



Webinar series: Accelerating energy efficient cooling – How Cooling as a Service is set to revolutionise the cooling industry

IEA SEAD Webinar, 22 April, 2020

Overview

- **Introduction**
 - Vida Rozite and Emily McQualter, Energy Efficiency Division, IEA
- **How Cooling as a Service is set to revolutionise the cooling industry**

Thomas Motmans, Basel Agency for Sustainable Energy (BASE)

Jim Maguire, Sustainable Development Capital, LLP

Peter Hobson, Sustainable Development Capital, LLP

- **Questions and discussion**

How to ask questions

The screenshot displays the GoToWebinar Attendee Interface. The main window is titled "GoToWebinar Viewer" and contains a large white area with the text "Attendee Interface". To the right of this area is a vertical sidebar. The sidebar contains several icons: a microphone, a speaker, a question mark, and a GoToWebinar logo. The "Questions" icon is circled in red. Below the sidebar is a "Questions" panel, which is also outlined in red. This panel contains a text input field with the placeholder text "[Enter a question for staff]" and a "Send" button. Above the "Questions" panel is an "Audio" panel with options for "Telephone" and "Mic & Speakers", a "MUTED" status indicator, and a volume slider. At the bottom of the sidebar, there is a section for "Webinar Housekeeping" with the "Webinar ID: 275-918-366" and the "GoToWebinar" logo. The Citrix logo is visible in the bottom left corner of the main window.

Attendee Interface

Question box

Questions in English

File View Help

Audio

Telephone

Mic & Speakers [Settings](#)

MUTED

Questions

[Enter a question for staff]

Send

Webinar Housekeeping
Webinar ID: 275-918-366

GoToWebinar

CITRIX

SEAD: Governments working together to save energy

 **SEAD SUPER-EFFICIENT**

EQUIPMENT & APPLIANCE DEPLOYMENT

AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

Governments working together to save energy, turning knowledge into action, and advancing global markets to encompass energy efficient products



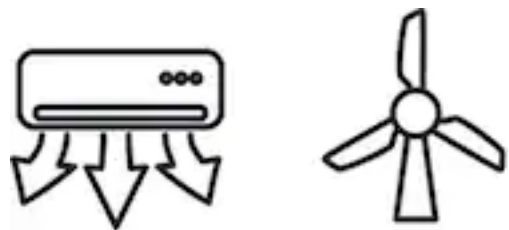
19 collaborating members

+ partners

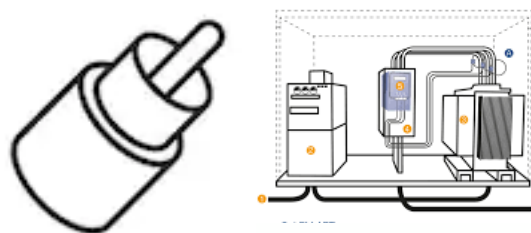
SEAD is an Initiative under the Clean Energy Ministerial

Covering a wide range of equipment and appliances.....

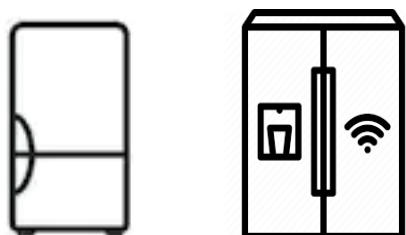
Cooling



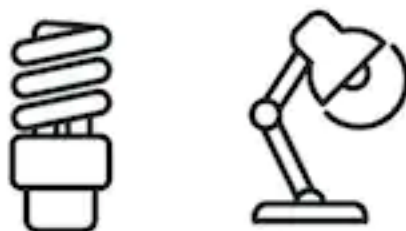
Equipment



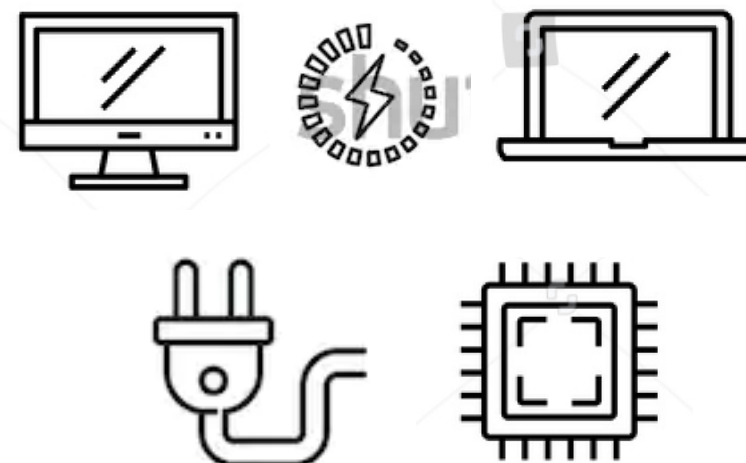
Refrigeration



Lighting



Electronics



Proposed activities in the near future



Knowledge exchange portal



International collaboration events



Webinar series (cooling, digitalization...)



Master classes



Tools for policy makers



Cooling as a Service
Refresh the planet

Market Transformation: Servitisation of Cooling Industry





About BASE

Basel Agency for Sustainable Energy



Driving investment in sustainable energy

BASE is a Swiss not for profit foundation and a Specialised Partner of UN Environment.

BASE develops innovative, actionable financial strategies and market-driven solutions to unlock investment in sustainable energy and to tackle climate change.



The Challenge

Cooling demand is rising dramatically

Cooling demand will triple by 2050, from 10 to 30% of global electricity consumption (= China's electricity use today) *



*IEA, The Future of Cooling, 2018



Opportunity

Significant investments in cooling systems upcoming

Market of **6.9 trillion USD** over next 30 years (**230 billion USD/year**) that could be invested in clean efficient cooling



*IEA, The Future of Cooling, 2018



Opportunity

Energy-efficient systems are cheaper over the long term

Life cycle cost (12 years)



- Cost of Water
- Cost of Equipment
- Cost of Maintenance
- Cost of Electricity

- 90%+ of costs related to operation and maintenance
- Large savings potential with short payback periods

BUT:

- Business and building owners are not investing in more efficient systems!

* BASE calculations with inputs from technology providers



The Challenge

Investment decision is sensitive to purchase price



Key barriers:

- Higher upfront cost of efficient technology (competing against cheap and inefficient tech)
- Lack of trust in performance
- Prioritisation of investment in core business



Cooling as a Service

Refresh the planet

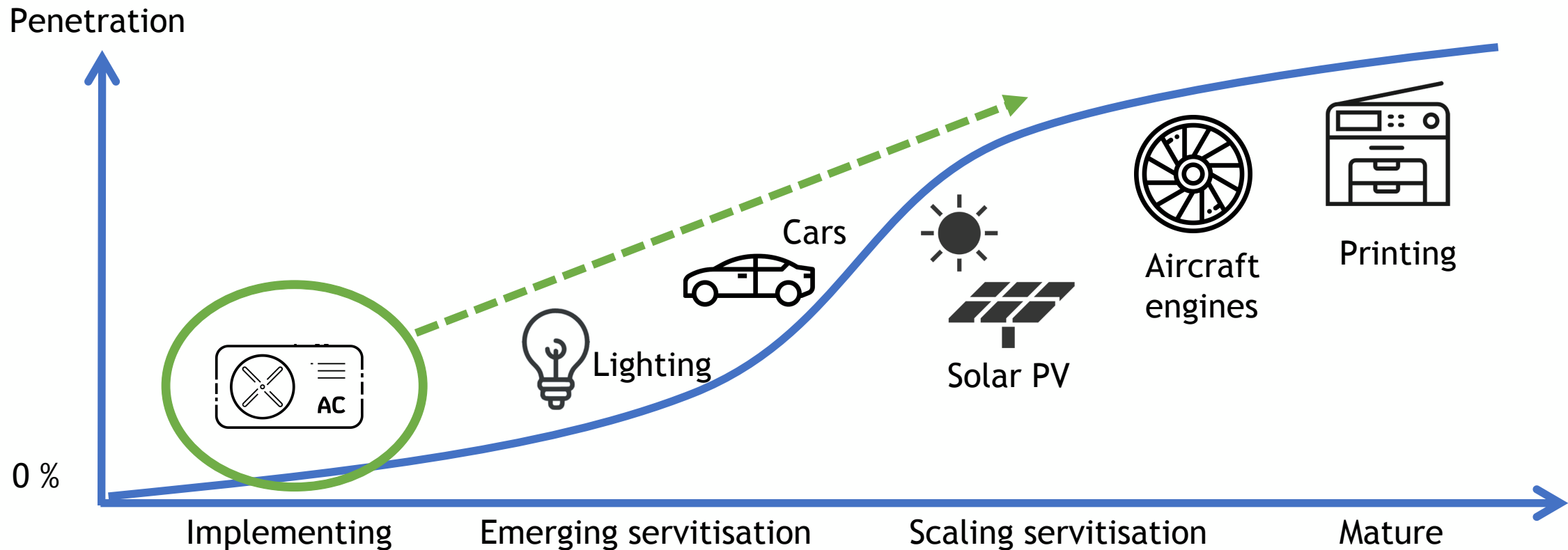
The Solution

Cooling as a Service (CaaS)



CaaS Solution

Servitisation: mega-trend growing rapidly across industries





CaaS Solution



Endorsed by the **Global Innovation Lab for Climate Finance** as one of 2019's most innovative financial instruments among **250+ applicants**

- Pay-per-use model
- Providers own equipment
- CAPEX to OPEX
- Aligns incentives for efficient production and efficient consumption
- Makes lower life-cycle cost of efficient cooling tangible
- Includes capitalisation mechanism of CaaS providers (SPV, sale-leaseback)



Differentiation from similar models

Instrument	Differentiation from CaaS
Energy Service Company (ESCO) : Shared savings and guaranteed savings Energy Performance Contracting	Payments dependent on energy savings. Instead a CaaS payment is agreed in advance as a function of actual usage.
District cooling	District cooling aggregates demand in large-scale systems. Instead CaaS can be applied to single buildings.

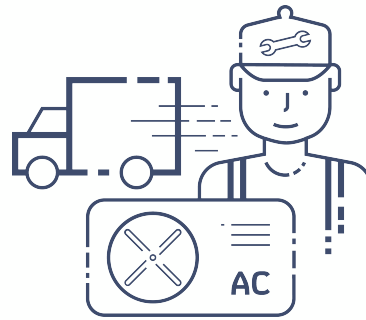


CaaS Solution

Key actors involved



Clients



Technology Providers



Banks / Investors



CaaS Solution

Advantages for customers



- No capital expenditure
- Reduced operating expenses
- Service is off-balance
- No more performance risks
- Full out-sourcing of cooling service
- Customer can focus and invest in core business



CaaS Solution

Advantages for technology providers



- Deploy full potential of technology
- Increase demand for energy efficient solutions
- Predictable and continuous revenue streams
- Brining additional value by selling outcome instead of selling equipment and parts



CaaS Solution

Advantages for banks and investors



- Opportunity to place green funding
- Become front-runner to finance servitisation models (new trend)
- Investing in assets generating cashflows



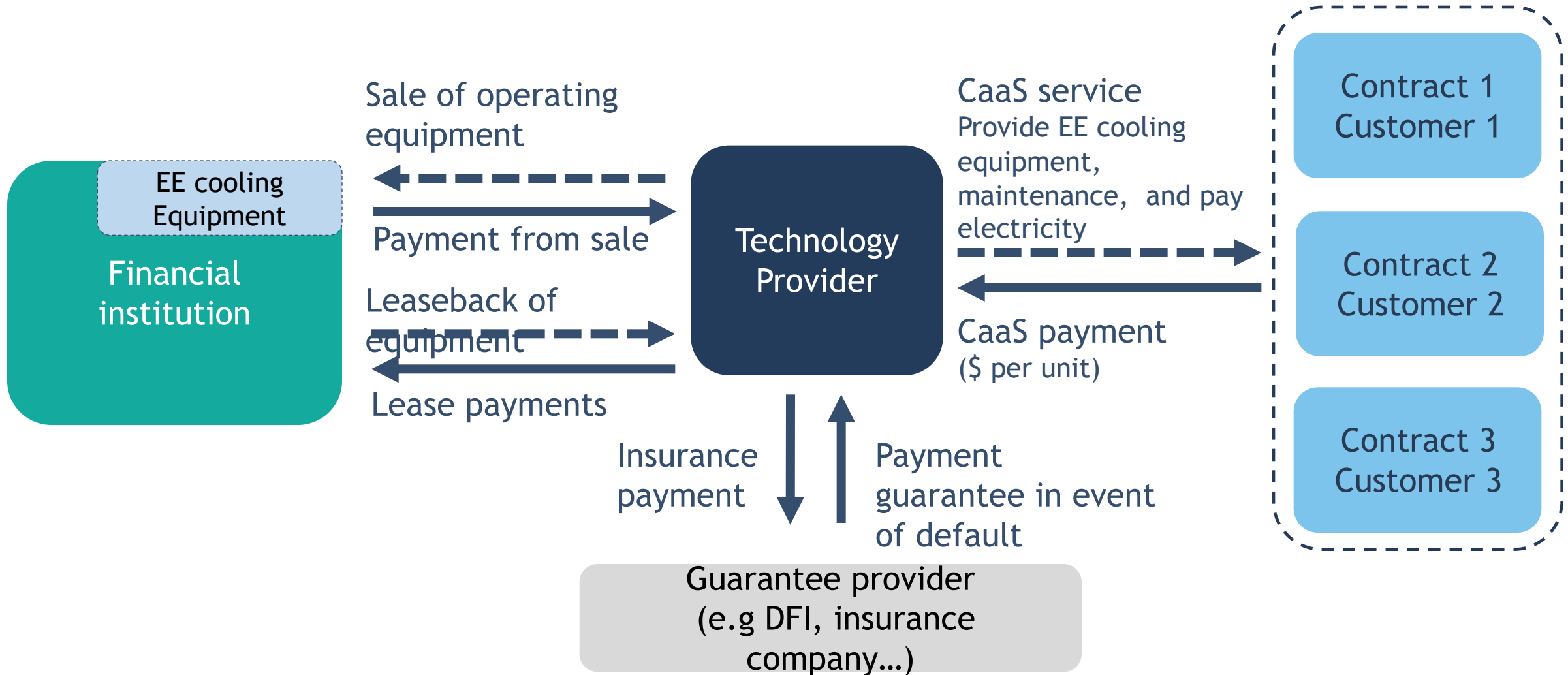
Cooling as a Service

Refresh the planet

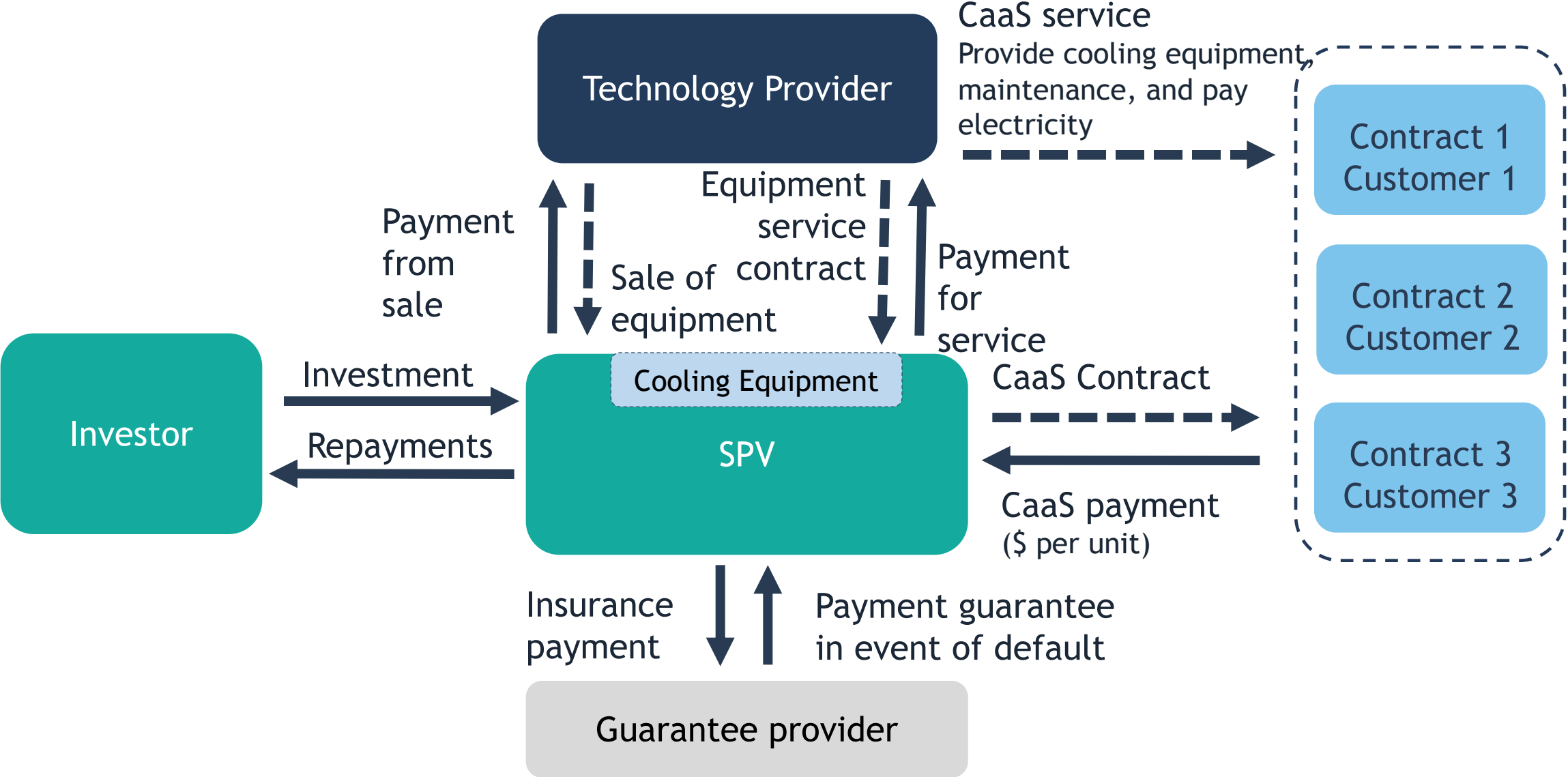
Funding structure

Possible financial structure 1

Sale and leaseback



Possible financial structure 2
Special Purpose Vehicle (SPV)

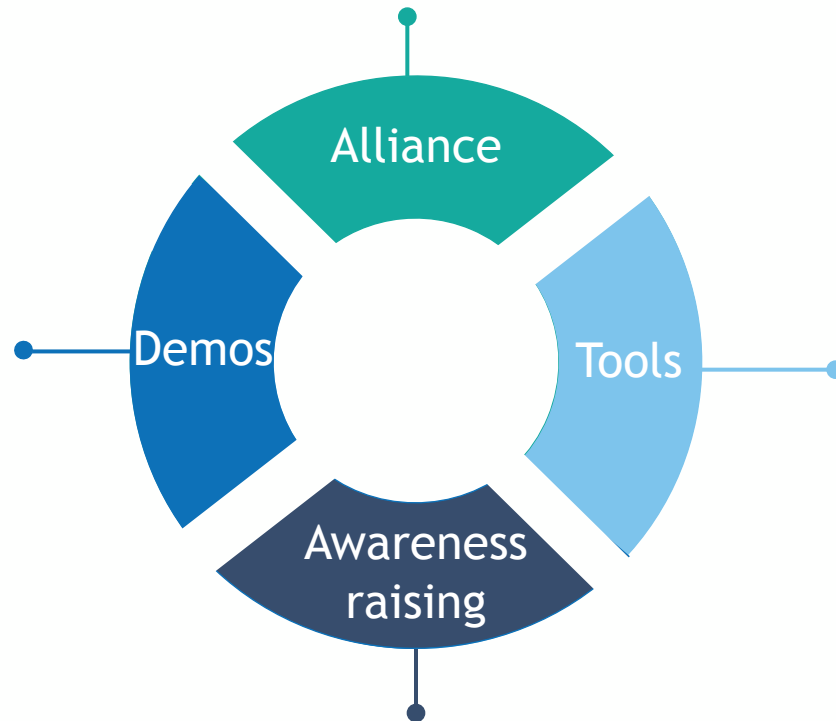




About

Partnerships with technology providers,
clients, investors, associations, networks

Dominican Republic, Jamaica,
Mexico, Argentina, Costa Rica,
Grenada, Nigeria, South Africa,
India



CaaS contracts,
Pricing models,
financial structures

More info: www.caas-initiative.org

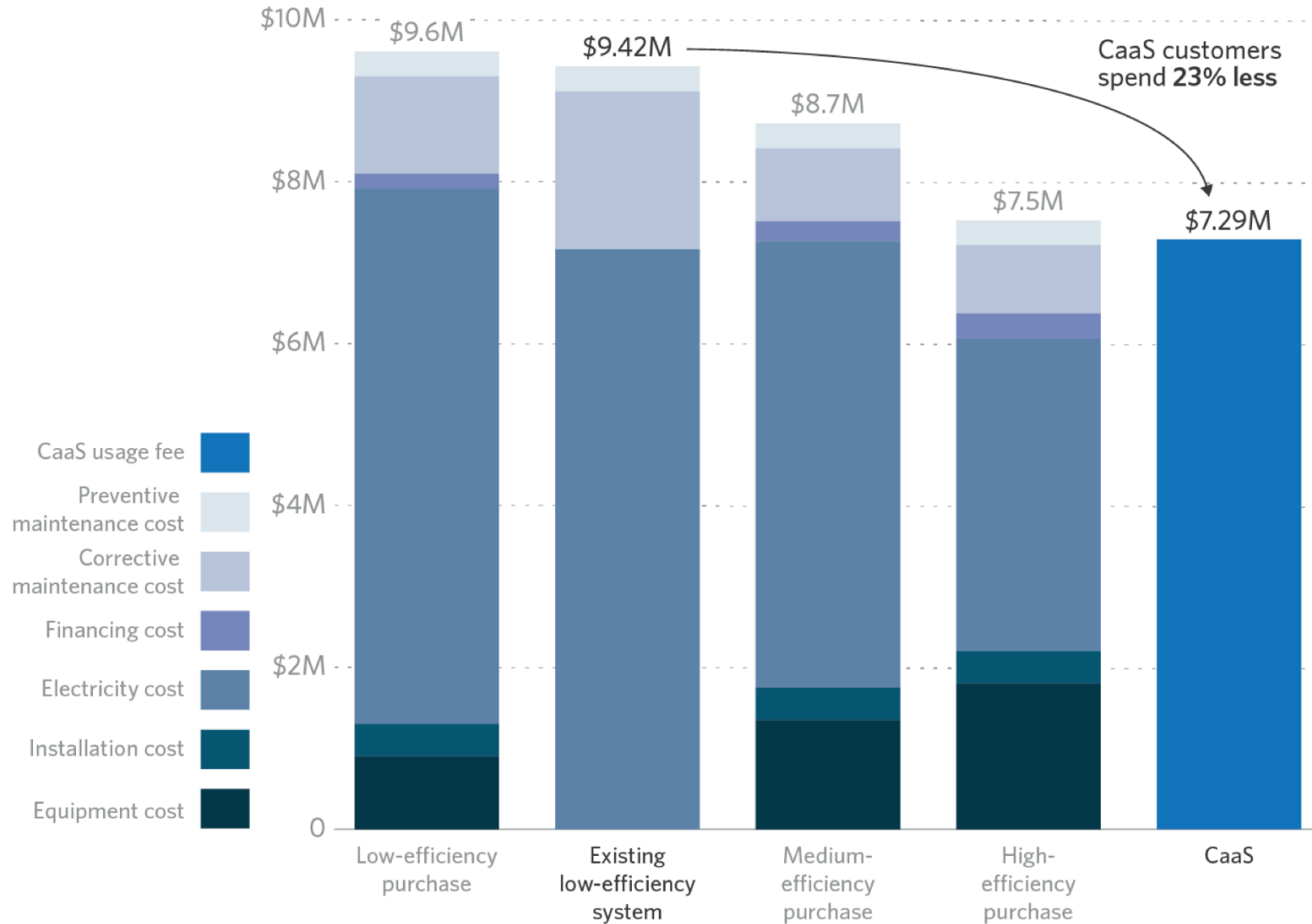
Matchmaking events,
workshops, webinars, articles,
podcasts





Financial benefits

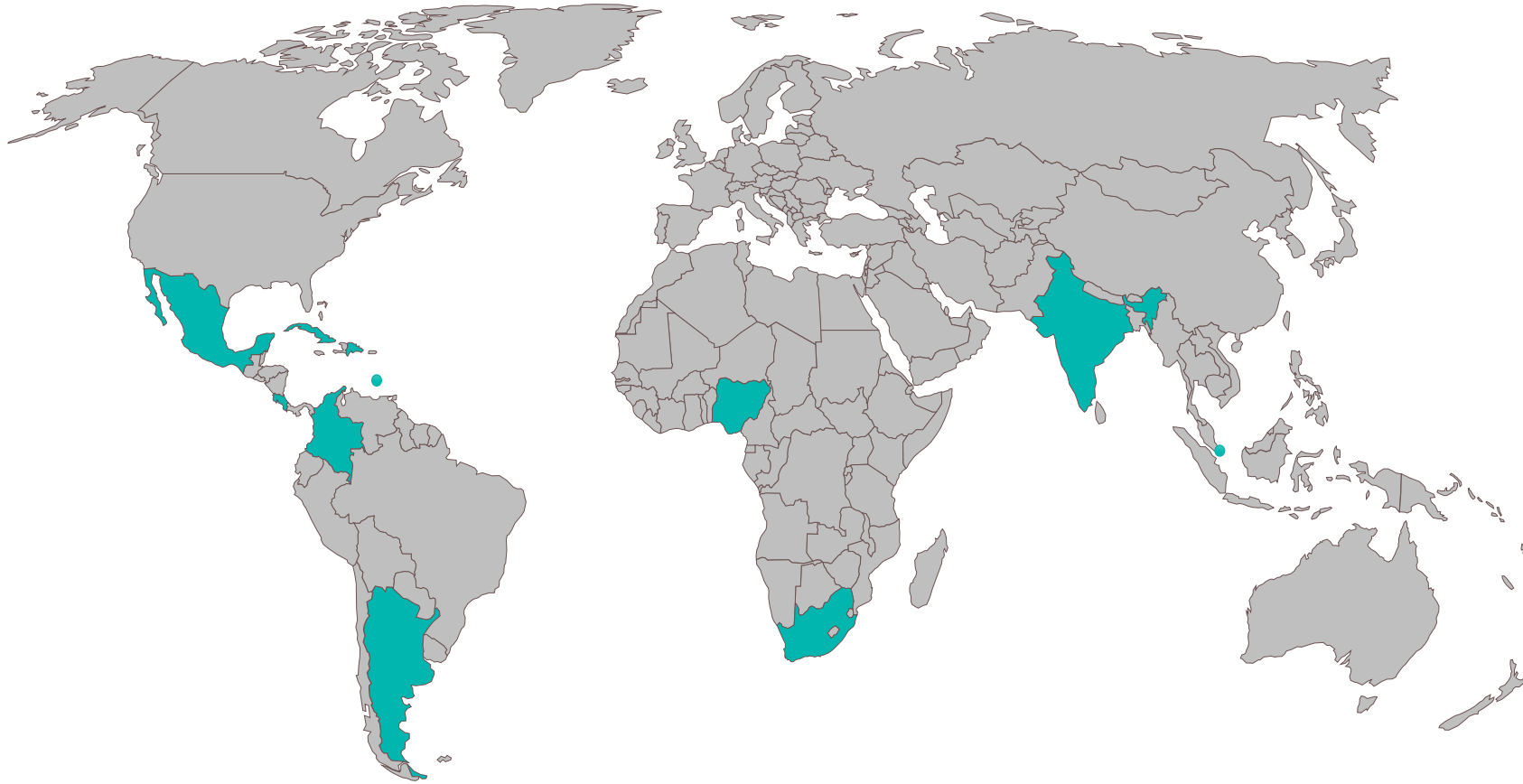
Figure 3. Cumulative discounted customer spending for a 1200 TR chiller system



**Cooling as a Service (CaaS),
Lab Instrument Analysis,
September 2019**



Implementation of CaaS





Case Study



CaaS for commercial building by MGM Innova Group in Medellin, Colombia

Context: New LEED certified building by Q-Group with 100 offices.

Solution: High efficiency 580TR magnetic bearing centrifugal chiller with valves to measure amount of cooling delivered to each user. Investment fully carried out by MGM; monthly payment billed to every office on a CaaS model. Common space bills are paid by building operator.

Benefits: Both client and final users enjoy a high-quality air-conditioning system, while focusing on their core-business and avoiding capital expenditures.

- Energy saving of 1,2GWh /year
- GHG emissions reductions of 440 tCO2e/year.





Alliance

Join the alliance and register to the CaaS Newsletter



Gathers investors, banks, technology providers, networks and international organisations to:

- Implement the model in different sectors and regions.
- Spread the word about the model
- Build capacity
- Register to the [CaaS Newsletter](#)

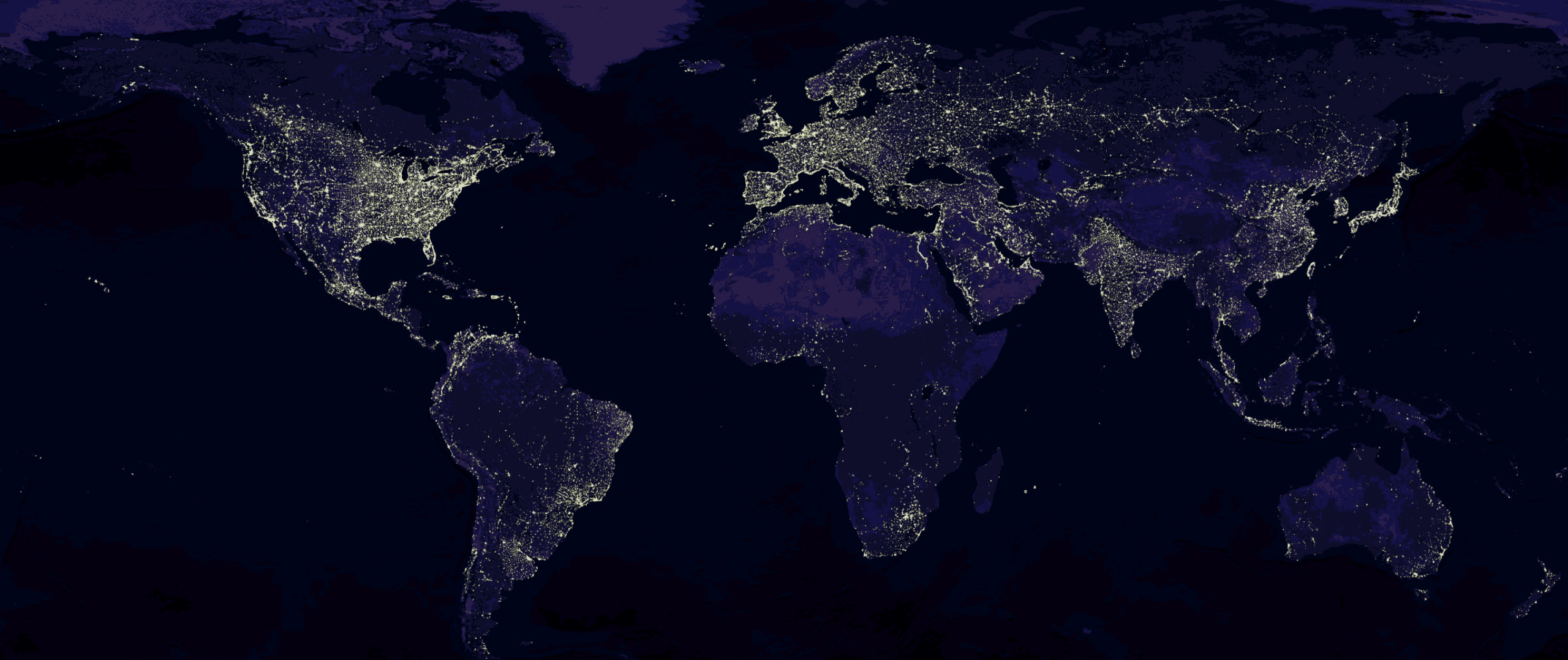


Cooling as a Service
Refresh the planet

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www.caas-initiative.org





IEA Sead Webinar series: Accelerating energy efficient cooling – How Cooling as a Service is set to revolutionise the cooling industry?

Developing an Asia Cooling and Efficiency Fund to Reduce Emissions from Cooling in a Warming World

April 22, 2020

Overview of the SDCL Group

SDCL is based in London with offices in the UK & Europe, North America and Asia. It manages institutional energy efficiency infrastructure funds in collaboration with the governments of the UK, Ireland, Singapore and New York.



- Established with government backed institutional funds focussed on efficient & decentralised energy assets
- 5 Offices and over 20 investment professionals in London, Dublin, New York, Hong Kong & Madrid

Investing throughout the project life-cycle

Development Phase

Construction Phase

Operational Phase

- On-site energy and energy efficient solutions: deep experience in project development, investment and asset management internationally
- Substantial experience at grid scale across multiple renewable technologies

International investment vehicles



UK



Ireland



Singapore



New York

Example institutional investors in prior funds



London
Stock Exchange



Government
of Ireland



NEW YORK
STATE OF
OPPORTUNITY.

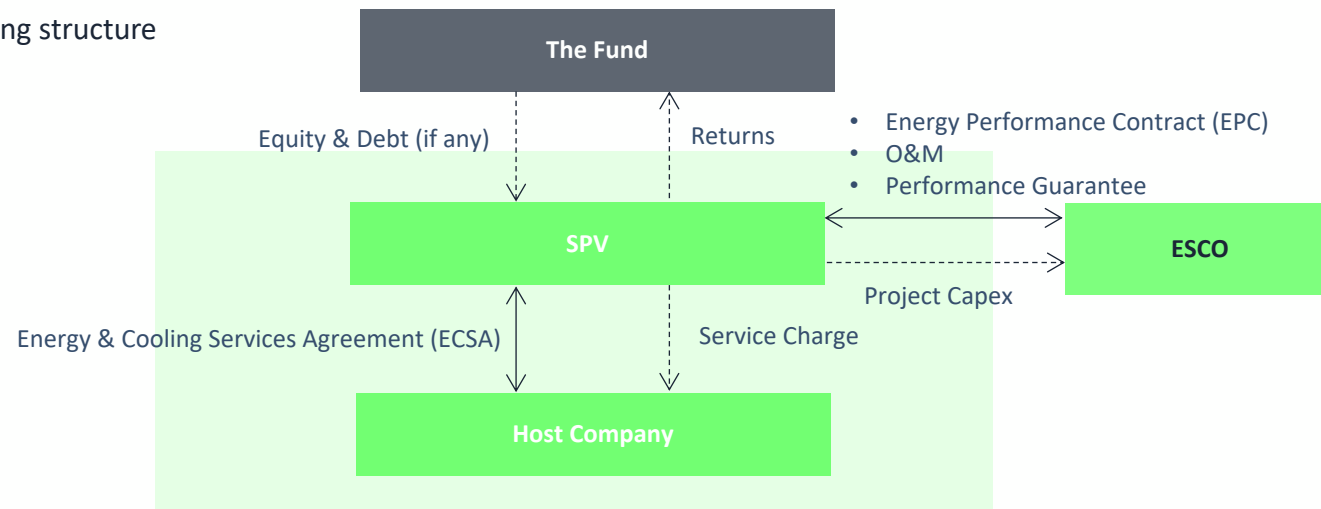
NY Green Bank
A Division of NYSERDA



Delivering energy and cooling efficiency through Service Agreements

- Cooling investment set to increase significantly driven by zero carbon targets - companies will be seeking additional sources of funds to meet these needs
- Cooling as a Service (CaaS) and Energy Services Agreements (ESA) combined as Energy and Cooling Services Agreements provide a fully funded solution implemented by an Energy Service Company backstopped by performance guarantees

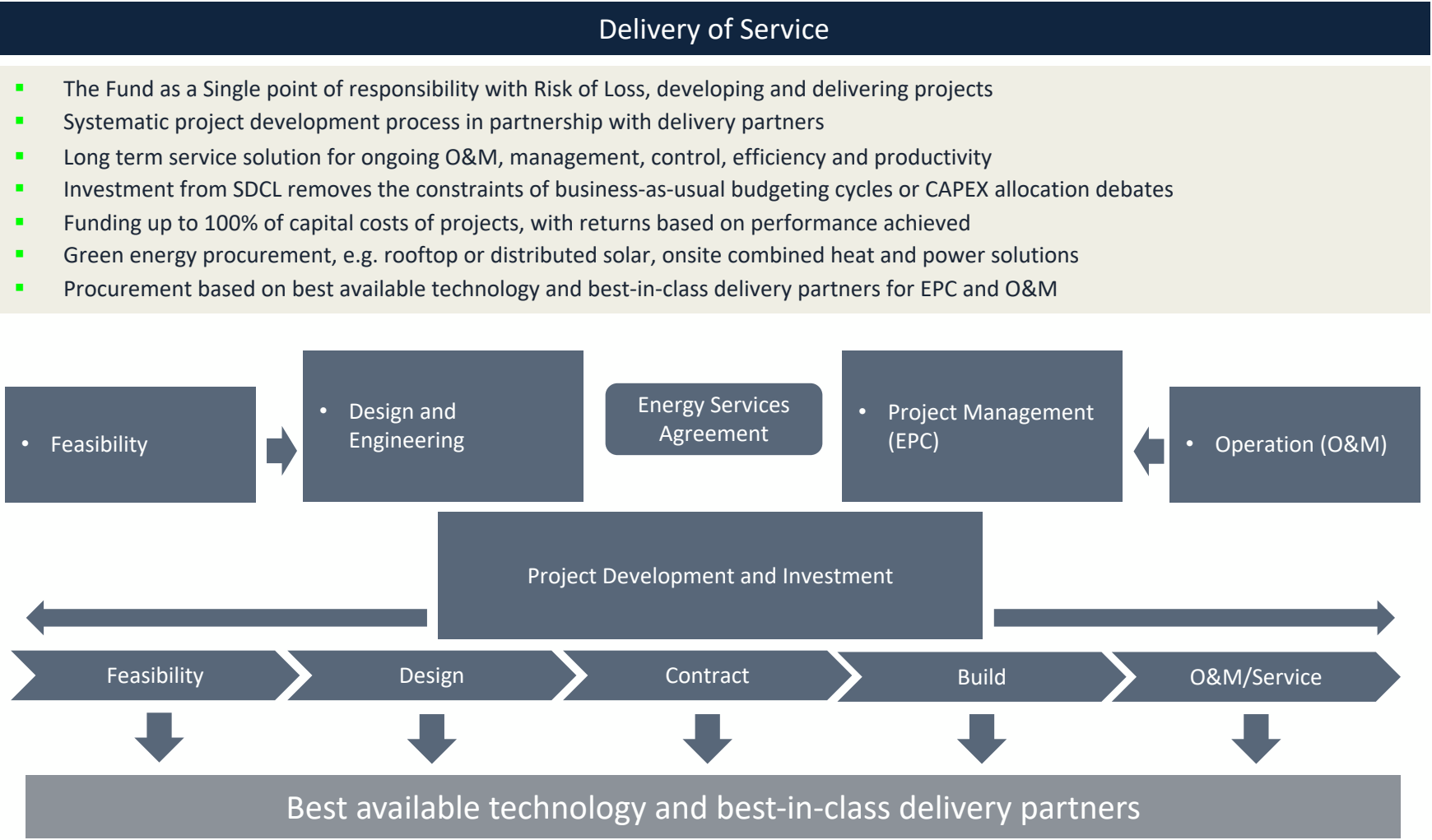
Simplified contracting structure



Overview of an energy/cooling services agreement

- 1 The Host enters into an energy/cooling services agreement (ECSA) with the Special Purpose Vehicle (SPV) – which funds and implements the energy efficiency project – in return for a service charge
- 2 The SPV sub-contracts implementation to an energy service company (ESCO) through an energy performance contract (EPC), financed by The Fund
- 3 The EPC typically incorporates a Performance Guarantee and ongoing Operations & Maintenance (O&M) services. Other EPC terms are designed back-to-back with the ECSA, leaving the SPV with the obligation to fund the project and the ESCO the obligation to deliver the project
- 4 The Host has the right to terminate the ECSA at any time after implementation for the present value of the future cash flow streams
- 5 SDCL anticipates that such projects would qualify for off balance sheet treatment (for the Host)

Project Development and Project Management Process - Concept to Operation Phase



Energy and cooling efficiency investment: project risks and mitigants

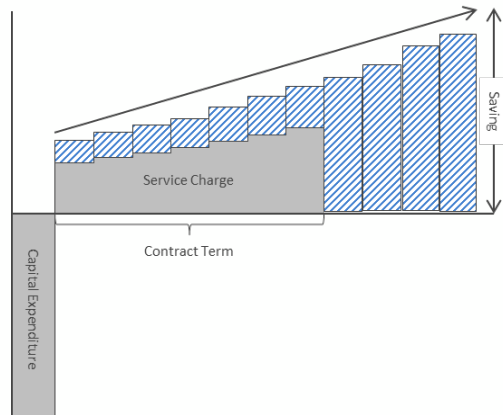
- SDCL's experience allows for effective identification and mitigation of potential risks
- The Fund to maximize use of financial risk management instruments (insurance, risk sharing, first-loss guarantee)

Risk	Description	Mitigant
Host Credit Risk	The host's ability (or willingness) to make the contracted payments	<ul style="list-style-type: none">▪ Qualitative/quantitative host credit assessment – target “sponsored” portfolios▪ Credit enhancement via innovative financial risk management instruments▪ Securing parent company or risk participation guarantees (where appropriate)
Performance Risk	The energy efficiency or cooling solution does not result in the expected savings	<ul style="list-style-type: none">▪ Performance guarantees from energy service companies (ESCOs) and OEMs▪ For smaller energy service companies, qualitative risk assessment is undertaken
Technology Risk	Technology used in the energy efficiency project fails	<ul style="list-style-type: none">▪ Using commercially proven technologies with strong track record and equipment warranties backed by insurance
Operating and Maintenance Risk	Energy efficiency equipment is not maintained resulting in equipment failure and financial loss	<ul style="list-style-type: none">▪ Operations & maintenance (O&M) counterparties with strong track records▪ O&M contract matching the life of the performance guarantee, with operational failure covered by the performance guarantee▪ Inability of the host to meet the terms of the O&M contract is covered under the terms of the energy service agreement (ESA) and may result in termination

Summary of value proposition for host clients

1

No upfront costs to our clients



2

Risk transferred to SDCL

Risks	SDCL	Client
Investment	✓	X
Construction	✓	X
Commissioning	✓	X
Operational / Performance	✓	X

3

Single point of responsibility



- Agreement between a dedicated SDCL project company and the Client to fund, operate and maintain the assets in return for a performance-based service charge linked to availability
- EPC and O&M contract between SDCL and the main contractor(s) providing appropriate guarantees and warranties
- Appropriate construction and operation phase insurance, procured by SDCL, provides cover for the projects

Making distributed energy and energy & cooling efficiency easier for clients

SDCL and the Kigali Cooling Efficiency Program (K-CEP) – Mobilizing US\$100 million in Capital

Montreal Protocol

- The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer successfully reduced the global production, consumption, and emissions of Ozone Depleting Substances (ODS)
- The Montreal Protocol signed by 196 countries and the European Union hailed as “perhaps the single most successful international agreement to date” due to widespread adoption

Kigali Amendment

- Kigali Amendment to the Montreal Protocol in force January 1, 2019 - obligates countries party to the Montreal Protocol to phase down hydrofluorocarbon (HFC) production and consumption
- HFC – a powerful greenhouse gas used mainly in refrigeration, air conditioning and heat pump equipment – thousands of times more harmful to the climate than CO₂ could account for 20% of climate pollution by 2050
- Phasing down HFCs through improved efficiency and replacement with low Global Warming Potential (GWP) refrigerants expected to avoid up to 0.5C of global warming by 2100
- Protect the ozone layer - drive innovation and economic opportunity in refrigeration/AC sectors

Kigali Cooling Efficiency Program

- The Kigali Cooling Efficiency Program (K-CEP) - a philanthropic initiative that works in tandem with the Kigali Amendment to the Montreal Protocol
- K-CEP aims to support developing countries transition to energy-efficient, climate-friendly, and affordable cooling solutions
- K-CEP is funded by 17 foundations and individuals including Bill Gates and the Children’s Investment Fund Foundation
- SDCL awarded a K-CEP grant to develop cooling and energy efficiency gains in the industrial and commercial operations of global companies with operations in developing countries

SDCL grant targets the mobilisation of US\$100 million investment into Cooling Efficiency projects

The World is getting hotter and needs more cooling...Why we're mobilizing Capital?

Temperature Increases

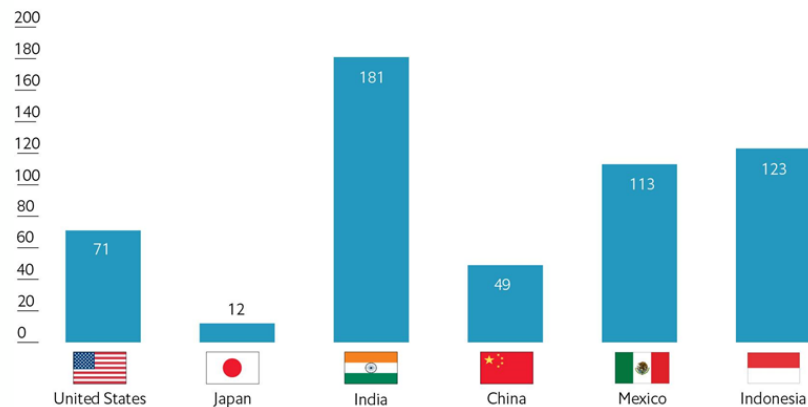
- Global temperatures are rising, possibly by 3°C or more by 2100
- Jakarta's average July temperature may hit 27.5°C or even 30.2°C by 2100, an increase of 1.8°C – 4.5°C from 1900
- Increases in hot and record-hot weather are disproportionately worse in emerging Asia (Indonesia, Singapore, Thailand, Malaysia), leading to more annual cooling degree days (CDD)
(Source: EIU 2019)

Cooling Sales

- EIU estimates 460 mm new cooling units will be sold annually by 2030, from 260 mm in 2010 and 336 mm in 2018
- Total annual market value trending to US\$170 bn by 2030
- Indonesia and India predicted to be fastest growing markets
- The industrial, transport refrigeration and commercial sectors will grow fastest to 2030 (Source: EIU 2019)

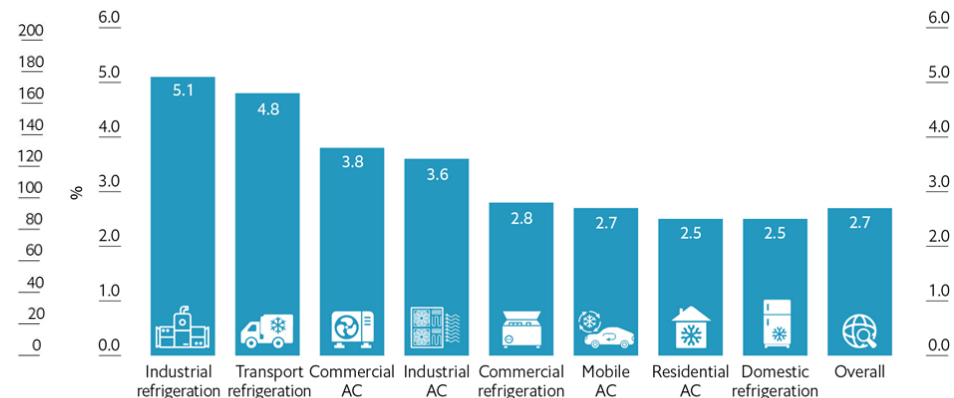
Turning up the heat

Total number of days >35°C (2080-2099) under high emissions scenario



Source: Climate Impact Lab (2019).

Cooling sales: Average annual growth rate by sub-sector (2018-2030) (a)



(a) As measured by compound annual growth rates.
Source: EIU analysis.

- Cooling demand will increase significantly to meet critical health, social and commercial needs
- Will require huge increases in investment and lead to increased energy consumption and GHG emissions

SDCL Asia Cooling and Energy Efficiency Fund – The Background

Unique Proposition and Market Opportunity	<ul style="list-style-type: none">▪ The world is getting hotter – a clear need for investment in cooling efficiency and distributed generation; increased urbanisation means that by 2050 up to 70% of population globally will be living in cities▪ SDCL Asia Cooling and Efficiency Fund represents a new investment vehicle focused on cooling and energy efficiency and distributed generation investments within Asia▪ Managed by Sustainable Development Capital LLP (“SDCL”) a leading energy efficiency investment manager, with backing from the Kigali Cooling Efficiency Program▪ Develop projects in Commercial (offices and buildings, hospitality) and Industrial (ICT/data centres, pharmaceutical, logistics) cooling and refrigeration, unlocking investment in Asia at the interface between the energy market and the built environment
Seed Portfolio of Energy and Cooling Efficiency projects	<ul style="list-style-type: none">▪ Initial portfolio is in the hospitality, manufacturing and real estate sectors with twenty-three current projects at IGA or completed IGA stage diversified by counterparty, technology and market (5 countries)▪ The Opportunity Pipeline considers 850+ individual projects across 90 counterparties▪ The projects are not reliant on subsidies to achieve their targeted returns
Highly Experienced Management Team	<ul style="list-style-type: none">▪ The Fund is the sixth specialist energy efficiency fund to be managed by SDCL, a market leading London based investment firm with a proven track record of investment in energy efficiency in UK and Europe, North America and Asia▪ SDCL manages over £500 million of capital commitments - SDCL funds have been backed by the UK Government (Green Investment Bank), the European Investment Bank, New York Green Bank, the Irish Government, the Government of Singapore and a wide range of private sector investors▪ Managed from Asia and London, Fund will apply global best practices to an Asia-focused regional platform
Advanced Pipeline	<ul style="list-style-type: none">▪ By leveraging the SDCL grant under the Kigali Cooling Efficiency Program the Fund intends to lead the transition to energy-efficient, climate friendly and affordable cooling solutions in Asia▪ The Fund will tap into a significant pipeline of projects in the energy efficiency and cooling sector in Hong Kong, Singapore, Malaysia, Indonesia and Thailand with development activity in the Philippines, China and the Greater Mekong Sub-Region (Cambodia and Vietnam)

The SDCL Grant and the Kigali Cooling Efficiency Program ‘Halo’

- Donor funds as catalytic capital - eliminates primary obstacle to Cooling/Energy Efficiency in Asia – no CAPEX budget for retrofit projects
- SDCL Grant funds Investment Grade Audits (“IGAs”) - evaluate energy consumption, develop business case

SDCL Approach	<ul style="list-style-type: none">■ SDCL approach for implementing a cooling efficiency programme is based around its core business model of project development and investment, to deliver ‘Cooling as a Service’■ Solution designed through a holistic approach optimising technology across supply-side, process and demand-side requirements;■ Delivering these through a fully financed package where the benefits are delivered to the host as a service rather than through ownership and operation of the assets
Technologies	<ul style="list-style-type: none">■ Supply of energy for chilling includes decentralized generation of sustainable, renewable power e.g., distributed or rooftop PV (photovoltaics);■ Demand of chilling (potential reduction of chilling demand with respective measures);■ Generation of chilling (efficient generation, low GWP refrigerants, different generation technologies potentially integrating sustainable energy sources);■ Distribution of chilling (especially for central cooling, e.g., optimized cold water sets including variable speed pumps); and■ Usage of chilling (efficiency in use, e.g., by adapted temperature settings etc.).
Target Market and “Partnering”	<ul style="list-style-type: none">■ SDCL works closely with global, regional and national Energy Services Companies (“ESCOs”) to identify new cooling and energy efficiency opportunities;■ SDCL Partnering with other K-CEP Grantees and global NGOs to develop cooling and energy efficiency opportunities: BASE, The Climate Group, LBNL, Climate Works and more;■ SDCL K-CEP grant prioritizes industrial and commercial cooling efficiency improvements addressing both process and building-related cooling needs. Specific sectors are:<ul style="list-style-type: none">- Property Development/Real Estate (including logistics and data centres) - Commercial AC/Refrigeration- Manufacturing of consumer goods – Industrial AC, capital equipment upgrade- Health-care facilities – Commercial AC and Refrigeration- Hospitality industry (hotels) – Commercial AC and Refrigeration

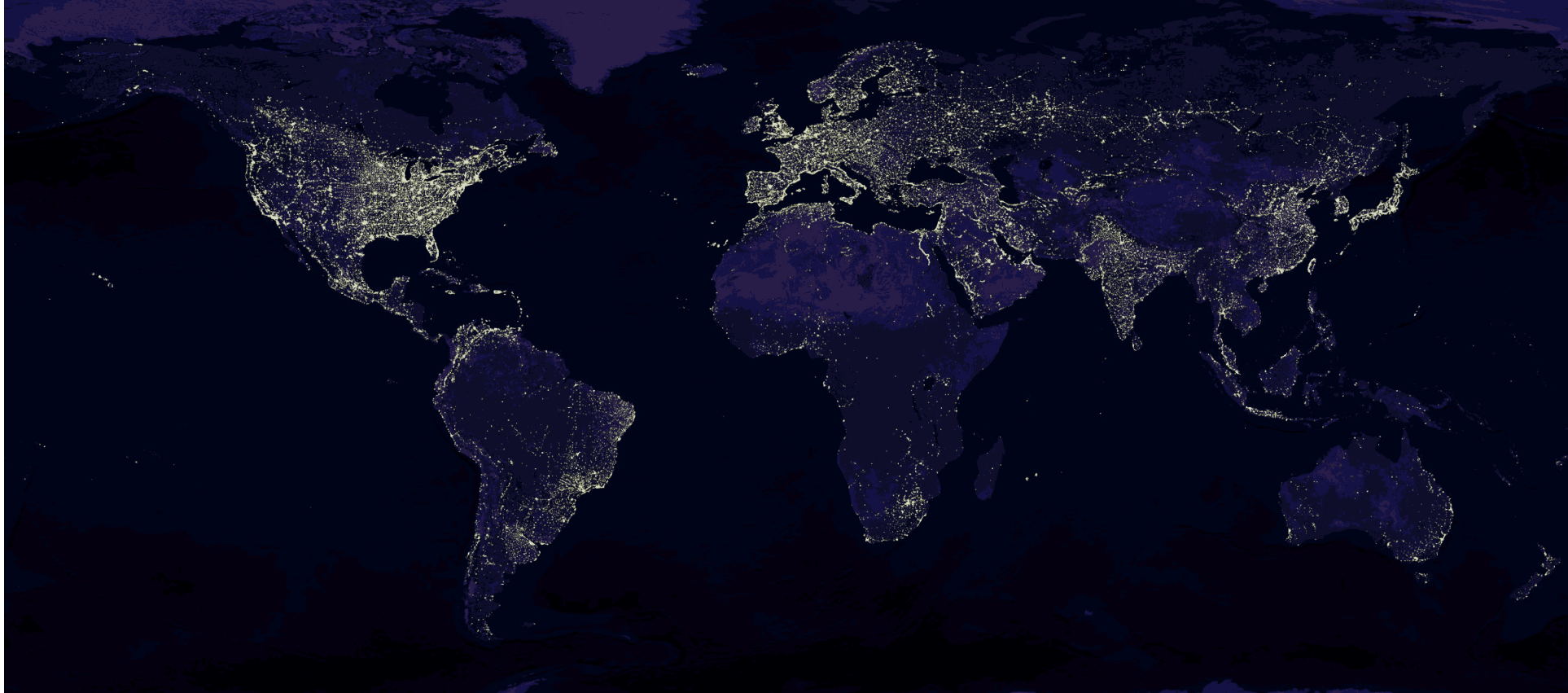
SDCL Asia Cooling & Energy Efficiency Fund – Preliminary Conclusions

SDCL Asia Cooling & Energy Efficiency Fund - Issues & Considerations

- **Cooling and energy efficiency is the most cost-effective way of reducing greenhouse gas emissions** and improving energy infrastructure, security and asset resilience. At the same time, it offers enduring cost savings, improved profits and infrastructure performance and benefits the economy via cheaper, cleaner, more reliable energy
- Significant achievements have been made but energy efficiency not reached full potential - many businesses continue to waste 25% or more of the energy they use and there remains a significant funding gap and opportunity
- EIU estimates the cooling market as a US\$135 billion opportunity – in Asia - asset owner's first choice is solar
- Barriers to growth in CaaS in Asia :
 - Disconnects between silos (engineering, finance, sustainability) and across geography
 - Cost of capital – Risk & Reward disconnect
 - Not a priority as the investment numbers not large enough
- Convergence of philanthropic, private and public capital needed to exponentially grow the sector

SDCL Asia Cooling & Energy Efficiency Fund – Preliminary Conclusions

- **Cooling now recognized as one of the largest contributors to Climate Change, accelerating a warming planet.**
- Kigali amendment to the Montreal Protocol tackling human-made fluorination gases from air conditioning and refrigeration that are 10,000 times more potent than CO2 in causing global warming and could account for 20% of climate pollution by 2050.
- **OEMs need to do a better job in the low GWP refrigerant space**
- SDCL **Distribution Strategies** have worked – targeting large asset portfolio to achieve economies of scale
- The need for **“brand standard”** to become the baseline in the **Hospitality** sector
- The **nexus between Cooling and Energy Efficiency and Indoor Air Quality** – SDCL funding a Technical Study at a global bank (driven by Health & Wellness program): tenants are driving change
- The Kigali **“Halo”** has been a **‘game-changer’** in terms of raising awareness of the ‘Cooling Imperative’



For more information on SDCL: www.sdcl-ib.com

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How to ask questions

