



FINANCING DISTRICT COOLING IN EMERGING ECONOMIES

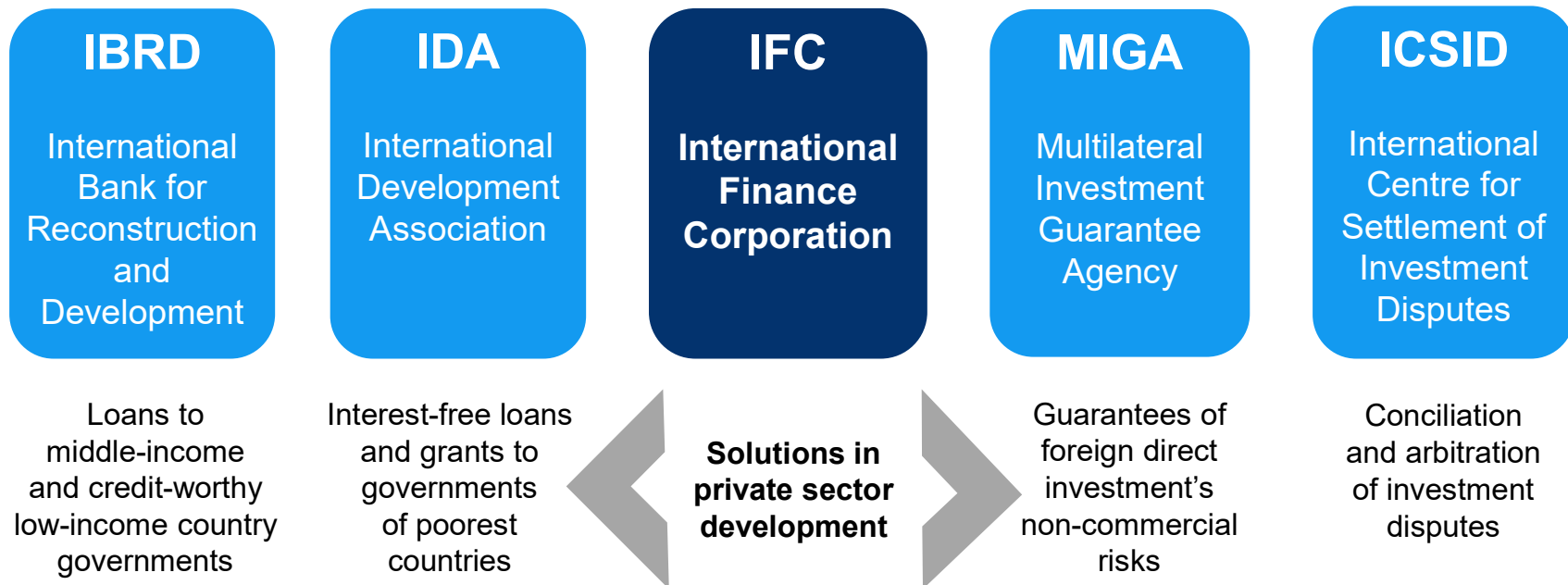
May 2023





IFC: WHO WE ARE AND WHAT WE OFFER

IFC: A MEMBER OF THE WORLD BANK GROUP



IFC: WHAT WE DO

Integrated Solutions, Increased Impact

INVESTMENT

Financial products tailored to client needs

- Loans
- Equity
- Trade and Commodity Finance
- Derivatives and Structured Finance
- Blended Finance

\$23.2 billion committed in FY22
\$63.8 billion committed portfolio

UPSTREAM

Create proprietary projects and investment opportunities by developing a sustainable pipeline of bankable transactions

- Early-stage, project level intervention in return for proprietary rights for equity and debt arranger role.
- Promoting and anchoring the design and implementation of platforms and programmatic approaches.
- Working closely across the World Bank Group to help develop policies, regulations and frameworks for private sector investments.

ADVICE

Innovative solutions combining IFC's expertise and tools

- Help Create New Markets
- Unlock Investment Opportunities
- Strengthen Clients' Performance and Impact
- Improve Environmental, Social, and Corporate Governance Standards

Over 800 projects of \$1.2 billion

MOBILIZATION

Mobilizing and managing capital for investment

- Syndications
- IFC Asset Management Company

\$10.1 billion under management at IFC AMC
\$10.6 billion mobilized from other investors



More than 4,000 staff from more than 150 countries, representing many professional disciplines (57% based outside of Washington, DC)

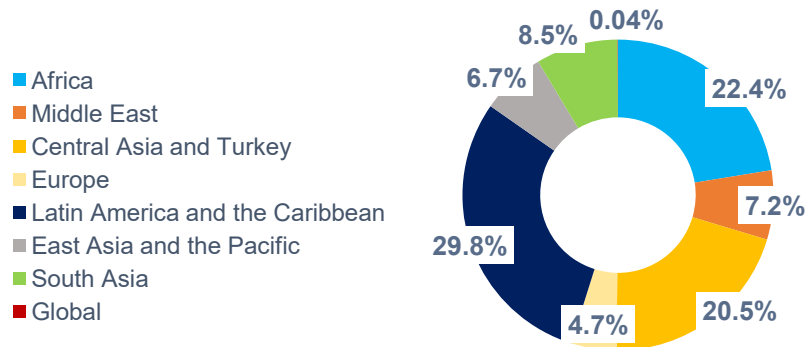
Offices in
100 countries
worldwide

IFC is the largest global development institution focused on the private sector in emerging markets

IFC: COMMITMENTS FY22

- AAA-rated by S&P and Moody's; owned by 186 member countries.
- Equity, quasi-equity, loans, risk management and local currency products.
- Takes market risk with no sovereign guarantees.
- Promoter of environmental, social, and corporate governance standards.
- Resources and know-how of a global development bank with the flexibility of a merchant bank.
- **Infrastructure accounted for 19% of FY22's commitments.**

IFC FY22 Commitments by Region



IFC FY22 Highlights

Portfolio (own account)	US\$63.8 billion
New Commitments (own account)	US\$12.6 billion
New Core Mobilization	US\$10.6 billion
Number of Countries	120
Number of Clients	1,848

In the last decade, IFC has invested over US\$61 billion in infrastructure in emerging markets.

Note: Financial year ends June 30. Charts include commitments for both IFC's own account and mobilization, excluding MIGA.

Gurugram, India

TABREED ASIA PLATFORM



IFC'S FIRST DISTRICT COOLING PROJECT WITH TABREED



- In 2021, **IFC committed US\$25 million of equity to its first District Cooling (DC) project to set up a greenfield DC platform for Asia with Tabreed**, one of the largest listed district cooling utilities, based in UAE. The platform will target projects of US\$300 - US\$400 million in the next 3-5 years. The platform focuses on Asia, with the initial market being India.
- The project is expected to **reduce approximately 57,420 tonnes of GHG emissions annually**. The company's water-cooled chillers reduce annual GHG emissions by up to 50 percent when compared to air conditioners, and up to 40 percent when compared to air-cooled chillers.

KEY FEATURES OF DISTRICT COOLING

1

Diversity Factor reduces upfront capex

DC optimizes the capacity of cooling infrastructure installed by aggregating diverse cooling loads across various buildings

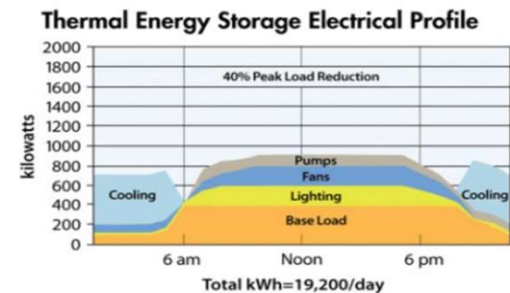
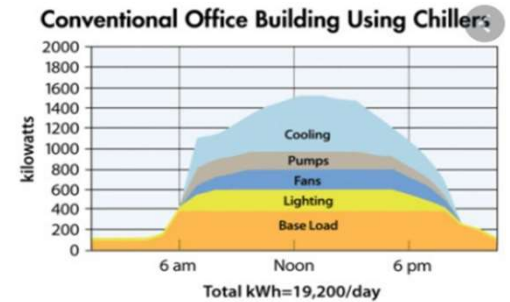
2

Cooling as a Service model: Efficient and continuous maintenance of all parts reduces refurbishment costs

3

Thermal Energy Storage (TES) optimizes installed cooling capacity

TES ensures that the chillers operate in a baseload mode for a higher percentage of time and by reducing operating costs, 'shaving' the peak cooling load



CONVENTIONAL COOLING VS DISTRICT COOLING



Conventional Cooling Systems



District Cooling System

Energy usage

- Oversized with redundant installed cooling capacity
- No incentives to lower replacement or O&M cost
- No cooling storage options during peak demand usage
- Electrical efficiency (kWh/ RTh) not considered
- Design lifetime of 8 – 15 years

- Lower installed cooling capacity due to aggregation across large, mixed-use demand
- Lower replacement costs
- Lower peak energy demand
- Lower O&M costs
- Electrical efficiency (kWh/ RTh) guarantee
- Capex (US\$/RT): 60-100% higher than conventional cooling systems
- Design lifetime: 20-30 years

Controls and monitoring

Less effective controls and monitoring. No incentives for long-term asset maintenance.

Centralized control: SCADA system. This contributes to better O&M practices

Refrigerants use

- No plan for phasing out
- Leakage

- Montreal Protocol for phasing out harmful refrigerants
- Zero refrigerants leakage

Climate

Conventional cooling can have a significant negative impact

GHG emissions reduction of up to 50% over the project lifetime

System benefits

Grid powered, limited means to tap other sources

- Unlock large-scale renewables, tap waste-heat etc.
- Power grid balancing and local benefits,

BENEFITS FOR STAKEHOLDERS



Community

- Lower GHG emissions (40-50%)
- Zero refrigerant leaks
- Less noise pollution



Government / Utility

- Lower MW installed (30-50%)
- Lower peak demand (up to 50%)



Cooling service provider

- Fixed payment
- Variable payment
- Utility return



Real estate developer

- Saving in upfront and replacement capex (30-40%)
- No headache of owning / operating cooling equipment
- More sq ft in buildings



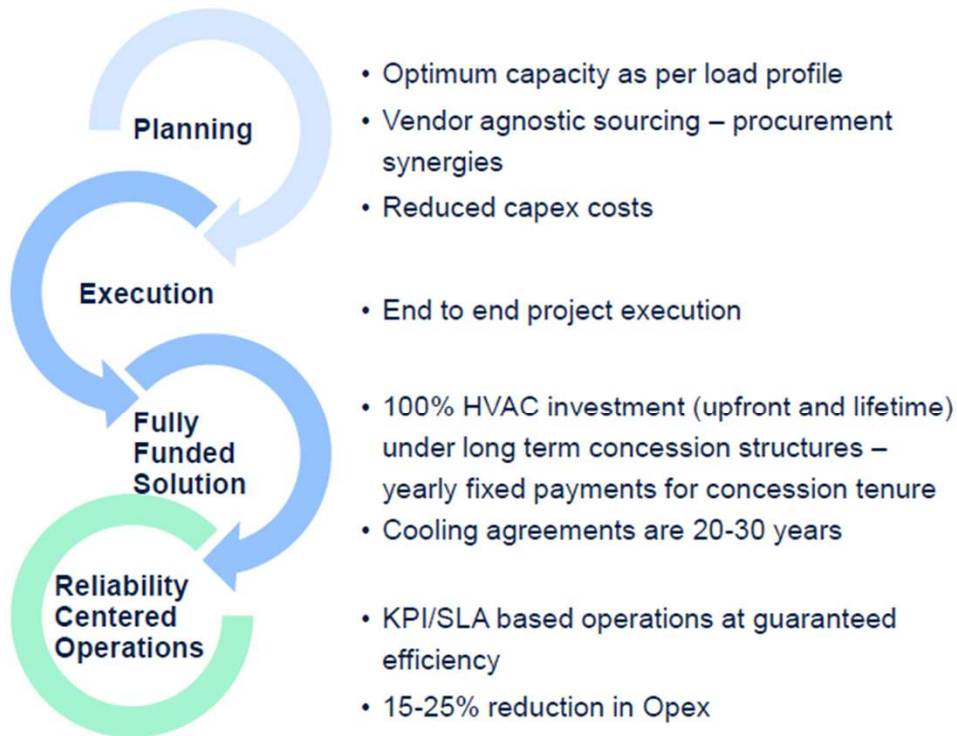
Tenant

- Lower payments (20% saving)
- Efficiency guarantee
- Improved comfort and indoor climate
- brand value of being located in an environmentally sustainable building

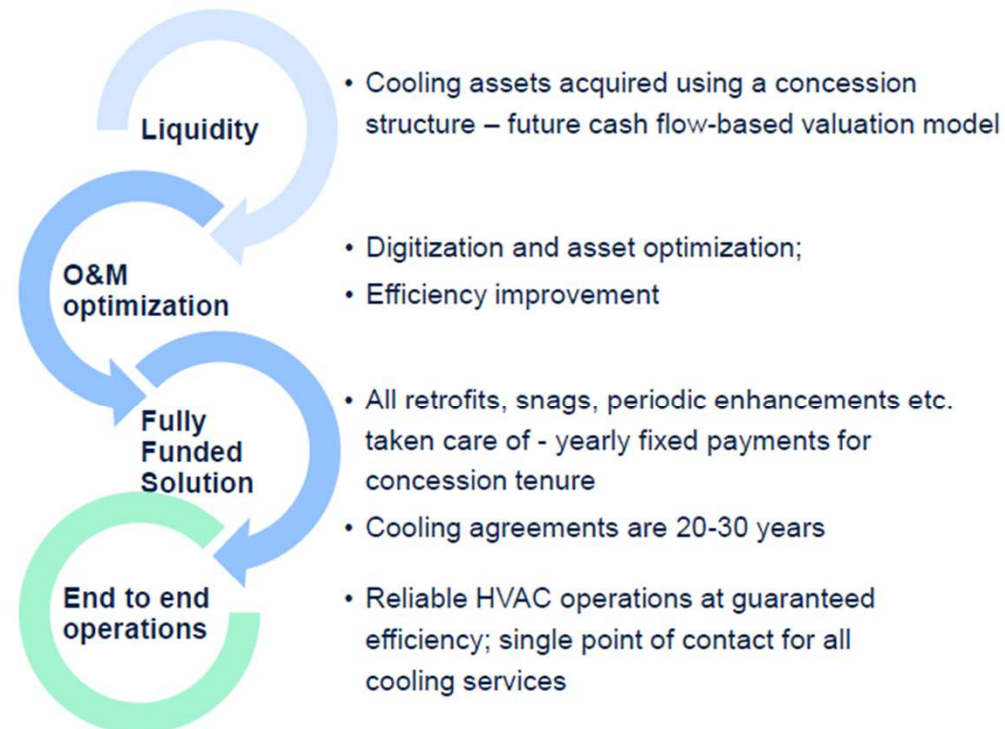
Overall, **lifecycle cost saving of 40-50%** (depending on baseline technology) shared among cooling service provider, real estate developer, and tenant. **GHG emissions can be up to 50% lower** over the project lifetime.

DC AND COOLING-AS-A-SERVICE

Greenfield Developments DC systems incorporated in the project



Brownfield Developments – existing cooling systems divested, and Cooling-as-a-Service



TABREED'S FIRST MOVER ADVANTAGE IN INDIA

Tabreed Asia Platform has first mover advantages for driving growth in India – a large untapped and fragmented market at a very nascent stage of development



Tabreed offers a **one-stop solution** for optimizing costs through '**best fit**' asset deployment and maintenance of uptime of the assets over 25-30 years with an '**efficiency guarantee**' to the customer that reduces the amount of electricity consumed per unit of cooling



Tabreed is **vendor agnostic**, and offers state-of-the-art customized integrated solutions, using automation, remote monitoring, and analytics derived from operating data



Tabreed's primary target is **Grade A/B offices**, office campuses and data centers, located in special economic zones (SEZs) / IT parks / business parks, with a floor space of >1 million sq. ft. and installed HVAC loads of 5,000 to 10,000 RT or higher



Similar to the UAE, the India business will seek to establish **long-term strategic relationships** and build repeat business with 5-7 players

KEY ELIGIBILITY CRITERIA TO ENSURE ROBUST PROJECTS

Strategic: Credit rating of concession grantor (public or private) or certain networth or debt considerations. For operational buildings, consider operational history, location, occupancy, lease tenor, debt coverage, cashflow protection mechanism.

Contractual protections:

- (a) Exclusivity in Concession Agreement,
- (b) Take or Pay contracts with customers,
- (c) Right to suspend services for delayed payments and to terminate for continued non-payment,
- (d) satisfactory termination payments in Concession Agreement and Cooling Services Agreement,
- (e) Change of control of grantor/ customer, replacement customer

Financial: target returns

Integrity Due Diligence, Legal, Technical, Environment and Social considerations

DC OPPORTUNITIES IN INDIA



India is a large market with strong DC potential. The World Bank Group is supporting DC development in the country

- DC potential for India has been estimated to be nearly **12 million RT** (≈315 DC systems) and the required investment is estimated at **\$36 billion**.
- India's **commercial sector** alone is expected to add over 765 million sq.ft. of office space with a corresponding cooling demand of over 2 million RTs in the next 5 years.
- Currently there are **over 10 DC projects** with a combined capacity of over 400k RTs (when fully built).
- Key stakeholders are **a mix of public and private entities**: in-house “single ownership” (airports, malls) and CaaS providers/utilities.
- Currently the development of DC is predominantly **market-driven by private actors** (domestic and international). Some cities bid out DC concessions.
- *Key challenges: unregulated market with limited supporting policies in place (regulation by contract), and lack of awareness among public stakeholders.*



The World Bank is supporting the Government of India in implementing **India's Cooling Action Plan** and enacting a national policy for DC

Check out the report: [Climate Investment Opportunities in India's Cooling Sector](#)











Creating Markets, Creating Opportunities

Bangkok, Thailand

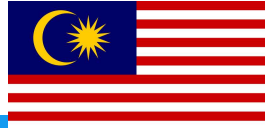
DEEP DIVE INTO HIGH POTENTIAL MARKETS



APPROACH TO IDENTIFYING NEW DC MARKETS

Drivers of district cooling		Possible Indicators
	Macroeconomic perspective	<ul style="list-style-type: none"> • Population • GDP (PPP) per capita
	Favorable enabling environment	<ul style="list-style-type: none"> • District cooling regulation; Cooling policies • Corruption perception index; FDI restrictiveness
	National energy strategies	<ul style="list-style-type: none"> • Regulatory indicators for sustainable energy • Sustainable development goals
	Electricity cost burden	<ul style="list-style-type: none"> • Electricity tariff • Buildings' electricity expenditure as a share of GDP
	Climate related factors	<ul style="list-style-type: none"> • Emissions Per Capita (tonnes of GHG) • Grid emission factor
	Strong cooling demand	<ul style="list-style-type: none"> • Cooling-degree days (CDD), or • Share of cooling in the total energy expenditure of buildings
	Real Estate Sector	<ul style="list-style-type: none"> • Number of cities • Urbanization rate % • Commercial real estate growth • Planned large-scale projects
	Cooling market maturity	<ul style="list-style-type: none"> • Cooling Technology Compatibility with District Cooling • No. of identified DCS (in operation / under development)

KEY FINDINGS (1/4) – MALAYSIA



Advanced market with strong DC prospects and interest from both public and private sectors

- Malaysia has **strong potential** given its strong cooling demand (3,700 cooling degree days), and increasing urbanization.
- Malaysia has the maximum number of DC systems in operation in Southeast Asia. There are currently 30+ DC projects under operation (240k RT), and 8 projects under development (160k RT).
- Key stakeholders are **a mix of public and private entities**.
- Currently the development of DC is **purely market driven**.
- *Key challenges: Unregulated market with limited supporting policies in place, and lack of awareness among national public stakeholders.*



KLCC District Cooling

KEY FINDINGS (2/4) – COLOMBIA



Small market for DC systems but with good potential. Market has been driven by tri-generation projects.

- There are currently 7 DC systems in operation (~8,300 RT) and 4 projects being developed (4,500 RT).
- **“Intramural” projects** in place, which could be compatible with DC projects.
- Many DC systems based on **trigeneration schemes** where **natural gas** is the main energy driver.
- Market has been driven by **private utilities**.
- As part of Colombia’s District Energy Initiative, 26 studies in key cities are being conducted to assess the feasibility of DC/DH systems, including **Barranquilla, Cali, Cartagena, Medellín**.
- No new cities coming up, but the **growth of commercial real estate** (hotels, malls, offices) in existing cities expected
- *Key challenges: lack of a coherent national strategy and regulatory framework, lack of engagement with municipalities responsible for urban planning.*



The city of Medellín, where Colombia’s first DC project is built

KEY FINDINGS (3/4) – EGYPT



High potential for the growth of DC systems with the development of new cities

- **Growing population** and real estate needs from **new cities** are expected to drive demand for DC systems.
- **Relatively high cooling penetration** of 36%. There are 10 DC systems in operation (190k RT), 6 DC systems under implementation (214k RT) and 15 projects being planned (401k RT).
- **Interest from public sector along with green shoots in the form of private sector business model:**
 - Key public developers: Administrative Capital for Urban Development (ACUD) and New Urban Committees Authority (NUCA)
 - Local real estate developers as well as developers and DC companies from UAE present with sector expertise.
- A **DC Code** was established that requires developers to assess the feasibility of DC systems in their project design stage.
- *Key challenges: unfavorable macroeconomic conditions, lack of formal regulation of the DC market.*



Smart Village, Egypt's first DC project

KEY FINDINGS (4/4) – THAILAND

Good potential for the growth of DC systems driven by real estate growth and private business models

- **Strong cooling demand** (over 4,000 cooling degree days), **high urbanization rates** (52% in 2022). The Bangkok Metropolitan Region accounts for more than 80% of the entire office space in the country. Potential demand for DC could come from development of Eastern Economic Corridor and smart cities under Thailand 4.0 strategy, and growth of data centers
- Currently, there are **5 DC systems** in operation (41k RT), 8 systems under construction/ development (200k RT), and 3 systems in the pipeline (156k RT).
- Majority of the DC projects are **private business models**. Collaboration/ JVs with international DC players to deliver projects.
- Although projects have been developed, the sector is **market-driven**, and there are no regulations, standards, or coordination bodies directly supporting DC developments.
- *Key challenges: lack of formal regulatory framework and policies and lack of awareness at the national/ state level of DC benefits.*



The Government Complex, Bangkok

An aerial photograph of the Kuala Lumpur skyline at dusk. The Petronas Twin Towers are the central focus, illuminated with warm lights. The sky is a mix of orange, pink, and blue. Other skyscrapers and buildings are visible in the background. A blue banner with white text is overlaid on the bottom half of the image.

Kuala Lumpur, Malaysia

BUSINESS MODELS FOR DISTRICT COOLING

PRIVATE SECTOR BUSINESS MODEL FOR REAL ESTATE DEVELOPERS



Public or Private Concession

- 0% real estate developer or municipal equity
- Financed & operated by DC company



Joint Venture SPV

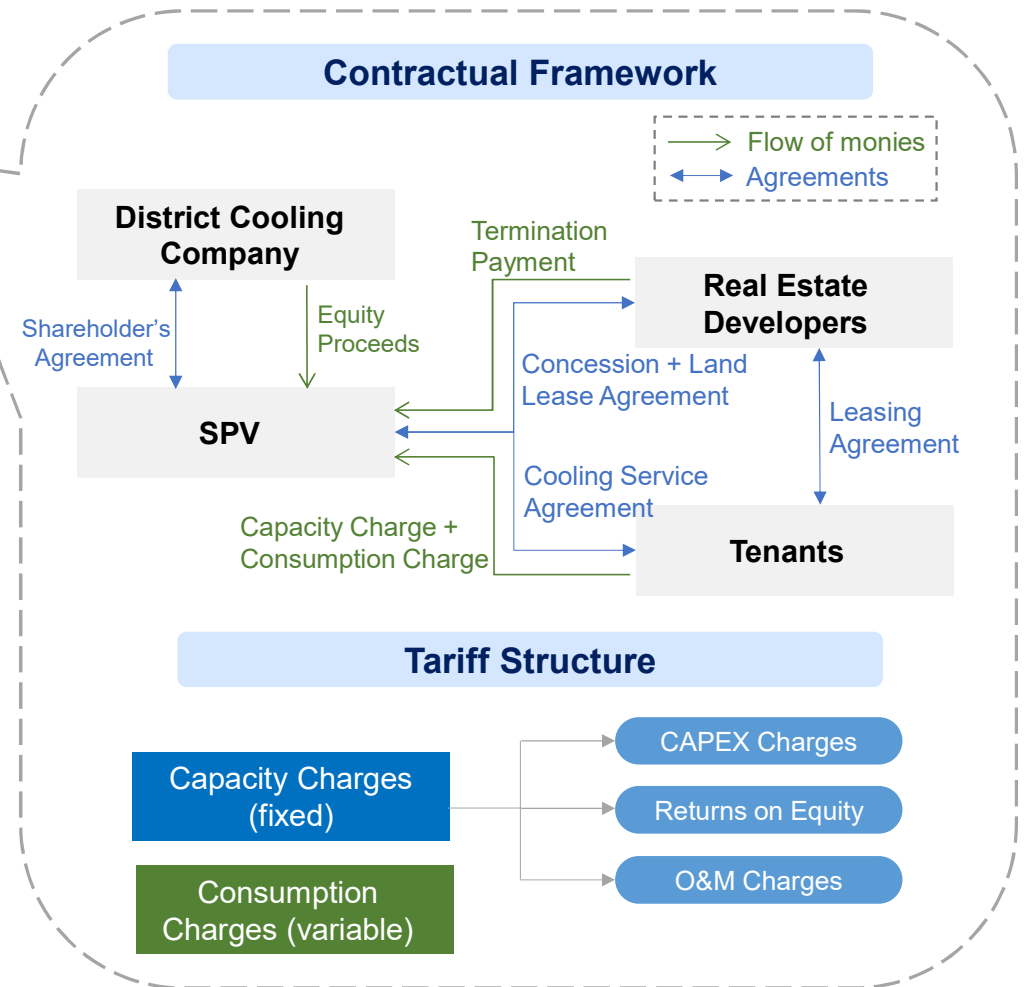
- <100% real estate developer equity
- Partly financed and operated by DC company



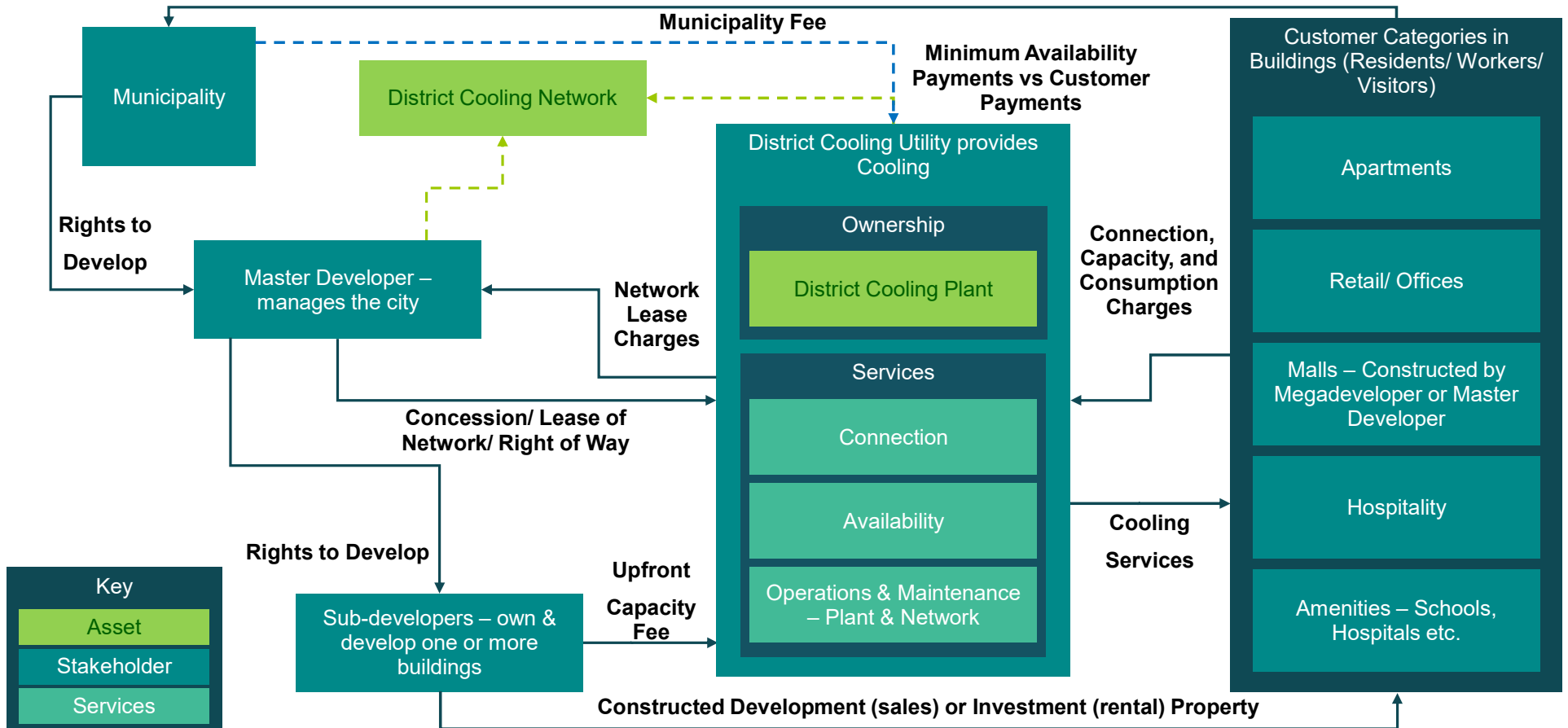
In House

- 100% real estate developer equity
- Operated by internal O&M or mgmt. contractor

The difference between developed countries and emerging economies is — **enabling framework**



MUNICIPAL PPP BUSINESS MODEL



POSSIBLE BLENDED FINANCE FOR DISTRICT COOLING

Financing challenges

- 1 High upfront cost** – District cooling systems include central plants and distribution grids. A certain portion of the central plant is required to be over-designed to accommodate future building developments- this results in higher upfront costs.
- 2 Offtake risk** – In emerging economies where the market is often unregulated, taking long-term payment risk on real estate developers/ tenants could be an issue.
- 3 Project ramp up** – Initial lower occupancy than projected can impact profitability

Possible blended finance interventions

CAPEX grants and Interest Rate Buydown would lower upfront CAPEX requirements or reduce financing costs improving project viability.

Subordinate debt tranches/guarantees could help to mitigate these risks

KEY CHALLENGES FOR DEVELOPING DC IN EMERGING MARKETS



Policy & Institutional

- Lack of supporting legislation and building codes
- Need for awareness in public stakeholders



Growth Potential

- Inherently linked to the growth potential of commercial real estate
- E&S considerations: greenfield projects usually require land acquisition



Commercial

- Lack of Cooling-as-a-Service business model
- Electricity price subsidies
- High up-front cost in phased real estate development
- Long-term contractual payment risk in the absence of regulatory framework
- Lack of relevant experience in structuring tariffs



Technology & Capacity

- Design risks (oversizing is common)
- Lack of large demonstration pilots
- Lack of technical capacity at various levels: (i) planning stage with public sector; (ii) absence of sector experts/consultants; (iii) real estate developers lack experience

HOW IFC CAN SUPPORT



Advocacy & Capacity Building

- WBG works with all levels of government to support advocacy and policy advice
- Creates awareness and capacity among stakeholders
- Partner with stakeholders such as UNEP and UNDP



Knowledge & Partnership

- Knowledge and lending experience with real estate developers, infra players, subnational governments
- Global knowledge with local expertise
- Matchmaking: Can help with local partner selection.



Project Development

- Co-finance feasibility, pre-feasibility studies, and technical assessment
- Undertake project development with private sector sponsors or SOEs
- Understand risk, and can help structure transactions
- Project viability – help identify other revenue streams such as carbon credits



Financing

- Debt
- Equity
- Guarantees
- Mobilization
- Blended finance (contingent upon donor support)






Cairo, Egypt



FINANCING DISTRICT COOLING

SUSTAINABLE FINANCE

Item	“Use of Proceeds” - Green / Social / Blue / Sustainable	“Target Driven” - Sustainability-Linked Financings
Description	<ul style="list-style-type: none"> Financial instruments with a dedicated use of proceeds focused on eligible categories, including: <ul style="list-style-type: none"> ✓ Climate adaptation ✓ Climate mitigation ✓ Social ✓ Ocean conservation 	<ul style="list-style-type: none"> Pricing linked to achievement of ambitious targets – Sustainability Performance Targets (“SPTs”) SPT compliance is verified at an agreed point in time and generally no rebates apply SPTs are normally SDGs or corporate ESG targets SPTs need to be material – i.e., relevant to the business; and ambitious compared to “business as usual” and peers
Pricing	<ul style="list-style-type: none"> Instruments priced in same way as conventional instruments although market demand is leading to a “greenium” for borrowers/issuers 	<ul style="list-style-type: none"> Interest rate and fees indexed to performance on SPTs For bonds, at least 25 bps step-up if targets are missed For loans, up to 25 bps step-down step down if targets are met
Verification	<ul style="list-style-type: none"> Implementation and validation methodology laid out in a Sustainable Financing Framework Second Party Opinion usually required 	<ul style="list-style-type: none"> SPTs rationale, ambitiousness and validation methodology laid out in a Sustainability-Linked Financing Framework Second Party Opinion usually required
Standards	<ul style="list-style-type: none"> Aligned with ICMA or LMA’s Green Loan Principles and Green, Social and Sustainability Bond Principles. 	<ul style="list-style-type: none"> Aligned with ICMA’s Sustainability-Linked Loan / Bond Principles
IFC Experience	 <p>Blue Loan</p>	 <p>“Super green” Sustainability-Linked Loan</p>



“Super green” Sustainability-Linked Loan

IFC'S SUSTAINABLE FINANCE EXPERIENCE WITH WATER UTILITIES



Blue Loan

- In June 2022, IFC signed a **BRL 760 million (~US\$150 million)** unsecured A loan to SABESP
- SABESP is the largest water and sanitation service provider in Brazil
- The largest worldwide based on the number of clients serviced, reaching over **28 million people in 375 municipalities** in the state of **São Paulo**.
- The **first** pureplay **Blue Loan** in Latin America.
- Use of proceeds: contribute to the UN Sustainable Development Goals:
 - Clean water and sanitation (SD6)
 - Sustainable cities and communities (SD11)
 - Responsible consumption and production (SD12)
 - Climate action (SD13).
- IFC played a key role in the transaction:
 - Transaction Support: IFC helped SABESP to: (i) define the **use of proceeds** for the Blue Finance; (ii) draft a **Blue finance Framework**; and (iii) interact with the **Second Party Opinion** provider.



“Super green” Sustainability-Linked Loan

- In June 2021, IFC signed a **US\$30 mn (in TRY equivalent) sustainability-linked loan** to IZSU
- IZSU is the water utility of the **City of Izmir, Turkey**
- Loan **supports** upgrades to its water treatment and supply infrastructure
- Facility has a **margin step-up down** if IZSU reaches a stretch target to hire at least 300 **female contracted employees** in 5 years into specific jobs where women are currently under-represented
- IFC played key roles in the transaction :
 - **Transaction Support:** Helped select and **define** the **gender SPT** and validate its ambitiousness.
 - **Implementation Support:** IFC providing **gender advisory services** to (i) promote increased female participation in IZSU’s workforce; (ii) foster awareness and prevention of gender-based violence (GBV); and (iii) help IZSU to establish a corporate culture of respect, equality and inclusiveness (gender tag).



“Super Green” Sustainability-Linked Loan

- In June 2021, IFC signed a **BRL300 mn (US\$56 mn) “super green” sustainability-linked loan** to Corsan
- Corsan is a leading state-owned water utility in Brazil
- Loan **supports Corsan’s water loss and energy efficiency programs** through network replacement and substitution of obsolete electric pumps and hydrometers
- **Coupon step-down** if Corsan reduces **water losses** in distribution to <35% by 2024
- As Sustainability Coordinator, IFC played a **key role** :
 - Helped **select the SPTs and validate their ambitiousness** through a materiality assessment
 - Assisted Corsan in putting together a **Sustainability-Linked Financing Framework** and getting a **Second Party Opinion**
- IFC also provided **Advisory Support** to help Corsan diagnose and plan priority locations and interventions in its objective to reduce water losses

MUNICIPALITIES AND SUSTAINABILITY LINKED FINANCE

Gothenburg, Sweden 

Sustainability-Linked Revolving Facility

- In 2022, Gothenburg issued a **US\$815mn sustainability linked finance revolving green facility**.
- It was the **first city in the northern hemisphere** to link the financing rate to green and social targets. Gothenburg had also issued the first municipal green bond in 2013.
- Gothenburg is city in Sweden with a 500,000 population. It is **rated AA+**.
- **There are three green targets for the green facility**
 - Emissions reduction
 - **Fossil-free district heating**
 - Replacement of city's fleet with electric vehicles
- **There is one social target for the green facility**
 - Gothenburg has six neighborhoods classified as highly vulnerable.
 - Gothenburg has committed to ensure there are none in the city by 2025.
- If the city hits all four targets, it will see a discount of 0.5bps on the commitment fee and 1.5bps on the loan. If it misses the targets it will pay the same amount in addition.

Helsingborg, Sweden 

Sustainability-Linked Bond

- In 2022, Helsingborg issued a **sustainability linked bond listed on Nasdaq's Sustainable Bond Market**.
- Helsingborg is a coastal municipality in the South of Sweden, the ninth-largest in the country with a population of 150,000. **It is rated AAA**. The city has set itself the **target of achieving net-zero emissions by 2035** at the latest, and the proceeds of the bond will help achieve that goal.
- In 2021, it has **developed a sustainability linked bond framework** in collaboration with Danske Bank and in accordance with the International Capital Market Association's Sustainability-Linked Bond Principles.
- **The target associated with the bond are linked to GHG emissions reduction:**
 - Decrease absolute CO₂e emissions annually to achieve 85% reduction by 2035 compared to emissions in 1990
 - Failure to meet the target will result in premium payable by the city in the form of coupons step-up or one time payment.
- To achieve this target, the city will focus on:
 - Push for public transportation and cycling
 - Developing renewable energy such as biogas production
 - Improve wastewater management and reuse

WHAT IS A CARBON CREDIT?

Carbon credit can be sold to generate additional revenue for companies

What are carbon credits?

- A carbon credit is a **certified & transferable instrument representing one tonne of CO₂ or equivalent greenhouse gases (CO₂e) that has been reduced, avoided or removed**. This can be traded to 'offset' the equivalent volume of residual emissions.

Where are they sold?

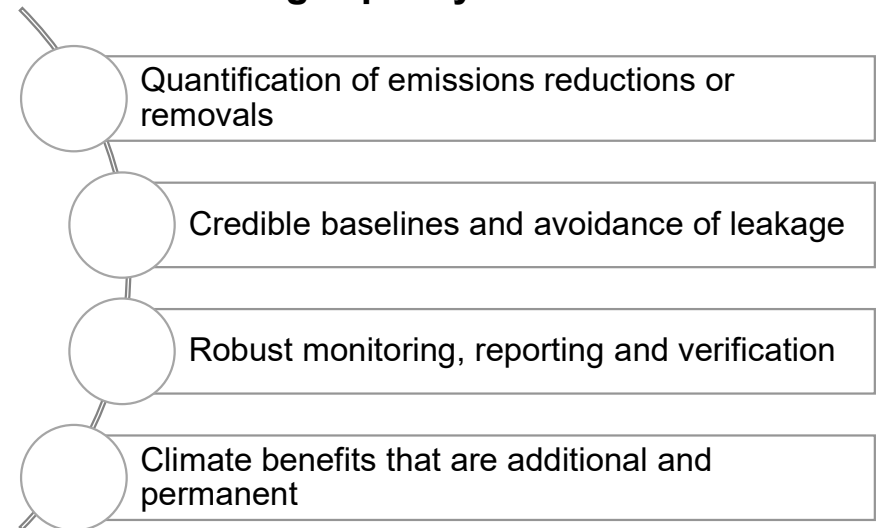
Compliance Market

Legally mandated for participants by international, regional, and (sub-) national agencies. e.g. European Union's Emissions Trading Scheme (EU-ETS), and the California Carbon Market.

Voluntary Market

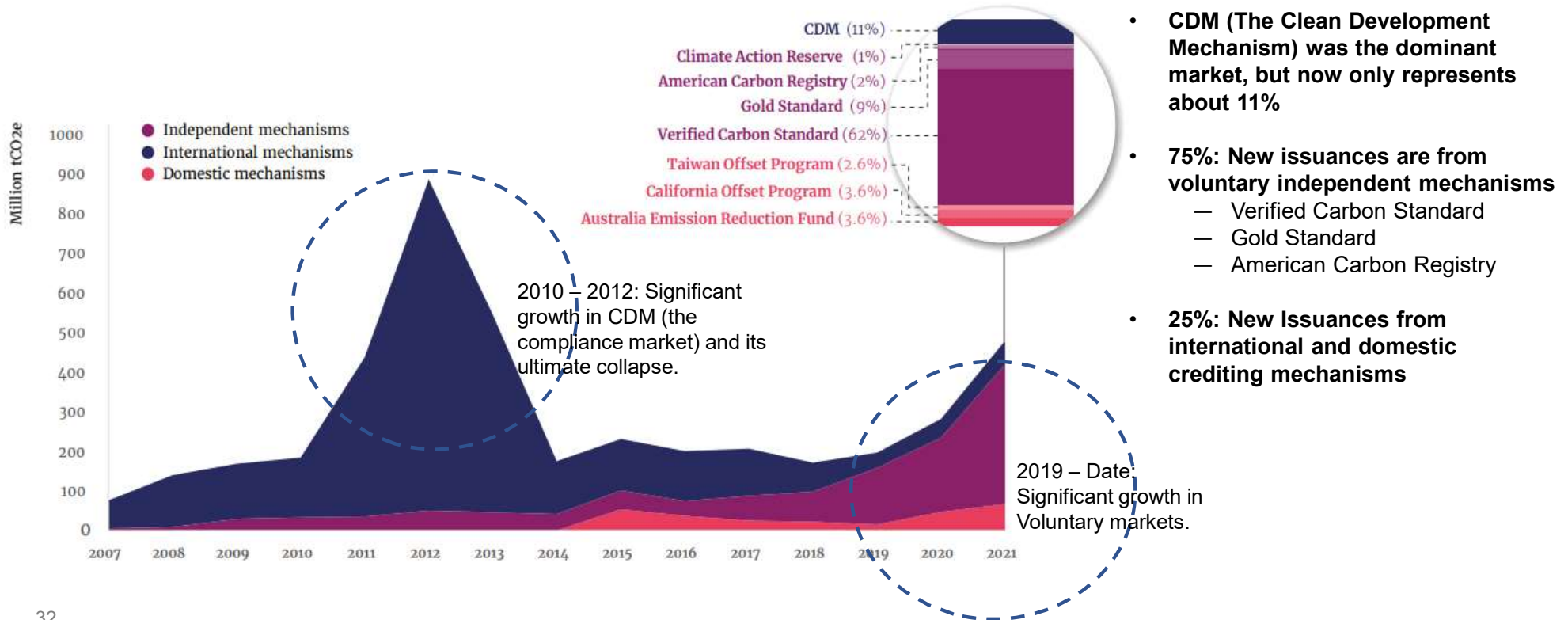
Voluntary emission reduction intentions of companies, organizations and individuals. (e.g., climate neutrality, net zero etc.).

What are high-quality carbon credits?



WHERE ARE THE CREDITS BEING SOLD?

Voluntary Markets now represent about 75% of new issuances, driven by a key strength; the ability to implement without government involvement.

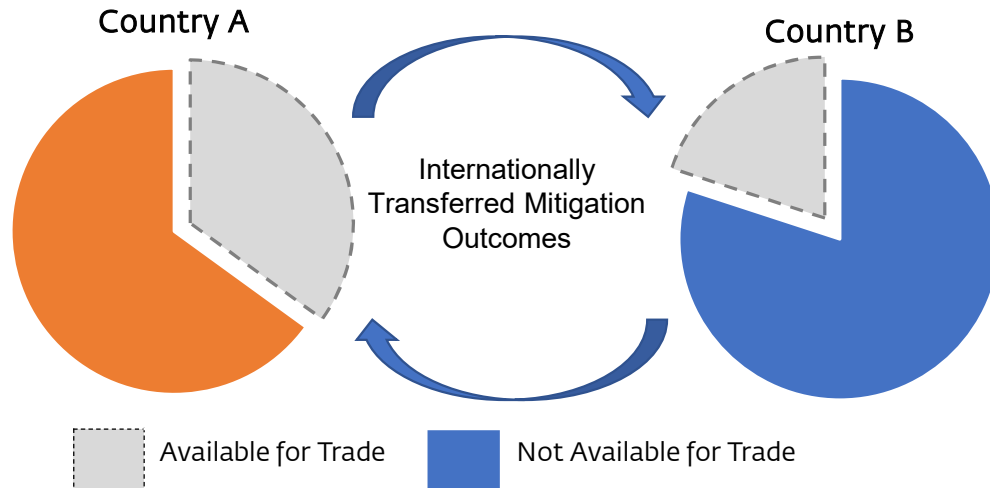


ARTICLE 6, PARIS AGREEMENT

Article 6 is crucial for the future of Carbon Credits globally. However, like all things that multiple countries cooperate on, it will take a long time to implement.

<p>What is Article 6</p>	<ul style="list-style-type: none"> Under the Paris Agreement, it is an international framework for Countries to cooperate on achieving emission reduction targets.
--------------------------	---

How is it expected to work?



<p>1 Is it mandatory?</p>	<p>No, but may be in the future</p>
<p>2 Does it regulate voluntary markets?</p>	<p>No, but could in the future.</p>
<p>3 Could there be double counting of credits?</p>	<p>No, but will require a robust system/ arrangement across all countries involved.</p>



Upasana Varma
uvarma@ifc.org

**Senior Investment Officer,
IFC Lead for District Cooling**