# Unit 2 Listening

## **Transcript**

**Will de Freitas:** As energy editor of The Conversation I get a lot of press releases and pictures promising me that researchers have developed the latest super fuel. These can involve turning all sorts of weird and wonderful things into fuel. In the past year or so we’ve run articles on extracting power from left-over coffee grinds, for instance, or human waste. But I think this one we’re about to look at tops them all. If this was ‘Energy Top Trumps’ this would be the magical winning card. Our Science editor Stephen Harris talks to two scientists who are literally creating fuel from thin air.

That rather high-pitched whirr is the sound of a car fuelled by nothing but air. To be precise, it’s air that’s been cooled to almost minus 200 degree Celsius and turned into a liquid. At a time when we’re looking for new sources of energy to help wean ourselves off fossil fuels, the discovery that you can actually make fuel from air is an exciting one. But, as Jonathan Radcliffe, Policy Director at the University of Birmingham Energy Institute explains, it’s an idea with a surprisingly long history.

**Jonathan Radcliffe**: So there was a liquid air engine at the turn of the last century, so round about 1900. There was a liquid air company that was formed to drive cars, and as you’ll probably know, at around the same time there were electric cars being produced as well. But they got overtaken with the discovery of plentiful supplies of gasoline. And so a lot of those technologies got pushed out. And it wasn’t until the 1970s and 1980s that some of our home-grown inventors – the garage inventor Peter Deerman – was thinking about it again and started experimenting and started using liquid air in a car that he’d converted to show the potential again.

**Will de Freitas**: Liquid air doesn’t work like a regular fuel that is burned to generate heat. When the liquid is released from a high-pressure tank it turns back into a gas and rapidly expands. You can then use this movement to power an engine or turbine. From the exhaust you get nothing but the air itself. This means you can use it in lots of different ways.

**Jonathan Radcliffe**: So we can produce the liquid air using electricity, and then use it either to generate electricity through a turbine – as you have in some big power stations where you’re burning a gas and that turns a turbine and generates electricity – what we can do is put liquid air into a turbine and the expansion from that turns the generator. So that’s on the large-scale side of it. On the smaller scale we can inject the liquid nitrogen into a fairly regular internal combustion engine, and the expansion there produces automotive, or auxiliary power for engines. And the application that’s being looked at most closely at the moment is for refrigeration units on the back of lorries. Sainsbury’s is trialling some of these Deerman engines to see what the benefits could be in terms of reducing particular emissions, or carbon dioxide around cities.

**Will de Freitas**: Is that because liquid air, and then the gas that you create when you burn it off again is very cold? So you’ve got cold air already, so it makes sense to look at applications where cooling is involved as well?

**Jonathan Radcliffe**: Yes – that’s exactly right. So we’ve got this liquid air which is at minus 200 degrees, and we can use that to cool a container on the back of a lorry, and effectively anything that’s at maybe minus 5 degrees looks very warm to a liquid that’s minus 200 degrees. So as you use the liquid air it evaporates, cools down the goods in the vehicle, but still expands, and you can use that to drive the generator to power the pumps or to power some electrical equipment for the lorry as well. And at the same time the only emission that you’re getting out of that engine is just the air again. So there aren’t any of the particulates that are very harmful to health that are of such concern around cities at the moment.

**Will de Freitas**: Do you think we’ll ever be able to pull up to a filling station and top up with some liquid air from one of the pumps?

**Jonathan Radcliffe**: Yes – I think that’s a very real prospect, and Deerman is trialling this unit with Sainsbury’s at the moment. And the signs are good that that will be successful, and we could see the next step having some refuelling depots for lorries, and expanding that into a much wider network.