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ANIMATION SCRIPT

HOW CAN ELECTRONICS ENGINEERS HELP TO POWER THE GREEN TRANSITION? PROFESSOR PETER GAMMON

TO MAKE THE MOST OUT OF THIS SCRIPT, YOU COULD:

- Stick it in your book as a record of watching Peter's animation
- Pause the animation and make notes as you go
- Add your own illustrations to the sheet
- Create your own animation to accompany it
- Add notes from classroom discussions
- Make notes of areas you will investigate further
- Make notes of key words and definitions
- Add questions you would like answered – you can message Peter through the comments box at the bottom of his article: **www.futurumcareers.com/how-can-electronics-engineers-help-to-power-the-green-transition**

SCRIPT:

Increasing our production of renewable energy will help to reduce our carbon emissions. But did you know that up to 10% of all energy generated is wasted before it even reaches your phone, laptop or lightbulbs?

At each stage of transporting electricity, from wind farm to National Grid to your house to your phone, a small amount is wasted as it heats up the transistors it travels through.

Transistors are electrical switches, turning on and off thousands of times per second to convert electricity between its two fundamental forms – alternating current and direct current.

If we could make these transistors more efficient, less energy would be wasted. This is what Professor Peter Gammon, an Electronics Engineer at the University of Warwick, is trying to achieve.

Imagine a dam turning the flow of water downstream from a reservoir on and off. Peter says this is similar to a transistor turning the flow of electrical current downstream from a battery on and off. The voltage of the battery corresponds to the water pressure behind the dam.

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Traditionally, transistors are made from silicon. Peter is creating transistors from silicon carbide (a compound of silicon and carbon) to increase their efficiency.

He says building a transistor out of silicon carbide rather than silicon is like building a dam out of reinforced concrete rather than regular concrete. The reinforced concrete can hold back the same water pressure, but with a thinner dam. The same goes for a silicon carbide transistor, which can withstand the same voltage as a silicon transistor but using ten times less semiconductor. This means the transistor has lower electrical resistance, and so less energy is wasted as heat.

To make his silicon carbide transistors, Peter works in a cleanroom to ensure all the electronics remain spotless.

He creates the transistors by growing layers of silicon carbide on very thin silicon carbide wafers, before oxidising these surfaces, depositing metals on them, and etching trenches in them. His transistor chips are cut up and individually packaged, ready to sell to manufacturers for use in electronic devices.

By replacing the silicon transistors in electric cars with silicon carbide, cars could travel further before they need recharging, or the number batteries could be reduced. Silicon carbide transistors could improve the efficiency of most electronic systems, from data centres to satellites to the infrastructure of the National Grid, thereby reducing wasted energy.

Electronics engineers will be at the forefront of designing the technology required to reduce our carbon emissions. What could you achieve as an electronics engineer?