Financing climate-friendly cooling: (Green) Cooling as a Service

Interactive Online Event | 11 November 2021 | 13:30 – 15:00 CET

On behalf of:

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany
Rules for Online Sessions

Use the chat for your questions.

You can use this feature for reactions or for raising your virtual hand.

If the connection allows it, please turn on your video when you speak.

For best audio quality, please stay muted.

- Please note: This event is recorded and will be published on the Green Cooling Initiative website. No personal data by the audience will be shown in the recording.
Please type into the chat:

Which country are you participating from?
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<tr>
<th>Time (CET)</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
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<td>13:30 – 13:35</td>
<td>Introduction to the event</td>
<td>Facilitator</td>
</tr>
<tr>
<td>13:35 – 13:45</td>
<td>Overview on Green Cooling and Proklima’s services</td>
<td>Philipp Denzinger&lt;br&gt;GIZ Proklima, Germany</td>
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<td>13:45 – 14:00</td>
<td>Explained: The CaaS Business Modell</td>
<td>Dave Mackerness&lt;br&gt;Kaer, Singapore</td>
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<td>14:00 – 14:15</td>
<td>CaaS Study 1: State-of-the-Art Ammonia Cooling Service in South Africa</td>
<td>Dawie Kriel&lt;br&gt;Energy Partners Refrigeration, South Africa</td>
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<td>14:15 – 14:30</td>
<td>CaaS Study 2: ColdHubs in Nigeria</td>
<td>Nnaemeka Ikekwuonu&lt;br&gt;ColdHubs, Nigeria</td>
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<td>Q&amp;A</td>
<td>All</td>
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Overview on Green Cooling and Proklima’s services
Philipp Denzinger, GIZ Proklima
Air Conditioning Is the World’s Next Big Threat

8 facts that prove Europe's record heatwave is the new normal

Why air con is ruining our environment


Warming climate to nearly double demand for cooling appliances

Researchers predict energy use for air conditioners and refrigeration to jump 90% on 2017 levels

The air conditioning trap: how cold air is heating the world

The cost of cool

Air-conditioners do great good, but at a high environmental cost

The rapid growth in their use makes it urgent to limit the damage
Proklima: Making cooling a hot topic since 1995

- Programme established in 1995 in the context of implementing technical projects for ozone protection under the Montreal Protocol. In 2016, the Kigali Amendment broadened the focus from ozone to climate protection.

- Goal: Promoting and introducing natural refrigerants and energy-efficient appliances in the RAC sector.

- Proklima is working on behalf of BMZ, BMU and other donors, e.g. EU, AFD, NAMA.

Proklima works in the areas
1) policy advice,
2) technology transfer and
3) capacity building.
Integrated Green Cooling approach

- Addressing the rising demand for RAC applications in a sustainable manner requires climate-friendly and energy-efficient solutions.

- Through an integrated technology approach, coordinated and coherent policy-making and comprehensive financial planning a sustainable transformation of the RAC sector is possible.

- This does not only reduce GHG emissions significantly, it also contributes to achieving many of the SDGs – a perfect match for countries’ Nationally Determined Contributions (NDCs).
Proklima: Over 265 projects in +40 partner countries worldwide
The mitigation potential of the RAC sector

(GIZ Proklima, 2017)
## GWP and ODP of Refrigerants and Blowing Agents

<table>
<thead>
<tr>
<th>Refrigerant</th>
<th>Type</th>
<th>GWP kg CO2eq./kg refrigerant</th>
<th>ODP</th>
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<tbody>
<tr>
<td>R-22</td>
<td>HCFC</td>
<td>1760</td>
<td>0.005</td>
</tr>
<tr>
<td>R-141b</td>
<td>HCFC</td>
<td>782</td>
<td>0.110</td>
</tr>
<tr>
<td>R-507A</td>
<td>HFC</td>
<td>3985</td>
<td>0</td>
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<tr>
<td>R-404A</td>
<td>HFC</td>
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<td>0</td>
</tr>
<tr>
<td>R-134a</td>
<td>HFC</td>
<td>1300</td>
<td>0</td>
</tr>
<tr>
<td>R-449A</td>
<td>HFC</td>
<td>1397</td>
<td>0</td>
</tr>
<tr>
<td>R-290</td>
<td>HC</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>R-600a</td>
<td>HC</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>R-717</td>
<td>NH3</td>
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<td>0</td>
</tr>
<tr>
<td>R-744</td>
<td>CO2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>R-729</td>
<td>AIR</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>C5H10</td>
<td>HC</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>LN2</td>
<td>LN2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>R-1233zde</td>
<td>HFO</td>
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<td>0</td>
</tr>
<tr>
<td>R-1336mzz(Z)</td>
<td>HFO</td>
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<td>0</td>
</tr>
</tbody>
</table>

Source: IPCC (2013) Anthropogenic and Natural Radiative Forcing
Proklima: What exactly is Green Cooling?

Green Cooling is the combination of…

- high energy efficiency
- natural refrigerants (e.g. propane/R290)
- and, in best case, electricity from renewable sources.

In addition, natural forms of cooling buildings (e.g. shading, good insulation, white roofs, plants and trees) should be considered.
Proklima: Avoiding emissions by "leapfrogging" to Green Cooling

Instant switch to highly energy-efficient technologies with natural refrigerants without relying on climate-damaging interim technologies.
Become an ally!

The members of the Green Cooling Network are all committed to energy-efficient and climate-friendly refrigeration & air conditioning.

Join the network and become part of the Green Cooling community today!

www.green-cooling-initiative.org/network
Thank you for your attention!

Contact

Philipp Denzinger
GIZ Proklima
Team Leader Africa Portfolio
Philipp.Denzinger@giz.de
www.green-cooling-initiative.org
The Cooling as a Service Business Model
Temperature goal
Limit the global rise to as close as possible to 1.5 °C.

Finance, technology and capacity-building
International cooperation to support a low-carbon and climate-resilient future.
Cooling alone accounts for 10% of global electricity consumption.

If inefficient systems are not replaced, demand is expected to triple in the next 30 years.

The Cooling Imperative, 2019
The best got better
The world followed Cooling System Performance in 2017 compared to the 2015 Benchmark.
The best got better
The world followed
The best got better

2020

Cooling System Performance

2015 Benchmark

2020 Benchmark

% of Buildings

0%

20%

40%

60%

80%

100%
The world followed 2021 Benchmark.
The world followed 2021 Benchmark

Cooling System Performance

2015 Benchmark

2021 Benchmark
TOGETHER FOR OUR PLANET – THE UK’S YEAR OF CLIMATE ACTION

We cannot afford to wait to act against the threat of climate change. We must work together to protect our planet and people and ensure a greener, more resilient future for us all.

The UK will host the UN Climate Change Conference COP26 with our partners Italy in November 2021 to bring together world leaders to commit to urgent global climate action.
COP26: Biden attacks China and Russia leaders for missing summit
% of customers

Features, Content and User Interface
% of customers

Features, Content and User Interface
Unlimited movies, TV shows, and more.
Watch anywhere. Cancel anytime.

Ready to watch? Enter your email to create or access your account.

Email address
TRY IT NOW >
“Entertainment as a Service” is not limited by the caterpillar effect.

“Cooling as a Service” isn’t either.
Cooling as a Service (CaaS)

**BUILDING OWNER**

Simply pay-as-you-use for cool air

- A single $/RTH rate
- No upfront/setup costs
- No fixed charges

**Capex**
(continuous investment in the cooling system)

**Opex**
(operations, S&M, repairs & utilities)

**Management**
(manpower, monitoring, compliance)

**Accountability**
Performance & Risk Management
**Cooling as a Service (CaaS)**

**Off Balance Sheet**
- Electricity
- Water

**On Balance Sheet**
- High capex with high chance of over-investment
- High vacancy risk
- Time spent on non-core activities
- Fluctuating and high maintenance costs
- Operational risks and staff management

- No capex
- Re-allocate vacancy risk (pay-as-you-use)
- Outsource non-core activities
- Lower opex and maintenance costs
- Minimise operational risks and staff management

Components:
- Cooling
- Lifts
- Lights
Cooling as a Service (CaaS)

**Off Balance Sheet**
- Electricity
- Water
- Cooling

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**On Balance Sheet**
- High capex with high chance of over-investment
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- Lifts
- Lights
kaer
Better Air For Better Spaces

$50 Million
of Cooling Assets Under Management

Serving over
10 Million
Square Feet of Space

55,000 Metric Tons of CO2
Saved Every Year

Low GWP Commitment
Phasing out non-low-GWP Equipment

Solar as Standard
POC Successful in Singapore & India

Circularity
A portfolio approach

Business Space; 10%
Commercial; 47%
Education; 9%
High-Tech / High-Spec; 28%
Pharmaceutical, 6%

Net Promoter Score (NPS) = % Promoters - % Detractors

81% NPS Engagement
57% NPS Score

BUSINESS FOR GOOD™
BUSINESS & SUSTAINABLE DEVELOPMENT COMMISSION
ELLEN MACARTHUR FOUNDATION
Outsourced Refrigeration Solution: Dr Oetker Case Study
Using the best natural refrigerant, ammonia, an efficiency optimised system with heat recovery for hot water was designed and built. The project offered great savings in terms of energy efficiency and reducing CO2 emissions. A baseline plant model were 20% less efficient use 334MWh more electricity, resulting in 317 tons of CO2 p.a. being avoided. Using a refrigerant leak rate of 15%, the CO2 emissions avoided goes up to an annual amount of 1,200 tons.

JOHANNESBURG
Completed July 2020

24k tons
CO2 emissions avoided
(over contract lifespan)

Innovative design and technology using natural refrigerants
The solar project is generating 20% of the total site consumption with over R200 000 savings per month on the municipal bill.
Focus shifts from capital to Lifecycle costs

- Capex: 65%
- Maintenance: 20%
- Energy: 15%
FULL VERTICAL INTEGRATION

IDENTIFY AND DEVELOP
sustainable refrigeration projects with our clients

DESIGN
projects to world-class engineering standards

BUILD
in-house construction that eliminates risk

OWN, OPERATE & MAINTAIN
Our innovative CaaS solution provides funding and long-term commitment to plant efficiency and reliability

MAXIMISING CLIENT PROFITABILITY
Benefits to Dr Oetker

- Specialist support to the management team for cooling so that they can focus on core business
- Guaranteed, predictable, low cost of cooling and renewable electricity
- Environmentally sustainable cooling with low CO₂ emissions and full energy integration including heating from waste heat – 41kt CO₂ emissions avoided
- Off-balance sheet system allows for deployment of capital where it has the biggest impact on production - $2M capital released
Solar Powered Cold Storage: Cooling-as-a-Service (CaaS)
Nnaemeka Ikegwuonu

Farmer, Radio Presenter & Social Entrepreneur

Founded:

Honored with more than 30 local and international awards - Ashoka Fellow 2008, Rolex Awards 2010, Fast Company’s 100 Most Creative in Business 2012, Nigeria’s Young Person of the Year 2011, Niigata International Food Prize Laureate, 2012 and 2013 Laureate of the Yara Prize for Green Revolution (Japan).
Smallholder Farmers
Rural Radio Studio
In Nigeria, 45% of food spoils due to lack of cold storage...

...this causes 93 million small farmers to lose 25% of their annual income.

Source: Rockefeller Foundation; Food Waste and Spoilage Initiative 2014
Most equipment is too costly for the average farmer to purchase.

Power grids are not capable of delivering reliable energy.

Most solutions are not rugged enough to withstand harsh conditions.

Refrigeration can be used to extend shelf life but is non-existent in Nigerian farms clusters, aggregation centers and marketplaces.
In 2015, we launched ColdHubs; 100% solar-powered walk-in cold stations for 24/7 storage and preservation.
Well designed for specific locations, weather conditions. R290 Refrigerant.
Offers education for post harvest management
Extends the shelf life of perishable food from 2 days to 21.
We charge up to 0.26 USD/night to rent 1 plastic 20kg crate of produce
1.32USD/night for meat & fish storage
Each station holds 150 crates - up to 75 – 198 USD/day in revenue
# CUSTOMER STORAGE CARD

## BIO DATA:

<table>
<thead>
<tr>
<th>HUB NO.</th>
<th>CUSTOMER NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH-00010</td>
<td></td>
</tr>
</tbody>
</table>

| NAME:             |                          |
| PHONE NUMBER:     |                          |
| ADDRESS:          |                          |
| TYPE OF BUSINESS: | DATE:                    |

<table>
<thead>
<tr>
<th>G.B</th>
<th>G.P</th>
<th>BR</th>
<th>GRP</th>
<th>TO</th>
<th>LT</th>
<th>OTHER</th>
<th>OTHER</th>
<th>OTHER</th>
<th>CRATE NO.</th>
<th>TOTAL CRATE</th>
<th>TOTAL AMT.</th>
<th>H.O. SIGN</th>
<th>CUS SIGN</th>
</tr>
</thead>
</table>

[Image -1x41 to 720x364]
Cold Hubs
Keeping it Fresh!

RECEIPT

NO 01751

L.P.O No.

DATE:

NUMBER OF CRATES: __________, STORAGE DURATION: _______ DAYS/ Nights

CUSTOMER’S NAME __________

AMOUNT IN WORDS __________

Naira _______ Kobo

DATE DUE FOR COLLECTION ______/_______/_______ AMOUNT IN FIGURE: __________

NO REFUND OF MONEY AFTER PAYMENT. EXCEEDING THE DURATION OF STORAGE AFTER THE DUE DATE OF COLLECTION ATTRACTS CHARGES OF PER DAY/NIGHT FOR STORAGE. RISK PASSES WITH PROPERTY.

THANKS FOR YOUR PATRONAGE.
Run by One Lady Hub Operators and One Lady Market Attendant per ColdHub.
42,024 tons of fruits and vegetables saved from spoilage

5,250 farmers, retailers and wholesalers have increased their income to US $120

66 jobs created for women as Hub Operators and Market Attendants

1,040,688kg of CO2 saved
Owns and operates 54 ColdHubs, across Nigeria

Projecting at least 100 new ColdHubs and 20 IcePoints by the end of 2020

Expanding through Africa
THE TEAM

Bright Benjamin Igbokwe  
**COO**

Experienced business development manager with extensive expertise in agribusiness startups, rural logistics, distribution, commercial strategy, contract negotiations, business processes, and team building.

Masters in Business Administration  
Imo State University, Nigeria

Chidubem Maxwell  
**CTO**

Electrical and electronics engineer, with extensive knowledge and expertise in clean energy, solar cells, batteries, air conditioning, cold room design, and refrigeration.

HND, Electrical & Electronics Engineering,  
Federal Polytechnic Nekede, Owerri, Nigeria

Terence Usibe  
**Finance and Admin**

Experienced office and finance administrator managing our accounts within local and international standards.

HND in Accounting  
Imo State Polytechnic Umuagwo
CJ Uzoho  
Commercial Manager Gas Aggregation  
Company of Nigeria  
energy economist, business development expert with extensively knowledgeable and experience in energy related transactions.  
Masters in Energy Economics  
University of Dundee

Osayuki Eguasa  
Financial Manager, All ON Energy Impact Investors  
economist with expertise in financial Planning / Forecasting, budgeting Budgetary Controls, Stakeholder Engagement and Corporate Finance.  
BSc Accountancy,  
University of Benin, Nigeria

David Ruben  
Advisory Board  
Consultant to The Rockefeller Foundation Food Initiative,  
BSc in International Business (Copenhagen Business School), an LLM in Public International Law (Stockholm University), and an MSc in Foreign Service (Georgetown University).
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