



# NHS Reusable Cups Trial

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The NHS goes through millions of single-use hot drinks cups each year. In practice, these cups are not recyclable and are ultimately sent to landfills or incinerated. To reduce the environmental impact of single-use cups, the University Hospital Crosshouse in Ayrshire partnered with Zero Waste Scotland to trial recyclable single-use and re-usable cups alongside a suite of measures to encourage re-usable cup usage among the hospital's ~5,000 staff. The trial was supported by cup manufacturers REACH and Amaray, and raw material producer Borealis.

## Background

Each year, 2.5 billion single-use hot drinks cups are used and discarded in the UK however, only 0.25% are recycled due to their difficult to separate plastic lining<sup>1</sup>. Yet these cups often end up in recycling waste streams, causing waste contamination issues. Single-use hot drinks cups can also escape the waste stream as litter, causing harm to the environment.

The most desirable means of managing waste is to prevent it; in the case of single-use hot drinks cups this is achieved by utilizing re-usable hot drinks cups. Many of the UK's biggest hot drinks retailers have implemented 25p discounts for customers using their own re-usable cup however, growing evidence suggests these are ineffective and charges on single-use cups have greater impact<sup>2</sup>.

## Implementing the trial

Existing plastic-lined paper and polystyrene (PS) single-use cups at University Hospital Crosshouse were replaced with recyclable single-use polypropylene (PP) cups provided by REACH. These were sold for 10p to encourage customers to use re-usable hot drinks cups.

Hot beverage prices were reduced by 10p to ensure the 10p cup charge was cost-neutral. To reduce confusion around recyclability, polystyrene soup cups were also replaced with the PP cup, though no price changes were enacted, meaning re-use rates for soup could not be tracked.

The dining room waste area was redesigned to improve recycling outcomes:

- A table was installed so customers could set trays down and dispose of waste more easily.
- Bins were repositioned with recycling first, and residual bins last to minimise 'dump and dash' behaviour.
- Cup recycling bins with liquid waste capture were installed to facilitate easy recycling.

## 8 Week Trial Conditions:

- Non-recyclable single-use hot drink & soup cups were replaced with recyclable single-use polypropylene (PP) cups.
- Hospital staff were provided re-usable, recyclable PP cups.
- A cost-neutral 10p cup charge was introduced with hot drinks.
- Staff using re-usable cup received stamps towards a free 10th drink.
- Waste area in dining room was redesigned and equipped with cup recycling bins.
- A survey was issued to staff to gauge sentiment on the trial.

## Key Results:

- Re-usable cup use rate increased from 1% to 43%, preventing 157 single-use hot drinks cups being wasted/day (~57k/year).
- Recycle rates for single-use cups rose from 0% to 75%.
- Hot drink sales increased by 10%
- Survey respondents strongly supported the trial, and cup charging more generally.

Blue re-usable hot drinks cups (also PP and recyclable) were provided by Amaray and branded for the purposes of the trial by Zero Waste Scotland. Hospital staff could collect a free re-usable blue cup from the dining room during designated times. In addition to paying 10p less for drinks, stamp cards were handed out to staff, allowing them to get every tenth hot drink for free when using any re-usable cup. A series of posters were placed around the dining room and at the tills (Fig.1), and an all-staff email was issued to ensure staff were aware of the trial and associated changes.

### Methodology

Till data collected before and during the trial was used to assess impacts on re-use rates and drink sales. Due to data issues, pre-trial re-use rates were inferred from data collected from Ayrshire Hospital. Results from a 1-day bin audit were compared against single-use cup sales over the same period to calculate the recycle rate and determine the environmental break-even point for the re-usable blue cups i.e. the number of uses needed to have a lower impact than the single-use cups. Finally, an online survey was distributed to hospital staff to understand their views on the trial.

**Your coffee's cheaper if the cup's a keeper**



**Disposable cups have always cost you 10p**  
**YOU CAN NOW AVOID PAYING THIS COST BY USING YOUR BLUE CUP**





**Why our blue cup is the best**



**No need to buy 10p white cup**

**Get every 10th hot drink FREE**

**Use again and again... meaning no waste!**




**Why pay for a cup?**

Did you know disposable cups make up 10p of the cost of your drink?  
 You can now **SAVE 10p** on every drink by using a re-usable blue cup



**WHITE CUP**  
Put me in the recycling

**BLUE CUP**  
Use me again and again




**University Hospital Crosshouse has been sending around 1 million disposable cups to landfill every year**

**That's why we've switched to a new 100% recyclable cup system.**

The old disposable cups have ALWAYS made up 10p of the cost of your hot drink.

But now you can CHOOSE not to pay that and save 10p by bringing your blue cup, which can be used again and again.

If you forget it, then white cups are available for the same 10p, so your drink is still the same price as before.

**Please remember to recycle the white cups at the new recycling point.**



Figure 1. Examples of some of the collateral created for the trial.

## Results

Re-use rate averaged 43% during the trial compared with 1% pre-trial (Fig.2). This resulted in 157 fewer single-use cups being consumed on site each day, reducing waste by 2.1kg.

During the trial, hot drink and soup sales increased 10% and 21% respectively (Fig.3) though seasonality may have impacted. 75% of single-use PP cups were recycled, compared with 0% pre-trial.

Using Scotland's Carbon Metric to account for production and observed waste management outcomes, the whole-life carbon impacts of the single-use PP cup used during the trial was estimated at 35.3 gCO<sub>2</sub>e; 4.2 gCO<sub>2</sub>e (10.6%) lower than the plastic-lined paper cups previously used for hot drinks (Fig.4). When compared to the former soup cup however, the single-use PP cup had an increased carbon impact of 6.7 gCO<sub>2</sub>e.

Assuming the same 75% recycle rate at end of life, the whole-life carbon impacts for the heavier re-usable PP cup was estimated at 98.4 gCO<sub>2</sub>e. PS cups were found to have the lowest carbon impacts however, due to their other environmental impacts they will be banned in the EU in 2021.

The number of re-uses required to achieve a carbon savings compared to single-use paper, polystyrene and PP cups (the break-even point) was calculated, assuming washing between each use (2.5 gCO<sub>2</sub>e/wash)<sup>3</sup>. By preventing the production and waste management for multiple single-use cups, break-even point for the re-usable blue cup was estimated at 3, 4 and 3 times, respectively (Fig.5).

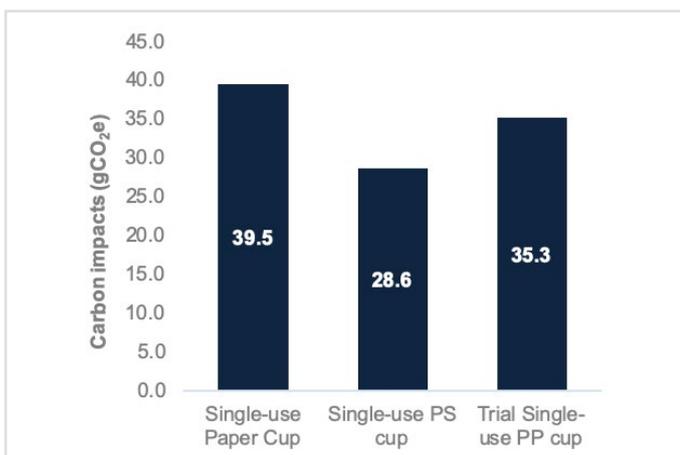


Figure 4. Lifecycle carbon impacts for two single-use cups used before the trial (left), and the single-use cup used during the trial (right).

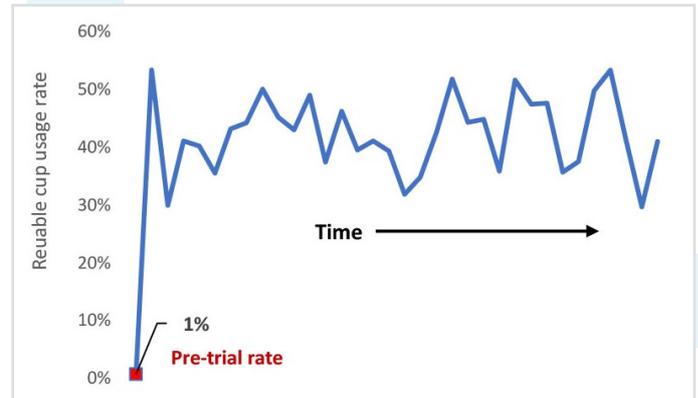


Figure 2. Daily cup re-use rate after the trial's implementation.

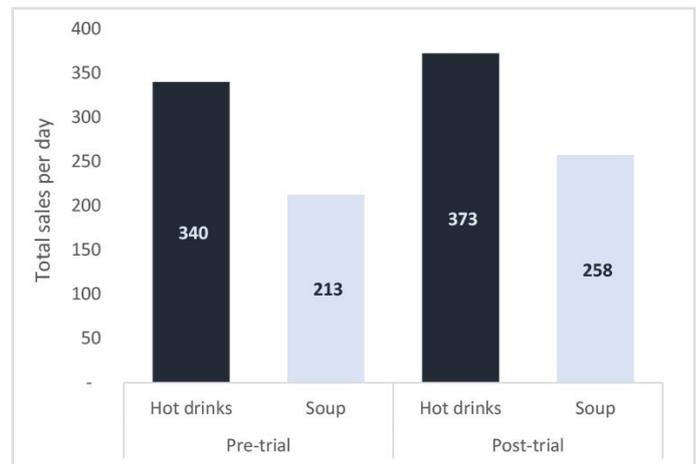


Figure 3. The number of hot drinks sold before and after the implementation of the trial. The post-trial increase in hot drinks sales was statistically significant, with a 9.54% increase.

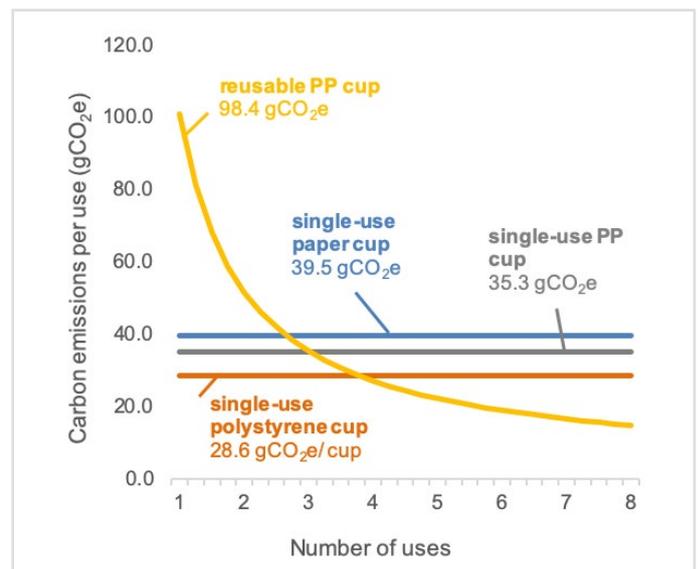


Figure 5. The change in the energy associated with a reusable cup as the number of uses increases.

3A literature review of re-usable cup LCAs was used to derive an average energy cost per wash, which was converted into CO<sub>2</sub>e using the 2017 UK grid carbon factor.

## Staff Survey Results

161 people (3.2% of staff) responded to the online trial survey. Key findings were:

- **Awareness** - 94% said they were aware of the trial and its purpose.
- **Behaviour Change** - respondents who “Always” or “Usually” use a reusable cup increased by over 40% (Fig.6).

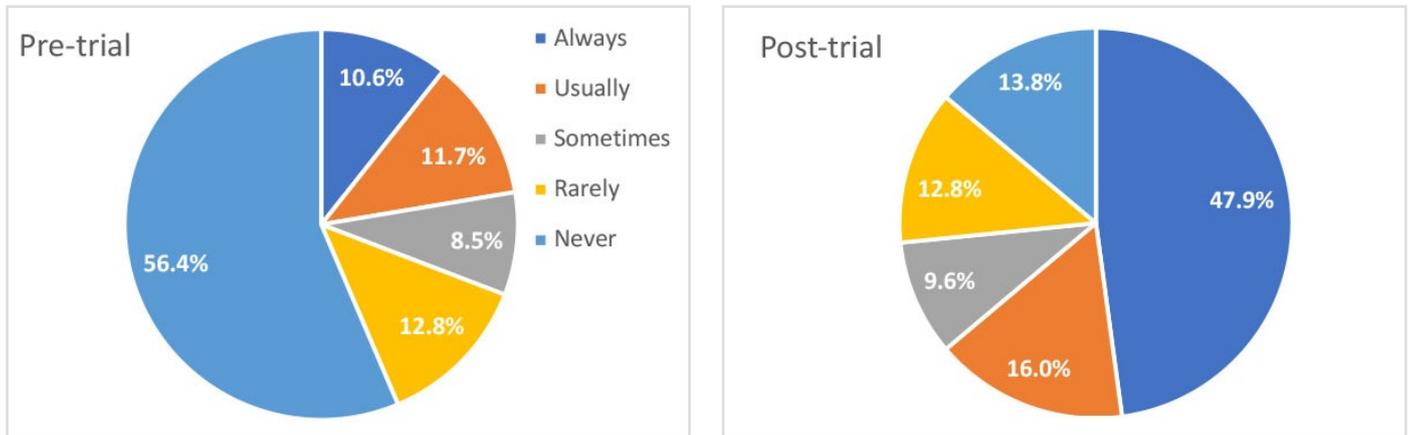


Figure 6. The frequency at which respondents claimed to use reusable cups before and after the trial.

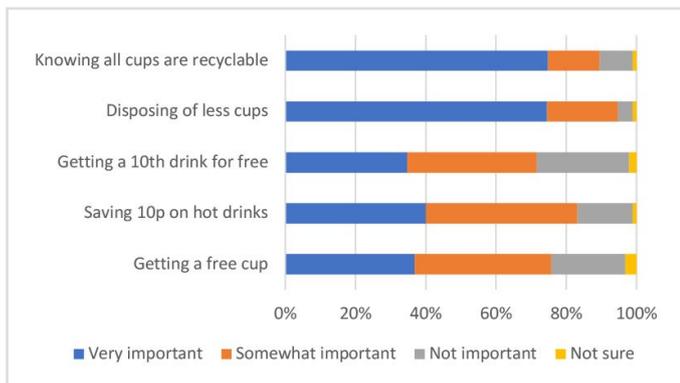


Figure 7. The staff’s ranked importance for different aspects of the trial.

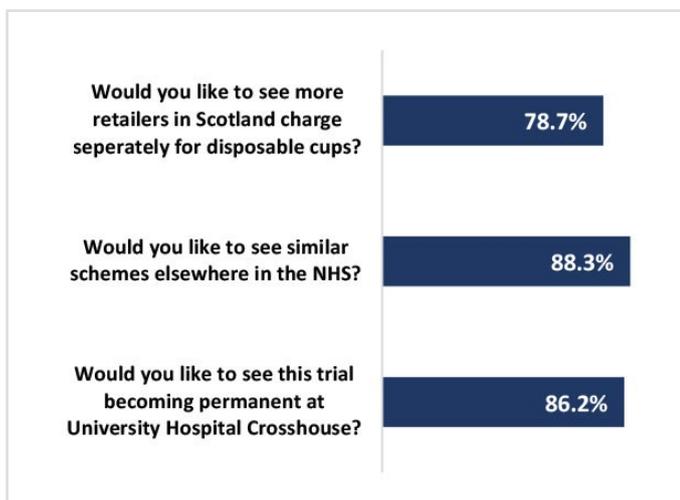


Figure 8. Share of respondents who answered “Yes”.

## Key Features (Fig. 7)

- 35-40% considered costs saving features to be “very important”.
- 75% considered environmental benefits “very important”.

## Support for Trial (Fig. 8)

Survey responses revealed strong support for retaining trial conditions at University Crosshouse Hospital and beyond.



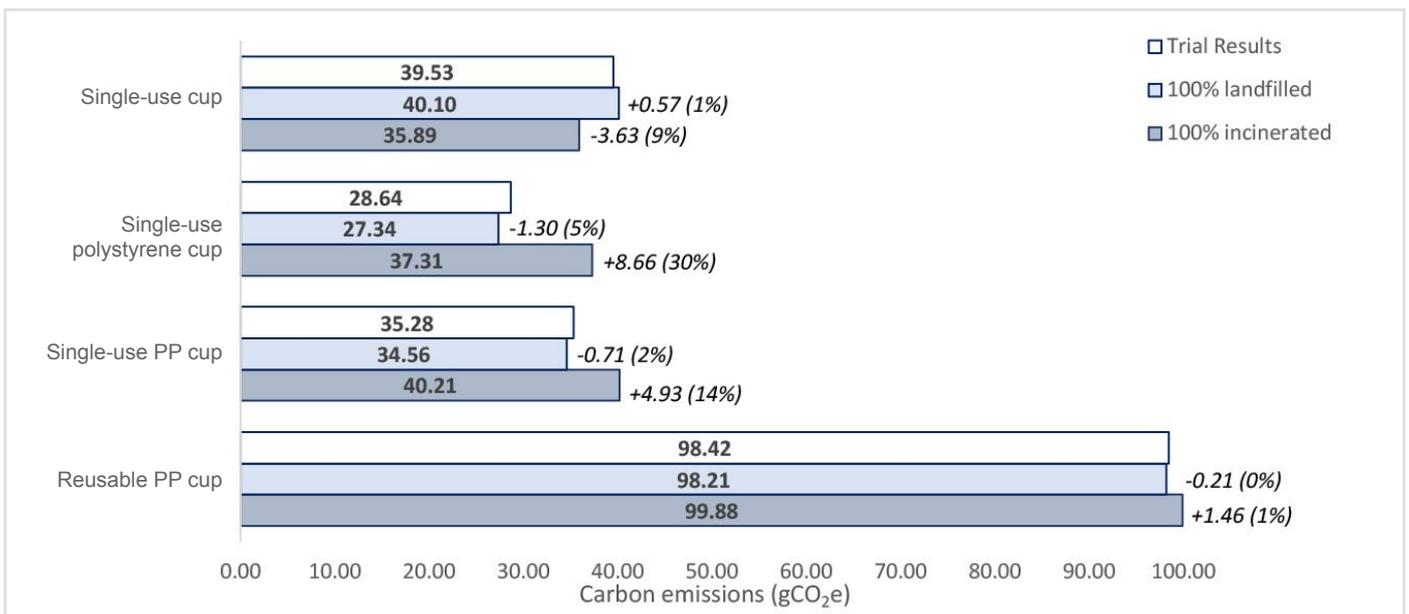


## Sensitivity Analysis (Fig. 9)

**Residual waste carbon impacts** were estimated using 2016 residual waste outcomes in Scotland (87% landfill/13% incineration). However, it is likely that all the residual waste from University Hospital Crosshouse was being managed by one method only. As such, the effects of using just one management technique have been analysed.

If all unrecycled cups were to be landfilled, this would cause minor changes in the carbon impacts of each cup, with single-use polystyrene cups experiencing the largest change (a 5% decrease in carbon emissions). If instead, all unrecycled cups are incinerated, then there are major changes, especially for polystyrene cups, which experiences a 30% increase in carbon emissions. Since plastics are typically derived from fossil fuels, burning them for energy is carbon intensive, and so the plastic cups have larger carbon impacts when incinerated rather than landfilled. For the single-use paper hot drinks cups, however, incineration provides carbon savings, whilst landfilling adds carbon emissions - this is because these cups are mostly paper, a material that tends to decompose anaerobically in landfills, emitting the potent greenhouse gas methane. Fundamentally, the best waste management pathway in terms of carbon emissions depends on the material.

The recycling rate used for single-use PP cups (including lids) was 75%. If 100% of these cups and lids were recycled, their combined lifecycle impact would be 3.9 gCO<sub>2</sub>e (11%) lower. This brings the carbon impacts of the single-use PP cup down to 31.4 gCO<sub>2</sub>e. However, this is still greater than the carbon impacts of the single-use polystyrene cup (by 2.7 gCO<sub>2</sub>e).



**Figure 9.** The changes in the carbon emissions of the different cup types used in the trial as waste management techniques are altered.

## Discussion and Conclusion

The trial at University Hospital Crosshouse increased the re-usable cup rate from 1% to 43%, reducing the number of single-use hot drinks cups by 157/day. If trial conditions were made permanent and results maintained, University Hospital Crosshouse could reduce consumption of single-use hot drinks cups 57k single-use hot drinks cups/year and reduce single-use hot drinks cup waste by over 1 tonne. Due to the short time period of the trial however (8 weeks), it is not clear the observed re-use rate would be maintained – a longitudinal study would be useful. Anecdotal evidence suggests some hospital staff also used their re-usable blue cups outside the workplace, however these waste prevention benefits cannot be accounted for.

Unfortunately, there was a lack of data on the re-use rates for cups used when purchasing soup. This was because the trial did not include a charge for soup cups. As such, it was not possible to determine the overall carbon impacts of replacing the former single-use soup cups with single-use PP and re-usable PP cups. A further improvement to the trial may involve expanding the charge to cover soups, in order to allow overall carbon savings to be calculated.

Complications concerning cup lids may have reduced behaviour change during the trial. Initially, separate lids were provided for the single-use and re-usable cups, however one lid was difficult to secure to its cup. Following feedback from catering staff, the decision was made to stock only one lid. Though not an ideal fit on both cups, this proved a workable solution. If replicating this trial in future, it is recommended a re-usable lid be provided with re-usable cups, and a single lid, compatible with both single-use and re-usable cups, is stocked.

One area of concern for retailers when contemplating a single-use cup charge is that it will negatively impact drink sales. It is therefore notable that during the trial, drink sales increased by nearly 10% and soup sales by 21%, albeit with a '10th drink free' re-use incentive for the former. Without more extensive pre and post-trial data, it is not possible to attribute increased sales to the trial (vs. seasonal change) nor to determine its cause(s). It seems plausible however, the financial savings in the case of drinks, and increased awareness afforded by the trial, had some impact.

The 75% recycle rate observed during the trial reduced residual hot drinks cup waste by 5.1kg/day (1.8 tonnes/year) compared with pre-trial conditions. It should be noted however, that some dining room staff were observed placing cups left on customers trays in the recycle bins when clearing the tray stacks. This suggests catering staff had an important impact on the recycle rate and highlights a potential strength of the tray stack system, provided catering staff are encouraged to sort waste.

Finally, survey responses indicated very strong support for the trial among hospital staff, and a high level of concern about the environmental impacts of single-use cup consumption and waste. Interestingly, while staff ranked the environmental benefits of the trial as more important than personal financial benefits, this is somewhat contradicted by the fact that only 1% of pre-trial hot drink sales were in re-usable cups. The increase in re-use rate during the trial suggests that while customers may not consciously identify financial benefits as a key motivator, they nonetheless provide an important nudge towards more sustainable behaviour.

## Concluding Findings:

- Re-usable cup usage increased from 1% to 43% during the trial, reducing single-use hot drinks cup consumption by 157/day – roughly 57k a year.
- Hot drink sales during the trial increased by almost 10%
- An estimated 75% of single-use cups were recycled, compared with 0% pre-trial.
- The staff survey respondents expressed strong support for the trial, and for charges on single-use hot drinks cups in general. The survey also confirmed that the trial encouraged people to use re-usable cups more.





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