

## **BACKGROUND**

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Bioenergy has been identified as an important means of meeting the Government's energy and environment objectives, including energy security and the reduction of greenhouse gas (GHG) emissions, and indicates that bioenergy could be a major contributor to the renewable energy mix in 2020. However, attempts by the government to stimulate the bioenergy sector in the UK have so far had limited success. The RCEP, 2004, report on bioenergy attributes the lack of progress in part to a focus on promoting specific technologies without full consideration of the wider market (i.e. a whole-system issue), and in part to the lack of integration of biomass supply with its utilisation and to issues of public perception and planning.

## **AIM**

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The TSEC-BIOSYS project aim is to:

*Conduct innovative multi and interdisciplinary research from a whole systems perspective.*

*It will provide answers on technical, environmental, social and economic issues related to the development of bioenergy in the UK.*

## **LIST OF PARTICIPANTS**

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### **Project coordinator:**

Imperial College London, Centre for Energy Policy and Technology – **ICEPT**

### **Consortium members:**

Imperial College London (Centre for Energy Policy and Technology – **ICEPT**, Centre for Process System Engineering – **CPSE**, Biology Department)

University of Surrey – **UniS**

University of Southampton – **UoSo**

Oxford University Centre of Environment – **TSU**

University of Glamorgan – **UoG**

University of Birmingham – **UoB**

University of Aberdeen – **UoA**

Rothamsted Research – **RR**

Centre for Ecology and Hydrology – **CEH**

Institute for European Environmental Policy – **IEEP**

Scottish Agricultural College – **SAC**

Forest Research – **FR**

Edinburgh Centre for Carbon Management – **ECCM**

### **Project website**

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<http://www.tsec-biosys.ac.uk>

### **Contact**

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Dr Ausilio Bauen

**Email:** [a.bauen@imperial.ac.uk](mailto:a.bauen@imperial.ac.uk)

**Web:** <http://www.iccept.ic.ac.uk/>

**Tel:** +44 (0) 20 7594 9332

**Fax:** +44 (0) 20 7594 9334

## **TSEC- BIOSYS**

*A whole-systems approach to analysing bioenergy demand and supply: Mobilising the long-term potential of bioenergy*



## WORK PROGRAMME

TSEC BIOSYS will investigate: (i) the potential role of bioenergy in satisfying UK demand for heat, electricity and transport energy; (ii) the potential contribution of bioenergy to UK Government energy and environmental objectives; (iii) the economic, environmental, and social implications of the large-scale development of bioenergy in the UK.

TSEC will interact with and integrate research findings from other projects including EPSRC Supergen Bioenergy and Distributed Generation, EPSRC SUE Waste, ESRC RELU, DEFRA bioenergy crop networks, EPSRC/Carbon Trust Carbon Vision, and will draw on information from EU and international bioenergy activities.

TSEC has four interrelated themes:

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**THEME 1:** An integrated analysis of bioenergy demand and supply dynamics.

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Topic	Description
1.1	Development of bioenergy scenarios for the UK
1.2	Analysis of bioenergy demand and supply scenarios and their implications for UK policy objectives
1.3	Modelling of novel bioenergy conversion routes and their potential
1.4	Analysis of potential for international bioenergy trade and implications for the UK

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**THEME 2:** Analysis of potential evolution and implications of UK biomass supply

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Topic	Description
2.1	Crop improvement - energy science and management
2.2	Productivity modelling for biomass supply from crop and forest systems
2.3	Greenhouse gas impact of biomass production in the UK
2.4	Environmental impacts of energy crop production - hydrology and biodiversity
2.5	Land use decisions and implications for UK bioenergy supply

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**THEME 3:** Sustainability analysis of bioenergy supply chains for heat, power and transport.

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Topic	Description
3.1	Development of a sustainability and MCDA framework for sustainability assessment
3.2	Full supply chain GHG emissions assessment for alternative bioenergy development pathways
3.3	Sustainability criteria and assessment of the sustainability of bioenergy systems

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**THEME 4:** Total system performance and evolution

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Description
Theme 4 is an integrating theme that uses the outputs from the three themes to develop an appraisal of the implications of the bioenergy scenarios for the UK energy and agricultural systems and for the UK's energy, environmental and agricultural policy objectives. The appraisal will result in an analysis and recommendation of strategies, and related policies and regulations (e.g. renewable heat incentives renewable fuels obligations, accreditation schemes, etc) for the development of the bioenergy sector. A participatory process involving stakeholders is a key element of the development of a Bioenergy Roadmap and recommendations of actions for its deployment.

### PLANNED RESEARCH OUTPUTS

- Bioenergy demand evolution in the UK, based on policy, industry, end-user and social factors.
- Supply options and possible transitions in bioenergy technologies in the UK.
- Assessment of spatial and temporal biomass supply potential in the UK.
- Analysis of advanced bioenergy technologies and assessment of their development potential.
- Sustainability framework including local, regional and global considerations, stakeholder and social concerns.
- GHG abatement potential of selected bioenergy chains.
- Technological, industrial, institutional and policy innovation requirements for the sustainable deployment of bioenergy.