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Should Canada Build more Nuclear Power Plants?

Editor's Note: Early in 2011, the Ontario government called for public input on its plans to build another nuclear power plant at Bowmanville, Ontario. The Board of Canadian Unitarians for Social Justice discussed this plan and came to no consensus. However, the majority of Board members felt strongly against building more nuclear power plants, preferring that the funds for such projects be put into the development and implementation of greener renewable energy projects. CUSJ President Frances Deverell and Board Member Margaret Rao therefore prepared a brief expressing this view, and acknowledging the lack of consensus. That brief is presented below as submitted to the Darlington Commission with the addition of an "Executive Summary" by one of the authors (Rao).

Explosion rocks Fukushima nuclear power plant

Three weeks prior to the presentation of this brief, an earthquake occurred near Japan (March 11, 2011) causing a large tsunami to hit six nuclear power plants, seriously damaging three operating plants, causing leakage of radioactive material, and forcing their closure. This once more raised serious questions about the safety of nuclear power plants.

Then shortly after the presentation of the brief, George Monbiot, a respected investigative journalist, discovered that many of the reports on which opponents to nuclear power had based their opinions had little basis in scientific fact. The feelings of outrage and betrayal, and unwillingness to accept Monbiot's findings are understandable. However, our Unitarian fourth principle states we covenant to affirm and promote "a free and responsible search for truth and meaning." We must be willing to re-examine our beliefs and opinions, remain sceptical, and readjust our stands on issues in the light of new information.

Monbiot, whose column is included here, does not say that nuclear power has no dangers, but only that much of the information on which we have based our concerns was false, and the dangers have been exaggerated. In a second column, also included here, he pointed out that the alternatives to nuclear power are not free of their own dangers—in fact the dangers may be worse. After these revelations, the CUSJ Board was split almost 50/50 as to whether it should be against nuclear power, or not.

We need to re-examine our stand on the use of nuclear power as humanity's needs for energy continue to increase. Monbiot's columns, and a small portion of the debate that followed on the internet, plus two papers on green energy sources are included in this Discussion Paper. Finally, an editorial sums up some of the points, and suggests what we may need to consider in the future.

The debate will continue. JUSTnews would be pleased to publish letters (less than 300 words) or short articles (300-700 words) with new or additional information or views on either side of this topic in future regular issues.

Darlington Brief from Canadian Unitarians For Social Justice
March 31st, 2011

Executive Summary

Canadian Unitarians For Social Justice (CUSJ) promotes an understanding that our world is very interconnected, and that the actions taken regarding nuclear power at Darlington will have wide ramifications across Ontario, the United States, in Quebec, across Canada, and in the world as a whole. We write to share our concerns about the economic, environmental and military impacts of nuclear power, and the overall risk to the well-being of our planet, both today and for future generations.

We seek an energy strategy for Ontario and Canada based on conservation and renewable sources of energy, not nuclear or carbon-based sources. We believe that a comprehensive, unbiased energy analysis would show this option as both feasible and more economic than nuclear energy, as well as more environmentally sustainable. Nuclear power should be, at best, a last resort. Our whole energy system would need to be transformed to achieve this goal, including significant changes to taxation and subsidy policies at the federal and provincial levels. A comprehensive public education campaign would be needed to bring the public on board.

CUSJ President the Reverend Frances Deverell and Board Member Margaret Rao with their Brief at the Darlington panel hearing.

The Nuclear Industry Has Not Solved Its Basic Problems

- The industry has a history of design problems, big cost overruns, and high maintenance costs that result in large public debt. In Ontario we are still paying $1.8 billion a year in debt retirement for past cost overruns on reactors that are past their useful lives.
- Because of the high risk, nuclear plants are uninsurable except by the public purse. Assurances that there will be no accidents are not realistic as climate change causes increasingly intense catastrophic events, and the threat of terrorism increases. Nuclear disasters endanger all life on land, sea and in air.
- The cost of decommissioning a single reactor after its useful operating life will exceed two billion dollars.
- There is no demonstrated safe way of disposing of the nuclear waste of the spent fuel in a nuclear reactor or of managing it securely for the necessary time period (possibly hundreds of thousands of years). This represents both an enormous cost and an enormous hazard.
- Uranium enrichment of used fuel leads to weapons-grade plutonium for nuclear

weapons. This poses problems of security and control of used fuel on an on-going basis.

- The Darlington plant is located in the heart of a huge population area, on the edge of the Great Lakes, source of drinking water for millions of people. It's connected with the waters that feed the St. Lawrence, directly affecting Ontario, the United States and Quebec.

Darlington Nuclear Power Plant, Bowmanville, Ontario.

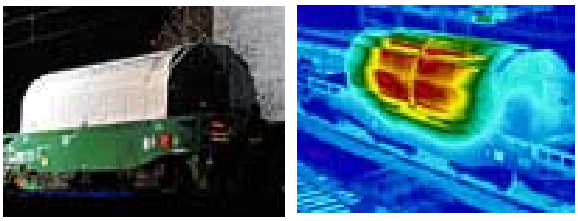
- In their day-to-day operations, nuclear power stations emit tritium and other radioactive materials into the environment. Tritium poses an ever-present radiological hazard to CANDU (reactor) workers. It pollutes the drinking water, and atmospheric emissions of tritium are readily inhaled—and also absorbed directly through the skin. There is increasingly strong evidence linking these emissions to childhood leukemia.
- Nuclear power is not a steady reliable source of energy. Corrosion problems have caused major shutdowns of the plants more often than expected, often for many months. The renewal and maintenance costs have been much higher than expected.
- Nuclear power is not clean energy. From mining, fuel enrichment, plant construction and deconstruction, and spent fuel storage, nuclear power pollutes. No other energy source combines the generation of as wide a range of conventional pollutants and waste streams, including heavy metals, smog and acid rain precursors and greenhouse gases (estimated at 240,000 and 366,000 tonnes of CO2 per year by the Pembina Institute).
- Uranium mining is energy intensive and exposes the environment to many harmful emissions. As uranium supplies decline and we exploit lower grades of ore, this problem will increase and the conventional energy required to refine it will require more energy to process than the nuclear reactors will generate.
- Nuclear power is high cost and simply not economical—especially when you include the costs of overruns, extra maintenance, full precautionary security measures, regular inspections, and the cost of dealing with decommissioning and management of the waste. It is not an acceptable investment of public funds.

The Precautionary Principle

What we need from our leadership, including the Joint Review Panel for Darlington, is a commitment to moving us forward into a sustainable energy future that honours both the health and well-being of our people and of the planet as a whole. To do this, we must take into account the precautionary principle—that if there is doubt about the safety of an approach, and the consequences of an accident are disastrous, then

we must err on the side of caution and prevention.

Even though nuclear power has been operational for nearly 50 years, the nuclear industry has yet to determine how to safely dispose of extremely toxic radioactive materials. These materials should not be moved from the site where they were created for between twenty and thirty years because they are simply too radioactive and unsafe to move. After this



Train transport of nuclear waste—the right-hand picture was taken with infra-red and shows the railcar glowing with heat.

waiting period, these materials will have to be stored in a controlled, safe storage site for thousands of years, posing on-going health and safety risks to future generations. We have not successfully identified anywhere in the world that would meet the required conditions for truly safe storage over such a period of time crossing many generations (Seaborn report, March 1998). The plan for deep geological disposal does not meet the public requirement for long-term safety and security.

The OPG [Ontario Provincial Government] has not evaluated the health and environmental risks incurred by the communities along transportation routes, and by workers handling that waste, if nuclear waste must be moved from the reactor site to a permanent storage site.

Communities that are now considering taking on the task of nuclear waste storage will be putting their own children and grandchildren at risk. Such a policy does not meet the standards of the precautionary principle. It does not achieve a vision of sustainable energy and living for the twenty-first century.

There are currently over 200 million tonnes of uranium tailings in Ontario and Saskatchewan. This waste remains a hazard for thousands of years and contains carcinogens, such as radium, radon gas, and thorium, among others. We learned at Sharbot Lake that the ore at that site would be much lower grade and create a much bigger problem of radioactive tailings polluting the environment and the water supply.

We also cannot ignore the threat that nuclear waste poses in terms of providing fuel for nuclear and conventional weapons. Low-grade spent fuel is already being used in "dirty cluster bombs." Plutonium, of course, is the necessary fuel for modern nuclear bombs. For true safety and security we need to eliminate the nuclear threat, not increase it by producing this dangerous fuel.

A Candu Nuclear Reactor gave India the fuel to test a bomb. The number of countries that are getting nuclear weapons is growing. We need to turn this around.

All of these very real risks and problems can be prevented or eliminated if we choose to phase out nuclear power.

The Energy Alternatives

We need the capital required for nuclear to empower Ontarians to build a myriad of smaller, renewable energy projects:

- Conservation projects that reduce the overall demand for power. Ontarians can build a "virtual nuclear power plant" by eliminating wasteful energy use at less than one fifth the cost of a real one. (OntarioCleanAirAlliance.ca)
- natural gas projects that simultaneously heat a home or business and provide it with electricity
- various scales of wind power projects sensitive to the local environment
- small, ecologically sensitive water power projects
- various scales of solar power projects including both photovoltaic and hot water.
- More water imports from Quebec. Existing transmission lines could meet up to 75% of the power now produced by the Darlington Station at a cost of 6.5 cents per kwh.
- biomass projects
- cogeneration
- heat pumps as an alternative to electric air conditioning and gas or electric heating.

A renewable energy strategy for Ontario is both possible and realistic. Mark Jacobson and

Mark Delucchi of Stanford University presented a study that shows the world can be electrically powered by alternative energy within 20 to 40 years. If we don't invest seriously in this direction, we'll miss out on the innovation, the research and development, and the jobs this new sector has to offer.

The Alternative Viewpoint

Some of our membership believe that nuclear power is the only practical solution to our energy needs, at least on an interim basis. All forms of energy production have negative environmental impacts and risks. The advantages of nuclear outweigh the risks.

- They believe that global warming is a greater and more immediate threat than nuclear catastrophe and that nuclear offers a cleaner energy option to get us off coal, oil and gas (an immediate imperative.)
- We are not technologically or politically ready to build a renewable energy system.
- It will take great commitment and a lot of time to change people's behaviour (conservation) and to change the way we do things (incentives, subsidies, power systems). We don't have time to overcome the usual inertia.
- Nuclear energy provides a stable, base-load supply of energy for industry, unlike the vagaries of renewable sources (when not shut down for repairs).
- We should support Canadian technology.
- If people have to pay the real costs of nuclear it will encourage conservation.
- It is seen as extremely safe compared to the health effects associated with fossil fuels (smog, acid rain, spills, etc.) (including many deaths by coal mining.)
- We will find a solution to the waste storage problem.

The Challenges of Converting to a Renewable System

1. The biggest challenge is the difficulty in inspiring and organizing human change. People are more likely to respond to economic pressures (price) than to ethical or environmental arguments. We have to find the political will to change the financial structures.
2. Our culture does not believe that government should be involved in building power infrastructure—except for nuclear, which the private sector won't finance. We need a shift in political ideology to invest in renewables by government.
3. We haven't conducted a full, comprehensive, neutral research to identify all our options and the pros and cons of each. We rely on industry-biased data.
4. Our system is designed to satisfy immediate needs, and not to plan for sustainability for future generations of both humans and all life forms. Ordinary people and future generations don't get a say.
5. We likely can't afford the investment required in both renewables and nuclear. We have to choose one over the other for our $26 billion investment. We believe we should invest for more effective immediate and long-term results by going to renewable energy. It is more flexible. A new power plant will take 10 years to come on line—if we are lucky.
6. NIMBY (Not in my back yard) will be a problem no matter which option we pick. There must be a comprehensive public education plan to make a renewable strategy work, and much public consultation.
7. A renewable energy strategy will be based on smaller, bottom-up initiatives rather than top-down mega projects, creating a diversity of power options enhancing local resiliency and sustainability. Financial and technical structures and systems and incentives must be available to encourage the innovation and involvement of the people of the province.
8. Provincial and municipal power companies must work with government, business, and the people to make use of all that innovation and coordinate it to produce an overall efficient system.

Conclusion

The Darlington New Nuclear Power Plant Project Joint Review Panel has a very important decision to make. The decision here will set the future direction for energy policy in Ontario, and may influence similar processes being made in other parts of Canada and around the world. Canadian Unitarians For Social Justice are asking you to take the full scope of the impact of your decision into account. We live in an inter-dependent world and your decisions will have a large impact. Just as Sweden and other countries around the area were affected by Chernobyl, we know that the winds and waters may carry radioactivity from Japan to other parts of the world. We've measured radiation effects from Japan in milk in Canada. What kind of a world do we want to live in? Do we have to use this highly risky source of energy in order to meet the power needs of the human family or can we do better?

We are ordinary people. We have done our best to research the facts, but you will have at your disposal a much greater range and depth of information than we can provide. We ask you to:

- take the full range of costs, from cradle to grave in the nuclear process into account as you assess the economic feasibility of nuclear power.
- take the full range of activities required to produce nuclear power before you assess how much it is a solution to the greenhouse gas problem.
- give a very close assessment to the different types of reactors proposed and look deeply into their records for cost overruns, maintenance and repair issues, security and record of leaking and so on. Don't just take the industry message into account. That industry has a long track-record of downplaying its risks and its weaknesses.
- think about the kind of world you want for your children and your grandchildren. Will nuclear power help or hinder future generations? What kind of a relationship do you want us to have with the earth, and with all species of life?

We know it is not your job to plan the energy future of Ontario. It is your job to determine if nuclear energy is a safe and cost-effective option. It is your job to determine if it is a viable option in Ontario today. Given the costs and the risks, we ask you to say no. Do this for the sake of future generations and all living beings.

Reverend Frances Deverell, President,
Margaret Rao, Board Member,
Canadian Unitarians For Social Justice

Source Documents

Anti-Nuclear

- Ontario's Green Energy Plan 2.0.
- Mouvement Vert Mauricie submission to the Joint Review Panel (technical review of CANDU reactors).
- Saskatchewan Environmental Society Position on Nuclear Power.
- Union of Concerned Scientists, (a Washington-based nuclear watchdog group) report by David Lochbaum, the UCS nuclear engineer (14 near misses).
- Sierra Club talking points.
- Kingston Whig Standard article, by Joshua Pearce, March 24, 2011 (Insurance).
- Physicians For Social Responsibility—Thorium fact sheet.
- Searching For a Miracle—Richard Heinberg on the need for a no-growth strategy for society.
- Walt Robbins—Nukeshaft.ca.

Pro Nuclear

- George Monbiot—Guardian March 22, 2011.
- Safe Nuclear Power does exist ... with Thorium, by Ambrose Evans-Pritchard.

Beyond Nuclear

- Searching For a Miracle - Richard Heinberg on the need for a no-growth strategy for society.

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We have been told Lies

By George Monbiot

Over the past fortnight I've made a deeply troubling discovery. The anti-nuclear movement to which I once belonged has misled the world about the impacts of radiation on human health. The claims we have made are ungrounded in science, unsupportable when challenged and wildly wrong. We have done other people, and ourselves, a terrible disservice.

I began to see the extent of the problem after a debate last week with Helen Caldicott. Dr Caldicott is the world's foremost anti-nuclear campaigner. She has received 21 honorary degrees and scores of awards, and was nominated for a Nobel Peace Prize. Like other greens, I was in awe of her. In the debate she made some striking statements about the dangers of radiation. So I did what anyone faced with questionable scientific claims should do: I asked for the sources. Caldicott's response has profoundly shaken me.

First she sent me nine documents: newspaper articles, press releases and an advertisement. None were scientific publications; none contained sources for the claims she had made. But one of the press releases referred to a report by the US National Academy of Sciences, which she urged me to read. I have now done so—all 423 pages(3). It supports none of the statements I questioned: in fact it strongly contradicts her claims about the health effects of radiation.

I pressed her further and she gave me a series of answers that made my heart sink—in most cases they referred to publications that had little or no scientific standing, that did not support her claims or that contradicted them. (I have posted our correspondence and my sources on my website). I have just read her book Nuclear Power is not the Answer(5). The scarcity of references to scientific papers and the abundance of unsourced claims it contains amaze me.

Chernobyl not the disaster it is painted

For the past 25 years, anti-nuclear campaigners have been racking up the figures for deaths and diseases caused by the Chernobyl disaster, and parading deformed babies like a mediaeval circus. They now claim that 985,000 people have been killed by Chernobyl, and that it will continue to slaughter people for generations to come. These claims are false.

The UN Scientific Committee on the Effects of Atomic Radiation (Unscear) is the equivalent of the Intergovernmetal Panel on Climate Change. Like the IPCC, it calls on the world's leading scientists to assess thousands of papers and produce an overview. Here is what it says about the impacts of Chernobyl.

Of the workers who tried to contain the emergency at Chernobyl, 134 suffered acute radiation syndrome; 28 died soon afterwards. Nineteen others died later, but generally not from diseases associated with radiation(6). The remaining 87 have suffered other complications, including four cases of solid cancer and two of leukaemia. In the rest of the population, there have been 6,848 cases of thyroid cancer among young children, arising almost entirely from the Soviet Union's failure to prevent people from drinking milk contaminated with iodine 131. Otherwise there has been no persuasive evidence of any other health effect in the general population that can be attributed to radiation exposure.(8) People living in the countries affected today, need not live in fear of serious health consequences from the Chernobyl accident.(9)

Caldicott told me that Unscear's work on Chernobyl is "a total cover-up"(10). Though I have pressed her to explain, she has yet to produce a shred of evidence for this contention.

In a column last week, the Guardian's environment editor, John Vidal, angrily denounced my position on nuclear power. On a visit to Ukraine in 2006, he saw "deformed and genetically mutated babies in the wards, and adolescents with stunted growth and dwarf torsos; foetuses without thighs or fingers." What he did not see was evidence that these were linked to the Chernobyl disaster.

Professor Gerry Thomas, who worked on the health effects of Chernobyl for Unscear, tells me that there is "absolutely no evidence" for an increase in birth defects(12). The National Academy paper that Dr Caldicott urged me to read came to similar conclusions. It found that radiation-induced mutation in sperm and eggs is such a small risk "that it has not been detected in humans, even in thoroughly studied irradiated populations such as those of Hiroshima and Nagasaki."(13)

Lies--continued from page 7.

Like John Vidal and many others, Helen Caldicott pointed me to a book which claims that 985,000 people have died as a result of the disaster(14). Translated from Russian and published by the Annals of the New York Academy of Sciences, this is the only document that looks scientific and appears to support the wild claims made by greens about Chernobyl.

However, a devastating review in the journal Radiation Protection Dosimetry points out that the book achieves its figure by the remarkable method of assuming that all increased deaths from a wide range of diseases "including many which have no known association with radiation" were caused by the accident(15). There is no basis for this assumption, not least because screening in many countries improved dramatically after the disaster and, since 1986, there have been massive changes in the former eastern bloc. The study makes no attempt to correlate exposure to radiation with the incidence of disease(16).

Its publication seems to have arisen from a confusion about whether the Annals was a book publisher or a scientific journal. The academy has given me this statement: "In no sense did Annals of the New York Academy of Sciences or the New York Academy of Sciences commission this work; nor by its publication do we intend to independently validate the claims made in the translation or in the original publications cited in the work. The translated volume has not been peer-reviewed by the New York Academy of Sciences, or by anyone else."(17)

Would we be deniers of scientific truths?

Failing to provide sources, refuting data with anecdote and by cherry-picking studies, scorning the scientific consensus, invoking a cover-up to explain it: all this is horribly familiar. These are the habits of climate change deniers, against which the green movement has struggled valiantly, calling science to its aid. It is distressing to discover that when the facts don't suit them, members of this movement resort to the follies they have denounced.

We have a duty to base our judgements on the best available information. This is not

Continued on page 9, Lies...

Editor's note: Below are excerpts from email correspondence to Caspar Davis, whom subscribers to CUSJ's e-list will recognize as the source of much material posted there. Mr Davis is a social activist and retired lawyer living in Victoria who has a large network of e-correspondents.

Caspar Davis prefaced emails he received below and next page from Mary Beth Brangan, Co-Director, The Ecological Options Network, containing quotes from scientific sources, with the following comment: My initial reaction is that these sources deal especially with the effect of radioactive iodine on children who have not been given preventive doses of potassium iodide. Monbiot certainly doesn't question that, instead he attributes much of the damage from Chernobyl to the fact that there was no attempt to provide potassium iodide.

Are low doses of radiation safe or even beneficial?

1) The U.S. National Academy of Sciences (NAS) published a report in 2006 titled Biological Effects of Ionizing Radiation (BEIR) report, VII Phase 2. The BEIR VII report was written by an expert panel whose members reviewed available peer reviewed literature and wrote, "the committee concludes that the preponderance of information indicates that there will be some risk, even at low doses."

The concluding statement of the report reads, "The committee concludes that the current scientific evidence is consistent with the hypothesis that there is a linear, no-threshold dose-response relationship between exposure to ionizing radiation and the development of cancer in humans."

This means that the sum of several very small exposures to radiation has the same effect as one large exposure, since the effects of radiation are cumulative." (From a recent article by Dahr Jamall.)

The common guidance is based on an assumption that there is a threshold exposure below which it is just safe, like a reasonable amount of alcohol would never kill you but gallons of it would do you in. The problems with that calculation are apparent in the actual studies of children after nuclear events.

1) The *ingestion* of radioactive isotopes is different from *external* exposure. The isotopes behave differently, with iodide-131 lodging in the thyroid, strontium 90 acting like calcium and lodging in the bones and breast, etc.
2) Repetitive exposure at low levels is dangerous, as shown by the increasing chances of leukemia in the children of women repeatedly x-rayed while pregnant.
3) The particular impact of radiation on children, infants, pregnant women and foetuses is different from the impact on adults. An x-ray, for example, is low-level radiation, but back when they used to do pelvic x-rays of pregnant women, it more than doubled the rate of leukemia in those children and it was eventually realized that this was a more sensitive population, and now x-rays are not used on pregnant women.

Lies... Continued from page 8.

just because we owe it to other people to represent the issues fairly, but also because we owe it to ourselves not to squander our lives on fairy tales. A great wrong has been done by this movement. We must put it right.

Published in the Guardian 5th April, 2011, www.monbiot.com.

References *[to conserve space, only the most important sources are listed below, with their original numbering.]*

3. Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, National Research Council, 2006. Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII ˆ Phase 2. National Academies Press. http://www.nap.edu/catalog/11340.html. The PDF costs $34.
5. Helen Caldicott, 2006. Nuclear Power Is Not the Answer. New Press, New York.
6. United Nations Scientific Committee on the Effects of Atomic Radiation, 2011. Volume II, Annex D: Health effects due to radiation from the Chernobyl accident. This is the latest section of the 2008 report Sources and Effects of Ionizing Radiation: Report to the General Assembly. See Paragraph 2, page 1 and Figure VII and paragraph 63, page 14. http://www.unscear.org/docs/reports/2008/Advance_copy_Annex_D_Chernobyl_Report.pdf
8. Para 99, page 19. As above.
9. Para 100, page 19. As above.
10. http://www.democracynow.org/2011/3/30/prescription_for_survival_a_debate_on
12. Professor Gerry Thomas, Chair in Molecular Pathology, Department of Surgery & Cancer, Imperial College, London, pers comm, 1st April 2011.
13. Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation, page 6. As above.
14. Alexey V. Yablokov, Vassily B. Nesterenko and Alexey V. Nesterenko, 2010. Chernobyl: Consequences of the Catastrophe for People and the Environment. Annals of the New York Academy of Sciences. I have this in pdf form, sent to me by the NYAS.
15. M. W. Charles, 2010. Review of Chernobyl: consequences of the catastrophe for people and the environment. Radiation Protection Dosimetry (2010) 141(1): 101-104. doi: 10.1093/rpd/ncq185. http://rpd.oxfordjournals.org/content/141/1/101.full
16. The authors announce that they reject this method in the introduction to the book. Alexey V. Yablokov, Vassily B. Nesterenko and Alexey V. Nesterenko, as above, page 2.
17. Sent to me by Douglas Braaten, Director and Executive Editor, Annals of the New York Academy of Sciences, 2nd April 2011.

Cancer and leukemia risks after low-level radiation—controversy, facts and future

Department of Clinical Epidemiology, Chaim Sheba Medical Center, Tel Aviv University Medical School, Israel. *Abstract*

Quantification of delayed low dose radiation (LDR) effects is still controversial. The current concept of the shape of the dose-response curve, particularly at very low levels, is derived primarily by extrapolation from high doses and is affected by economic, social and political implications of cancer yield. Evidence based on epidemiological studies of populations exposed to fallout, occupational, intrauterine or background LDR is limited, due to methodological drawbacks and the need for extremely large sample sizes. Nevertheless, recent data indicate that LDR-induced childhood leukemia and thyroid cancer may exceed the rates predicted on the basis of the linear quadratic curve. The high yield in-utero and in early childhood could be associated with low cumulative load of background radiation, and a consequently more effective radiation increment.

In a paper published in January 1968, Merrill Eisenbud, who had been head of the AEC's New York Health and Safety Laboratory at the time of the Troy incident, reported an actual measurement of the iodine in the thyroid of a 12-week-old fetus aborted in New York City in 1962, the peak year of testing. The fetus had received a thyroid dose ten times as large as that being received by the average newborn infant during the same period. And so, in 1964 and 1965, the director of the Federal Radiation Council, Dr. Paul C. Tompkins, who had previously served as Deputy Director of the AEC's Office of Radiation Standards and Director of Research in the Bureau of Radiological Health of the U.S. Public Health Service, announced a twenty-fold rise in the permissible amounts of the most hazardous isotopes in milk in the event of an accidental release. For the first time in the history of radiation standards the permissible doses to the public were *raised* rather than lowered, *despite the mounting evidence that there was no safe threshold dose of radiation as presented* in August 1963 before the Joint Committee [emphasis added]. And this was done quietly by presidential executive order, for which no public hearing is required.

Fukushima Disaster Taught me to Embrace Nuclear Power

By George Monbiot

You will not be surprised to hear that the events in Japan have changed my view of nuclear power. You will be surprised to hear how they have changed it. As a result of the disaster at Fukushima, I am no longer nuclear-neutral. I now support the technology.

A crappy old plant with inadequate safety features was hit by a monster earthquake and a vast tsunami. The electricity supply failed, knocking out the cooling system. The reactors began to explode and melt down. The disaster exposed a familiar legacy of poor design and corner-cutting. Yet, as far as we know, no one has yet received a lethal dose of radiation.

Dangers of radioactive pollution exaggerated

Some greens have wildly exaggerated the dangers of radioactive pollution. For a clearer view, look at the graphic published by xkcd.com. It shows that the average total dose from the Three-Mile Island disaster for someone living within 10 miles of the plant was one 625th of the maximum yearly amount permitted for US radiation workers. This, in turn, is half of the lowest one-year dose clearly linked to an increased cancer risk, which, in its turn, is an 80th of an invariably fatal exposure. I'm not proposing complacency here. I am proposing perspective.

If other forms of energy production caused no damage, these impacts would weigh more heavily. But energy is like medicine: if there are no side-effects, the chances are that it doesn't work.

Renewables need an energy grid

Like most greens, I favour a major expansion of renewables. I can also sympathize with the complaints of their opponents. It's not just the onshore windfarms that bother people, but also the new grid connections (pylons and power lines). As the proportion of renewable electricity on the grid rises, more pumped storage will be needed to keep the lights on. That means reservoirs on mountains: they aren't popular either.

The impacts and costs of renewables rise with the proportion of power they supply, as the need for both storage and redundancy increases. It may well be the case (I have yet to see a comparative study) that up to a certain grid penetration—50 or

Continued on p. 11, Embracing nuclear

Why is irradiated toxic land considered "green"?

While I struggle with a claim that appears in more than one opinion piece—that nuclear power plants are safer than burning coal—and try to dig through decades of conflicting statistics about radiation—there is another question that looms large.

There are at least 443 nuclear power plants in the world right now. Each plant is huge. I'd estimate the footprint is about two square miles. Each plant has an operational expectancy of about 40 years (NRC says 60 years, max), and then it must be "decommissioned".

http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/decommissioning.html

In theory, the plant could be dismantled, the materials decontaminated, and shipped elsewhere. In fact, nobody really knows how to "decontaminate" masses of highly radioactive materials. The closest anyone has come to recycling is to propose loosening up regulations so that radioactive metals can be processed into toasters and girders. NRC estimates decommissioning one single plant would cost $300 million, http://www.nrc.gov/reading-rm/basic-ref/students/decommissioning.html, but the European experience has been that this is an underestimate.

In practice, what happens is that the nuclear power plant is shut down, fenced, and declared off-limits until the radiation dissipates—which with plutonium, takes about half a million years. The land is uninhabitable.

So here is my question: how is this a Green strategy—rendering land so toxic that it cannot be inhabited for half a million years?

Technology exists to deal with other kinds of toxins (eg, Love Canal cleaned up for $400 million) http://www.nytimes.com/2004/03/18/nyregion/love-canal-declared-clean-ending-toxic-horror.html so that living entities can survive if they happen to cross the land—but not decommissioned power plants. With the plants that have already been decommissioned, I estimate there must be 1000 square miles of earth already that are uninhabitable and will be forever—perhaps comparable to the damage done by the tar sands.

So I repeat my question: how is deliberately killing and permanently sterilizing large patches of earth an environmentally-friendly policy? Even if somebody wants to argue that nukes are a "lesser evil", to my mind that argument fails when we factor in the cost of what is literally a "scorched earth" result.

Penney Kome, Editor, Straight Goods, http://straightgoods.com, posted this on the CUSJ e-list April. 7, 2011.

Embracing nuclear, continued from p. 10

70% perhaps?—renewables have smaller carbon impacts than nukes, while beyond that point, nukes have smaller impacts than renewables.

Like others, I have called for renewable power to be used both to replace the electricity by fossil fuel and to expand the total supply, displacing the oil for transport and the gas used for heating fuel. Are we also to demand that it replaces current nuclear capacity? The more work we expect renewables to do, the greater their impacts on the landscape will be, and the tougher the task of public persuasion.

Solar power generation, Murcia, Spain

Expanding the grid to connect people and industry to rich, distant sources of ambient energy is also rejected by most of the greens who complained about the blog post I wrote last week [preceding article by Monbiot in this Discussion Paper]. What they want, they tell me, is something quite different: we should power down and produce our energy locally. Some have even called for the abandonment of the grid. Their bucolic vision sounds lovely, until you read the small print.

Geothermal power generation, Iceland

At high latitudes like ours [Britain, >50^{o}], most small-scale ambient power production is a dead loss. Generating solar power in the UK involves a spectacular waste of scarce resources. It's hopelessly inefficient and poorly matched to the pattern of demand. Wind power in populated areas is largely worthless. This is partly because we have built our settlements in sheltered places; partly because turbulence caused by the buildings interferes with the airflow and chews up the mechanism. Micro-hydropower might work for a farmhouse in Wales; it's not worth much in Birmingham.

And how do we drive our textile mills, brick kilns, blast furnaces and electric railways—not to mention advanced industrial processes? Rooftop solar panels? The moment that you consider the demands of the whole economy is the moment at which you fall out of love with local energy production. A national (or, better still, international) grid is the essential prerequisite for a largely renewable energy supply.

Some greens go even further: why waste renewable resources by turning them into electricity? Why not use them to provide energy directly? To answer this question, look at what happened in Britain before the industrial revolution.

Renewable energy has impacts too

The damming and weiring of British rivers for watermills was small-scale, renewable, picturesque and devastating. By blocking the rivers and silting up the spawning beds, they helped bring to an end the gigantic runs of migratory fish that were once among our great natural spectacles and which fed much of Britain: wiping out sturgeon, lampreys and shad as well as most sea-trout and salmon.

Traction was intimately linked with starvation. The more land that was set aside for feeding draft animals for industry and transport, the less was available for feeding humans. It was the 17th century equivalent of today's biofuels crisis. The same applied to heating fuel. As E. A. Wrigley points out in his new book *Energy and the English Industrial Revolution*, the 11 million tonnes of coal mined in England in 1800 produced as much energy as 11 million acres of woodland (one third of the land surface) would have generated.

Before coal became widely available, wood was used not just for heating homes but also for industrial processes: if half the land surfaces of Britain had been covered with woodland, Wrigley shows, we could have made 1.25 million tonnes of

bar iron a year (a fraction of current consumption) and nothing else. Even with a much lower population than today's, manufactured goods in the land-based economy were the preserve of the elite. Deep green energy production—decentralised, based on the products of the land—is far more damaging to humanity than nuclear meltdown.

Most likely alternative to nuclear power is coal

But the energy source to which most economies will revert if they shut down their nuclear plants in not wood, water, wind, or sun, but fossil fuel. On every measure (climate change, mining impact, local pollution, industrial injury

Mountain top coal mining

and death, even radioactive discharges) coal is 100 times worse than nuclear power[1]. Thanks to the expansion of shale gas production, the impacts of natural gas are catching up fast.

Yes, I still loathe the liars who run the nuclear industry. Yes, I would prefer to see the entire sector shut down, if there were harmless alternatives. But there are no ideal solutions. Every energy technology carries a cost; so does the absence of energy technologies. Atomic energy has just been subjected to one of the harshest of possible tests, and the impact on people and the planet has been small. The crisis at Fukushima has converted me to the cause of nuclear power.

[1] In the case of radioactive pollution, the 100 times is not figurative: according to Scientific American, the fly ash produced by a coal-burning power plant "carries into the surrounding environment 100 times more radiation than a nuclear power plant producing the same amount of energy."

Published in the Guardian, March 22, 2011. Sources for many of the statements are provided in the original article (see www.cusj.org) but have been deleted here (with the exception of one) for reasons of space.

77% Renewable Energy Possible for Earth by 2050—New IPCC Report

By Guy Dauncey

Can our global civilization operate—and flourish—without fossil fuels? That's the question that hangs over us all, with techno-optimists at one end of the spectrum and the "party's over, civilization will collapse" folks at the other.

So now the prestigious United Nations Intergovernmental Panel on Climate Change (IPCC) has weighed into the debate, with a lengthy report due out at the end of May. In a smart move, they have given the world a sneak preview in their Summary for Policymakers.

The content is exciting, but don't expect an easy read. More than 120 researchers dug into 164 different scenarios which addressed the question. In our bid to reduce the world's carbon emissions, how much might solar, wind, geothermal, hydropower, ocean energy and bioenergy contribute—and what might be the social and environmental impacts?

The Report's numbers are written in exajoules, which is the metric way of measuring electricity, fuel and heat in one very big number. If you prefer to think electrically, 1 EJ = 277 TWh. A million BC households use one terawatt hour of electricity a year, or 1/277th of an exajoule.

The report finds that in 2008, we planet Earthers used 492 EJ of energy. In the scenarios the researchers looked at, they concluded that we could be using anywhere from 407 to 749 EJ by 2050, depending on how energy efficient we decide to become.

And how much could renewable energy contribute? From the four scenarios the researchers looked at in detail, they concluded that renewables could provide 314 EJ by 2050, which is 77% of the most energy efficient scenario.

Wind farm power generation, Denmark

For the detailed breakdown, we'll need to await the full report, but from the graphs in the Summary Report it's possible to make an approximation:

	Low EJ	High EJ
Direct Solar	10	135
Wind	10	120
Geothermal	5	51
Hydro	25	35
Bioenergy	100	300

There's lots we'll need to wait for, but it does show a huge assumed dependency on bioenergy, which includes everything from firewood to biofuels, which could cover a multitude of sins. The bioenergy numbers are given in their raw biomass state, before conversion into useful energy. Ocean energy (tidal and wave) is included in the study, but has not been represented in most of the scenarios studied. The IPCC estimates that it could deliver up to 7 EJ (1940 TWh) a year by 2050.

Have Fun with Solar Maths

Just for fun, how much is 135 EJ of solar energy? 135 EJ converts to 37,400 TWh of electricity. A large south-facing single-family roof with a 5 kW solar system would generate 5,000 kWh a year. A million such roofs would generate 5 TWh a year—so it would take 7.5 billion such roofs to generate 37,400 TWh using solar PV. Ouch!

But wait. A solar PV system produces 10-100 GWh of electricity per square kilometre per year. To obtain 37,400 TWh, we'd need between 374,000 and 3.74 million square kilometres. Concentrated solar thermal energy, however, generated in the world's deserts, can produce 100 to 250 GWh per square kilometre, so if this was our source, we would need between 150,000 and 374,000 square kilometres. Saudi Arabia, to give a sense of size, is 3.4 million square kilometres. Arizona is 284,000 sq km. In total, the Earth's deserts receive more solar energy every six hours than humans consume in a year.

Other considerations

The Summary Report includes some other fascinating findings:

- If we're going to hit the larger numbers we will need a concerted policy effort, using feed-in tariffs, bioenergy sustainability criteria, building mandates, and other policies.
- Although the prices of most renewables are higher than energy from fossil fuels, if the pollution caused by fossil fuels was included in their price, renewables would be much more attractive financially. Long live the carbon tax!
- In 2008, renewables provided 35% of all the new added electrical capacity. From 2008 to 2009, in spite of the global financial melt-down, wind energy grew by 32%, grid-connected solar PV by 53%, and solar hot water by 21%.
- We are currently using less than 2.5% of the globally available technical potential for renewables. Over 97% is still untapped, so the availability of the resource will not be a concern.

Watch out for media analysis of the full report in early June.

Guy Dauncey is President of BCSEA. He is a speaker, author and sustainable communities consultant who works to develop a positive vision of a sustainable future, and to translate that vision into action. He is author of the award-winning book Stormy Weather: 101 Solutions to Global Climate Change, and co-author of Cancer: 101 Solutions to a Preventable Epidemic, and other titles. He is founder of The Solutions Project, co-founder of the Victoria Car-Share Cooperative, and publisher of EcoNews, a monthly newsletter that promotes the vision of a sustainable Vancouver Island. His home page is www.earthfuture.com.

Editor's note: The article below in its original form contained a number of unsupported statements. With the warnings of Monbiot's article (page 7) in mind, I removed statements that would now appear dubious. Useful thoughts and information remain.

Let's Join Japan and Junk New Nukes

By Harvey Wasserman

Japan will build no new nuclear reactors. It's a huge body blow to the global industry, and could mark a major turning point in the future of energy.

Says Prime Minister Naoto Kan: "We need to start from scratch… and do more to promote renewables."

Wind power alone could—and now probably will—replace 40 nukes [nuclear power plants] in Japan.

The United States must join them. Axing the $36 billion currently stuck in the 2012 federal budget for loan guarantees to build new reactors could do the trick.

Wind potential alone between the Mississippi and the Rockies could produce 300% of the nation's electricity. That doesn't include solar, geothermal, ocean thermal, sustainable bio-fuels and the many more renewable sources poised to re-shape the American energy future once the prospect of new nukes is discarded.

Japan was set to build 14 new nukes before Fukushima. Six of Japan's total of 55 reactors were shut by the earthquake and tsunami. Three at Kashiwazaki remain shut from the seven that were hit by an earthquake

less than five years ago. Kan wants three more closed at Hamaoka, also in an earthquake/tsunami zone.

Japan's reactor fleet remains the world's third-largest, behind the US and France. The General Electric and Westinghouse nuclear divisions, builders of nearly all the commercial reactors in the US, are at least partly controlled by Japanese companies. Reactor Pressure Vessels and other major components are built there.

Numerous US reactors are perilously close to earthquake faults, including two operating at Indian Point, 35 miles north of Manhattan. Four California reactors also sit in earthquake zones vulnerable to tsunamis. San Onofre, between Los Angeles and San Diego, has 7.5 million people living within a 50-mile radius. Its two operating and one dead reactor sit less than a mile from the high tide line. Diablo Canyon, near San Luis Obispo, sits near a series of earthquake faults, including one newly discovered less than two miles from the two reactor cores there. The Perry reactor, on Lake Erie east of Cleveland, was damaged by an earthquake in January, 1986.

Radioactive fallout [*level unspecified, probably low, ed.*] has also been detected in rainwater, milk and on vegetables throughout the United States, threatening the health of millions of Americans, especially small children and embryos in-utero.

Now Fukushima Unit Four appears to be on the brink of physical collapse. Fission may be continuing in at least one spent fuel pool, and possibly in one or more cores. A definitive end to the disaster could be years away.

Kan's decision to shut Hamaoka and then to cancel future nukes came as a shock. Widely criticized for weakness in the wake of Fukushima, he has now redefined Japan's energy future.

Though dependent on imported fossil fuels, major Japanese corporations have substantial investments in wind, solar and other Solartopian technologies. This will push them to the forefront of Japan's energy future.

Likewise Germany. In the wake of huge public demonstrations and a major electoral defeat, Prime Minister Angela Merkel has shut seven old reactors and says ten more will go down by 2020, making Germany nuke-free. For decades Germany has been pushing wind, solar and other green technologies harder than any other industrial nation, with enormously profitable results.

In the US, renewables are also booming, while the reactor industry has been taking hard hits. Just this week a major French-operated component factory proposed for Virginia has been pushed back two years—which means likely cancellation. A $5 billion taxpayer-funded facility in South Carolina to produce plutonium-based Mixed Oxide reactor fuel faces a lack of customers, and growing doubts about the project's viability or real purpose.

Overall, Fukushima has complicated an already dark financial picture. A Texas project meant for Japanese financing is now all but dead. So, too, is one proposed for Maryland by the French.

While the Obama Administration continues to push for those $36 billion in loan guarantees, it's unclear what reactor projects are in credible shape to accept them.

Meanwhile ferocious battles to shut old reactors in Vermont, New York, New Jersey and elsewhere are heating up. With roughly two dozen of similar design to Fukushima Unit One now operating in the US, the public demand for more shut-downs continues to escalate.

We need to finish the job and get to a green-powered Earth.

Nuclear power makes global warming worse, and spells economic as well as ecological doom.

The industry can't get private financing, can't get meaningful liability insurance, can't deal with its wastes, can't compete in the marketplace, can't guarantee us we won't suffer a Fukushima of our own, can't provide a reliable energy supply into the future.

What lies before us once we kill these loan guarantees is a Solartopian reality powered by the sun, wind, tides, waves, earth's heat and more.

Those countries like Germany, Denmark and now Japan that head definitively toward a nuke-free future are in the process of turning toward survivability and prosperity.

Let's kill that loan guarantee package, shut the dying nukes like Vermont Yankee and Indian Point, and join them in truly green-powered future.

Harvey Wasserman's Solartopia! Our Green-Powered Earth, A.D. 2030, is at www.solartopia.org. He is senior advisor to Greenpeace USA and the Nuclear Information & Resource Service, and writes regularly for www.freepress.org. He and Bob Fitrakis have co-authored four books on election protection, including Did George W. Bush Steal America's 2004 Election?, As Goes Ohio: Election Theft Since 2004 , How the GOP Stole America's 2004 Election & Is Rigging 2008, and What Happened in Ohio. Published on Wednesday, May 11, 2011 by CommonDreams.org http://www.commondreams.org/view/2011/05/11

Editorial Conclusion

CUSJ has a weighty and difficult decision to make whose ramifications stretch far into the future. This Discussion Paper is intended to provide CUSJ members with some of the information that must be taken into account when determining our organization's stand on this issue.

There is no question about our ultimate goal: we want humanity's energy needs to be supplied totally by green renewable technology, without assistance from fossil-fuel or nuclear power plants. However, even one of the most optimistic projections (pp. 12-13, this Discussion Paper) suggests that green technology will only meet 70% of our current energy needs by the year 2050, nearly 40 years from now. That's an enormous gap to be spanned in both time and supply capability. Is our goal of totally green energy ever achievable, and what do we do in the interim? What should be the strategy of activists to get us as close to our goal as is humanly possible?

Human environmental impact: the Aral Sea, as was (left, black is water) and as is—not the result of climate change, but river diversion to grow cotton.

It is up to CUSJ members and its Board to answer these questions, but here are some suggestions and possibilities to consider.

1) As suggested by Wasserman for the USA (pp. 13-14, this Discussion Paper) we might take the same position that Japan is taking and urge a moratorium on the construction of any new fossil-fuel and nuclear power plants. We are currently de-pendent on numbers of ageing plants of both types. We could agree to repair and use them until, say, 2050, assuming that's possible. Opponents will argue that this makes less economic sense than building new plants.
2) Such a moratorium on new nuclear and fossil fuel plants would put pressure on governments to develop and build green renewable technology. Money saved from the construction of new fossil-fuel and nuclear power plants could be used for this purpose.
3) One of the great difficulties of many green electrical generation technologies is that the electricity is not always available when needed. Solar power, for instance, is only available during the day, and may not be practical at higher latitudes than about 50^{o}. New technology may resolve some of the storage problems. For instance, some solar generators super-heat oil that is then used to produce steam for turbines—the heated oil can be stored during the day until the power is needed at night.
4) If the IPCC's predictions (pp 12-13 this Discussion Paper) are true, we still have a 30% difference between energy demand and green energy production in 2050. Some of that demand could be reduced by conservation. Governments can do a great deal to reduce energy demand by subsidizing retrofitting of home insulation and setting higher standards of insulation for new homes. Governments can improve the availability and cost of public transport, electrifying it, and eventually eliminating the use of fossil-fuel driven cars, and more.
5) Our current life-styles are high-energy demanding. Sooner or later, let's hope sooner, we must begin working towards a no-growth economy. While that is currently unthinkable by business people, it must eventually be achieved if we are not to overwhelm the resources of our planet. A no-growth economy could greatly reduce energy consumption per person.
6) But all our conservation efforts will be nullified if human populations continue to grow, so we need seriously to think about halting population growth and overcoming the demographic difficulties this will cause. We know that education, particularly of girls and women, will slow and eventually stop population growth in less developed countries. It's time we started following Greg Mortensen's lead in Afghanistan (*Stones into Schools: Promoting Peace with Books, Not Bombs, in Afghanistan and Pakistan*) and start educating people.
7) Unfortunately, the above actions by government are unlikely while conservative political parties hold a majority in parliament. Fundamental to any progressive changes in Canada is a strengthening of democracy and of our decision-making processes. We need electoral reform at a minimum, and ideally many other reforms to governance as well if we are to meet our goal.

The actions suggested above emphasise once again that everything is connected to everything else, as implied by our seventh UU principle. The problem is much more complicated than simply eliminating nuclear power. We have much to consider.

PEKS

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STATEMENT OF PURPOSE

The CUSJ purposes are:

- to develop and maintain a vibrant network of Unitarian social action in Canada and elsewhere and to proactively represent Unitarian principles and values in matters of social justice and in particular
- to provide opportunities, including through publication of newsletters, for Unitarians and friends to apply their religious, humanistic and spiritual values to social action aimed at the relief of (1) poverty and economic injustice, (2) discrimination based on religious, racial or other grounds, (3) abuses of human rights whether of individuals or peoples, (4) abuses of democratic process, and
- to promote peace and security, environmental protection, education, and literacy in keeping with the spirit of Unitarian values

These purposes are an integral part of the Constitution of CUSJ, adopted at the CUSJ Annual Meeting in Mississauga, ON, May 19, 1999, and amended at the 2003 AGM.

I agree with the above Statement of Purpose, and wish to ☐ join or ☐ renew membership in CUSJ.

Enclosed please find my donation of $_____

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