Count On Cooling Webinar

Energy as a Service

cutting emissions, creating jobs, lowering energy bills... meeting EU climate goals

Tuesday 19 May 2020 – 9.30 - 11.00
Instructions to participants

• All participants should remain in mute mode during the entire time of the webinar
• Only speakers will unmute themselves during their time of presentation and Q&A session
• Speakers will not take questions after their respective presentations, but a 15 minutes Q&A session will take place at the end of the webinar
• During the Q&A session, participants are kindly requested to submit their questions through the chat to “Everyone”
• The EPEE Secretariat will read these questions to the speakers
• If time doesn’t allow to cover all questions, they will be submitted to speakers after the webinar and we will keep you informed of their response
• Presentations will be shared after the webinar
• Please note that this webinar is recorded
## Webinar programme

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<th>Timing</th>
<th>Agenda</th>
<th>Speakers</th>
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<tr>
<td>9.30-9.45</td>
<td>Setting the scene: EPEE’s 5-step approach to deliver sustainable cooling</td>
<td>Andrea Voigt, EPEE Director General</td>
</tr>
<tr>
<td>9.45-10.00</td>
<td>Case study #1: Cooling as a Service</td>
<td>Dimitris Karamitsos, Senior Energy Efficiency Business Developer Specialist, BASE</td>
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<td>10.00-10.15</td>
<td>Case study #2: Heating as a service</td>
<td>Roxanne Pieterse, Research Manager, Heating Business Service, Delta-EE</td>
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<td>10.15-10.30</td>
<td>Case study #3: Lighting as a service</td>
<td>Thomas Leenders, Manager Public &amp; Government Affairs Benelux, Signify</td>
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<td>10.30-10.50</td>
<td>Q&amp;A</td>
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<tr>
<td>10.50-11.00</td>
<td>Closing remarks</td>
<td>Andrea Voigt, EPEE Director General</td>
</tr>
</tbody>
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**Dimitris Karamitsos**  
BASE  
@D_Karamitsos  
@Energy_BASE

**Roxanne Pieterse**  
Delta-EE  
@della_e  
@delta_ee

**Thomas Leenders**  
Signify  
@Leenders82  
@SignifyNL
A five-step approach to deliver sustainable cooling

Andrea Voigt, EPEE
There is no European Green Deal without sustainable cooling

CountOnCooling VIDEO
Who is EPEE?

- Founded in 2000
- Headquartered in Brussels
- Currently 50 members from 3 continents
  - Asia
  - Europe
  - North America
- Representing the full value chain of the refrigeration, air-conditioning and heat pump industries
Cooling is a big industry and demand is set to grow

Cooling in comparison
Cooling market value versus other sectors (2018, US$bn)

Source: EIU; Clean Cooling Landscape Assessment; Transparency Market Research; Grand View Research; Alrosa; Newzoo; Power Technology; Allied Market Research
It contributes to many sustainable development goals

Making sustainability cool
How cooling will help achieve priority SDG goals

- **Food Security**
  - Scaling up fresh and safe food provision and combating waste

- **Health**
  - Combating heat stress and scaling up vaccines

- **Education**
  - Boosting student performance and combating fatigue

- **Employee Productivity**
  - Combating damage to employee well being from uncool conditions, and reducing productivity losses

- **Societal Inequality**
  - Preventing hurt to marginalised citizens: women and the poor

Source: EIU; UNDP

#CountOnCooling
It can contribute significantly to the EU’s climate and energy goals

Final energy consumption in the EU ktoe

<table>
<thead>
<tr>
<th>Category</th>
<th>Consumption (%)</th>
<th>Renewable Energy Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating &amp; Cooling</td>
<td>47%</td>
<td>20%</td>
</tr>
<tr>
<td>Transport</td>
<td>28%</td>
<td>8%</td>
</tr>
<tr>
<td>Electricity</td>
<td>25%</td>
<td>32%</td>
</tr>
</tbody>
</table>

Eurostat, Shares Summary results 2018
Many solutions are readily available

- **Heat pumps** or photovoltaics to relieve burden from the electricity infrastructure
- **District heating and cooling** networks for large buildings, building clusters or whole cities
- **On-site energy storage** where cold and heat can be used as thermal energy batteries
- **Demand response schemes**, providing flexibility to the grid and shifting peak demand
- **Integration of decentralised systems** into thermal networks
- **Use of rejected heat from cooling systems** to further enhance energy efficiency and system integration
- **Building automation and control systems**, remote monitoring, optimised controls
- **Etc.**
So what is standing in the way?

- Higher upfront investment costs
- Silo thinking and lack of cooperation between demand and supply side
- Limited end user awareness of the potential life cycle cost reductions of improved efficiency
- Lack of awareness and skills at installer level
- Split incentives landlord/tenant
- Inadequate accounting rules
- Lack of political awareness of the potential for improved efficiency and the significant benefits of an integrated approach – and therefore a lack of clear financial drivers
- Lack of adequate business models
- Market distortion due to high electricity prices and ongoing fossil fuel subsidies
- Etc.
01. 

Case study #1: Cooling as a service

Dimitris Karamitsos, Senior Energy Efficiency Business Developer Specialist, BASE
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.
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
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
Energy-efficient systems are cheaper over the long term

- 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
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
The Solution
Cooling as a Service (CaaS)
Servitisation: mega-trend growing rapidly across industries

- Printing
- Aircraft engines
- Solar PV
- Cars
- Lighting

Penetration

Implementing
Emerging servitisation
Scaling servitisation
Mature
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

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

- Clients
- Technology Providers
- Banks / Investors
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
Advantages for technology providers

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

- Opportunity to place green funding
- Become front-runner to finance servitisation models (new trend)
- Investing in assets generating cashflows
Funding structure
Possible financial structure 1
Sale and leaseback

Sale of operating equipment
Payment from sale
Leaseback of equipment
Lease payments

CaaS service
Provide EE cooling equipment, maintenance, and pay electricity
CaaS payment ($ per unit)

Insurance payment
Payment guarantee in event of default

EE cooling Equipment
Financial institution

Technology Provider

Guarantee provider (e.g. DFI, insurance company...)

Contract 1 Customer 1
Contract 2 Customer 2
Contract 3 Customer 3
Possible financial structure 2
Special Purpose Vehicle (SPV)

- **Investor**
  - Investment
  - Repayments

- **SPV**
  - **Insurance payment**
  - **Payment guarantee in event of default**

- **Technology Provider**
  - **CaaS service**
    - Provide cooling equipment, maintenance, and pay electricity

- **Cooling Equipment**
  - **Sale of equipment**
  - **Equipment service contract**

- **Guarantee provider**

- **CaaS Contract**
  - **CaaS payment ($ per unit)**

- **Contract 1**
  - Customer 1

- **Contract 2**
  - Customer 2

- **Contract 3**
  - Customer 3
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

Matchmaking events, workshops, webinars, articles, podcasts

More info: www.caas-initiative.org
Figure 3. Cumulative discounted customer spending for a 1200 TR chiller system

CaaS customers spend 23% less
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.
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
02.

Case study #2: Heating as a service

Roxanne Pieterse, Research Manager, Heating Business Service, Delta-EE
HEAT AS A SERVICE
DEFINITIONS, EXAMPLES AND OPPORTUNITIES

CONTACT:
Roxanne Pieterse – roxanne.pieterse@delta-ee.com
Delta-EE enables organisations to develop the best strategies, business models and customer propositions for the energy transition. Clients work with Delta-EE because of our unparalleled research base, which provides both breadth and depth of expertise, spanning:

### ‘New Energy’ Business Models

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EVs &amp; Electricity</strong></td>
<td>Understand the opportunities and challenges from sector coupling between electricity and transport</td>
</tr>
<tr>
<td><strong>Flexibility &amp; Energy Storage</strong></td>
<td>Take advantage of the opportunities emerging from an active demand side</td>
</tr>
<tr>
<td><strong>Heat</strong></td>
<td>How channel disruption, sector coupling and new technologies are changing the heat sector</td>
</tr>
<tr>
<td><strong>Distributed Power</strong></td>
<td>Global market insight &amp; expertise into the growing role of decentralised generation</td>
</tr>
<tr>
<td><strong>Digital Energy</strong></td>
<td>Opportunities in the connected home market and how digitalisation is changing the energy customer relationship</td>
</tr>
</tbody>
</table>

Delta-EE provides:

- Subscription Research Services
- Consultancy
Delta-EE’s international presence and research

Remote workers in Netherlands, Denmark, Japan, Australia
A question for the audience:

You’ve recently bought a house with an old, inefficient gas boiler. It’ll need to be replaced in a few months time. You have the following options:

<table>
<thead>
<tr>
<th></th>
<th>Option 1: Buy a gas boiler</th>
<th>Option 2: Buy a heat pump</th>
<th>Option 3: A renewable heat contract</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appliance:</strong></td>
<td>Gas boiler (own)</td>
<td>Heat pump (own)</td>
<td>Heat pump (rent)</td>
</tr>
<tr>
<td><strong>Supplier:</strong></td>
<td>Local installer</td>
<td>Local installer</td>
<td>Major energy retailer</td>
</tr>
<tr>
<td><strong>Upfront cost:</strong></td>
<td>€3,000</td>
<td>€10,000</td>
<td>€0</td>
</tr>
<tr>
<td><strong>Monthly heating bill:</strong></td>
<td>€150 per month</td>
<td>€90 per month (~10 year payback)</td>
<td>€150 per month (contract includes energy supply to heat pump)</td>
</tr>
</tbody>
</table>

**Includes:**

- **Installation:** ✓ ✓ ✓
- **Maintenance, repairs and replacement:** ✗ ✗ ✓
- **Remote monitoring and optimisation:** ✗ ✗ ✓
You need to replace your gas boiler. Which option are you most likely to choose in this scenario?

Option 1: Buy a gas boiler (n=40)

Option 2: Buy a heat pump (n=31)

Option 3: Buy a renewable heat contract (n=115)

I don't know (n=28)
What is heat as a service?

New ways of paying for heating appliances and energy use

THE HEATING EQUIPMENT

monthly payment rather than upfront through financing/rental agreement

THE ENERGY USE

selling outcomes rather than inputs

fuel input (kWh) → heat output (kWh) → warmth outcome (°C)
What is heat as a service?
Transferring risks from customers to service providers

- Heat contract / Heat output as a service
- Warmth contract / Heat outcome as a service
- Asset leasing / Finance and maintenance contract

- Financial risk
- Technical risk
- Performance risk
- Behaviour risk
- Energy price risk
- Regulatory risk

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What is heat as a service?

Optimising energy within homes and the energy system

"USER" OPERATED

SUPPLIER OPERATED
What’s behind the recent interest in HaaS?

Some of the drivers and opportunities:

1. Everything-as-a-service
2. Energy customer loyalty / New routes to market
3. Connectivity and demand response
4. Decarbonising heat / Energy efficiency
5. Circular economy
“Rent heating” / “Heat contracting”

E.ON, EWE, Innogy, Thermondo, Viessmann

<table>
<thead>
<tr>
<th>Gross cost per month</th>
<th>Eigenbetrieb</th>
<th>Warmth Basic</th>
<th>Heat flex</th>
<th>Warmth Green +</th>
</tr>
</thead>
<tbody>
<tr>
<td>heating system</td>
<td>€ 50</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Full guarantee over 10 years</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>maintenance</td>
<td>€ 19</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>repair</td>
<td>€ 8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>chimney sweeper</td>
<td>€ 3</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>interest payment</td>
<td>€ 17</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

| Monthly heating rent         | € 97         | € 107        | € 114     | € 126          |
| Basic price for gas / heat   | € 16         | -            | ✓         | ✓              |
| Labor price for gas / heat   | € 126        | -            | ✓         | ✓ossiping             |
| Monthly energy costs         | € 142        | -            | € 101     | € 119          |
| Total monthly rate           | € 239        | € 107        | € 215     | € 245          |

Source: Viessmann

Location: Germany
Equipment type: Gas boiler
Equipment contract: Finance
Energy supply contract: € per kWh heat
Equipment operation: User
Contract length: 10-15 years
Risks: 💰🔧✔️
Stage of development: Commercial 10,000s
“e-Home Subscription / Membership”

The FCTR E

Location:
Netherlands

Equipment type:
Heat pump + solar panels

Equipment contract:
Asset lease

Energy supply contract:
None (yet)

Equipment operation:
User

Contract length:
Indefinite

Risks:

Stage of development:
Commercial 1,000s

Source: The FCTR E

Well insulated 2-under-1 roof house, 200 m² with 4 people, energy rating B

- THE FCTR E service membership: €30/month
- Lease * of heat pump, boiler & solar panels: €176/month
- Electricity residual bill: €89/month
- Cost of e-home subscription: €295/month
- Current electricity and gas bill: -€358/month
- Average savings: €63/month

* You can also buy your heat pump, boiler & solar panels, ask for the options and costs.

Source: The FCTR E
Eneco

“Comfort as a Service”

Location:
Netherlands

Equipment type:
Heat pump

Equipment contract:
Asset lease

Energy supply contract:
Subscription (with limits)

Equipment operation:
Supplier

Contract length:
15 years

Risks:

Stage of development:
Trial – new build

Source: Eneco
Delta-EE's outlook for how the market will evolve

Some of the barriers and challenges:

1. Value proposition
2. Silos / capabilities
3. Risk management strategies
4. Customer demand
5. Regulations

How appealing is the idea of having a subscription package for all your heating product and service needs?

- 0% Very unappealing
- 20% Quite unappealing
- 40% Neutral
- 60% Quite appealing
- 80% Very appealing

All (n=1008)
Delta-EE's outlook for how the market will evolve

A major part of the heating industry will become service orientated

The European heating replacement market

€ 20 Bn

European market outlook for Heat as a Service

(Indicative percentage of heating systems sold across Europe)

- Buy
- Rent
- Rent + Energy
- Full heat as a service
More on Heat as a Service from Delta-EE

Series 1, Episode 3: Heat as a Service – selling comfort to the customer
Guests: Engie & Energy Systems Catapult

Series 2, Episode 4: Transforming homes with super-insulation and high-efficiency heating
Guests: The FCTR E & Ecoworks

Series 3, Episode 7: Home Energy Management: What is it and where’s it headed?
Guests: GreenCom Networks & PassivSystems

Series 4, Episode 3: The world of heating controls: what’s hot?
Guests: Schneider Electric & Climote
HEAT AS A SERVICE
DEFINITIONS, EXAMPLES AND OPPORTUNITIES

CONTACT:
Roxanne Pieterse – roxanne.pieterse@delta-ee.com
03.

Case study #3: Lighting as a service

Thomas Leenders, Manager Public & Government Affairs Benelux, Signify
Our world is changing - Global trends shaping our business

Population growth

Resource challenges

Digitalization

- more light
- more energy efficient light
- more digital light

Today, lighting accounts for 13% of the world’s electricity demand. The global shift to LED will reduce this to 8% by 2030.
Signify is the world leader in lighting
We provide high-quality energy efficient lighting products, systems and services

- **No. 1** Connected, LED, Conventional
- **€6.2bn** sales in 2019, ~75% professional
- **38,000** people in 74 countries
- **No. 1** Industry Leader Dow Jones Sustainability Index
Brighter lives, better world
Sustainable portfolio and operations

100% carbon neutral in 2020

2017 - 2019
#1 Industry leader, ‘Electrical Components and Equipment’ category, Dow Jones Sustainability Index
2019 “A” Rating by Carbon Disclosure Project for ‘Climate’ and ‘Supply Chain’

82.5% sustainable revenues (2020 target 80%)

94% electricity from renewables; carbon neutral in 15 markets

90% of industrial waste recycled

99% sustainable supply chain (2020 target 90%)
Global Warming
What is a Circular Economy?

A circular economy is an economical system which maximises the reusability of products and resources and minimises value destruction.
The concept of circular economy

- **Maximasing the lifespan**, by optimal maintenance and high flexibility

- **Maximum value**, by enabling that products and parts can be re-used, refurbished and recycled
Circular lighting
"I’m not interested in the product. I want to buy light, nothing else."

Thomas Rau, CEO, founder Turntoo,
Buy light, not lamps!
"It is Schiphol’s ambition to become one of the most sustainable airports in the world. We believe in a circular economy and want to play an active role in its realization."

Jos Nijhuis, Former CEO and President Schiphol Group
Luminaires can be reused or recycled

With the return Philips wants to be able to re-use the materials, the components, the luminaire or ultimately recycle it.
Our Instruments

- Design
- New business-model
- Reverse logistics
- Collaboration
Design
Pacific LED as an example of circular design:

1. Modular Design
   - Standardised Components

2. Easy to disassemble

3. Easy to maintain

4. Easy to recycle

5. Upgradeable
New technology: 3D printed luminaires
New businessmodel
New business model

‘End-to-end’ approach
Reverse logistics
Reverse logistics

At the end of the contract
1. Refurbish
2. Collect Spare parts
3. Recycle
4. New installation, new contract
Collaboration
Implement and maintain by reliable partners

Collaboration

Signify Manufacturing, suppliers, installers, etc.

Customer
And... It all begins with a transition to LED
Closing remarks

Andrea Voigt, EPEE
EPEE - European Partnership for Energy and the Environment

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