In 2008 the Science and Innovation Team in Southeast Asia focused on improving UK-regional collaboration and enhancing co-ordination in tackling malaria and infectious diseases. We held five scientific workshops bringing together over 900 experts from the UK, Southeast Asia, China and beyond, to share their latest research and agree joint projects. Two policy roundtables involving the UK and Indonesian Science Ministers, World Health Organization, and public and private researchers identified the need for better detection devices in rural settings and action against antimalarial resistance. As a result, the UK's Medical Research Council and Singapore's Agency for Science, Technology and Research announced a joint £6m fund for collaborative research to be launched by mid 2009. Information exchange networks for scientists, clinicians and policymakers have also been set up.

Case Study 2: Ensure environmental sustainability (MDG 7)
Amazonian rainforest depletion is taking place at double the rate previously estimated; an area 40 times the size of Singapore is being destroyed annually by selective logging which was previously undetected by satellite (Science, 2005).

The Science & Innovation Team in Brazil recently brokered agreement for a British high definition camera to be launched on the Brazilian Earth observation satellite Amazonia-1 in 2010. The camera will monitor deforestation, the management of natural resources, pollution and natural disasters in both the Amazon and Congo River basins. Detailed satellite imagery is crucial in the fight against illegal logging activities which cause the loss of livelihoods for millions of local people. The camera is to be manufactured at the UK's Rutherford Appleton Laboratories with £1m funding from the Department for International Development, and will also assess the impacts of climate change.

FUTURE SINNING

Since 2004, the SIN Team in Southeast Asia has organised a series of 38 scientific workshops enabling some 260 UK experts to share their cutting edge research and generate collaborations with an audience of 7,000 local scientists. To date our work outside Singapore has focused on emerging economies such as Thailand, Indonesia and Malaysia. We have a further opportunity to support scientists in less economically developed countries such as Cambodia, Laos and Vietnam.

In 2009 and beyond, the Science and Innovation Network will continue to work with UK and overseas organisations to strengthen the global partnership between the scientific and development communities. Strengthening the science infrastructure and capacity of developing countries "helps nations to help themselves", and home-grown scientists can offer practical and insightful solutions to the challenges on their doorstep. Whilst long-term vision and investment is needed, the returns provide a sustainable self-reinforcing solution to both scientific problems and international development.

Science is therefore a key contributor to the MDGs and more could and should be done to increase co-ordination and accelerate activities. In this way we will maximise our efforts to improve the lives of the world's poorest people and share the economic and social rewards of science and innovation.

FOOD VERSUS FUEL - IS THERE A VIABLE SOLUTION?

Dr Jeremy Tomkinson, CEO, National Non-Food Crops Centre

The National Non-Food Crops Centre (NNFCC) is the UK's National Centre for renewable materials and technologies, providing independent advice and information to industry, Government and the general public. The NNFCC develop and assess the scientific evidence on renewable materials and help to build supply chains for renewable materials, which could be made from non-food crops, by-products from edible crop production or organic material that would currently be specified as 'waste'. Defining a non-food crop is not necessarily straight forward; a non-food crop can be something perfectly edible, so we define non-food crops more by their application than actual plant species. However, the recent so-called 'food vs fuel' situation has driven the need for a sharper focus on biomass, by-products and renewable wastes streams than ever before. Clarifying this feedstock question will form a major part of our work programme in the coming years.

The NNFCC understands the technologies, markets and feedstocks and how to get them working together. Equally importantly, we understand how to identify the supply chains that will be sustainable both economically and environmentally and how to connect the players in these supply chains to realise the benefits. Our team of 17 based in York come from the relevant industry backgrounds eg petrochemical refining, plastics, high value chemicals, materials, biology and agriculture, which aligns well with our position at the forefront of the burgeoning bioeconomy.

Information is key to what we do; once we have acquired and analysed data we disseminate the information through business to business activity by our sector experts, or through our website, publications and events. We maintain strong links to a number of Government Departments and manage projects to develop the evidence base on which Government policy is founded. We do this through formal responses to consultation documents and through on-going contacts.

The biofuels and bioenergy sectors are obviously of great importance. We are producing a road map for UK advanced biofuels and a techno-economic evaluation of emerging algal oil technologies. On the waste-to-energy side we are reviewing the potential for gasification of waste and we are examining the co-digestion of biodegradable packaging and food waste by anaerobic digestion. Both reports should be available in early 2009.

Plant-derived renewable materials are extremely important to the development of the sector because, whilst renewable electricity can be generated in diverse ways, fuels, materials and chemicals can only come from petrochemicals or biomass. One good example would be the construction industry, which has many applications for renewables, including hemp-lime mixtures and straw bales for walls, hemp, flax or waste sheep wool for insulation, linoleum flooring and linseed oil for surface coatings. The production of one tonne of cement generates around one tonne of carbon dioxide. Hemp-lime mixtures lock up around 110 kg of carbon dioxide per cubic metre. Emissions resulting from cultivation of hemp are also low because it requires few agricultural inputs. An example is The Adnams distribution centre. Built using hemp and lime, it is estimated to have removed more than 150 tonnes of carbon dioxide from the atmosphere; the construction of an equivalent concrete building would have emitted over 600 tonnes.

Construction-related projects we have recently carried out include life cycle assessments of natural fibre insulation compared with conventional materials, and a manual for hemp-lime construction; all are available on our website. We have recently embarked on an ambitious project to build a family home showcasing a wide range of renewable materials. The house will be launched at the prestigious BRE Insite event on June 1st 2009.

The chemicals sector includes the bulk chemicals used as building blocks by the chemical industry and also polymers, adhesives, solvents, pigments, pharmaceuticals and so on. It has been estimated that the replacement of commodity petrochemicals with plant-derived chemicals could deliver up to 32% energy saving in the chemical industry by 2050. This represents up to 3% non-renewable energy saving for the entire European economy. Our involvement with Government initiatives like IB-IGT (Industrial Biotechnology Innovation and Growth Team) and special interest groups like FROPTOP (From Renewable Platform Chemicals to Added Value Products) means we can help the UK to develop into a true bioeconomy in the years to come.

Bio-energy, renewable fuels and renewable materials are closely inter-related and the potential feedstocks are, in many cases, exactly the same, and hence the policy frameworks need to be closely co-ordinated. The processing, conversion and manufacturing are also closely related and valorising co-products can be extremely lucrative for collaborating industries. We can use our land to produce food, animal feed, energy, fuels and materials. The land to produce these feedstocks is limited and calls have been made to develop increasingly stringent sustainability criteria. The UK is already committed to rigorous environmental standards for biofuels. The Renewable Fuels Agency reports on the progress of the RTFO including environmental criteria. A common misconception is that agricultural inputs from growing biofuel feedstocks are not taken into account, but life cycle assessments (which include fertilisers, pesticides, tractor fuel, etc) indicate that UK biofuels yield definite GHG savings compared to petroleum-based fuels. Using UK grown rape in biodiesel, for example, saves 40% of GHGs compared to diesel. The inclusion of the impact of indirect land use change is also being carefully evaluated by NNFCC.

Clearly challenging times are ahead; our land will have to deliver more, but with fewer inputs. However, challenging times bring opportunity. There is enough land to meet our current National and European targets for biofuels but, as land is a limited resource, to go beyond these targets we will need to use advanced technologies that are not reliant on food crops. Furthermore, we must recognise that we're not a country with millions of tonnes of homogenous feedstock and millions of hectares of agricultural land available for use as is the case in Asia and the Americas. Producing synthetic fuels by thermochemical treatment of biomass is one technology suited to the UK's circumstances. This process firstly uses gasification to convert biomass to synthesis gas (also known as syngas), a mixture of carbon monoxide and hydrogen. The syngas is subsequently converted into a range of fuels and chemical with low carbon footprints. This process is flexible in terms of feedstock so it could use what the UK has available: energy crops, straw, forestry, and even municipal solid waste. Synthetic fuels have much higher yields per hectare of land compared to first generation processes, potentially have greater greenhouse gas savings. This process could also produce heat, power and chemicals.

Concerns about climate change and diminishing resources are not new, so where are the big, innovative projects? The Government can help by giving clear, robust commitments to renewables. The creation of our new Department of Energy and Climate Change (DECC) and legislation such as the Climate Change Act 2008 show that the UK is not afraid to take a world-leading stance and reflect the strength of the UK's commitment to tackling climate change. But we have to follow this with stable policies based on a long-term vision that give investors the evidence and courage they need to support renewables.