Sustainable Heating

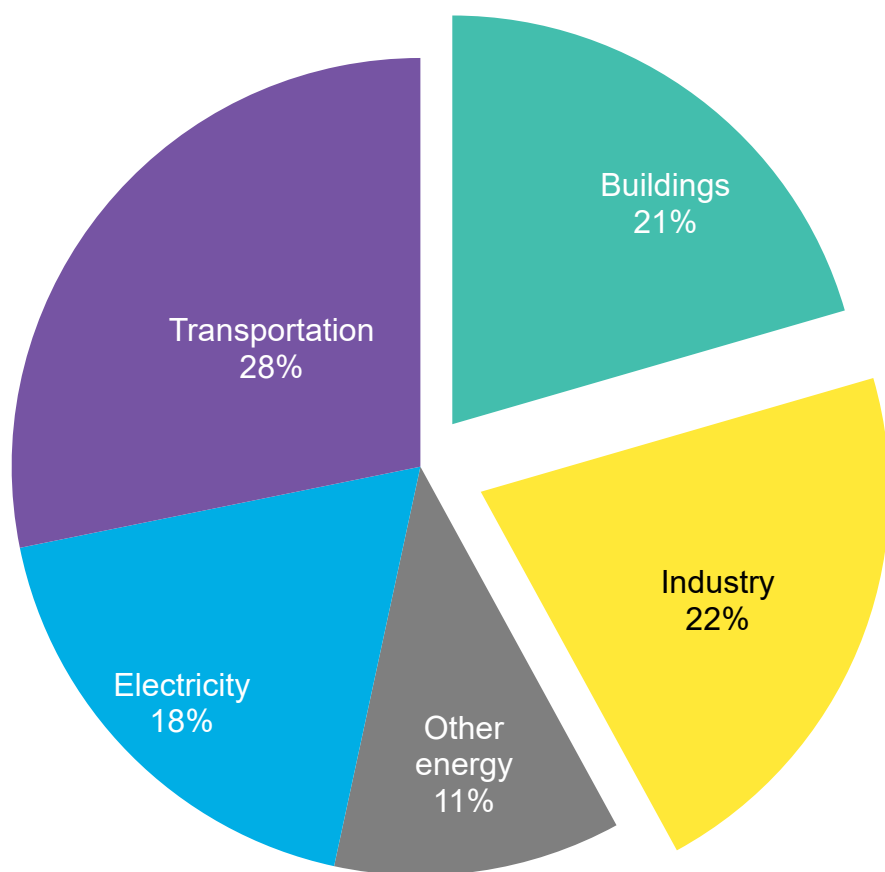## The status today

Meredith Annex

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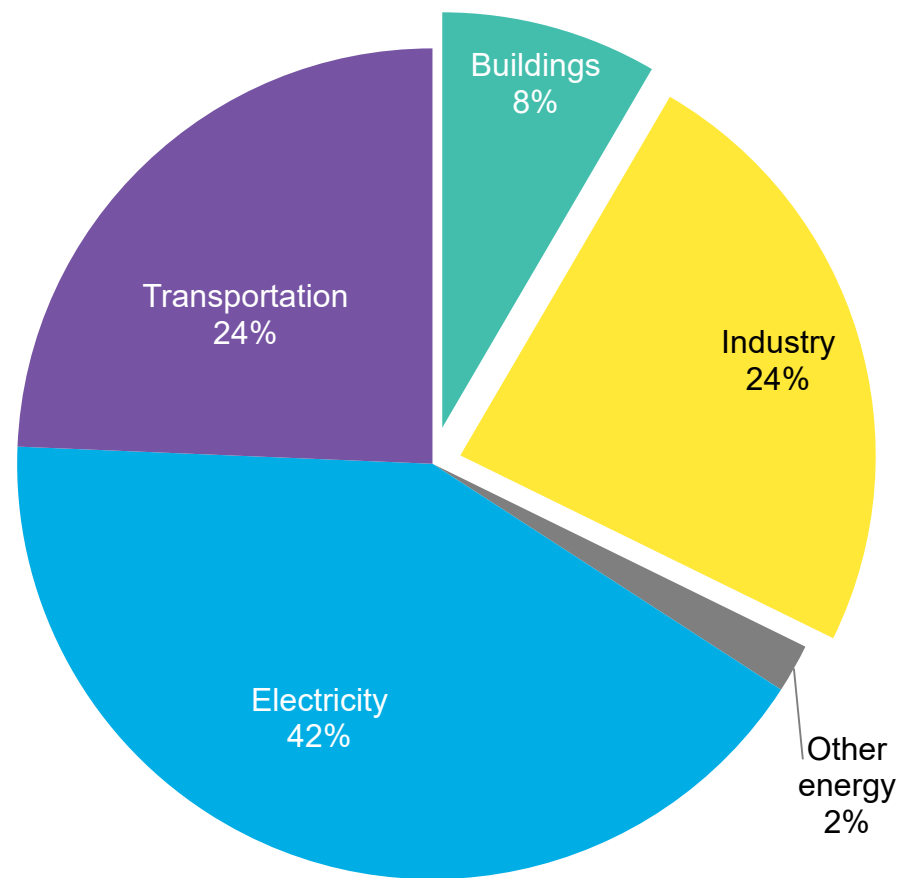
Global energy consumption and emissions in 2016

Energy consumption
110 thousand TWh

- Buildings 21%
- Industry 22%
- Other energy 11%
- Electricity 18%
- Transportation 28%

Emissions from fuel combustion
32 billion metric tons CO2 equivalent

- Buildings 8%
- Industry 24%
- Other energy 2%
- Electricity 42%
- Transportation 24%

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European heat demand by source in 2015

All demand sectors

Total heating and cooling demand:
6,352 TWh

← **51% of total EU energy demand**

All demand sectors

Water heating; 8%

Cooling/cooking, 8%

Space heating; 53% | Industrial process heat; 31%

Buildings only

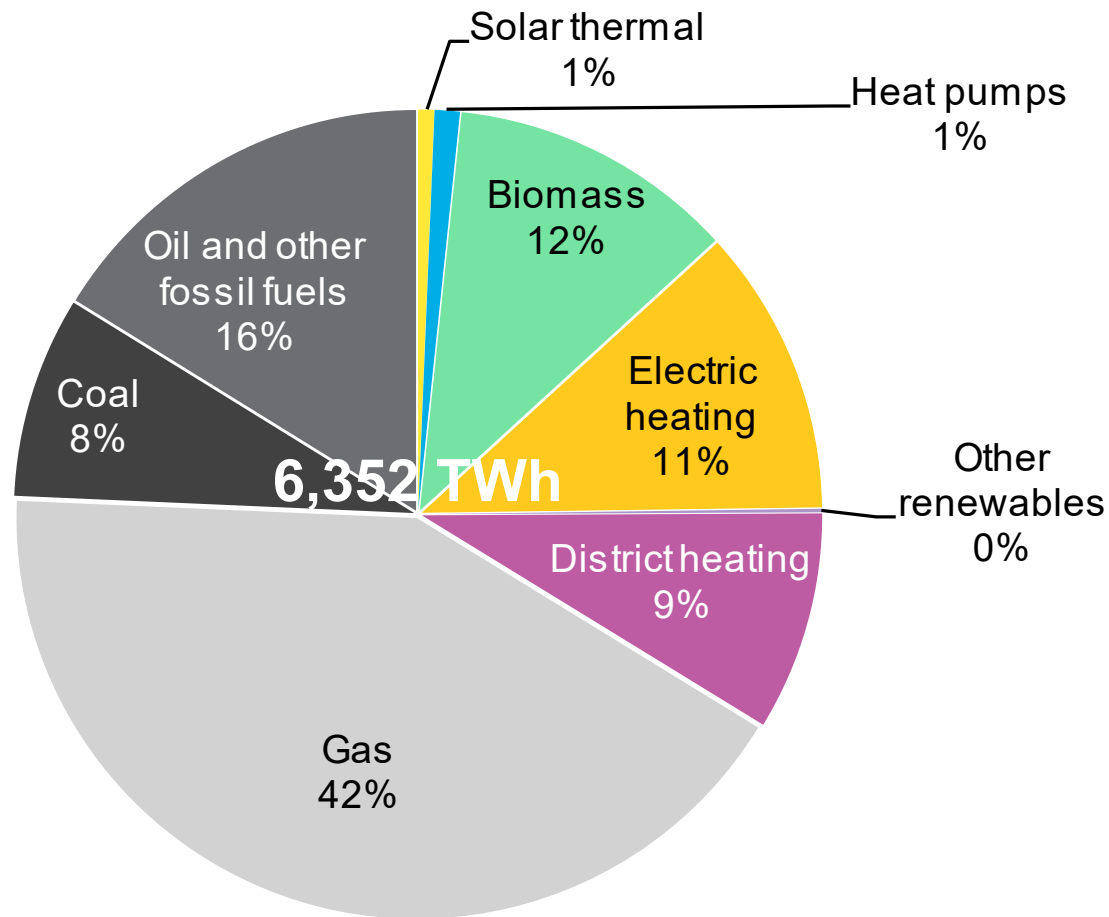Residential; 41% | Commercial; 15% ← **3,570 TWh (56% total demand)**
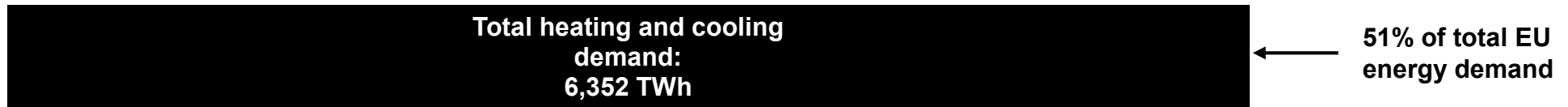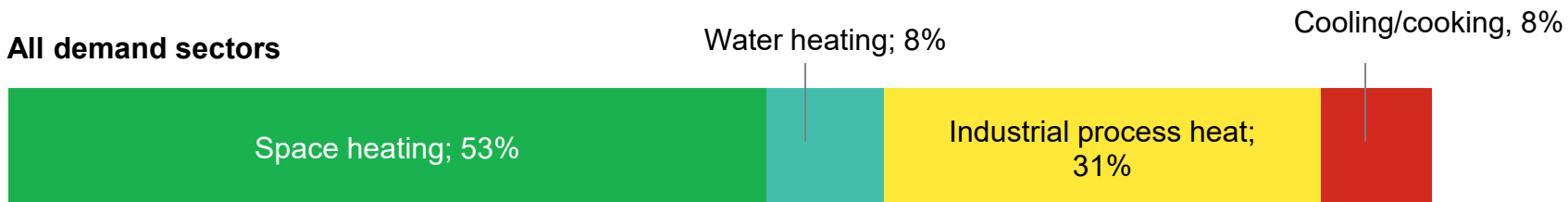
Source: Heat Roadmap Europe, BloombergNEF

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Heating supply by "energy carrier"

2015 European heat supply

25% from "clean" sources, 33% when including district heating

Solar thermal 1%
Heat pumps 1%
Biomass 12%
Oil and other fossil fuels 16%
Electric heating 11%
Coal 8%
6,352 TWh
Other renewables 0%
District heating 9%
Gas 42%

Source: Heat Roadmap Europe Note: "Clean" includes biomass, solar thermal, other renewables, heat pumps and electric heating

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Industry is hard to decarbonize
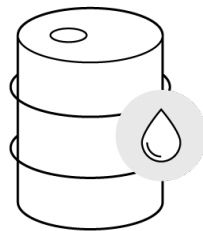
Example technologies for low-carbon heating by output temperature

Temperature (Celsius)
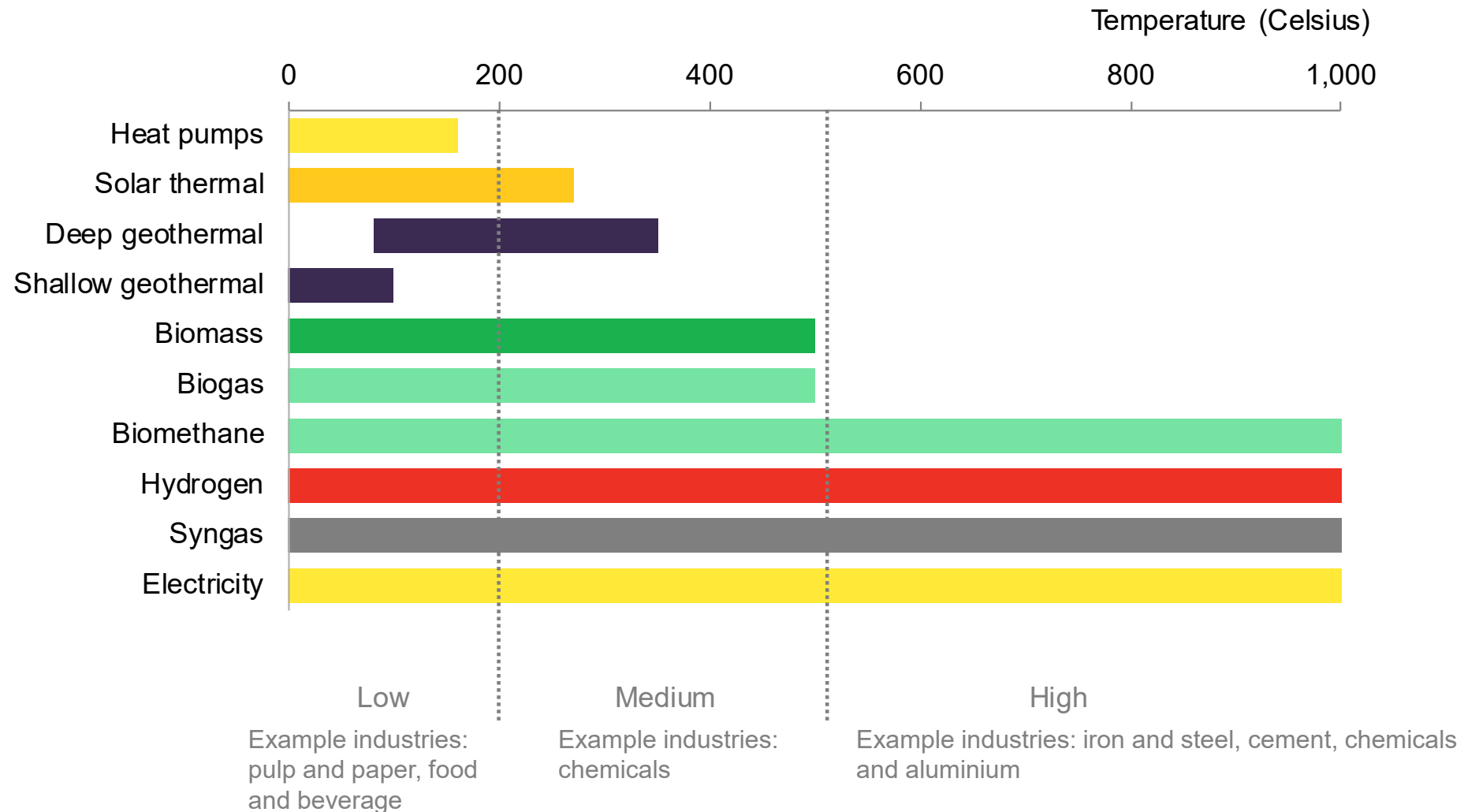
Source: Oxford Energy Institute, BloombergNEF, EHPA

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Buildings have more low-carbon options

Fossil fuels

Natural gas

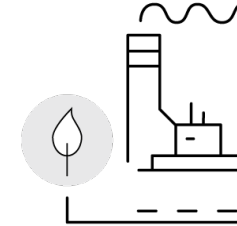**Petroleum**

Coal

"Green" gas and fuels
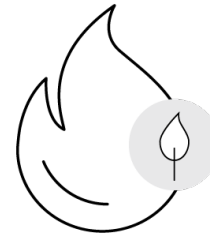
Biogas

Biomass / waste-to-energy
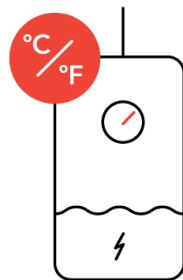
Hydrogen

H_2

Electrification
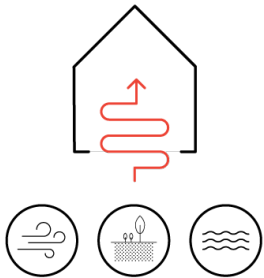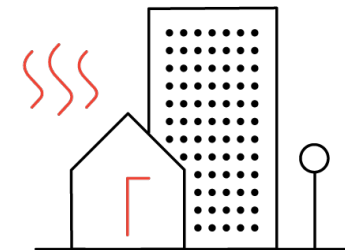
Heat pumps
(Air-, ground- or water-sourced)

Electric boiler

Electric heaters / radiators
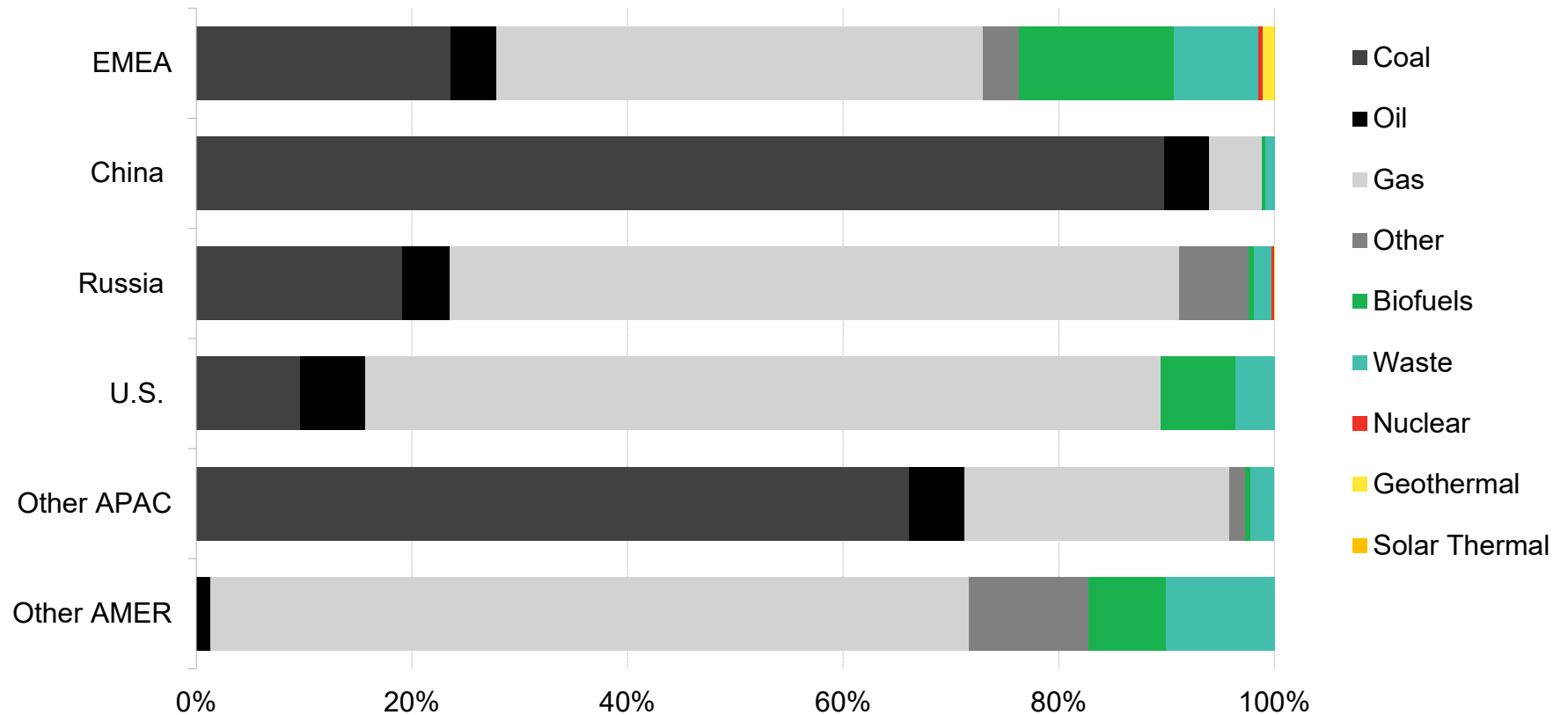
District heat

District Heating

Source: BloombergNEF   Note: List is non-exhaustive.

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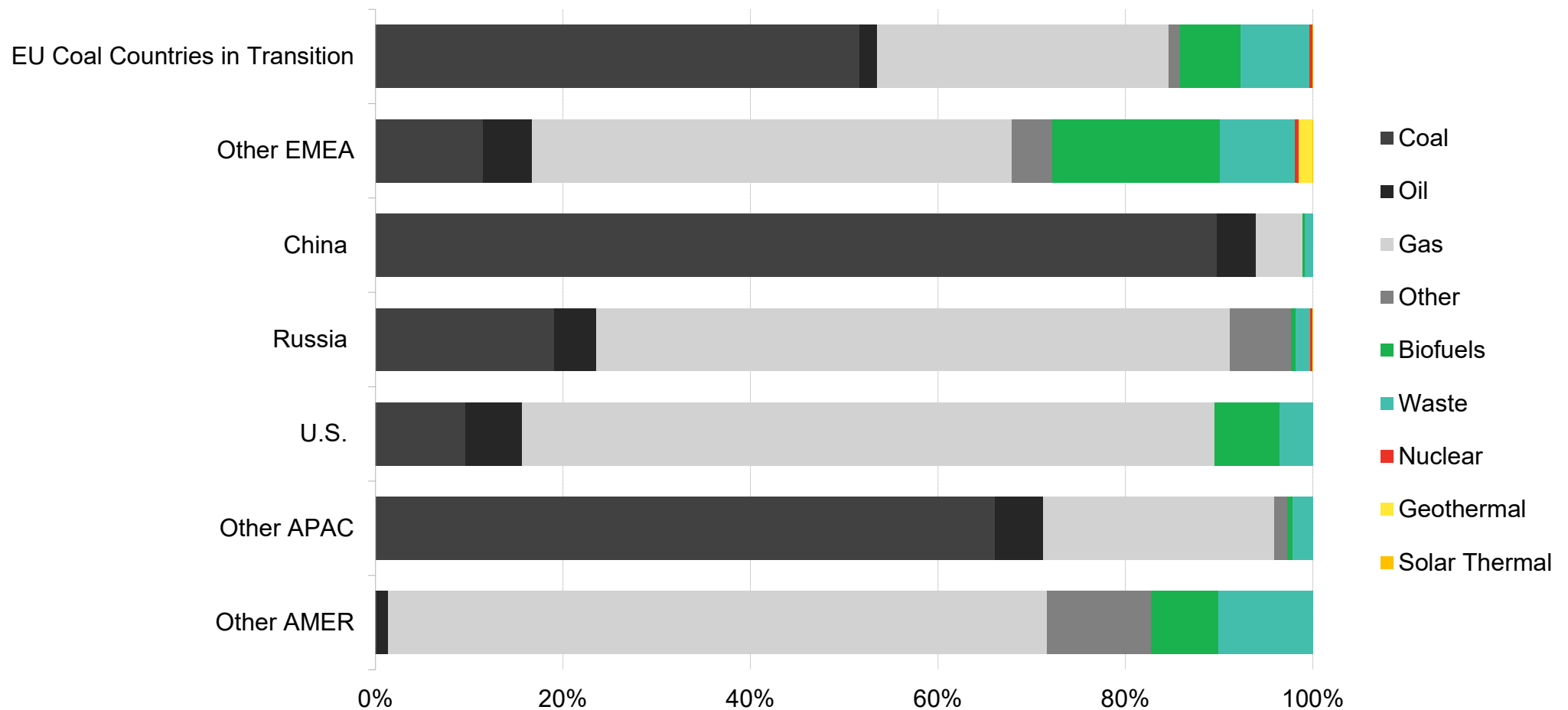# District heating isn't clean…yet

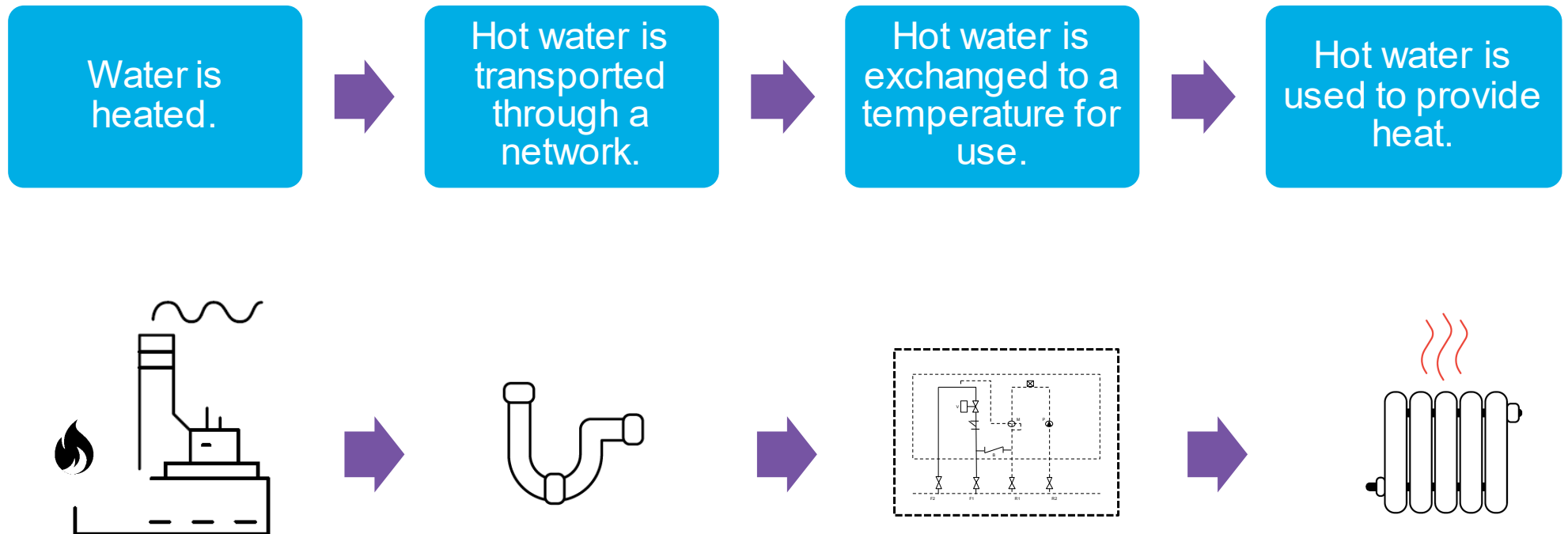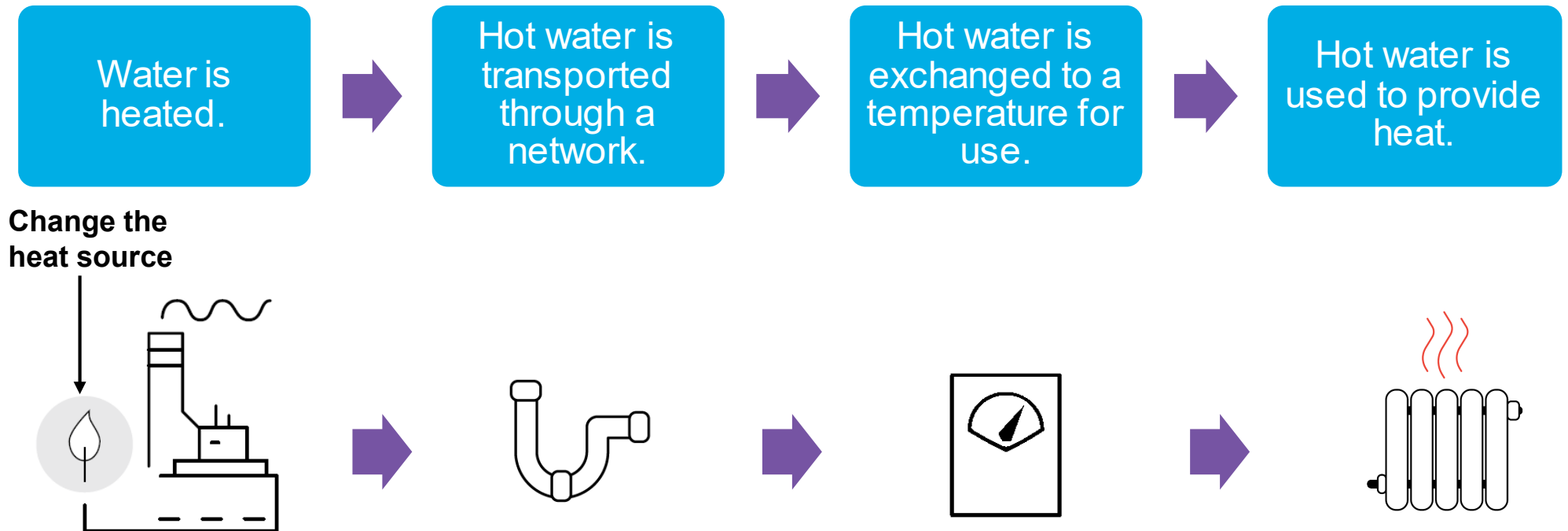## Heat supply sources for district heating

Source: IEA, BloombergNEF Note: IEA district heating includes any heat that is sold to a third-party in the form of steam/hot water. This includes district heating networks and campus heat networks where the supplier and consumer are different entities. It excludes on-site generation owned by a building/campus/industrial site.

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District heating isn't clean…yet

Heat supply sources for district heating

Legend: Coal, Oil, Gas, Other, Biofuels, Waste, Nuclear, Geothermal, Solar Thermal

Categories: EU Coal Countries in Transition, Other EMEA, China, Russia, U.S., Other APAC, Other AMER
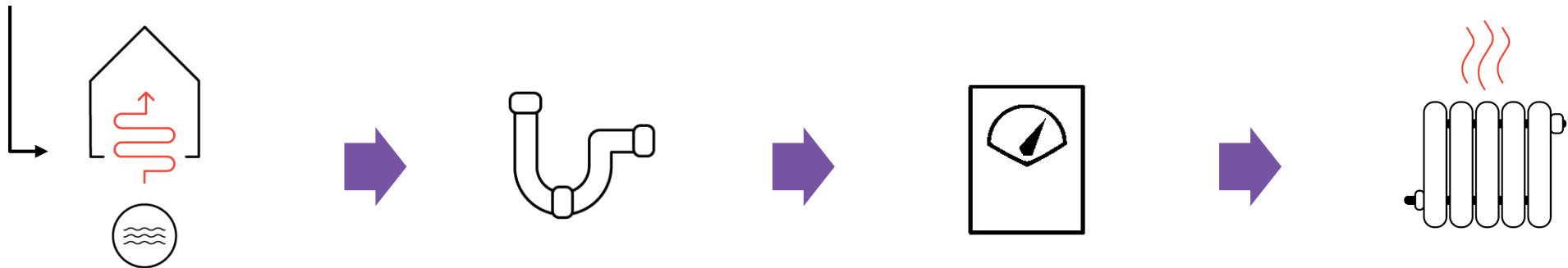
Source: IEA, BloombergNEF Note: IEA district heating includes any heat that is sold to a third-party in the form of steam/hot water. This includes district heating networks and campus heat networks where the supplier and consumer are different entities. It excludes on-site generation owned by a building/campus/industrial site. EU Coal Countries in Transition include Poland, Greece, Slovakia, Czechia, Romania, Spain and Germany.

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Cleaning up the district heating network

Simplified stages of a district heating network

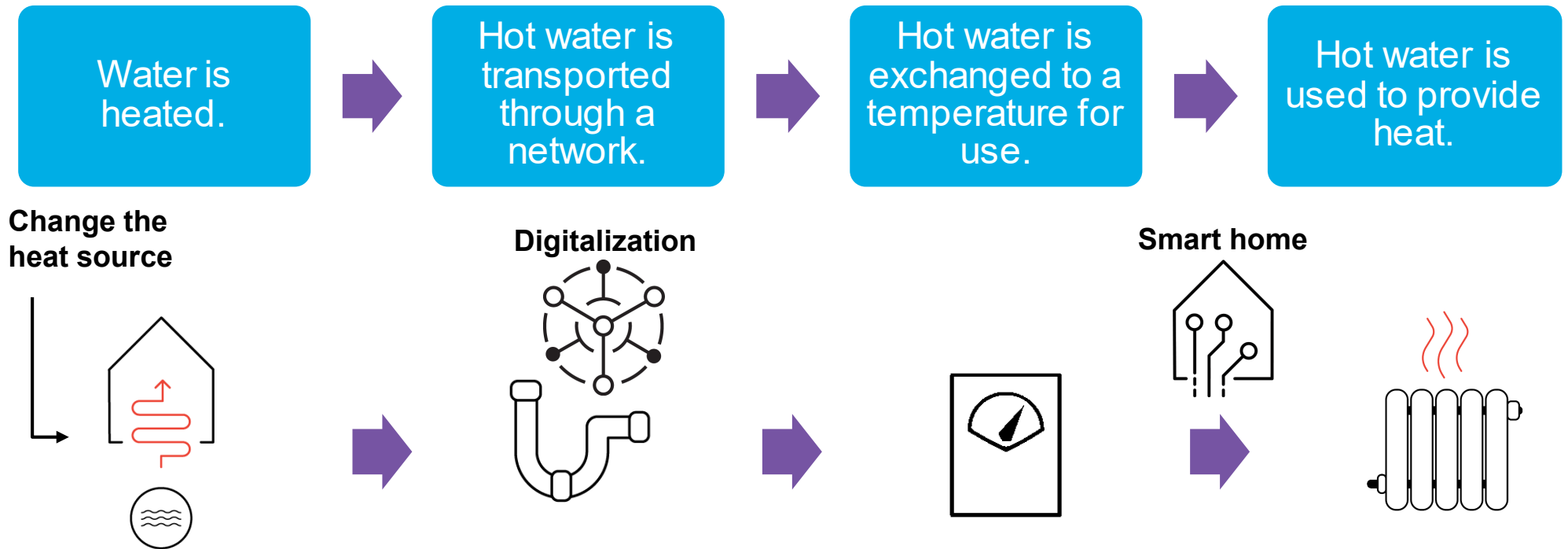|			
Water is heated.	Hot water is transported through a network.	Hot water is exchanged to a temperature for use.	Hot water is used to provide heat.

Source: IEA, BloombergNEF Note: IEA district heating includes any heat that is sold to a third-party in the form of steam/hot water. This includes district heating networks and campus heat networks where the supplier and consumer are different entities. It excludes on-site generation owned by a building/campus/industrial site.

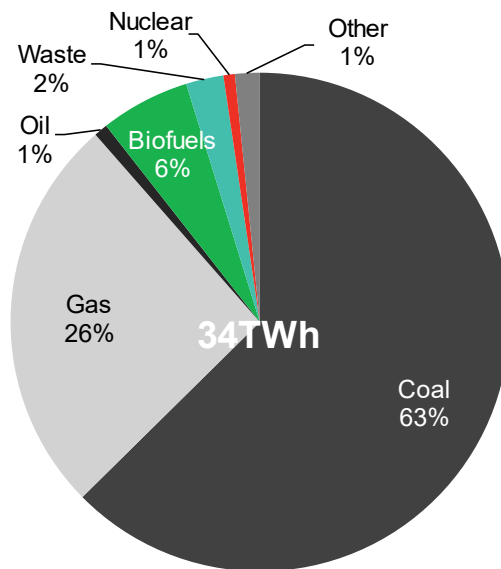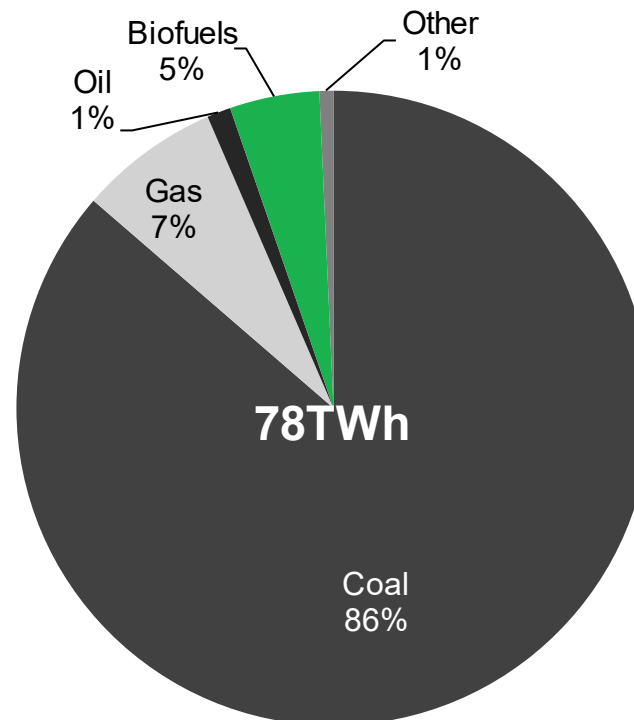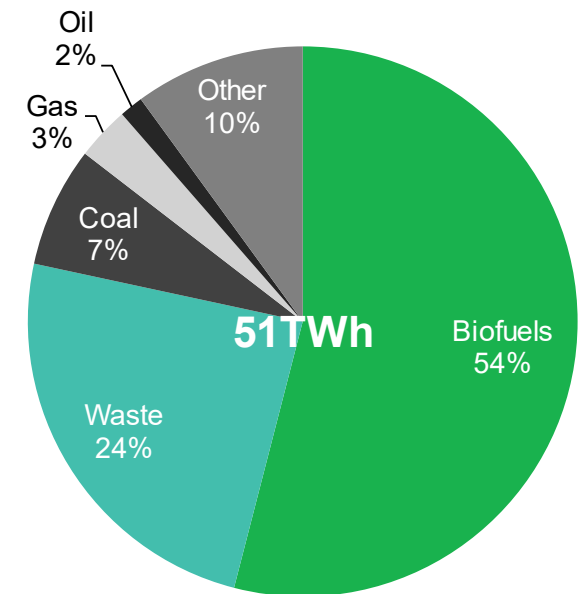**BloombergNEF**

Cleaning up the district heating network

Simplified stages of a district heating network

Water is heated.	→	Hot water is transported through a network.	→	Hot water is exchanged to a temperature for use.	→	Hot water is used to provide heat.

Change the heat source

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Cleaning up the district heating network

Simplified stages of a district heating network

| Water is heated. | → | Hot water is transported through a network. | → | Hot water is exchanged to a temperature for use. | → | Hot water is used to provide heat. |

Change the heat source

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Cleaning up the district heating network

Simplified stages of a district heating network

| Water is heated. | → | Hot water is transported through a network. | → | Hot water is exchanged to a temperature for use. | → | Hot water is used to provide heat. |

Change the heat source

Digitalization

Smart home

Source: IEA, BloombergNEF Note: IEA district heating includes any heat that is sold to a third-party in the form of steam/hot water. This includes district heating networks and campus heat networks where the supplier and consumer are different entities. It excludes on-site generation owned by a building/campus/industrial site.

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District heating by supply source

Czechia

Waste 2%
Oil 1%
Nuclear 1%
Other 1%
Biofuels 6%
Gas 26%
34TWh
Coal 63%

Poland

Biofuels 5%
Oil 1%
Other 1%
Gas 7%
78TWh
Coal 86%

Sweden

Oil 2%
Gas 3%
Other 10%
Coal 7%
51TWh
Biofuels 54%
Waste 24%

Source: IEA, BloombergNEF Note: IEA district heating includes any heat that is sold to a third-party in the form of steam/hot water. This includes district heating networks and campus heat networks where the supplier and consumer are different entities. It excludes on-site generation owned by a building/campus/industrial site.

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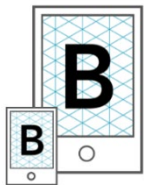
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