Temporary Use Bans – A Reality Check

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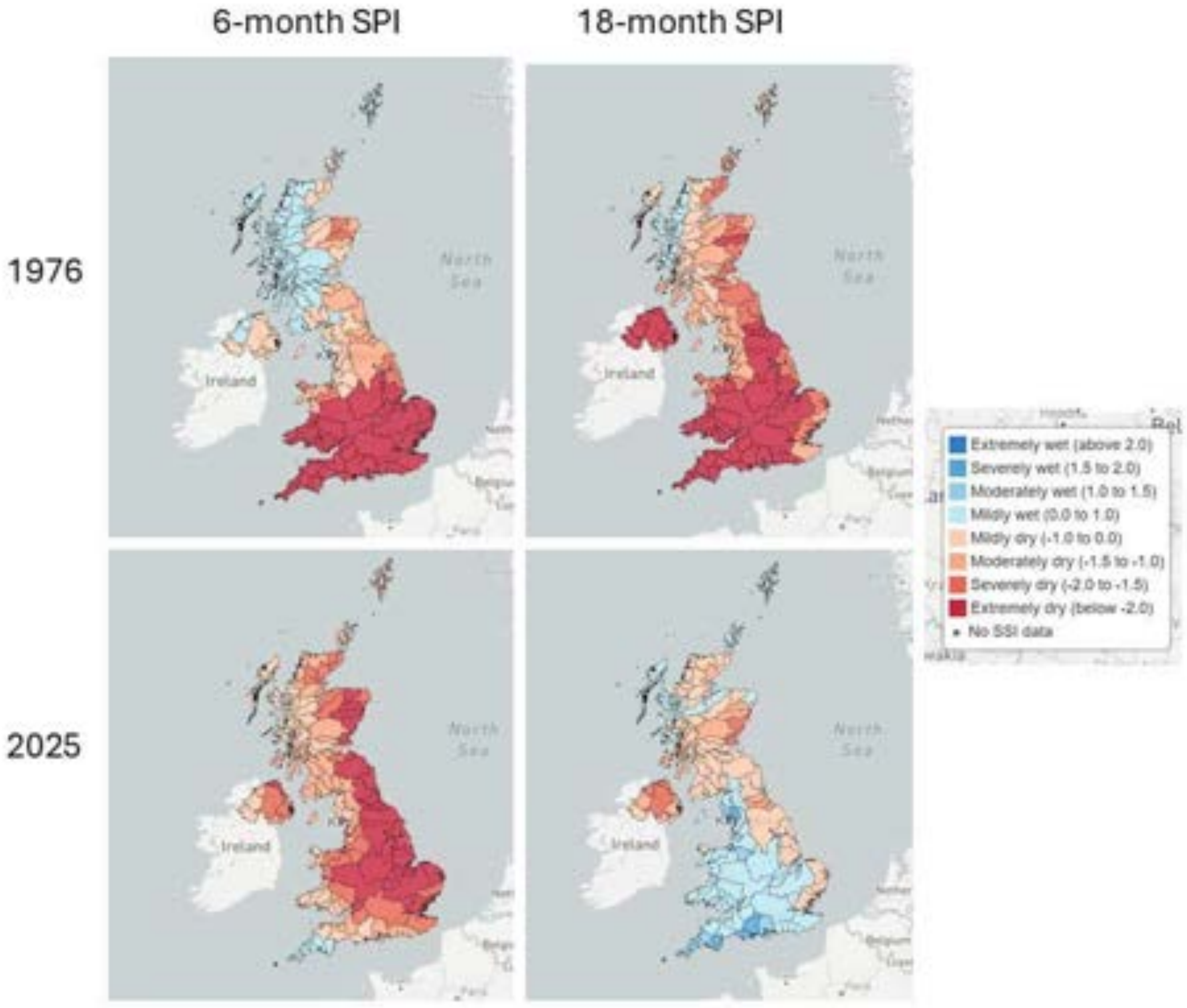
UKWIR's project lead was Oluseyi Onifade and UKWIR's project manager was Paul Henderson

1976 and 2025

1976 was preceded by dry weather, 2025 was not.

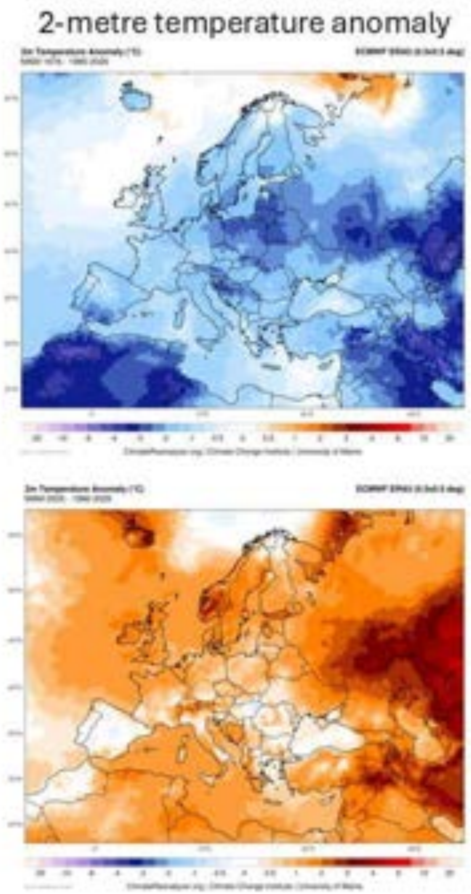
Baker, L, University of Reading
https://blogs.reading.ac.uk/weather-and-climate-at-reading/2025/how-does-the-uk-summer-so-far-compare-to-the-extreme-hot-dry-summer-of-1976/



1976 and 2025

Spring 1976

Spring 2025



Spring of 1976 was not hot, 2025 was much warmer across the whole of Europe

Summer of 1976 was hot, 16 days of >30^{O}c

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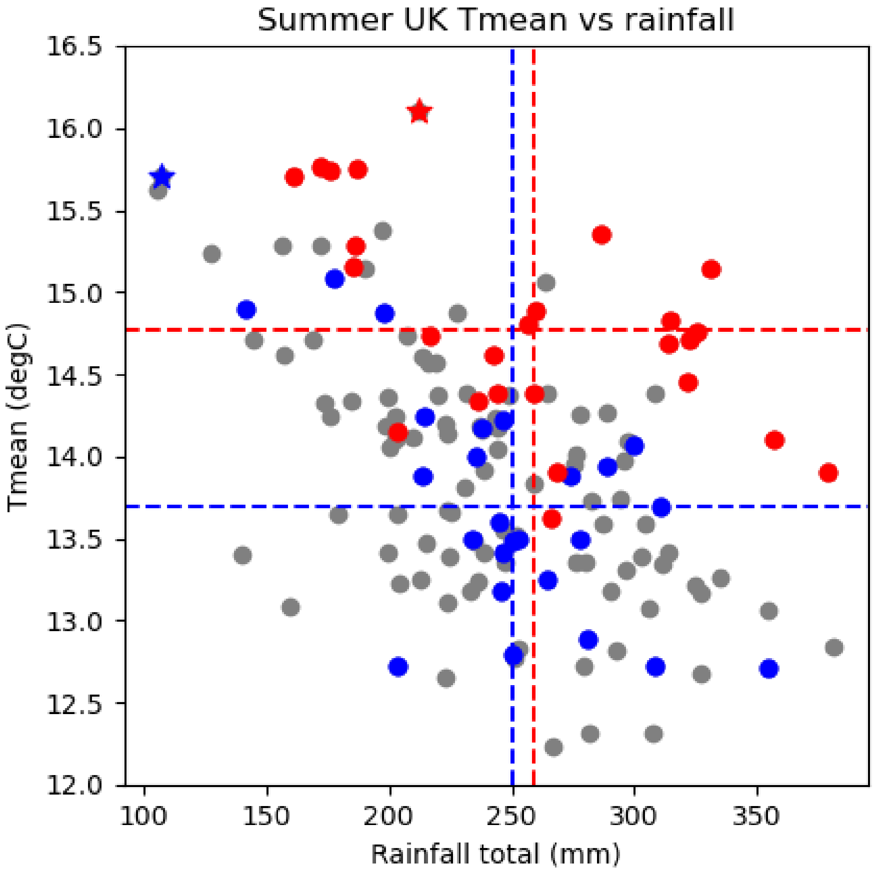
https://blogs.reading.ac.uk/weather-and-climate-at-reading/2025/how-does-the-uk-summer-so-far-compare-to-the-extreme-hot-dry-summer-of-1976/

Baker (2026), Weather (submitted)



TUBs are a key tool to managing water resources during a drought. They are included in levels of service.

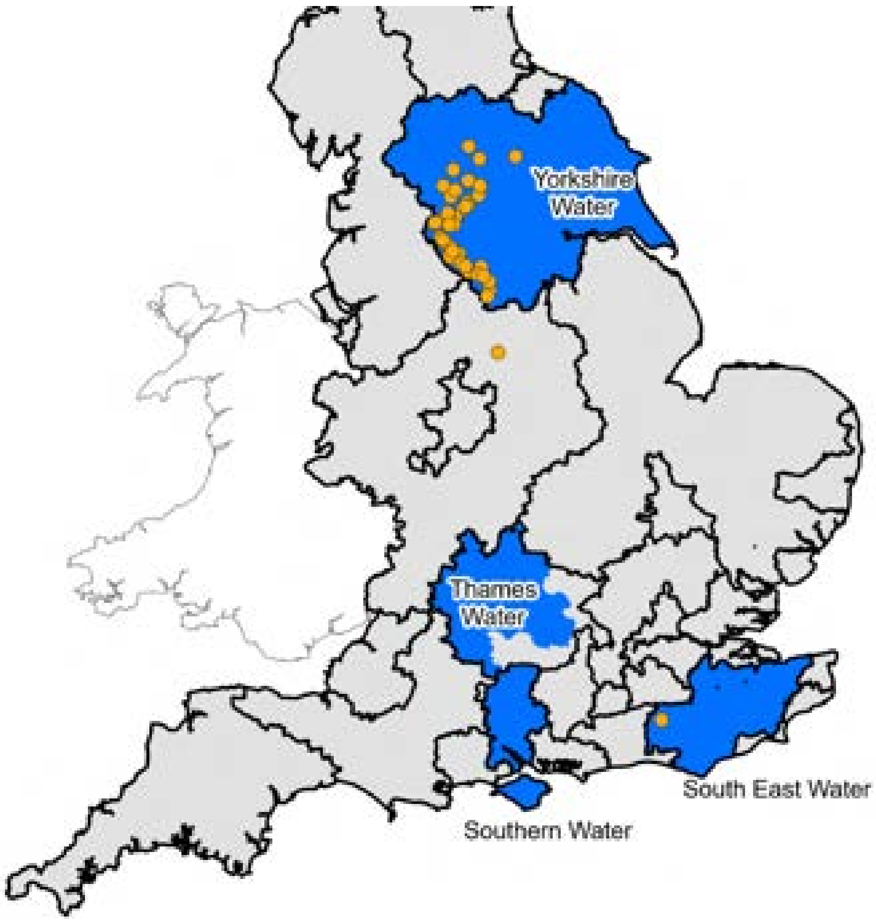
All water companies in England did some communication campaigns.

Four companies applied for TUBs.

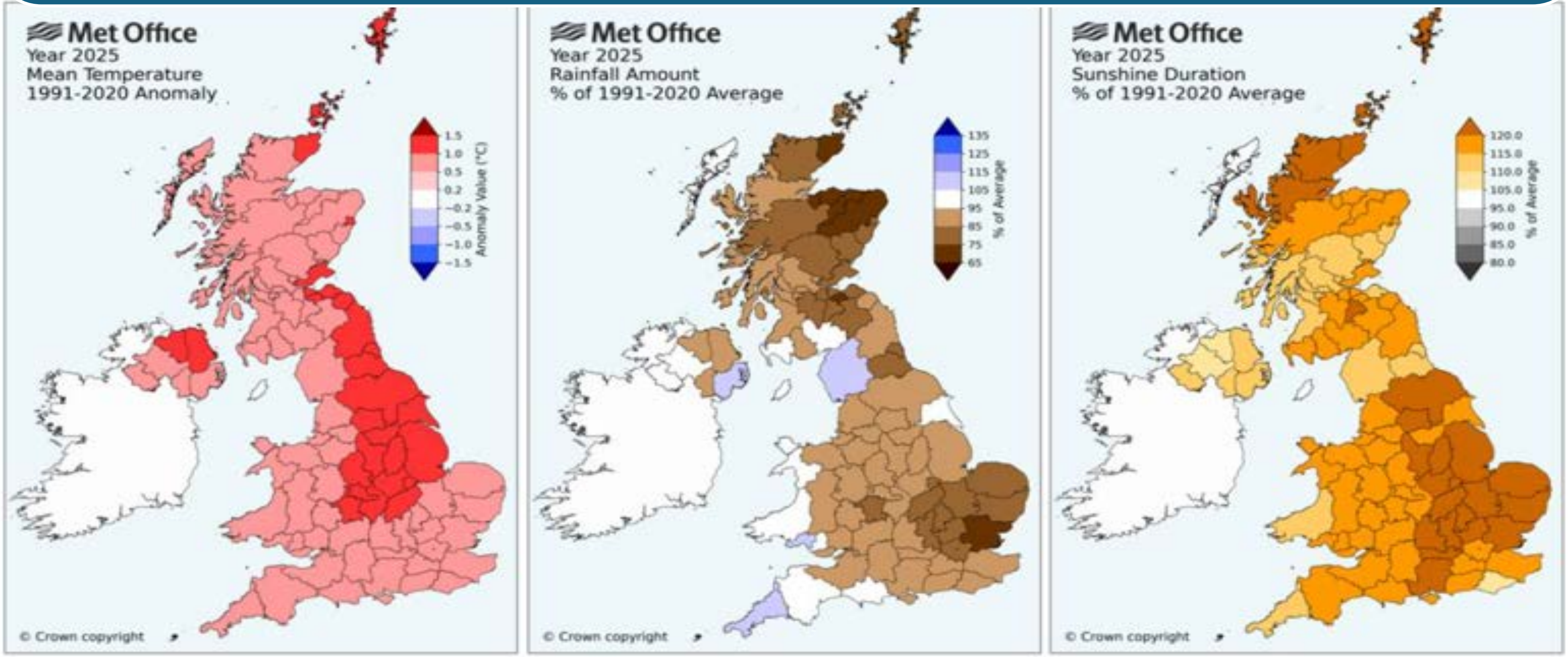
TUBs were not for every WRZ.

Drought permits and orders were issued to allow changes in abstraction.

Some companies got close to NEUBs.

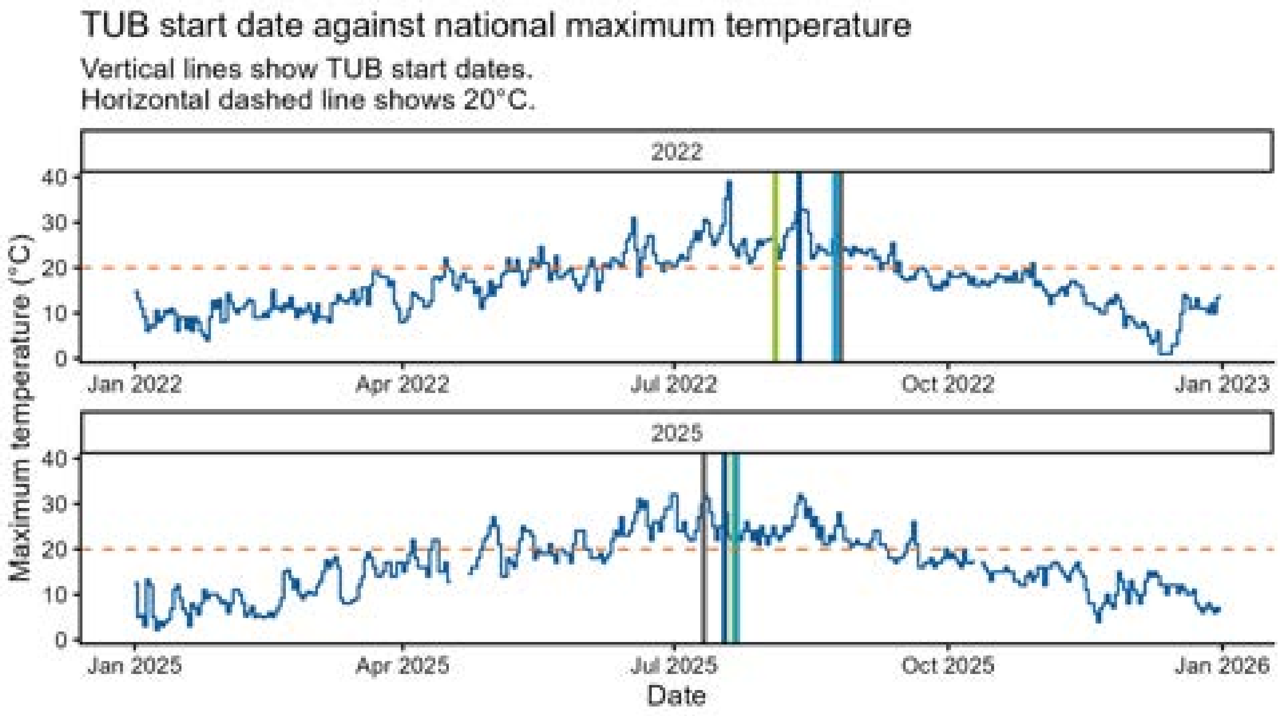


UKWIR commissioned an urgent piece of work, whilst the restrictions were still in place, to understand what impacts communication campaigns and TUBs had on demand: Review of the impacts of early implementation of Communications Campaigns and Temporary Use Bans in 2025 (Summary report).



Timing of TUBs

- In 2022, all four TUBs started in August.
- In 2025, all TUBs started in July, capturing more of the summer drought.
- However, there was a hot period before any TUBs in 2025, and three major temperature and demand peaks.
- High consumption during these earlier periods will have increased stress on resources, even if they pre-dated drought triggers.



- Data was collected from four companies with a TUB in 2025, and two without.
- Companies provided data at DI, DMA, and individual household level.
- This combination of regions and scales allowed a more granular analysis, representing both different areas and property types.
- Statistical techniques were applied to all datasets to quantify the impacts of TUBs, as well as other drivers of demand.

DI

- Mix HH, NHH, leakage
- Daily consistent datasets
- Long time series
- Homogenous across companies

DMA

- Contains mostly HH, but some NHH and leakage too
- High temporal resolution
- Shorter time series
- Less consistent across companies

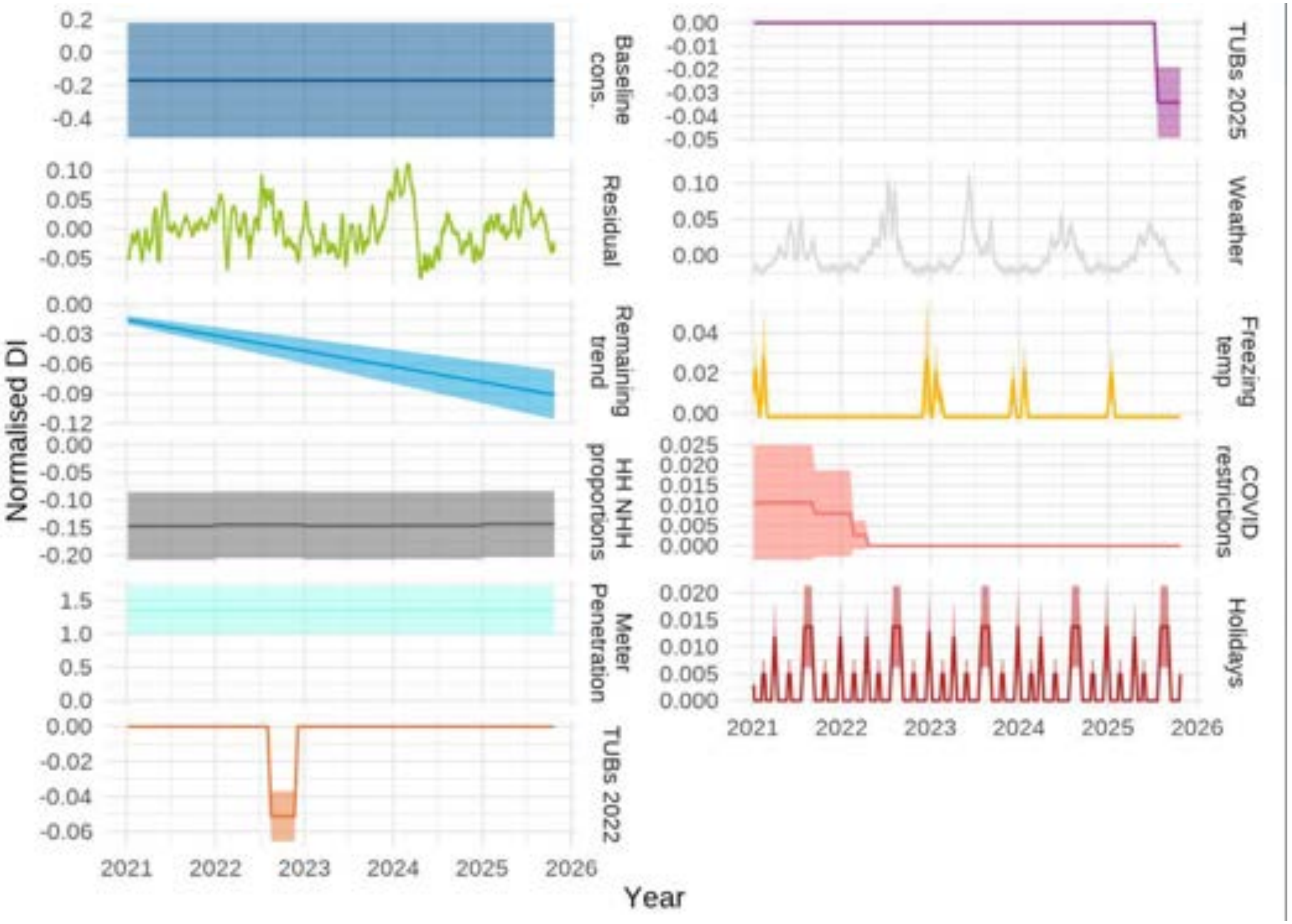
HH

- Direct HH readings
- Might include some CSL
- Heterogeneous quality of data across companies
- Various time series length, but generally shorter than DI and DMA

Application of temporal decomposition – DI

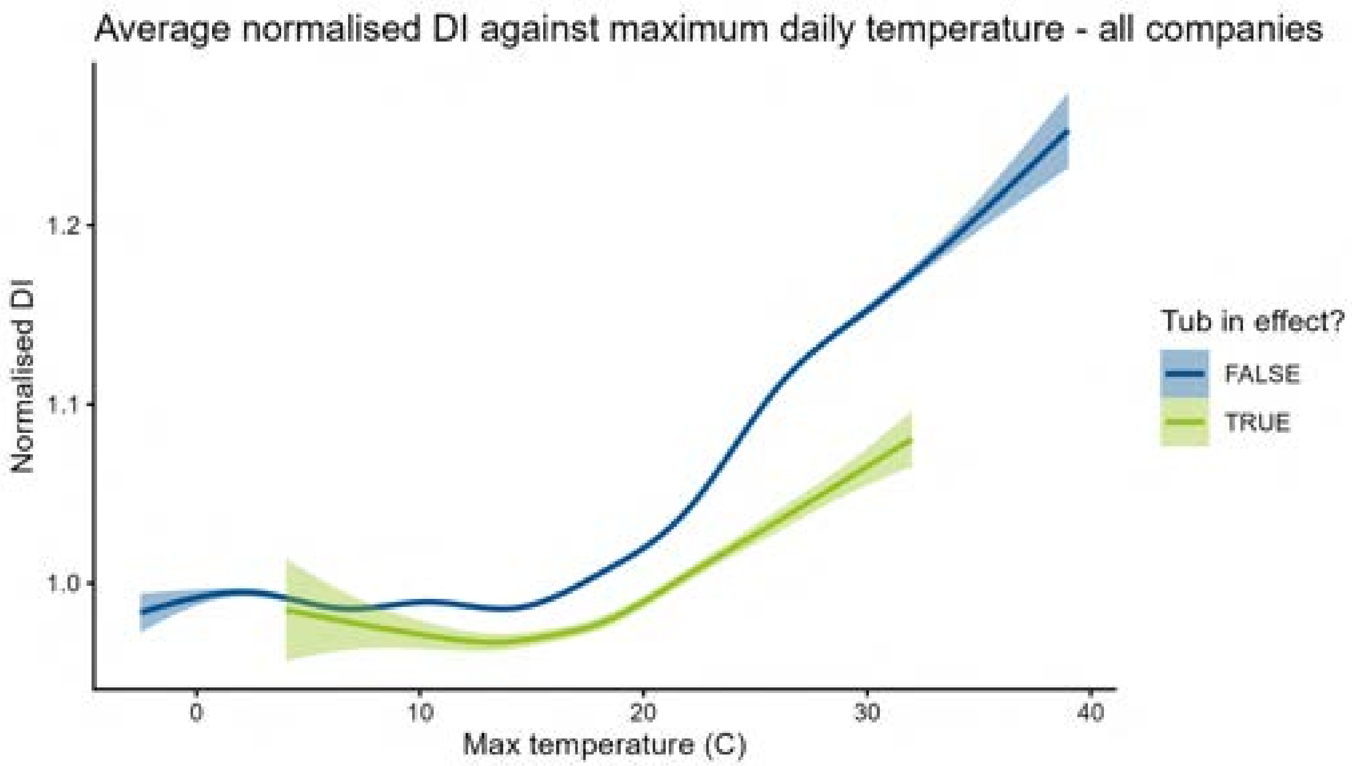
An example plot for one WRZ is provided here. As it is applied to normalised DI, the components can be interpreted directly:

- We observe a realistic impact of weather and freezing spells.
- COVID-19 results in increased DI, as do holiday periods.
- There are some trends due to HH/NHH proportion, meter penetration, and other uncaptured structural trends.



Relationship between temperature and DI

- DI is relatively stable for temperatures below a certain threshold.
- Above this threshold, DI increases in line with temperature.
- TUBs seem to mitigate some of this increase, having a seemingly larger effect as temperature increases.
- This threshold temperature is important in both deciding how to apply TUBs, and how to include them in plans.



DMA data

Considered effects

- Weather
- Seasonal effect
- Weekends and holidays
- % meter penetration
- Customer cohort
- COVID-19
- Consumer price index
- MNF as a proxy for leakage
- Offset by number of properties
- TUBs
- Interaction terms

Model development

- DMA sample selection
  - Temporal data coverage
  - Initial model performance
  - Diversity in DMA sizes
- DMA analysis
  - Covariate and proxies
  - AIC-based model selection
  - Linear models and GAMs

Estimation

- Estimation of historical TUBs
  - Predict total flow (TUB) with TUBs
  - Predict total flow (NT) with no TUBs

$$\%\text{ change in flow} = \frac{\text{flow(TUB)} - \text{flow(NT)}}{\text{flow(NT)}} \times 100\%$$

- TUB impacts as function of
  - Weather – max temperature
  - ACORN modal class
  - Average garden size

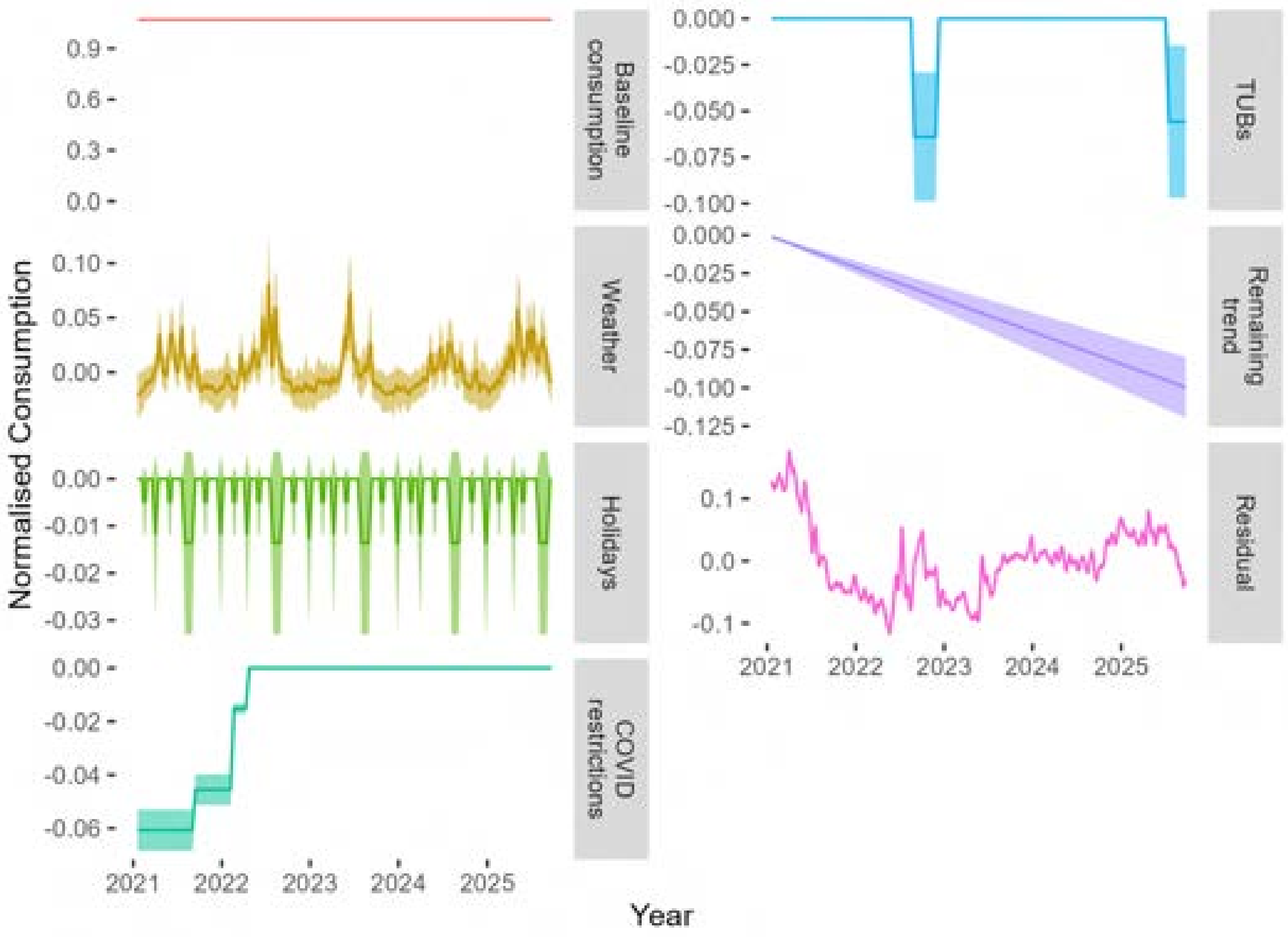
Application of temporal decomposition – HH

There are some key differences between the DI and HH analysis:

- HH analysis is a more ‘direct’ measurement (no NHH, limited leakage), at property level.
- Data sets are much bigger (there are thousands of properties).

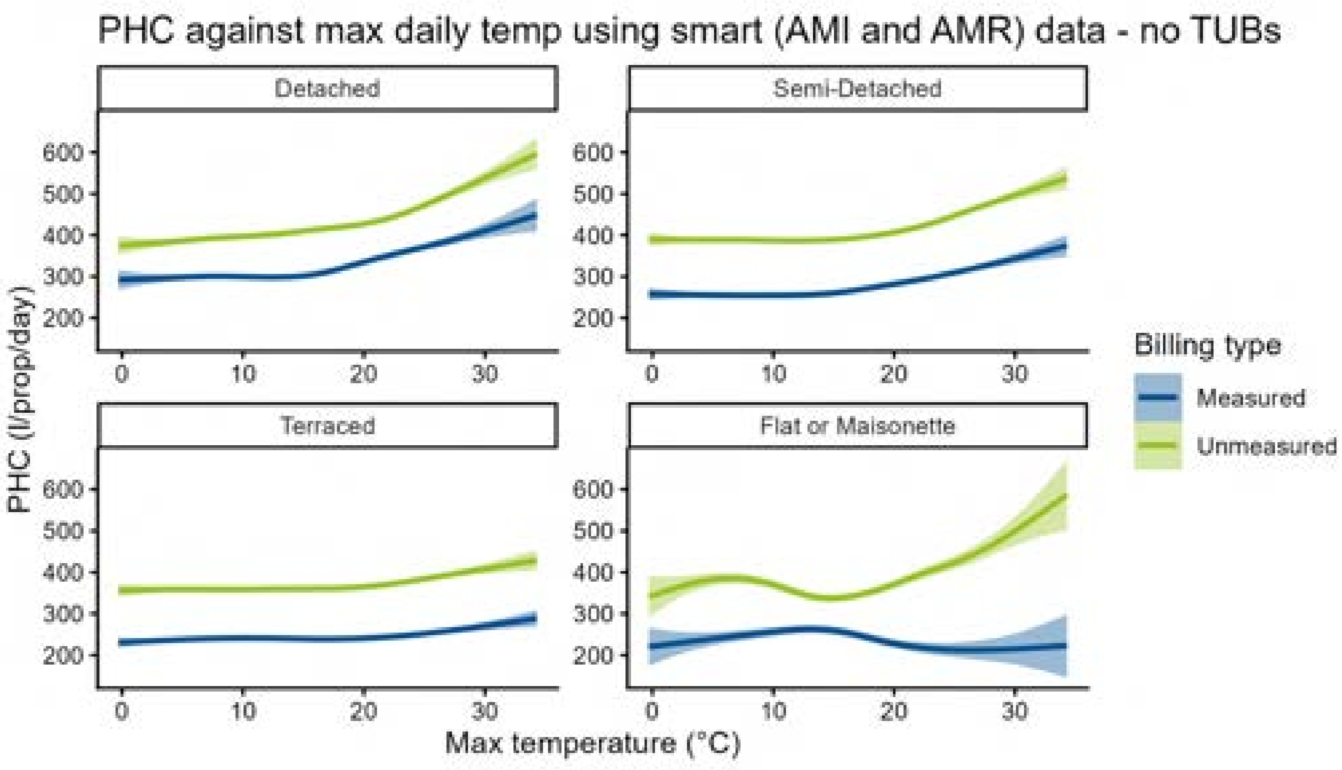
BUT

- The data quality is more heterogeneous.
- Data is not representative of company level (i.e. all unmeasured IHM in one company).



Relationship between temperature and household consumption

- Household consumption is relatively stable for temperatures below a certain threshold, for all property types and measured and unmeasured properties.
- A similar pattern is seen in detached, semi-detached, and terraced properties – although the effect seems stronger in detached properties. This is likely to relate to garden size.
- Flats and maisonettes show a slightly different profile. Measured properties so no change with temperature, while unmeasured properties see an increase as temperature increases.



Results – some warnings

- The results are complex and need to be interpreted and used carefully.
- If you plan to use them, we suggest you review the information provided in the report.
- The results are very specific, it is difficult to infer what would have happened in 1976, but we draw some broad conclusions.
- Distribution Input data should be used to answer the question “how much water was saved by the TUBs implemented in 2025 in each Water Resource Zone?”, while District Meter Area and Household analysis give additional context around where this water was saved and behaviour by different customer groups.

At a DI level…

- We have derived the estimation of the impact of TUBs on DI for all WRZs affected by TUBs in 2025.
- Based on this we could estimate the impact on companies (considering only the WRZs where TUBs were in place in 2025)

Company	Effect of 2022 TUB	Uncertainty	Effect of 2025 TUB	Uncertainty
Company B	-0.3%	±1.6%	-4.5%	±1.4%
Company C	+0.3%	±1.5%	-2.4%	±1.50%
Company D	-1.9%	±1.5%	-3.0%	±1.70%
Company F	-2.2%	±1.5%	-1.7%	±1.5%

At a DMA level…

- The DMAs used are not representative of each company, they are samples
- Savings vary with temperature
- So the more hot days there are, the larger the savings

Conditional TUB impact x Likelihood of conditions = Estimated TUB impact

Max temp (°C)	Mean % change
< 17.5	-1.01%
17.5 ~ 22.5	-2.09%
22.5 ~ 27.5	-3.15%
27.5 ~ 32.5	-4.20%

x

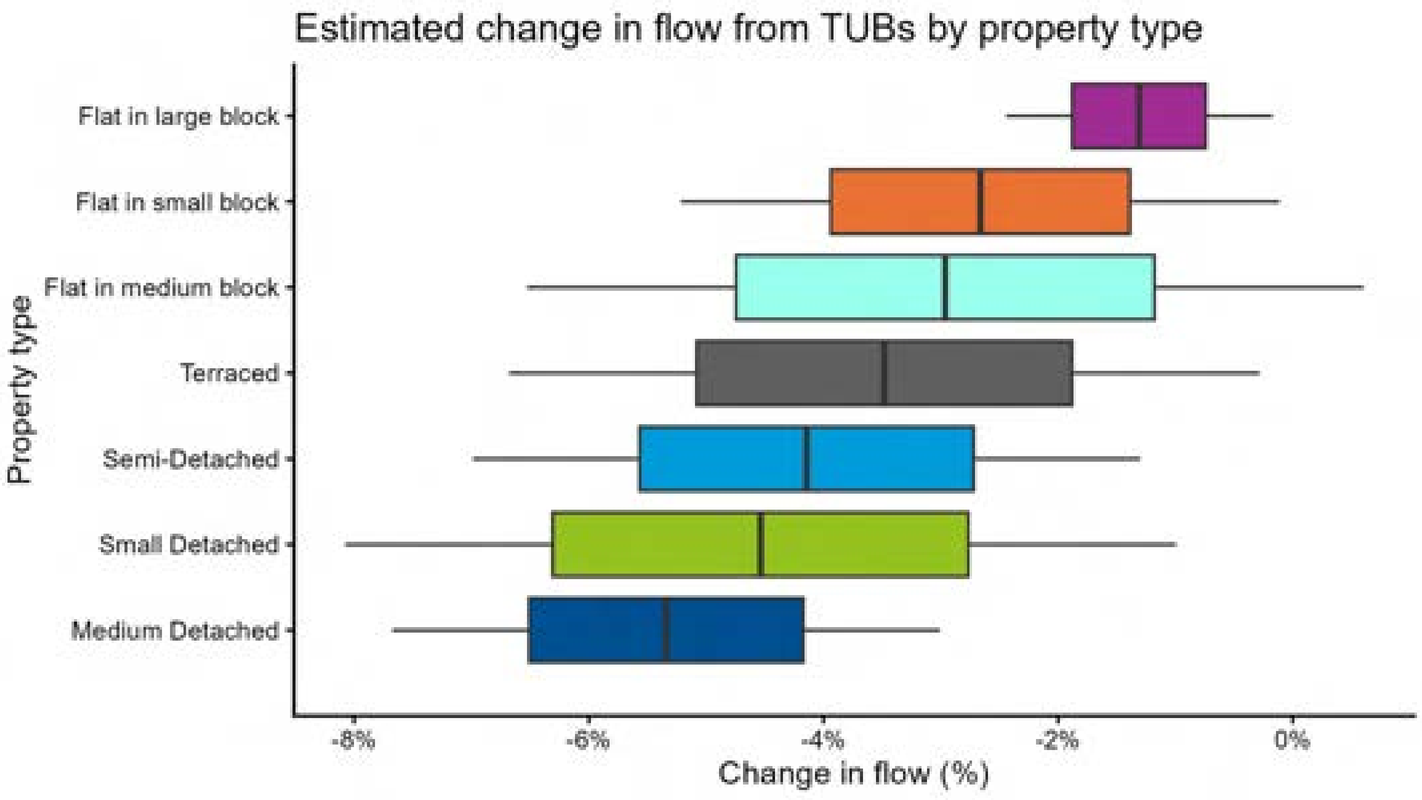
Max temp (°C)	TUB 2022	TUB 2023	TUB 2025
< 17.5	61%	8%	39%
17.5 ~ 22.5	31%	88%	52%
22.5 ~ 27.5	6%	4%	9%
27.5 ~ 32.5	2%	0%	1%

=

TUB 2022	TUB 2023	TUB 2025
-1.23%	-2.82%	-2.01%

At a HH level…

- Savings from unmeasured households are greater than measured households.
- Savings again vary by temperature
- The savings vary by property type



Results

The extensive data sets and analysis show that the impact of TUBs follows a more complicated behavioural response than previously considered:

- The savings from TUBs vary depending on temperature, location and property type, interestingly rainfall is not a big factor.
- Savings on unmetered properties were greater than measured properties in the studied samples.
- The largest impacts are in larger detached houses, during very hot days, which in 2025 were mainly in early summer.
- The smallest impacts are on smaller properties, when the temperature is milder.
- Savings from TUBs are impacted by the number of hot days above a threshold (>20 degrees, although the threshold varies by region).
- This project demonstrates that estimating the savings from TUBs is more complicated than previously understood.
- A simple number or percentage is therefore insufficient to estimate the savings from TUBs

Conclusions

- TUBs are a useful tool for managing demand in a drought.
- Their impact will vary depending on a range of measurable factors which have been presented and analysed in this project, including property type, demographics and weather.
- The impact of TUBs should no longer be defined as a single percentage value.
- Communication campaigns are a necessary pre-cursor to TUB implementation. However, it is challenging to measure their direct impact in reducing water use.

So what?

- We will have more droughts
- Companies are investing in additional water supply resilience, but TUBs will still be needed
- Companies can use this data to prioritise investment, campaigns and research
- We need to be wary about over-stating the benefits of TUBs – they are a key tool in drought
- More research could be undertaken:
  - Is there TUBs fatigue?
  - Who ignores TUBs?
  - What will TUBs impacts be in a hotter UK?

So looking back to 1976....

Restrictions were more severe in some parts of the UK than TUBs.

Things have changed a lot since 1976:

- Many more flats, apartments and maisonettes – TUBs have less of an impact on consumption in these property types
- Much more metering – TUBs have less of an impact on measured properties
- Generally hotter – TUBs have more of an impact in hotter weather, and rain has much less impact
- Increase in affluence – possible increase in non-essential use (garden watering etc)
- Leakage has gone down – leakage not affected by TUBs
- Less industrial demand – not affected by TUBs