06 June 2006

**COOKING BIOMASS TO CREATE BIOENERGY – TRANSCRIPT**

**00.00** Images: Planes over
Traffic
Petrol station
Cars
Aston University exteriors
Pyrolysis rig

**Guide Voice:** The transport sector is now the fastest growing consumer of energy, and also the fastest growing source of greenhouse gas emissions, yet few people are prepared to even reduce their flying or driving, let alone cut down on heating and lighting for their homes.

So as reserves of fossil fuels dwindle and the need to cut carbon dioxide emissions becomes paramount the search is on for renewable alternatives, which are also carbon neutral. The hunt for viable forms of bioenergy is well advanced at Aston University, in the West Midlands of the UK, where a research team are leading the field in the development of "fast pyrolysis", which can convert biomass and bio-waste into a biofuel through a carbon neutral process.

**00.41 SOT** Professor Tony Bridgwater, Chemical Engineering and Applied Chemistry, Aston University: "Fast pyrolysis is a process similar to the traditional way of making charcoal, but it does it in a far quicker way. It processes small pieces of biomass from trees or crops like miscanthus or straw, heats it very quickly to a carefully controlled temperature around 500 degrees, and cools the products down very quickly and in so doing we make a liquid we call bio-oil, which is like this, and then bio-oil can be used for energy for power for heat and for chemicals."

**01.13** Images: Lab shots
Biomass samples
Close up oil
Oil poured out
Leaves

**Guide Voice:** The bio-oil end product is an easy form to store and transport, and it's versatile, it can be developed as a fuel itself, or converted to electricity, transport fuels or chemicals. At Aston they have experimented with a number of different forms of biomass and successfully turned them into this oil. All organic matter is basically biomass: crops, forests, agricultural waste, and can be used to produce clean energy sources, in a sustainable way, in a closed carbon cycle.

**01.43 SOT** Mr. Mark Coulson, Chemical Engineering and Applied Chemistry: "In the case of biomass, when you're growing the crop you're storing carbon dioxide out of the atmosphere into the crop, when you then burn or convert the crop into energy, you release that carbon back into the air in the form of carbon dioxide so the carbon goes round and round a closed circle in a very short time scale. In the case of fossil fuels the energy has been stored underground for a very long period and so we're releasing carbon that has been there for millions of years."

**02.13** Images: GVs fields, straw
GVs rape seed
Hay harvested
GVs general agriculture
Professor at computer
Elephant grass on computer screen
Lab GVs

**Guide Voice:** While using biomass to create energy is clean and sustainable in contrast to fossil fuels, deciding what biomass is best to use and how, cuts to the heart of two of the bioenergy field's key considerations: yield and cost. Where rapeseed and other vegetable oils have been successfully used as additives to diesel fuel, they can only be replace up to 5% of diesel.

And vegetable oils are not necessarily the most effective use of limited land resources producing just 1 to 1 ½ tonnes of bio-diesel per hectare. By contrast the fast pyrolysis process could generate up to three times the amount of renewable liquid fuel from the same land area, if you use a different biomass resource with a higher yield such as miscanthus or elephant grass. The pyrolysis process itself however also needs to be done on a sufficient scale to bring the costs down.

**03.08 SOT** Professor Tony Bridgwater: "We're limited in the UK by the amount of suitable land we have available for growing biomass. The second limitation is the high cost of producing that biomass in a country like the UK. But if there was sufficient biomass available one can consider what's called a biorefinery of the order of millions of tons per year. A biorefinery will take in bio-oil or biomass and will produce an optimised combination of energy products, fuel products and chemicals that is energetically and economically as efficient as possible."

**03.45** Images: Ablative pyrolyser
Lab Rig shots
Mark points out char and gas collection
Close ups small rig
Petrol pumps
Leaves

**Guide Voice:** At the moment in the lab their fast pyrolysis test rigs can deliver up to 5 kilos of bio-oil an hour; on an industrial scale a fast pyrolysis plant would need to produce at least five tonnes an hour to be commercially viable. As they continue to research the best ways to improve the pyrolysis process, there are other factors that could make a biorefinery even cheaper and more efficient, by-products of the process include char and gases that could be used to provide the entire power requirements of the refinery process.

At the moment fast pyrolysis cannot produce fuel at a competitive cost to fossil fuels, but with rising oil prices and greater political commitment it could make a major contribution to a cleaner and more sustainable planet in the future

**04.30 SOT** Professor Bridgwater: "We see fast pyrolysis as satisfying the short term needs for producing heat and power and in the medium to long-term as being the heart of a biorefinery process that produces transport fuels and chemicals as well as heat and power and if you build a biorefinery large enough, maybe millions of tons per year of biomass, you can reduce the costs to a much more acceptable level."

**04.53** Ends