

# mind•full: a brainsnack for future leaders with ethical appetites

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## energy & international security

The world needs energy. Today's economies need cheap and abundant energy sources to grow. As a result, maintaining access to the world's energy resources such as oil and coal is an important part of many countries' national security strategies. Because the developed world consumes over half the world's energy but only produces slightly more than one-third, there are important strategic concerns associated with energy policies.

Many analysts say that in the next century wars will continue to be fought over the control of the world's limited resources. In the past, political leaders have used access to energy resources as an excuse to maintain their countries' military presence in certain regions, develop strong navies and rapid deployment forces, and forge security alliances. Historically, access to energy resources has been a factor leading to military conflict. This was at least partly the case in Saddam Hussein's decision to invade Kuwait's oil fields and the international response. However, other situations such as the oil crises of the 1970s were not resolved by armed conflict.

Some argue that expanding the use of nuclear energy would lessen our reliance on depleting fossil fuels and the likelihood of conflict over their control. However, an increased reliance on nuclear energy raises significant national security concerns over the linkages between nuclear energy and nuclear weapons proliferation.

Economic, environmental and military instability also can result from short sighted or poor energy policy choices. As issues surrounding global warming and resource scarcity persist, policy makers must critically assess how energy decisions affect global security.

The mission of Student Pugwash USA is to promote the socially responsible application of science and technology in the 21st century. As a student organization, Student Pugwash USA encourages young people to examine the ethical, social, and global implications of science and technology, and to make these concerns a guiding focus of their academic and professional endeavors.

The **mind•full** series encourages readers to explore crucial ethical dilemmas associated with the application of science and technology.

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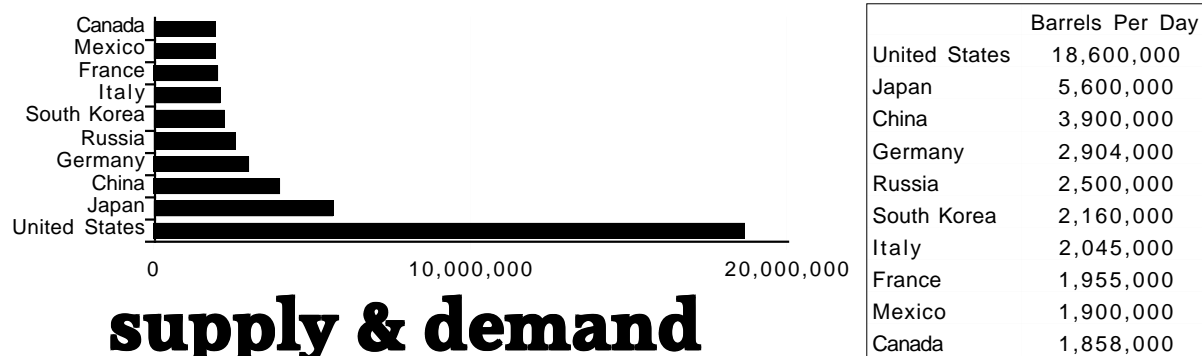
U S A

# go figure!

There is increased concern over future energy consumption. Numerous government agencies and non-governmental organizations have worked on projections, which are called baseline forecasts. The World Energy Council (WEC), for example, predicts between a 54 and 98 percent increase in world energy demand between the years 1990 and 2020, depending on global economic growth. However, if future energy decisions encourage the use of energy-efficient technologies, the WEC projects an increase of only 30 percent. The US Department of Energy, on the other hand, uses lower growth rates for developing nations and predicts the increase of energy demand to be somewhere between 22 and 52 percent.

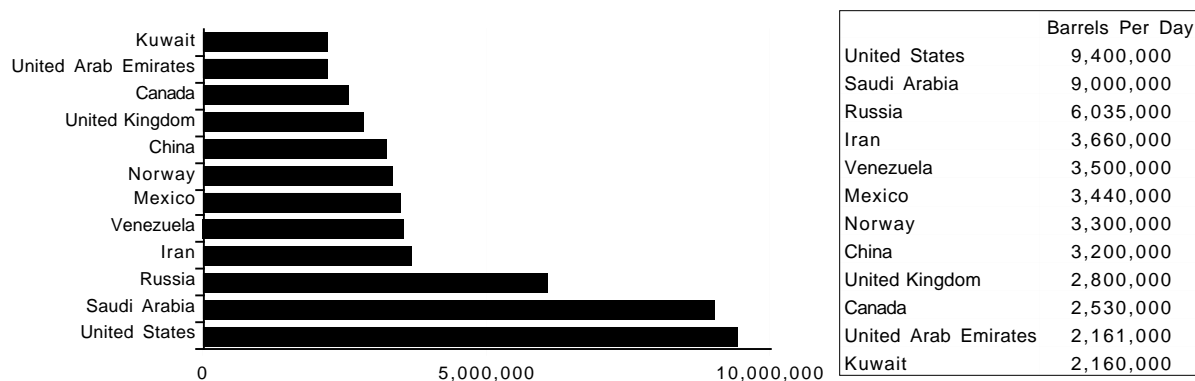
The United States is relying less on oil imported from the Middle East. According to British Petroleum's *Statistical Review of World Energy*, the US imported only 18% of its oil from the Middle East in 1997, down from 26 percent prior to the Gulf War. The Middle East, however, continues to be the world's largest oil supplier, providing 45 percent of the world's total imported oil. The regions that rely most on Middle East oil, according to BP's study, include Western Europe, which imports 40 percent of its oil from the Middle East, and the Asia Pacific countries, including Japan and South Asia, which import a staggering 78 percent. China imports 28 percent of its oil from the Middle East.

## top 10 oil-consuming countries (barrels per day in 1997)



## supply & demand

## top 12 oil-producing countries (barrels per day in 1997)



**source:** US Energy Information Administration and Cox News Service as cited in Andrew Mollison, "Foreign Oil is Still Cheap, Plentiful," *Washington Times*, October 19, 1998, page A14.

# in control or out of it ?

Economic growth in the United States relies on an affordable energy supply. As a result, the US government has stated that "ensuring uninhibited access to . . . energy supplies" is a vital national interest. Policy makers are particularly concerned about dependence on imported oil, much of which comes from the politically troubled Middle East. The 1998 *Annual Defense Report* cites protection of oil reserves abroad as one of the top justifications for using unilateral military force. Despite these concerns, the percentage of oil that the United States has imported continues to increase.

One initiative taken by the US government to ensure a continual supply of oil was the development of the Strategic Petroleum Reserve, an emergency supply of over 560 million barrels of crude oil stored in huge underground salt caverns along the Gulf of Mexico. This supply, inspired by the 1973 oil embargo, is to be used in case a cutoff of oil imports ever occurs.

Critics of US energy and security policies believe that the US relies too much on foreign oil as an energy source. They believe that US and global dependence on petroleum may not only lead to military conflict but also may have devastating effects on the environment. Such critics feel that the world must reduce its reliance on petroleum and make a greater effort to develop energy sources that do not contribute to global warming.

Another area of concern for policy makers is the spread of nuclear technologies. Nuclear reactors used for energy produce plutonium, a fissionable material that can be used to make nuclear bombs. In addition, the spread of nuclear energy technology also leads to knowledge of nuclear-weapons-relevant technology and materials. Some countries have used nuclear energy programs as "cover" for clandestine nuclear weapons programs. Although there are more than 400 operating nuclear power plants in 58 countries around the world, the nuclear energy industry has grown more slowly than previously predicted. This is due largely to problems with cost, reactor safety concerns, and public worry about radioactive waste management and nuclear weapons proliferation. However, many countries are looking toward nuclear energy as a way to reduce greenhouse gases while still meeting their future energy needs.

## learn the lingo!

**barrel**—in the petroleum industry, a barrel is 42 US gallons. It takes one barrel of oil to make enough gasoline to drive an average car from Los Angeles to San Francisco and back (at 18 miles per gallon over the 700-mile round trip).

**baseline forecast**—a prediction of future energy needs which does not take into account the likely effects of new conservation programs that have not yet been started.

**global climate change**—gradual changing of global climates due to buildup of carbon dioxide and other greenhouse gases in the earth's atmosphere.

**greenhouse gas**—the gases carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), tropospheric ozone (O<sub>3</sub>), and water vapor (H<sub>2</sub>O), which allow visible light and ultraviolet light to pass through the atmosphere and heat the earth's surface. This heat is reradiated from the earth in form of infrared energy. The greenhouse gases absorb part of that energy before it escapes into space.

**OPEC**—acronym for Organization of Petroleum Exporting Countries founded in 1960 to unify and coordinate petroleum policies of the members.

**petroleum**—oil as found in its natural state under the ground.

**renewable energy**—resources that constantly renew themselves or that are regarded as practically inexhaustible. These include solar, wind, geothermal, hydro and wood.

**source:** *Glossary: California Energy Commission*, found at [www.energy.ca.gov/glossary/glossary.html](http://www.energy.ca.gov/glossary/glossary.html), October 23, 1998.

The 1968 Non-Proliferation Treaty gives countries the right to develop nuclear energy as long as they promise not to develop nuclear weapons. The International Atomic Energy Agency verifies that countries with nuclear energy programs are not developing nuclear weapons. To do this, IAEA inspectors make site visits to ensure that no nuclear materials are being diverted into clandestine weapons programs. Critics of the IAEA inspection process think that it is too easy to hide nuclear weapons activities from inspectors. As it is now, countries often know months in advance when inspectors are coming and what sites they will be visiting. This gives potential proliferators ample time to hide any suspicious activities. Some critics say that all nuclear facilities in all countries should be subject to IAEA inspection without any advance notice or warning.

Many are concerned about the long-term environmental and security threats that increased energy consumption may create. These include the consequences of global warming and the potential for conflict over access to depleted energy sources. International negotiations started last year in Kyoto, Japan are beginning to address these problems. The Kyoto protocols are designed to lower greenhouse gas emissions to seven percent below 1990 levels. Critics of the protocols, especially in the United States, argue that if the protocols are enacted they will have dire effects on the economy and that target goals are unfairly distributed between the developed and the developing world. Supporters believe that these are necessary risks and that the protocols will encourage the development of more energy-efficient technologies.

### **feeding a giant**

China has one of the world's fastest growing economies and, as a result, is using more and more energy. Currently, China is consuming nearly 4 million barrels of oil per day and producing nearly 3 million barrels. Based on current growth rates, China's oil consumption will increase to around 9.5 million barrels per day by 2020. In 1993, China began to import oil to meet its growing energy needs. In 1995, China was importing 230 thousand barrels per day. It is estimated that in 2010 that total will reach 3.1 million barrels per day. One analyst, Kent Calder, believes that China's increased reliance on Middle East oil could lead to potential arms-for-energy deals with countries that sponsor international terrorism. Already, China has been criticized for questionable transfers of nuclear technologies to Iran.

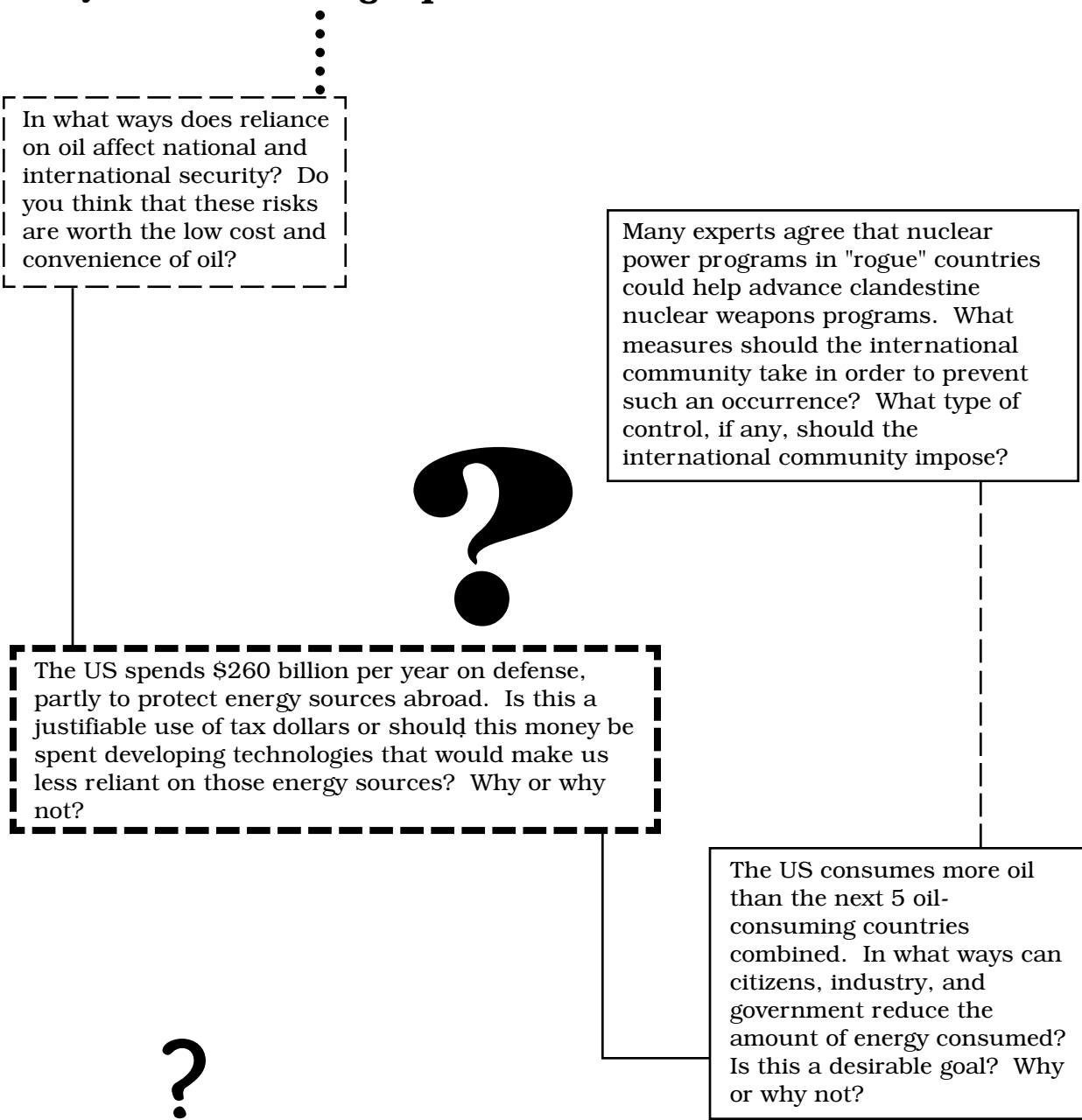
### **did we fight a war for oil?**

The world's heavy reliance on Middle East oil carries many consequences. In July 1990, Iraq invaded the Kuwaiti oil fields resulting in a US-led international effort to regain Kuwait's sovereignty. Kuwait, the world's 12th largest oil producing country would have been a valuable prize if Iraq could have kept the territory. John Holdren, a professor at Harvard University's John F. Kennedy School, argues that the international response to Iraq was not so much about future access to oil, since Iraq would have been more than willing to sell it, as it was about over concerns of what Iraq would do with the revenues gained from the oil field. It was quite clear that Iraq's president, Saddam Hussein, desired to expand his empire possibly into such other oil-rich countries as Iran and Saudi Arabia. However, Dr. Holdren believes that the danger of conflict over oil is dwindling as the Middle East share of world oil production falls and new reserves are found.

# (anything but a) conclusion

The world will continue to have growing energy needs. Access to affordable energy will be a national security concern for most countries. Guaranteeing that there is ample energy for everyone will require creative thinking by policy makers, industry, and citizens alike. We also must explore the consequences of our energy. Over reliance on fossil fuels risks harmful pollution, global warming, and possible conflict over control of oil reserves. And yet, dependence on nuclear energy risks the possibility of increased nuclear weapons proliferation, possible nuclear accidents, and problems with waste storage and clean up. Finding renewable and clean energy sources will help guarantee future peace and global security.

How do **you** answer the **tough questions**



.....  
• There is considerable debate about  
• encouraging developing countries to agree to  
• the Kyoto protocols' standard emissions,  
• when developed countries are most  
• responsible for the world's energy  
• consumption. How should this debate be  
• addressed? How can we prevent future  
• conflicts in setting international standards?  
.....

What roles and responsibilities do scientists have in educating the public about the risks associated with energy use? Should scientists be responsible for learning about the societal risks associated with their work? Why or why not?

What roles and responsibilities, if any, do businesses and transnational corporations have in promoting socially responsible energy sources?



Following the oil shortages of the 1970s, many in the US questioned the country's ability to maintain an independent energy supply. Do you think this is a good reason for the US to pursue renewable energy sources? Or, do you think the growing global interdependence is a stabilizing factor in international affairs?

Many analysts have discussed ways in which environmental degradation can lead to conflict. What measures can the international community take to prevent such conflicts? What should it do when and if these conflicts occur?



Many of the world's oil providing countries also are reported to abuse the human rights of their citizens. Should human rights be a consideration when we decide where to buy our petroleum products? Why or why not?

## electrifying information

- *1998 Annual Defense Report*—a detailed summary of the US defense strategy. A must read. Found at [www.dtic.mil/execsec/adr98/toc.html](http://www.dtic.mil/execsec/adr98/toc.html).
- *American Hegemony and World Oil: The Industry, the State System and the World Economy*, Simon Bromley—a good introduction to the US reliance on oil. University Park: Pennsylvania State University Press, 1991.
- *Asia's Deadly Triangle: How Arms, Energy, and Growth Threaten to Destabilize Asia Pacific*, Kent E. Calder—explores the link between East Asia's economic growth, the lack of accessible energy sources, and some of the devastating consequences that could result. Nicholas Brealey Press, 1997.
- *Climate of Opportunity: Renewable Energy After Kyoto*, Christopher Flavin and Seth Dunn—a look at the opportunities available for renewable energy following the Kyoto protocols. Renewable Energy Policy Project, July 1998, Number 11.
- *Energy, Society, and Environment: Technology for a Sustainable Future*, David Elliot—a good overview of some alternative energies. New York: Routledge Press, 1997.
- *Environmental Dimensions of Security*, Proceedings from a AAAS Annual Meeting Symposium, February 9, 1992—contains an excellent article by John Holdren on energy and international security. Washington, DC: American Association for the Advancement of Science, 1992.
- *Federal Energy Research and Development for the Challenges of the Twenty-First Century*, Report of the Energy Research and Development Panel—a great overview of US energy policy. Washington, DC: The President's Committee of Advisors on Science and Technology, 1997.
- *The Heat is On: The High Stakes Battle Over Earth's Threatened Climate*, Ross Gelbspun—shows how industry front groups like the Information Council on the Environment created the appearance of uncertainty within the scientific community. Old-fashioned muckraking at its finest. Perseus Press, 1997
- *Nuclear Energy and Security in the Former Soviet Union*, David R. Marples and Marilyn J. Young (editors)—covers topics including the cleanup at Chernobyl and other sites of nuclear disasters, nuclear smuggling, safety concerns in the Ukrainian and Russian nuclear industries, and Ukraine's negotiations with Russia and the West regarding the transference of its nuclear weapons to Russia. Boulder: Westview Press, 1997.

# check it out !

## celluloid products

- *Chain Reaction*—Keanu Reeves and Morgan Freeman star in this tale about a young doctor who discovers a cheap energy source. Ridiculous at best.
- *The Harlem Globetrotters on Gilligan's Island*—a mad doctor and his accomplice plan to take over the island for its rich energy supply by scaring off Gilligan and his buddies, but he soon settles to a basketball match between the doctor's robots and the Globetrotters. Energy and conflict at its finest.
- *Nuclear Power, Nuclear Weapons*—a documentary by America's Defense Monitor that explores the link between nuclear power and nuclear weapons. Go to [www.cdi.org/adm/transcripts/1023/](http://www.cdi.org/adm/transcripts/1023/) for a transcript.
- *The Saint*—international intrigue ensues as Val Kilmer attempts to steal the formula for cold fusion for a Russian mafia boss.

# cyberspace

## top picks

- Energy Information on the Internet (this site, sponsored by the Netherlands Energy Research Foundation, contains a database of thousands of energy-related sites around the world)—[www.ecn.nl/eii/main.html](http://www.ecn.nl/eii/main.html)
- Energy Information Administration (Department of Energy site loaded with stats and information)—[www.eia.doe.gov/](http://www.eia.doe.gov/)

**enhance  
your web  
environment!**

## best of the rest

- Center for Defense Information (endless amounts of information about defense and foreign policy issues with a very impressive links page)—[www.cdi.org](http://www.cdi.org)
- Center for Energy and Environmental Studies (Princeton University program that aims to teach and carry out research in the broad fields of energy and the environment)—[www.princeton.edu:80/~cees/](http://www.princeton.edu:80/~cees/)
- Department of Energy/Fossil Energy (information on US fossil energy and the US Strategic Petroleum Reserve)—[www.fe.doe.gov/](http://www.fe.doe.gov/)
- Environmental Protection Agency: Ozone Depletion (information about the science of ozone depletion, regulations in the US designed to protect the ozone layer, and other topics)—[www.epa.gov/ozone/](http://www.epa.gov/ozone/)
- Institute for Energy and Environmental Research (IEER is dedicated to increasing public involvement in and control over environmental problems through the democratization of science)—[www.ieer.org/](http://www.ieer.org/)
- Nuclear Control Institute (this site is mainly concerned with the proliferation risks associated with nuclear energy)—[www.nci.org/nci/](http://www.nci.org/nci/)
- Rocky Mountain Institute (RMI works to foster the efficient and sustainable use of resources as a path to global security)—[www.rmi.org](http://www.rmi.org)
- Union of Concerned Scientists (information on energy policy, arms control, and plutonium)—[www.ucsusa.org](http://www.ucsusa.org)
- United Nations Environment Programme (good site for UN environmental initiatives)—[www.unep.org/](http://www.unep.org/)
- Worldwatch Institute (organization that publishes *State of the World* every year)—[www.worldwatch.org](http://www.worldwatch.org)

This **mind•full** was written by David Andersen, associate director of Student Pugwash USA. Special thanks to Hal Feiveson, Princeton University, Center for Energy and Environmental Studies, for his comments. Any errors are the responsibility of Student Pugwash USA. ©1998 Student Pugwash USA.

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## but wait, there's more!

• **mind•full: a brainsnack for future leaders with ethical appetites.** Volume one available, includes: international weapons trade; emerging infectious diseases; access and the Internet; public's role in science; future of nuclear weapons; water quality and availability; war and disease; renewable energy. Volume two issues available: pugwash conferences; exploring human genetics; science, technology, & culture; communications technologies; beyond nuclear weapons; nuclear energy; computers & human genetics.

• **Jobs You Can Live With: Working at the Crossroads of Science, Technology, and Society.** The fifth edition of the Student Pugwash USA internship directory. It highlights approximately 200 organizations that work to promote the ethical use of science and technology and provides suggestions on how to go about the internship and job search.

• **Science, Technology, and Ethical Priorities: Proceedings of Student Pugwash USA's Ninth International Conference.**

• **Pugwatch.** The chapter newsletter.

• **Chapter Organizing Guide.** Newly updated, provides chapter members with an A to Z guide to getting a campus-based chapter up and running.

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