DHC Investor Perspectives

13:00-17:00, 16th June 2022
Helsingborg, Sweden
REWARDHeat DHC Investor Perspectives
Afternoon Session: Thursday 16th 13:00 – 17:00

Agenda & Speakers:
Opening remarks & moderation: Kristina Lygnerud - Senior Energy Department Manager, IVL
Keynote speech: Anders Ericsson – CEO, Värmevärden/Adven
Learnings from REWARDHeat project: Tobias Popovic – Professor of Corporate & Sustainable Finance, HfT Stuttgart

Panel Discussion:
• Allister Sykes – Director, Asper Investment Management
• Peter Dahl – Investment Manager, Polhem Infra
• Georg Inderst – Principal, Inderst Advisory

Pitch Session by REWARDHeat demonstrator networks:
Helsingborg and Mölndal demo site:
• Håkan Knutson – Managing Director, Indepro
Szczecin demo site:
• Lilli Wolny – Project Manager, Szczecińska Energetyka Cieplna (SEC)

Feedback from financial experts
REWARDHeat, June 15th – 17th
Investor Perspectives

Anders Ericsson
CEO, Adven/Värmevärden
CEO: Anders Ericsson

Employees: Total: 560
- Finland: 220
- Sweden: 220
- Estonia & Latvia: 120

Financials (2021):
- Net Sales: €280 M
- Asset: €1.5 b

Energy volume:
- c. 5.1 TWh
- c. 350 sites

Customer Offerings:
- District heating
- Decentralized Real Estate solutions
- **Industrial infrastructure**: process heating, cold and cooling, energy recovery, water treatment and energy intensive processing

Combined Financials (2021):
- Combined Financials: 77 DH/RE SITES, 14 IES SITES
- Combined Financials: 12 DH SITES, 75 IES SITES
- Combined Financials: 12 DH SITES, 75 IES SITES

Combined Geographical footprint:
- Revenue:
  - Finland: 42%
  - Sweden: 46%
  - Baltics: 12%
  - Combined Financials: 37%

- EBITDA:
  - Finland: 51%
  - Sweden: 41%
  - Baltics: 7%
  - Combined Financials: 63%

- Combined Financials (2021):
  - 12% DH
  - 37% IES, GEO
  - 51% Baltics

The leading partner in Energy Transition
The Story of De-Carbonisation

Energy Sources in Swedish District Heating

Source: Swedish Energy Agency
The Story of De-Regulation and Divestment

- The first major grid starts to develop
- De-regulation making private investments possible
- The first DH law in place, market framework and transparency

1955: Municipalities develop DH as a public infrastructure

1996: First divestments around year 2000. Causes market disturbances, mainly due to price increases


- Carbon tax introduced 1992, start of transition to fossil free
- Increased transaction activity around 2017. (All in all approx 30 YTD)
Opportunities to Invest in DH

• The Nordic experience has shown that DH has the potential to play a big role in the needed de-carbonization of the heating (and cooling) sector.

• The Nordic experience has also proven that DH can provide predictable cashflows matching the requirements of many institutional investors.

• Customer focus - A DH network is a natural monopoly and require either regulation or high trust/transparency to build customer confidence.

• Green field projects – To develop DH is a long term and multiplayer effort, yet to be proven to fit for institutional investors.
Attracting Investors to DHCN – Learnings from the REWARDHeat project

Prof. Dr. Tobias Popovic, Sebastian Schultze, Stuttgart University of Applied Sciences, Center for Sustainable Economics and Management (CSEM), Sustainable Finance-Cluster
"The next 1,000 unicorns won’t be search engines or social media companies, they’ll be sustainable, scalable innovators – startups that help the world decarbonize and make the energy transition affordable for all consumers."

Larry Fink, CEO, BlackRock (January 2022)
EU Action Plan on Financing Sustainable Growth – Transforming the real economy
(Institutional) investor groups, identify their needs and objectives

<table>
<thead>
<tr>
<th>Banks</th>
<th>Investment Funds</th>
<th>Insurance Companies, Pension Funds</th>
<th>International Financial Institutions</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Commercial Banks</td>
<td>• Open-end Funds</td>
<td>• Insurance Companies</td>
<td>• European Union</td>
<td>• Utilities</td>
</tr>
<tr>
<td>• Investment Banks</td>
<td>• Closed-end Funds</td>
<td>• Re-Insurance Companies</td>
<td>• EIB</td>
<td>• Industrials</td>
</tr>
<tr>
<td>• Savings Banks</td>
<td>• Infrastructure Funds</td>
<td>• Sovereign Wealth Funds</td>
<td>• European Fund for Strategic Investments (EFSI)</td>
<td>• ...</td>
</tr>
<tr>
<td>• Cooperative Banks</td>
<td>• Sovereign Wealth Funds</td>
<td>• Pension Funds</td>
<td>• European Territorial Co-operation (ETC)</td>
<td></td>
</tr>
<tr>
<td>• Public Promotional Banks</td>
<td>• ...</td>
<td>• ...</td>
<td>• Connecting European Facility (CEF)</td>
<td></td>
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<tr>
<td>• ...</td>
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<td>• European Bank for Reconstruction and Development (EBRD)</td>
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<td>• IRENA</td>
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<td></td>
<td></td>
<td></td>
<td>• World Bank</td>
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<td></td>
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<td>• ...</td>
<td></td>
</tr>
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</table>

Source: Popovic, T. (2021)
Conceptual framework for investment and financing decisions in the area of Sustainable Finance

Key Performance Indicators:
- e.g. Cash Flows, Internal Rate of Return (IRR), Return on Equity (ROE), Return on Assets (ROA), Return on Investment (ROI), Cash Flow Return on Investment (CFROI), ...

Key Performance Indicators:
- e.g. Debt Ratio, Leverage, Equity Ratios, Debt/Equity Ratio, Debt Service Profile, Debt Cover Ratios, Cash Flow at Risk (CFaR)...

Key Performance Indicators:
- e.g. Cash Flows, Cash Ratio, Quick Ratio, Current Ratio, ...

Key Performance Indicators:
- e.g. Energy Consumption, CO2 - Emissions, ....

Source: own representation based on Popovic, T. (2012); Images: UN, UN PRI, European Commission, Volkswagen AG, CECE
## Sustainability Balanced Scorecard (SBSC)
### KPIs for investors

<table>
<thead>
<tr>
<th>Return</th>
<th>Risk</th>
<th>Liquidity</th>
<th>Sustainability (ESG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCoH = Levelized Cost of Heat</td>
<td>Debt Ratio</td>
<td>Cash Flow</td>
<td>GHG Emissions</td>
</tr>
<tr>
<td>NPV = Net present value</td>
<td>Equity Ratio</td>
<td>Cash Ratio</td>
<td>Specific primary energy</td>
</tr>
<tr>
<td>CAPEX = Capital expenditure Costs</td>
<td>Leverage</td>
<td>Quick Ratio</td>
<td>% of DH production based on RE and waste heat</td>
</tr>
<tr>
<td>OPEX = Operational expenditure Costs</td>
<td>Carbon abatement costs</td>
<td>Current Ratio</td>
<td>GHG emissions abatement potential</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>... (S&amp;G)</td>
</tr>
</tbody>
</table>

Source: Own illustration

REWARDHeat - DHC Investor Perspectives © 2022 Prof. Dr. Tobias Popovic, Manuscript is protected by copyright. All rights reserved. Reprint - also in extracts - only with permission of the author.
Decision-making process for Taxonomy-aligned investments/financing

1. Significant contribution (SC)
   ...to one or more of the EU’s environmental goals (e.g. fighting climate change)

2. Do no significant harm (DNSH)
   ...to any of the other environmental goals

3. Minimum social safeguards (MSS)
   Compliance with MSS

4. Technical screening criteria (TSC)
   Compliance with CO₂ thresholds


24.06.2022

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Regulatory trends increase attractiveness for DHCN as a sustainable asset class

Sources: own illustration. Images: UN, UN PRI, European Comission, Volkswagen AG, CECE

Checklist DH-Asset Class

- Reorientation of capital flows: ✔
- Compliance with the CO₂ limits of the taxonomy: ✔
- Contribution to UN SDGs: ✔
Mapping REWARDHeat demosites to the infrastructure finance lifecycle (tentative)

- Balilla
- Gadio
- (Heerlen)*
- Topusko
- Toulon
- Gardanne
- Szczecin
- Albertslund
- Helsingborg
- Mölndal

Source: Popovic (2022) based on demosites' information and results of REWARDHeat WP 3.3.; * delayed indefinitely
## DHCN in the context of the infrastructure finance lifecycle – risks and risk transfer

<table>
<thead>
<tr>
<th>Strategy / Development / (Re-)Investment</th>
<th>Construction / Refurbishment</th>
<th>Operation / Maintenance</th>
<th>Termination / Sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risks (focus on cash flows)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• High investment volume</td>
<td>• Governance</td>
<td>• Governance</td>
<td>• Contract duration</td>
</tr>
<tr>
<td>• Lack of sufficient funding</td>
<td>• Permits/contracts</td>
<td>• Qualitative deficit of infrastructure/services</td>
<td>• Decommissioning risk</td>
</tr>
<tr>
<td>• Inflation/interest rates</td>
<td>• Construction delays</td>
<td>• Stakeholder (esp. customer) acceptance</td>
<td>• Asset transfer</td>
</tr>
<tr>
<td>• Long time horizon</td>
<td>• Inflation/interest rates</td>
<td>• Demand volatility</td>
<td></td>
</tr>
<tr>
<td>• Project complexity/feasibility</td>
<td>• High cash outflows due to CAPEX</td>
<td>• Inflation/interest rates</td>
<td></td>
</tr>
<tr>
<td>• Technological</td>
<td></td>
<td>• Refinancing/liquidity</td>
<td></td>
</tr>
<tr>
<td>• Regulatory</td>
<td></td>
<td>• Counterparty default</td>
<td></td>
</tr>
<tr>
<td>• Environmental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk transfer &amp; mitigation</td>
<td>(State) guarantees</td>
<td>(State) guarantees</td>
<td>(State) guarantees</td>
</tr>
<tr>
<td>• (State) guarantees</td>
<td>Insurance</td>
<td>Insurance</td>
<td>Insurance</td>
</tr>
<tr>
<td>• Insurance</td>
<td>Derivatives</td>
<td>Derivatives</td>
<td>Derivatives</td>
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</tbody>
</table>

## DHCN in the context of the infrastructure finance lifecycle – investors and financing instruments

**Strategy / Development / (Re-)Investment**
- **Equity sponsors**, e.g.
  - Utilities
  - Governments/ municipalities/ multilateral institutions
  - Infrastructure funds
  - Private equity
  - Pension funds?
- **Debt investors**:
  - Promotional banks
  - Multilateral institutions (e.g. EIB)
  - Bank syndicates

**Construction / Refurbishment**
- **Equity sponsors**, e.g.
  - Utilities
  - Governments/ municipalities/ multilateral institutions
  - Infrastructure funds
  - Private equity
  - Pension funds?
- **Debt investors**:
  - Promotional banks
  - Multilateral institutions (e.g. EIB)
  - Bank syndicates

**Operation / Maintenance**
- Investment funds
- Infrastructure funds
- Pension funds
- Sovereign Wealth funds
- (Re-)Insurance Companies

**Termination / Sale**
- Investment funds
- Infrastructure funds
- Pension funds
- Sovereign Wealth funds
- (Re-)Insurance Companies

### Investors
- **Equity sponsors**, e.g.
  - Utilities
  - Governments/ municipalities/ multilateral institutions
  - Infrastructure funds
  - Private equity
  - Pension funds?
- **Debt investors**:
  - Promotional banks
  - Multilateral institutions (e.g. EIB)
  - Bank syndicates

### Financing Instruments
- Subsidies
- Blended finance/PPP
- (Private) Equity
- Debt:
  - Promotional loans
  - (Syndicated) (Green) Loans
  - (Green) Bonds?

## Source
Due to inherent risks increasing importance of Blended Finance

Definition:
„Blended finance is the strategic use of development finance for the mobilisation of additional finance towards sustainable development in developing countries.”

The OECD DAC Blended Finance Principles:
Principle 1: Anchor Blended Finance Use To A Development Rationale
Principle 2: Design Blended Finance To Increase The Mobilisation Of Commercial Finance
Principle 3: Tailor Blended Finance To Local Context
Principle 4: Focus On Effective Partnering For Blended Finance
Principle 5: Monitor Blended Finance For Transparency And Results

## Financing instruments – EU Taxonomy- and SDG-aligned instruments

<table>
<thead>
<tr>
<th></th>
<th>Green Bonds</th>
<th>Green Loans</th>
<th>Green Bonded Loans (GSSD)</th>
<th>ESG-linked Bonds</th>
<th>ESG-linked Loans</th>
<th>ESG-linked Bonded Loans</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>• Environmentally oriented bonds</td>
<td>• Environmentally oriented loans</td>
<td>• Environmentally oriented SSD</td>
<td>• ESG-oriented bonds</td>
<td>• ESG-oriented loans</td>
<td>• ESG-oriented SSD</td>
</tr>
<tr>
<td><strong>Market relevance</strong></td>
<td>• high</td>
<td>• high</td>
<td>• increasingly</td>
<td>• increasingly</td>
<td>• increasingly</td>
<td>• increasingly</td>
</tr>
<tr>
<td><strong>(Binding) regulations</strong></td>
<td>• Green Bond Principles (ICMA**)</td>
<td>• EU Green Bond Principles</td>
<td>• EU Action Plan / EU Taxonomy</td>
<td>• Green Loan Principles (LMA**)</td>
<td>• No, but usually orientation towards Green Bond Principles</td>
<td>• EU Action Plan / EU Taxonomy</td>
</tr>
</tbody>
</table>

### Second Party Opinion (SPO)
- Yes, e.g. by rating agency
- Yes, e.g. by rating agency
- Yes, e.g. by rating agency
- Yes, e.g. by rating agency
- Yes, e.g. by rating agency
- Yes, e.g. by rating agency

### ESG rating
- meaningful
- meaningful
- meaningful
- meaningful
- meaningful
- meaningful

### ESG KPIs/SPTs**
- meaningful
- meaningful
- meaningful
- necessary
- necessary
- necessary

### Use of Proceeds-Reporting
- yes
- yes
- (yes)
- (yes)
- (yes)
- increasingly

### Examples (each exemplary)
- BayWa
- EnBW
- KWI
- EBRD
- EIB
- State of Baden-Württemberg
- E.ON
- BASF
- Numerous other companies
- Philipps
- Danone
- Handle
- Indorama Ventures
- Nordex (including M+W Gruen
- Schaeffler
- Nassaüische Heimstätte (Green & Social)
- enercon AG
- Enel
- Association
- Hapag-Lloyd
- Handle
- Pfeiderer GmbH
- Continental
- Handle
- Laxness
- German Stock Exchange
- Dürr
- Voith
- Telefonica Germany
- Jenoptik AG
- RHI Magnesita
- Faber-Castell AG
- Faurecia SE

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24.06.2022
Findings of investment experts interviews (1)

Development Bank:
“Investments have to be in alignment with Paris Agreement”

Sustainable Finance Rating Agency:
“A main driver of green infrastructure investments is regulation”
“Our clients desperately look for genuine, sustainable investments.”

United Nations Environment Programme Finance Initiative (UNEP FI):
“Investments have to contribute to the SDGs”
“What is important to be able to apply the taxonomy? Data, data data! Data availability and data quality. Data is the biggest issue.”

Source: HFT (2022): Expert interviews for REWARDHeat-project, May/June 2022
Findings of investment experts interviews (2)

Infrastructure Finance Advisory:

“DH can represent a diversification of the portfolio, as it is not linked to the normal stock market cycle”

“Projects must have a volume of several 100 million Euro to be of interest to large investors.”

Regional promotional/development bank:

“DHCN-projects must be bundled as an investment in order to become interesting for more investors.”

“If you have an investment of 300, 400 or 500 million Euro and a sustainability certificate on your investment, it is much easier to convince big investors.”

Source: HFT (2022): Expert interviews for REWARDHeat-project, May/June 2022
# Outlook – Investor-financial-instruments-matrix

<table>
<thead>
<tr>
<th></th>
<th>Equity</th>
<th>Mezzanine</th>
<th>Debt</th>
<th>Structured and Cashflow Based Finance</th>
<th>Grants / Subsidies / Subsidized Funding</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private / Retail Investors</td>
<td></td>
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<tr>
<td>Public Institutions</td>
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<tr>
<td>Banks</td>
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<tr>
<td>Investment Funds</td>
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<td>Pension Funds</td>
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<td>Insurance Companies</td>
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<tr>
<td>International / Multilateral Financial Institutions</td>
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<tr>
<td>Industrial Investors (e.g. Utilities)</td>
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</tbody>
</table>

Source: Popovic (2020)
Conclusion and outlook

• EU regulatory initiatives (e.g. Taxonomy) provide tailwind for sustainable infrastructures

• This should result in more investor’s interest for DHCN. If so, which kinds of investors?

• Innovative sustainable finance instruments (e.g. ESG-linked) should gain importance. Which ones will be of special importance?

• Data for calculating KPIs relevant for investors’ decision making will increase in relevance. What are investors’ expectations in this respect?
Prof. Dr. Tobias Popovic, Sebastian Schultze,
HFT Stuttgart, Center for Sustainable Economics and Management (CSEM),
Sustainable Finance-Cluster
tobias.popovic@hft-stuttgart.de
sebastian.schultze@hft-stuttgart.de

Thank you
www.rewardheat.eu

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Panel Discussion

- Allister Sykes – Director, Asper Investment Management
- Peter Dahl – Investment Manager, Polhem Infra
- Georg Inderst – Principal, Inderst Advisory
REWARDHeat
Decarbonise Heat

Allister Sykes
Asper Investment Management
June 2022
Our mission: Build the New!

Asper is an independent, specialist investment management firm 100% focused on sustainable infrastructure. We have invested €1.7bn to date in new build sustainable infrastructure. Our passion is to support entrepreneurial developers and help them build their projects and businesses faster.

>1.2GW
Built across Europe

€1.7bn
Total capital invested in newly built infrastructure

2014
First district heating investment made

100%
Focus on sustainable real assets
Our District Heating experience

- Aggregated a new platform in Sweden in 2014 backing an experienced management team including material plant upgrades

- Latest DH platform backed by Asper in 2020. Building a portfolio of DH network from diverse sustainable heat sources

- Asper as financial partner of D2Grids since 2018 aiming to develop 5th generation heating and cooling networks (5GDHC) across Europe

+ more exciting news later this year...
Brownfield DH networks are infrastructure assets...

- Acceleration of brownfield DH deals in Europe from 2017 – predominantly in Nordics

- Re-rating of asset class as “infrastructure” attracting funds and institutional investors → valuations more than doubled to >20x EV/EBITDA

- All assets sold were operational, cash-generative high temperature networks

Size of bubble = transaction size
Source: Asper Investment Management research
...but greenfield DH networks require a different approach

**KEY CHALLENGES**

- Multiple stakeholders
- Regulatory uncertainty
- High upfront capex
- Demand uncertainty (upfront)
- Drive to decarbonisation and low temperatures
Our approach: Infrastructure Growth Equity

We support entrepreneurial developers with our capital, our experience and our work.

Our goal is to accelerate growth of our partners and the transition towards a sustainable future.

- **Platform approach**: Asper looks to back entrepreneurs over many years, to help them build market-leading sustainable infrastructure businesses

- **Asper supports its partners** with a combination of:
  - Construction equity
  - Development/growth equity
  - Raising and executing debt project financing
  - Sourcing and executing expansion M&A
  - Hands-on assistance with growing their business: strategy, organization, market intelligence
Thank you

CONTACT:

ALLISTER SYKES

allister.sykes@asper-im.com
The AP-funds and their missions

Polhem infra is founded and owned to equals shares by The First, The Third and The Fourth AP-funds

The mission of the AP-funds is to manage pension capital for the public pension system, for today’s and tomorrow’s pensioners.

The general pension consists of income pension and premium pension. The AP Funds (AP1, AP2, AP3, AP4 and AP6 manage the buffer capital in the income pension system. The Seventh AP Fund (AP7) manages capital in the premium pension system.

By the end of June 2022 AP1, AP3 and AP4 together managed SEK 1 450 billion.

Första AP-fonden (AP1) manages part of the capital in Sweden’s national income pension system.

AP1’s assets of SEK 466 billion are distributed across a global portfolio consisting of equities, fixed-income securities, real estate, infrastructure, private equity funds and hedge funds.

AP1 invest sustainably and long-term, and practise responsible ownership.

AP3’s overarching mission is to manage the fund capital in the best interests of the income pension system by generating high returns at low risk.

Total fund capital amounted to SEK 503 billion at the end of June 2022.

AP4’s mission is to contribute to the financial security of current and future pensioners in Sweden by managing part of the national pension system’s buffer capital. AP4’s long-term perspective, responsibility as an owner and strong commitment to sustainability create opportunities for high returns at a low cost.

Total fund capital amounted to about SEK 500 billion at the end of June 2022.
Polhem Infra Investment focus

Polhem Infra has identified priority sectors in which investment opportunities will be perused.

- **Energy**
  - District heating
  - District cooling
  - Energy storage

- **Digital Infrastructure**
  - Fibre to the home
  - Global fibre
  - Tele Towers
  - Datacentres

- **Renewable power production**
  - Wind farms
  - Solar PV
  - Hydro Power

- **Other opportunistic areas**
  - Railway
  - Depots
  - Harbors
Coffee Break
14:30 – 15:00
Pitch Session

Helsingborg and Mölndal demo site: Håkan Knutson – Managing Director, Indepro

Szczecin demo site: Lilli Wolny – Project Manager, Szczecińska Energetyka Cieplna (SEC)

Feedback from:
• Allister Sykes (Asper-IM)
• Anders Ericsson (Adven/Värmevärd)en)
• Tobias Popovic (HfT Stuttgart)
REWARDHeat DHC Investor Perspectives

Pitch Session by REWARDHeat demonstrator networks Helsingborg and Mölndal demo site

Håkan Knutson – Managing Director, Indepro
Thomas Wildig – Managing Director, Arvalla

In collaboration with:

Supported by:
Target group: Investors

A) Owner of a district heating system
   new built
   existing

Regardless of temperature levels

Other type of investor could be
   B) building property owners
   C) Third party energy module owners
Context

Scarce resources for heating and required reduction of emissions:

No fossil fuels (oil, gas, coal)
Lower volumes of combustible waste
More expensive biomass
Volatile electricity supply, unpredictable price max/min related to capacity
Our offer to your DH network platform

New Module Interface to Your Customers
Benefits for you – as heat supplier

New module means:
You sell more heat at your choice – more flexibility and full compatibility

To any temperature (above 10°C)
At any volume (capacity)
At any chosen time of the year
Minimum capacity taken from distribution grid

More power from your CHP
Comfort cold to customers – new revenue
Function of the Module – well proven components in new combination

New module components:
1. DH capture and re-distribute heat
2. Geothermal boreholes store heat and provide cold
3. Front-end heat pumps customize heat (JIT)

Peak power mitigation
Power purchasing at low price

Option to add module for DH driven power supply

50-100 kW electricity
80°C
70°C
10°C
500-1000 kW heat

70°C
10°C
50-100 kW electricity
### Energy Balance – Heat – and CO2 profile

<table>
<thead>
<tr>
<th>Source</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Heating</td>
<td>+272 MWh</td>
</tr>
<tr>
<td>Free Cooling/Vent</td>
<td>+45 MWh</td>
</tr>
<tr>
<td>Heat losses boreholes</td>
<td>-60 MWh</td>
</tr>
<tr>
<td>Electricity to HP compressors (SCOP7)</td>
<td>+43 MWh</td>
</tr>
<tr>
<td>Heat to customers</td>
<td>+300 MWh</td>
</tr>
<tr>
<td>Cooling to customer</td>
<td>+45 MWh</td>
</tr>
</tbody>
</table>

Scalable from 100 MWh to 6 000 MWh or higher. Start price at EUR 200 K per module.

#### CO2-profile:
- District Heat is recovered surplus heat with zero CO2
- Cooling is free cooling from boreholes with zero CO2
- Electricity consumption (Nordic Mix) can be optimized to minimum CO2
Financial

Estimated ROI/pay back time: 7-10 years
Estimated IRR: 8-10%

Investment life time (depreciation time): more than 30 years
(15 years at heat pump compressor)

Technical Risks: Low, well proven components
Energy system Risk: Very low probability that a customer switch to other solution
Commercial Risks: Contract specific

Scalable
Compatible
Please note that this is not a commercial offer.

Contact:

hakan.knutsson@indepro.se
+46 733 347977
REWARDHeat Project
Demo case in Szczecin, Poland
Helsingborg
16.06.2022
Łasztownia Island - location
Łasztownia – New Heart of the City
Łasztownia Island – solution tomorrow
L = 750 m
DN 250

The boost HP will deliver:
25 kW * (1 - 0.6) = 10 kW  Heat
with an el input of
2 kW
e (CoP_H = 5)

100 kW

400 kW

About 60% of the tap hot water load
will be heated with a small heat exchanger

The tap hot water accumulator reduces dim load with 75%

Production need:
100 kW * (1 - 0.75) = 25 kW

18 - 38 °C

35 - 50 °C

15 kW

8 kW

10 kW

423 kW

600 kW

If you have a clear picture of the flow direction in the DH return pipe and that there are sufficient amount of water flow at various loads up to maximum load in return pipe you can connect only on the return pipe otherwise normal connection between supply and return with a steering valve on primary side.

Building

Central unit to passively inhale heat into the system

Central unit to passively exhale heat from the system
Łasztownia Island – 5G DH network

- 5G DH network
- thermal storage
- cooling machines
- substations combined with heat pumps

Traditional DH network

Excess heat from chocolate manufactory

5G DH network

50/37°C (winter)
15/30°C (summer)

Heat/cold storage to balance the network.

Cooling tower

Heat from the 5G network – 400 KW

Source for cooling machines – 600 kW

Domestic hot wather prepared locally, by MSC, used solar thermal collectors/ heat pump

Marine Science Centre
Project description

Heating Balancing Station
- up to 1,2 MW heating via DH
- central 800 KW cooling with air coolers
- passive Balancing Unit storing up excess energy
- possible extension to 3,5 MW heating, 2,4 MW cooling

Waste heat potential
from chocolate manufactory

Marine Science Center
- low temperature comfort heating
- air conditioning with use of chillers
- partial heating of DHW
Benefits and challenges

Benefits of solutions on Lasztownia island

- Cooling production
- Reduction of heat losses
- Possibility of using waste heat from buildings
- Establishing prosumer relationships and strengthening cooperation with waste energy generators
- A step towards decarbonization of the energy sector in the area and support of alternative transport by creating charging stations for electric cars
- Scalability of the project
- Creating opportunities for RES usage

Challenges of the project

- Problem with integration of existing buildings in Łasztownia
- Need to divide the project into stages
- Connecting new buildings to the network
Łasztownia Island – what solution for the future?
Thank You for your attention!
Slido Poll

Join at slido.com with #3151678

Would you invest in the demo networks that have been presented?
REWARDHeat

Thank you

www.rewardheat.eu

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