Is the current status still up to date?

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Erdwärmesysteme

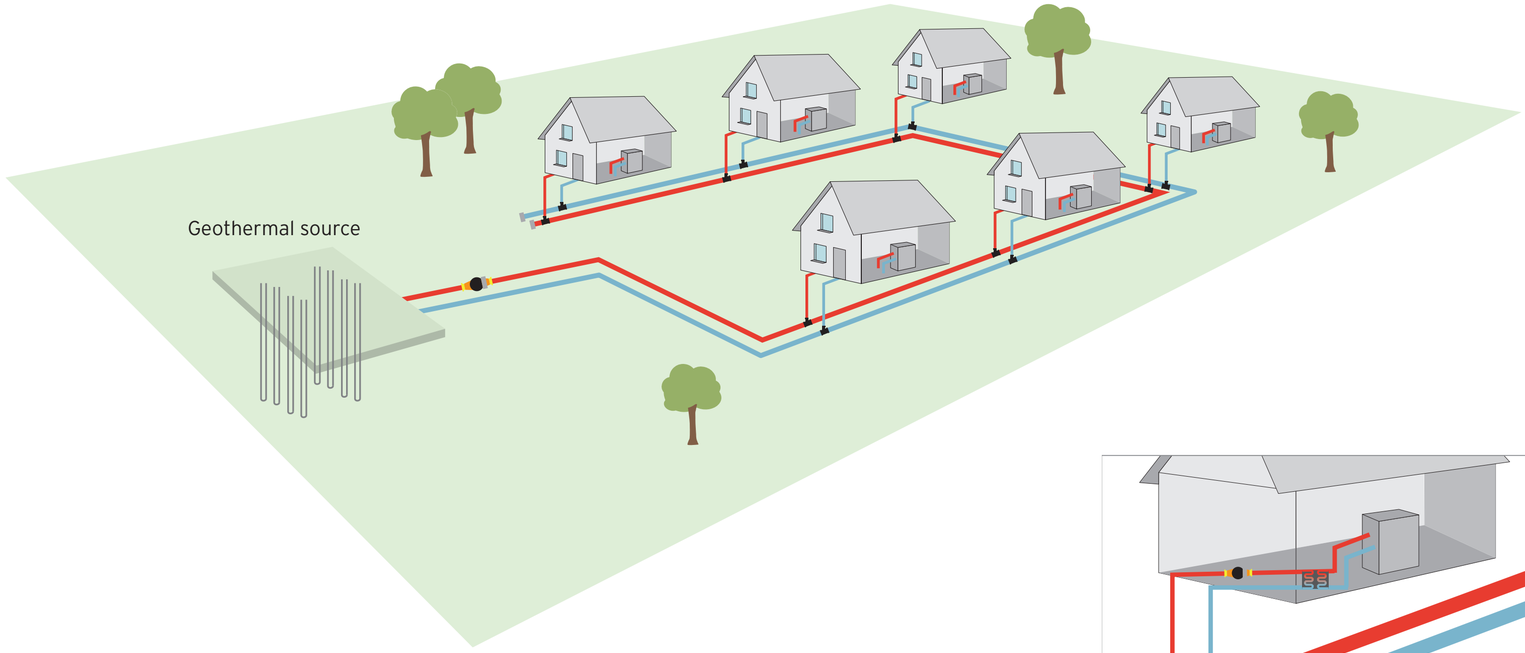
Current state of the art:

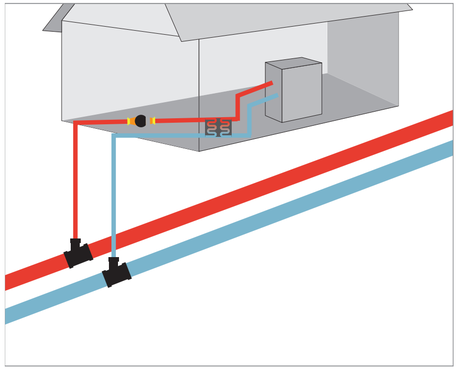
We have given this matter a great deal of thought and asked ourselves whether the current approach to cold local heating is really the best possible solution. We have filed patents and questioned the existing approach.

We have developed a solution that addresses these challenges and offers significant potential for improvement.

Disadvantages of the current system:

- Double piping with supply and return lines.
- High complexity in planning and operation to ensure reliable supply even to the most remote consumers.
- High installation costs with many distributors. Due to the shared hydraulics, even small leaks can shut down the entire network.
- The length of the network is limited.





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For patent reasons, the illustrations are not detailed or to scale and are only shown schematically.

New approach to cold local heating

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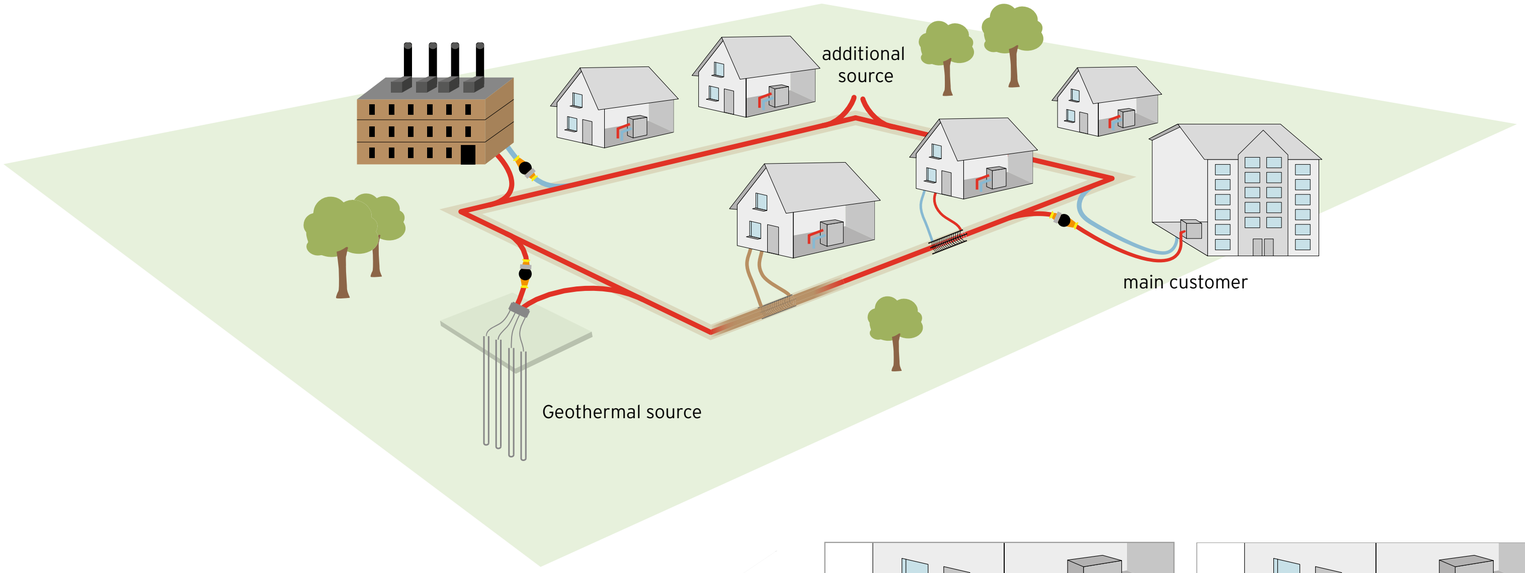
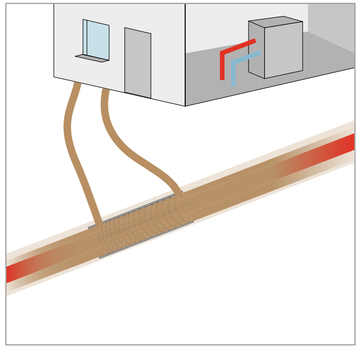
Our new solution as a single-pipe ring line with different sources and consumers:

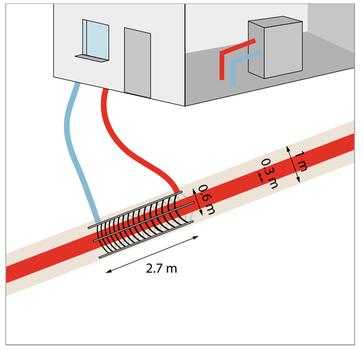
With our submitted patents, we offer high improvement potential while reducing technical requirements.

Advantages of our new system:

- Simple piping as a ring line of unlimited length.
- Low installation costs thanks to hydraulically decoupled small consumers via net collectors.
- Flexible connection of larger consumers with automatic adjustment of the flow rate.
- Simple temperature and volume control via the source and consumer pumps.
- Operation without antifreeze possible (in the ring line).
- Significant cost optimization in construction and operation.







Trench filling with heat-conducting material (e.g., liquid soil).

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Efficient network design for maximum performance: Focus on our ring line system

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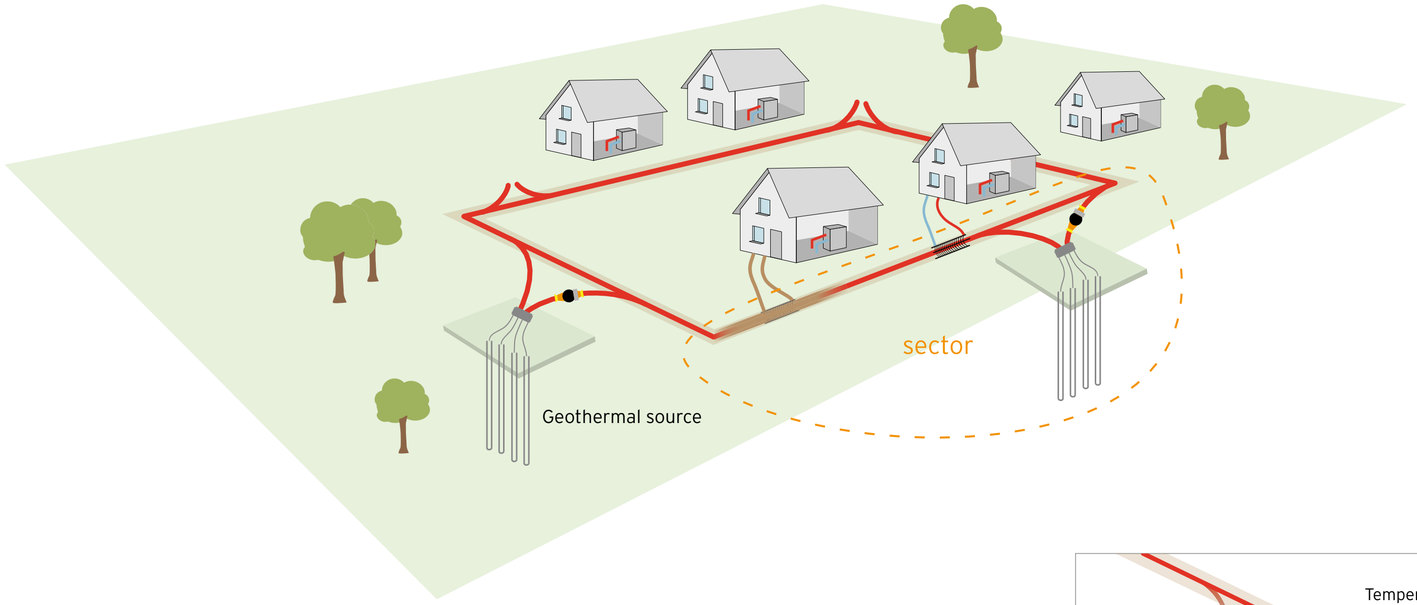
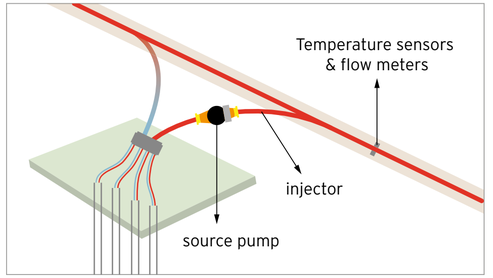
Our goal:

- Minimal pressure loss.
- No hydraulic disturbances.
- Automatic regulation of flow velocity.
- Lowest possible system pressure.
- No significant geodetic pressure differences.
- Possibility of implementing networks of unlimited length.

Therefore:

- No braking elements in the ring line: no valves, pumps, or flow-inhibiting branches.
- The tangential outlets and inlets of the heat sources and main consumers are used to maintain the target flow velocity. The pump capacity at the inlet points supports acceleration in the network (injector).
- Smaller consumers are not directly connected hydraulically; instead, net collectors are used for this purpose.
- The heat demand and volume flow are evaluated on a sectoral basis.





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Sectoral assessment of heat demand and volume flow

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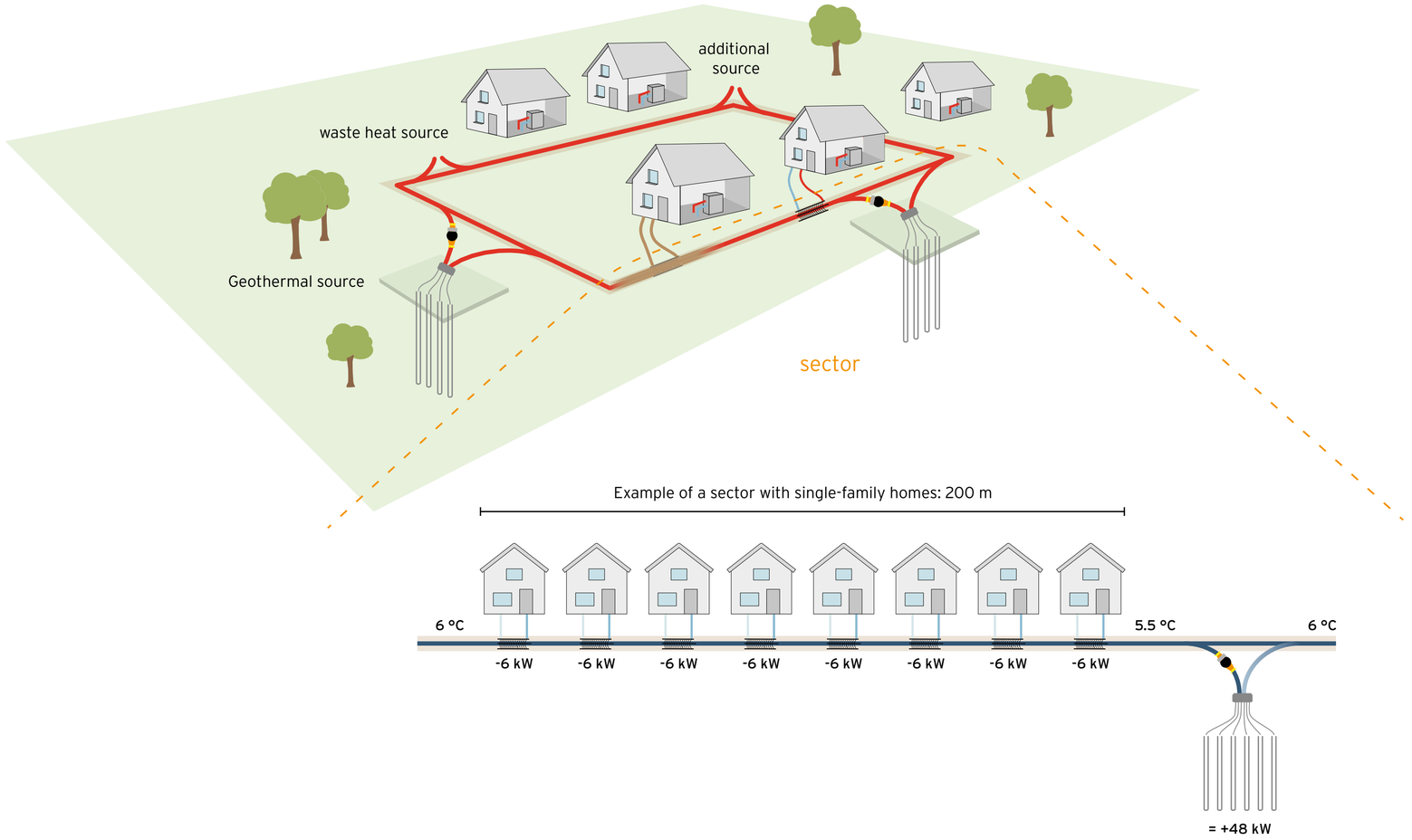
Basic facts:

- The same temperature conditions should prevail at the beginning and end of each sector. The pressure is balanced by sector pumps, which also regulate the flow rate.
- Seasonal adjustment of the sector pump for summer and winter operation.
- Control of temperature and flow rate in the main network is optional.

Example of a sector with a length of 200 m and 8 consumers:

- Design: DN300 SDR17, outer diameter 315 mm, inner diameter 277.6 mm
- Pipe length sector: 200 m
- Volume flow: 100 m^3/h
- Flow velocity: 0.459 m/s
- Pressure loss: 18 mbar



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Description of sources and bulk buyer management

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Sources and bulk buyer management:

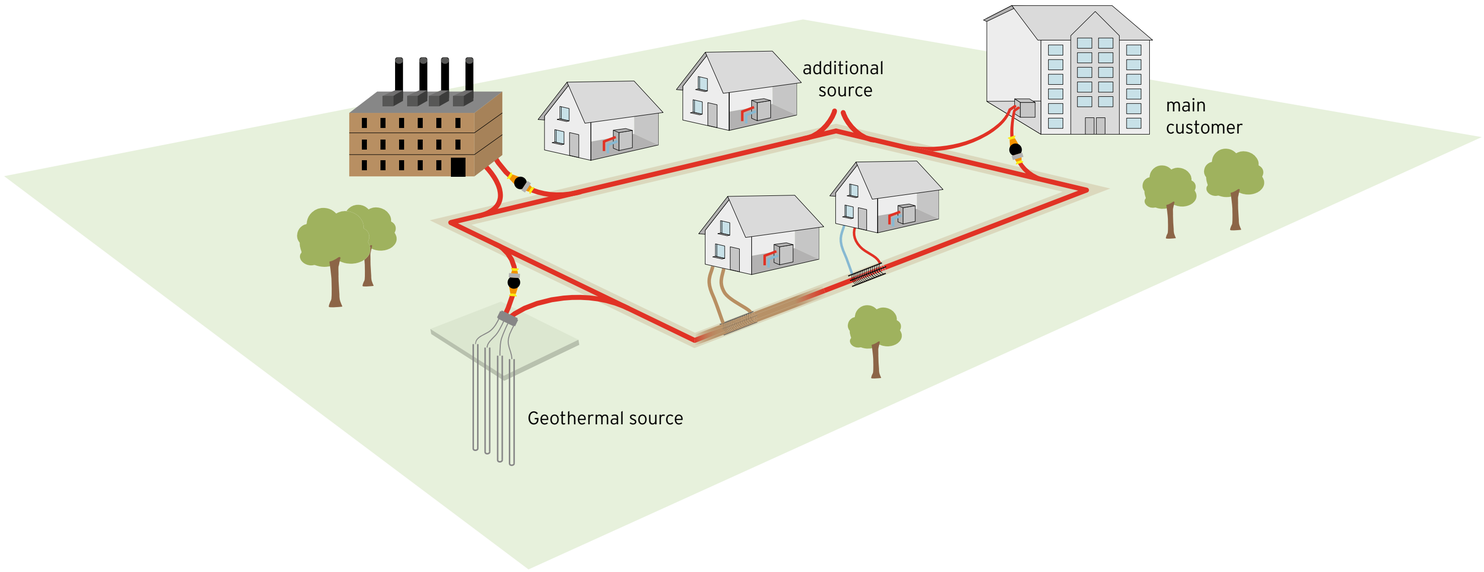
- Sources always have a sector shaft with a sector pump, load valve, and temperature sensor.
- Sources can include collectors, deep probes, PVT, waste heat (industrial or municipal), or return flow from district heating pipes.
- Large consumers can be connected hydraulically using the same sector shaft system.

Source example with depth probe on a 200 m long sector:

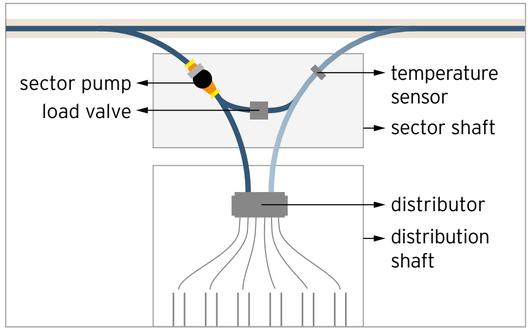
The 0.5 °C / 48 kW is tracked by the source:

- Main volume flow 100 m^3/h
- Source volume flow approx. 10 m^3/h in the discharge
- 6 x 200 m: 12 strands
- Outer diameter: 40 mm
- Pressure loss: 116 mbar

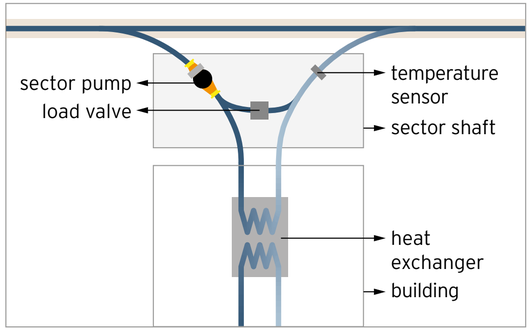
The sector pump must compensate for a pressure loss of 134 mbar.



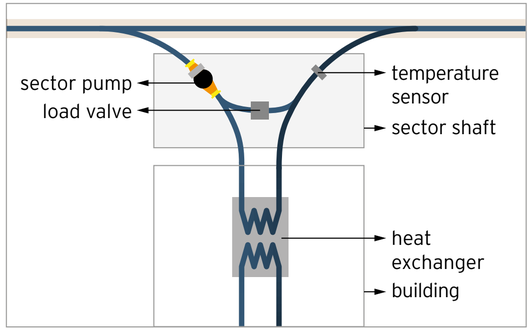
Geothermal source
depth probe



Waste heat source
industry



Main customer



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How net collectors work

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Performance description:

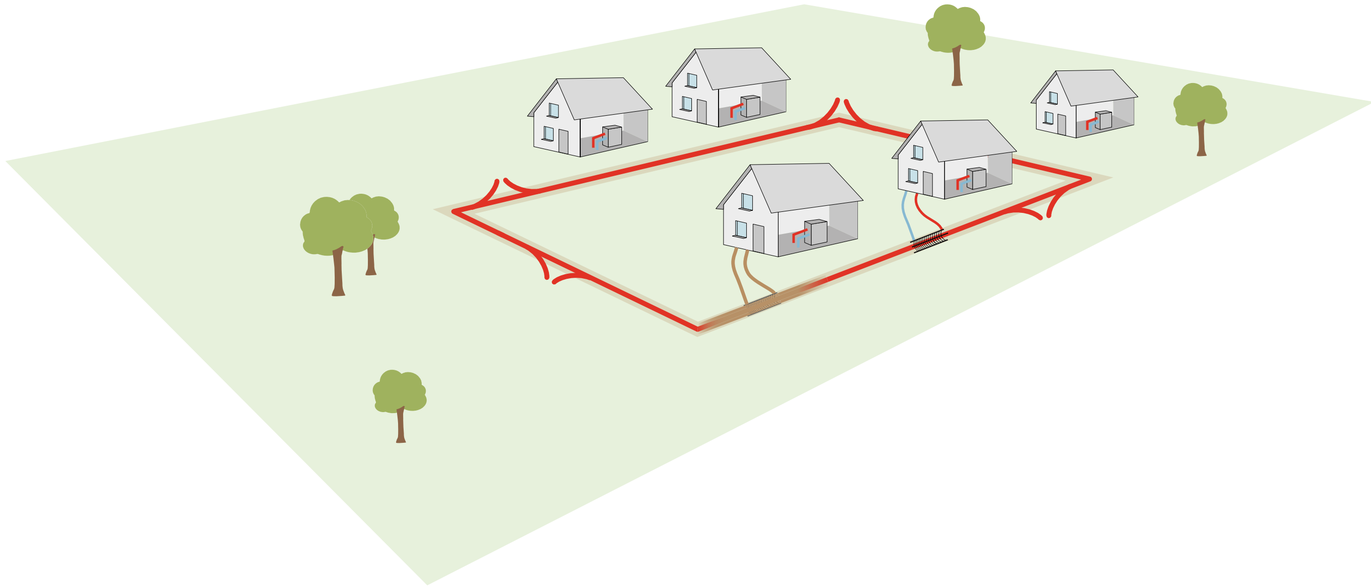
A collector (3.5 – 7 m long with 3 – 5 kW extraction capacity) is required for a single-family home with a KfW rating of 40 to 150 m².

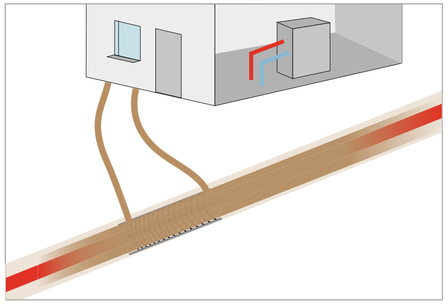
Installation:

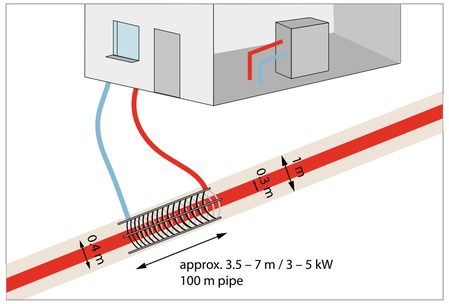
The collector is delivered in a length of 3.5 m. The collector is fed through the main pipe and extended to a length of up to 7 m. If several collectors are required, they must be connected via a distributor. The trench is backfilled with heat-conducting material (e.g. liquid soil).

Advantage:

The collector is not hydraulically connected to the main pipe, but is operated directly by the consumer's heat pump.







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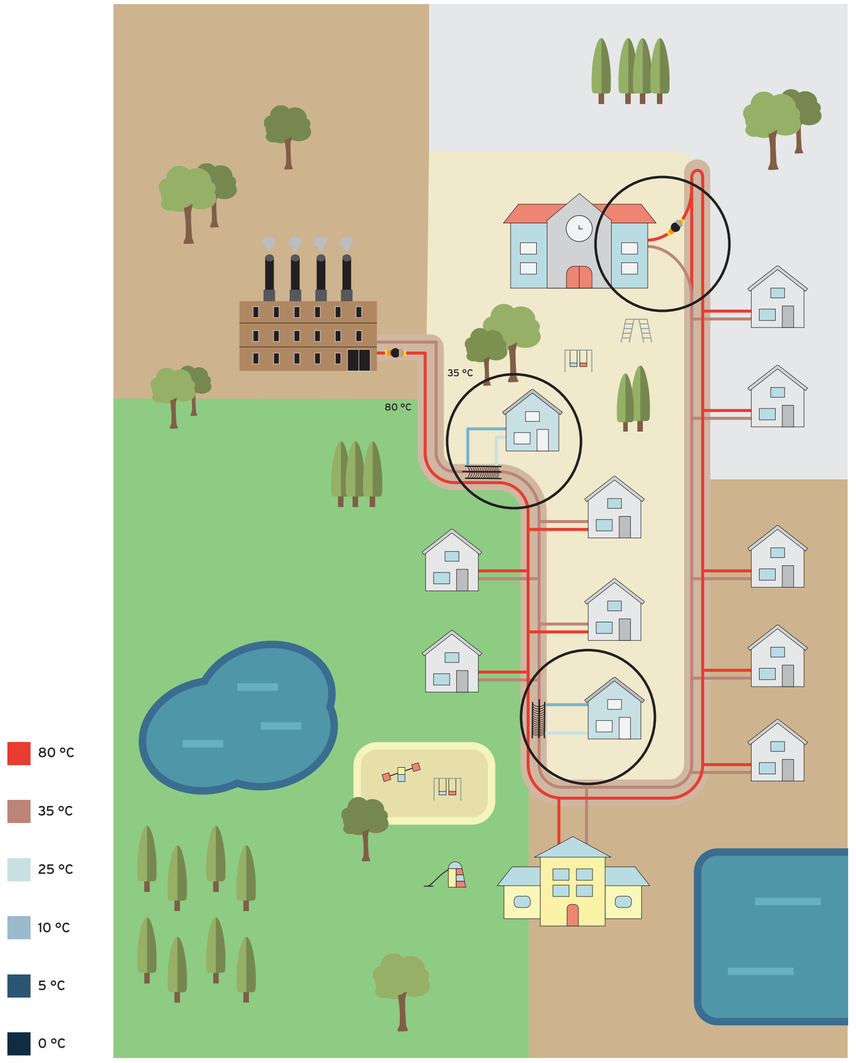
Integration of net collector and power unit into existing district heating networks

Use in a two-pipe system

The power unit and the net collector are also suitable for conventional two-pipe systems: a small consumer can be connected to an existing district heating pipe with a net collector, and a main consumer with a power unit.



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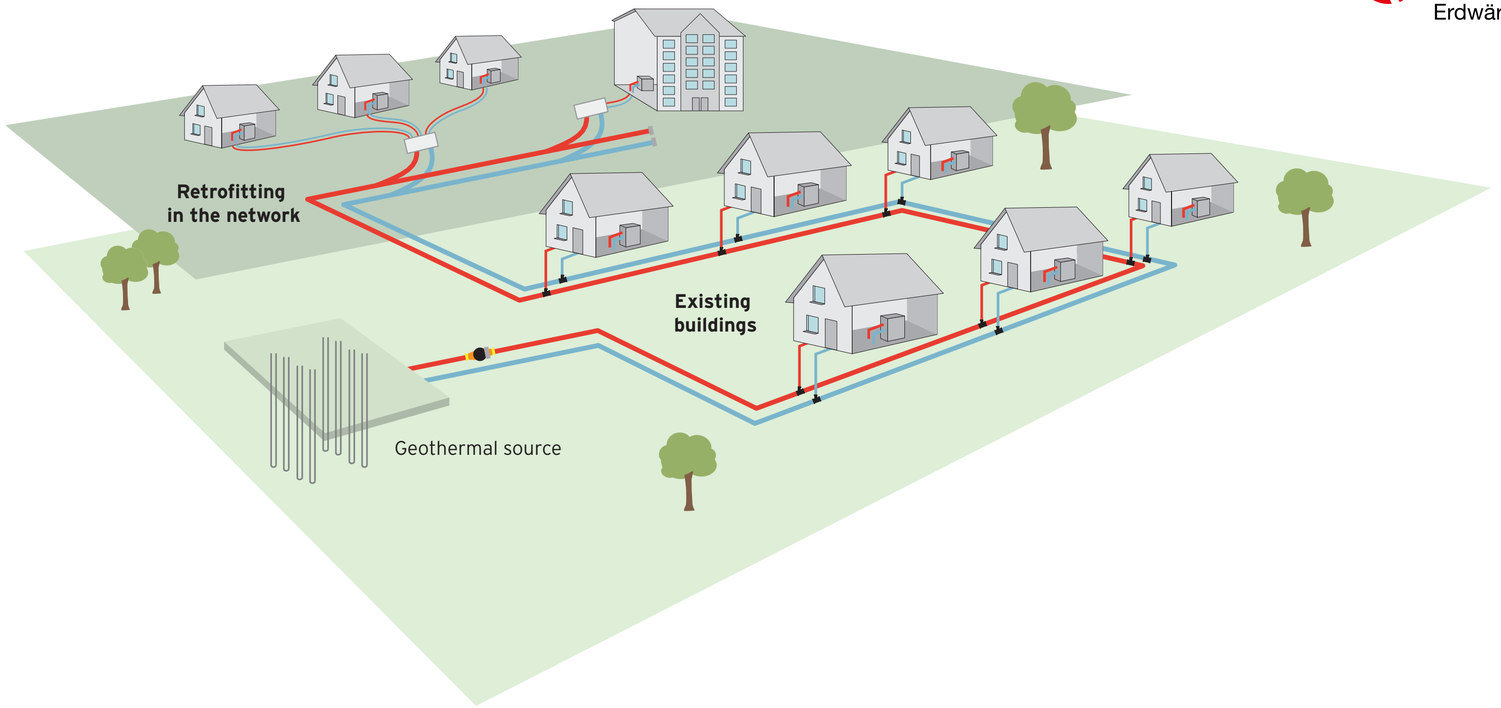
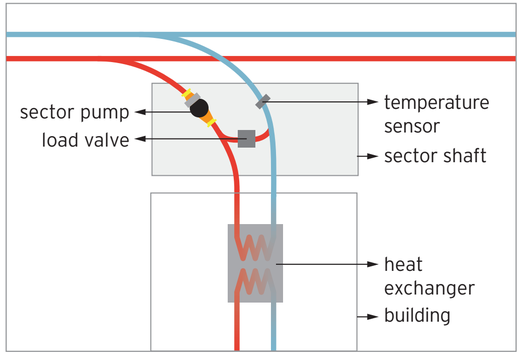
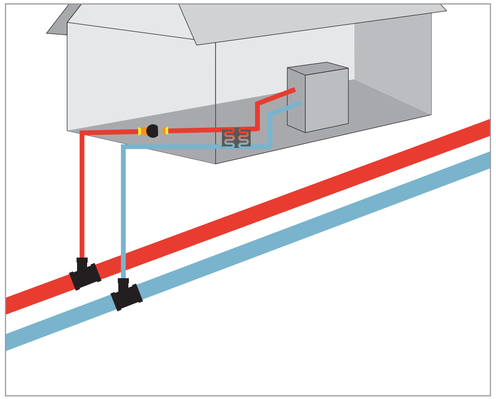
Power units
in a two-wire system

Expansion of cold local heating networks in existing buildings

- Retrofitting in existing networks.
- Any network expansion possible.
- New network participants can be integrated without increasing pressure loss.
- Combination of several small consumers or one large consumer using power units.
- Tangential discharge and intake of volume flows for minimal flow disturbances.
- Automatic control of pressure loss compensation using power units.







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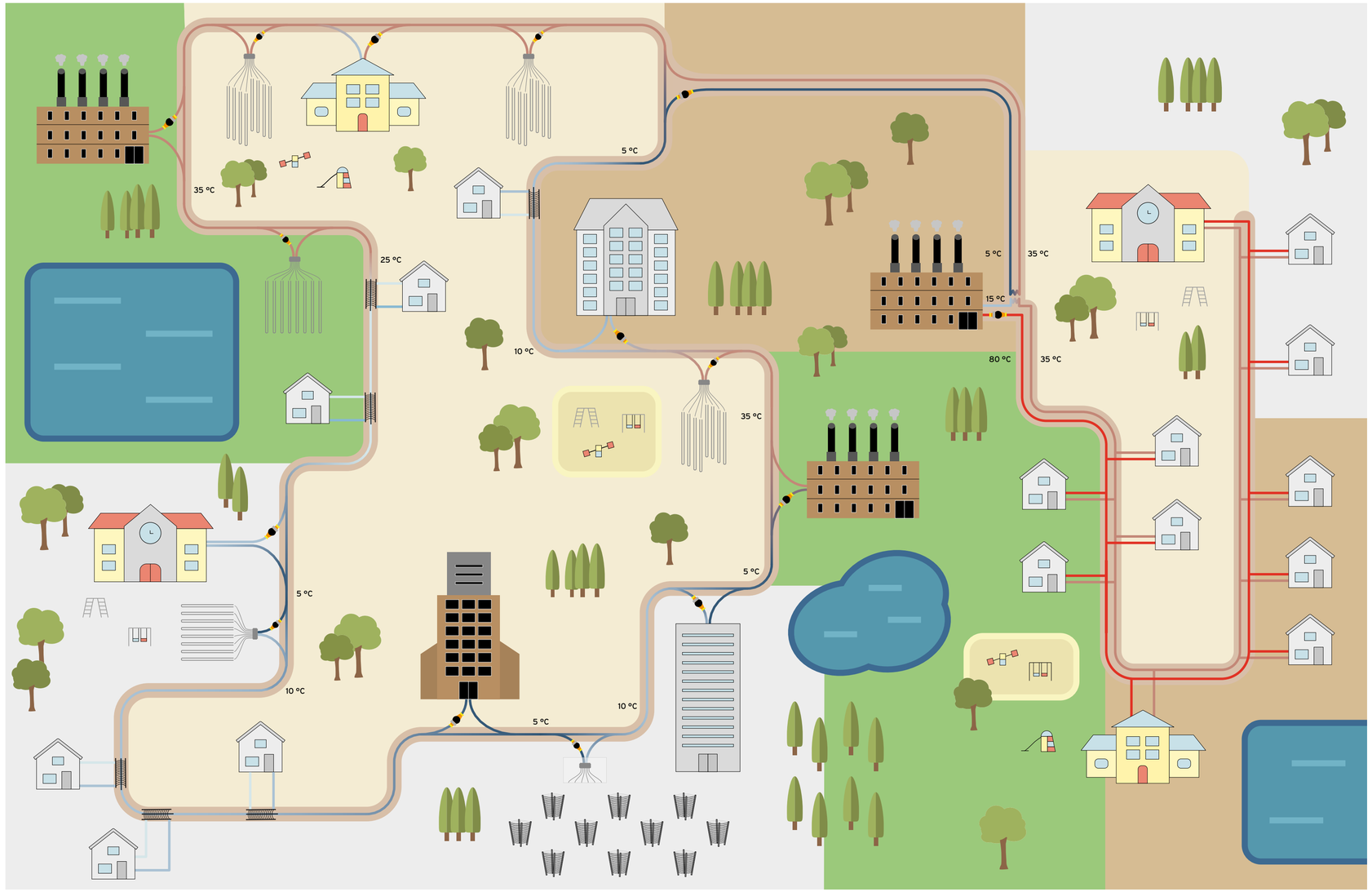
Cold local heating network
with integration of existing district heating

- District heating pipes as an efficient heat source for the cold local heating network.
- Energy is used more efficiently: residual heat from district heating networks is put to use.
- The district heating network also benefits from the cooling of the return pipes.



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Power unit

The power unit and grid collector are also suitable for the two-wire system.

We are looking for partners!

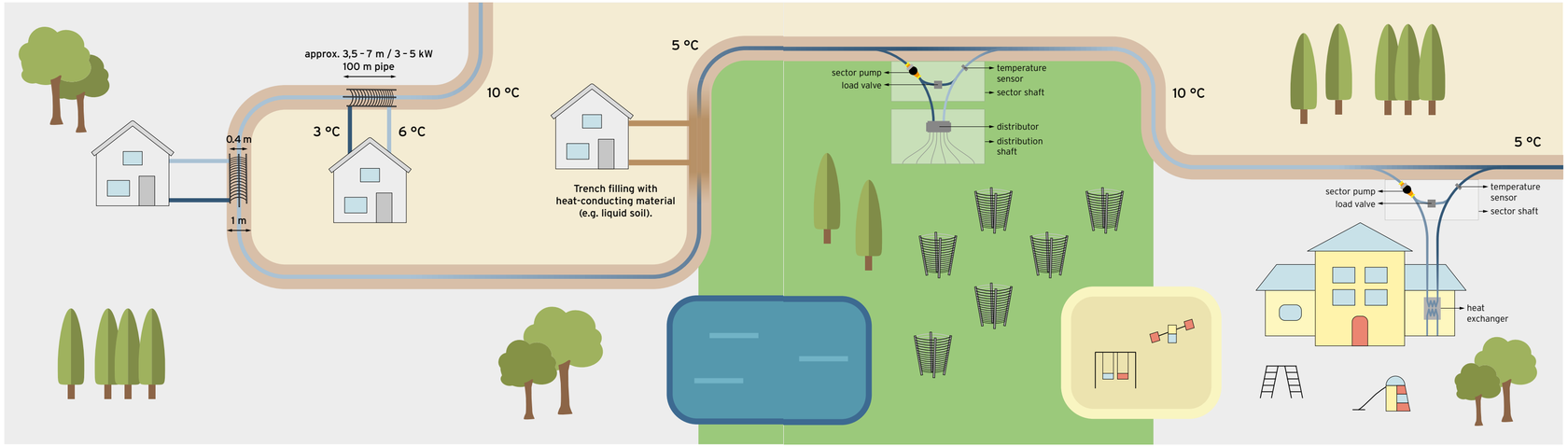
Our strength lies in the manufacture of the net collector. We are now looking for competent partners to work with us to create the optimal power unit.

The power unit comprises the entire sector shaft with sector pump, load valve, and temperature sensor.

Specifically, we are looking for partners in the following areas:

- Manufacture of sector shafts/distribution shafts
- Network design, planning, and software solutions
- Sector pumps
- Load valves

Interested in working with us?
We look forward to hearing from you!



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Cold local heating network
with net collectors

The figures shown are taken from the planning of a real neighborhood – all values were calculated specifically for the project; the name and location of the project remain undisclosed for reasons of confidentiality.

Neighborhood

- Number of building sites: 100
- Total length of network: 2,025 m
- Annual heating requirement: 2,249,257 kWh/a
- Total property area: 46,190 m²

Heat sources

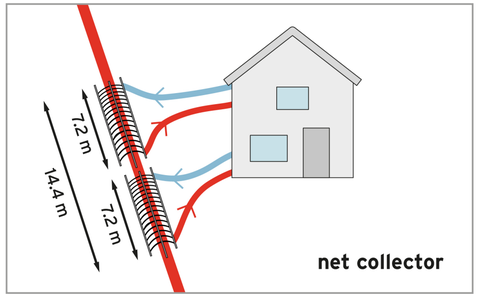
- Number of heat sources: 7 probe fields
- Heat source type: deep probes

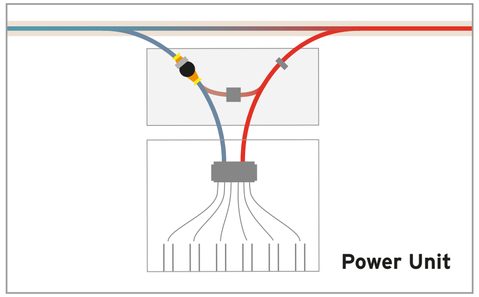
Main pipe

- Dimension: DN300 SDR17
- Volume flow: 73.5 m³/h
- Flow velocity: 0.337 m/s
- Maximum pressure loss: 23.1 mbar

Heat consumption

- Hydraulically decoupled with 1 – 4 net collectors per property





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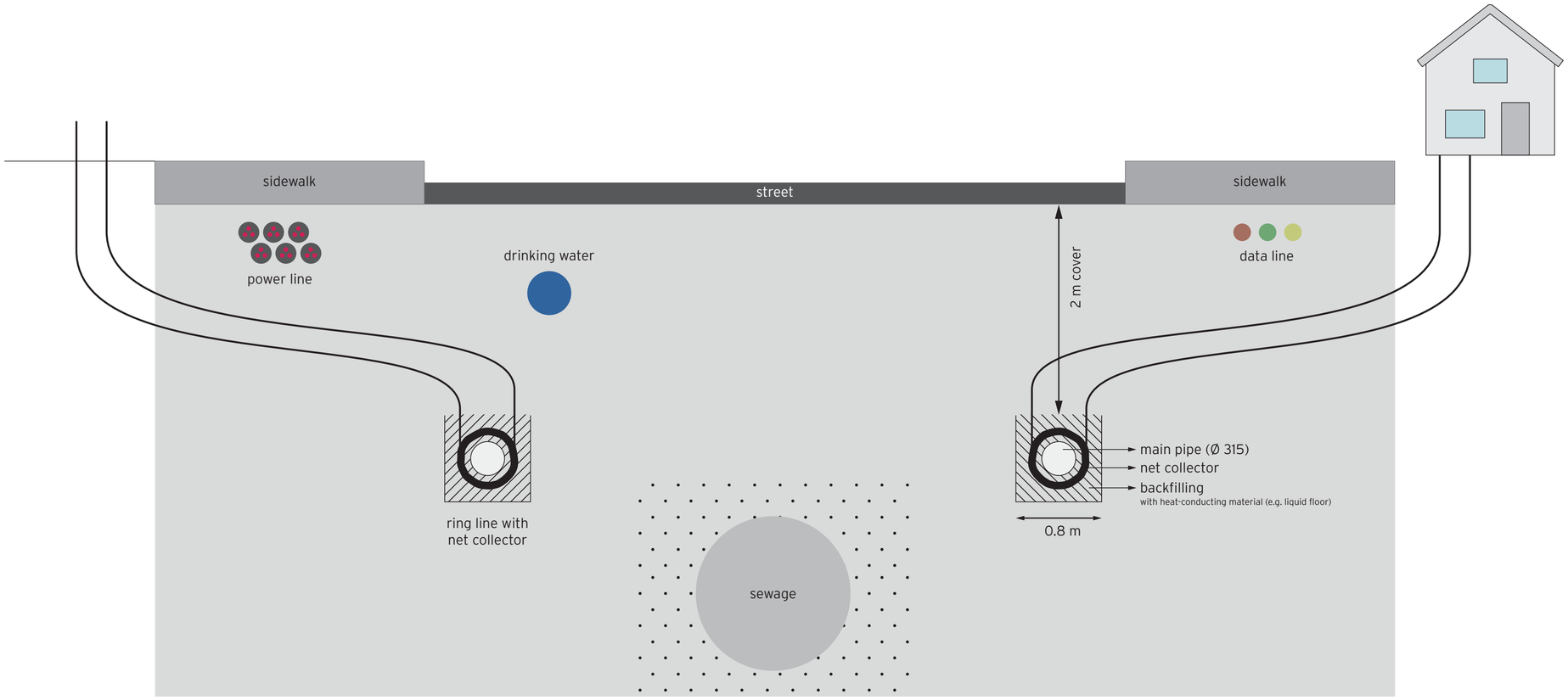
Ring main with net collector in street cross-section

- No distributors necessary
- Decoupling of house connections from the main line

The systematic separation of the main pipe and consumer / net collector allows for different fluids (water / antifreeze) and pressures to be used, as desired.

The aim is to drive on the source and main pipeline without frost protection if possible.



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