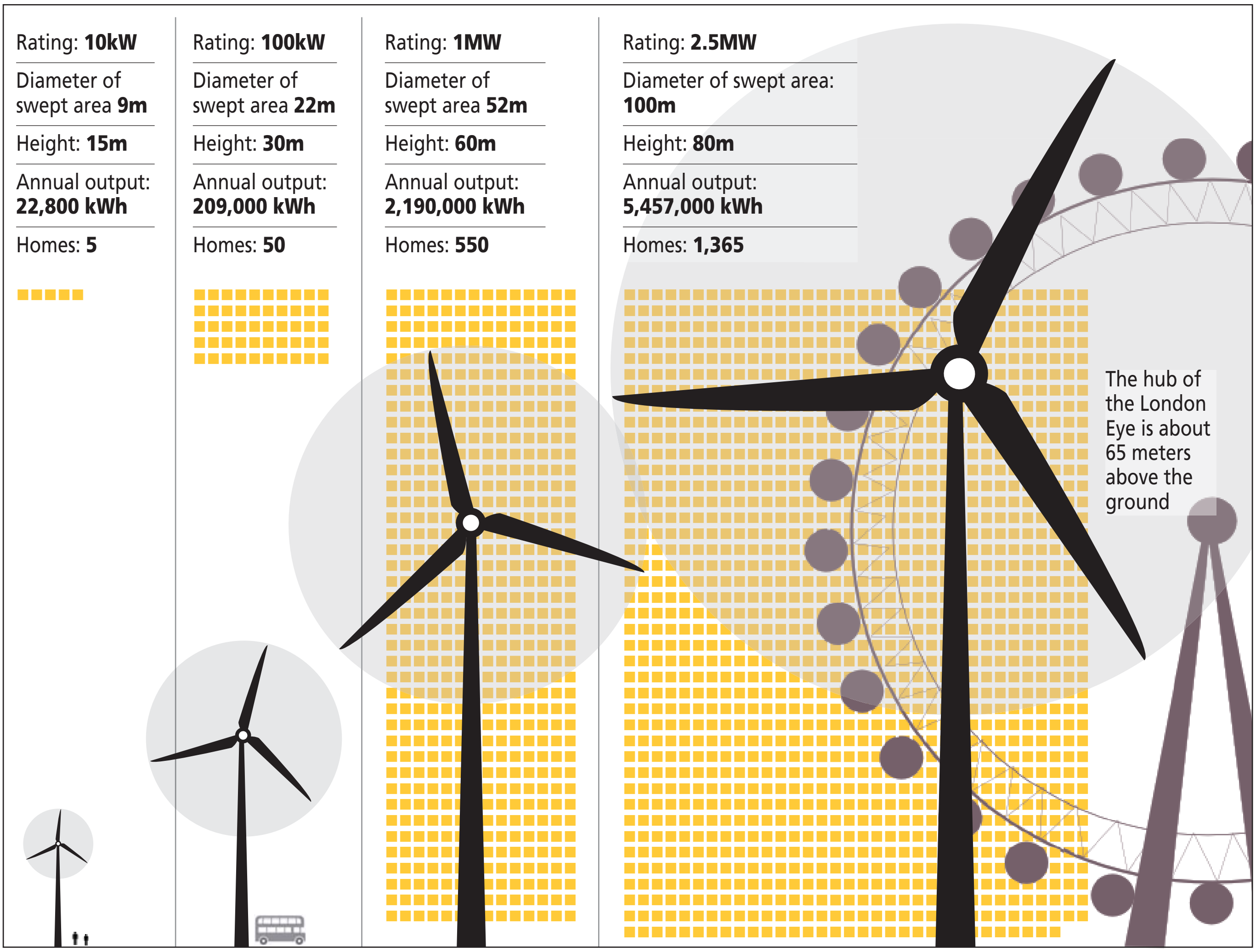
The numbers game ...

Below is the illustration used on page 17 of CSE's guidance note **How to identify suitable areas for onshore wind development in your neighbourhood plan**. It illustrates the point that while smaller wind turbines obviously have less visual impact, taller ones with longer blades can supply power to *many more* homes. So how did we get the numbers?

The first thing to be aware of is that for each given 'size' (e.g. kW rating) of wind turbine in our illustration we've taken a 'typical' figure from within a range of possible blade lengths, heights and power outputs. So while our 10kW turbine has a blade length of 4.5 meters and is 15 meters tall, other 10 kW turbines may have shorter or longer blades or be taller or shorter in height. And likewise, depending on the turbine's height and the wind speeds it is subjected to, it may produce more or less power in the course of a year.

And we've deliberately erred on the conservative side. Most 100 kW turbines with a height of 30 meters and a swept area diameter of 22 meters will likely produce more than the 209,000 kWh that we have given for the second smallest turbine in the graphic below.



So, here come the numbers ...

Let's take the biggest turbine as an example. It's **rated capacity** is 2.5 MW (or 2,500 kW).

If it runs at this rate all day long for a whole year it would have a **theoretical maximum annual output** of 2,500 x 24 (hours) x 365 (days) = 21,900,000 kWh.

But, of course, no wind turbine operates at full pelt all the time; there are days with little or no wind, days with such strong wind that the turbine can't operate, and down-time for maintenance. And to take this into account you need another figure, the turbine's **capacity factor**. This is the ratio of its **actual output** to it's **theoretical maximum output** over a period of time, and for most turbines this is between 20% and 57%.

Figures from the Digest of UK Energy Statistics published annually by the UK Department of Energy and Climate Change (p36 of PDF at www.bit.ly/1NQzR2s) suggest a national average **capacity factor** of 27.2%, which we've rounded down to 25% for the examples in our illustration.

So for our large turbine, we take our **theoretical maximum** of 21,900,000 kWh and multiply it by our **capacity factor** of 25% to get an **actual output** of 5,475,000 kWh.

How many houses can this supply? According to government figures (p7 of PDF at www.bit.ly/1IaPObv) the (mean) average UK home uses 4,000 kWh of electricity, so we divide our **actual output** by 4,000 to get the number of homes that our large turbine can supply: 5,475,000 ÷ 4,000 =1,368 homes. This has been rounded down to 1,365 in the illustration.

NB We could have used the *median* average energy use for UK homes which is 3,300 kWh. This would have given a different (higher) set of figures for the number of homes each turbine could supply:

We hope that helps.

And finally, a double decker bus is about 4.5 meters high, and the London Eye's great wheel is 120 meters in diameter, meaning that the hub is about 65 meters off the ground.

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