The path to a successful District Cooling Project

Eric Lindström

Devcco
• District Cooling is based on central production of cold water
• Cold Water is distributed to customers in a closed loop pipe network.
• At the customer end of the system, the cooling is transferred to buildings in energy transfer stations (ETS).
There are several technologies and system combinations available for building energy efficient District Cooling. Basic in system design is finding a dense demand for cooling and identifying available energy sources. Listed below are some of the most common sources, technologies and market segments in modern District Cooling (and heating).

**Technologies**
- Electrical compressor chillers
- Heat driven absorption chillers
- Energy storage
- Geothermal energy/ground source

**Industrial sources**
- Heat from Waste-to-Energy plants
- Waste heat from power generation
- Industrial waste heat
- Resorts/hotels
- Airports
- Hospitals
- Business areas
- Retail centers
- City centers
- Neighborhoods

**Natural sources**
- Sea or lake water for primary cooling use
- Surface or river water for condenser cooling
Examples from the World

Stockholm

Amsterdam

Honolulu

Maldives

Dominican Republic

Curacao

Lusail

International District Cooling & Heating Conference

24th - 25th October 2017 | Ritz-Carlton Hotel - Doha, Qatar
System design – Swedish example

Energy balance per month

- Absorption chiller
- Sea water cooling
- Compression chillers (water cooled)
- Compression chillers (air cooled)

Energy (MWh/month)

1 2 3 4 5 6 7 8 9 10 11 12

Cold sea water in winter

Absorption chillers (waste heat) in summer

Compression chillers (water cooled) for mid load

Compression chillers (air cooled) for peak load
Impact on HFC Phase out

By introducing District Cooling in a city or a district with floor space of more than 500,000 sqm

- Capacity reduction with centralized system - 50% due to redundancy and simultaneously factor
- Production mix: Financially Optimized system
  1. Free Cooling; non HFC base load
  2. Heat driven absorption; non HFC base load
  3. Large size chillers; 20-30% for peak capacity
- Alternative refrigerant with no or low GWP (ammonia, HFO-1234ze)
- 24/7 operation control secure <2% annual leakage
District Cooling is not only about Technology!
..and it is not Rocket Science

Pipes
Chillers
Heat Exchangers
Pumps
... is all about your business case

• Long term strategic roadmap
• Phased expansion
• Start-up in compliance to roadmap
Stakeholder benefits

**Local Government**
- Meet the CO₂ targets
- Supports the optimization and utilization of the electricity utility and its transfer to green production
- Security of supply / Decreased dependency of imported fossil fuel
- Attractive and competitive investment case

**Investors**
- Attractive returns & exit possibilities
- Long term stable cash-flows
- Manageable risks

**Utilities**
- Portfolio expansion
- Increased profitability
- Sustainable product

**Property Developer**
- Carve out the energy utility business
- Offer a full service cooling (and heating) solution
- Increase the asset value

**Real Estate developers and owners**
- Lower investments
- Improved CSR and Green profile
- Higher assets values due to higher building certificate rating
- Green, Reliable and Price stable solution

**End Customers**
- Simple product/service
- Efficient and reliable
- Flexible and competitive
Challenges & barriers

- **FINANCIAL SUPPORT - BRIDGING THE GAP** – Study to operation
- **GRANTS AND GUARANTEES** - debt and equity
- **PERMITTING** can be challenging and time consuming.
- **POLICIES** providing District Cooling a level playing field
  - Building codes and standards allowing decentralized air-conditioning systems in buildings
- **Subsidized electricity rates**
Critical success factors

Organisation
- Dedication
- Attention
- Short lead times
- All competences within the team
- Speed - Income before investing

Technique
- Time, performance, profitability

Market
- Clean, simple, reliable and flexible product
- Market communication
- Relationship sales with combined products DHC
- Price strategy (alternative price, risk allocation)
- Customer information system (statistics, analysis, billing)

Finance
- Steering on profitability - not on budget

Successful development of District Cooling require multi disciplinary work. Experience says that securing permits and revenue are often on the critical timeline.
Thank YOU!

eric.lindstrom@devcco.se
+46 70 644 39 43