

# A carbon-neutral way to power your home

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(PhysOrg.com) -- A super-efficient system that has the potential to power, heat and cool homes across the UK is being developed at Newcastle University.

It works by burning vegetable oil to power a generator and provide electricity for the home.

The waste heat from this process is then used to provide heating and hot water and is also converted to cool a fridge.

At each step, the waste heat that is produced from engine gases and cooling is used elsewhere to recover the maximum amount of energy from the system.

In addition to this, the plant producing the fuel absorbs carbon whilst growing – resulting in near zero overall carbon emissions.

Using these three forms of energy for home use is known as micro-trigeneration and this new design will take the concept of combined heat and power to the next level.

Led by experts at the Sir Joseph Swan Institute for Energy Research at Newcastle University and drawing on expertise from across the UK and China, the design also includes a unique energy storage system.

This allows home owners to store the extra electrical energy during ‘off-peak’ times – for example during the night – and efficiently releases it

when it is needed most.

Project leader Professor Tony Roskilly, of Newcastle University, explained: 'The supply of electricity, heating and cooling can be optimized by this one, efficient and sustainable system.

'The combination of the generator and energy storage provides new ways to respond to changing energy demand in the home.'

One of the potential oils to be used in the system comes from the seeds of the Croton Megalocarpus plant which grows in East Africa.

Croton Megalocarpus oil brings with it the advantage of being able to grow on land that is not suitable for traditional farming or food production – providing a fuel without sacrificing land for food crops.

Drawing on the modelling expertise of scientists at Ulster University, the team will build a full-scale prototype of the system.

The energy storage system, being developed with Leeds University, will supply electricity and cooling - helping to ensure that the correct form of energy is available at the right time and that the engine operates at its optimum efficiency.

Newcastle University's Dr Yaodong Wang, said that this form of energy system for the home would be highly efficient.

'In the past, a significant barrier to the take-up of domestic scale micro-trigeneration systems has been the availability of the right energy at the right time,' he explained.

'A household has varying energy demands depending on the time of day and the time of year.

'By integrating new energy storage technology with the micro-trigeneration system we have the potential to overcome this barrier and make an impact on future domestic energy supply.'

Provided by Newcastle University

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