Research Report Environmental Commission

Forum:	Environmental Commission
Issue:	The question of long term storage and depletion of nuclear waste
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Background information

The use of nuclear energy is one of the issues that continues to create much debate in the international world. It is especially the so-called 'high level waste' left after such energy production, which is the cause of great debate on the issue. Such waste stays radioactive for thousands of years and it is therefore disposed of deep in the ground in specially designed facilities. Some countries such as Germany, Japan, the United Kingdom, France and Russia

reprocess their fuel, meaning their high-level waste, which is still greatly radioactive, can be reused. If the reactor is not reused, there is still a great amount of highly radioactive isotopes, which generate a lot of heat making it necessary to cool down the waste. After approximately 40-50 years the heat and radioactivity is only one thousandth of its stage when disposed. It is now ready for being stored in casks, where it will remain for permanent disposal. Although most nations choose to reuse the radioactive waste, some countries such as the USA and Sweden make use of the direct disposal. The disposal of nuclear waste makes up 5 % of the total cost of the electricity generated. However, despite great debate, radioactive waste only makes up less than 1 % of the total industrial waste in the countries where such is used. [1]

Definitions

High-level waste: The waste left from a nuclear reactor after it has been used as fuel for approximately 3 years for creating heat used for electricity.[2]

Intermediate-level waste: The waste, which is more radioactive than the low-level waste, but less than the high-level waste. Some of it may require shielding. It usually consists of resins, chemical sludge and metal fuel cladding.[3]

Low-level waste: The waste that makes up the majority of the remains after producing nuclear energy. It consists of objects that have been less contaminated by the radioactivity and includes tools, work clothing etc.[4]

Reprocessing, direct disposal or opposition against nuclear energy

The following nations reprocess their nuclear waste:
Belgium, China, France, Germany (but is making the transition to direct disposal), India, Japan, Russia, Switzerland, United Kingdom

The following nations make use of direct disposal of their nuclear waste:
Canada, Finland, South Korea (wants to change though), Spain, Sweden, USA (is considering to change to reprocessing).[5]

In the following nations there is the greatest resistance against nuclear energy among the general public:
Italy, Germany and Mexico.[6]

[1] http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Nuclear-Wastes/Radioactive-Waste-Management/
[2] http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Nuclear-Wastes/Radioactive-Waste-Management/
[3] http://www.world-nuclear.org/Nuclear-Basics/What-are-nuclear-wastes-/
[4] http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Nuclear-Wastes/Radioactive-Waste-Management/
[5] http://hubpages.com/hub/Dumping-of-Nuclear-Waste-In-the-Oceans#
[6] http://www.theguardian.com/environment/damian-carrington-blog/2011/jun/23/nuclearpower-nuclear-waste

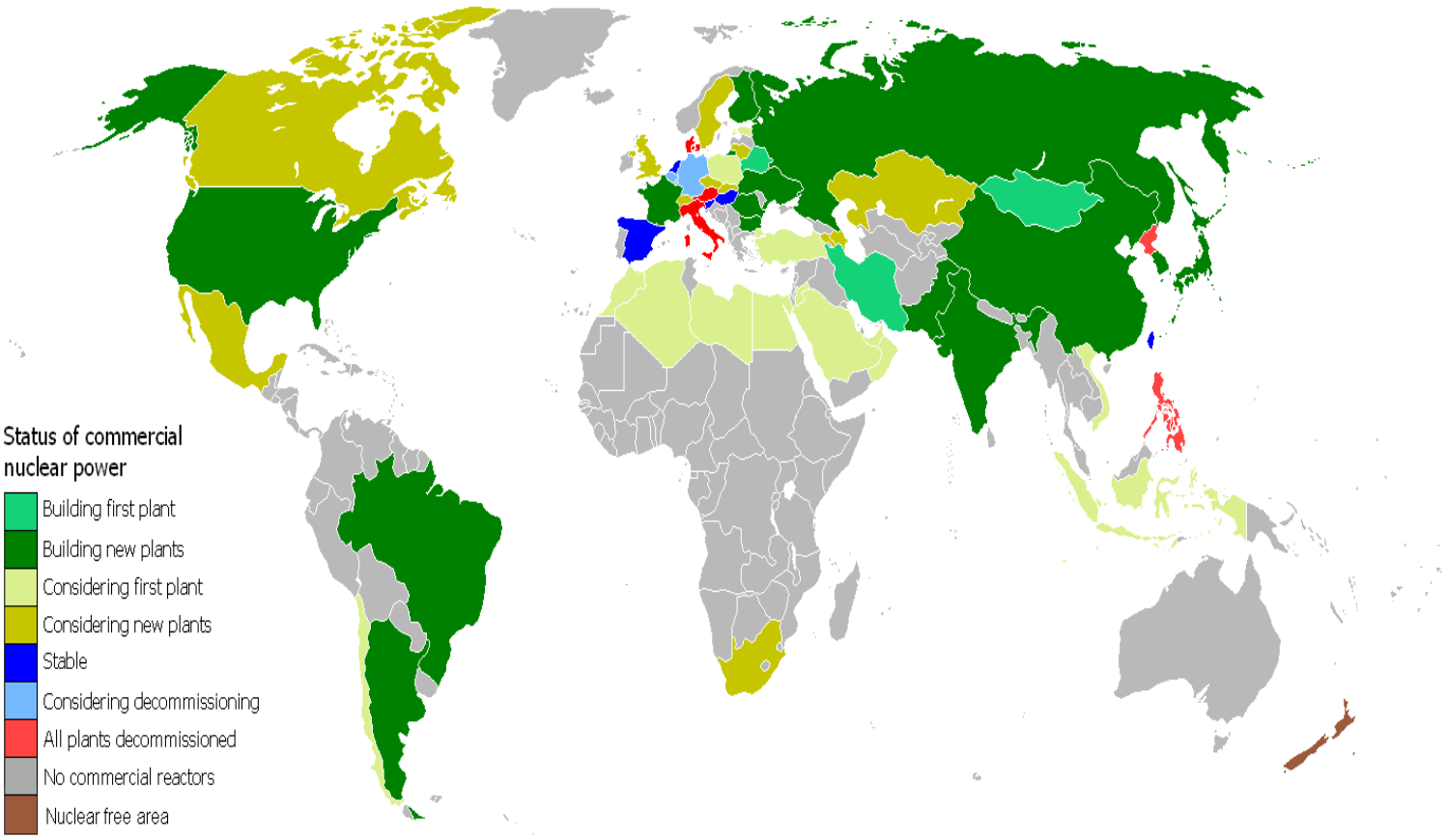
The areas with a small symbol next to them have had radiation exposure/leaks/storage sites.

The scope of the usage of nuclear energy

On a worldwide level, there are currently 440 nuclear reactors operating, which produce 375 gigawatts of nuclear power. To put it into perspective, a light bulb uses 60 watts, meaning the world creates enough energy for 6,250,000 bulbs using nuclear energy. It thereby makes up 14 % of the world's total electricity demand.

The five leading nations in the usage of nuclear energy are as following:

1. The United States of America
2. France
3. Japan
4. Russia
5. South Korea



Map showing the world's usage of power plants and nuclear energy.

Regulating the use of nuclear energy

Several organisations are involved in the safeguarding of nuclear waste. One of such organisations is the International Atomic Energy Agency (IAEA), which is an international institution advising nations on safe and peaceful use of nuclear technology. Furthermore, it also provides technical help as well as equipment and training. It has its base in Vienna and is an organisation made by the United Nations, which currently consists of 134 member states, both with and without nuclear energy.

The Nuclear Energy Agency from the OECD (Organisation for Economic Co-operation and Development, which has the purpose of creating policies to promote the economic and social standards on an international level)[7] also helps in the disposal of nuclear waste. It is located in Paris and contains a number of waste management programmes involving its 28 member states. Its purpose is to guide these nations in creating safe disposal strategies and the organisation works closely with the IAEA.

Issues with nuclear waste

Despite being the supplier of large amounts of the world's electricity, the use of nuclear energy has often been criticised. Firstly, the waste will remain radioactive for thousands of years after its usage period and there is no guarantee that it will not leak back into the environment, contaminate the water or disturb any food chains. Furthermore, the population is at risk of being exposed to such dangers already when the waste is being transported around the countries by road, rail or sea. In the case of one of these transportation vehicles being the subject to a terror attack, thousands of people would be exposed to radiation potentially causing cancer.

Concrete examples of problems with nuclear energy can be seen with the issues of Chernobyl and Fukushima. In 1986, a flawed reactor in the Chernobyl plant site caused 5 % of the radioactive reactor to be released into the atmosphere. Two workers were killed at the night of the accident and within the next couple of weeks, another 28 died from acute radiation poisoning. However, the organisation UNSCEAR (United Nations Scientific Committee on the Effects of Atomic Radiation) has stated that besides an increase in thyroid cancers, there is no evidence of the accident having had an impact on radiation exposure 20 years after the accident. Today, the area is used as a tourist site.[8]

In 2011 another nuclear tragedy stroke when an extreme earthquake in Japan enabled the power supply and thereby the cooling of three Fukushima reactors. This meant that the three cores were melted already within the first three days and it took two weeks before the cores could be stabilised again. Furthermore, the main task consisted of containing the radioactive material and prevent it from leaking into the water supply or environment. No people were killed or affected by illness from the accident but more than 100,000 people were evacuated and returning was delayed due to governmental concerns. [9]

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[7] http://www.oecd.org/about/
[8] http://www.world-nuclear.org/info/Safety-and-Security/Safety-of-Plants/Chernobyl-Accident/
[9] http://www.world-nuclear.org/info/Safety-and-Security/Safety-of-Plants/Fukushima-Accident/

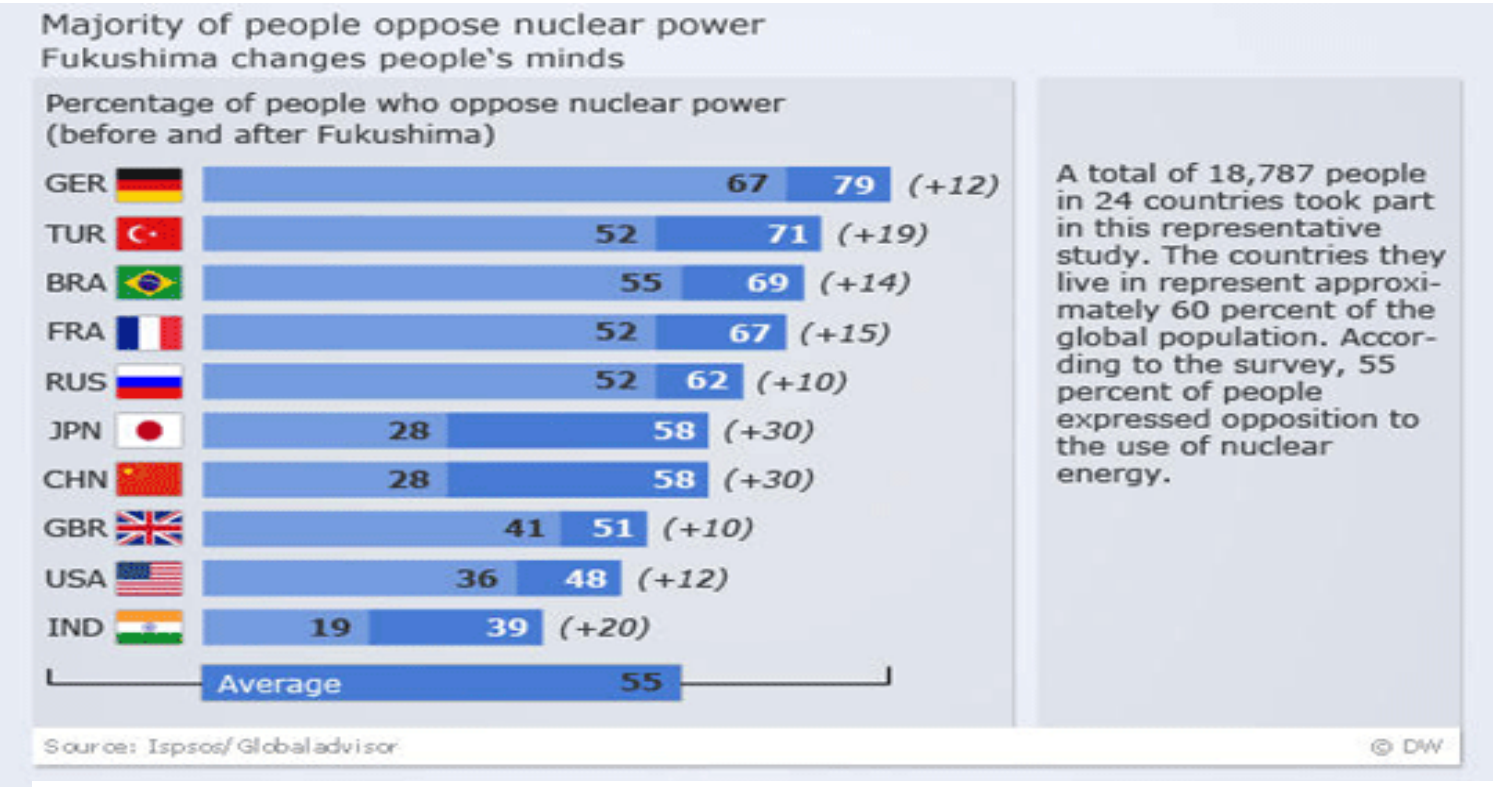

Chart showing the difference in public opinion towards nuclear energy before and after the Fukushima incidence.

Questions to consider

What is your nation's stand on the usage of nuclear power?
Is your nation in the process of upgrading or cutting down on its usage of nuclear power?
Does your country have any nuclear reactors?
Has there been any previous nuclear issues involving your nation?
What pros and cons can you find for the usage of nuclear energy and what could be used as counter-arguments to such?

Useful websites

http://www.un.org/earthwatch/radioactivewaste/ - UN work on the topic

http://www-pub.iaea.org/MTCD/publications/PDF/Pub1449_web.pdf - Member states of the IAEA and safety regulations

https://www.iaea.org/OurWork/ST/NE/NEFW/Technical-Areas/WTS/informationsystems.html - IAEA official website

http://www.theguardian.com/environment/damian-carrington-blog/2011/jun/23/nuclearpower-nuclear-waste - Public opinion in various nations on the issue of nuclear power