PUBLIC FIRST
A SHGH Company

The Risk of Water Shortages

Modelling the impact of higher than expected water demand on water deficits and the water available for house building

May 2026

Public First was commissioned by Water UK to assess the impact of higher-than-anticipated water use on water availability at national and Water Resource Zone (WRZ) level in 2030 and 2035. We were also asked to estimate how many homes could be at risk if the resulting water deficits were addressed by constraining housebuilding.

To do this, we developed evidence-based tests for the three main drivers of water demand: household water delivery, non-household water delivery, and distribution system leakage. Non-household water delivery and distribution system leakage could be analysed directly, allowing us to assess the potential for each to exceed planned levels. Household water delivery required further deconstruction into three components - population growth, per capita household consumption, and customer-side leakage (USPL). Of these, population growth was excluded from the analysis: since it functions as a proxy for housing growth in Water Resource Management Plans (WRMPs), any demand attributed to it cannot meaningfully be "paid for" through reductions in housebuilding.

Together, these three tests - covering household delivery, non-household delivery, and distribution leakage - form our central projection. We compare this against the planned demand and supply-demand balance set out in WRMPs to estimate water deficits at the Water Resource Zone (WRZ) level, before aggregating the results to produce a national estimate of shortfall.

We were also asked to convert these water deficits into an estimate of the number of new house builds, benchmarked against the government's target of delivering 1.5 million homes, that could potentially be at risk were these deficits to be mitigated by reducing housebuilding.

This analysis has been prepared for Water UK, alongside detailed data tables setting out the full results. A summary of the key findings is provided in this note, and maps showing the projected number of new homes for which water supply is not expected to be available within the supply-demand balance under the central high demand projection are included in Annex A.

Projection for water use in 2030 and 2035

Every five years water companies are required to produce draft 25-year Water Resources Management Plans (WRMPs) which are then approved by the Secretary of State for the Environment. These plans set out how much water companies think will be needed over the long term to support population growth, climate change and environmental improvement - reducing the amount of water we take from rivers and groundwater. These plans also have to set out how this demand will be met - through a combination of increasing supply, such as building reservoirs, and reducing leakage and household and non-household water use.

WRMPs set out assumptions about how much water will be saved through reductions in household and non-household demand and reductions in distribution system leakage at WRZ level. For the latest round of planning, covering the period 2025-50, water companies were required to assume that targets for demand and leakage reduction will be met[1].

We were asked to develop evidence-based tests for three key drivers of water demand - household water delivery, non-household water delivery and distribution system leakage - and use these to project water demand at a WRZ level over the next 10 years. We then compared these projections with those in WRMPs to estimate WRZ deficits and aggregated these results to produce a national estimate of water shortfall.

Water Availability and House Building

Water UK also asked us to explore what this could mean for water availability to support new house building. Although it is challenging to predict, water is considered to be available to support new housing where the supply-demand balance within a WRZ is positive and will remain positive after the development[2]. The supply-demand balance in a WRZ is the volume of water a company expects to put into supply in that zone plus 'headroom'.

In its Water Resources Management Plan guidance document the Environment Agency acknowledges that 'Given there is uncertainty in all forecasts [water companies] should include an uncertainty allowance relating to [their] supply and demand forecasts depending on [their] chosen methods. This is known as headroom'[3]. Headroom is intended to cover uncertainties in modelling as well as actual uncertainties in future forecasts for factors such as climate change and population growth.

In the water sector, headroom is considered a necessary requirement and something to be protected when deciding on planning applications, for example. For this reason water companies should not plan to eat into headroom when responding to planning enquiries about water available to support growth.

The relationship between water availability and housebuilding is complex. Local plans - including projected housing development - are taken into account in the preparation of WRMPs. However, by the time those projected developments materialise as specific planning applications, it may have become apparent that the relevant WRZ has entered a supply-demand deficit and is drawing into headroom. In such circumstances, this may influence the outcome of the planning application.

Public First was asked to estimate the scale of housebuilding that would need to be foregone in order to eliminate our projected water deficits against the supply-demand balance. In effect, the analysis models the impact on housebuilding if reduced housing delivery is used as a lever to offset the increase in water demand driven by non-household water delivery,distribution system leakage, and two of the three variables used to determine household water demand - per capita household consumption and customer side leakage (USPL).

We were asked to model a rate of housebuilding consistent with the Government's target of delivering 1.5 million homes over the course of this Parliament - equivalent to 300,000 homes per year. We then assumed that the population would grow in line with housebuilding (i.e. that new homes built would be filled with people, assuming average rates of occupancy). This assumption underpins the population

[1] Water demand Environment Act target delivery plan - GOV.UK
[2] Water Resources Planning Guidelines
[3] Water resources planning guideline - GOV.UK

growth projections described above. Together with the four other variables included in our modelling, it drives additional water demand and the resulting supply deficits.

Our analysis of water availability to support housing is based on the following assumptions:

- Distribution system leakage - follows the 10-year historical trend.
- Non-household water demand follows a flat aggregate projection, with additional demand driven by growth in the data centre and hydrogen sectors (this is evidenced by analysis previously carried out by Public First).
- Household per capita water consumption and customer-side (household) leakage per capita follows the 10-year historical trend.
- Patterns of population growth are aligned with areas identified for growth through the government's target to deliver 1.5 million additional homes between 2025 and 2030. For 2035, population growth is aligned with the assumption that the government renews its target to deliver an additional 1.5 million homes between 2030 and 2035.

Although the assumptions above are reasonable, as set out in the main report, Water UK also asked us to explore what would happen if elements of the projection did not follow historic trends and, instead, were in line with projections in water companies' Water Resources Management Plans. We believe the projections in company plans are more optimistic about water availability because water companies were required to assume that the government's ambitious targets for the reduction of water use in the Environment Act 2021 would be met. The four outcomes tested were:

- **Central Projection:** Distribution leakage, household water demand and non-household demand follow the trends described above, with additional pressure added by business demand from new industries - data centres and hydrogen production.
- **Distribution leakage follows target not trend:** Everything in the central projection takes place but distribution leakage is in line with projections in WRMPs.
- **Non-household demand follows target not trend:** Everything in the central projection takes place but non-household demand is in line with projections in Water Resources Management Plans.
- **Household demand follows target not trend:** Everything in the central projection takes place but household water consumption per capita and customer-side household leakage per capita are in line with projections in WRMPs.

Headlines

Our full results are contained in the data tables provided to Water UK. We summarise the headline findings below. The number of houses for which there will not be sufficient water increases considerably between 2030 and 2035 for three reasons:

- Over time the gap between the government's targets and historical trends gets larger. Given we are paying for this only through reduced housing delivery, the impact on house building is disproportionate.
- More homes are anticipated to be built between 2030 and 2035 (an additional 1.5 million) so there are more homes in total for which, if demand and leakage follow trends, there will not be sufficient water.
- Many WRZs currently hold surpluses that could support housing delivery before 2030. However, our projections indicate that these surpluses are likely to be exhausted within that timeframe, limiting their availability for future development.

Houses for which there will not be sufficient water due to a negative supply-demand balance, assuming the Government's 1.5 million homes housing target.

	2030	2035
Central Projection	1,081,541 homes	2,084,279 homes
Distribution leakage follows target not trend	842,190 homes	1,706,316 homes
Non-household demand follows target not trend	1,020,234 homes	2,003,316 homes
Household demand and customer-side leakage follows target not trend	676,243 homes	944,850 homes

Driving additional demand

Lower-than-expected reduction in distribution leakage

In this analysis we have assumed companies will follow the 10-year historical trend in performance on distribution leakage reduction. Leakage has been reducing in the last 10 years as companies seek to meet their regulatory commitments. However, leakage has not been reducing as fast as it is projected to reduce in WRMPs. If leakage reduction follows trend rather than very ambitious targets then by 2030 this would result in a shortfall of 372 million litres a day in water available for use - contributing to a negative supply-demand balance in our trend forecast. By 2035 this deficit will have increased to 410 million litres a day. While there are some new interventions which could, over time, support leakage reduction, there are also countervailing factors which could push leakage in the other direction. By 2030 water companies propose to roll out 10 million smart meters. Early data from leading companies suggests that once smart meters are rolled out, they could cut customer-side leakage by up to 20%[4]. However, this full benefit would not be realised until 2035 when the smart meter rollout is largely complete, and this saving would only account for two-thirds of water companies' WRMP leakage reduction targets for 2035.[5]

Assuming leakage will follow trends in spite of the smart meter rollout also accounts for countervailing trends which may limit these savings. For example, climate stress will increase pressure on the network. 2022 was a drought year and there was a roughly 3.5% increase in leakage, partly as a result of pipe

[4] Analysis based on published estimated savings per meter by Thames and Anglian Water, factored up to assume all properties in their region have smart meters.
[5] For example, Anglian Water is planning to cut leakage by 31.3-33% by 2035.

bursts caused by ground movement as the soil dried out[6]. Secondly, many companies have achieved large progress to date through addressing 'low hanging fruit' - relatively cheap interventions such as pressure management. That means further progress will both be more expensive and relatively harder to achieve.

On this basis, and absent further data, we feel justified in projecting current trends on leakage reduction over the last ten years into the future.

Lower-than-expected reduction in per capita household demand

We have assumed that household per capita consumption will follow the 10-year historical trend, which again is a shallower downward slope than that assumed in the Water Resources Management Plans. A core reason why we believe this to be the case is that while smart meters will drive down demand, this impact is likely to be small and potentially cancelled out by countervailing pressures. The latest Environment Agency summary of the annual review of Water Resources Management Plans already highlights a shortfall between water assumed to be available in water resources management plans and actual water available of 220 million litres per day.[7]

Water companies have a target to reduce household consumption by 10% by 2038[8]. Water Resources Management Plans assume this target will be achieved, which our trend analysis suggests will not be the case. As with leakage, the smart meter rollout is estimated to deliver significant savings - with companies assuming that smart metering will reduce demand by 13%.[9] However, this is based on properties moving from having no meter to having a smart meter. Previous studies have demonstrated that traditional meters can reduce consumption by 10-15%[10]. Because 75% of the 10 million properties expected to receive a smart meter by 2030 already have an analogue meter, the actual saving for most properties will be 3 percentage points in addition to savings from their existing meter[11].

As with leakage, there are countervailing trends which could see demand increase. For example, in the very hot weather in the summer of 2022 in the south east, demand increased by 36% on very hot days[12]. As the climate changes, and longer spells of very hot weather are expected in the summer, this will have a significant impact on the annual average consumption per person per day. If this weather was sustained over three weeks rather than three days due to changes in climate this would push annual average demand up by almost 2%.

The government's housing targets driving up household demand

House building provides another source of additional demand to that being modelled in the Water Resources Management Plans. We have incorporated the government target of 1.5 million homes by 2030 in our trend forecast. This is higher than house building assumptions used in Water Resources Management Plans which were based on local authority plans which were not based on mandatory housing targets. Additionally, the government's housing targets assumed a different pattern of growth

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[6] From around 2720 megalitres per day to 2820 megalitres per day.
[7] Environment Agency (2025), Water Resources 2024 to 2025: Analysis of the water industry's annual water resources performance
[8] Based on a reduction per person per day from 136 litres to 122 litres.
[9] Based on data from Thames water's metering programme. See Thames Water (2024), Water Resources Management Plan 2024 – Section 8 – Demand Options, p.49.
[10] Artesia (2021), The Benefits of Smart Metering
[11] See chart in CIWEM (2025), Work Smarter, not Harder: The smart meter revolution
[12] Artesia (2023), Water UK: Preparing for 2023 and beyond – an action plan for demand reduction, slide 11

than that assumed by existing local authority plans - notably a decrease in numbers of new houses in central London and an increase in new housing in the city's suburbs.

To incorporate the 1.5 million homes in our model, we first took the number of additional homes that Water Resources Management Plans projected would be built and found the difference between this and the government's target. This difference was then allocated in proportion to the projected housing growth rate in each WRZ. In doing so, we assume that an increase in the number of homes translates directly into an increase in population, reflecting a similar approach to that used in Water Resources Management Plans. The average number of people per household was calculated and used to convert the additional homes planned into a population number. We assume that the annual target for additional homes remains constant from 2030 to 2035 at the same level as in 2025 to 2030.

Lower than expected reduction in non-household demand

We have previously carried out extensive trend analysis in the non-household water sector. This strongly suggests that non-household water demand is no longer declining steadily as it was from 2005 to 2012. In fact, the analysis suggests that water use in the non-household sector is likely to be flat over the next ten years, at best.[13]

We suggest non-household water demand has not declined as much as expected for a combination of structural and behavioural reasons. Water Resources Management Plan forecasts assume that efficiency improvements, technological upgrades, and price signals will lead businesses to reduce consumption over time; however, in practice, demand has proven more resilient. This reflects continued economic and population growth in key sectors, limited incentives or regulatory pressure for some businesses to invest in water efficiency, and the fact that water costs often represent a relatively small share of operating expenses, reducing the urgency to cut usage. In addition, some sectors - such as manufacturing, food production, and healthcare - have inherently water-intensive processes with limited scope for substitution, while increased hygiene standards and operational requirements in others have, in some cases, pushed demand upwards rather than downwards. Our trend forecast therefore assumes that baseline business demand will be flat over the next ten years, but that on top of this there will be growth in water-intensive sectors - data centres and hydrogen production.

High growth industries driving additional non-household demand

Data centres

The rise of AI is driving a significant increase in demand for compute capacity and data centres. The government projects that the UK will need 6GW of data centre capacity by 2030, a threefold increase on 2025 levels.[14] Despite this, the Environment Agency's National Framework for Water Resources explicitly excludes data centres from its forecasts.[15]

We estimate the increase in water demand at a local level associated with the government's ambition and integrate this into our models so that these impacts are reflected in projected deficits. To do this, we use data on data centre energy consumption to estimate average energy use per facility, and combine this with National Grid projections of data centre energy demand to estimate the likely growth in the number of data centres by 2035.

[13] Public First (2026), Risking Growth: The impact of water deficits on businesses
[14] Department for Energy Security and Net Zero (2025), UK Compute Roadmap
[15] Environment Agency (2025) National Framework for Water Resources (section 9)

We then estimate average water use per data centre using consumption data supplied by MOSL for WRC's Water Efficient Data Centres report[16] and combine this with projected growth to derive the increase in water demand at the national level. Finally, we allocate this additional demand across water resource zones based on the current geographic distribution of data centres. This assumes that current location patterns are a reasonable proxy for future capacity, which we consider to be a credible assumption.

The above analysis does not capture the additional pressure that data centres will place on water supply systems in periods of peak demand. Water Resources Management Plans plan water supply based on annual average demand. Peak periods – such as summer heatwaves – are planned for through investment planning for treatment and distribution infrastructure (e.g. water treatment works capacity) rather than through water resources planning which examines storage capacity (e.g. reservoirs). Data centres predominantly use water for cooling and so will place additional strain on the network on hot summer days - which are also peak periods for other users. Water UK has calculated that if new data centre capacity is built in line with the least water efficient data centres, it could impose peak demands on the network equivalent to four times the daily capacity of the new Havant Thicket reservoir. As a result of this additional peak pressure on the network, data centres will therefore likely drive more investment in network upgrades than our analysis, which explores annual water usage, suggests.

Hydrogen production

The government has an ambition to create 10GW of hydrogen capacity by 2030 to support the decarbonisation of industry and is supporting initial projects in the north of England. The growth of hydrogen production is expected to place additional pressure on water resources, particularly in areas where new capacity is concentrated. To estimate the associated increase in water demand, publicly available data on the location and planned production capacity of hydrogen projects was collated. These projects are then mapped to WRZs to estimate the total additional hydrogen production capacity, measured in MW, in each WRZ by 2035.

Water demand per MW of production capacity is estimated using an approach similar to that adopted by Mathias et al[6]. We additionally assume that future production capacity operates at a 60% capacity factor, which is widely regarded as the minimum level required for commercial viability. The projected production capacity in each WRZ is then multiplied by the estimated water requirement per MW of capacity to calculate the total additional water demand in each WRZ.

Methodology: Converting water deficits to houses

To provide a clearer sense of the practical implications of projected water deficits, we were asked to estimate the extent to which additional demand - driven by non-household use, leakage, and per capita household consumption - and the deficits it generates would reduce the number of new homes for which there would be sufficient water supply available.

To model the number of houses for which there would not be sufficient water, we first calculate additional water demand at the WRZ level and subtract this from the supply-demand balance to derive the resulting deficit. This deficit is then converted into an equivalent number of homes using water resource zone-level data on per capita consumption, customer-side leakage, and average household size in the target year. We then compare this figure to the number of homes proposed within each WRZ and take

[16] The report scales from a sample to estimate an annual sector of 1,879,000 m3/year across 453 data centres. https://www.wrcgroup.com/uploads/Water%20Efficient/Water%20Efficient%20Data%20Centres.pdf

the lower of the two – the assumption being the deficit cannot be reduced using homes that are not planned to be built. For example, a WRZ may have:

- 10,000 homes planned by 2030
- a current water supply surplus of two megalitres a day
- average usage per person of 136 litres a day (the national average in 2024-25) and the national average occupancy of 2.36 people per household - and therefore household consumption of 321 litres per day.

In this case the additional houses would place 3.2 megalitres of additional demand on the WRZ and, absent any other action to reduce demand or increase supply, result in a deficit of 1.2 megalitres per day. This is equivalent to the water use of 3,700 homes, meaning only 6,300 homes could be built before the WRZ goes into water deficit.

Conclusion

The above analysis suggests that if household per-capita demand, customer-side leakage, non-household demand and distribution leakage follows historical trends rather than the government's targets, then there would only be sufficient water above the supply-demand balance for around 420,000 of the government's planned 1.5 million homes.

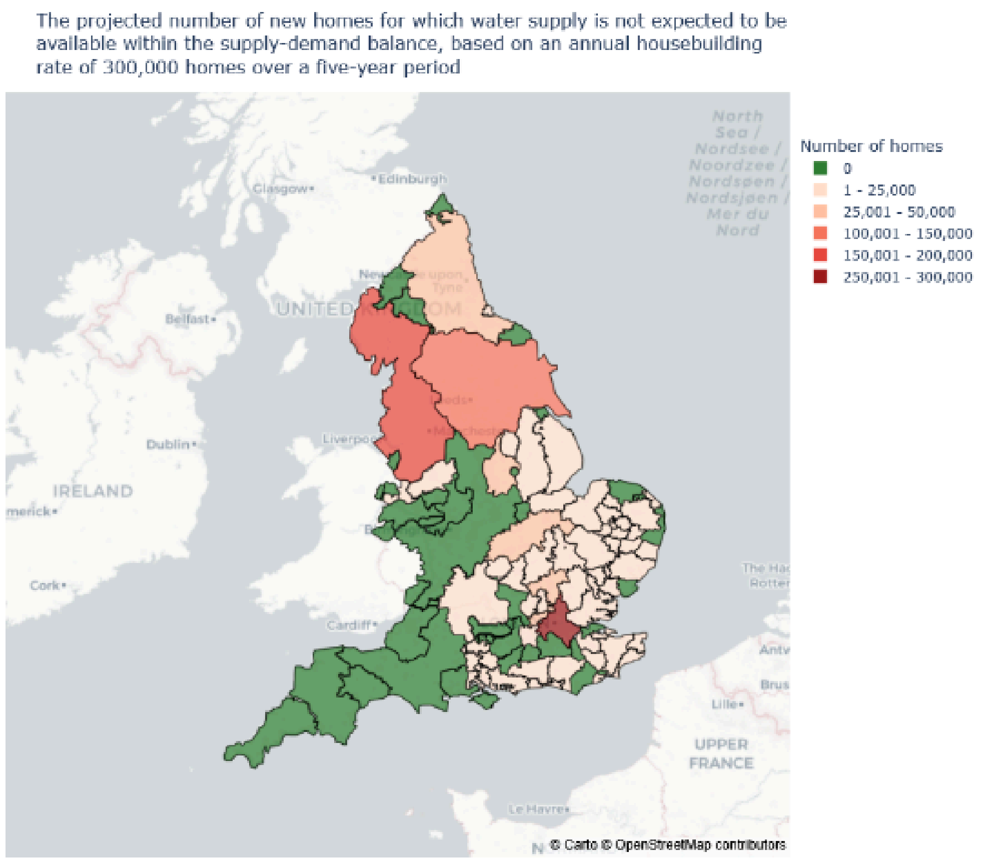
Key modelling sources

1. Environment Agency (2025) Water Resource Management Plan Annual Review Data. Available at: https://www.data.gov.uk/dataset/87b59684-3da3-45cf-8881-e4727cfd1415/water-resource-management-plan-annual-review-data
2. Environment Agency (2025) Water Resource Management Plan Supply-Demand Balance Forecast Collated Data. Available at: https://www.data.gov.uk/dataset/4eccde92-ca38-4e7e-b4b7-45a95079caf5/water-resource-management-plan-supply-demand-balance-forecast-collated-data
3. National Grid DSO & Regen (2025) Data Centre Impact Study: An analysis of the growth and impact of data centres in National Grid Electricity Distribution's licence areas. Available at: https://dso.nationalgrid.co.uk/downloads/15083/data-centre-impact-study2.pdf
4. Office for National Statistics (ONS) (2025) National population projections: 2022-based. Available at: https://www.ons.gov.uk/releases/nationalpopulationprojections2021based
5. Hydrogen UK, Hydrogen Project Directory. Available at: https://projectmap.hydrogen-uk.org/
6. Mathias, S et al.. (2025) 'Impact of decarbonisation on water availability in the UK', Sustainable Water Resources Management, 11, 105. Published online 8 September 2025. doi: 10.1007/s40899-025-01283-8

Annex A: The projected number of new homes for which water supply is not expected to be available within the supply-demand balance for the 2030 and 2035 central projections by WRZ

Available water supply definition used:
Supply-demand balance

Year:
2030



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Supply-demand balance

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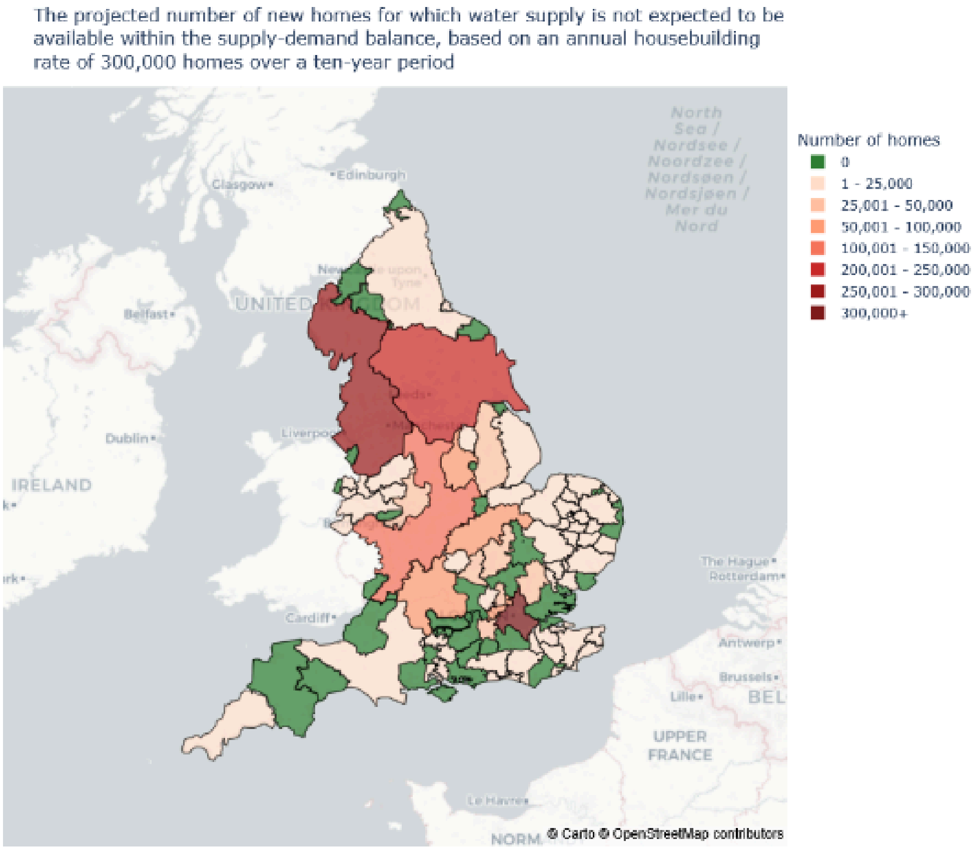
2035</td>
<td>
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