

Making Tea

At the interval during a football world cup game, some people watching at home make a cup of tea using electric kettles. Make a reasoned order of magnitude estimate of the load on the national grid. Note there is no “correct” answer.

Answer

First estimate the number of people watching, ~ 10 Million

Guess the fraction that make drink a cup of tea or coffee in the interval. Is there more than one person in each room? This will obviously affect the answer, if there are two people on average, only one of them will put the kettle on.

Estimate the power of an electric kettle. If you don't know, you probably know the main voltage in the UK is 230V, what is the maximum current that can flow before a fuse in the plug blows? Then use $P=IV$. If this doesn't help, consider the energy taken to raise the temperature of water from 20C to 100C and then guesstimate the time this takes for a typical electric kettle. Multiply the number of kettles being using by the power to get the load on the national grid.