Book Reviews

The Anti-Nuclear Game

by GORDON SIMS
Ottawa: University of Ottawa Press, 1990
pp.285

Ontario Hydro's demand/supply plan is currently being debated before the Province of Ontario's Environmental Assessment Board. These hearings again pit advocates for the expansion of the electrical energy supply, including the nuclear option, against intervenors ranging from Indian bands in Northern Ontario to well-known anti-nuclear activists, such as Energy Probe. Gordon Sims' book, *The Anti-Nuclear Game*, has reinforced my fear that there is total mutual distrust between these two groups. The book jacket informs us that it is a powerful, persuasive defence of the nuclear power industry. It is nothing of the sort. It is a small, narrow-minded, inaccurate pamphlet attacking the Canadian anti-nuclear movement.

The book's basic outline is as follows: first, introduce a topic (e.g., radiation and health, nuclear fuel waste, alternative energy sources) by giving "The Facts" (Mr. Sims' words); second, present quotes from spokespersons from the anti-nuclear movement; finally, proceed to destroy these statements.

All advocacy groups, whether they be anti-nuclear activists or smokers' rights militants, have this in common: they emphasize their truths and do not wish to complicate the issue by giving other views some respectability. These are the techniques that the advertising profession has bestowed upon us. So it is hardly surprising to find in the anti-nuclear literature some rather unidimensional statements.

Sims has collected a series of these statements, pronounced them inaccurate or misleading, and then provided a rationale for his judgement. Let me state immediately that the author is right in some instances. For example, the linkage of the details of the Chernobyl disaster to the likelihood of a similar disaster in CANDU reactors, as suggested by some anti-nuclear activists, seems erroneous to Sims. I agree. Likewise, I agree with him that some of Energy Probe's criticisms of the Nuclear Liability Act are not as clean as they should be. Furthermore, as Sims points out, Lawrence Solomon of Energy Probe is indeed misleading when he states that electricity rates in Ontario tripled between 1973 and 1983. Solomon simply does not take inflation into account. And there are other such instances.

However, most of the statements criticised by the author are correct or at least open to debate. For instance, he finds this statement made in

1983 inaccurate:

> Attempts at international nuclear safeguards are not working. More and more countries are joining the nuclear weapons club.

This statement reflects correctly the opinion of many experts on the non-proliferation treaty in 1983. Sims, however, claims that nuclear safeguards are working because only the five permanent members of the UN Security Council are nuclear weapons states. He does not include India, since it only exploded one solitary device, and excludes Israel and South Africa because we are not absolutely sure. There is no mention of Pakistan or Iraq or other near-nuclear weapons states.

An example of a statement that is open to debate is one made by David Poch (a lawyer who represented Energy Probe at regulatory hearings): "At present Ontario Hydro sucks up capital for projects that no sane investor would touch." Sims does not like this rather brash statement, saying that Ontario Hydro raises its money like anybody else through commercial lending institutions. True, but Ontario Hydro bonds are backed by the Government of Ontario and Poch wanted us to speculate about the effect the absence of this backing would have on Ontario Hydro's capacity to raise money.

The idiosyncrasy of some of Sims' arguments provides us with moments of sheer joy. For instance, he argues that energy conservation measures might not result in energy savings. He tells the story of a homeowner who thoroughly insulates his house and thereby saves $400 per year in fuel bills. "What," Sims speculates, "will this homeowner do with the money? He may well buy a second car and what would then be the energy savings due to his conservation efforts?" How the consumer spends money saved through energy conservation is indeed relevant, but random speculation of this sort is not. I suggest a far more likely outcome is that the conserver will be so enchanted by this saving that he will invest the money in other energy-saving devices, and the whole process snowballs. Or else, following Sims' line of logic, he will buy a gun and kill the local shopkeeper, and this murder will become the fault of the energy conservation program. Need I say more about Sims' frivolous evidence?

The most interesting argument between Sims and the anti-nuclear movement is in the area of risk. Four chapters out of ten are directly related to this topic. A pattern of discourse arises that is typical of arguments about risk and nuclear power. On the one hand the anti-nuclear movement describes in detail the possible dramatic consequences of nuclear power and declares these consequences to be unacceptable. Advocates of the nuclear power industry, on the other hand, emphasize the low probability of such dramatic outcomes and minimize the effects of radiation.

I want to clear the air somewhat on this point. Risk is a concept which embodies both unpleasant consequences and uncertainty. In my opinion, the anti-nuclear movement's insistence that only possibility (and not probability) matters is misguided. Furthermore, its call for absolutely no exposure to radiation for workers and the public is not a workable proposition, although it may well be a useful advocacy tool, like the zero-discharge campaign for the Great Lakes. Zero exposure to radiation would require far-reaching changes in our society (e.g., elimination of X-rays for medical diagnosis, elimination of air travel, destruction of television receivers).

With some justification Sims jumps on these positions of the anti-nuclear movement and proclaims that the scientific community knows how to deal with risk. He claims that risk is the product of the probability of the occurrence and its magnitude. From his discussion of risk and from his references to the literature, it is clear that the author is not familiar with that literature and with the complexity of risk. He replaces one simplified measure of risk, the anti-nuclear movement's "possible outcomes," with another one, his product of probability and possible consequence, or the expected value of the risk. Neither is an adequate measure of the psychological, social, economic and political dimensions of risk. The author's advocacy of using the expected value of risk as the ultimate decision making tool is just contrary to human experience. Insurance companies survive on the fact that the expected value of a risk is less than their insurance premium. Is Sims arguing that people who buy insurance are irrational?

The views presented in the book on the risks

associated with nuclear power are very simple indeed. Any policy analysis of the role of risk should carefully study the interactions between three sets of actors: those who impose or create the risk, those who are at risk, and those who regulate this imposition of risk. Each set of actors emphasizes different dimensions of risk.

The imposers of risk are mainly interested in its economic dimension, the population at risk emphasizes the psychological and social dimension, while the regulators are concerned about political survival. The interaction between the three sets of actors are played in the political arena, and therefore such issues as the resources and power available to each of them become important. In an ideal world, this triad of actors would become one, where the imposers of risk are also the population at risk, as well as the regulators. In the area of nuclear power we are far removed from this situation. This book does not clarify any of these issues for us.

It also does not provide any analysis of the reasons for the deep chasms between these different actors. Neither does it advance ideas for a resolution of these conflicts. It is too busy throwing stones, too few well-aimed, in the direction of the anti-nuclear movement. The cliche about people in glass houses applies well in this case.

For example, Sims is less than candid in his discussion of the relationship between radiation and health. He indicates that a large consensus exists on this issue in the scientific community, with the exception of a few dissenters such as Drs. Gofman and Bertell. As this field is in a considerable state of flux, this is a simplification. The author does not recount the disagreements within the Biological Effects of Ionizing Radiation (BEIR) III Committee in 1980. Neither does he report on the significant changes in the evaluation of the effects of low-level radiation made in the BEIR V Report in 1990 compared to previous reports. And, as evident from an obscure note in the text, he knows that these effects are now estimated to be larger than the one fatal cancer for 10,000 person-rems he keeps on using (see pp. 45 and 273).

His discussion of the effects of Chernobyl is, to say the least, misleading. He implies strongly that this accident is now behind us. It was a terrible accident that, according to him, resulted in 29 deaths and a prediction of between zero and 200 fatal cancers for the evacuated population. He then dismisses the prediction of thousands or tens of thousands of excess future cancers in the population of Europe and the Soviet Union by arguing that they are an artifact of the calculation methods used, relating person-rems with excess future cancers.

The first and most importance rejoinder is to note that the Chernobyl story is not over. The World Heath Organization is conducting an international research program to study the effects of Chernobyl and has warned that it will be a long-term project because many of the cancer cases will not emerge for another 5-15 years. For solid cancers, studies of radiation-exposed population, such as the Hiroshima and Nagasaki bomb survivors, have shown a ten year latency period before excess cases appear.

Secondly, the author's prediction of zero to 200 fatal cancers in the evacuated population is misleading. There is no expert prediction of zero fatal cancers for this population. The number of 200 fatal cancers as an upper limit is also inconsistent with the BEIR V report.

The author's dismissal of the large number of excess future cancers in the population of Europe and the Soviet Union hardly merits comment. I only wish to point out that the Atomic Energy Agency of the United Kingdom (UKAEA), hardly a hotbed of the anti-nuclear movement, has estimated that Chernobyl will eventually cause 10,000 excess cancer deaths in the Soviet Union alone.

Such inaccuracies in this book are not isolated. They are symptomatic of the pamphleteer's style used in this diatribe. The whole issue of truthfulness in the area of nuclear power deserves a more thoughtful study than was presented in *The Anti-Nuclear Game*. The split between the anti-nuclear activists and the nuclear power industry about the structural nature of the risks involved in nuclear energy production endures, as this book certifies. In this field there is still lots of work to be done.

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Energy Analysis and Policy; Selected Works

by MOHAN MUNASINGHE
London: Butterworths, 1990
pp.xx,315

This book is a collection of fourteen papers by Munasinghe on energy problems of developing countries and energy policies for those countries. Some are previously published, others are not. Most were originally presented or written between the late 1970s and the early 1980s. A staff member of the World Bank for the last 15 years, from 1982 to 1986, Munasinghe was Senior Energy Advisor to the President of Sri Lanka, his native country. The chapters in this book reflect the analytical outlook of a professional researcher on both problems and policies and the practical eye of an experienced policy maker for the implementation of policies. It may be this combination of outlooks that distinguishes many of Munasinghe's contributions to the analysis of energy problems in developing countries.

The chapters include papers on energy planning, energy pricing, energy project evaluation, energy forecasting, energy conservation, implementation of energy policy, rural energy, biomass energy, nonconventional energy technologies, and energy R&D agendas for developing countries.

Most of the papers appear to be directed to an audience of development managers, administrators, and policy makers, in the sense that they develop the intuition of problems and analytical approaches, rather than bludgeon the reader with either reams of numbers or pages of mathematical argumentation. Many of them also are persuasion pieces. Munasinghe often talks to people with the political or administrative power to do considerable mischief or good to a country's energy situation, and one of his major missions is to eliminate as many of the knowledge barriers to their doing good as he can. Occasionally, he is not above downright flattery to get attention for his message (page 142)! The proof of the effectiveness of these papers, if I am correct in assessing their persuasive purpose, is whether they have improved the quality of energy policy both in developing countries and in multilateral development lending agencies and bilateral development assistance agencies. That is impossible to assess here, but the papers are models of clarity and contain many valuable insights on the special characteristics of energy in developing countries.

Would people besides administrators and time-conscious policy makers benefit from the papers in this book? Graduate students and researchers interested in developing country energy problems will find well-known topics adapted to the circumstances of developing countries in such a fashion that the economists among them will come away with an appreciation of developing country energy problems and the engineers and developing country specialists will have had familiar problems illuminated with cogently applied analytical methods. This is not the book to teach the analytical tools for studying energy for the first time, but it is a place to see the methods applied with an earnest and generally successful effort at a transparent walkthrough for the reader who has not done it before. It is particularly useful for offering specific ideas on policy implementation rather than staying at the level of the optimal tax or suggesting that the new equipment be gotten out to the users in order to solve all their problems.

Many of the papers are getting old. Are they also getting dated? The answer is mixed. Munasinghe's layout of the energy problems of developing countries probably has influenced the thinking of much of the energy intellectual community on those problems (Chapters 1, 3, 8) and remains a useful framework for thinking about energy in developing countries. The paper on energy pricing, specifically electricity pricing (Chapter 3), was published 11 years ago, and while the technical and implementation issues remains largely the same, recent energy price reform efforts in Latin America in particular have pointed to the importance of economy-wide pricing distortions and to macroeconomic interactions in both price distortion and price reform. The papers on rural and biomass energy remain useful frameworks, but may be a bit

dated in their optimism about improved household cook stoves, even as a stop-gap policy to allow time for tree plantations to mature. The analysis of improved cook stoves is more engineering than economic. The concerns for biomass energy are as much for environmental problems with excessive wood harvesting as for household fuel shortages, but this is the extent of attention devoted to environmental problems associated with energy supply and consumption. These papers largely antedate the surge of worldwide energy-environmental worries. If the present papers are predictive, Munasinghe will have published useful ideas about energy-environmental policy within the next few years.

The book has the makings of a very useful and practical text on energy problems and energy policies for developing countries, but the current format of largely unrelated papers inevitably involves the reader in duplication of material, as Munasinghe has addressed different audiences with overlapping areas of interest. Nonetheless, people interested in energy and energy policy in developing countries will find a rapid immersion course in this book.

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Emissions Permit Trading: A Policy Tool to Reduce the Atmospheric Concentration of Greenhouse Gases

by MERETE HEGGELUND
Calgary: Canadian Energy Research Institute, 1991
pp.108,xxi

Emissions permit trading as a policy device for controlling pollution has attracted considerable attention in the recent literature on economic and public policy, consistent with a growing acceptance of longstanding arguments from economists for more efficient control mechanisms. Such pollution reduction policies are generally referred to as market mechanisms because they involve the "polluter pays" principle, which leads the polluter to use market savvy to reach pollution control targets.

As our understanding of the greenhouse problem has improved, these tools have been discussed in the context of controlling global emissions of the greenhouse gases. For many who are involved in the discussion, emissions permit trading is the preferred version of the market-based control mechanisms. In this context, Merete Heggelund has undertaken to investigate the potential to apply an emissions trading framework in Canada for controlling anthropogenic carbon dioxide emissions. The result is an impressive work, which serves to outline the conditions under which such an approach might best be utilised, as well as to identify questions for further investigation.

Heggelund's book consists of a concise set of six chapters. The first serves as an introduction to greenhouse gas emissions and existing political efforts to control them. She outlines the scientific context in which the global warming issue is understood, specifying the relative importance of anthropogenic CO_2 emissions among the six major greenhouse gases (roughly 50% — see p. 8). This is followed by a breakdown of estimated Canadian CO_2 emissions from anthropogenic sources (excluding land use changes) by province, territory and economic sector. The first chapter also deals with international political efforts to arrive at target levels and strategies for greenhouse gas emissions reduction. These efforts include the Second World Climate Conference (Geneva, 1990), the Montreal Protocol dealing specifically with chlorofluorocarbons (CFCs), and, in Canada, the Federal/Provincial/Territorial Energy Minister's Task Force on Energy and the Environment. The political intricacies of agreeing on a global framework for the reduction of all greenhouse gas emissions, and specifically for the curtailment of carbon dioxide emissions, are, however, beyond the scope of the book.

Heggelund is successful at conveying the sense that Canada's commitment has been somewhat less than it could be. However, in setting out to explore the possibility of using a tradeable emissions permit system for CO_2 in Canada, she

clarifies that the analysis was done under the assumption that Canada has unilaterally committed to significant reductions or has done so pursuant to some multilateral framework.

Chapter 2 is devoted exclusively to the description of emissions permit trading as a generic tool for emissions reduction in comparison with other approaches. Briefly, emissions permit trading is an approach to pollution control that recognises the variation in abatement costs among individual firms within and between industries. While traditional command-and-control regulation simply apportions emissions licenses proportionally in a given jurisdiction, pursuant to a control target, a tradeable permit system allows market mechanisms to determine the final allocation of pollution permits. In this type of framework, the regulatory agent establishes an emissions target and issues permits to firms within its administrative jurisdiction, by auction or by free transfer. The firms are then allowed to cut back their emissions further and sell unused permits, or purchase more permits from other firms in order to have higher emissions. Because there is variation in marginal abatement costs, firms have an incentive to trade permits; firms with comparatively low costs of abatement will restrict their emission more and sell excess permits to firms with comparatively higher marginal abatement costs until an equilibrium is reached. The theoretical advantage of the system is that, while the emissions target is set by the regulatory agent, the aggregate costs of reaching this level of pollution output are reduced.

Although the diagrams demonstrating the potential advantages of a tradeable emissions permit system (p. 24) are less than ideal, the textual outline is quite clear. Moreover, subsequent description of the circumstances under which this approach is appropriate, relative to other policy tools, is excellent. Notable in the author's assessment is an acknowledgement that theoretical predictions of cost savings and empirical results will rarely coincide, for reasons that include non-competitive behaviour, insufficient variability in control costs to induce trading, and large administrative and transaction costs in operating the program. Heggelund's conclusion in this chapter is that emissions permit trading will most often be effective when employed in conjunction with other policy tools, notably command-and-control and emissions taxes.

A brief chapter 3 describes the various actual and expected results from existing applications of emissions permit trading, all cases being from the United States. This includes a description of the Fox River program, the lead emissions program, and the original provisions of the complex US Clean Air Act (which features "netting, banking, offsetting and bubbling"), as well as the US CFC framework and the yet-to-be-implemented Acid Rain provisions under the revised Clean Air Act. Although it is useful to have a report on existing experience, this chapter offers little that cannot be gleaned from a small portion of the existing literature (in particular from two articles authored principally by Robert Hahn).

In the fourth chapter, we get to the heart of the matter. First comes a discussion of the potential scope of a Canadian CO_2 emissions permit program. Despite the author's stated purpose of avoiding the political aspects of the problem, this section is concerned with political issues and, perhaps as a result, does not work well. It involves some rather contentious ethical debate about Canada's unilateral responsibilities as a first world nation and a prolific source of emissions.

The remainder of the chapter is quite sound. In the first of two major sections the author delineates a potential emissions trading program applicable to large stationary sources of emissions, primarily large industrial sources and electrical utilities. Her estimate is that a program of this nature would encompass roughly three-quarters of Canadian industrial CO_2 emissions. Remaining sources in the industrial and other economic sectors could either be brought into the fold subsequently (e.g., the transportation fleet) or subjected to different control mechanisms (such as taxation in the case of diverse residential and commercial sources). In the second major section is an outline of the specific mechanisms which might be used to implement and operate this emissions trading program. Much of this discussion, which is thorough and consistent, harks back to the theoretical framework presented earlier. In reasserting the potential deviation of practical results from theoretical predictions the author outlines the wicked problem of

initial permit allocation, and establishes that a free distribution method, following some formula for proportional allocation, could have significant regional economic consequences and should be considered carefully alongside alternatives; e.g., an auction. She also cautions that monitoring and enforcement costs can be extremely high in tradeable permit schemes and are not to be ignored in consideration of program costs and benefits.

The last chapter summarises the study's conclusions and recommendations. This summary is crucial to the book's success, as the amount of material covered is both large and at times technical. Heggelund's synthesis is excellent. Her general conclusion is that, despite a glaring need for more research (her work stands alone as a publication devoted to tradeable permit systems and carbon dioxide emissions reduction in Canada), she believes that a tradeable emissions permit system for the control and abatement of CO_2 emissions from large, stationary, sources in Canada holds genuine potential as a cost-effective policy tool.

This book deals with most of the salient issues involved in the implementation of an emissions permit trading system for the cost effective and equitable control of carbon dioxide emissions in Canada and thereby serves as a seminal publication in this field. The author is to be especially respected for resisting the siren song of glowing theoretical predictions for tradeable permit systems, which have overestimated actual savings in the past, notably under the US Clean Air Act provisions. Further, she maintains that the tradeable permit approach is no panacea for the regulation of emissions, arguing that regulation is best undertaken through a combination of policy tools. Finally, Heggelund is responsibly adamant in arguing that more research needs to be done in related areas of policy analysis, initial permit allocation schemes and economic impact assessment, a list to which one might add social and environmental impact assessment.

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