GAME OF FUELS – TEACHERS NOTES

INTRODUCTION

Current energy and chemical needs are largely met by the extraction and processing of the fossil fuels oil, gas and coal. Such resources are limited and their use causes environmental pollution and greenhouse gas (GHG) emissions. The challenge facing humankind is, therefore, to identify new, sustainable and cleaner processes for chemical and energy generation.

Solar power, wind power and water power are three of many alternative technologies which help supply our demand for energy, but they cannot provide for all our needs are not currently a viable option for a car or a plane and cannot be converted into the many chemicals we take for granted.

To maintain our lifestyle, at least in the short-term, we need clean, sustainable, transportable liquid fuels… and biofuels have come to our rescue. CURRENT biofuels (e.g. Bioethanol and Biodiesel) allow us to grow our fuel by recycling atmospheric carbon dioxide, so reducing greenhouse emissions and our reliance on a finite resource. They now play a major role especially in the US and Brazil. But they are not without their critics as they use land which could be used for food and remain carbon positive (produce more atmospheric carbon than they use). This has stimulated scientific research to develop an array of ADVANCED "Future Fuels". They are still in development, but the science looks promising, and once they become commercially viable, any one, or all could come to our rescue at our "petrol" pumps.

AIM

1. To provide scientific background on biofuels and global warming
2. To promote the idea that there is not just one answer to our energy crisis.
3. To illustrate the importance of politics, publicity and people in influencing the future of research.

NOMENCLATURE

4 types of alternative fuel are recognised and exemplified in this game:

Current Biofuels

These are called "Food fuels" in the game as the feedstock is a food crop such as wheat, corn or sugar. This includes bioethanol, biodiesel and biogas. The example chosen for the game is Bioethanol produced from corn.

Lignocellulosic Fuels

These are called "Fibre fuels" in the game as the feedstock is a food crop waste such as wheat straw or rice straw. The example chosen for the game is Ricefuel (biobutanol) produced from rice straw.

Algal Fuels

"Algal fuels" are produced from seaweed (macroalgae) and microalgae. The generic term "Algal fuel" is used in the game.

Recycled Carbon Fuels

The example chosen for the game is "Waste Gas Fuel" (butanol) which is produced by bacteria from recycled carbon gases (e.g. from steel mills and household waste). Although they involve biological processes, they are not currently classified as biofuels as they are not directly produced from biomass.

HOW TO PLAY

Each player chooses a game-piece consisting of a toy pick-up truck. Each player rolls a die and moves their vehicle ahead to collect a feedstock; they will also be given a fact card with information on about their particular feedstock. They will then continue rolling a dice and moving forward through the preparation and production processes to the final product. There will be challenges along the road; if a player lands on a PPP (Politics, Publicity & People) space they will be given information which can either hinder or enhance their movement along the board. If a player lands on a question space, they will be required to answer the question correctly in order to continue. The players proceed through the necessary steps and required technologies for a sustainable bioenergy production. The game concludes when one of the players has developed their entire bio-industrial line production and has made their final product.