

Electricity and Heat Demand in Scotland – the implications of heat electrification

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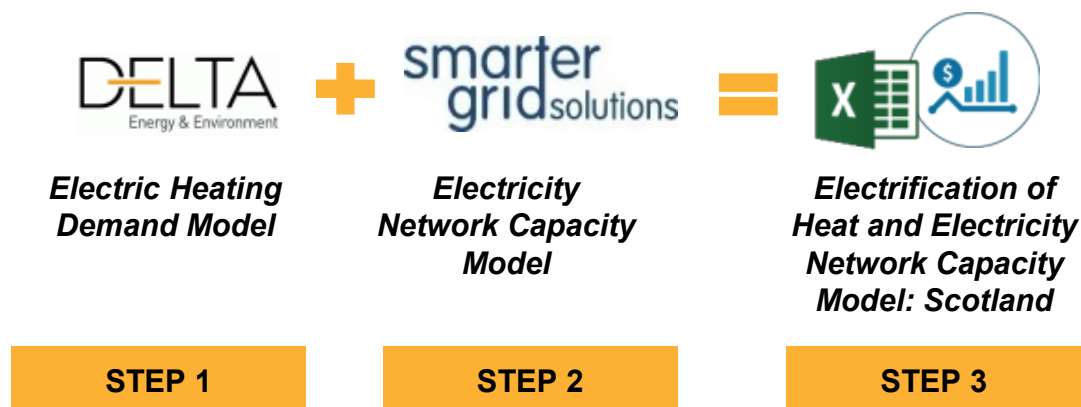
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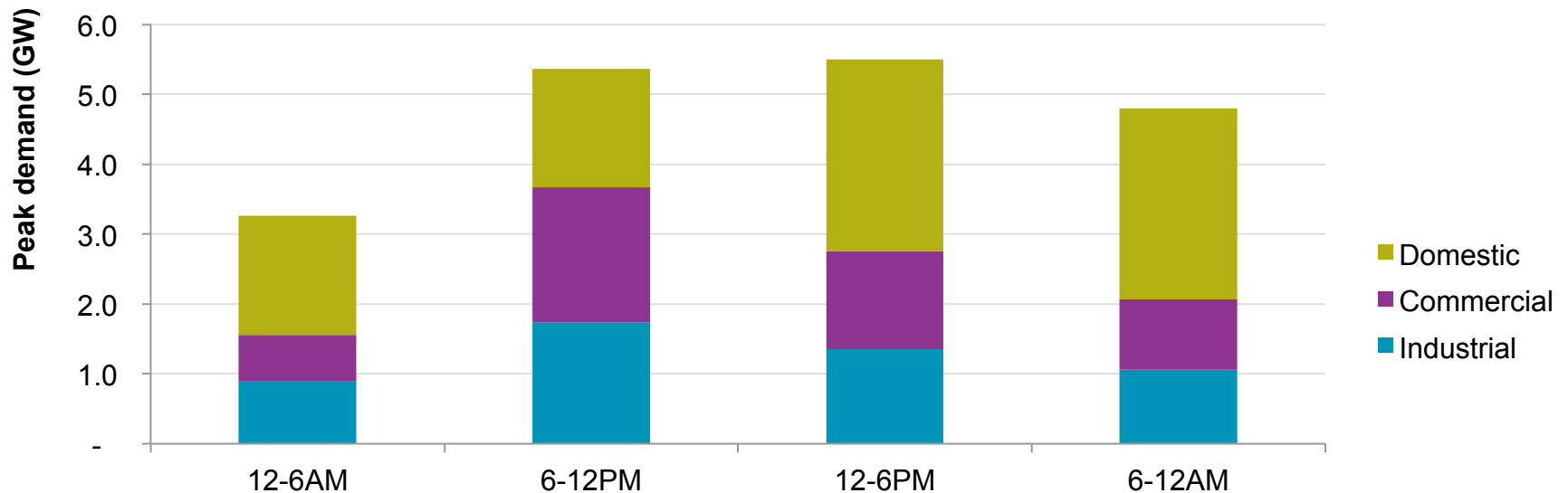
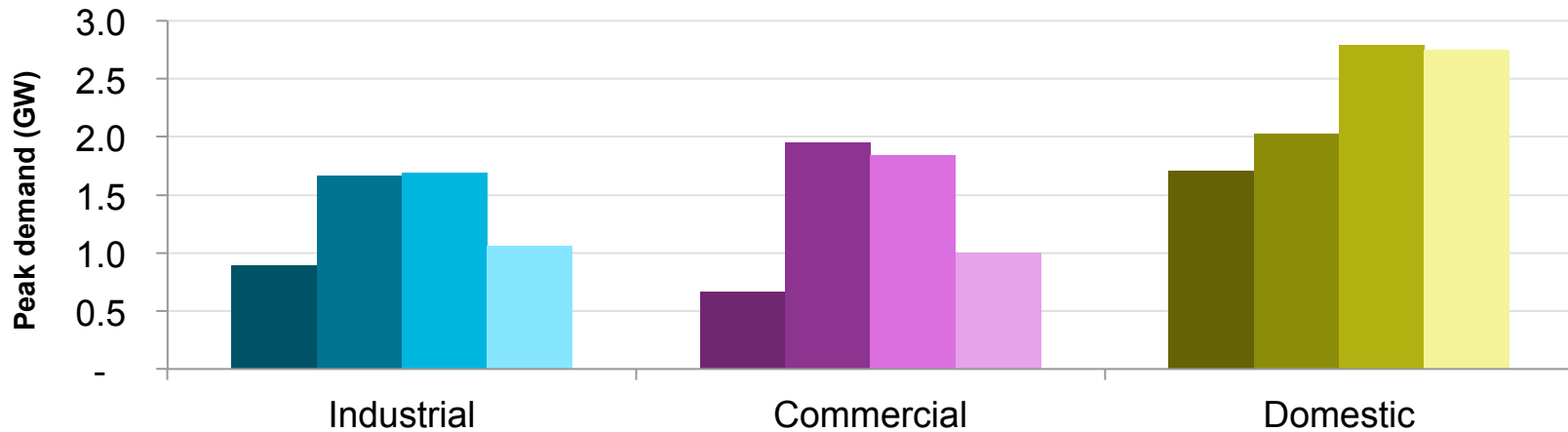


What are the grid impacts of electrifying heat?



Electricity demand today – the winter peak

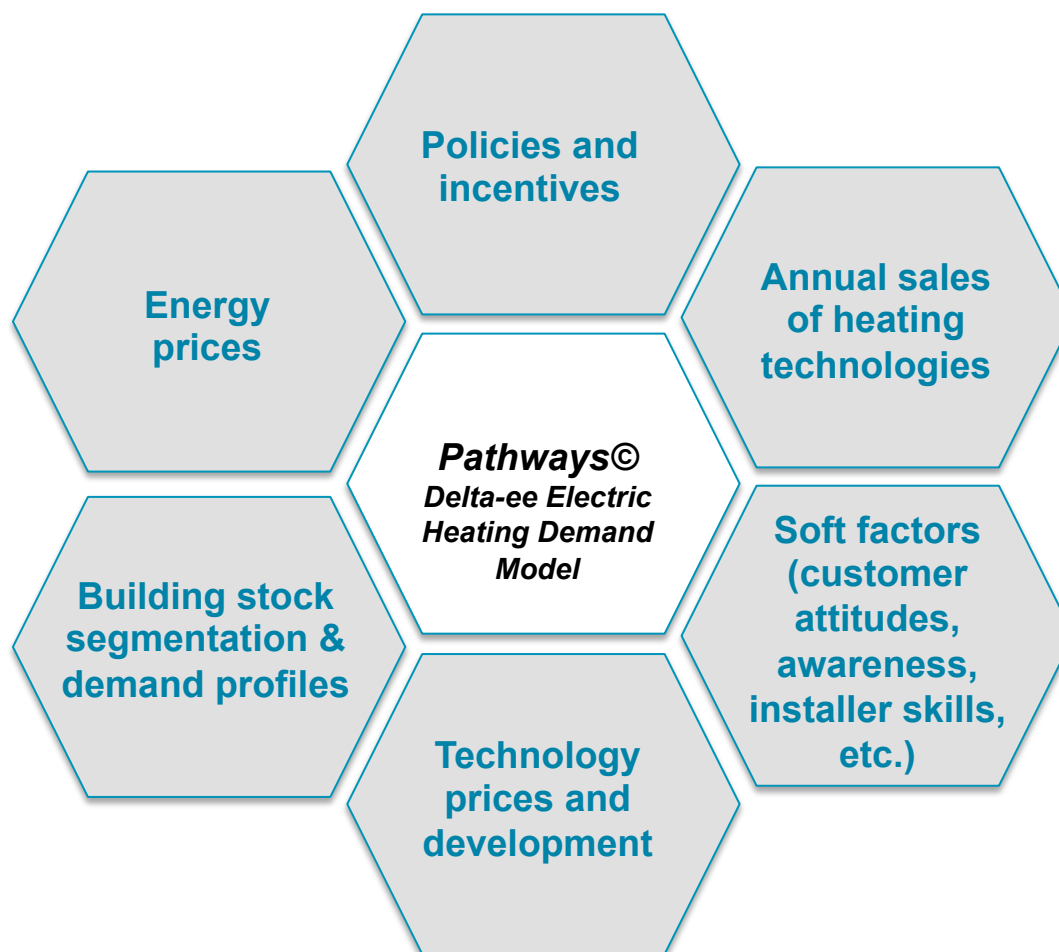
Winter weekday
[12-6am ; 6-12pm ; 12-6pm ; 6-12am]



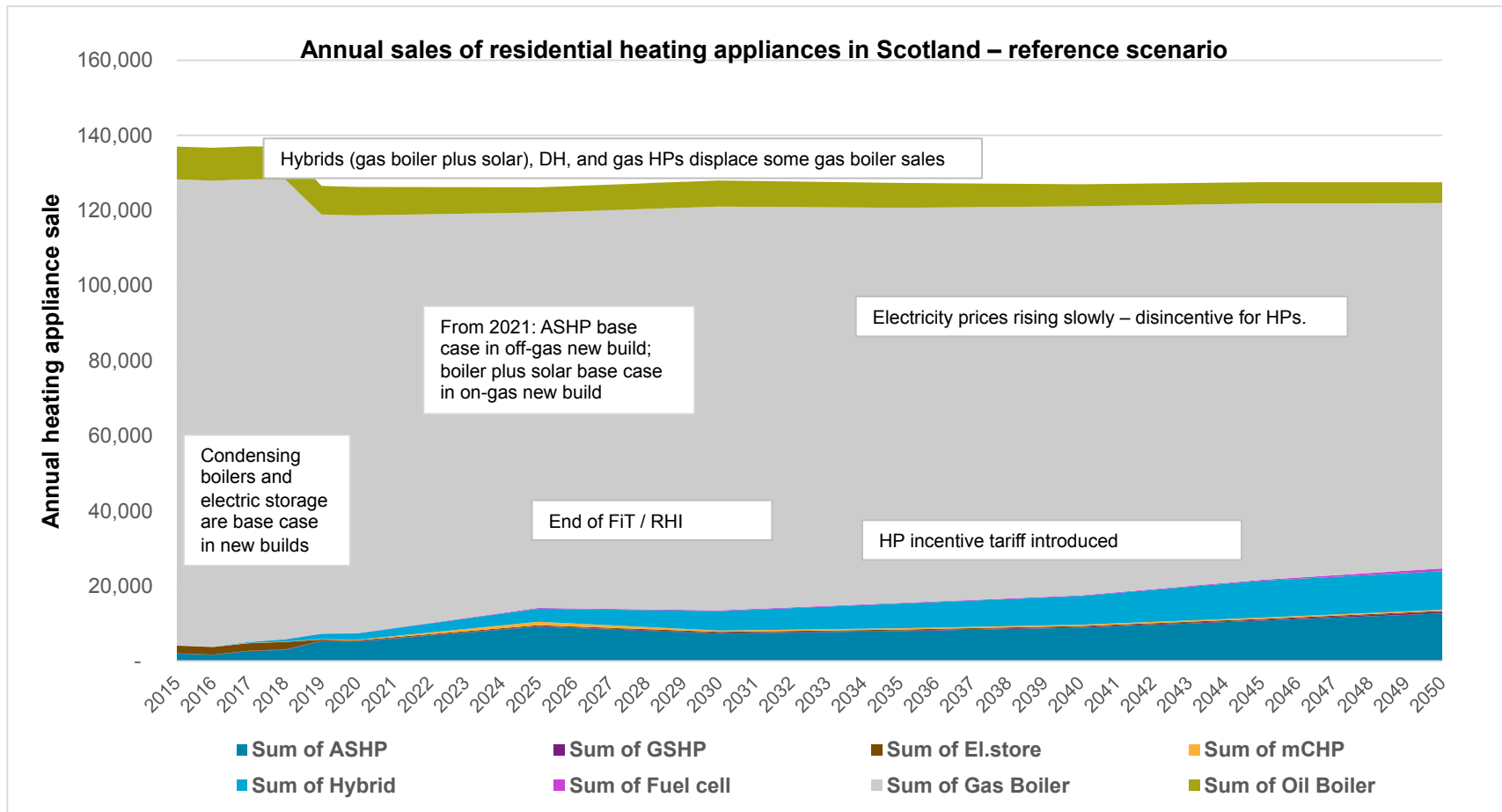
What happens when some of the heat demand is electrified?

We developed a Reference Scenario to identify potential electric heating demand

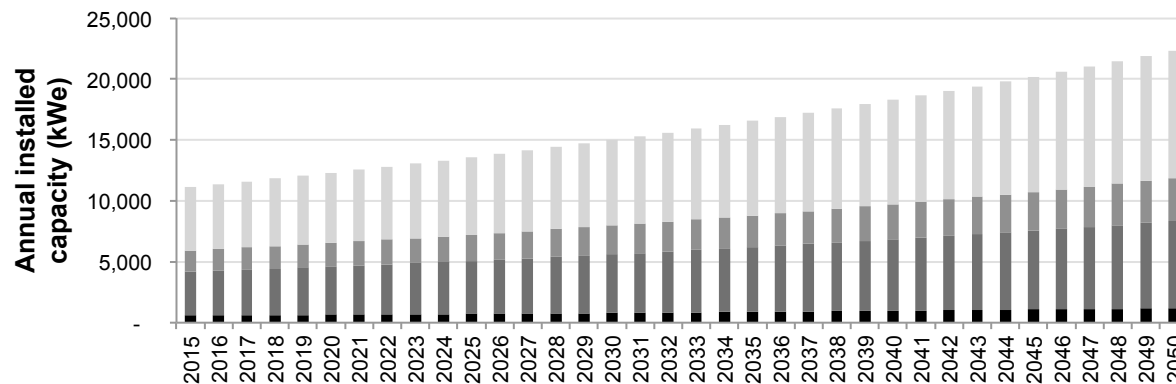
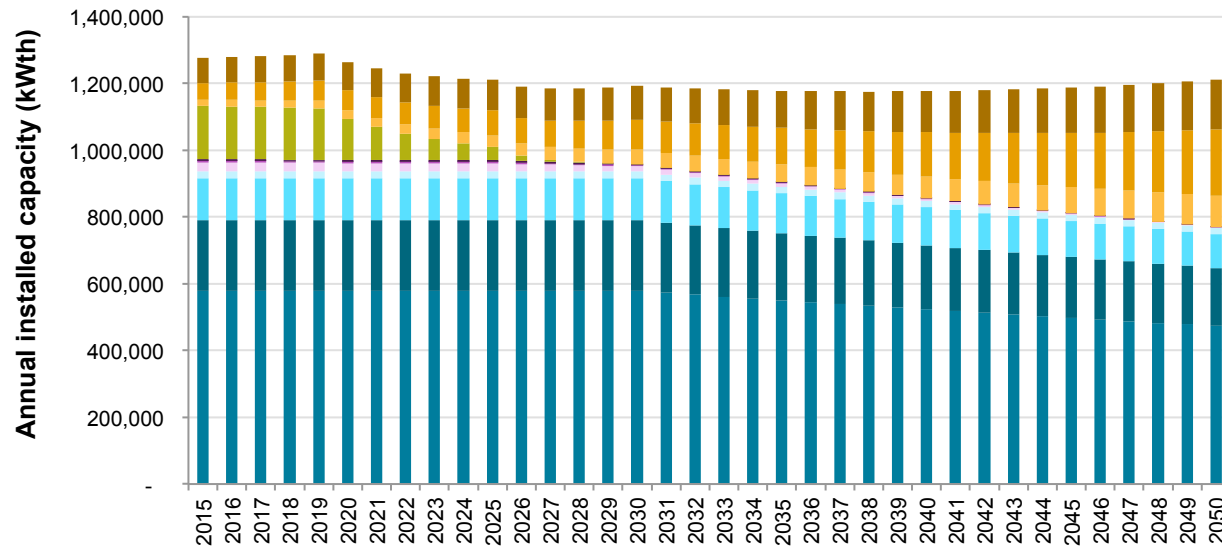
Inputs and assumptions



Residential – slow, steady increase in electric HP deployment

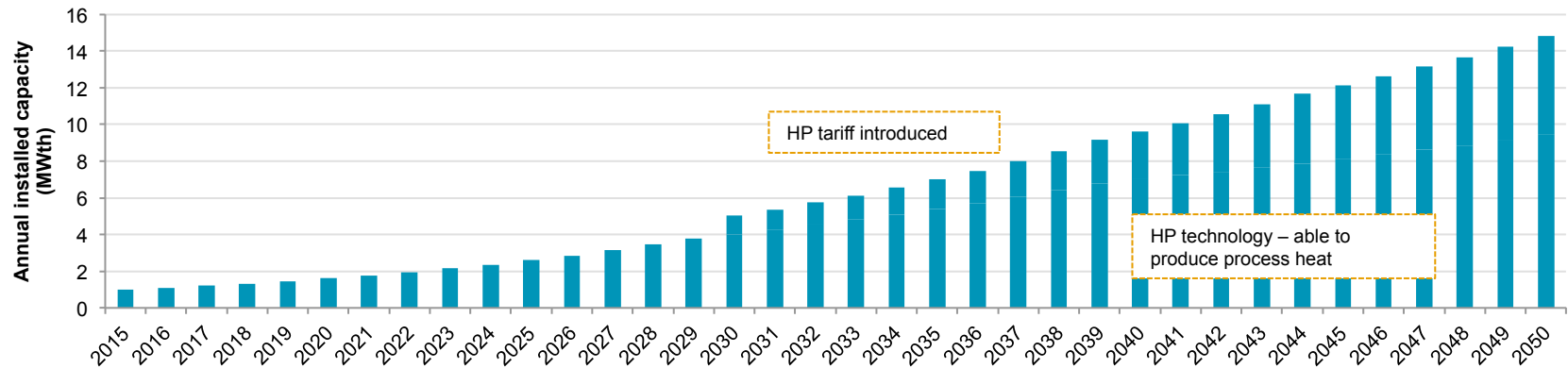


Commercial buildings – growth in HP and CHP deployment

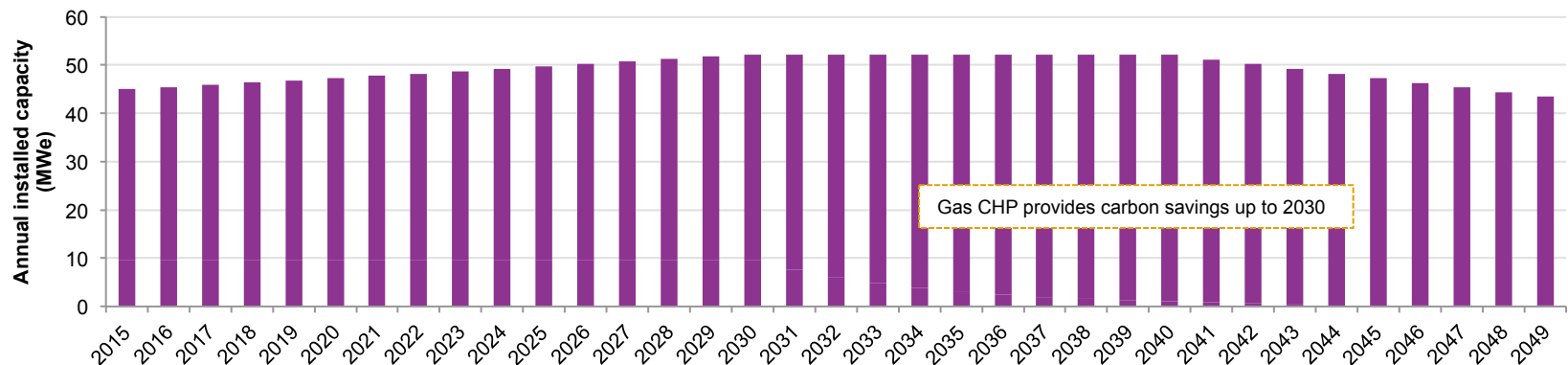


Industry – modest expansion in HP deployment

Annual installed *thermal* capacity (Heat Pumps) in INDUSTRIAL sites – reference scenario

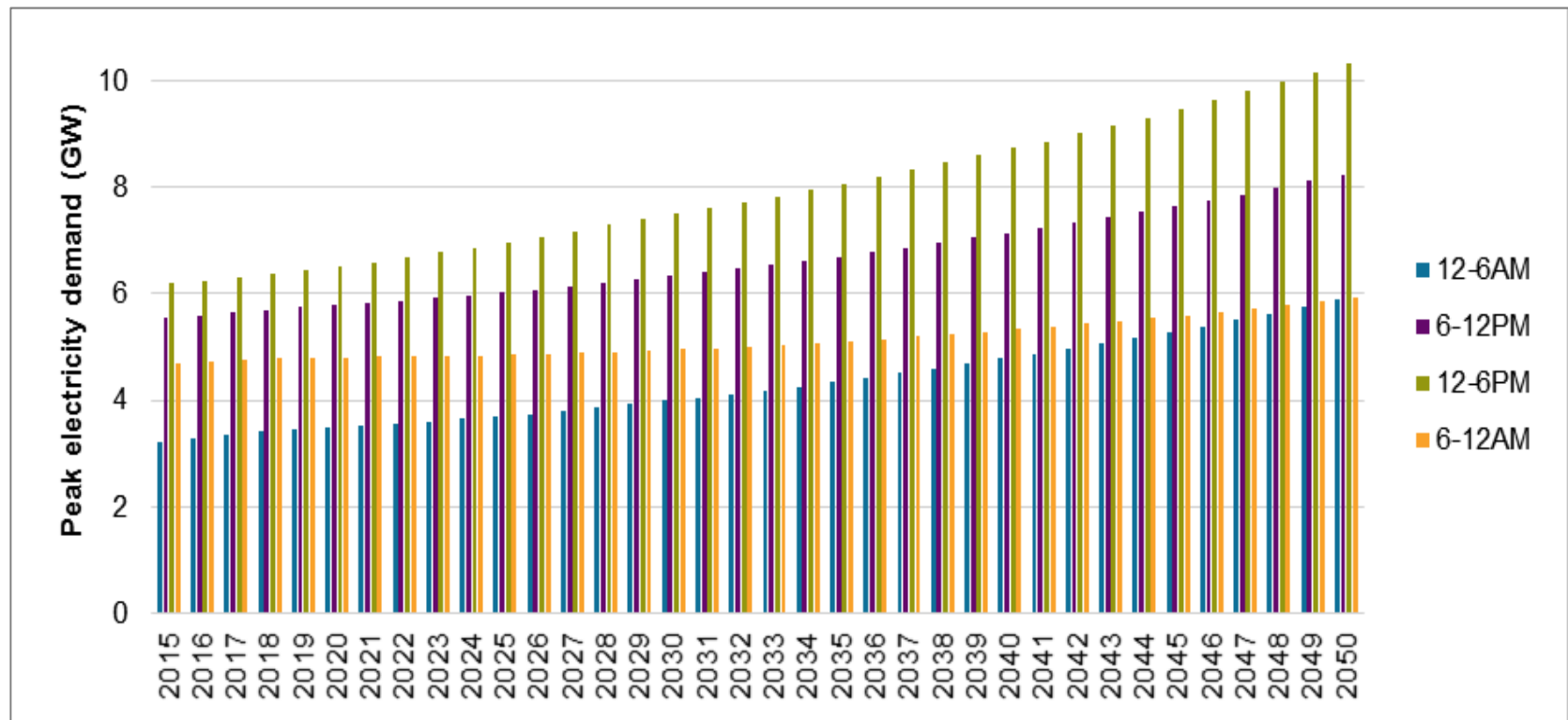


Annual installed *electrical* capacity (CHP) in INDUSTRIAL sites – reference scenario

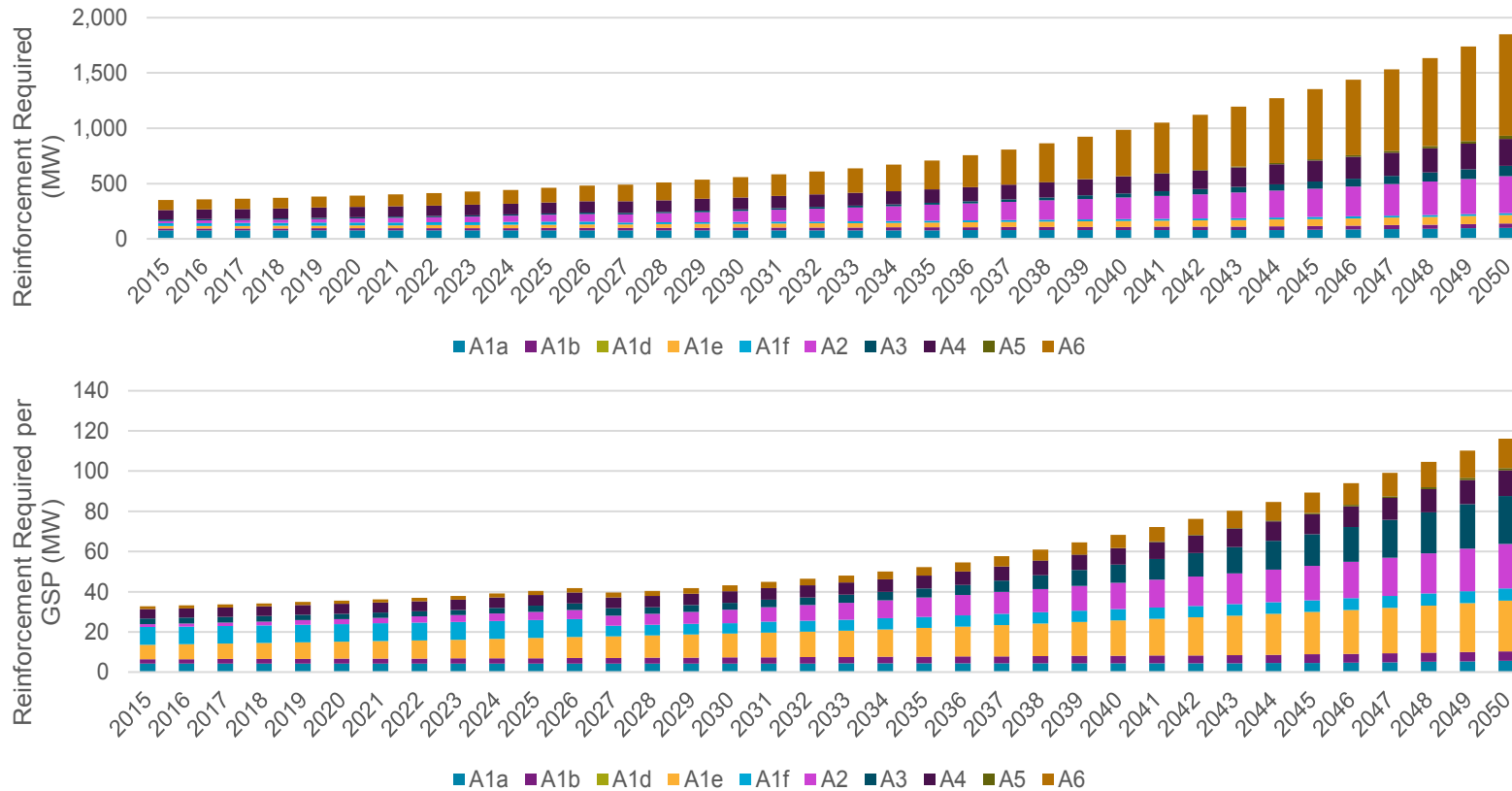


Key impact: winter peak demand increase ~4.1 GWe

Forecast Peak Electric demand, Scotland (2016 – 2050)



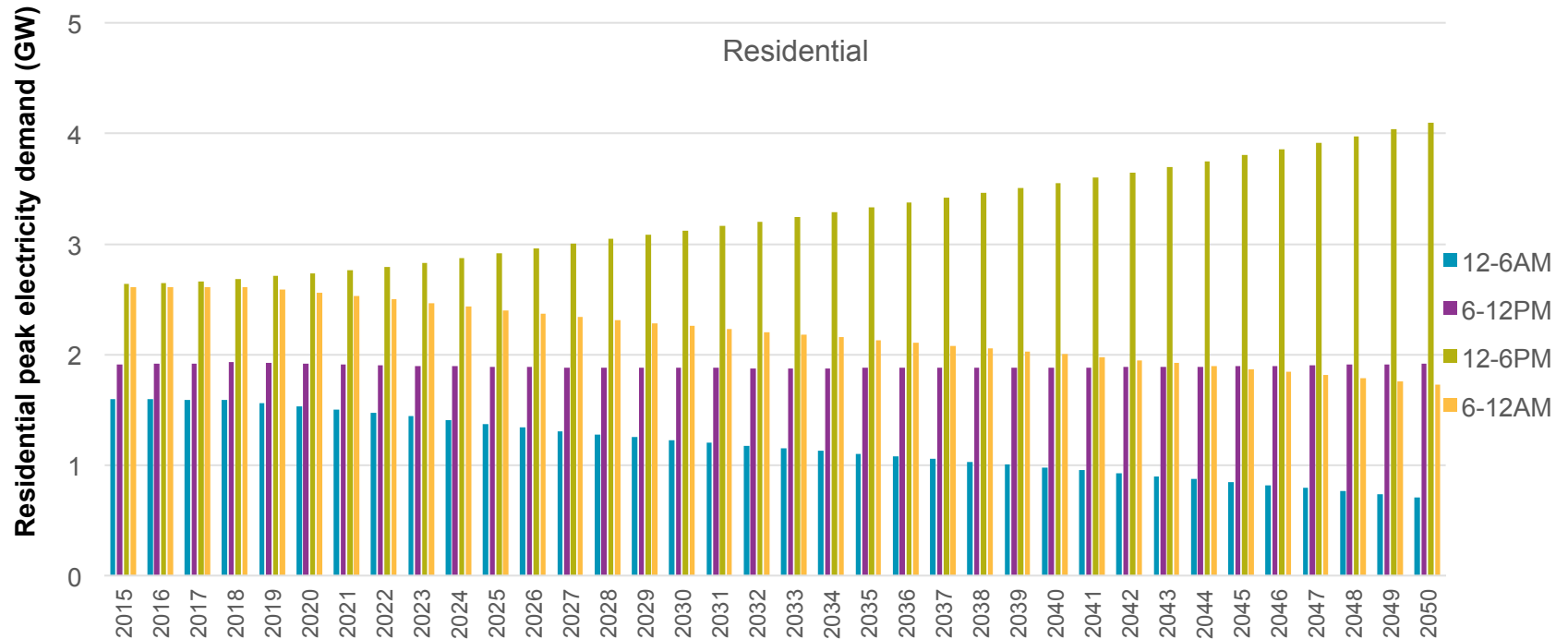
Key impact: grid reinforcement requirements increase greatly



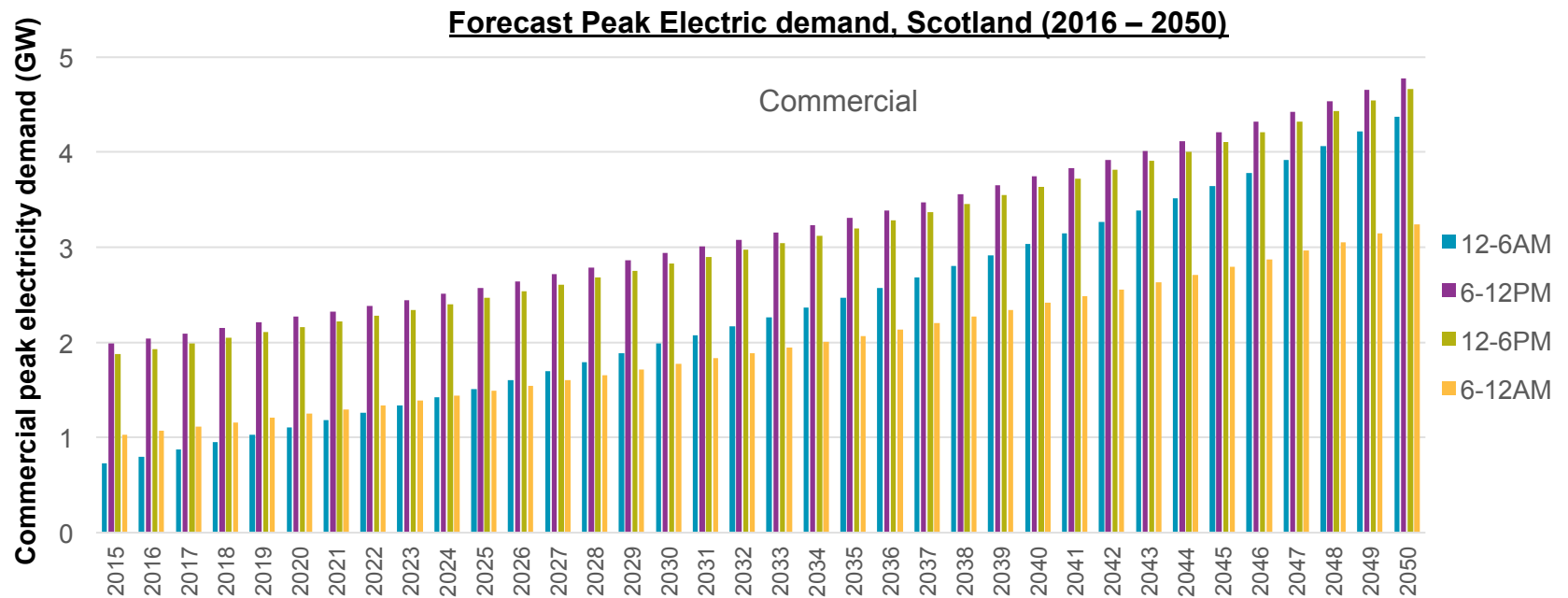
- ▶ By 2050, substantial reinforcements would be required
- ▶ From 2035, the need for reinforcements would accelerate significantly.

RESIDENTIAL: Peak demand increase ~1.4 GWe

Forecast Peak Electric demand, Scotland (2016 – 2050)



COMMERCIAL: Peak demand increase ~2.7 GWe



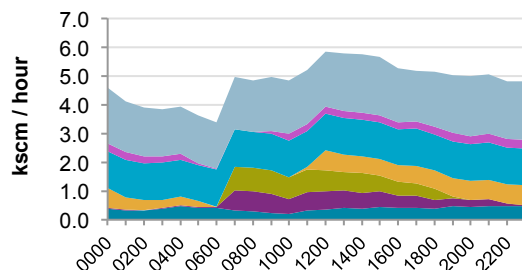
- ▶ By 2050, peak electricity demand on a peak winter weekday could rise from ~6 GWe to > 10 GWe.
- ▶ Most of the growth derives from commercial buildings
- ▶ This electrification is relatively modest – eg in 2050 district heat meets 7.4 TWh of demand – up from 0.3 TWh today
- ▶ By 2050, substantial grid reinforcements would be required

Why is electricity demand in the industrial sector relatively unchanged?

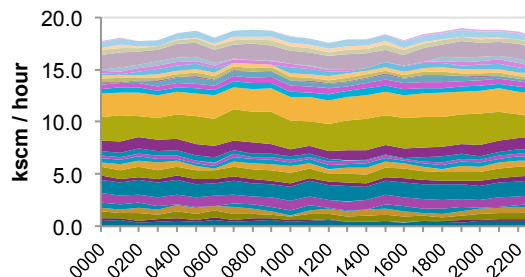
1. Most industrial sites have relatively flat heat demand through the day.
2. Industrial heat pumps currently best cater to low-temperature process heat and we expect only modest improvements in terms of technology development to handle medium and high temperature process heat leading out to 2050.
3. The prevalence of CHP systems within the industrial sector.

Gas demand – proxy for thermal demand

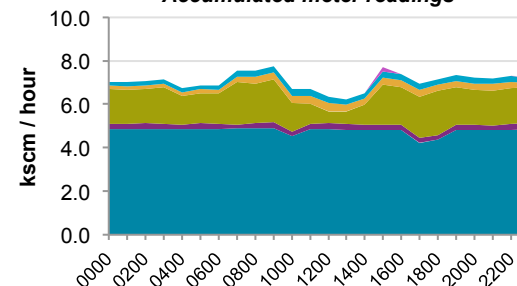
BREWERY & MALTING
(GAS DEMAND IN WINTER)
Accumulated meter readings



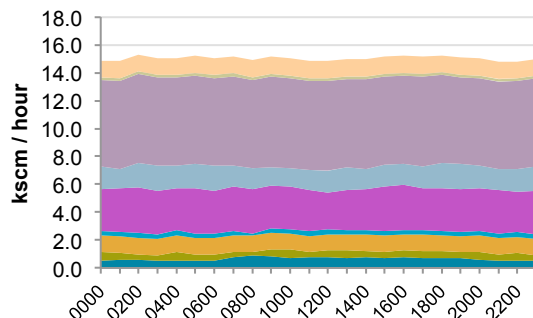
SPIRIT DISTILLING & COMPOUNDING
(GAS DEMAND IN WINTER)
Accumulated meter readings



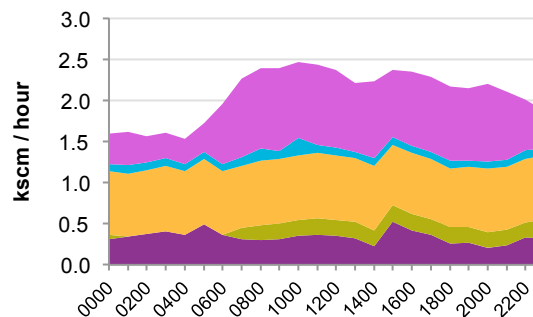
PAPER & PULP
(GAS DEMAND IN WINTER)
Accumulated meter readings



CHEMICAL & MISC. CHEMICAL PRODUCTS
(GAS DEMAND IN WINTER)
Accumulated meter readings



MISCELLANEOUS FOOD
(GAS DEMAND IN WINTER)
Accumulated meter readings



PREPARATION OF MILK AND MILK PRODUCTS
(GAS DEMAND IN WINTER)
Accumulated meter readings

