

**DELTA-EE**








**MITIGATING THE NETWORK IMPACTS OF  
ELECTRIFYING HEATING WHILE GIVING  
CUSTOMERS THE OUTCOMES THEY WANT**

**CONTACT:**

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# Delta-EE's research

Delta-ee enables organisations to develop the best strategies, business models and customer propositions for the energy transition. Clients work with Delta-ee because of our unparalleled research base, which provides both breadth and depth of expertise, spanning:

| <b>'New Energy' Business Models</b>   |  |   |  |  |
|---|--|---|--|--|
| Identify and understand the alternative and new business models for the energy transition   |  |   |  |  |
| <br><b>EVs &amp; Electricity</b><br>Understand the opportunities and challenges from sector coupling between electricity and transport | <br><b>Flexibility &amp; Energy Storage</b><br>Take advantage of the opportunities emerging from an active demand side | <br><b>Heat</b><br>How channel disruption, sector coupling and new technologies are changing the heat sector | <br><b>Distributed Power</b><br>Global market insight & expertise into the growing role of decentralised generation | <br><b>Digital Energy</b><br>Opportunities in the connected home market and how digitalisation is changing the energy customer relationship |

Delta-EE provides:

Subscription Research Services

Consultancy

# Electrification of heat and flexibility



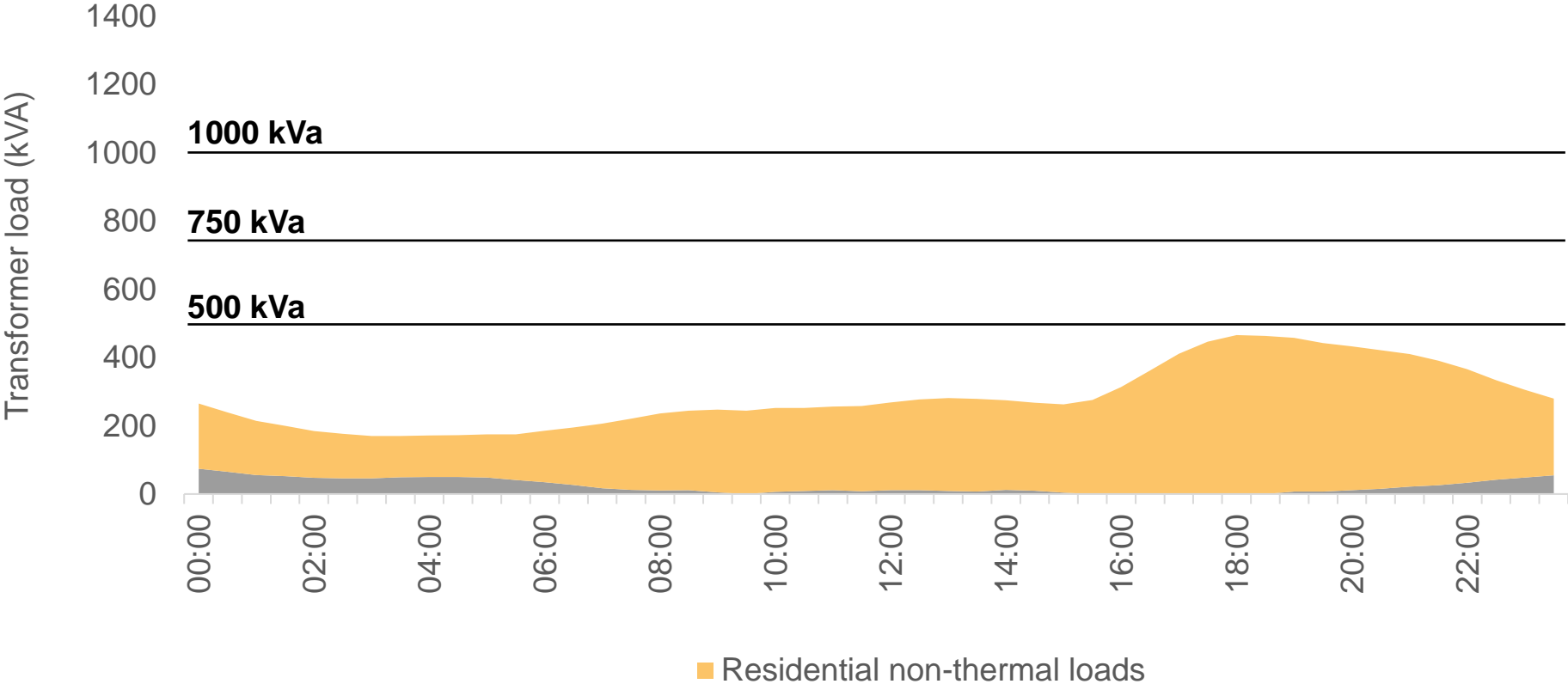
# How much electrical load will heat pumps add?

## An example distribution transformer

300 homes

0% with HPs

Cold winter weather (-4.5C)



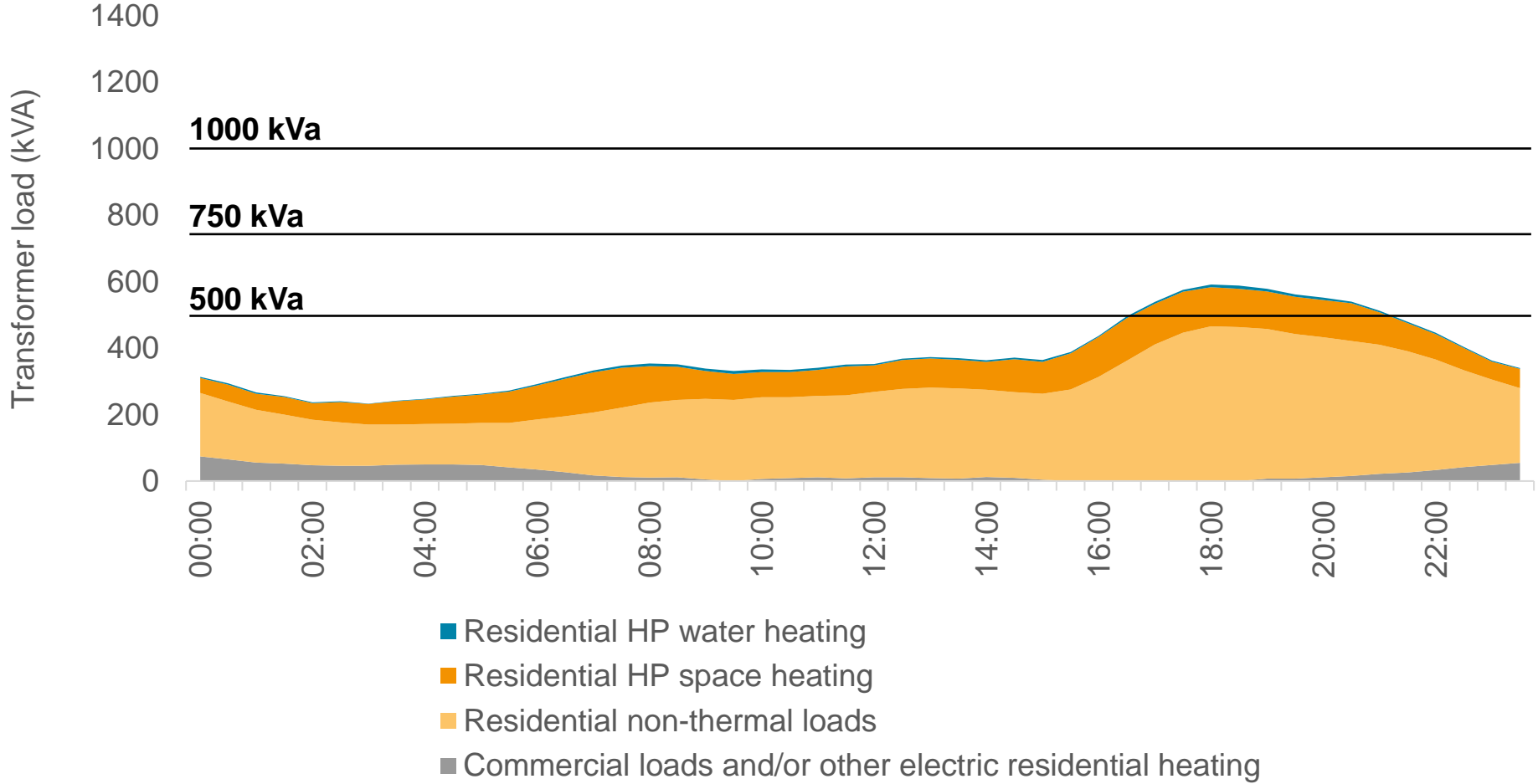
# How much electrical load will heat pumps add?

## An example distribution transformer

300 homes

10% with HPs

Cold winter weather (-4.5C)



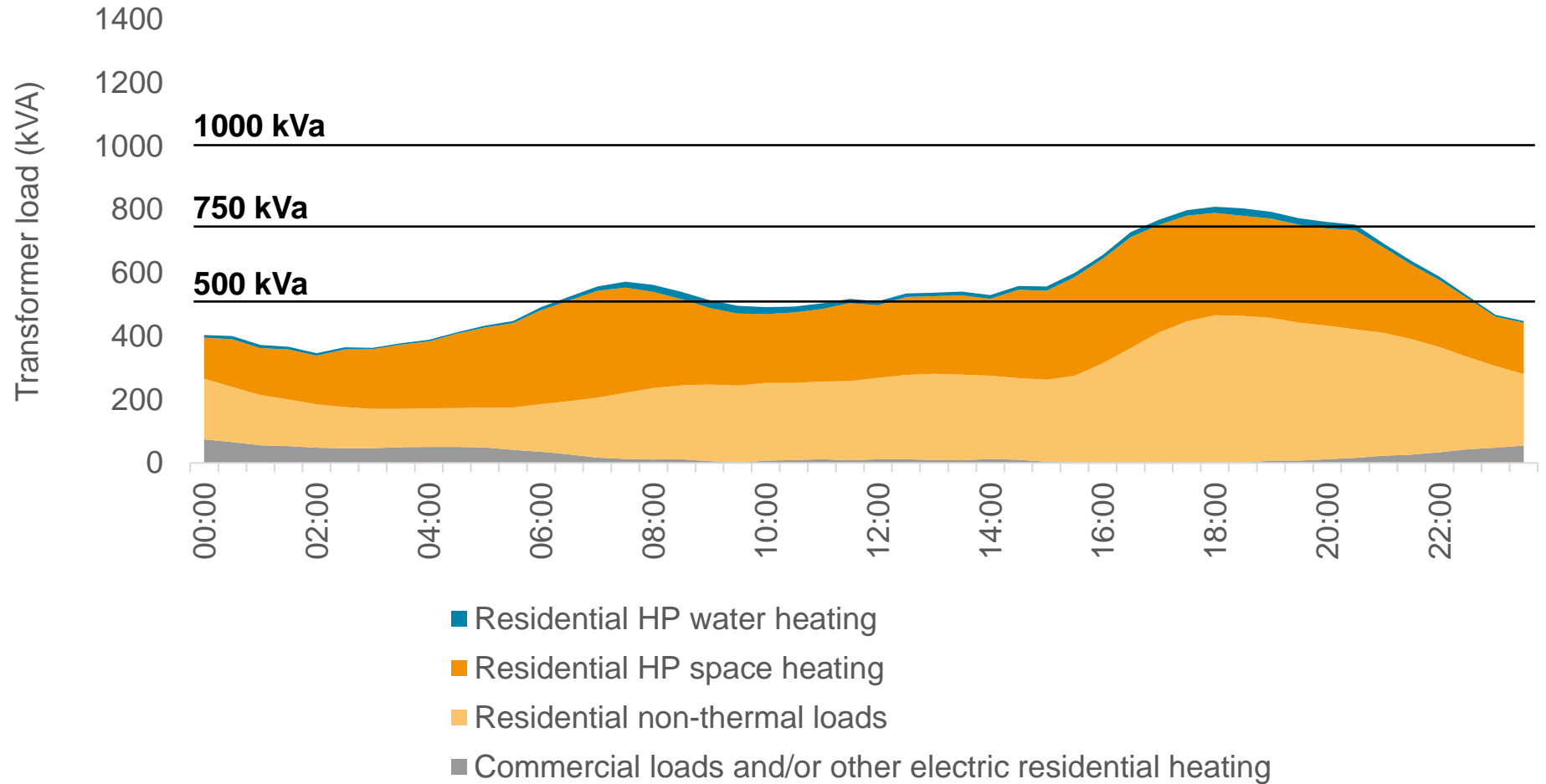
# How much electrical load will heat pumps add?

## An example distribution transformer

300 homes

30% with HPs

Cold winter weather (-4.5C)



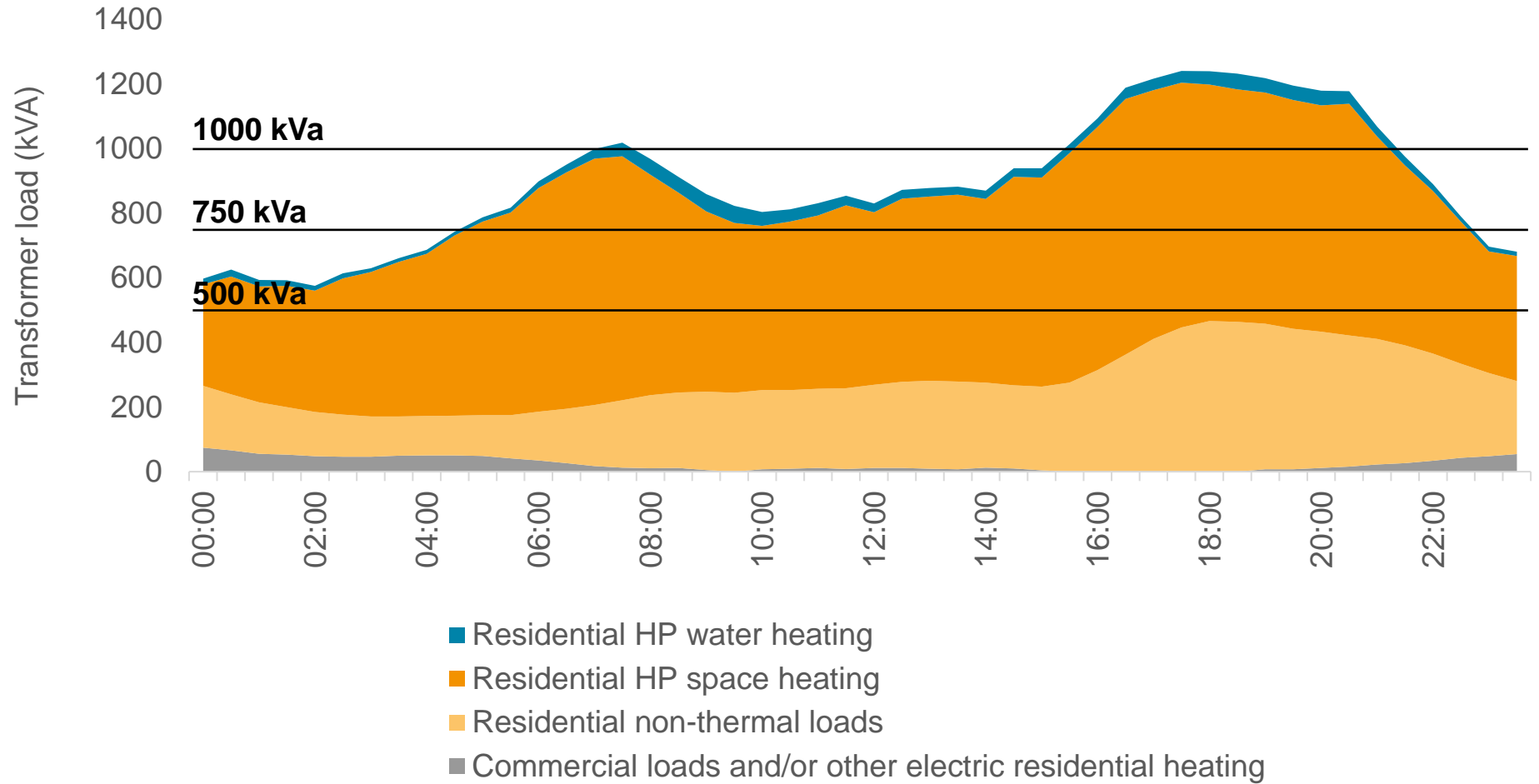
# How much electrical load will heat pumps add?

## An example distribution transformer

300 homes

70% with HPs

Cold winter weather (-4.5C)



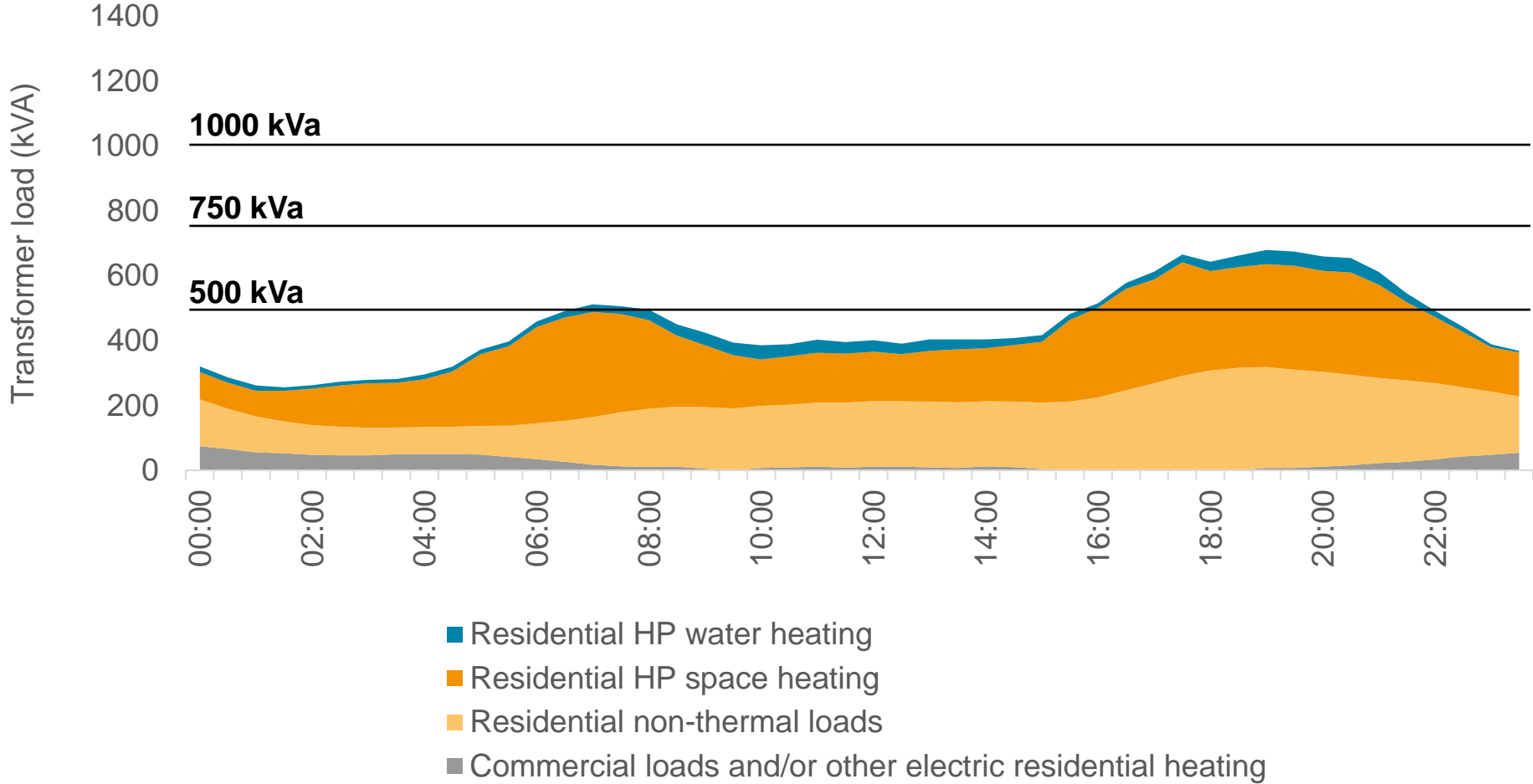
# How much electrical load will heat pumps add?

## An example distribution transformer

300 homes

70% with HPs

Average winter weather (+4.5C)

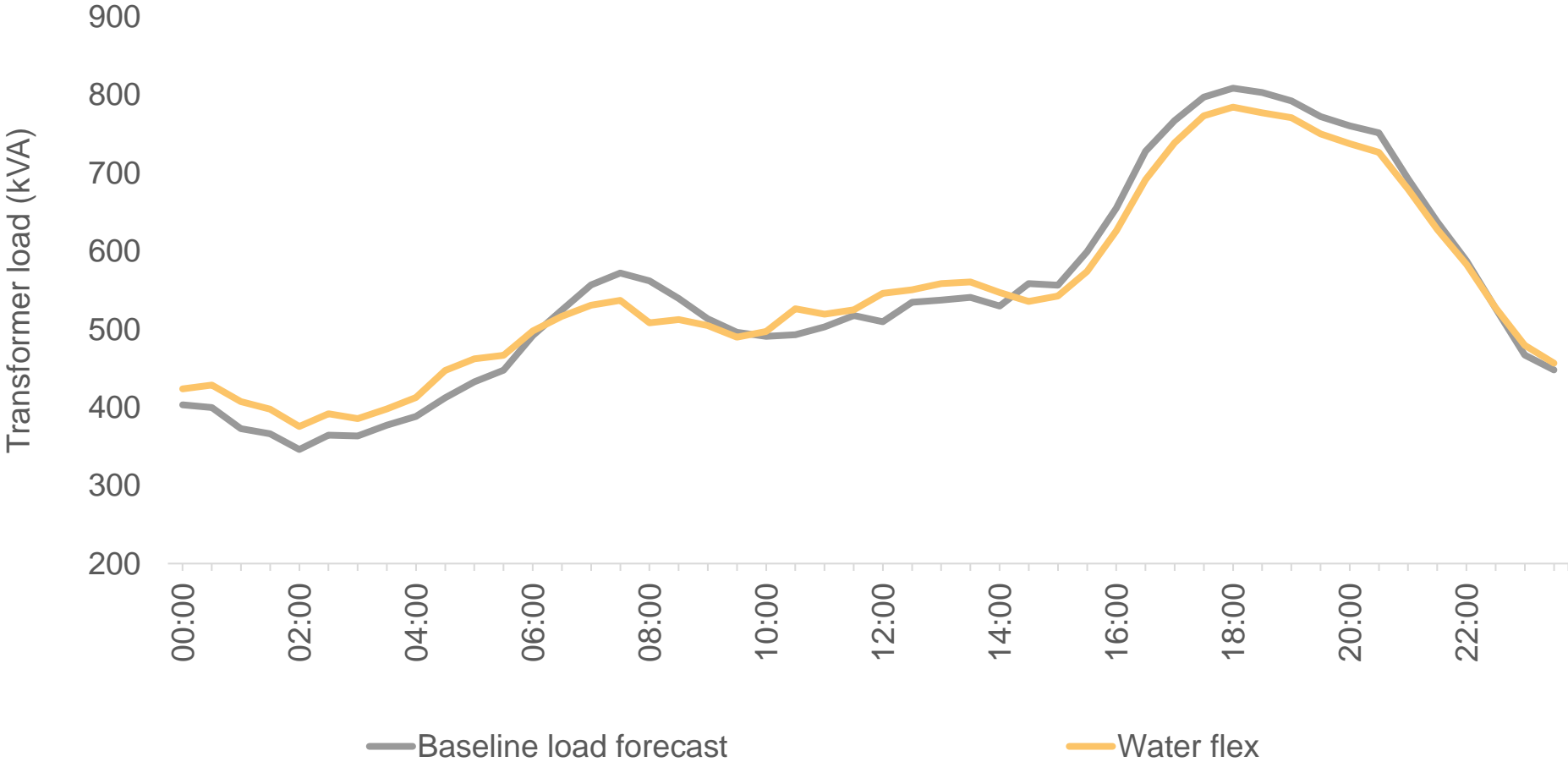




# How much could demand side management help?

## An example distribution transformer

- 300 homes
- 30% with HPs
- Cold winter weather (-4.5C)
- No hot water generation peak periods



# How much could demand side management help?

## An example distribution transformer

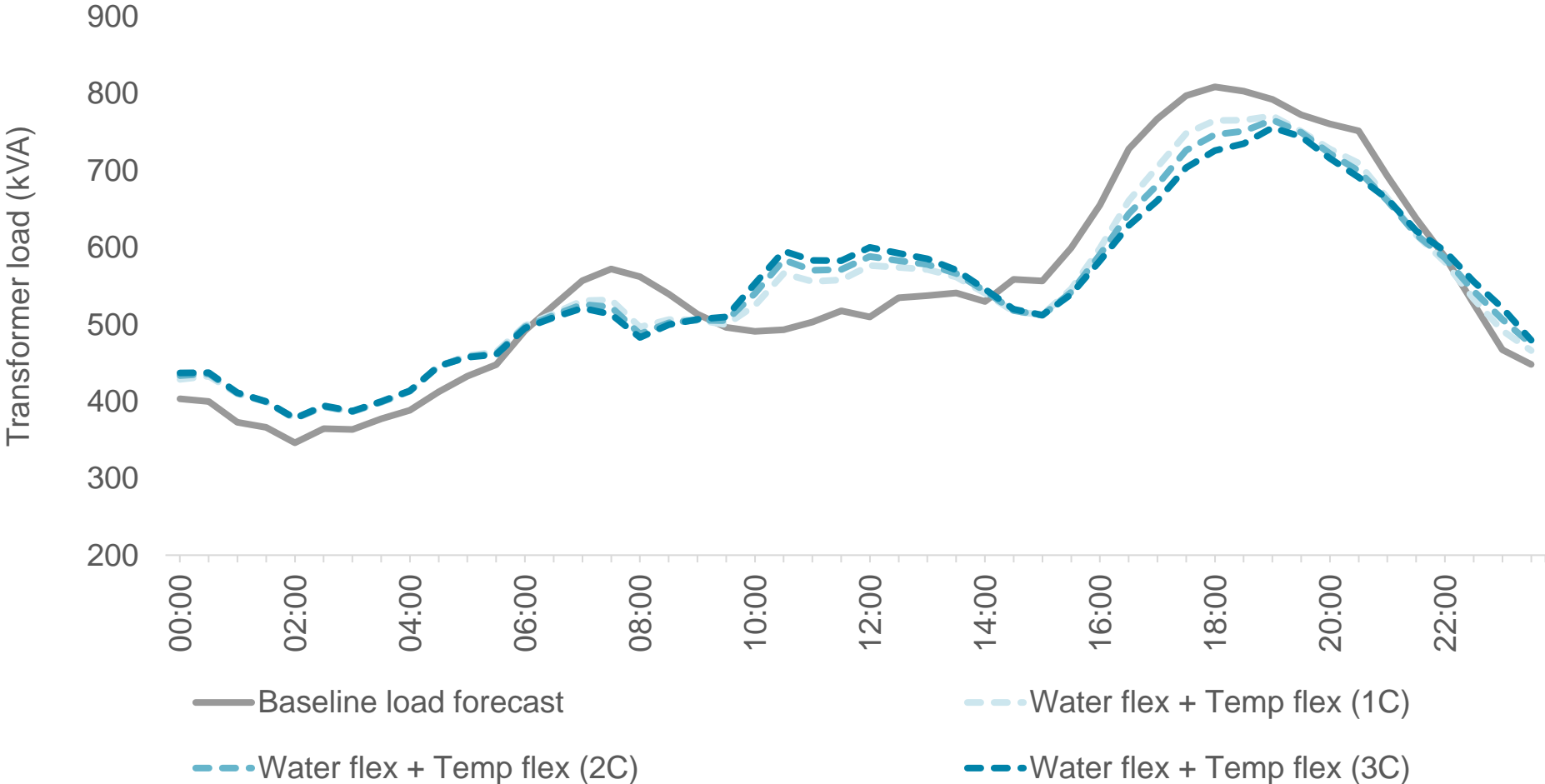
300 homes

30% with HPs

Cold winter weather (-4.5C)

No hot water generation peak periods

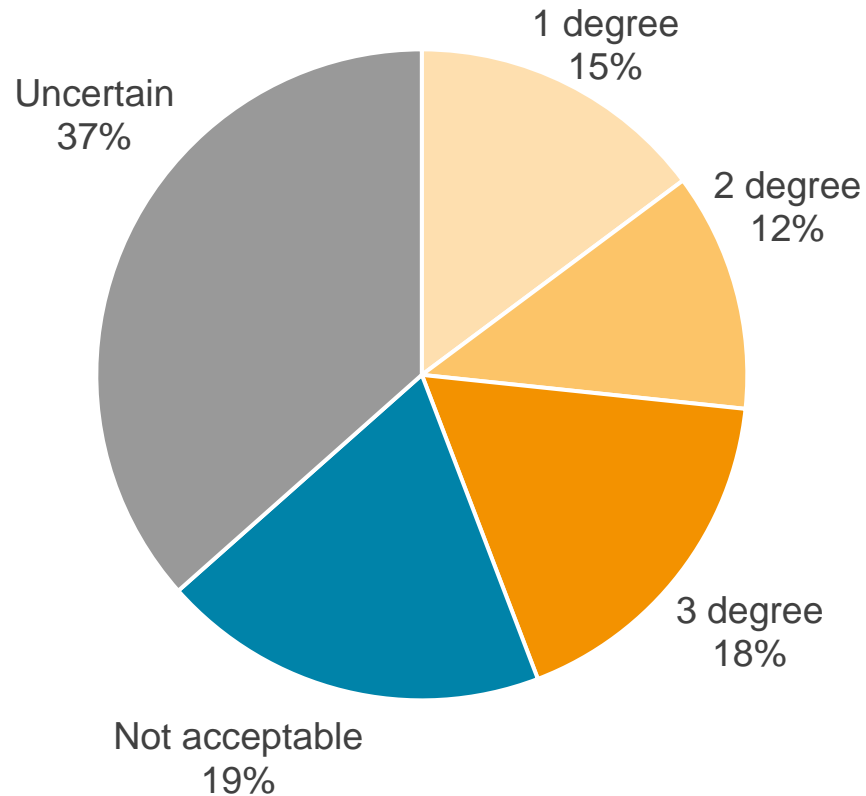
Lower temperatures in peak periods



# Will households provide demand side response?

## Evidence from customer research

### Acceptable temperature change for energy bill savings



*“I think people should be able to use what they need, when they need to use it, because that's what they're paying for.”*

*“I'd be quite happy to sit with a throw on and watch TV. I wouldn't freeze to death, but I've no objections to turning it down.”*

# How much could demand side management help?

## An example distribution transformer

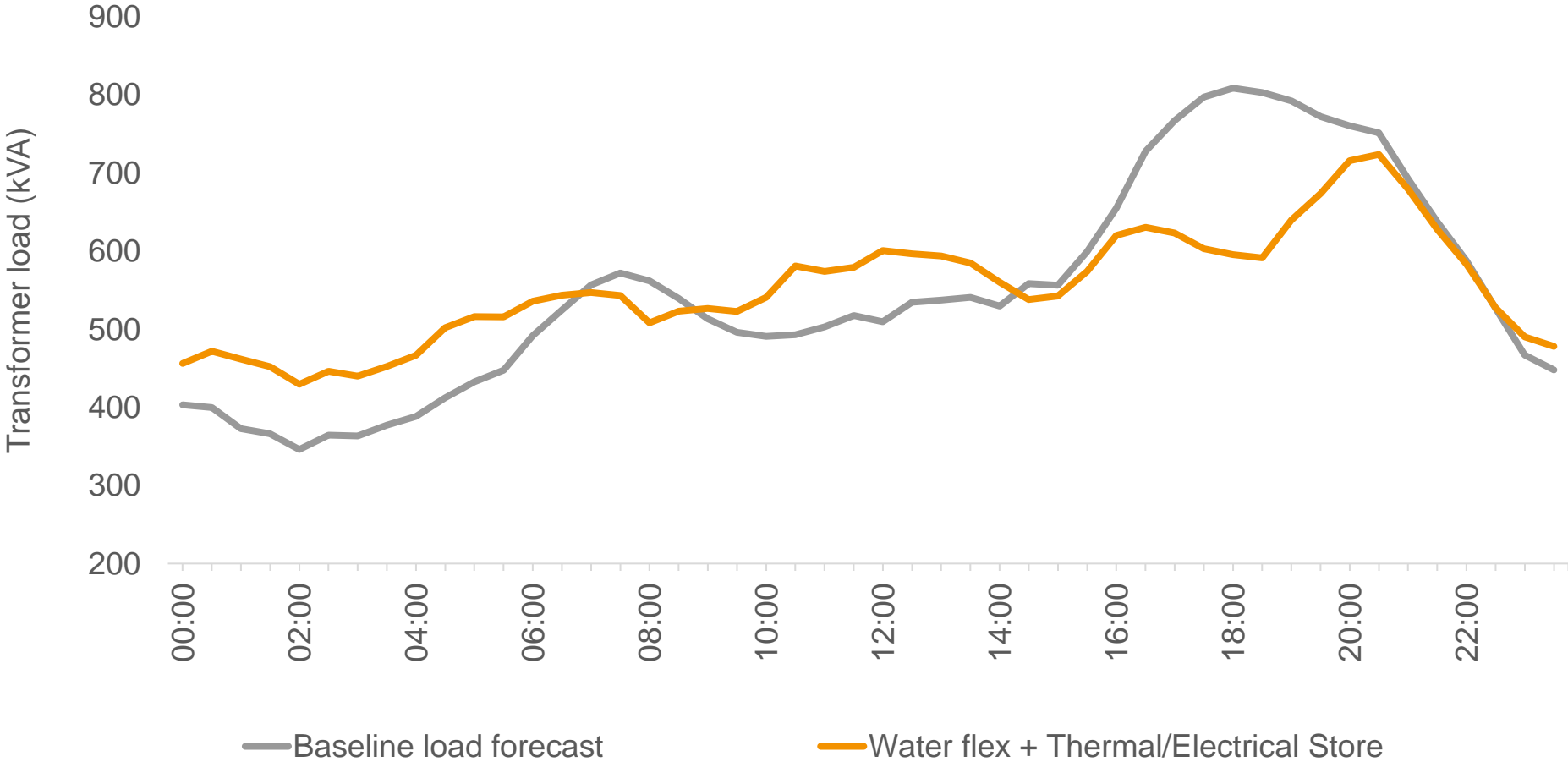
300 homes

30% with HPs

Cold winter weather (-4.5C)

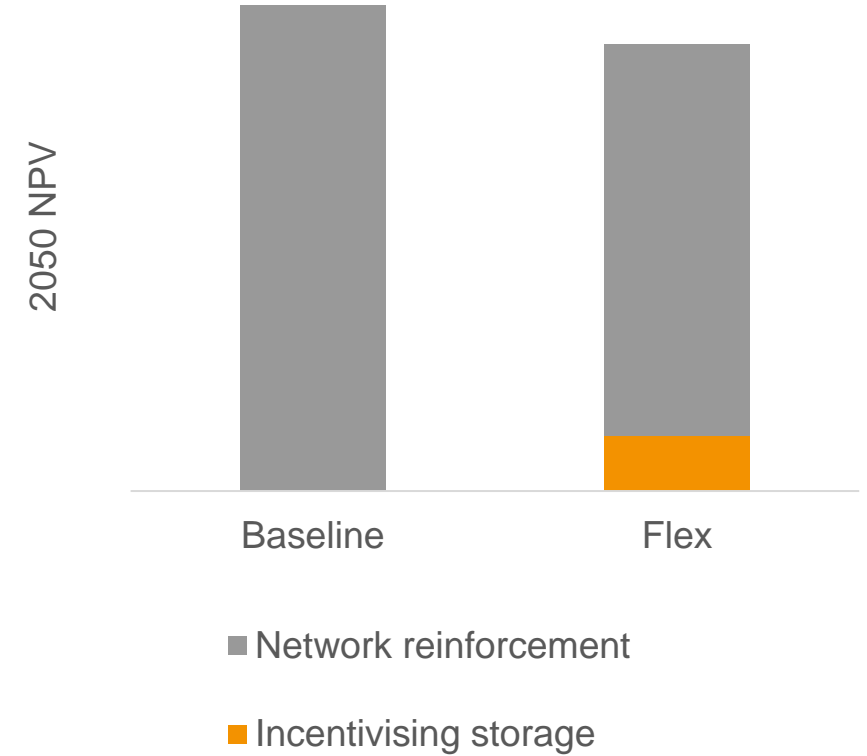
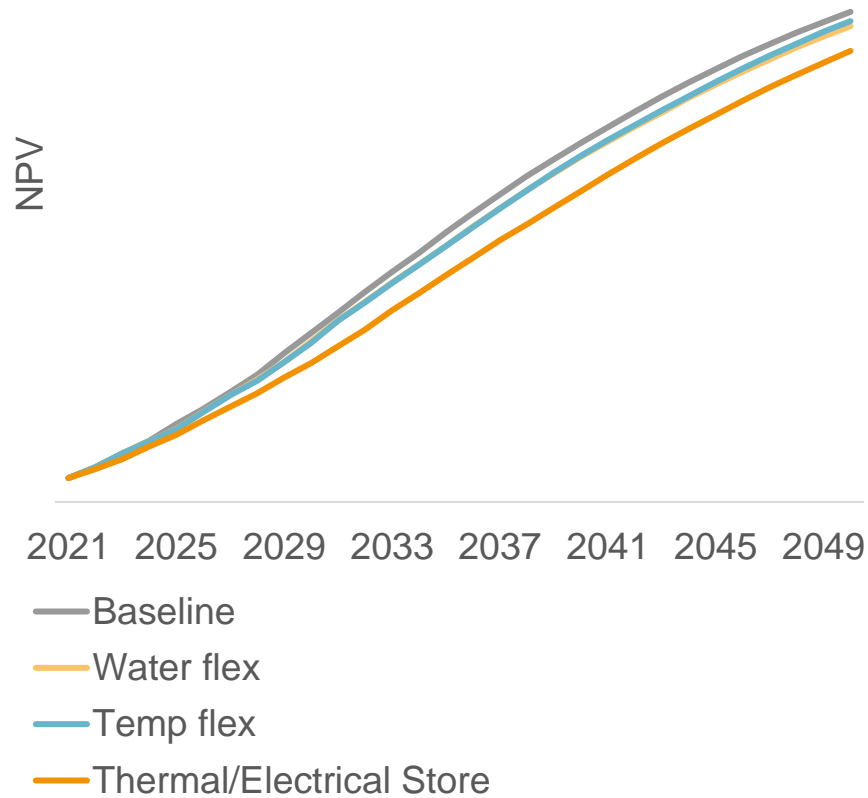
No hot water generation peak periods

Thermal or electrical storage in all homes



# Is demand side response cost effective?

## Network level cost benefits



# Key takeaways

## For heat pump producers and installers:

- Generate hot water outside evening peak
- Include as much storage as possible
- Include connectivity

## For regulators, energy suppliers and network operators:

- Encourage / support energy efficiency
- Require connectivity
- Incentivise demand shifting

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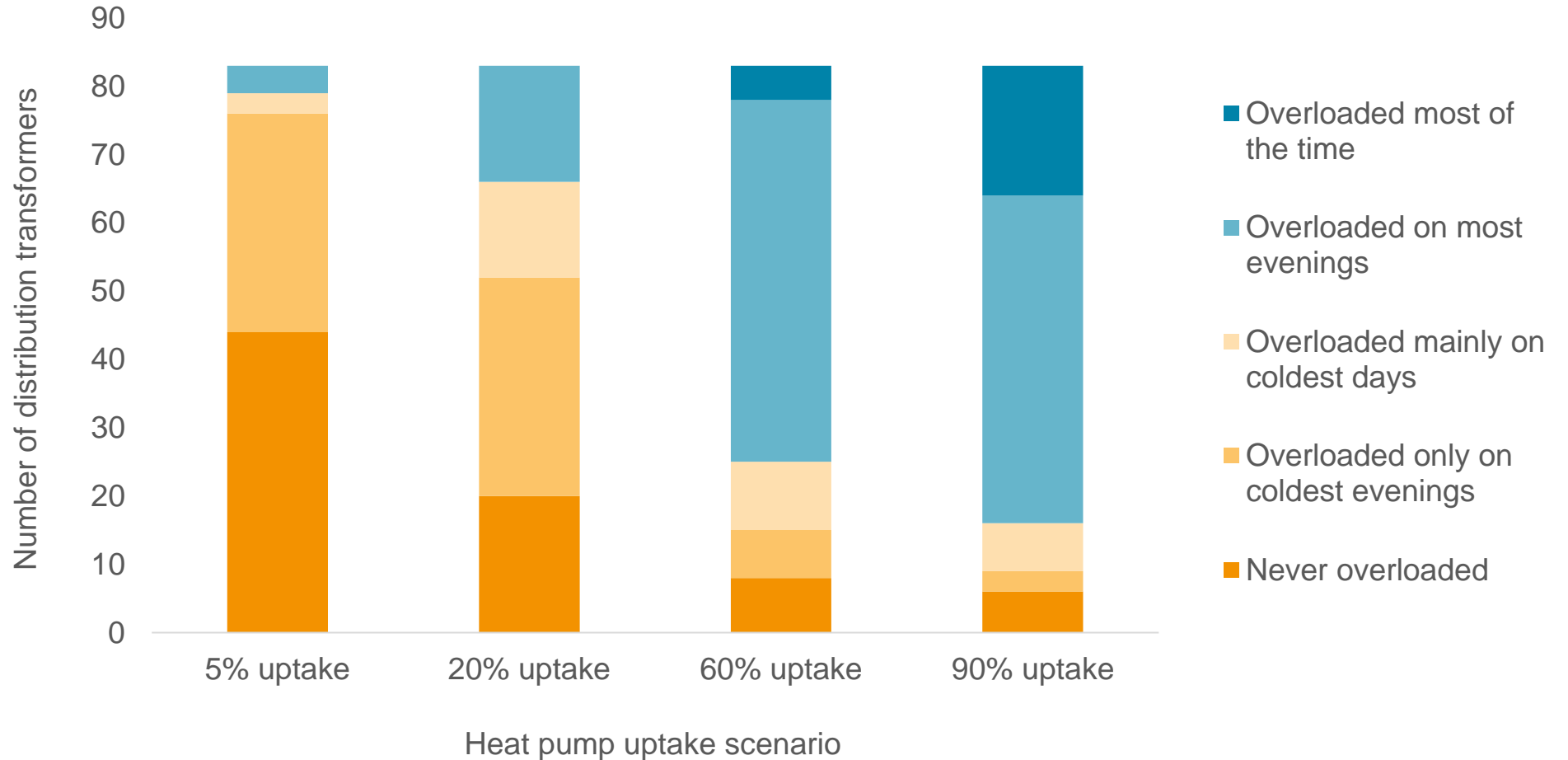
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# How much of the network will be overloaded\*?

## A sample of distribution transformers

\*Overload relative to nameplate rating





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