



UKERC Technology and Policy Assessment

Decarbonising home heating: An evidence review of domestic heat pump installed costs

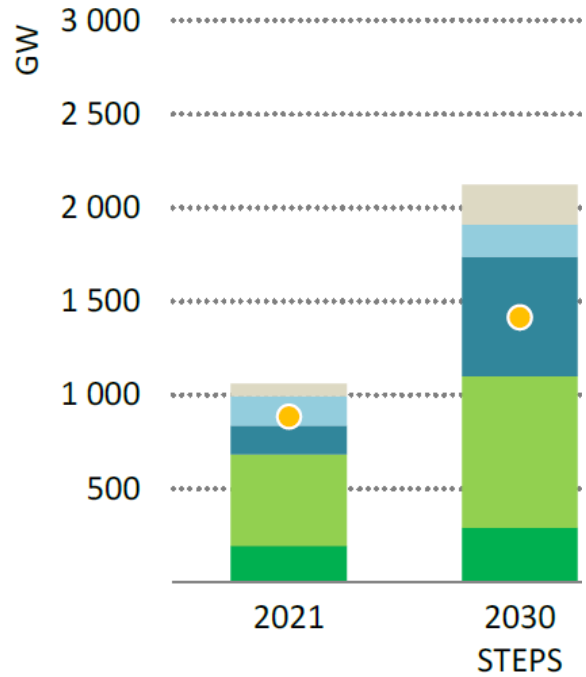
**Mark Winskel, University of Edinburgh
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BIEE Conference, September 2023

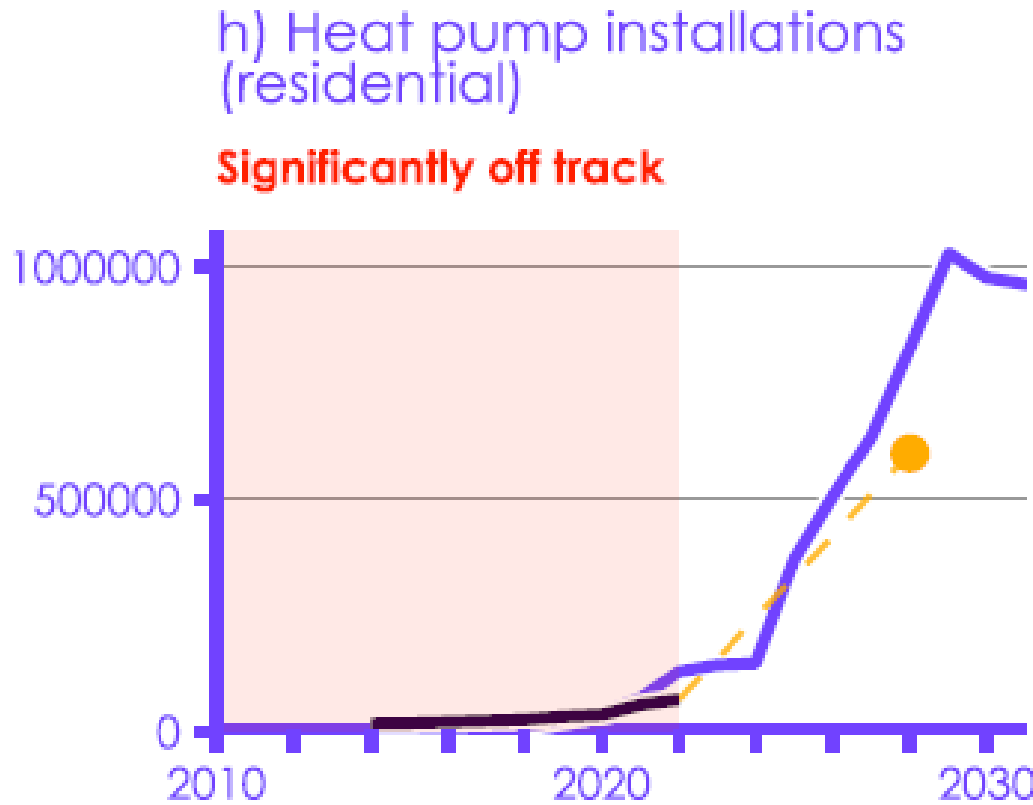
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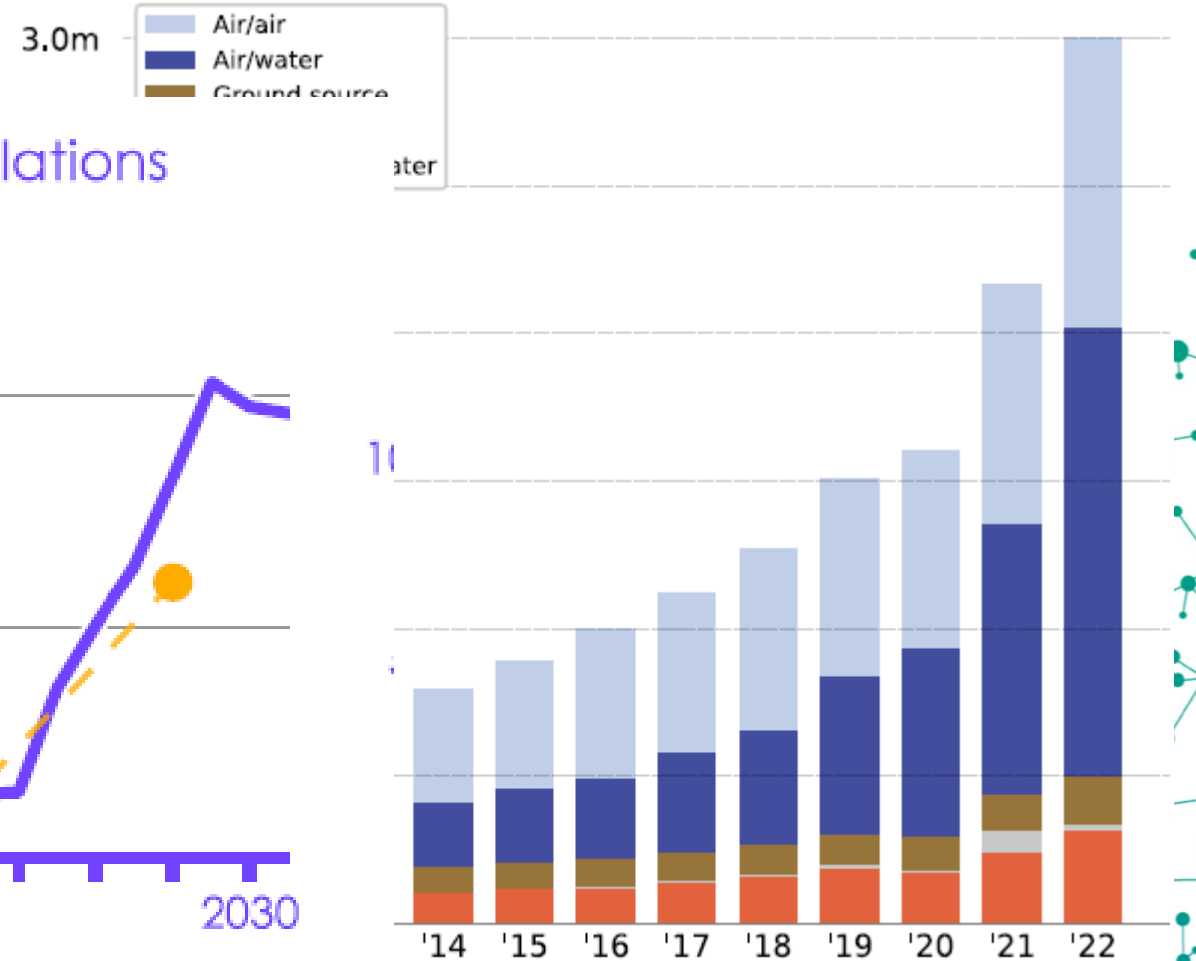
Background



Heat pump capacity in GW (IEA, 2022)



UK heat pump sales and projected (CCC, 2023)



Heat pump sales in Europe (EHPA, 2023)

UK Policy

- At least 600,000 installations annually by 2028, including c.400,000 retrofits,
- *“contingent on the market finding ways to reduce the upfront cost ... while continuing to improve consumer experience and appeal”* (HMG, 2021, p.57)
- *“an ambition ... to reduce costs of installing a heat pump by 25-50% by 2025 and towards parity between heat pumps and gas boilers by 2030”*. (ibid.p.86)

Heat and Buildings Strategy

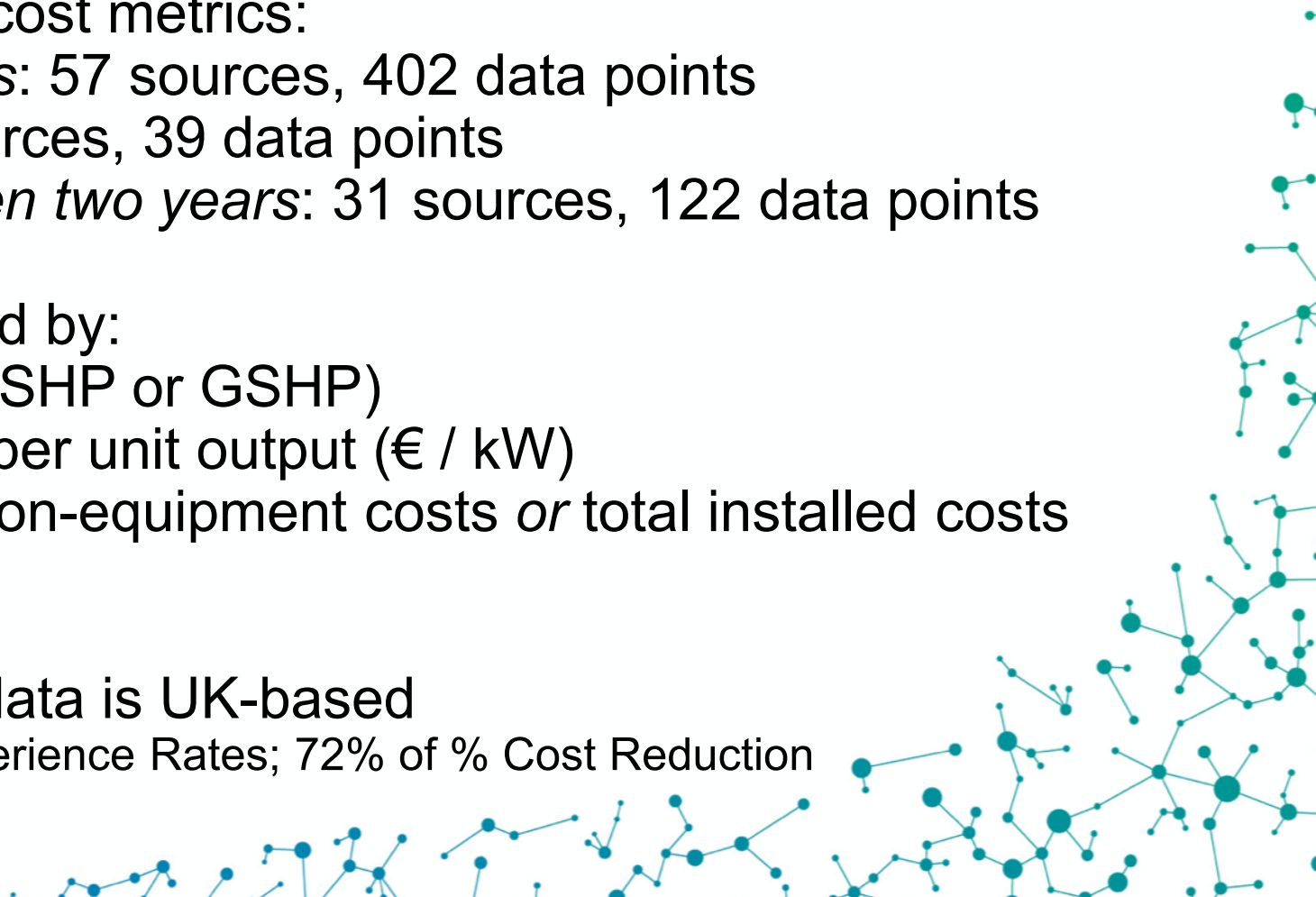
Presented to Parliament by the Secretary of State for Business, Energy and Industrial Strategy by Command of Her Majesty

October 2021

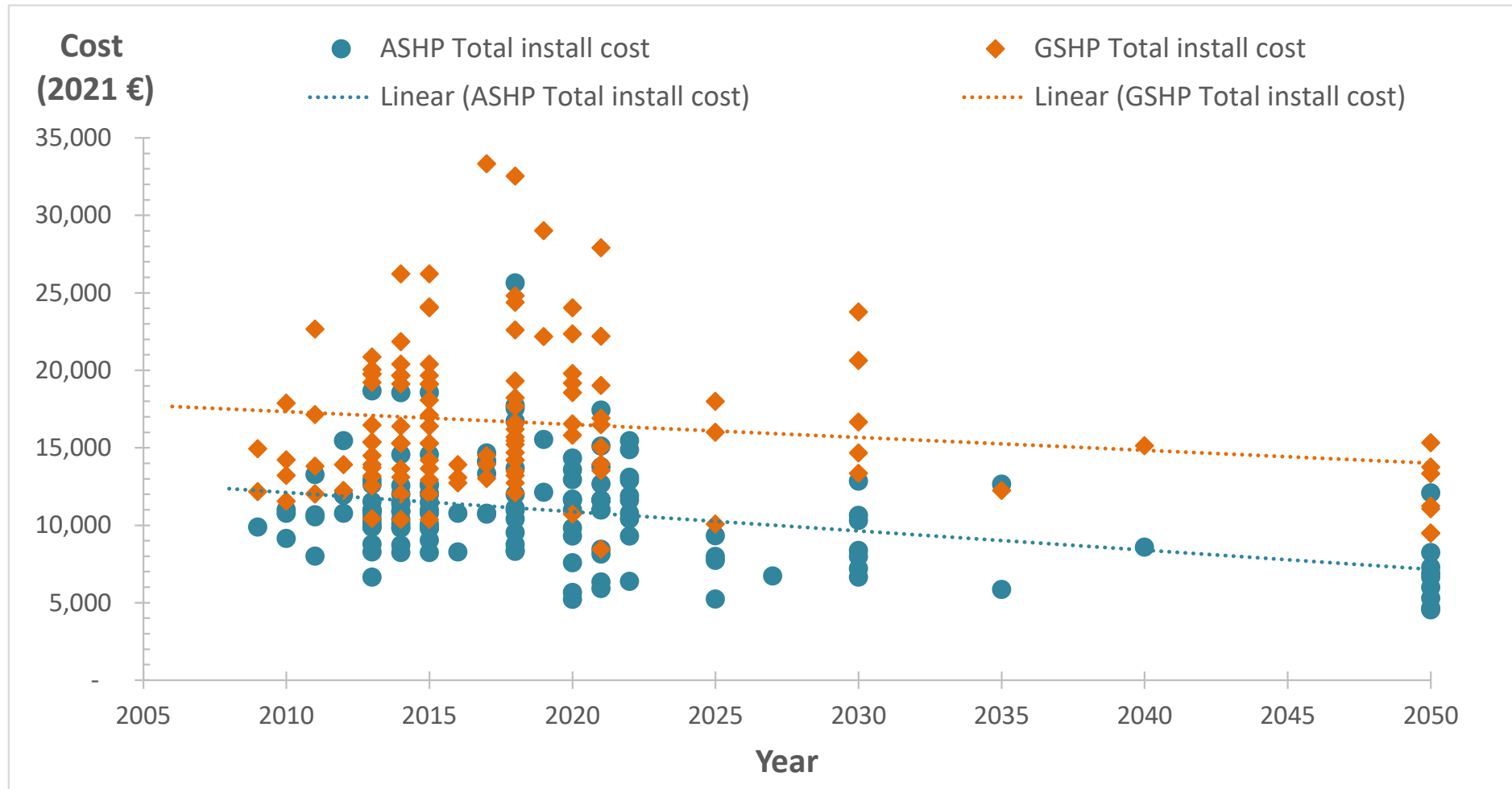
Project Scope

- Total installed costs for domestic scale heat pumps
 - Including capital equipment, non-equipment costs and any changes to the building fabric and/or home heating system
 - Wide variety of technology designs, performance factors and domestic building contexts, including existing and new homes
- Not including:
 - lifetime or running costs, wider energy system costs
 - A2A ASHPs, given unsuitability for UK housing stock

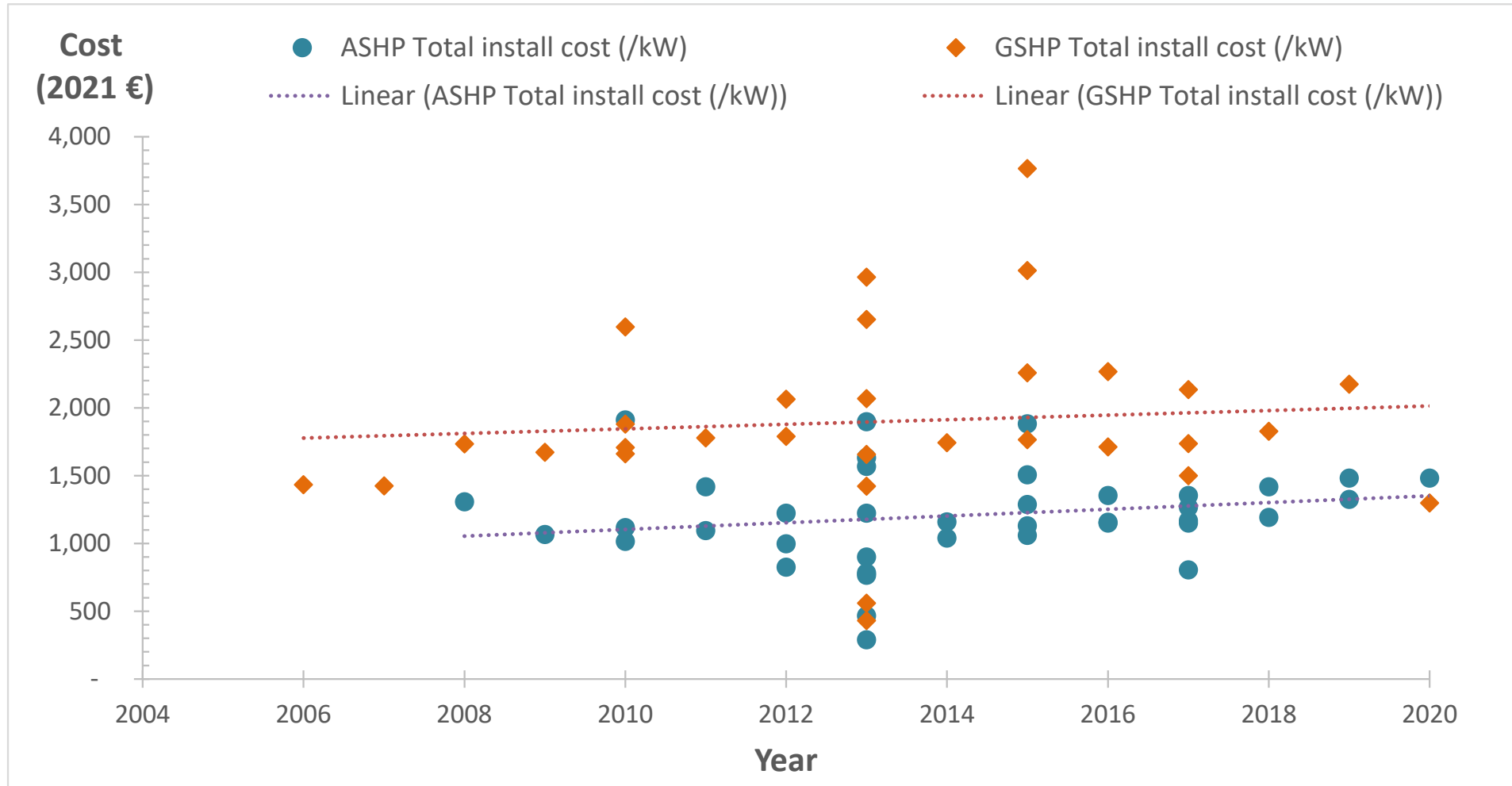
Data sources and metrics

- 1,700+ search results, with c.180 relevant sources
 - Dataset includes three main cost metrics:
 - *Single Year reported costs*: 57 sources, 402 data points
 - *Experience Rates*: 13 sources, 39 data points
 - *% Cost Reduction between two years*: 31 sources, 122 data points
 - Cost data is also differentiated by:
 - technology type (mainly ASHP or GSHP)
 - total cost (€) *or* total cost per unit output (€ / kW)
 - technology unit costs *or* non-equipment costs *or* total installed costs
 - Limited and inconsistent data
 - High proportion of available data is UK-based
 - 63% of Single Year; 38% of Experience Rates; 72% of % Cost Reduction
- 
- A decorative graphic in the bottom right corner of the slide, consisting of a network of interconnected nodes and lines in shades of blue and teal, resembling a molecular or data network structure.

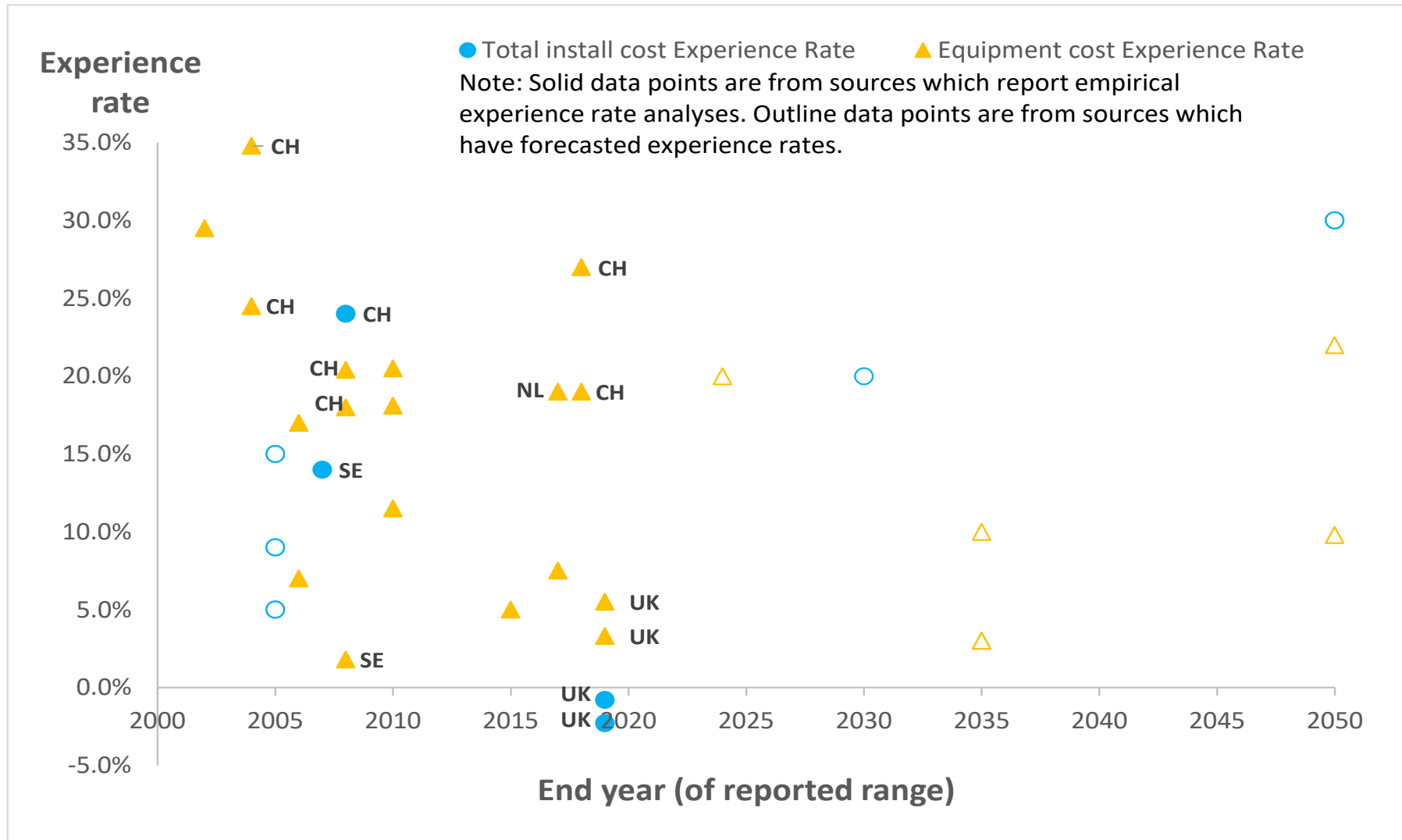
Single Point Total Installed Costs



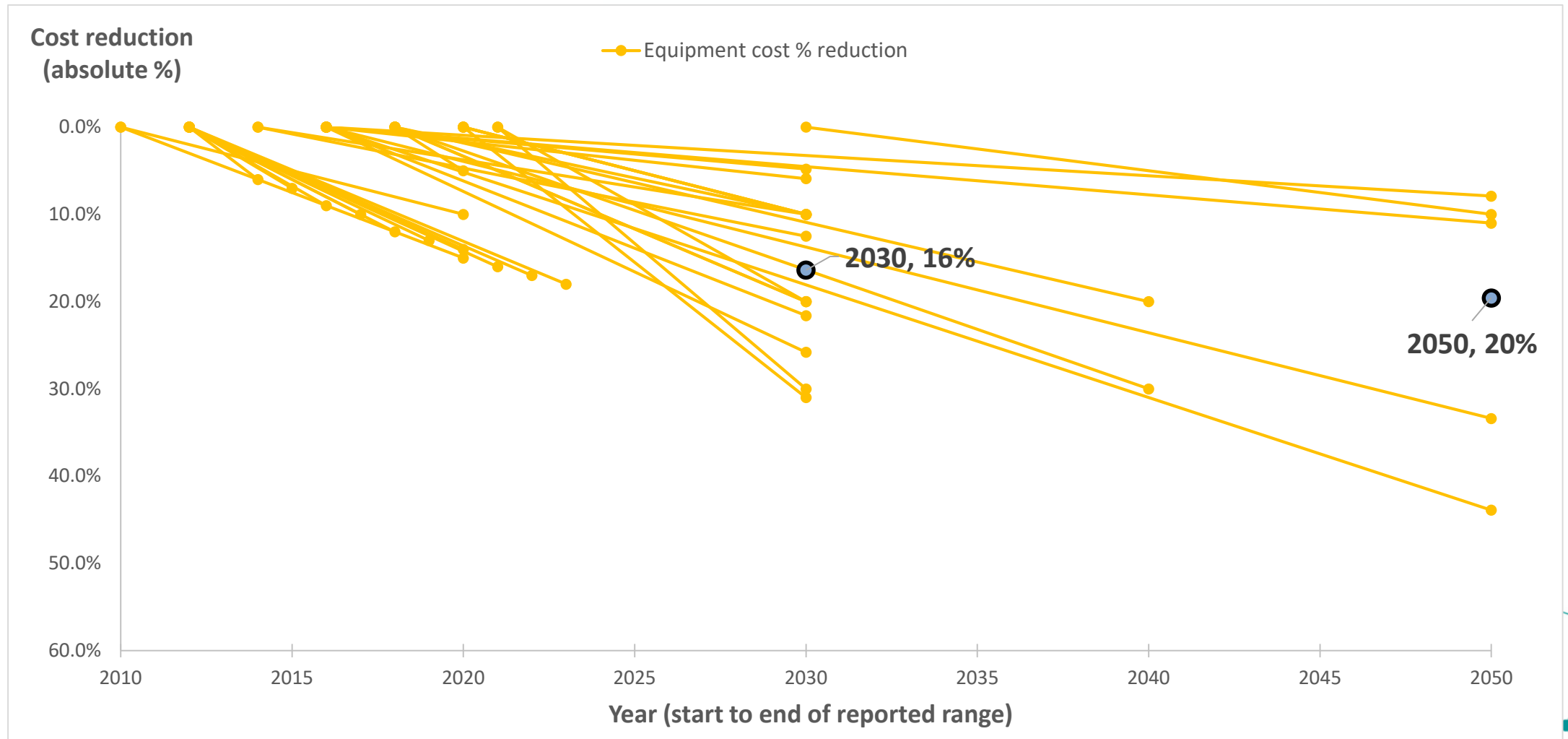
Single Point Costs per kW



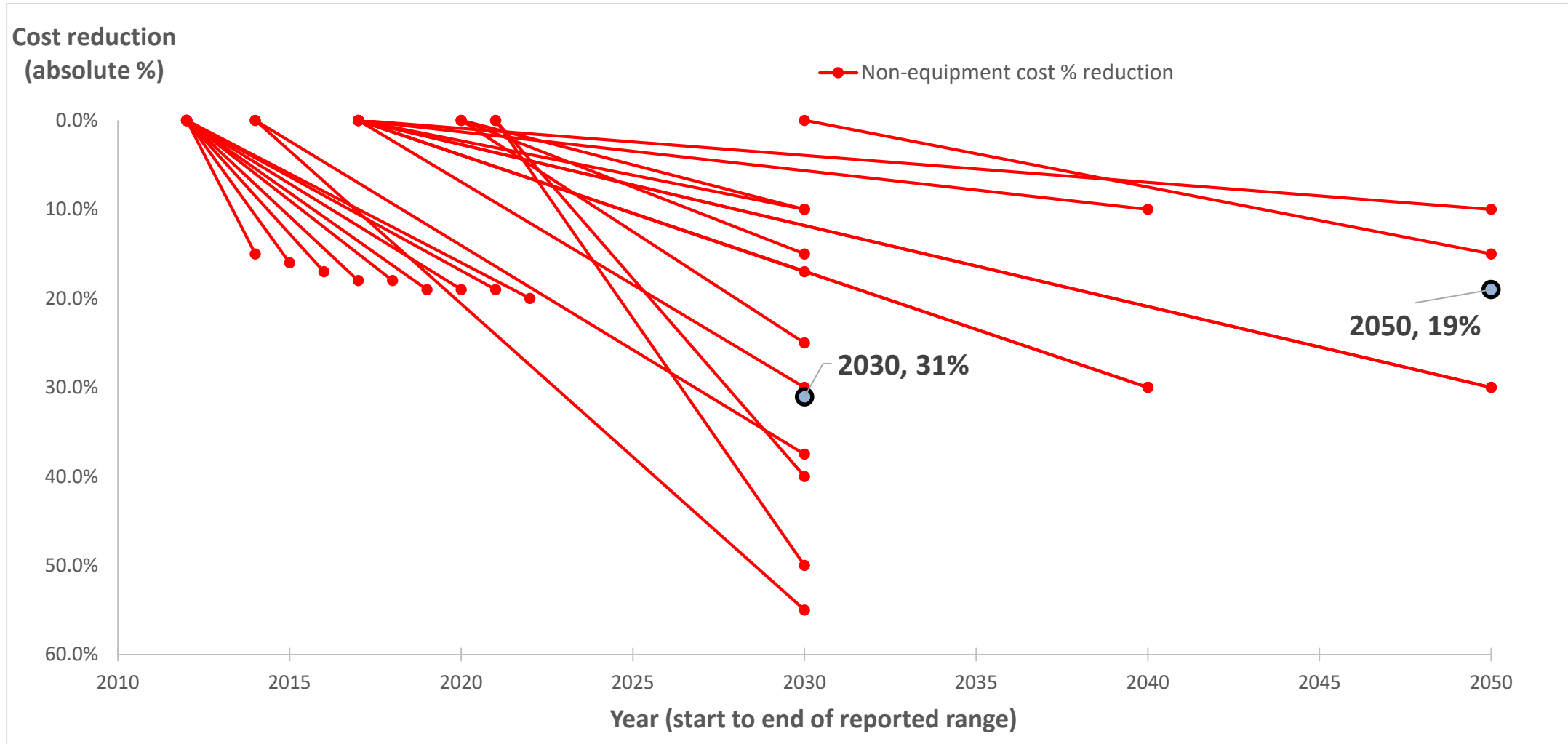
Experience Rates



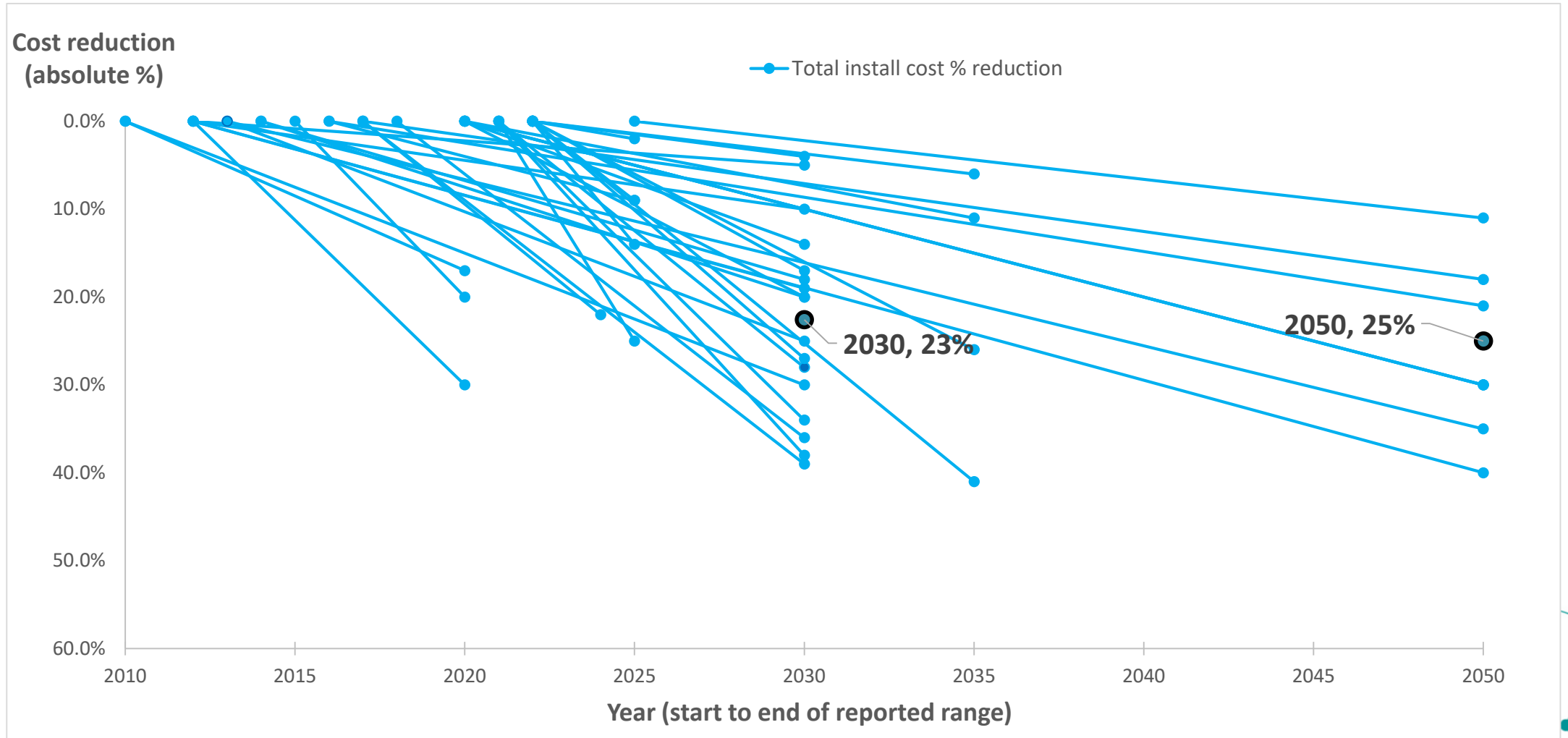
% Cost Reduction, equipment costs only



% Cost Reduction, non-equipment costs only



% Cost Reduction, total installed costs



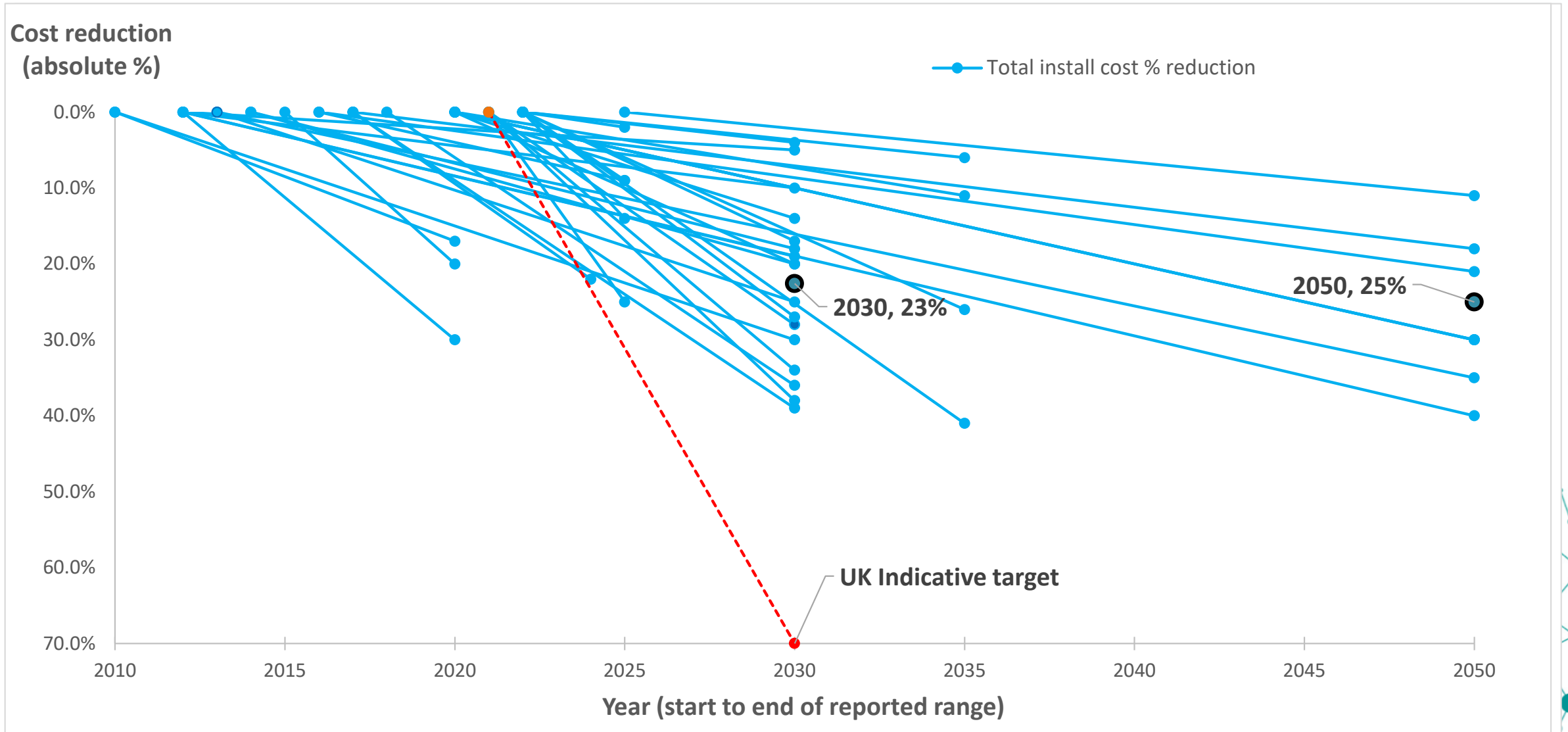
Summary, by metric type

- *Single Point Cost*: historic average reported costs have been roughly static in the UK over the past decade or so, while moderate reductions seen internationally.
- *Experience Rates*: some countries have at times aligned deployment growth and sizeable cost reductions, but also cases where costs did not reduce despite significant market growth.
- *% Cost Reduction*: prospects for significantly reduced total installed costs in the 2020s. Average forecasts of around 20-25% by 2030; higher for non-equipment costs.

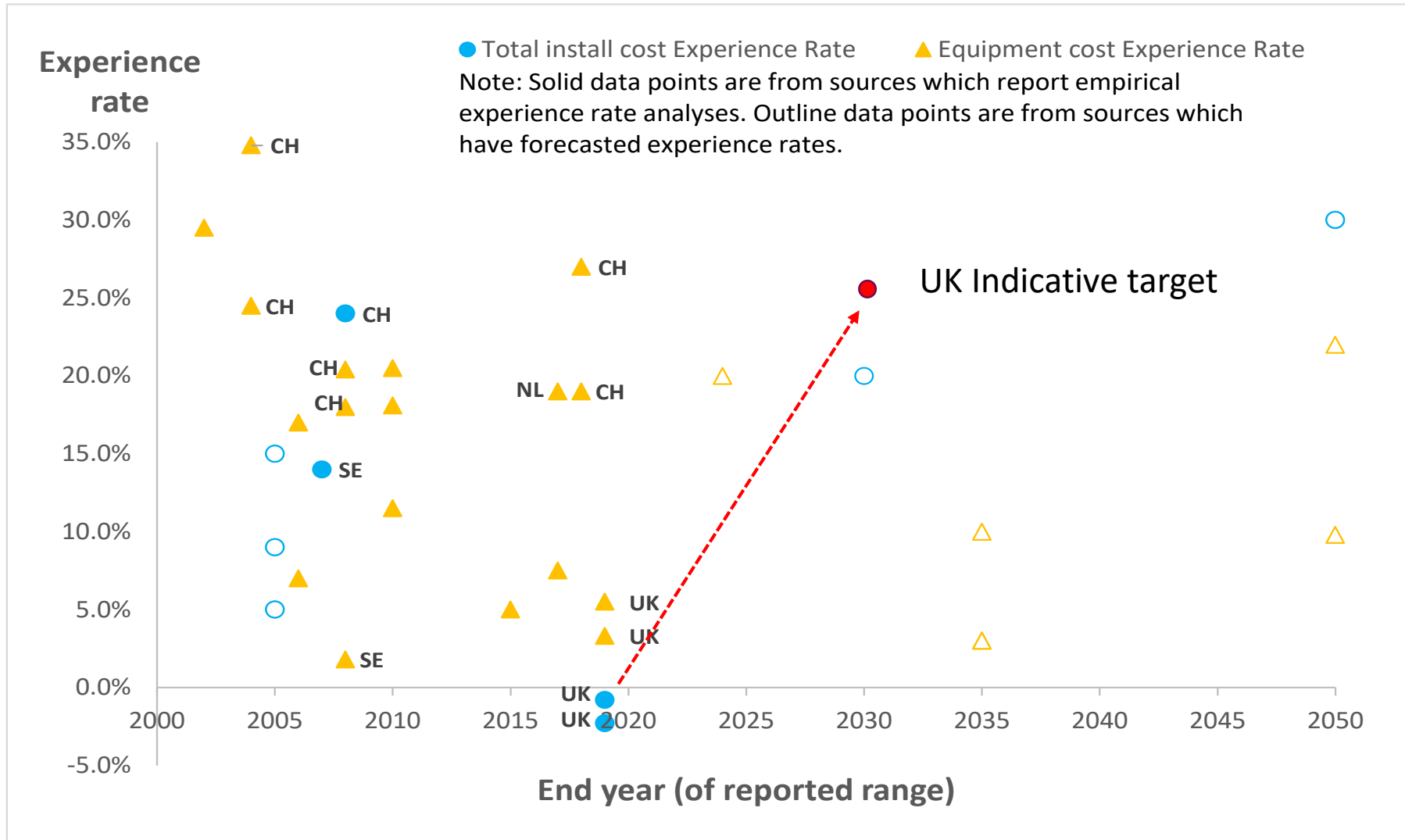
Experience Rates, country cases

		Cost Reduction	
		<i>Low</i>	<i>High</i>
Deployment	<i>Low</i>	UK	Netherlands
	<i>High</i>	Sweden	Switzerland

UK policy targets in context



UK policy targets in context



Conclusions

- Need for improved data / data access on total installed costs
- Prospects for significantly reduced installed costs in the 2020s, but unlikely to be on a scale and pace to match UK policy aims
 - UK is aiming for transformation from global laggard to leader in under a decade
- Market growth is essential but insufficient for cost reductions
 - also requires capacity-building and competition in supply chains, manufacturing, installer base, etc.
- Well-designed policy is a critical enabler of cost reduction, but can't guarantee results.
 - Upward as well as downward cost pressures as the market grows.
 - Policy commitment should be resilient to fluctuations in installed costs



<https://ukerc.ac.uk/publications/heat-pump-cost-review/>

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Summary, by metric type

Single Point Cost	%
Median forecast Single Point Cost reduction, 2020 to 2030, ASHPs (total installed costs)	24
% Cost Reduction	
Median forecast % Cost Reduction, 2030 end point (equipment costs only)	17
Median forecast % Cost Reduction, 2030 end point (non-equipment costs only)	30
Median forecast % Cost Reduction, 2030 end point (total installed costs)	20
Experience Rates	
Median Experience Rate, historic and forecast (equipment costs only)	18
Median Experience Rate, historic and forecast (total installed costs)	14
Experience Rate data range, all data	-2.3 to +35