

# Medical and mobility technology energy requirements in a future energy system

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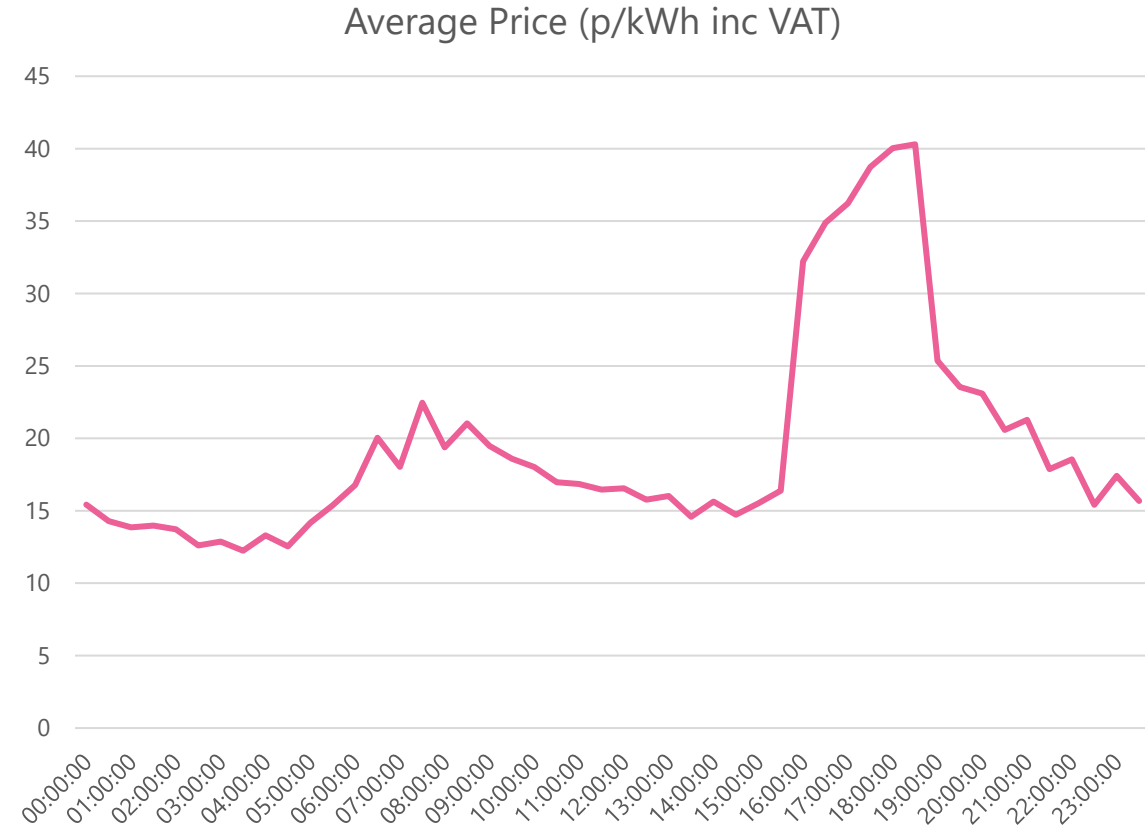
Rowanne Fleck

14<sup>th</sup> November 2023



## The energy system is changing

- Increasing electrification – requiring upgrades to the energy system and need to reduce peak energy usage
- Increased use of renewable energy – making it more challenging to match supply and demand
- Need for us to be able to use energy more flexibly in the future



- Our Emerging Vulnerabilities research
  - Highlighted the energy requirements of disabled consumers.
  - Raised concerns that expensive peak-time energy could disproportionately impact disabled consumers – many of whom rely on energy for essential medical equipment and mobility aids
- Aims of this research
  - Understand how many people in the UK rely on energy for medical devices and mobility aids, and how much this costs them
  - Explore in more detail how they might be affected by a future energy system



# Our approach

We conducted a nationally representative survey (n= 4297) to understand how many households need energy for medical devices and mobility aids, and what these technologies are.

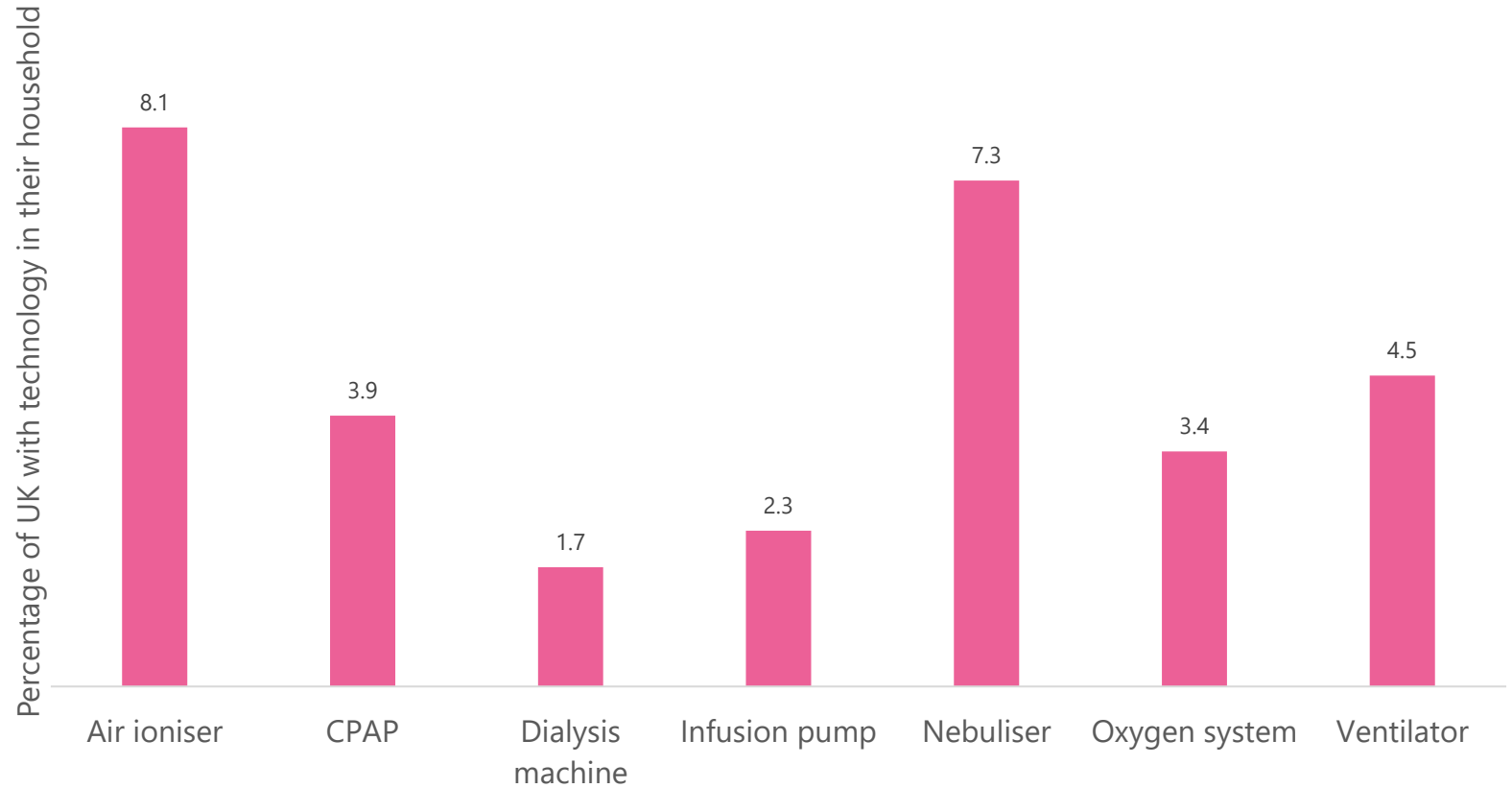
We also conducted a one-week diary study with 11 participants from our Living Lab to understand more about how people use their assistive technologies and how much energy they use.



# Which technologies do people rely on?

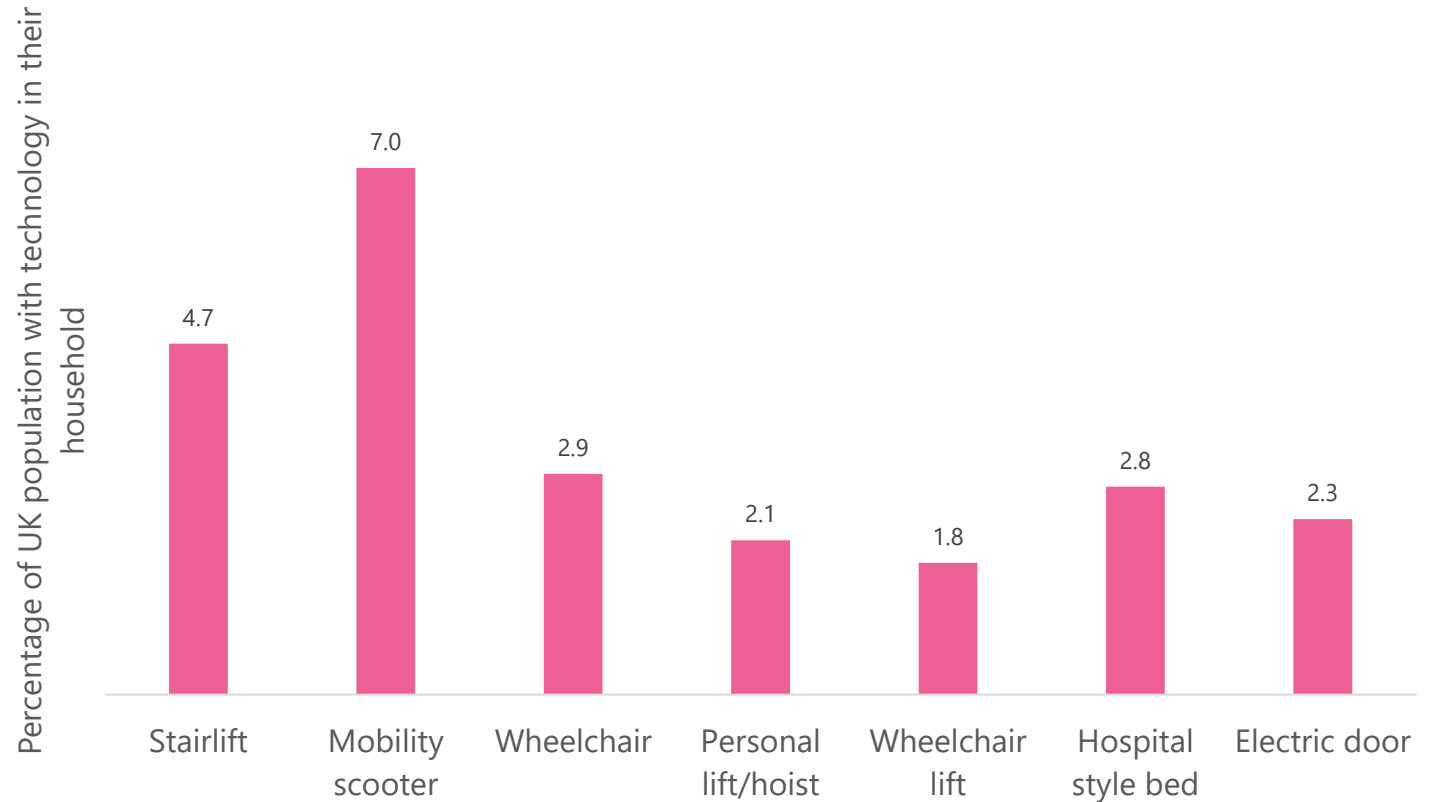


More than  
**8%**  
of people in the  
UK live in  
households that  
rely on energy for  
at least one  
medical device



Electrically powered home medical equipment  
Base: unweighted representative sample N = 3991

More than  
**7%**  
of people in the  
UK live in  
households that  
rely on energy  
for at least one  
mobility aid



Electrically powered home mobility aids  
Base: unweighted representative sample N = 3991

# Energy Use

Device	Number of owners	Average recorded weekly energy usage in kWh	Estimated yearly costs*
Mobility scooter	1	17.13	£243.62
Powerchair	2	1.06 (1.04, 1.07)	£15.08
Spinal cord stimulator	1	0.93	£13.23
Stairlift	2	0.85 (0.85, 0.85)	£12.09
Air cushion	2	0.51 (0.63, 0.39)	£7.25
CPAP	4	0.425 (0.27, 0.27, 0.56, 0.6)	£6.04
Rise Recliner	2	0.34 (0.24, 0.19)	£4.18
Air purifier	1	0.27	£3.84
Hospital style bed	2	0.22 (0.32, 0.12)	£3.13
Heat pad	1	0.11	£1.56
Nebuliser	1	0.1	£1.42

\*Based on EST average UK electricity costs, standard rates - 27.35p per kWh from <https://energysavingtrust.org.uk/about-us/our-data/> valid 1st October 2023

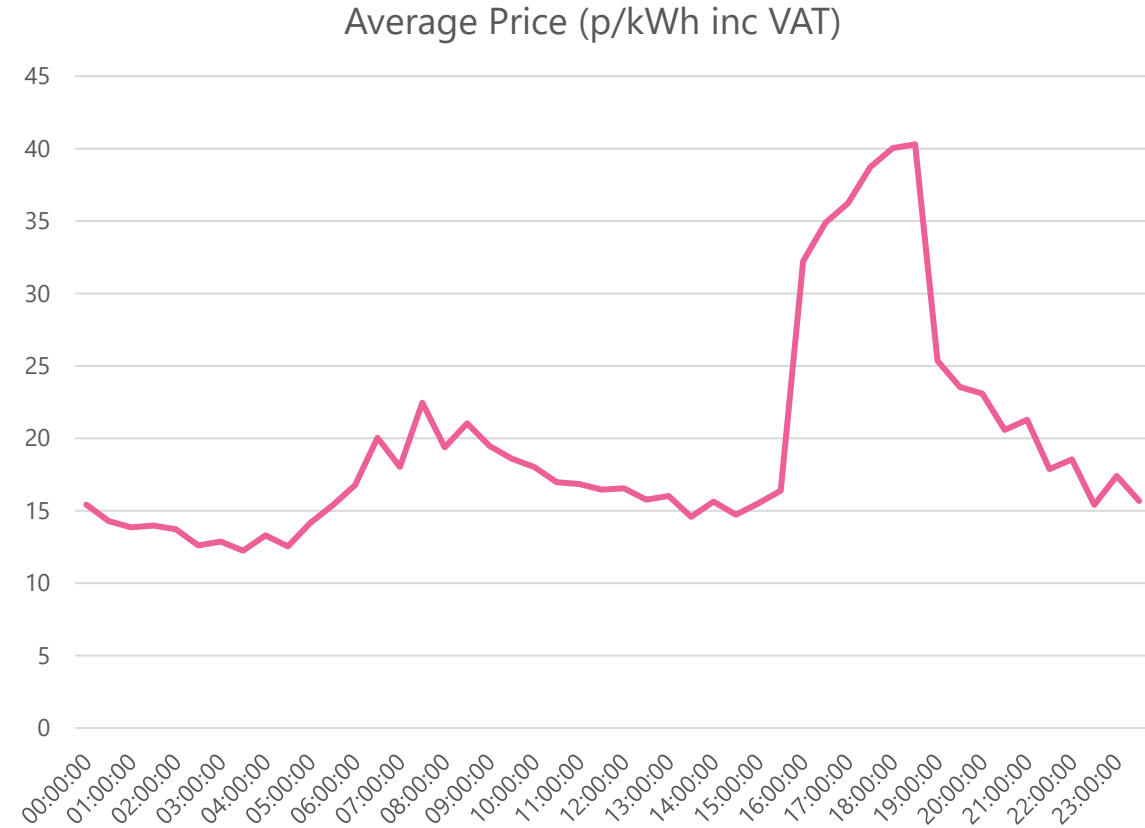


# How could people be affected in a future energy system?



# Flexible use of energy in a future energy system

- Some people are already embracing the opportunity to save money by using energy flexibly

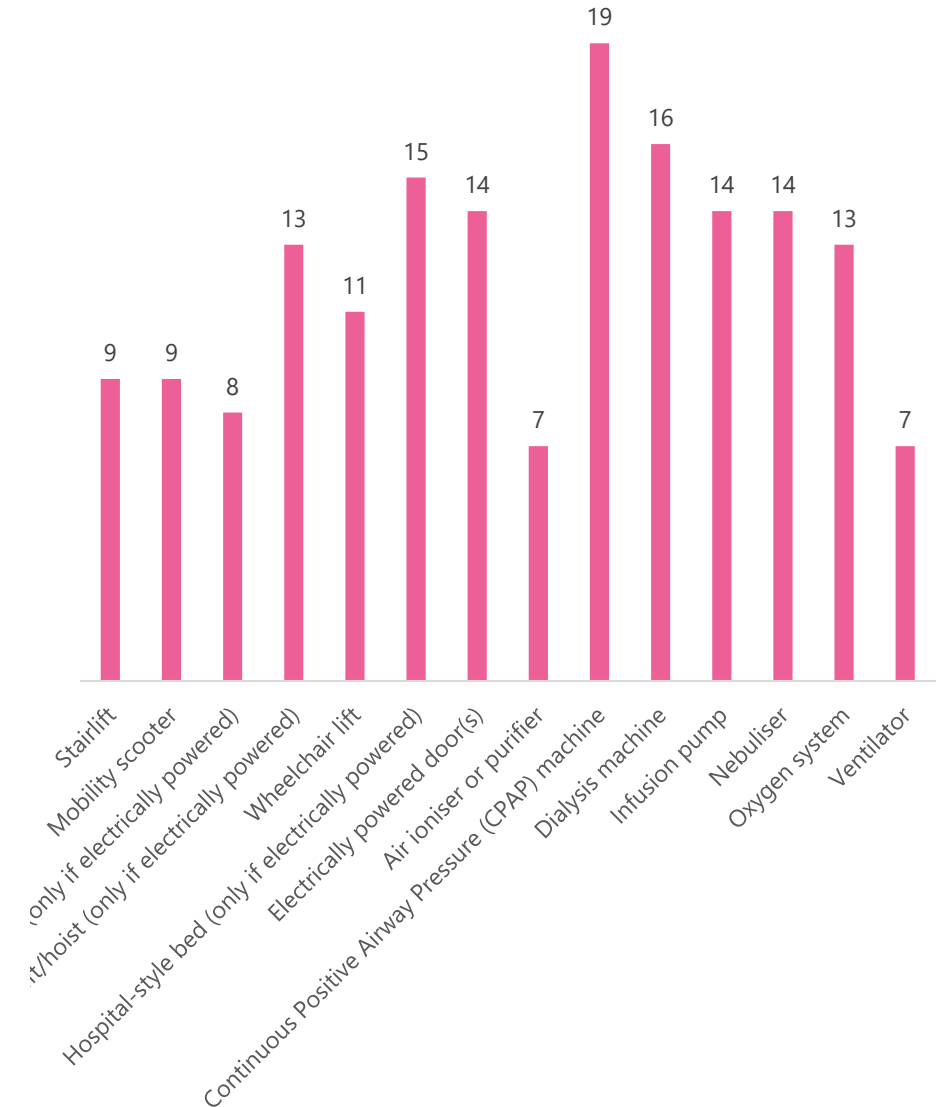


# Not everyone can be flexible

*Yeah, I mean that's [nebulizer] quite flexible, yeah...  
but there may be times where I would need it kind of  
there and then.*

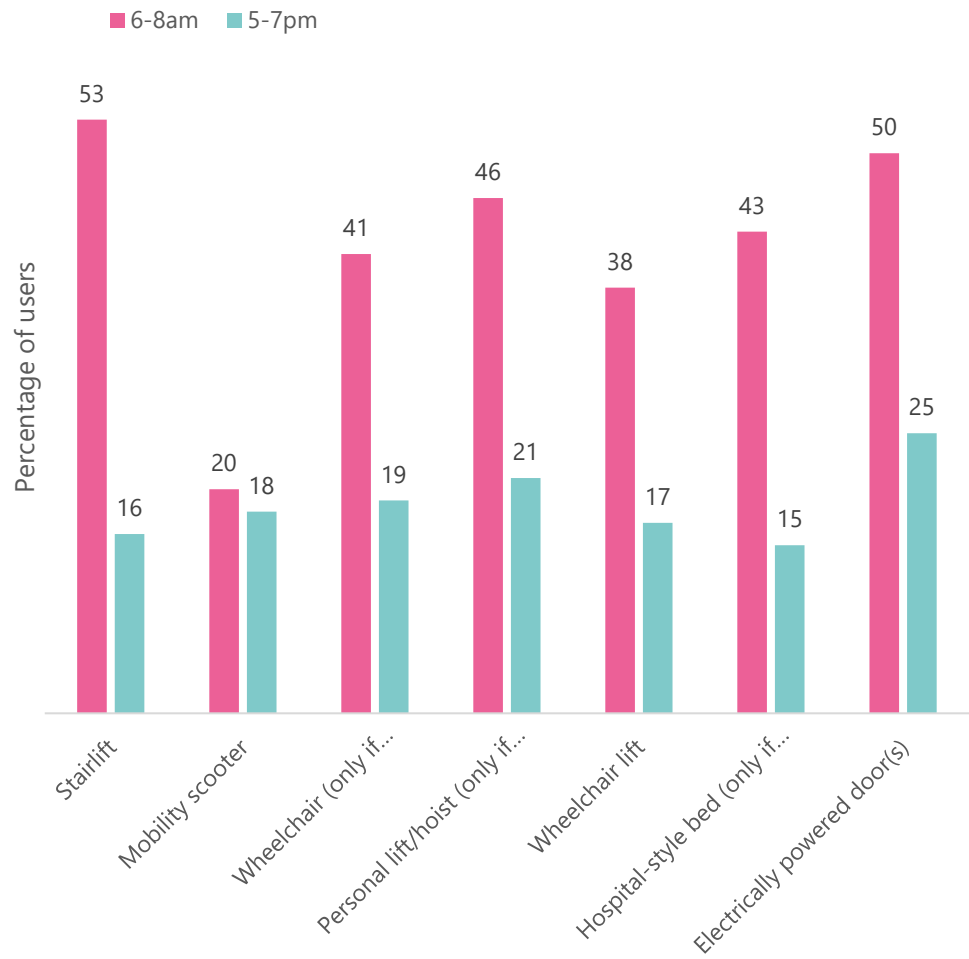
*I have used the [CPAP] machine for over 30yrs and only  
missed one night which I never slept. I wouldn't know what  
to do with a prolonged power cut.*

*But if I don't plug it in, when I come off [work] and come  
into the house, it will be too cold, too dark, too far to walk  
in the dark and to go outside [to the charger] and plug it.*

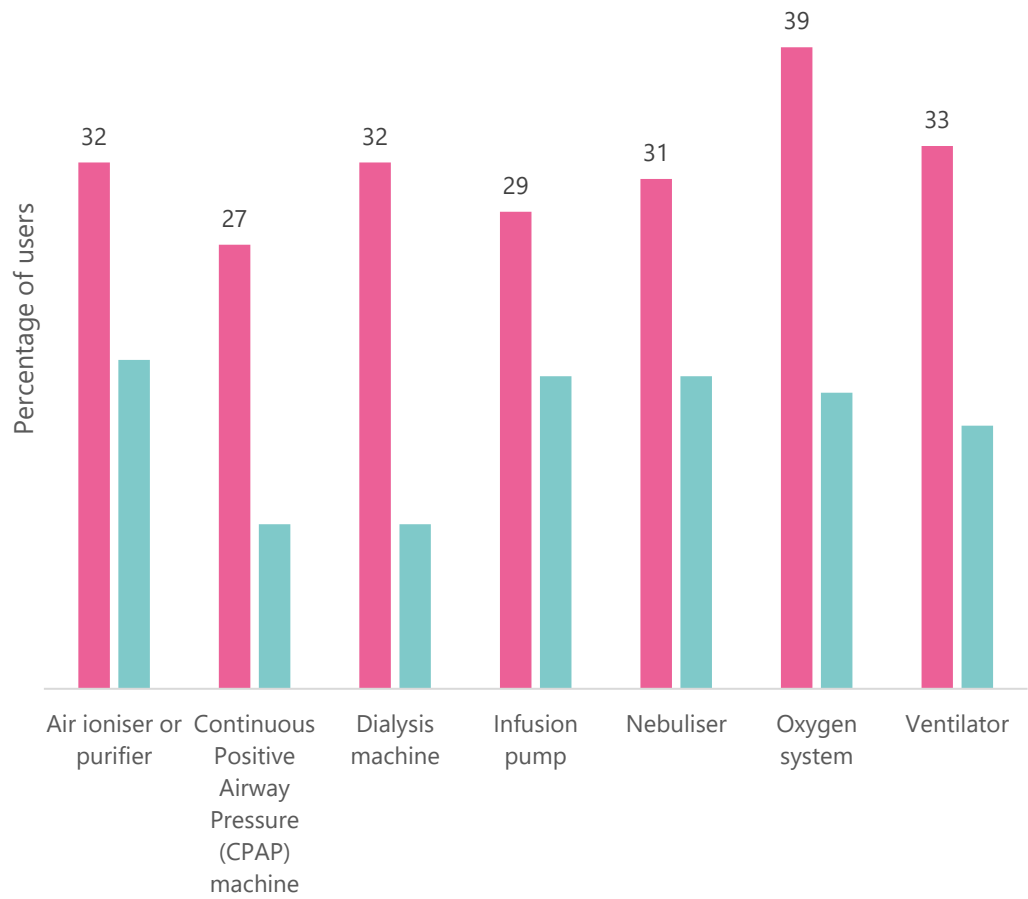


# Many people use their assistive technologies during peak times

Mobility aids



Medical devices



# Susannah and Tom

Susannah (66) and Tom (65) live in a bungalow in Galashiels and have been married for over 40 years.

They both have sleep apnoea and have restricted mobility. They each have a CPAP machine which they use overnight. They have been told by the hospital respiratory service that a regular sleep routine is very important, so they go to bed at 11:00 each evening, settle down to sleep at 11:30, and get up at 07:30.

They both sleep for around 8 hours a night. Susannah finds that she sometimes knocks her CPAP mask off in her sleep; when this happens, she feels very tired next morning and takes a 90-minute nap at 13:00 to catch up on missed sleep.

Tom has chronic kidney disease and is on a waiting list for kidney transplant. Meanwhile, he has equipment at home for daily peritoneal dialysis which he needs four times daily. Each fluid exchange takes around 40 minutes, with intervals of several hours between exchanges. Tom is anxious to maintain this schedule and sticks to a strict timetable for it.

They are on the Priority Services Register operated by their local Distribution Network Operator.



[https://commons.wikimedia.org/wiki/File:CPAP\\_machine\\_for\\_obstructive\\_hypoventilation\\_syndrome.jpg](https://commons.wikimedia.org/wiki/File:CPAP_machine_for_obstructive_hypoventilation_syndrome.jpg)

## Estimated energy costs today

Assuming Susannah took around 3 mid-day naps a week, Susannah and Tom's total weekly CPAP use might be around 0.88kWh per week (or 24p)  
Tom's dialysis machine use would be around 4.67kWh per week (or £1.28)

Total **weekly** cost = **£1.52**

Total **yearly** cost = **£79**

\*Current prices 27.35p per kWh  
Average Agile tariff 19.47p per kWh

## Estimated energy costs in the future

Assuming the same use of the CPAP machines as above, and Tom using his dialysis machine 4 x a day for 40 mins at 8.30am, 12.30pm, 4.30pm and 8.30pm  
Susannah and Tom's total weekly CPAP costs = 13p  
Tom's dialysis machine total weekly costs = £1.08

Total **weekly** cost = **£1.21**

Total **yearly** cost = **£62.96**

## Estimated energy costs in the future - with flexibility

Assuming the same use of the CPAP machines as above, and Tom using his dialysis machine 4 x a day for 40 mins at 9am, 1.30pm, 7pm and 10pm  
Susannah and Tom's total weekly CPAP costs = 13p  
Tom's dialysis machine total weekly costs = £0.90

Total **weekly** cost = **£1.03**

Total **yearly** cost = **£53.41**

# Gautam

Gautam (56) lives on his own in a ground floor apartment in Chester. He qualifies for the Motability Scheme and uses his allowance to lease a mobility scooter.

He uses his scooter to make a daily trip to the shops and also to go into the town centre to visit the library and meet friends in the café there.

Gautam's scooter has a rechargeable battery, and he usually recharges it at home in the early evening. However, he would be willing to recharge it overnight if this would reduce his electricity bill, which has risen a lot in the last year, provided he was guaranteed enough charge for his next day's use.

Gautam is unaware of the Priority Services Register operated by his local Distribution Network Operator but says he can't remember the last time he had a power cut, and he has relatives nearby who could help out if he missed a recharge for his scooter.



<https://commons.wikimedia.org/wiki/File:Scootmobiel.jpg>

## Estimated energy costs today

Assuming Gautam goes out everyday and charges his scooter approx. 2 x a week for 7.5 hours, starting the charging when he comes in in the evening at about 5pm.

His scooter uses around 17kWh per week

Total **weekly** cost = **£4.65**

Total **yearly** cost = **£241.77**

\*Current prices 27.35p per kWh  
Average Agile tariff 19.47p per kWh

## Estimated energy costs in the future

Assuming he charges his scooter 2 x per week, starting at 5pm, for 7.5hours each time

Total **weekly** cost = **£4.19**

Total **yearly** cost = **£217.75**

## Estimated energy costs in the future - with flexibility

Assuming he charges his scooter 2 x per week, for 7.5hours each time, but programs his scooter to start charging when energy prices will be cheapest (in our example 11pm).

Total **weekly** cost = **£2.43**

Total **yearly** cost = **£126.25**



- More than 8% of people in the UK live in households that are reliant on energy for essential medical equipment or mobility aids (though these are not the only energy costs faced by disabled people).
- The costs associated with using this equipment varies considerably.
- Costs could vary even more in the future.
- Important to understand these costs, and make support available to those most affected by it.

**But** the future energy system has the potential to be better for everyone - essential to include disabled people in the design of solutions that will work for them in a future energy system to realise this potential

# Thank you!

**Rowanne Fleck**

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