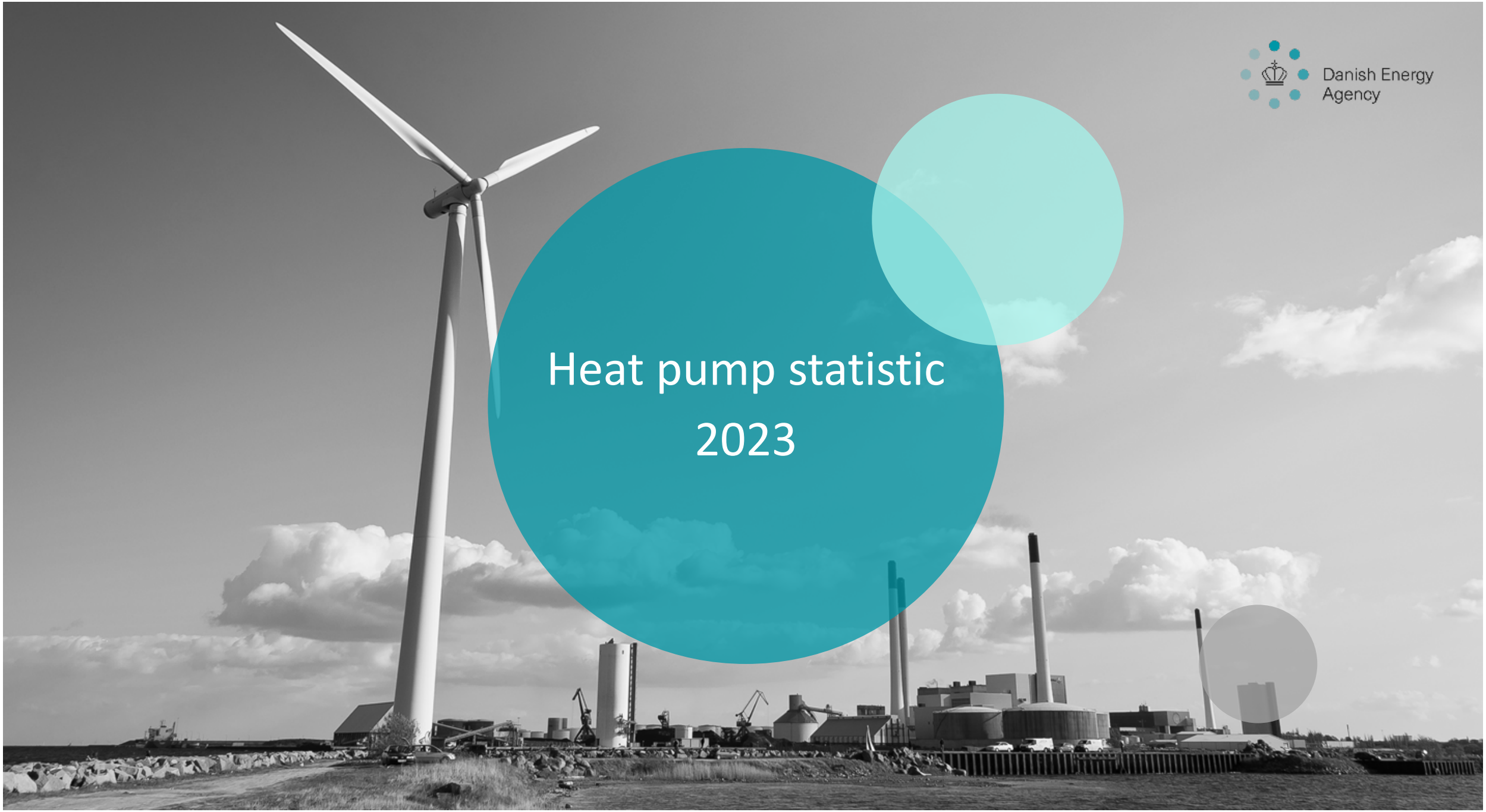


Danish Energy Agency

Heat pump statistic 2023

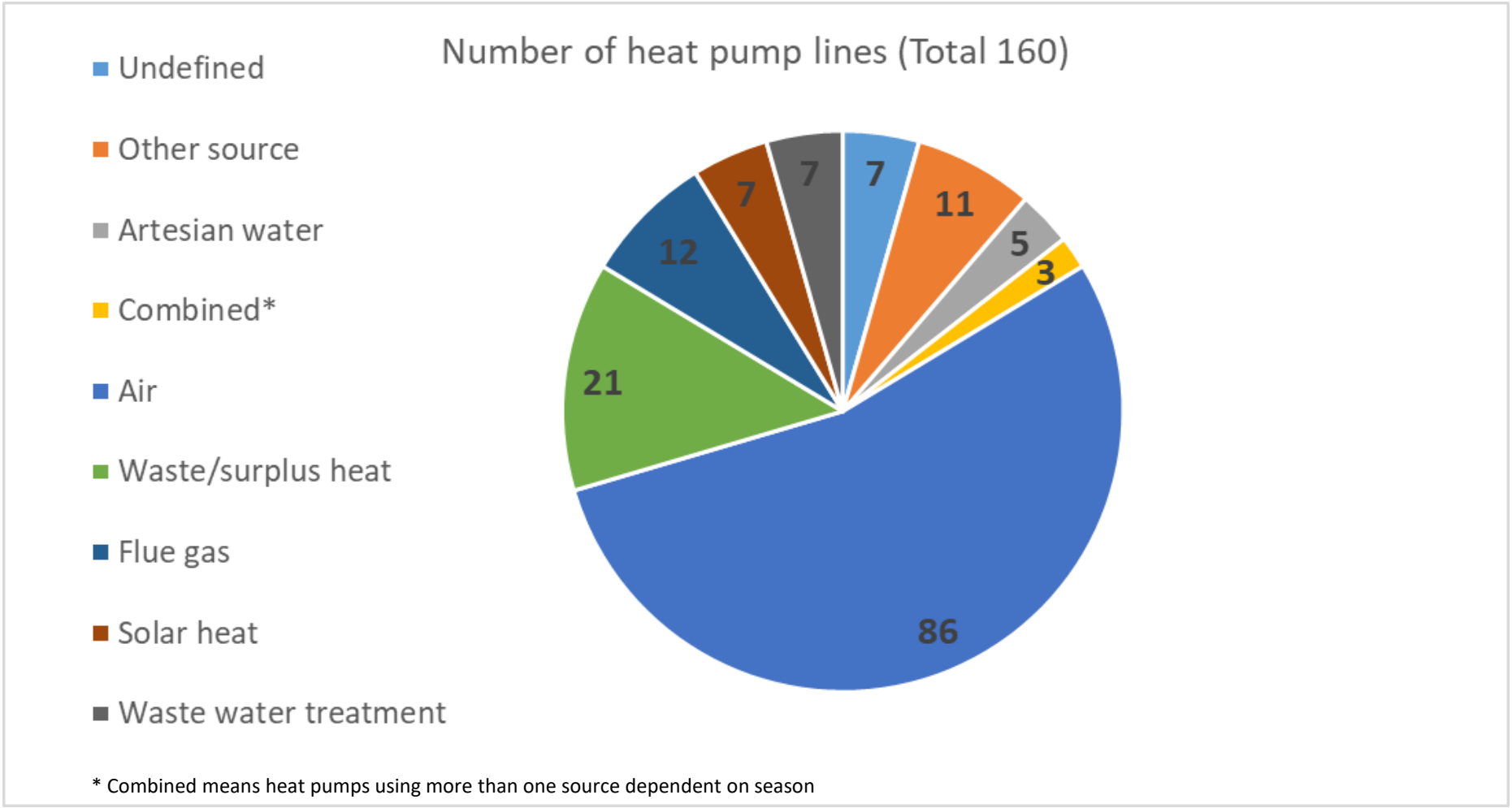
Comments large heat pumps

- List does not include combined cooling and heating pumps in for example supermarkets (Often based on CO_2)
- Only natural refrigerants are allowed (CO_2 and ammonium)
- Most ammonium heat pumps are delivered by Johnsson.
- Most CO_2 heat pumps are delivered by Fenagy and Advansor.
- There may in future be more natural refrigerants available.
- CO_2 types are dominating Air-to-water (Keep high COP in winter).
- CO_2 heat pumps can get issues if return temperature is too high.

Comments large heat pumps

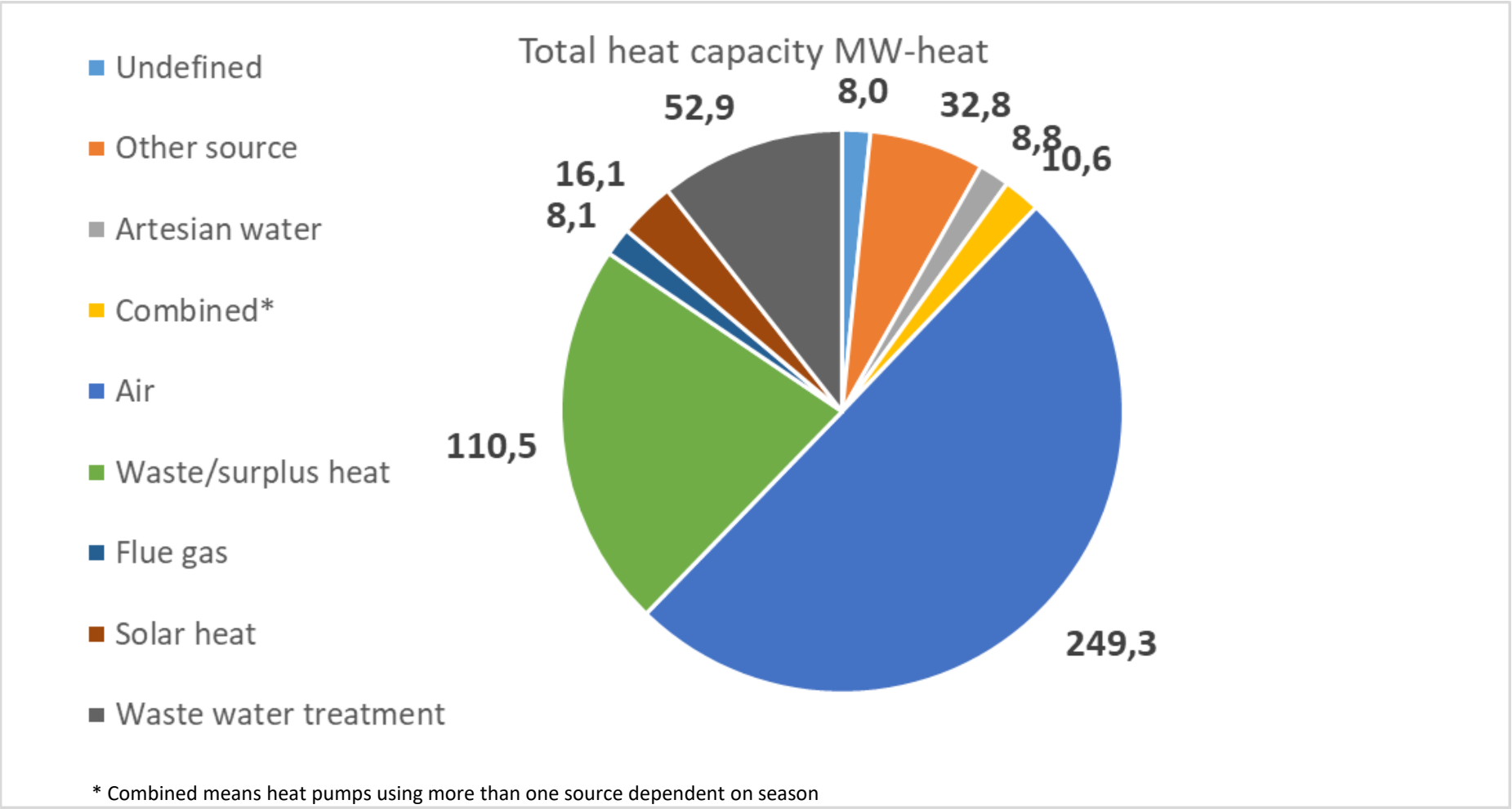
- Some of the large heat pumps are not in operation all the time due to other cheap heat sources available in area and if electricity prices are quite high. This disrupt the statistics.
- Warm and cold winters can change results from year to year.
- Two very large 25 MW-heat pumps (CO_2) going into operation in 2024 in one city (Esbjerg) based on ocean water are bringing the sector to a new level regarding sizes and sources. MAN deliver these heat pumps. Aalborg have ordered a 177 MW (4 units) CO_2-heat pump installation for start up in 2027 (Ocean water)

Heat source categories and number of lines 2023



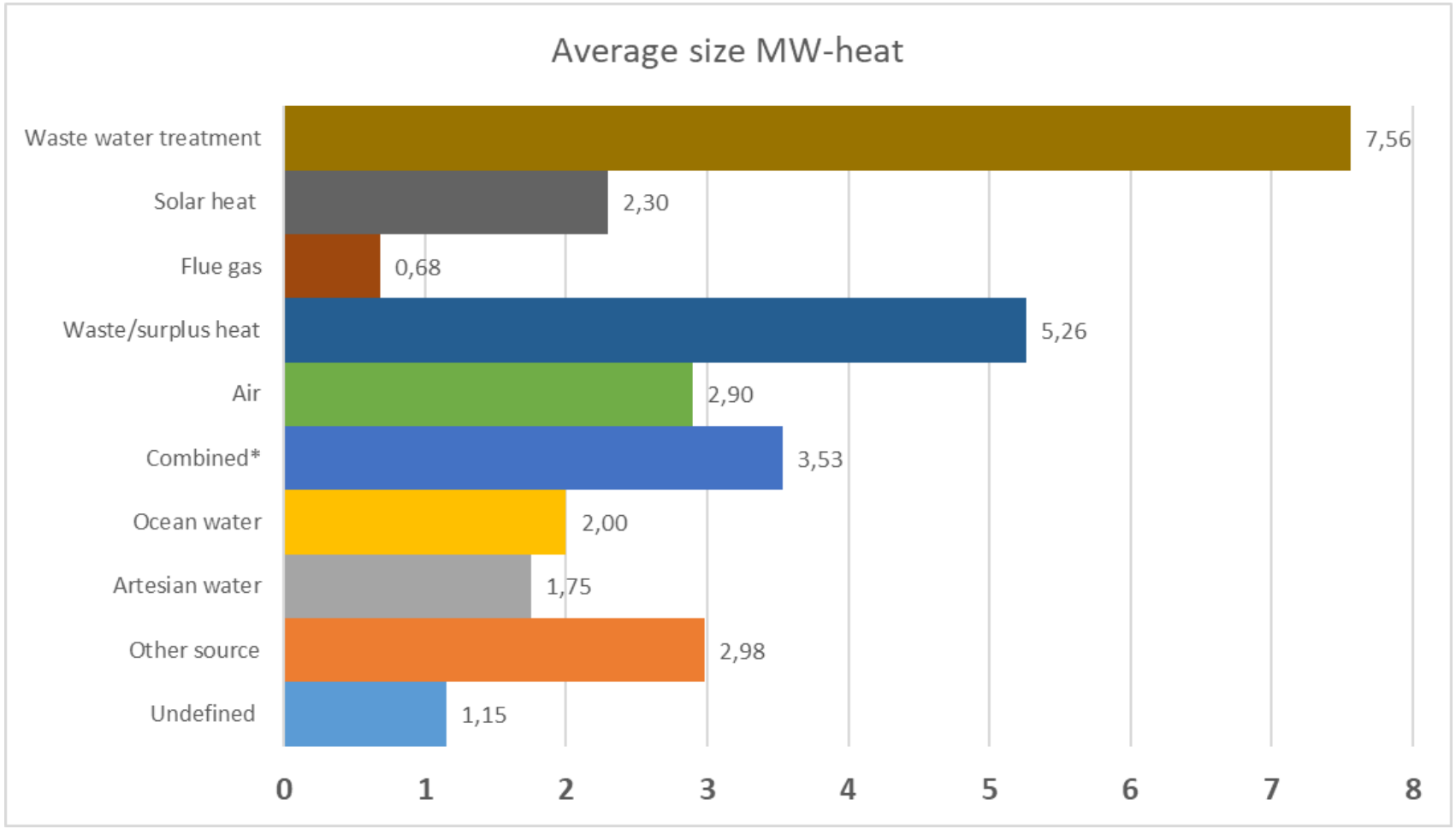
* Combined means heat pumps using more than one source dependent on season

Heat source heat pump capacity 2023



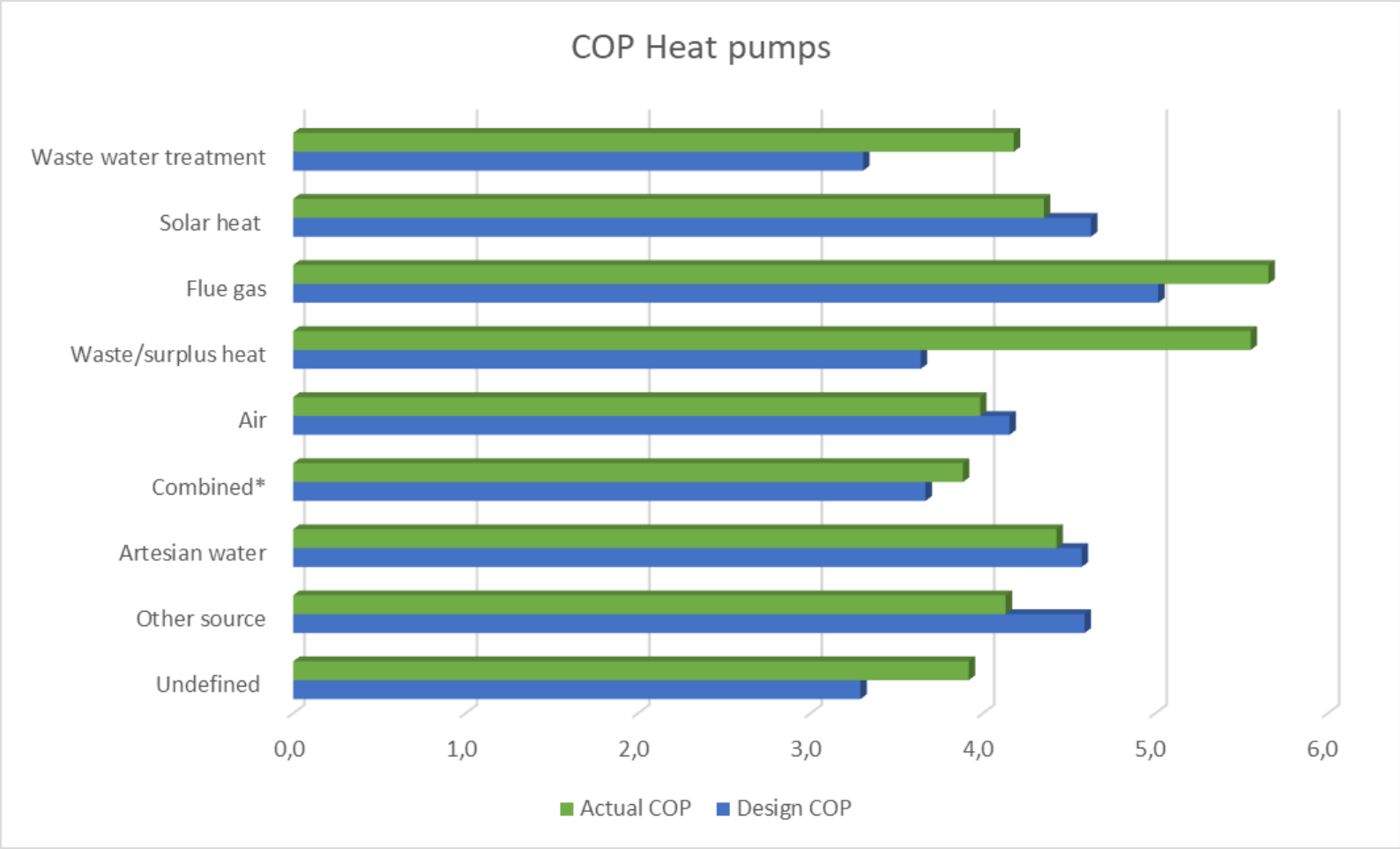
* Combined means heat pumps using more than one source dependent on season

Heat source heat pump average unit capacity 2023



* Combined means heat pumps using more than one source dependent on season

Heat source heat pump performance 2023



* Combined means heat pumps using more than one source dependent on season

Heat source aggregated data 2023

Year	2023								
Heat pump - heat source	**Elec. capacity MW**	**Heat capacity MW**	**Used Electricity MWh**	**Produced heat MWh**	**Design COP**	**Actual COP**	**Units**	**Average size MW**	**Full load hours**
Undefined	3,5	8,0	6.897	20.120	3,3	3,9	7	1,15	2.504
Other source	9,1	32,8	29.114	91.172	4,6	4,1	11	2,98	2.783
Artesian water	2,5	8,8	7.140	24.464	4,6	4,4	5	1,75	2.790
Ocean water	0,7	2,0	0	0	3,9	0,0	1	2,00	-
Combined*	4,0	10,6	8.925	25.737	3,7	3,9	3	3,53	2.428
Air	79,0	249,3	264.712	789.762	4,2	4,0	86	2,90	3.168
Waste/surplus heat	41,9	110,5	69.363	315.775	3,6	5,6	21	5,26	2.858
Flue gas	2,0	8,1	3.062	14.257	5,0	5,7	12	0,68	1.751
Solar heat	4,4	16,1	11.423	38.300	4,6	4,4	7	2,30	2.381
Waste water treatment	23,0	52,9	34.825	110.701	3,3	4,2	7	7,56	2.093
Total	**170,1**	**499,1**	**435.461**	**1.430.287**	**3,9**	**4,3**	**160**	**3,12**	2.866
*Combined means different heat sources dependent on season									

Heat sources for DH aggregated full-load production

Annual average full load hours	2020	2021	2022	2023
Operation central CHP plants	1.407	2.345	2.628	2.022
Operation Ngas CHP engines	641	991	769	661
Operation heat pumps	2.124	2.921	2.568	2.866
Operation electric boilers	872	950	869	1.157

Based on reported heat production and heat production capacity.

Subsidy large heat pumps

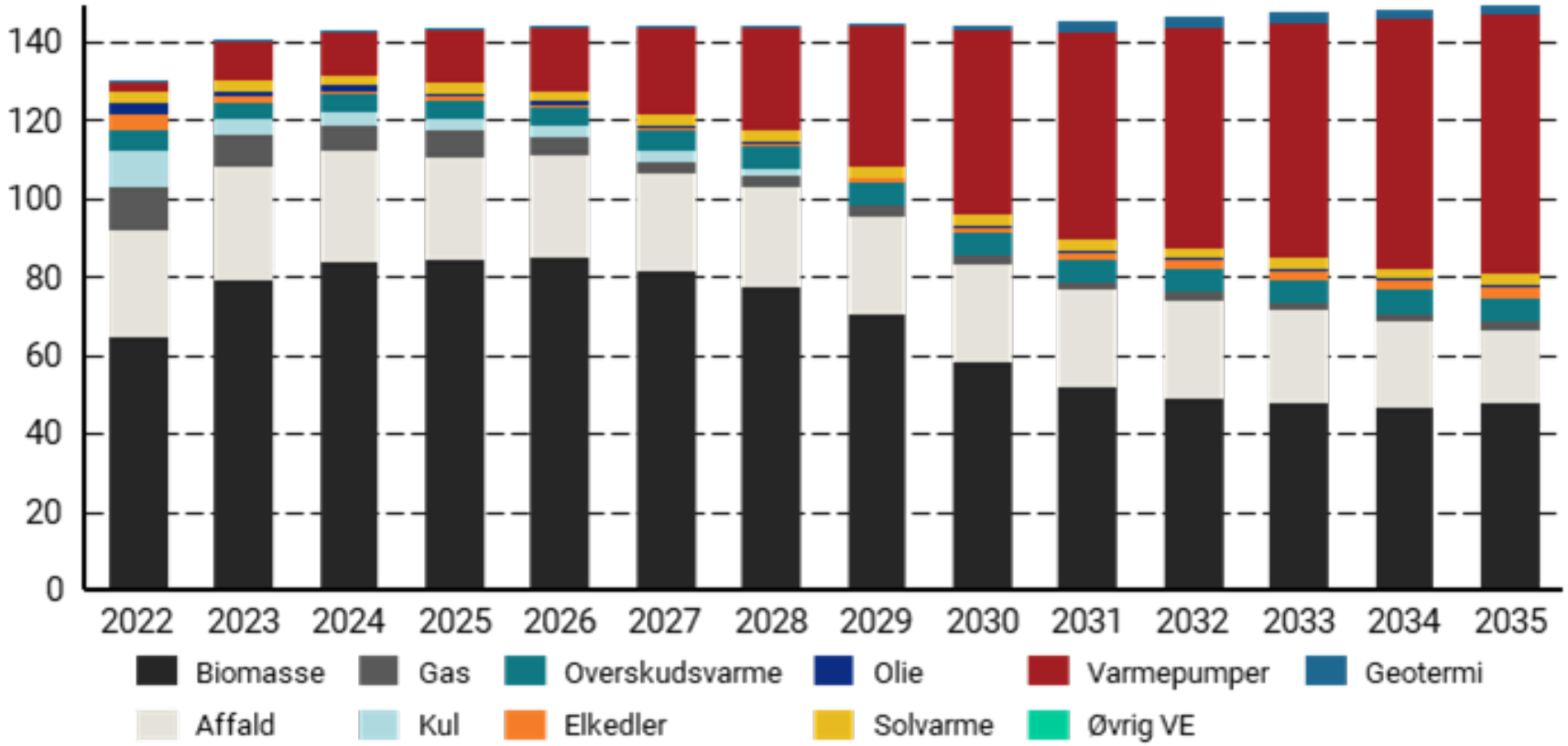
For district heating

Subsidy for large district heating heat pumps				
Year	**Subsidy mill. Kr**	**MW-heat**	**Subsidy mill kr/MW**	**Number of units**
2017	23	30	0,8	13
2018	24	21	1,1	15
2019	Data not available			
2020	Data not available			
2021	57	105	0,5	20
2022	37	25	1,5	9
2023	14	25	0,5	2
2024	No subsidy 2024			

Conditions:

- At least 50 % of production replace fossil fuels
- Based on electricity
- Source renewable or surplus heat
- Possible to establish within 3 years

District heating production by technologies, PJ

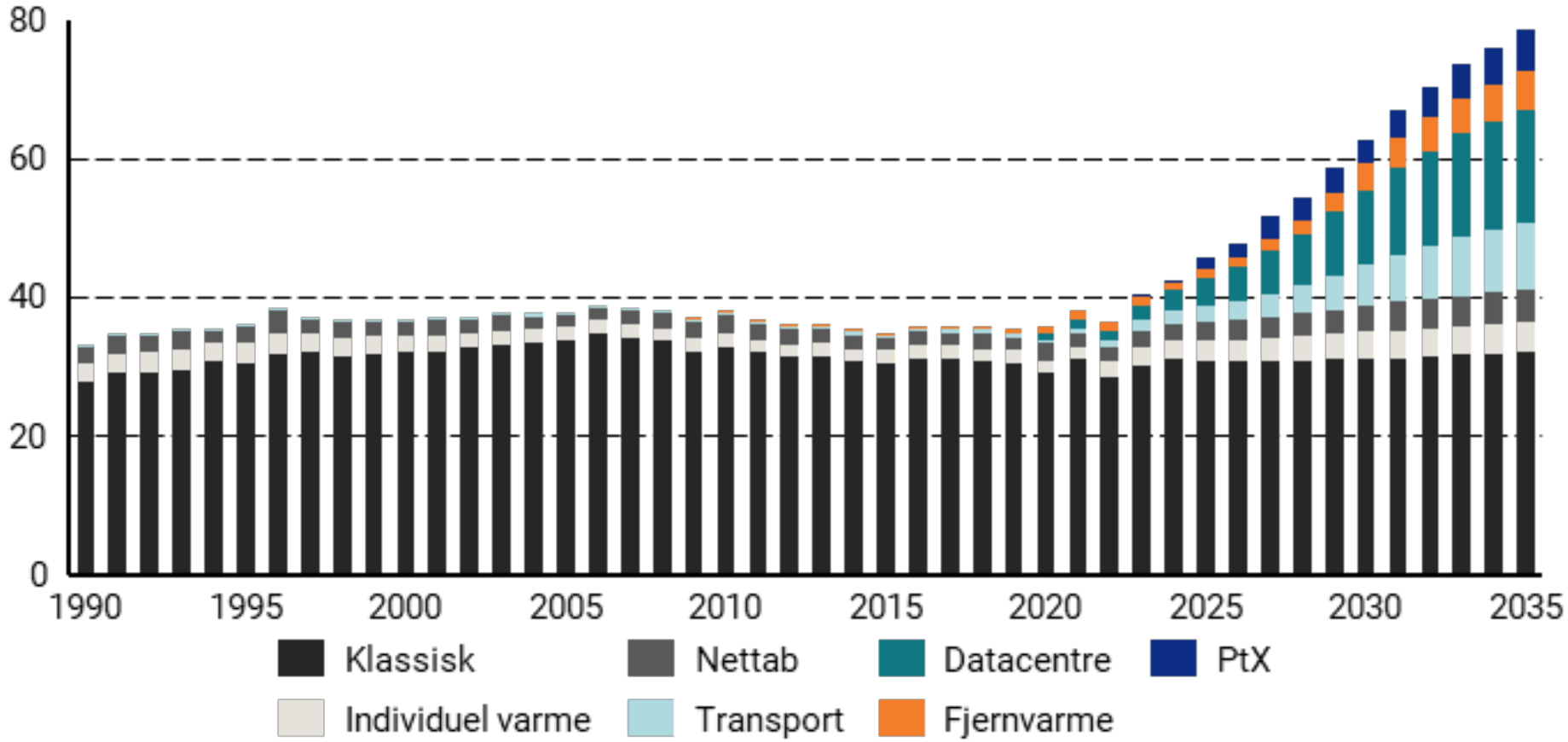


Heat pumps 2035:
68,3 PJ (46 %)
19 TWh

2035:
Electric boilers 2%
Waste incineration 13 %
Biomass 30%

Electricity consumption sectors, TWh

District Heating 2035:
5,7 TWh (7,2 %)

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Thanks
John Tang Jensen