

# The Biofuel Researcher Practical Guide

## Who this is for:

**Researchers** - This guide will enable you to communicate and engage young people with the scientific principles and research in the fields of **bioenergy** and **biofuels** through outreach activities.

Bioenergy science and research are ideal topics to engage young people and support teachers in delivering the curriculum. Delivering a number of small public engagement activities across the UK to young people and families increases awareness of research and the issues that it raises whilst also providing opportunities for dialogue. Stimulating discussion within families raises the level of interest in science and provides an effective means of promoting further study in science subjects. By engaging with young people you will be able to consider the relevance of your research to the needs of future generations and potentially refine the direction of research you undertake to meet those needs.

## What is in the practical guide:

The background information on these pages will cover the basic science involved in the field of bioenergy and biofuels and links to the curriculum and further information on the research being conducted. There are also a range of practical activities with instructions. The activities can be carried out in universities and research institutes with visiting students as well as school science laboratories and classrooms, and with modifications most can be demonstrated at science fairs or other engagement activities. The topics cover plant science, microbiology, chemistry and a range of other areas of science and technology.

Each activity has background science, further reading and links to research groups to enable you to become familiar with the important developments that have occurred in the field of biofuel research. There are learning outcomes, keywords, suitable age ranges, extension activities and curriculum links to help plan activities that will meet the needs of teachers and young people. Before carrying out activities, try to find out the

audience's existing knowledge or understanding of science concepts. You may want to consult teachers or parents prior to the activity. To help with this, suggested prior knowledge is included for each activity.

Activities take between 10 and 60 minutes depending on the age and ability of the participants. Some of the activities require incubation periods which can be carried out in advance or as part of a series of engagement activities with schools or young people. The time taken can be reduced if materials are prepared in advance or parts of the activities carried out as a demonstration. It is recommended that sufficient time before or after the activity is arranged and planned in advance so that the outcomes can be observed.

Many of the activities in this guide are suggested by exam boards to cover the knowledge, understanding or practical skills content required for GCSE, A-level or Higher examinations.

The activities can be carried out with equipment available in most school science laboratories.

Equipment and consumables can be obtained from Sigma-Aldrich, the National Centre for Biotechnology Education (NCBE), Philip Harris Education, Blades Biological Ltd, Mindsets, Sciento, Timstar Laboratory Suppliers Ltd, Bio-Rad and Edvotek.

**Key to abbreviations:** Association for Science Education (ASE), Biotechnology and Biological Sciences Research Council (BBSRC), Consortium of Local Education Authorities for the Provision of Science Services (CLEAPSS®), Control of Substances Hazardous to Health (COSHH), Department for Education and Employment (DfEE), National Centre for Biotechnology Education (NCBE), Royal Society of Chemistry (RSC), Science and Plants for Schools (SAPS), Society for General Microbiology (SGM), Scottish Schools Equipment Research Centre (SSERC), Scottish Qualifications Authority (SQA), Oxford, Cambridge and RSA Examinations (OCR), Assessment and Qualifications Alliance (AQA).