

Teaching-learning materials compiled by the PARSEL consortium  
as part of an EC FP6 funded project (SAS6-CT-2006-042922-PARSEL).

Cooperating Institutions and Universities within the PARSEL-Project:



## Science in a Class of Its Own: Renewable Energy Sources – “My iPod Works with Energy from Bull Shit”

A Module for Science Instruction – especially Chemistry – for Grades 10 to 13



### Abstract

The PARSEL module “**Renewable energy sources – My iPod works with energy from bull shit**” focuses on the question of how biogas is produced and in how far the production of biogas can be used as an alternative to conventional energy production (e.g. fossil fuels). Working together in groups, the students will synthesize biogas. Afterwards, still in groups, the heating value of the biogas will be determined through experiments, and the explosiveness of air-biogas-mixtures will be systematically analysed. Optionally, the combustion products formed through burning biogas can be qualitatively and/or quantitatively measured. The results of the heating value determination as well as the qualitative and/or quantitative analyses which the students carried out by themselves will be compared to the heating values and analysis results of other sources of energy. These comparisons may be important in finding an answer to the above mentioned question.

**Subject:** Science and/or Chemistry

**Grade level:** 10<sup>th</sup> to 13<sup>th</sup> grade

**Curriculum content:** Energy and chemical reactions (First Law of Thermodynamics, analyzing the energy of chemical reactions; chemical equilibrium in nature and industry (especially ‘Le Chatelier’s Principle’); economical and ecological effects of selected technological systems; the world of macromolecular properties; polysaccharides: building blocks, structure and properties; relevance of biopolymers

**Kind of activity:** Appropriate judgment, inquiry, laboratory activity, field trip/excursion, role-play, reasoning, group activities etc.

**Anticipated time:** 4 lessons of 45 minutes for the example – 40 lessons of 45 minutes in total

**Overall objectives/competencies:** Concept of energy, scientific inquiry, communication (role-play), appropriate judgment

Attached files		
1.	<a href="#">Student activities</a>	Describes the scenario in more detail and the tasks the students should carry out
2.	<a href="#">Teaching guide</a>	Suggests a teaching approach
3.	<a href="#">Assessment</a>	Gives suggested formative assessment strategies