

There is a renewed interest in nuclear energy. Some people have already termed this interest the "Nuclear Renaissance" or the "New Nuclear Energy Revival". This interest is because of concerns about the increasing price of oil, global warming, climate change, and other environmental impacts. In a reflection of the 1950's, when President Eisenhower introduced the idea of "Atoms for Peace", this current interest in nuclear energy brings hopes of energy security and environmental protection. It also raises serious questions.

The global market for nuclear energy is projected to double in the next 30 years (http://www.armscontrol.org/act/2007_05/squassoni.asp http://www.armscontrol.org/act/2007_05/feiveson.asp), as demand for energy continues to rise. Many new nuclear reactors are being planned in countries such as China, India, and the United States. Compared to coal, hydro, oil, and gas, nuclear energy may have many advantages in terms of the environment and long-term costs. However, with these potential benefits, there are also risks and other issues. These issues include nuclear waste and spent fuel storage, proliferation concerns and, perhaps most critical, nuclear terrorism. There is a need to carefully assess both the benefits and risks involved in the nuclear revival in the context of these issues. This is the central theme for CIF 2007-2008.

Benchmark I – Background Knowledge

In Benchmark I you will examine the objectives from the point of view of the scientific & environmental; social & cultural; economic; political & geopolitical domains to demonstrate a comprehensive understanding and comparison of conventional energy and nuclear energy.

Objective 1: Your task is to clearly demonstrate, in a carefully constructed project, an understanding of energy sources in use in the world today and their availability, distinguishing between renewable and non-renewable sources of energy. In your project you will describe the processes involved in the production of energy around the world, showing the energy resources of different major countries of the world. The project must be your own work with clear and correct citations from any work borrowed from others. All work not your own, including photos, graphics, multimedia, charts, and graphs must be credited within your text and in a bibliography.

Suggested activities: Note that these are suggested activities; they are not your tasks. You may choose to look at any, all, or none of them. The information you gain from doing these activities will help you to construct your project.

1. Build your own glossary of terms and phrases related to energy sources. Be able to describe the important sources of energy in use in countries of the world today.
2. Give examples of the changes in sources of energy in the past 100 years.
3. Describe the major sources of oil, natural gas, coal, uranium, and other energy resources.
4. Give examples of how countries rely on different sources of energy.
5. Explain current stockpiles/reserves, their current rate of depletion, and future demands on major sources of energy in the world today.
6. Create a timeline that explains the changes in the use of energy sources from, for example, coal to oil to nuclear energy in different countries in the world.
7. Visit a power plant; interview a plant spokesperson. Report on the visit.

Objective 2: Your task is to clearly demonstrate, in a carefully constructed project, an understanding of the processes involved in the production of nuclear energy in countries around the world. Your project will describe the

nuclear fuel cycle and will show places in the cycle where diversion of materials could take place. In this regard, you will bear in mind the possibilities of nuclear proliferation or nuclear terrorism. Your project will also describe the dual nature of nuclear energy – civilian vs. military – and identify which countries have these capabilities. Additionally, your project will describe different designs for nuclear power plants around the world, identifying their strengths and weaknesses. The project must be your own work with clear and correct citations from any work borrowed from others. All work not your own, including photos, graphics, multimedia, charts, and graphs must be credited within your text and in a bibliography.

Suggested activities: Note that these are suggested activities; they are not your tasks. You may choose to look at any, all, or none of them. The information you gain from doing these activities will help you to construct your project.

1. Add to your own glossary, nuclear terms and phrases. Be sure to include: definitions of proliferation & nonproliferation, safety & nuclear security as they relate to nuclear energy, and nuclear terrorism.
2. Diagram and explain the nuclear fuel cycle.
3. Identify the differences between a non-nuclear power plant and a nuclear one.
4. Give examples of and explain the different kinds of nuclear power plants in the world today.
5. Show where civilian nuclear power is used and/or being planned. Identify countries that have the scientific and economic capabilities to convert from civilian to military use.
6. Describe the sciences and technologies involved in a nuclear power plant and explain how these are used.
7. Give job descriptions for three different kinds of workers in a nuclear power plant. You may want to consider job duties, knowledge required, special skills, past experience, etc.
8. Show examples of the differences between civilian and military uses of nuclear energy. Be able to explain how a peaceful nuclear program could contribute to the development of a military program.
9. Visit or invite a nuclear expert to your classroom to discuss these issues. Report on your interview with the expert.

At the end of Benchmark I you will have created two original projects with internal citations and bibliographies both of which demonstrate your

knowledge and understanding of the objectives of this Benchmark. Your projects will be your own work. When you refer to the work of others, you must have complete citations, and the work must also be in your bibliography. All work not your own, including photos, graphics, multimedia, charts, and graphs must be credited. You must have a bibliography of the resources you have cited.