in Germany. Air conditioning has the lowest penetration among appliances in Delhi, indicating a rising demand for energy likely to be fueled by the adoption of cooling solutions. This makes the Delhi NCR region a prime emerging market for CaaS, poised to mature within the next couple of years.

Market Readiness:

- Single-Family Housing: This niche segment is expected to mature for CaaS over the next 5-7 years. As household energy consumption rises, the feasibility and demand for CaaS in single-family homes will likely increase.
- Multi-Family Housing: This market, concentrated mainly in Tier 1 and 2 urban cities, is predicted to mature for CaaS within 1-3 years. Multifamily residential projects often cater to a premium clientele seeking superior amenities and heightened security measures, making them receptive to innovative solutions like CaaS.

CASE STUDY IN GURUGRAM, INDIA.

A comprehensive evaluation of costs and savings was conducted for a 500,000-square-foot commercial office project, utilizing the actual energy consumption patterns of a Platinum LEED-rated building situated in Gurugram, India. The subject building exhibited an EPI of 180kwh/m2, closely corresponding with the benchmark set by the Bureau of Energy Efficiency India for office buildings. The transition from conventional methodologies to CaaS not only promises substantial environmental enhancements but also ensures significant financial gains.

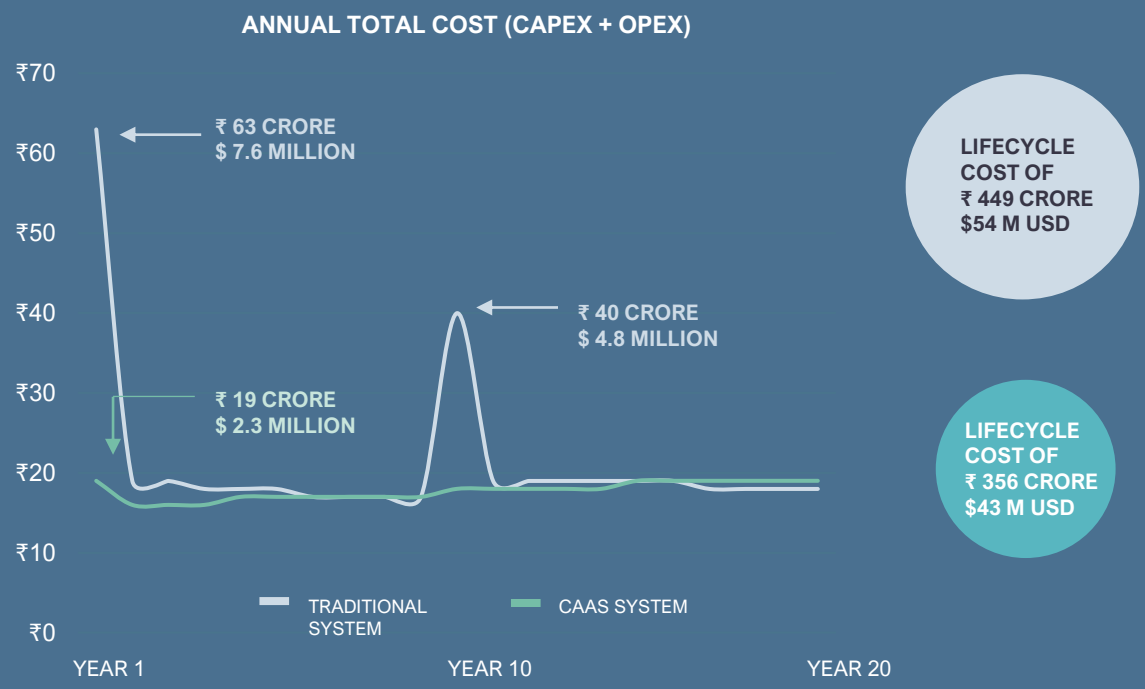
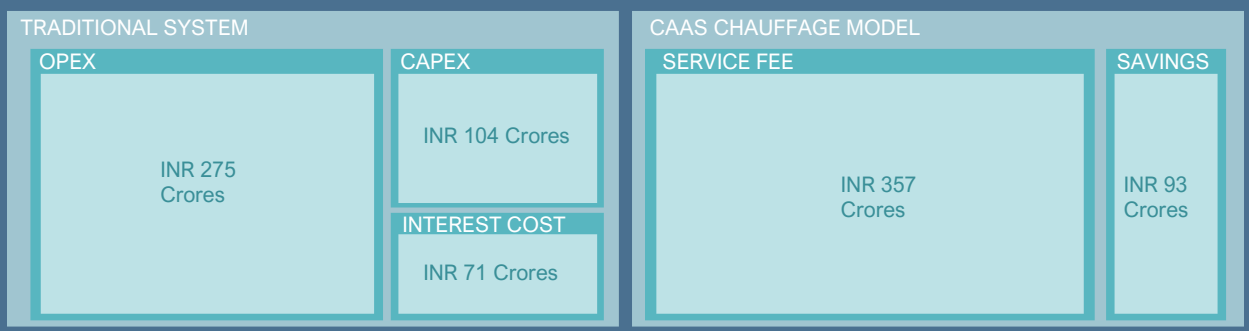


Figure 3: Urbs' CaaS reduced lifecycle costs by INR 93 crores over 20 years, with 60% lower capital expenditure (CapEx) and 20% lower overall costs compared to traditional systems.



Note 1 The assessment of traditional system costs involved computations utilizing inflation rates (Wholesale Price Index) for electricity and air conditioning plants published by the Office of Economic Advisor of India, based on the past decade, with the year 2011-12 as the base year.

Note 2 The pricing structure outlined above for CAAS is specifically designed for clients deemed to have minimal risk assessment and does not factor in any supplementary risk premiums.

UNLOCKING VALUE WITH URBS' CAAS

ENVIRONMENTAL CASE.

The CaaS model brings forth a clear environmental advantage over traditional cooling systems. Its focus on energy efficiency, integration of renewable power sources, and the elimination of harmful refrigerants which significantly reduces its environmental impact. Figure 4 illustrates how the CaaS system compares to a traditional cooling system in the case of the building in Gurugram, India. As seen, the traditional system consumes over twice the amount of energy as CaaS and emits over twice the amount of CO2.

Additionally, CaaS prioritizes water-efficient technologies, reducing strain on water resources, and promotes the use of natural refrigerants to replace harmful ones, protecting both air and water quality. By adopting CaaS solutions, organizations and individuals make a responsible choice for a more sustainable and greener approach to cooling.

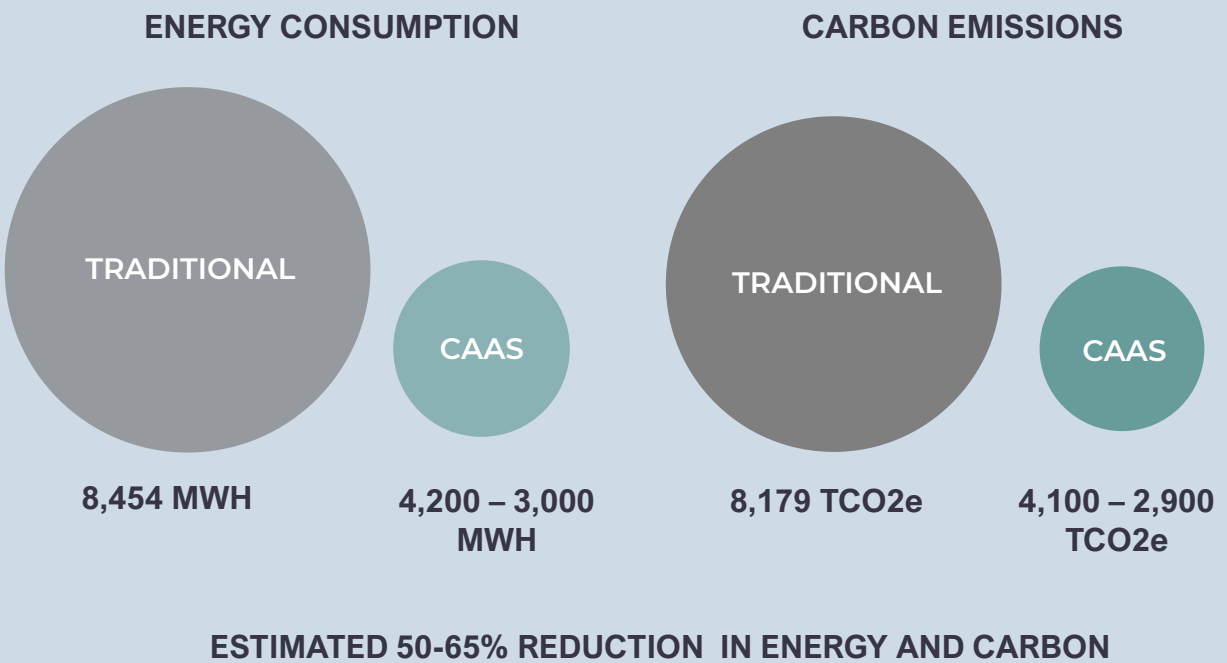


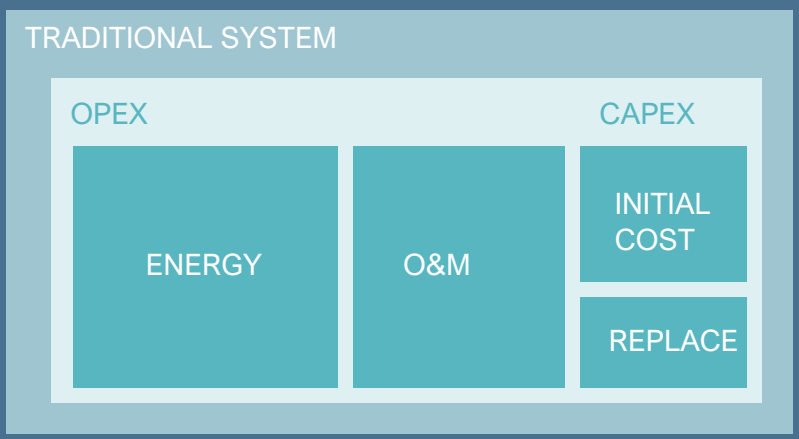
Figure 4: Illustrates the difference in energy consumption and carbon emissions of a traditional cooling system versus CaaS.

COMMERCIAL CASE.

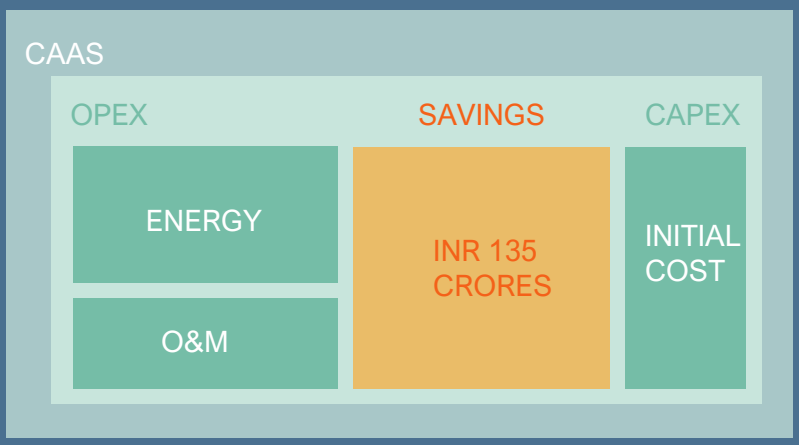
URBS' CaaS model offers compelling financial advantages over traditional cooling systems. As demonstrated in the table below, users can significantly reduce operational costs. Traditional systems incur lifecycle OpEx costs of approximately ₹ 275 crore ($33.1 million), while CaaS lowers this to ₹ 156 crore ($18.8 million) – a substantial savings of ₹ 119 crore ($14.3 million). Additionally, CaaS eliminates the need for large upfront CapEx associated with purchasing and installing equipment. Instead, users pay a predictable service fee, improving financial flexibility.

CaaS providers also handle all maintenance and repair costs, further reducing user burdens and ensuring optimal system performance. The inherent energy efficiency of URBS' CaaS leads to lower energy bills, further contributing to reduced OpEx. Finally, the predictable pay-as-you-go service fee simplifies budgeting and financial planning for users.

ESTIMATED ₹ 119 CRORE ($ 14.3 MILLION) REDUCTION IN OPEX COSTS



ESTIMATED ₹ 92 CRORE ($ 11.1 MILLION) REDUCTION IN TOTAL COSTS



THE SUSTAINABLE, COST-EFFECTIVE SOLUTION TO COOLING.

URBS' Cooling-as-a-Service model presents a transformative shift in how we can approach cooling. By aligning incentives between users and providers, CaaS addresses both the technical and financial barriers associated with traditional cooling solutions. This unique model offers a compelling path towards a more sustainable and cost-effective future for cooling.

Environmental Impact: CaaS systems prioritize energy efficiency, resulting in significantly reduced carbon footprints and the potential to incorporate renewable energy. This addresses the global need to combat climate change and conserve precious resources.

Operational Excellence: CaaS providers are incentivized to maintain systems at peak performance, ensuring optimal thermal comfort and user satisfaction.

Technological Innovation: CaaS drives development and adoption of superior, eco-friendly technologies, such as natural refrigerants and water-efficient systems.

Financial Benefits: CaaS eliminates the need for large upfront investments for users, reduces overall operational costs, and provides a predictable pay-as-you-go structure. This makes advanced cooling solutions more accessible to a broader market.

THE CLIMATE CRISIS NEEDS BOLD ACTORS. URBS CREATES OPPORTUNITIES FOR COLLABORATIVE ACTION TO CREATE ECONOMIC VALUE WITH CLIMATE IMPACT.

WELCOME TO THE FUTURE OF BUSINESS.

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URBAN SYSTEMS