# Helsinki Energy Challenge

## Creating the future of urban heating

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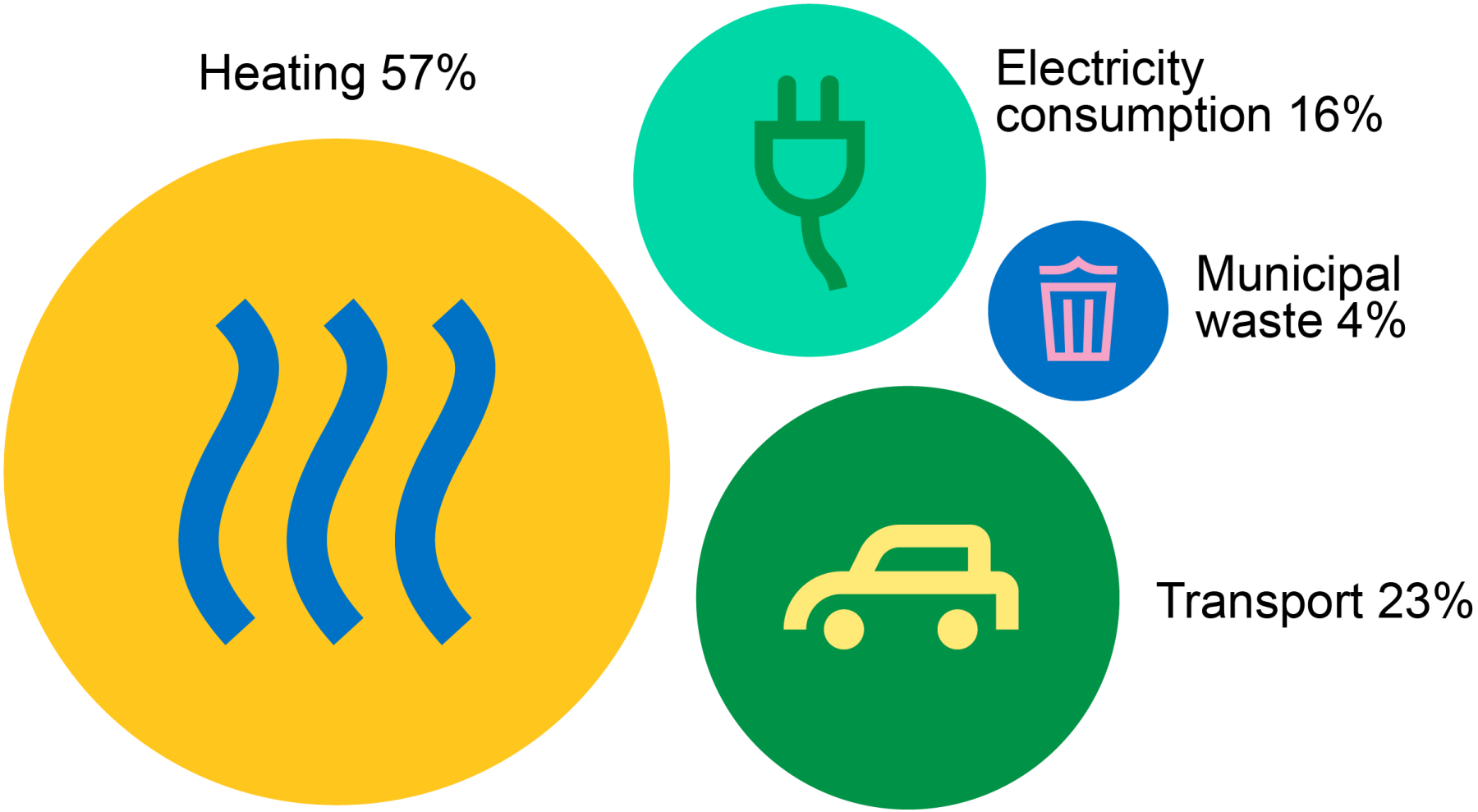
# Emissions in Helsinki

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HELEN

**How can we decarbonise the heating of Helsinki, using as little biomass as possible?**

## Starting point:

1. Goal: Helsinki - Carbon neutral by ~~2035~~ **2030**
2. Fact: Over 50% of heat in Helsinki produced with coal
3. Fact: Finland - Use of coal in energy production banned as of 2029
4. Goal: Helsinki - rid of coal with no increase in biomass use

- **International challenge competition**
- **Main prize**: 1 000 000 EUR
- **Two phases**: (1) Open application phase – (2) Co-creation phase

- **Solutions for Helsinki – *But, to be shared with other cities around the world***

**Evaluation criteria (Team):** Solution relevant expertise – **The diversity** of the relevant expertise within the team - Team's experience with the energy sector *(Team evaluated only in Phase 1)*

**Evaluation criteria (solution):**
Climate impact - Cost impact - Impact on natural resources - Implementation schedule - Implementation feasibility - Reliability and security of supply – Capacity

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| 27 Feb–30 Sept 2020 | Application phase |
| April–September | Helsinki Energy Challenge webinars and other events |
| By 14 September | All clarifying questions and answers are published on the Challenge website |
| 30 Sept 16:00 EET | Deadline for the Challenge applications |
| 6 November | Finalist teams invited to the co-creation phase |
| 11 November | Orientation webinar for the finalist teams |
| 9–11 December | Boot camp in Helsinki |
| 22 January 2021 | Deadline for the finalist teams to submit their final competition entries |
| February 2021 | Winner(s) selected by the international jury |
| March 2021 | Awards ceremony, Helsinki |

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# The Helsinki Energy Challenge jury

**Hans Jørgen Koch**
Senior Advisor
Nordic Energy Research

**Markku Ollikainen**
Chair of the Finnish Climate Change Panel, Professor of Environmental and Resource Economics
University of Helsinki

**Sanna Syri**
Professor,  Energy Technology and Energy Economics
Aalto University

**Brian Vad Mathiesen**
Professor, Department of Planning
University of Aalborg

**Martin Young**
Senior Director, Scenarios and Business Insights
World Energy Council

**Robert Stoner**
Deputy Director of Science and Technology
MIT Energy Initiative;
Founding Director
MIT Tata Center for Technology and Design

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# Teams from all around the world took up the Challenge. Many of them now innovating solutions for other cities.

**All received applications:**

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| **252** Teams/ proposals | **1528** Innovators and solution providers | From **35** countries |

**Finalist teams:**

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|---|---|---|
| **10** Teams | **41/ 104** Organisations/ persons | From **12** countries |

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# Diverse expertise represented among the finalist teams

**Smart Salt City** SaltX Technology (Sweden) & Rebase Energy (Sweden)

**Beyond Fossils** VTT - SYKE - Hansel - Independent expert (Finland)

**The Hot Heart** Carlo Ratti Associati (Italy) - Ramboll (Finland) - Transsolar (Germany) - Danfoss / Leanheat (Finland) - Schneider Electric (Finland) - OP (Finland) - Schlaich Bergermann Partner (Germany) - Squint/Opera (UK)

**Helsinki Energy Designers** Three independent experts (Finland)

**Flexible Future** Granlund (Finland) - Wapice (Finland)

**Use It or Lose It** Northern Tanker Company (Finland)

**Sustainable Heat Coalition** EIT InnoEnergy (Sweden) - Heliac (Denmark) - ConnectPoint (Poland) - Ecovat (The Netherlands) - HeatVentors (Hungary) - Savosolar (Finland)

**CarbonHelSinki** Swedish Environmental Research Institute (IVL) (Sweden) - Resourceful Futures (UK) - EKSTA Bostäder (Sweden) - EDF Group (France) - European Institute for Energy Research (Germany) - Ochsner Process Energy Systems (Germany) - EURAC Research (Italy) - LKAB WASSARA (Sweden) - Metropolia University of Applied Sciences (Finland)

**HIVE** Storengy (France) - Newheat (France) - ENGIE (France & Belgium) - PlanEnergi (Denmark) AEE INTEC (Austria) - SAVOSOLAR (Finland)

**Full competition proposals available: energychallenge.hel.fi**

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# Helsinki Energy Challenge showed that sustainable urban heating system can be reached through many different kinds of solutions.

## Awarded proposals:

**HIVE:** A flexible plan, based on proven technologies (e.g. seawater heat pumps, electrical boilers, solar thermal fields, demand side management measures); the plan is capable of integrating new technologies if and when these emerge and the roadmap until 2035 can be updated several times. ***Storengy*** *(France)* - ***Newheat*** *(France)* - ***ENGIE*** *(France & Belgium)* - ***PlanEnergi*** *(Denmark)* - ***AEE INTEC*** *(Austria)* - ***SAVOSOLAR*** *(Finland)*

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**Beyond Fossils:** An energy transition model based on regular, open and technology-neutral clean heating auctions paving up the path to carbon neutral Helsinki in a flexible and innovation enabling way. ***VTT - SYKE - Hansel*** *- Independent expert (Finland)*

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**Smart Salt City:** Comprehensive plan that melds a novel thermochemical energy storage and artificial intelligence with commercially available energy technologies. ***SaltX Technology*** *(Sweden)* & ***Rebase Energy*** *(Sweden)*

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**The Hot Heart:** An “energy island”: A system made of 10 cylindrical reservoirs filled with hot seawater which can receive different energy sources as input. Electric energy is converted into thermal energy using sea water heat pumps - the output of Helsinki’s Hot Heart is heat that can be distributed across the existing district heating system. Four cylinders of the “Hot Heart” would be enclosed with inflatable roof structures to create a new leisure attraction for the city. ***Carlo Ratti Associati*** *(Italy)* - ***Ramboll*** *(Finland)* - ***Transsolar*** *(Germany)* - ***Danfoss / Leanheat*** *(Finland)* - ***Schneider Electric*** *(Finland)* - ***OP*** *(Finland)* - ***Schlaich Bergermann Partner*** *(Germany)* - ***Squint/Opera*** *(UK)*

# Some key elements highlighted by the competition proposals:

- The flexibility of the overall heating system
- Electrification of heating (e.g. heat pumps play an important role)
- Increasing importance of heat storage
- Lowering the temperature of district heating network
- Two-way district heating network
- Models with multiple heat producers
- Optimization of energy production and consumption, energy efficiency measures

**Ultimately – decarbonizing an urban heating system is not just a technological challenge.**

Helsinki Energy Challenge showed that the heating system of the future is **flexible and made up of several partial solutions and actors, which have been optimized to work together**. This challenges our traditional approach. In the future model, there are many actors and the integration of interests requires new kinds of operating models and approaches.

**The energy sector is in transition phase in which the City has an important role as an enabler -** important role in enabling the systemic change and in striving to make the overall heating system flexible. And in bringing the development towards heating ecosystem that allows innovations and where the measures of different actors go towards the same direction**.**

# Roadmap to carbon-neutral heating ecosystem

As a result of the Helsinki Energy Challenge, the City started to build **a city-wide roadmap to carbon neutral heating ecosystem**. The roadmap will help to proceed so that the upcoming decisions will benefit **the entire city and different stakeholders.**

The key is to identify the steps that the city needs to take next in order to enable the implementation of the best solutions **from city's & citizens perspective.**

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# More information:

https://energychallenge.hel.fi

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