

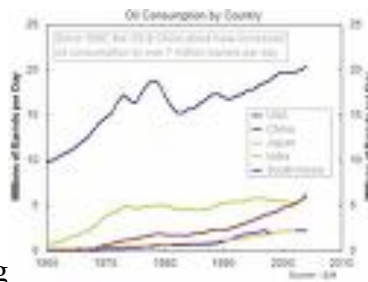
Benchmark III

Richard Tjosaaas

Alex Hirtle

Despite the controversy surrounding the use of nuclear power plants in the production of energy, there are many benefits that must be noted in the decision of whether or not to construct a nuclear power plant in local areas. Among these benefits is the production of cleaner, more efficient energy, which in turn results in a lessened amount of carbon dioxide and other greenhouse gases being released into the environment. Nuclear energy is one of the most effective forms of energy used in the world today. This can be illustrated by the fact that a piece of uranium the size of an average fingertip produces as much electricity as 150 gallons of oil. Furthermore, nuclear reactors may also be the answer to our world's growing addiction to oil and other fossil fuels, which can then in turn be saved for use in other, non-fuel petroleum based products, such as pharmaceutical, facial, and skin care products. In many ways, nuclear energy is

Global Oil Consumption Chart  
[www.bigpicture.typepad.com/photos/uncategorized/](http://www.bigpicture.typepad.com/photos/uncategorized/)

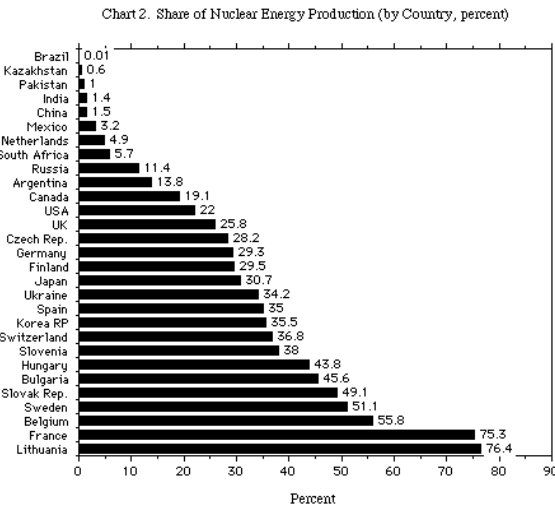


the solution to a global economy relying

far too heavily on an already short supply of oil. If our present course is not reverted, it may be only a matter of time, even a few decades, before the world's supply of oil reserves will virtually run dry.

Another important reason for local communities to consider the possibility of a nuclear power plant being constructed close to home, is the evident success rate of these reactor's

production of energy in several countries. Many of these countries, such as France and Lithuania, now acquire about three-fourths of their total energy from nuclear reactors. Ironically enough, the United States and Russia, the two key nations that took part in the Cold War, produce only a meager 22 and 11.4 percent of their energy through nuclear power, respectively.



Nuclear Energy Production By Country  
[www.huri.harvard.edu/workpaper/chart2.gif](http://www.huri.harvard.edu/workpaper/chart2.gif)

Despite major nuclear meltdowns at Three Mile Island, and the Chernobyl disaster, these situations, among other failures, have resulted in a heightened sense of safety and security, leading to better government regulation of nuclear facilities. The events that occurred at Chernobyl and Three Mile Island are well understood and quite unlikely to occur again. In both of the incidents, a lesson was learned. For example, the Chernobyl incident was caused by a flawed reactor, which was being operated by inexperienced personnel at the time of the disaster. The explosion released about five percent of the radioactive core into the air. Because of this, a total of fifty-six people have died as a result. The safety of all Soviet made nuclear reactors constructed was drastically increased in the aftermath of the Chernobyl disaster. Modifications to reactors have been made to overcome deficiencies in their operation. Chernobyl is very well

understood and many safety procedures have been made since this incident (World Nuclear



Chernobyl Nuclear Reactor  
[www.atomicarchive.com/images/chernobyl.jpg](http://www.atomicarchive.com/images/chernobyl.jpg)

Association).

Another example of a meltdown incident was the Three Mile Island nuclear accident. Thankfully, there were no reported deaths or injuries in this incident. Three Mile Island is the most widely known and publicized example of a nuclear accident in United States history. The incident started with a failure in the secondary non-nuclear area of the plant. The main water pumps stopped working, preventing the generators from removing heat. The reactor automatically turned off, and the pressure in the nuclear area of the plant began to rise. In order to stop the pressure, a relief valve was opened. Although the valve should have turned off the when the pressure went down, due to a malfunction it did not. However, there was no indication of this for the operators to see. A coolant was poured over the reactor, causing it to somehow overheat. This incident brought about sweeping changes involving emergency response planning, reactor operator training, human factors engineering, radiation protection, and many other areas of nuclear power plant operations. It also caused the U.S. Nuclear Regulatory Commission to tighten and heighten its regulatory oversight. Resultant changes in the nuclear power industry and at the NRC had the effect of enhancing safety. Both of these incident brought change to the safety of all nuclear reactors. They are both understood well enough for it to not happen again.

Three Mile Island Nuclear Reactor  
[www.ohiocitizen.org/campaigns/electric/2004/](http://www.ohiocitizen.org/campaigns/electric/2004/)



(United States Nuclear Regulatory Commission).

With this in

mind, the probability of a nuclear malfunction to occur in the nuclear reactors of today is extremely low, in a well-managed facility with a competent staff. However, another issue that must be addressed in the construction of a nuclear power plant is the problem of nuclear waste. The ongoing debate over the disposal of radioactive waste from nuclear power plants and nuclear missiles is as politically intense an issue as the plants and missiles themselves. Nuclear waste can be generally classified as either "low level" radioactive waste or "high level" radioactive waste.

(Gold)

Low level nuclear waste usually includes material used to handle the highly radioactive parts of nuclear reactors, such as cooling water pipes and radiation suits, and waste from medical procedures involving radioactive treatments or x-rays. Low-level waste is comparatively easy to dispose of. The level of radioactivity and the half-life of the radioactive isotopes in low level waste is therefore relatively small. Storing the radioactive waste for a period of 10 to 50 years will allow most of the radioactive isotopes in low-level waste to decay, at which point the waste

Chernobyl Victim  
[www.commondreams.org/images/0423-02.jpg](http://www.commondreams.org/images/0423-02.jpg)



can be disposed of as normal refuse.

In comparison, high-level radioactive waste is generally the material from the core of either a nuclear reactor or a nuclear weapon. This waste includes uranium, plutonium, and other highly radioactive elements made during fission. Comparatively, most of the radioactive isotopes in high-level waste emit large amounts of radiation and have extremely long half-lives, in some cases longer than 100,000 years, creating extremely long time periods before the waste will settle to safe levels of radioactivity for normal disposal. To address these issues, many steps have been taken in the overall design of new nuclear reactors. Scientists and researchers are currently working towards reactors that not only use more efficient amounts of radioactive materials such as uranium and plutonium in their energy production, but for ways to recycle the leftover materials in nuclear waste, in an effort to reduce the amount of nuclear waste released into the environment and ecosystem. (Gold)

One of the most important aspects of nuclear energy, however, is the fact that it releases no greenhouse gases and other pollutants into the Earth's atmosphere, and does not contribute to acid rain. Although the problem of nuclear waste disposal still remains largely unsolved, major strides in the scientific community have yielded positive results that indicate the answer may lay just around the corner. (Energy Kids Page)

Even still, what may stand as the largest issue in the decision of whether or not to construct a local nuclear power plant is the reaction of the surrounding community. Due to major nuclear incidents and disasters in the past few decades, many citizens are still disillusioned by the idea of the construction of any new nuclear reactors, especially local. However, once made aware of the truth, the facts about nuclear energy and its regulation today, the fear of the citizens, the people of our nations, will subside. For example, in the United States city of San Onofre, California, many residents live, work, and play in close proximity to a local nuclear power plant.

There has been much care taken in an effort to make nuclear energy safe for the world today. In our present day, enlightenment has taken hold, and prior ignorance of atomic energy has given way to the age of a nuclear renaissance.



San Onofre Nuclear Reactor  
[www.oregister.com/2006/08/18nuke\\_md.jpg](http://www.oregister.com/2006/08/18nuke_md.jpg)

## **Works Cited**

Gold, Ezra, Nuclear Waste Disposal

<http://www.history.rochester.edu/class/EZRA/>

World Nuclear Association, May 2008

<http://www.world-nuclear.org/info/chernobyl/inf07.html>

United States Nuclear Regulatory Committee, 20 February 2007

<http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html>

Energy Information Administration, Energy Kid's Page

<http://www.eia.doe.gov/kids/>