National Energy Policies of the Federal Republic of Germany and Canada in the 1970s and 1980s: are Economic and/or Environmental Concerns Responsible for Change?

by

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Abstract

The thesis presents a comparison of the national energy policies of the Federal Republic of Germany and Canada from 1973 until the late 1980s. The purpose of this paper is to analyze whether economic and/or environmental concerns were responsible for changes in the West-German and Canadian national energy policies. Furthermore, the feasibility of implementing a soft energy path in West-Germany and Canada is examined.

For better comprehension of the policy-making process and implemented changes in the national energy policies of the two states, the West-German and Canadian parliamentary systems and the political cultures were compared. For the analysis, several events with international impact were taken as guidelines. Furthermore, based on statistical data, the West-German and Canadian energy production and consumption were analyzed. With reference to these results the degree of the de facto changes in the national energy policies were analyzed. In addition, the thesis discusses the possibilities which a soft energy path offers to both national governments to renounce themselves from the dependencies on a few energy resources.

The thesis reveals that changes in the West-German and Canadian national energy policies, in their energy production and consumption are correlated to various world events. In particular, governmental responses security of energy supply by the two international oil crises of 1973 and 1979/1980 demonstrate that changes in the West-German and Canadian national energy policies were implemented in reaction to economic concerns than environmental ones.

With the policies "away from oil" and "off oil", the West-German and Canadian government implemented the
substitution of oil through various diverse energy supply resources. However, energy savings concepts and policies were initiated through the first oil crisis in 1973. The world recessions in 1975 and 1982 had no profound impacts on the agenda of West-German and Canadian energy policies. As a consequence of the stagnation or the negative growth of the world economic market, changes in their energy production and consumption can be perceived. However, the West-German and Canadian energy production and consumption intensified with the augmentation of the world economy. During the period of study, environmental concerns were taken into account in the energy policy agendas of the Federal Republic of Germany and Canada but they were not of primary concern. Within the decade of the 1980s notably more environmental considerations were taken into account in the energy policies of the two states. The two nuclear reactor accidents in 1979 and 1986 sharpened to various degrees West-German and Canadian public discourse of present energy supply mix and attitude towards energy production and consumption. The statistical data reflects yet no changes in the energy policies in regard to the position of nuclear power. However, in the next several years possible changes can be observed through statistical data, because the planning, the construction and possible phase out of nuclear power requires several years.

Finally, the thesis reveals that the implementation of a soft energy path requires profound changes in the consumer behaviour. As several studies indicate, a soft energy path is technological and economically feasible for the Federal Republic of Germany and Canada, its implementation remains to be a political decision.
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Chapter I

INTRODUCTION

"Energy is, put most simply, the fundamental unit of the physical world. As such, we cannot conceive of development without changes in the extent or the nature of energy flows. And because it is so fundamental, every one of those changes of flows has environmental implications. The implications of this are profound. It means that there is no such thing as a simple energy choice. They are all complex. And they all involve trade-offs. However, some of the choices and some of the trade-offs appear to be unequivocally better than others, in a sense that they offer more development and less environmental damage."\(^1\)

This paper compares the national energy policies of the Federal Republic of Germany and Canada from 1973 until the end of the 1980s. This paper will review the national energy policies of the Federal Republic of Germany and Canada and analyze the extent to which economic and/or environmental concerns were responsible for changes in the national energy policies of both states. The thesis demonstrates that

economic factors have dominated recent energy policies and that environmental concerns played a minor only role prior to the beginning and early 1980s.

During the last two decades, West-German and Canadian energy policies were exposed to several events with international impacts such as the 1973 and 1979/1980 oil crisis, the world recessions in 1975 and 1982, and the nuclear plant accidents in 1979 and 1986; among these the first oil crisis in 1973 in particular had a long lasting effect on both West-German and Canadian national energy policies. More recently however, global environmental concerns, such as atmospheric pollution resulting in global warming, the greenhouse effect and acid rain, to name just a few, are increasingly shaping West-German and Canadian national energy policies.

Until the OPEC oil embargo of 1973 the extraction of fossil fuels had increased significantly. Simultaneously, the dependence on primary energy resources increased. With increasing dependence upon these non-renewable resources, the energy supply of both societies became more and more vulnerable to external interferences. Events such as the international oil crises brought to light the problems of availability and use of present energy resources.

1Primary energy sources are the fossil fuels: oil, natural gas, and coal.
Present West-German energy supply mix consists primarily of fossil fuels and, to some extent, nuclear power. Current Canadian energy supply mix encompasses fossil fuels, nuclear power and hydro. Until recently, it appeared that West-German and Canadian energy policies were determined more by economic concerns than by environmental ones. Politicians in the Federal Republic of Germany and Canada, when making energy policy decisions, tended to place economic factors such as cost effectiveness, competitiveness and employment, ahead of environmental concerns such as atmospheric pollution and the risk of nuclear plants and nuclear waste disposal. For a long time, energy policy was based on the assumption that the higher the energy consumption, the higher the living standard and the more prosperous the economy. Consequently, energy consumption was considered as an indicator of both economic wealth and a higher standard of living.

In the last two decades, the environmental impacts of existing energy policies have been researched by environmentalists and scientists. Studies which examine alternative energy sources have also been done by environmental scientists to ensure the energy supply necessary for the maintenance of West-German and Canadian societies. These studies indicate that the guarantee of

society's energy demand can be achieved with renewable resources, such as biomass, solar, wind and to some extent hydro electricity. But in order to meet future energy demands, substantial changes in society's behaviour and energy policies have to be made.

One alternative to contemporary energy paths is discussed by introducing Amory Lovins' soft energy path concept. Lovins predicts that, with a shift from the supply orientation of current energy production to a demand oriented one, not only can nuclear power be phased out but the use of nonrenewable energy resources will be eliminated or at least reduced. In a society where energy production and policy is demand oriented, energy demand could be met primarily through renewable energy resources resulting in the minimization of negative environmental impacts. Moreover, the risks associated with nuclear power, such as accidents and sabotage, would be eliminated. Considering Lovins' concept of a soft energy path, which introduces options to avoid environmental hazards, several options exist for the West-German and Canadian national governments to change current policies relating to energy production and consumption.

Organization of the thesis

In order to provide a content for the discussion of past, and possible future energy policies in West-Germany and Canada, the second part of this introductory chapter provides a brief comparison of the two political systems, their political institutions, their energy policy processes and aspects of their political cultures which have relevance for energy policy.

Chapter two examines changes in West-German and Canadian energy policies with reference to several events with international impacts which occurred between 1973 and the late 1980s. These events were chosen because of their influence on West-German and Canadian energy policies. They include the two international energy crises, which jeopardized energy supplies, international recessions which may be expected to intervene the demand for energy and the two nuclear accidents at Harrisburg and Chernobyl which caused many critics to question the wisdom of energy policies reliant upon nuclear power. The chapter discusses many of the changes in the energy policy agendas of West-Germany and Canada, including substitution of oil by various other energy resources (specifically through nuclear energy), conserving
energy and further improving renewable energy resource technology.

Chapter three analyzes West-German and Canadian energy production and consumption during the period of study. Based on statistical data, the mix of energy supply resources, the proportion of fossil fuels and renewable resources within the mix, and the distribution of energy demand by sector are compared. Further information related to the empirical data, such as conversion factors for energy resources for the Canadian data, is provided in the appendix.

In chapter four criticisms of present West-German and Canadian energy policy paths are presented by introducing two soft energy path studies, one for each country. The West-German study was undertaken by the Oko-Institut in Freiburg in 1980. The Canadian study was done by the Friends of the Earth in 1983. Both studies assume that the use of nonrenewable resources will be minimized, even eliminated, and that nuclear power will be phased out. Both soft energy path studies emphasize that these alternative paths are economically and technologically feasible. Each study indicates that both domestic West-German and Canadian present and future energy demands can be met with renewable energy sources. Supporters of the soft energy path conclude that its implementation is a political issue. As well, chapter four discusses several options which both governments have in
order to achieve and implement changes in the overall attitude towards energy use, production, and consumption.

Chapter five, the conclusion to the thesis, emphasizes the differences between the two parliamentary systems in regard to energy policies, as well as the differences in public reactions to energy issues and options for the public to influence West-German and Canadian national energy policies. The contemporary West-German and Canadian national energy policies will be reviewed with respect to the initial question whether economic and/or environmental concerns were responsible for changes in the West-German and Canadian national energy policies. The thesis concludes with a discussion of the options available to the West-German and Canadian national governments if they are to implement fundamental changes in their national energy policies in order to achieve a sustainable society.
Energy Politics and Policy in West-Germany and Canada

Before examining in detail the developments in energy policy in the Federal Republic of Germany and Canada over the last two decades, the political environment in which energy policies were formulated and implemented in the two societies will be examined. This part of chapter one attempts, therefore, to compare the political institutions, policy-making processes and political cultures of West-Germany and Canada as they pertain to the issues of energy policy.

The Institutional Framework

Both the Federal Republic of Germany and Canada have a democratic parliamentary system incorporated in a federal structure. Both federal governments, specifically the Bundeskanzler (Prime Minister) in West-Germany and the Prime Minister and Cabinet in Canada, are dependent upon support of
a majority of the popularly-elected lower-houses: the Bundestag and the House of Commons. However, there are differences based on differences in the electoral system, and hence, in the parliamentary party systems. In West-Germany, a mixed system permits citizens to vote for individual constituency representation, as in Canada, furthermore, it permits the electorate to vote for a political party as well. A rough proportionality is the overall effect of this system although a minimum threshold, the so called "five per cent hurdle", for political parties is required before they can enter parliament. The West-German voting-system allows the possibility for smaller political parties, such as the Gruenen (Greens), to gain representation in the Bundestag. Moreover, because the election system does not give a disproportionate number of seats to largest party, coalition government, rather than single-party government is the norm. In Canada, a plurality or "First-past-the post" majority election system tends to restrict the number of parties represented in parliament by discriminating against smaller parties. Thus the Canadian system favours a two-party system, and tends towards single-party government by the party with the majority in the lower house.

Furthermore, the two systems differ with respect to the composition and executive role of the upper house of the federal legislature. The West-German Bundesrat consists of delegates of the various Laender (state) governments.
Depending on their population, three to five members per Land are delegated. The function of the Bundesrat provides a means for the Laender governments to serve as a check and balance institution on the federal government. The Canadian Senate, however, has no such function. Even though originally intended to represent regional interests, it developed through the method of appointment by the Prime Minister as a vehicle for patronage and rewards for service to the governing party. Most Senators vote on party lines rather than representing regional or provincial interests. Because of the strong check and balance function of the West-German upper house, the Bundesrat has tended to play a more significant role than the Canadian Senate in national policy-making and in relations between the federal government and sub-national (Laender/provincial) governments. As a partial consequence of the lack of a check and balance institution, Canada has developed a separate institution, the First Ministers' Conference, to deal with federal-provincial relations.

As mentioned above, West-Germany and Canada have federal constituencies which delegate powers to national governments and to sub-national governments.\(^1\) However, significant

\(^{1}\) Federal Republic of Germany. Grundgesetz; Canada. Constitution Act of 1982. The organization and the distribution of power between the Bund (Federation) and the Bundeslaender, the vertical-federal level, are regulated in Part II, Articles 20 to 37 of the Grundgesetz. The vertical-federal distribution of power is expressively regulated by Article 28 and 31 of the Grundgesetz. The Bundesregierung (Federal Government) is the
differences exist in the way that powers are allocated and exercised in the two systems. In West-Germany, concurrent legislative jurisdiction is implemented. That means that both levels of government may legislate in most policy areas, but a form of "administrative" federalism has emerged in which, in many areas, the federal government formulates policy or at least sets a frame, while the Laender administer or implemented those policies. In Canada, the constitution originally allocated most issue areas to either exclusive national or exclusive provincial jurisdiction. However, over time, several policy areas have emerged in which the definition of jurisdiction is not clear. Hence, both national and provincial governments seem to legislate in those areas, which leads to competition and conflicts between the two levels of government.
The Energy Policy Process

The differences in the West-German and Canadian federal systems have significant implications for the formulation of energy policy in the two countries. While in West-Germany the federal government has exclusive authority to formulate national energy policy, in Canada both levels of government claim, and make use of, the power to legislate in energy areas.¹

In West-Germany, the Bundeswirtschaftsministerium (federal Ministry of Economy), and in particular its energy branch, is responsible for formulation of domestic and international energy policy. Therefore, energy policy is incorporated into macro-economic policy-making and planning. At the political level, a parliamentary commission on energy policy advises, investigates, proposes and approves national energy issues. In Canada, a separate national government department, the Ministry of Energy, Mines and Resources has responsibility for the general direction of domestic and international energy policy. However, much of administration and implementation of the domestic energy policy is

undertaken by the National Energy Board (NEB).\textsuperscript{1} The NEB advises the Department of Energy, Mines and Resources and the national cabinet in energy issues, and is responsible for forecasting energy production and consumption. Furthermore, the NEB is responsible for issuing export and import licences, approving prices, tariffs and rates\textsuperscript{2}. As in West-Germany, the Canadian energy policy has on occasions been linked closely to macro-economic policy, particularly in the early 1980s. The sometimes unclarified legislative jurisdictional authority over energy issues, the existence of the separate national energy department and the National Energy Board with its regulatory competence are factors which may greatly complicate the coordination of a domestic energy policy.

In both countries, energy policy-making is significantly influenced by the sub-national levels of government. In West-Germany, however, this influence is smaller than in Canada. For the most part the Laender governments and municipalities administer and implement energy policy formulated by the national government. However, they have

\textsuperscript{1} one overview of the organization and tasks is given in \textit{The National Energy Board} by the Law Reform Commission of Canada (Ottawa: 1977). J. A. Olthuis is one of those who question the effectiveness of the Board; in: "Prerequisites of a Self-Sufficiency Debate" in \textit{Canadian Public Policy}, VI, No. 3, 1980, 482.

\textsuperscript{2} Law Reform Commission of Canada, \textit{op. cit}, 1977, p. 12
legislative power over the licensing and operation of electric power generation. And since none of the Laender has legislative power over natural resources or has extensive reserves or access to these, conflicts among the various levels of governments seldom occur.¹

In Canada by comparison, the provinces play an important role in the hydro-electric industry, which is administered by crown corporations. Furthermore, the provinces have legislative power over natural resources; hence, oil and gas producing provinces want to make their own policy in this area, often resulting in conflicts with oil and gas consuming provinces such as Ontario.²

Political Culture

West-Germany's political culture is shaped by class orientation along economic lines and recent history, while the Canadian one is characterized by regionalism and multiculturalism. In addition, the two societies have different approaches to the politics of influence.

¹Barbara Breuer Die Energiewirtschaft der Bundesrepublik und der DDR im Vergleich (Energy Economy of the Federal Republic of Germany and the German Democratic Republic in Comparison) (Muenchen: Oldenbourg Verlag 1987)

²See discussed further in Chapter 2 on the example of the National Energy Program
One distinctive feature of West-German political culture is the traditional importance of class alignment. Simultaneously with Germany's industrialization and secularization, West-Germans aligned themselves to different parties according to their socio-economic status. Several studies on voting behaviour indicate that the West-German electorate votes in accordance with occupation, religion and socio-economic status.\(^1\) Professionals, higher income earners, middle class business persons, and most catholics tend to vote for the rather conservative Christian democratic parties, the Christlich Demokratische Union Deutschlands (CDU) and its Bavarian counterpart, the Christlich soziale Union (CSU). Labourers and most of the protestants and atheists tend to vote for the social democratic party, the Sozial Demokratische Partei Deutschlands (SPD), while business and white collar employees and some professionals tend to vote for the smaller liberal party, the Freie Demokratische Partei Deutschlands (FDP).

However, some more recent studies observe a change in voting behaviour which implies change in the value system and lifestyle of many West-Germans. The most obvious evidence of these changes is provided by the emergence of the "Green" party, or the Gruenen.\(^2\) The Greens consider themselves an

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\(^1\)Polls are undertaken after each general election with respect to the these indicators.

\(^2\)Material about the discussion of postmaterialism and evolving of the Greens were gathered from: Gerd Langguth *Protestbewegung:*
alternative to the established political parties and have been able in the last two elections to attract citizens from every social stratum. Voters and members of the Gruenen come from many age-groups and occupations, including the young and elderly, women and men, physicists, students, lawyers and blue collar workers.¹

Ingelhart's theory of the "Silent Revolution"\textsuperscript{1} suggests that the development and emphasis of "postmaterialist" values in several western industrialized countries occurred as a result of the different political and socialization periods in the formative phase of the generations raised before, during and immediately after the second world war. While the political socialization of the prewar and wartime generations is defined by an emphasis on material values, the post war generation's value structure is dominated by postmaterial values, such as aesthetic, cultural and political concerns. According to Ingelhart, and as various other studies show\textsuperscript{2}, material demands were crucial to the prewar and wartime generations. By contrast, members of the post war generation do not give the same status to these values because they never experienced and suffered deprivation to the same extent. In addition, with continuous economic growth and economic well-being in the postwar period, postmaterial values achieved more importance for the post war generation. With the change from materialist to postmaterialistic Weltanschaung (world-view) the philosophy of life and the expectations on life changed fundamentally.

\textsuperscript{1}Ronald Ingelhart. \textit{The Silent Revolution} (Princeton: Princeton University Press, 1977)

\textsuperscript{2}Studies, regarding the West-German aspect of Ingelhart's theory are undertaken by Peter Gluchowski and the Horst Becker. Studies, analyzing the theory's appropriateness for Canada is done by Ian McAllister "Party Elites, Votes and Political Attitudes: Testing Three Explanations for Mass-elite Differences" in \textit{Canadian Journal of Political Science} June 1991, xxiv:2, 237-268
Another distinct feature of West-German political culture is the high rate of politicization, especially among the younger generation. This appears to have its origins in the student movement and other social movements of the late 1960s. Between 1966 and 1969 the federal government consisted of the two main political parties, the social democrats (SPD) and the two Christian democrats (CDU/CSU) who joined forces in the so called Grosse Koalition (Grand Coalition). An effective parliamentary opposition did not exist. The third main political party, the liberal FDP, had virtually no influence on government policies. As a consequence of these conditions, the Ausserparlamentarische Opposition (APO) (non-parliamentarian opposition) was formed, mainly by students. Societal political discourse and the focus on non-material values resulting from the postmaterialists’ socialization led to fundamental changes in West-German society and politics. Both are, to some extent, responsible for the emergence of the Greens. The existence of the Greens as a political party reflects distrust on the part of a broad segment of the West-German electorate concerning the ability of the traditional parties both to cope with the history of West-Germany and to deal with future challenges.

The Greens constituted themselves from various organized, half organized and "non group" movements, "lists" and "tendencies" of diverse political opinions. The
political spectrum of the party extends from centrist to extreme left; the party's political shade is as diverse as its objectives and concerns. Middle class conservative-nationalism and utopian-communism are as well represented as those groups concerned with issues such as feminism, peace and environmentalism.

In the mid 1970s various events caused these postmaterialists to argue and debate for a different way of living. Both the first oil crisis in 1973 (and the resulting shock about the shortage of energy supplies and the tendency to replace oil by nuclear power) and the discussion of the stationing of American nuclear weapons on German soil, created a climate of dissatisfaction within society. Young people (18 to 25 years old) especially voiced their disapproval on several occasions by protesting in the streets against these developments.

Anti-nuclear and peace groups arose quickly in all those regions in Germany where nuclear plants or the stationing of cruise missiles were planned. These groups worked independently of each other, and most were active only as long as their region was directly affected. The distinctive feature of these groups was that, for the first time since World War II, citizens from different parts of the society and from different societal levels and age-groups became involved. Farmers, lawyers, doctors, academics, housewives,
employees, students, old and young came together to
demonstrate and voice their disapproval of nuclear power
plants or the stationing of nuclear missiles in their
neighbourhoods. Over the years, several of these interest
groups came and went. Once the issue was settled, either
because the plant was built, or the Landesregierung decided
to construct the plant somewhere else or cancelled it
altogether, or because the missiles were stationed elsewhere,
most of the interest groups disappeared. But, a few groups
remained and started to work at a broader level.

In 1979 with the ratification of the NATO-
Doppelbeschluss (double track policy), the anti-nuclear and
peace movement reached its first peak all over West-Germany.
Thousands of people demonstrated in the streets and voiced
their disapproval against the stationing of American cruise
missiles. One small group, the Gruenen, unknown so far, to
the major segment of the German population and the rest of
the world, was one of the main organizers. Ever since, the
Gruenen have been demonstrating for peace, protesting against
anti-nuclear weapons and power plants and directing attention
to environmental problems.

In 1980 the Gruenen established themselves as a
political party to serve as the parliamentary extension of
diverse grassroot movements. Their aim was to represent
minorities, to debate and voice issues which had not been
expressed so far by the existing parties. Therefore, from the beginning, the Greens have been a political party with diverse objectives and no clear and sophisticated programme: as Petra Kelly stated it became the first "anti-party".\(^1\)

The distinctive feature of the Greens' success was their attraction for young voters for whom the existing three major parties held no appeal. However, as a decade passed by, it appeared that the Greens while retaining the allegiance of the original supporters, found themselves less and less attractive to new young voters to the great dismay of the party leaders.\(^2\) Paradoxically, it turns out to be that the once distinct attraction of the Gruenen—heterogeneity—became the main disintegrative factor. From the beginning, the political diversity of the Greens ranged from centrist to extreme left ideological positions. Depending on the various political standpoints of party members and supporters, objectives and issues varied accordingly. Agreements and compromises among the party representatives were difficult to reach and resulted in controversial and long political debates. Soon after its founding, two major streams developed within the party: on the one hand, the so called Realos (realists) who argued that the Green party had to take

\(^1\)Petra Kelly is one of the first well-known members of the Greens as a Member of the European Parliament and Member of the Bundestag. Her description of the party was made at its founding convention in Offenburg, 1980.

\(^2\)Gluchowski, op.cit 1987; Becker, op.cit, 1984
over political responsibility and try to get elected to office in order to implement changes; while on the other hand, the Fundis (fundamentalists), who rejected any form of governmental responsibility and compromise.

By taking into consideration the extreme diversity of the Green party supporters, one may ask how the party was able to attain such wide support among the young voters in the first place. The common feature of all these supporters is their critical view of politics and their rejection of the prevailing criteria of rationality in politics. Consequently, this segment of the voting population denies the ability of the existing parties to structure the political order in response to the changes demanded by the younger generation.

The Greens are the most visible symbol of a broad awareness among the citizen that the existing industrial system cannot any longer fulfil its function to protect its members. From the position of a Green supporter, it seems that the industrial society has lost its ability to guarantee people a high quality of life. The existing parties appear to lack innovation. In contrast to this assessment, Green voters believe that their party has the capacity for innovation and reform. Consequently, they believe that there are solutions to ecological and economic problems which the
existing system, with its focus on quantitative economic growth and depletion of resources, cannot solve.

Until the emergence of the Grünen in the Federal Republic of Germany, citizens' interests in politics were commonly represented by big associations such as trade unions and employers' organizations. As demonstrated above, this pattern changed with increasing environmental awareness within all regions of West-Germany. The emergence of the Greens and their entry into parliament is the most visible sign of changes within the West-German political culture.

The Canadian political culture differs significantly from the West-German one. Numerous books and articles have suggested that present Canadian public discourse is preoccupied by the issues of national unity, regionalism and the question of Canadian identity.¹ The Quebec issue is one example which illustrates the distinctive features of Canada's political culture--nationalism and regionalism. Both features are of less significance for the West-German political culture.

¹David V.J. Bell and Lorne Tepperman Roots of Disunity: A Lack at Canadian Political Culture (Toronto: McClelland and Stewart 1979); Douglas Verney Three Civilizations, two cultures, one state: Canada's political tradition (Durham: Duke University Press 1986)
In West-Germany, class cleavages played an important role in party development; this has not occurred to the same degree in Canada. In comparison to the Federal Republic of Germany, Canadian political parties do not necessarily represent the same interests throughout the whole country. The infrastructure and economic conditions of the provinces shape the images and programmes of each political party. The parties tend to represent the interests of provinces or regions rather than distinct classes, although the New Democratic Party (NDP) has traditionally associated itself with the interests of the working class and, to a less extent, with farming.

Neville, Bakvis and Gibbins suggest in their study "The Ideological Contours of "New Politics" in Canada: Policy, Mobilization and Partisan Support", that "postmaterialist" values do exist in Canada. But these values have not

1despite the western Co-operative Commonwealth Federation (CCF) and its successor the New Democratic Party (NDP). Janine Brodie and Jane Jenson found in a contemporary study that class conflict is primary concern of Canadian political parties. Janine Brodie and Jane Jenson Crisis, Challenge and Change: Party and Class in Canada in Canada revisited (Toronto: Methuen 1988). Clarke et al. state in Absent Mandate that parties succeed best by providing a range of policies to suit diverse interests.

2Neil Nevitte, Herman Bakvis and Rodger Gibbins "The Ideological Contours Of "New Politics" in Canada: Policy, Mobilization and Partisan Support" in Canadian Journal of Political Science vol. 22, no. 3, Sept. 1989, pp. 475-503. In contrast to Ingelhart's sozialitaion theory, Herman Bakvis and Neil Nevitte suggest that the existence of postmaterial values in Canada may not be explained by that theory, but postmaterial values are determined thorough the various life circle which each voters passes. See Herman Bakvis and Neil Nevitte "In Pursuit of Postbourgeois Man. Postmaterialism and Intergenerational Change in Canada" in
replaced the "left-right" conflict. Moreover, they detect an overlap between postmaterialist values and left-right ones, whereby postmaterialist values are considered to be "left" values by the Canadian electorate. This lack of distinction between left and postmaterial values makes it difficult for an environmental movement to establish a national political party. Hence, environmentalists and postmaterialists tend to consider the NDP to be the one political party which is seriously concerned with postmaterialist and environmental issues. The Liberals and the Progressive Conservatives (PCs) are seen as less environmentally concerned by environmentalists.

In contrast to the strong West-German environmental movement with the Gruenen as its parliamentary wing, the Canadian environmental movement is differently structured. Different environmental concerns are shaped through economic, social and environmental conditions among the various regions. In addition, the role of interest and pressure groups in Canada may contribute to the lack of a nationwide environmental movement and a national environmental party.  


1Robert Penner and Peter Kraft "The NDP, Peace Issues And The Last Federal Election" in Canadian Dimension vol. 23, no. 8, 1989, pp. 11-20. In addition, after several conversations with environmental activists from various groups this impression was conveyed to the author.

2Galipeau states that the interests of environmental interests and pressure groups "are often derogerated as "single-issues"."

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2Galipeau states that the interests of environmental interests and pressure groups "are often derogerated as "single-issues"."
The lack of a nationwide Green Party may be attributed to three factors. First, the weakness of postmaterialism; second, the overlap between postmaterial and left values, and, thirdly, the fact that the NDP has not yet been the governing party at the national level nor in most provinces. In West-Germany, all three established parties have been in government (albeit as majority or minority coalition partners). So far, the SPD has not been able to address environmental concerns to the satisfaction of all of their supporters, the traditional material left wing. The SPD, like the NDP, faces conflict between postmaterial and environmental values and the materialistic value structure of their traditional supporters, the working class. The NDP has yet not had to make hard choices between "jobs" and "environmentalism" since it has not been in a governing position to do so. Now that the NDP is forming provincial governments, and is forced to make tough choices between jobs and economic growth and environmental and postmaterial concerns, it is of interest whether or not the party can hold onto its supporters.

Willingness to join and participate in interest groups appears to be an additional feature to note in the Canadian political culture. In Canada, as Pross states, an interest or pressure group exists for almost every political issue and they lobby all levels of government.\(^1\) Their targets are politicians, bureaucrats and the senior staff of governments. Furthermore, Pross considers their presence within the Canadian political system to be an enhancement of Canadian democracy.\(^2\) The functions of these groups are considered to be legitimate and important in terms of controlling and influencing government decision-making.

In both Canada and in West-Germany, lobbying is a legitimate method to intervene in government policy. However, lobbying is not used to the same extent in West-Germany as in Canada, especially since the Gruenen entered the national parliament and various Laender parliaments. In Canada the most common method of lobbying for interest groups is briefing and directly contacting the local Member of Parliament in Ottawa or the provincial parliament, or the local city councillor. If an issue is region wide of importance, local interest groups contact other groups in


order to coordinate their strategy and reactions towards government decisions.

In Canada, environmental and business interest groups are as plentiful and multi-faceted as the issues themselves. In each region different environmental concerns exist. People in the peripheries are concerned about the deforestation unaccompanied by reforestation, about the construction of huge hydro dams, and uranium mining. People from central Canada are concerned about nuclear power, nuclear waste disposal and hydro electricity plants. Native Indians and other people living in the Canadian north are concerned about their living conditions being jeopardized by the extraction of northern resources.

These diverse interests among the various regions make it difficult to build a foundation for a national environmental party. Environmental activists argue that is impossible to establish a national Green party without having a national environmental movement, and that the latter does not exist as yet. In contrast to West-Germany, environmental interest groups never merged into a cross-local of even inter-provincial body. Even the nation wide pressure groups,

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1 Helga Hoffman and David Orton "Canadian Greens: On the Political Margins" in Canadian Dimension vol. 23, no. 8, 1989, pp. 21-23

2 Ibid., p. 21
which do exist, such as Friends of the Earth (FoE) and Greenpeace, do not strive for the integration and fusion of the many independent local or provincial interest groups.

Effective and successful lobbying requires strong participation and involvement of the group members' time and money. These factors are the cornerstones required to provide politicians and bureaucrats with persuasive information based on studies, reports and expert opinions. In order to enable environmental pressure groups to lobby effectively and competitively against business and industrial groups, members and supporters of these groups must donate money. Sometimes, environmental pressure groups receive money from the provincial or federal government for specific projects. In the early eighties, Friends of the Earth received money from the national government in order to undertake a soft energy path study for Canada.¹ Currently, the Ontario government has provided interest and pressure groups in the province with a $10 million fund, partly to enable these groups to respond to the Supply and Demand Energy Plan for Ontario (SDP).²

¹Friends of the Earth 2035: Soft Energy Path for Canada (Ottawa 1983). The study will be introduced in chapter IV of this paper.

²The first energy and environment caucus was held at the weekend of 26-29 of August on Grindstone Island, Portland, Ontario with the objective of setting the agenda and informing groups about the Supply and Demand Plan.
Overview

As mentioned above, West-Germany and Canada are parliamentary democracies with a federal structure. As a consequence of the West-German mixed voting system, smaller parties can more easily gain parliamentary representation than is possible with the plurality voting system, which tends to restrict the number of parties represented in the lower house. Furthermore, in West-Germany coalition governments are more common while in Canada a single-party government is more usual. With respect to the upper houses of the federal legislature, the West-German Bundesrat is a federal institution providing a check and balance on the national government. In Canada, the Senate appears to be elitist club with no significant role in Canadian policy-making. The First Ministers' Conference, however, appears to have become a institution with more significant function in regard to federal-provincial relations. As suggested above, legislative jurisdiction is allocated and exercised differently in the two countries. Whereas in West-Germany concurrent legislative power is implemented, in Canada most policy issue areas are either exclusively under national or exclusively under provincial jurisdiction. But, since several issue areas are not clearly defined a national or provincial jurisdiction, conflicts and competition between the two levels of government arise.
In West-Germany, national energy policy is exclusively formulated by the national government, while in Canada, the national and sub-national governments legislate energy policy. The energy policies of both countries are integrated into the macro-economic policy-making process. However, in Canada a separate national department, the Ministry of Energy, Mines and Resources sets the general outline of national energy policy, while in West-Germany the Bundeswirtschaftsministerium has this responsibility. Most of the administration and implementation of Canadian energy policy is undertaken by the National Energy Board, but no such equivalent regulatory agency exists in West-Germany. Furthermore, the sub-national governments of both countries have significant influence on energy policies. However, the role of the West-German ones is much smaller than that of the Canadian provincial governments. The main reason for the difference is provincial legislative power over natural resources, which lead the oil and gas producing provinces to make their own policy. In West-Germany, none of the Laender has either extensive reserves of energy resources, or access to them, or has legislative power over natural resources.

West-Germans and Canadians started with the same means to intervene in policy-making. In both states, citizen initiatives, interest and pressure groups arose to express concern about various environmental issues. In the Federal
Republic of Germany, these environmental groups and the environmental movement merged to form the Gruenen. This political party defines itself as a party primarily concerned with the environment, peace issues and other "postmaterialist" issues, and it represents these issues in parliament. In contrast to West-Germany, a broad environmental movement does not exist in Canada. The absence of a national environmental movement in Canada is due in part to the weakness of postmaterialism, the overlap between postmaterialist and left values and the specifically regional nature of most environmental concerns. In addition, the traditional custom of lobbying through interest and pressure groups provides a recognized and efficient tool to influence the policy-making process. At present, there is no need for an environmental party on the national level.
Chapter II

Comparative Energy Policies

The national governments of the Federal Republic of Germany and Canada have promoted significant changes in their energy policies over the last two decades. The agenda in both cases included the demand for better energy-efficiency, conservation, increasing use of renewable energy resources, and, in the case of Canada, energy self-sufficiency.¹

The following chapter analyzes, the extent to which the West-German and Canadian energy policies have changed over the past twenty years. As well, whether economic

¹The debate over energy independence has been taken place for decades in the Canadian political discussion as well. John N. McDougall Fuels and the National Policy (Toronto: Butterworths 1982), W. A. Ross "Energy and Self-Sufficiency: Possible and desirable?" Canadian Public Policy VI, No. 3, 1980, 535-545. Pursuant advocates of the self-reliance thought, Canada can meet its energy demand by the use of its own resources, opponents argue twofold: first, Canada may not be able to meet its domestic energy demand, and second, if Canada could even satisfy the demand it would be only possible through expensive costs.
considerations or environmental ones led to the changes identified in the West-German and Canadian energy policies is examined.

The West-German and Canadian energy policies are examined in relation to the oil crises of 1973 and 1979/1980, the world recessions of 1975 and 1982, the 1979 nuclear plant accident in Harrisburg, Pennsylvania, USA and the one in Chernobyl, USSR in 1986. Changes in West-German and Canadian energy policies are analyzed and statistical data are examined to determine the extent to which announced changes in energy policies were implemented by the Federal Republic of Germany and Canada and to investigate the motivations for these changes.

The energy policies after the first oil crisis in 1973

In general, the energy policy of the Federal Republic of Germany can be characterized by strong dependency on non-renewable energy sources, in particular oil. In 1973, over 90 per cent of that oil was imported and most of the industries were and are still heavily oil oriented.1 Thus, the energy crisis precipitated by OPEC in 1973 had a major

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impact upon the Federal Republic in terms of the reaction of
government, politicians, the economy, and citizens.

Coincidentally, a few months before the announcement of
the oil embargo, the national West-German government had
passed its first energy programme in September 1973. This
Federal Energy Programme considered energy supply as one of
the major requirements to maintain and develop the present
societal economic status. The objectives of the programme
included a reduction of dependency upon oil in general.
Pursuant to this programme, appropriate means to achieve this
objective were the assurance of a steady level of oil
reserves and the development of less expensive energy
sources, such as natural gas, nuclear energy, and coal. The
programme also called for the limited construction of nuclear
plants, to supplement energy production.

One direct consequence of the 1973 oil crisis was the
Sonntagsfahrverbot (temporary prohibition of driving on
Sundays) enacted by the Federal government. The political
agenda was "away from oil" and remained so until the end of
1975. In the next couple of months, the Federal government
enacted several regulations in reaction to the unforeseen oil

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1 ibid., p. 225
2 ibid., p. 225
shortages. In order to increase the reserve of oil and to expand the security of oil reserves the government demanded an increase in the amount of oil on hold. In addition, the Federal government forced the oil industry indirectly to reform the ownership and share of the oil market within the Federal Republic.\footnote{Ibid., p. 228} Overall however and in accordance with the economic order of the *soziale Marktwirtschaft*, ("social market" economy) the Federal government did not intervene in the price policy of the fossil fuel industry or of the electric industry as they increased the prices for their products. On the other hand, the Federal government did enact immediate aid programmes, benefiting those who were of low income.\footnote{Ibid., p. 229}

The request for further energy sources then reached its first peak. Politicians as well as some scientists and business people considered nuclear energy to be the appropriate substitute for oil. Other alternative energy sources such as hydro electricity, solar, wind and biomass were rejected with the arguments that the technology needed for these renewable energy sources was not yet sufficiently developed and that these sources were therefore inefficient, both economically and in their productivity. Nevertheless
some support for research into these soft energy paths did emerge.\textsuperscript{1} In the late 1980s, the amount of funding increased for these energy means. Nevertheless, the main attention was and is still given to the further development of nuclear power.\textsuperscript{2}

The economy coped with the oil shortages and with the rise of the oil prices only with difficulty. The costs of production were increasing. These higher production costs were transferred to the consumer by industry in the form of higher prices for fossil fuel products, in order to maintain profit margins so far as possible. In addition, economic incentives were provided to manufacture machinery which required less energy and which was more energy efficient.

With the oil embargo, the demand for a safe energy source supply increased. The nuclear industry stressed the "advantages" of their energy source in comparison to oil and other fossil fuels. These advantages were the low cost of its production, the independence of the energy source itself, and its "environmentally friendly" character.

\textsuperscript{1}Federal Republic of Germany Statistisches Jahrbuch der Bundesrepublik Deutschland 1989 (Statistical Yearbook of the Federal Republic of Germany)

\textsuperscript{2}see Figure 1, p. below.
Citizens reacted to the events caused by the oil shortages with energy savings in all areas. Transportation by car and household consumption of oil decreased. Nevertheless, the use of electricity continued to increase in households and in the non-industrial sector. At the same time opponents of nuclear energy expressed their concern and disapproval. Among these opponents were citizens, scientists, politicians and businessmen.¹

The Canadian government was as unprepared for the oil crisis as the West-German government. The responses of the Canadian governments, federal as well as provincial, were different from the German ones. Within Canada, differences in reactions existed among the federal and various provincial governments according to their main interests. While the major energy producing provinces opposed Ottawa's policies, central Canada, in which the major energy consuming industries are located, supported the federal policies. As in the West-German case, the Canadian national government adopted the objective of reducing its dependence on oil, replacing its use with natural gas and, to a minor extent, with coal.²

¹The arguments for and against the use of nuclear power split West-German society: see also Chapter II of this paper.

Alberta, as one of the main provinces affected by Ottawa's policies, faced the consequences of the changed national energy policy having only recently experienced great changes in its provincial political conditions. After thirty-one years of Social Credit government, the Conservatives have recently taken office; and in the 1971 election which brought the Conservative Party to power, its leader Peter Lougheed had campaigned for diversification of the province's infrastructure based upon its wealth of oil and natural gas.

The federal government enacted oil export controls and controls on exports of refined products. In addition and to the disapproval of Alberta, the federal government froze the price for domestic oil and established an export tax on crude oil. In order to compensate for the uneven supply conditions and circumstances, an extension of the interprovincial pipeline to Montreal was announced by the federal government.¹ These initiatives as well as the founding of the national publicly owned oil company Petro-Canada caused serious disagreements between Alberta, on the one hand, and the federal government and Ontario, on the other. Most of the other provinces did not strenuously intervene in this

¹Michael Whittington and Glen Williams (eds.) Canadian Politics in the 1980s (Toronto: Methuen 1981)
dispute, although some of them supported the Alberta government in its position.¹

The Canadian national government implemented oil and gas export controls in order to maintain its domestic supply, although Canada continued to export oil and gas to the United States. Simultaneously, domestic oil prices were frozen far below the world oil price. The Alberta government viewed this action as a restriction of their rights and it intensified in the following decade the political disagreement and cool climate between the two governments. Oil and energy policy became one of the main sources of conflict within Canadian politics.

The national government enacted an additional tax on exports through the Oil Import Compensation Programme (OIPC), in order to distribute the burden arising from the oil crisis among all provinces. The revenues from this export tax were used to subsidize the eastern provinces who were depending on oil imports. As a result, the oil producing provinces in the west were supporting eastern and central Canada. Another planned project for the benefit of Quebec was the extension of the interprovincial pipeline to Montreal in order to

¹Doern and Toner The Politics of Energy: The Development and Implementation of the NEP Toronto: Methuen 1985, 89-95
supply a greater area in the east with Canadian oil and cut off their dependence on oil imports.

Taking into consideration the political circumstances at the time on the national level, the establishment of Petro-Canada in the fall of 1973\(^1\), has to be regarded as an alternative to, rather than as an instrument of, nationalization.\(^2\) In order to survive politically on the national level and to expand the possibilities of intervention in the energy policies, the national government planned the creation of Petro-Canada in the fall of 1973. With the state oil company, the Liberal minority government conceded the demand of the New Democratic Party (NDP) which argued in favour of such an company. In addition, Petro-Canada was established in order to reduce the vulnerability of Quebec and the Maritimes to the unsteady conditions of the world oil and energy markets. Furthermore, the recognition by Ottawa that it had little control over energy supply security contributed as well to the founding of Petro-Canada. And, the rising tendency of state-to-state contracts among oil producing nations might also have played a role.\(^3\)

\(^1\)However, Petro-Canada did not come into existence until the summer of 1975.

\(^2\)Op.cit., p. 92

\(^3\)Ibid., p. 91
In addition, the national government took into consideration the further extraction of Arctic and off shore oil. Pipelines through the Mackenzie Valley and the Alaska Highway Pipeline were planned. While the latter one was for American gas transportation from Alaska to America, the Mackenzie Valley pipeline was for oil transportation from the Arctic to southern Canada. In 1977, a Royal Commission, established under chair of B.C. Supreme Court Justice Thomas Berger, recommended a freeze on the construction plans, after a comprehensive study of circumstances and consequences for the affected natives and the impact on the natural environment of the area.\(^1\)

**Energy Policies between the two oil crises**

In neither West-Germany nor Canada, did the world recession in 1975 bring any profound changes in the agenda of national energy policy. Both national governments regarded the current mix of energy supply resources as appropriate. Nuclear energy continued to be the best substitute for oil in thermal generated electricity. During the recession, energy consumption slowed down to some degree. After the recession energy demand and production increased significantly.

What was the role of environmental concerns in energy policies? Both states implemented environmental impact assessments. Within the years between 1975 and 1979, both national governments enacted an environmental impact assessment act (EIA Act). In 1975, the West-German national government implemented the Umweltvertraeglichkeitsspruefung (environmental impact assessment). Pursuant to this act, every public project within the Federal Republic of Germany and outside its boundaries must be assessed in regard to its environmental and social impacts.\(^1\) The Canadian environmental impact assessment act had a 1973 precursor in the form of a federal environmental assessment and review process.

While the first comprehensive legislation was enacted by Ontario in 1975,\(^2\) the federal government amended in 1979 the Government Organization Act which changed the former administrative character of the environmental impact assessment requirement (EARP), and authorized the Ministry of the Environment to establish and to operate an environmental

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\(^1\)Umweltsvertraeglichkeitsspruefung (environmental assessment) from August 15, 1975 and its amendments. By outside of the Federal Republic is meant each project which is funded or supported by the federal government, e.g. development aid.

\(^2\)Today, each province has its own act.
assessment process. The duties and responsibilities of the Ministry of the Environment are
to ensure that new federal projects, programmes and activities are assessed as early in the planning process for potential adverse effects on the quality of the natural environment and that a further review is carried out of those projects, programmes and activities that are found to have probable significant adverse effects.\textsuperscript{1}

In 1984, the \textit{Environmental Assessment and Review Process Guidelines}\textsuperscript{2} were enacted. According to this act, each ministry undertakes its own environmental assessment in accordance with the guidelines provided by this act. The guidelines and the EIA act respectively are under federal jurisdiction and can be changed at will by Cabinet.

The objectives of the West-German and Canadian environmental impact assessment acts are either to avoid or to limit the environmental impacts of projects already in their planning process. That means every project related to energy production and refinement has to be assessed in regard to its possible environmental impacts. Therefore, for each mining and drilling project of natural resources an assessment has to be done, as well as for each coal-burning,

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\textsuperscript{2}Canada \textit{Gazette Part II}, vol.118, no. 14, Registration SOR/84-46.\end{flushright}
nuclear or hydro electric plant. In addition, possible environmental impacts of energy transportation systems, such as pipelines and electric transmission lines, have to be assessed.

Critics of environmental impact assessments are many. The degree to which the results of the impact studies are to be taken into account in the decision-making has been questioned. Further, critics argue that environmental assessments are of minor importance in the assessment process; economic aspects are still the main basis for decision-making. In addition, tools and theoretical approaches of the impact assessment act are too "soft and weak". It is argued that the guidelines, provided by the act, are easily bypassed by the industry. As well, difficulties arise in the evaluation of environmental components, and the problem of comparing environmental impacts to economic costs and benefits. Furthermore, the predictability and therefore the reliability of the environmental impacts of a project are questionable, because the possible impacts are often unknown. Since Canadian environmental assessment guidelines can be changed by the

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1Over the last couple of years, Virginia W. Maclaren and Joseph B. Whitney published several books related to EIA in Canada and elsewhere; the Institut for Environmental Studies of the University of Toronto released also several articles in its series the "Environmental Monograph". For detailed discussion of this area and problematic consult these publications.
will of Cabinet, and because exemptions can be given to nuclear plants as they have been in the past,\(^1\) the future application and effectiveness of the Canadian environmental assessment act are in question.

**The second oil crisis and the energy policies of the eighties**

With the second oil crisis in 1979, caused by the Iranian revolution and the Iraq-Iran war, a second wave of oil shortages and scarcity began. Previously enacted programmes and policies were considered appropriate by the West-German federal government and were continued, especially since the proportion of oil among total energy supply sources had fallen for the first time since 1968, below 50\%.\(^2\) In addition, the strengthening of nuclear energy was again considered as an indispensable necessity.\(^3\) The nuclear industry had developed further during the years between the two oil crisis. With the second oil shortages, criticisms of nuclear plants increased in number and in intensity. The

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\(^1\)The nuclear plants at Bruce and Darlington were built without being assessed, even though the Ontario environmental impact assessment was already in place.


\(^3\)Ibid.
Three Mile Island accident in Harrisburg, Pennsylvania awakened many people and led them to question the security of nuclear plants. As a result of citizens' protest and legal challenge three planned nuclear plants in West-Germany were cancelled. The project in Wyhl never got beyond the its planning status, the plants in Brockdorf and in Muehlheim were prohibited from production by the Laender governments and by edict of the federal constitutional court respectively.\(^1\) As one result of these events, the federal government reconsidered the status of nuclear energy. For the next five years, no investigation concerning the planning and construction of a nuclear plant was undertaken.\(^2\)

The West-German government continued its energy programme focusing on the policy "away from oil". The programme's objective was to achieve energy savings by enforcing the mining of domestic hard coal and making significant changes in respect to the discovery and development of alternative energy sources. The absolute

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priority given to nuclear energy changed significantly. In an amendment of the 1973 energy programme, the development of non-nuclear alternative energy sources is mentioned the first time expressly. According to this amendment, intensified attention will be given to energy produced by solar and thermal energy. Nevertheless, the positions of government members and officials were, and are, diverse in regard to the present status and future of nuclear energy. No coherent picture of the future of nuclear energy is given.

In 1980, the Canadian federal government responded to the second oil crisis with the enactment of the National Energy Program (NEP). Since 1973, the price for oil quadrupled. The impact upon Canadian consumers was significant, and the interests between oil producing and exporting provinces and oil importing ones turned out to be controversial once again.

The objectives of the programme were self-sufficiency in oil by 1990\(^1\), increase of the amount and proportion of Canadian ownership in the oil and petroleum business, and fairness to consumers by restraining the price increases and

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\(^1\)MacDoughall questions the whole self-reliance agenda by reminding that Canada never achieved self-sufficiency, and may never do so, taking into consideration the geographical location of its resources. John N. McDougall *Fuels and the National Policy* (Toronto: Butterworths 1982)
redistributing the burdens and benefits among all Canadians.\(^1\) Energy producing provinces and the oil industry were strongly against the NEP.

Once again, the debate surrounding Canada’s option of energy self-sufficiency arose and the national government justified to some degree its energy programme with this argument. In order to achieve self-reliance and energy savings on the demand side, one of the main governmental targets was to reduce consumption in the residential and transportation sector. Significant savings could be made in these sectors, since they demanded the largest amount of energy.\(^2\)

On the supply side, a grant based petroleum exploitation programme was created. It was hoped by the initiators of the programme, that major discoveries in the Arctic and off shore would be made and would have significant impact on the

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\(^1\)To establish the basis for Canadians to seize control of their own energy future through security of supply and ultimate independence from the world market; "To offer to Canadians, all Canadians, the real opportunity to participate in the energy industry in general and the petroleum industry in particular", and "To share in the benefits of industry expansion; to establish a petroleum pricing and revenue-sharing regime that recognizes the requirements of fairness to all Canadians no matter where they live", in G. Bruce Doern How Ottawa Spends 1983 (Toronto: Lorimer 1983), chapter 1

demand-supply equation.¹ Doern and Toner comment that the NEP was "a bargaining ploy designed to force a solution to the pricing and revenue sharing dilemmas created by the huge increases in the international price" and further, that the NEP can be "viewed as part of an inter-related effort by the recentralizing Liberals to reaffirm the central government's economic management powers and political visibility".²

The world recession in 1982 raised the debate about nuclear energy as a substitute for oil once again in the Federal Republic of Germany. The advantages of nuclear energy were again urged: nuclear energy is efficient, environmentally friendly, and is the most important alternative for oil that is economically feasible. Nevertheless, steady and increasing changes in West-German energy policies can be observed. More and more environmental concerns were taken into consideration by the identification of appropriate alternative energy sources. Politicians began to withhold their support for nuclear energy. At the same time, renewable energy sources gained attention and were process.

¹However, the exploitation of the resources in the Arctic and offshore are extremely capital intensive. Special equipment is required in order to drill and transport these resources. The environmental impacts however are not known yet. The impact upon the natives, the wildlife and the ecosystem are still incomputable.

² Doern and Toner Op.cit, p. 458
In the past couple of years a tendency towards more environmental awareness and policies considering environmental impacts can be observed in the West-German energy policies and policies in general. The image of the Ministry of Economy changed from the "unrestricted advocate for West-German industry" to a ministry which starts recognizing that without a healthy environment no prosperous and healthy industry and state can exist. In 1990, the Ministry of Economy proposed measures to increase energy sources and energy production that could be supported by the government such as incentives for private enterprises seeking to strengthen the alternative energy sector.¹

Increasingly, environmental aspects and concerns influenced to a significant degree West-German energy policies. In the mid eighties, the federal parliament enacted a proposal of the Ministry of Environment for tight emission standards for coal burning plants.² The question arose whether it was still justifiable to burn coal since the


A profound negative environmental impacts caused by the process of burning coal are now known. Even so, the coal industry and even mining labour organizations demanded a continued reliance on the use of this source. Economic and social aspects were brought into the discussion of the future of coal burning plants. Since coal is a major industry with many employees, the West-German national government still tends to argue in favour of coal by warning of the social impacts which may occur by closing the mines, when thousands of people will become unemployed. In addition, on the recommendation of the Ministry of the Environment, the requirement of a catalytic converter as standard equipment for each new car was enacted in 1986.\(^1\) In the last couple of years, several renewable resource pilot projects were initiated by the federal West-German government. In northern Germany, the national government runs a windmill programme and energy research institutes construct and run with financial support houses self-reliant on solar energy.

After the Chernobyl accident in 1986, the attitude towards nuclear energy changed again. However, these changes, while after recognizing the jeopardy for the ecosystem caused by nuclear power plants, were less than one would have expected.\(^2\) The government of the day still

\(^{1}\) Older cars have to be readjusted with catalytic converters

\(^{2}\) The discussion of West-German energy policies was on the hand determined by the accident of the soviet nuclear reactor, on the
maintains the position that nuclear energy is one option to substitute for oil and claims officially that it is environmentally friendly. The opposition parties, however, have demanded the “phase-out” of nuclear energy for several years. In 1988, the Social Democratic Party—as the first of the three traditional parties in West-Germany to do so—adopted this concept which the Gruenen and citizen initiatives (Buergerinitiativen) have demanded for many years.\(^1\) The present government parties, the Christian Democrats and the Free Democrats, maintain their support for nuclear energy. However, it is getting more and more difficult for them to implement nuclear power policies. Environmental and safety concerns gain increasing attention because of the environmental awareness of society. Evidence of this is given by the decision of the federal constitutional court concerning a proposal to build a nuclear waste disposal and recycling plant in Bavaria: the court rejected the government’s plan to build a nuclear plant. With this decision, nuclear energy opponents began to foresee the end of nuclear plants and of the pro-nuclear energy policy.

\(^1\)Helmut Schmidt “Sieben Prinzipien vernueftiger Energiepolitik” Die Zeit, February 19, 1988
At present, of renewable energy sources hydro makes the greatest contribution to West-German primary energy production. The current federal government regards renewable energy sources as not yet economically feasible and the need for further refinement in their technique is required if they are to achieve the status of an appropriate alternative to contemporary energy supply sources—oil, coal, natural gas and nuclear.¹

Since 1984, when the Progressive Conservatives under Prime Minister Mulroney succeeded the Liberal government. The new federal government, Canada's energy policy has changed significantly, set up new policies by introducing and enacting various bills concerned with the pricing, taxation and management of energy policy and energy sources. The emphasis has been on decentralized and deregulated energy prices, and profit based, investment-oriented taxation of the industry. As well, the policy focuses on "investment oriented planning environment", with "a nondiscrimination non-intergovernmental fiscal and regulatory management regime".² Under the Trudeau government all these sectors were strongly regulated under the National Energy Program. The NEP of 1980 had extensively regulated domestic energy


²Canada: Statistics Canada Yearbook 1988
policies through the established Canadian Oil and Gas Land Administration (COGLA) and the Office of Industrial and Regional Planning.¹

The Mulroney government implemented some of the following legislation in an attempt to de-regulate at least some parts of the energy industry: the Economic and Fiscal Statement of November 1984; the Atlantic Accord of February 1985; the 1985 financial budget; the Agreement on Natural Gas Markets and Prices of October 1985; Canada’s Frontiers of October 1985; and the Nova Scotia Accord of August 1986.

Present energy policies

Presently, West-Germany’s energy policy is oriented towards the European Economic Community (EEC). In addition, common emission standards, as well as the use of different energy resources and in particular the status of renewable sources have to be negotiated. The use of nuclear energy and

its waste treatment are also important subject for this negotiation. Furthermore, the West-German national government has to cope with the supply and distribution of energy in the new Bundeslaender from the former German Democratic Republic. Major investments, repairs, restorations and new electric supply facilities and other energy related utilities have to be built within the immediate future. But here, the national government has the option of using renewable energy resources in those areas where old energy supply systems are to be destroyed and new ones are to be built. In the east part of the new Germany, the national government can build upon achievements already in place on the old Federal Republic in designing new policies.

In Canada, the recently released Green Plan gives some information about future energy policy. The federal government states that the Green Plan

"is the most important, most comprehensive, and most eagerly awaited environmental action plan ever released in Canada, ..., a plan that is ... generous in its funding, clear in its accountability and unique in its provisions for public involvement".1

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1Canada: House of Commons Debates December 11, 1990, no.16239
The main objective of the Green Plan is to strive for a healthier environment and a sound and prosperous economy within the next decade.\footnote{The Hon. Robert R. de Cotret, former Minister of the Environment, at the press conference on December 11, 1990} Sustainable development in the environment and in the economy requires the involvement and cooperation of all sectors of society. A change of thinking and a specific share in the responsibility for the environment on the part of all, Canadian including business and governments, is essential. Individuals have to learn how to deal with household waste, how to shop and how to travel in a more environmentally sound manner. For business, changes involve how to use energy and water more efficiently as well as taking greater responsibility in the use of paper and chemicals.

The Green Plan suggests a more efficient use of energy. Through better house insulation, retrofitting of older buildings, improvement of energy use in transportation, development of alternative transportation fuels, tighter emission standards, alternative forms of energy production, inquiries in regard to the environmental impacts of electricity generation, the socio-economic impact of climate changes, and tree planting the government believes that the threat of global warming can be reduced.
Conclusion

As demonstrated above, the energy policies of the Federal Republic of Germany and Canada since the OPEC oil crisis in 1973 were mainly determined by the fear of oil scarcity for the following years and decades. In addition, this fear was reinforced by the second oil crisis in 1979/80. In order to prevent their countries from current and eventually increasing dependence on oil, the policies “away from oil” and “off oil” were implemented by the two national governments of the day. The West-German government demanded reductions in energy consumption through various legislation, such as the Sonntagsfahrverbot, higher taxes on fossil fuel and refined products, tighter standards for space-heating systems and charging energy use based on the actual used unit instead of charging a flat charge.¹ The federal government evaluated coal and nuclear energy as the most effective and appropriate substitutes for oil. Other energy resources, and in particular renewable ones, were generally dismissed by both national governments on the basis of economic considerations. Still today, solar, photovoltaic, wind, and biomass play a minor role in the overall share of the primary energy production. In the Federal Republic, hydro electricity achieved to some extent importance in the share

¹Energieeinsparungsgesetz (Energy Saving Bill) from July 22, 1976 an its amendment from June 20, 1980
of the primary energy production sources.\textsuperscript{1} In Canada however, hydro electricity, as a consequence of Canada's physical geography, is an important energy source.\textsuperscript{2} In both countries, no other renewable energy resource is as far developed and utilized as hydro.

The Canadian federal government intervened in an area of provincial responsibly by forcing oil prices below the world rate, controlling exports, and expanding the oil pipeline towards the east in order to provide east and central Canada with domestic oil. Further measures were the establishment of the national oil company Petro-Canada, and the increasing concern for self-reliance, the demand to decrease Canada's dependence upon oil by substituting for it natural gas, nuclear energy and hydro electricity. In addition, further exploitations of the Arctic oil and offshore were discussed, planned and implemented.

With the 1979/1980 oil crisis, again both national governments wanted to reduce the impact of the crisis upon their countries. The West-German government considered its energy policy objectives of 1973 confirmed. Energy conservation, an increasing proportion of domestic coal in the energy supply mix, as well as further construction of

\textsuperscript{1}see Figure 1, p. 71, below.

\textsuperscript{2}see Figure 2, p. 74, below.
nuclear power plants appeared to be the best means for the West-German government to ensure society's energy demand.

In Canada, the Trudeau government enacted the National Energy Program. The NEP was energy supply and energy safety oriented, and, as the West-German energy policy, was not primarily concerned with environmental problems resulting from energy production and consumption. The reduction of possible negative environmental impacts resulting from the use of nonrenewable energy resources was considered as positive side effects. The Canadian national government intended to restructure the power between itself, the provinces and the oil industries; this is characterized by Doern and Toner as a radical initiative of the Trudeau government.\textsuperscript{1}

The 1986 nuclear power plant accident in Chernobyl, USSR, had some impact on the West-German energy policy. The West-German national government emphasized the importance of renewable resources for the future. The research and development of renewable energy resources was enforced by the national government. At the same time, public pressure and judicial objections interdicted further construction of a few already planned or constructed nuclear plants. In the

\textsuperscript{1}Doern and Toner \textit{Op.cit.}, p. 2
meantime, opposition parties as well as parts of the government of-the-day discussed the option of a nuclear phase out.

In West-Germany, the demand to "phase-out" nuclear energy has increased within the last decade. The emergence of the Gruenen can be partly explained by a growing awareness among the West-German citizens of the danger nuclear energy holds. Conservatives and socialists, young and old, white and blue collar workers, housewives and students, scientists, journalists, physicists and philosopher, physicians and lawyers join the movement and help to oppose the federal view that--nuclear energy is the best substitute for oil.¹ The political agenda in the Federal Republic reflects this process of changing attitudes to some degree. In the past decades, nuclear energy was the undoubted alternative. However, today's energy programme contains the option of the "phase-out".² At the same time, a new emphasis on the

¹Sonja Boehme-Christiansen states in "Energy policy and the public opinion: Manipulation of environmental threats by vested interest in the U.K. and West-Germany" in Energy Policy (U.K.) No. 9 November 1990, 828-837, that in comparison to other nations, West-Germans are one the best informed in respect to the impacts and possible dangers of nuclear energy.

development of renewable energy sources and technologies is given by the federal government.¹

As in the Federal Republic of Germany, the Canadian government evaluated nuclear energy as one of the main alternatives to oil. Furthermore, Canadian nuclear energy will be of even more significance in the future: its contribution to the total energy supply shall achieve greater extent than hydro electricity. Since Canada has access and reserves for fossil fuels and uranium, the tendency to utilize these resources more than renewable ones can be observed. With the Green Plan, however, energy conservation and further utilizing of renewable energy sources is given more attention than ever before. But as in West-Germany, nuclear energy is still evaluated as indispensable in order to meet, satisfy, and ensure future energy demand.

¹Federal Republic of Germany: Bundesministerium fur Forschung und Technik Jahresbericht der Bundesregierung 1988 and 1990 (Annual Report of the Federal Government, Report of the Ministry of Research and Development); H.- F. Wagner, deputy secretary of the West-German R&D programme in the Federal Ministry of Research and Technology, stresses the fact that the development of renewable energy sources are of prior concern for West-Germans energy production. Further, the author states, technologies related to conservation are yet undeveloped and their implications are now a matter for the politicians. At the same time however, Wagner expresses the government’s opinion that nuclear energy is and still will be in the future one of the major energy resources for the West-German energy production, H.- F. Wagner “The third energy R&D program of West-Germany” in Energy Policy (U.K.) Vol. 19, No. 4, May 1991, 392-399
Canada never experienced huge citizen protests against any policy related to energy as West-German society did. In addition, as a distinct feature of the Canadian parliamentary system interest groups attempt to influence governmental policies at all levels. Furthermore, no Canadian political party characterizes itself as the explicit parliamentary representative of environmental concerns and protest, as is the case in the Federal Republic of Germany with the Gruenen. Most of the environmental interest groups, however, align themselves with the New Democratic Party (NDP) rather than with either of the two other established parties on the national level, the Progressive Conservatives (PC) and the Liberals.

In the past few decades, the national governments of the Federal Republic of Germany and Canada have promoted significant changes in their energy policies. However, these changes in the official agenda were not the result of environmental concerns but were to a great extent the result of policies seeking independence, energy self-reliance and economic security. In the West-German case the aim of energy independence has been sought by diversifying its energy supply sources and reducing the dependence on oil. The
debate over energy independence has taken place for decades in Canadian political discussion as well.\textsuperscript{1}

But today's West-German energy policy is to a great extent concerned with the upcoming European Economic Community in 1992. Since the two German states have been reunified, the West-German government faces tremendous tasks, difficulties and problems; and new objectives not only related to energy policies arise daily. Energy savings or conservation are prior objectives for the new German government. These objectives will be met by enacting and implementing new legislation, conditions and tighter standard settings.\textsuperscript{2}

In regard to the issue raised by this thesis, whether economic and/or environmental concerns have been responsible for changes in both domestic energy policies it can be concluded that environmental concerns have influenced the West-German political agenda in respect to its energy policies increasingly since the beginning of present decade. Signals of this are tighter emission standards for coal burning plants, compulsory catalytic converters for new

\textsuperscript{1}John N. McDougall Fuels and the National Policy (Toronto: Butterworths 1982)

\textsuperscript{2}Federal Republic of Germany Das Parlament "Koaltionsvereinbarung II" (The Parliament Coalition Agreement Part II) February 8./15., 1991
cars\textsuperscript{1}, the edicts to construct some nuclear power plants by
the federal constitutional court, and finally, the court's
decision to disallow the construction of a nuclear waste
disposal and recycling plant in Wackersdorf, Bavaria. All
these events give evidence of a changing attitude within
West-German legislative and executive institutions.

Hydro electricity, as one of the renewable energy
sources was and is gradually gaining significance in the
overall energy production; other renewable sources such as
solar, wind, and biomass remain of minor concern. As in the
Federal Republic of Germany, the main attention is given to
nuclear energy; its development and the further refinement
and safety of this technology are of prior concern. But
overall, environmental concerns have gained significance in
relation to Canadian national energy policies. For more than
a decade, reduced speed limits and catalytic converters and
unleaded gas have indicated changes in Canadian energy
policies. In addition, the delay of the Mackenzie valley
pipeline after the report of Justice Th. Berger reveals that
environmental concerns, in terms of societal and wildlife and
ecosystem impacts, can prevent a major project under some
circumstances.

\textsuperscript{1}For further information on West-German federal energy policies
and the successful implementation of environmental aspects without
losing the market orient approach of the national government see
Eike Rohling and Jochen Mohnfeld "Energy policy and the energy?:
The West-German government demanded just in the last decade catalytic converters as a compulsory equipment for automobiles. Consequently, unleaded gas is increasingly available. Speed limits are still not applied in West-Germany. The automobile lobby opposed—and opposes with the slogan “free Autobahn for free German citizens”—any governmental attempt to implement speed limits.

According to Mitchell and Sewell, energy saving and renewable energy supply programmes were in the past too narrowly introduced; few incentives were given by the national and provincial governments to energy consumers and producers to adopt the necessary changes in habit. 1 Although environmental interest groups have been active in the decade between 1970 and 1980, the political process has not been galvanized through their activities, and Environment Canada has not yet been able to get a generous budget from the Finance and Treasury Board. 2 The main concern regarding


2Douglas Smith discusses the effectiveness of environmental protection by Environment Canada with the indicator of national government's financial plan for its environment ministry. Smith argues that Environment Canada has to evaluate its projects through cost-benefit-analysis in order to achieve any support of the Department of Finance. But cost-benefit-analysis are not applicable for environmental projects, because societal impacts and those on the ecosystem cannot be determined with monetary values. Douglas A. Smith “Defining the Agenda for Environmental Protection” in Katherine A. Graham (ed.) How Ottawa Spends 1990-91: Tracking the Second Agenda (Ottawa: Carleton University Press 1990) 113-136
renewable resources is seen to be in the maintenance and enhancement of natural resources. In the latest global statement of the government related to the environment expressed in the Green Plan, renewable resources are defined as forests and fisheries. Canada's nonrenewable energy resources (oil, water, coal, uranium) are excluded from this category. The section on global warming is concerned about these nonrenewable resources, but only with respect to how energy efficiency can be achieved, not how the exploitation of these resources can be reduced, nor which alternatives are available and promising for a sustainable future.
Chapter III

Comparative Energy Production and Consumption

The Federal Republic of Germany and Canada are both dependent upon imports of natural resources in order to meet domestic energy demands. But West-German society is to a larger extent dependent on fossil fuels. This dependence on fossil fuels, and especially on oil, can be explained by two factors. First, since the end of World War II, West-German industry has been oil oriented. Up to the time of the beginning of World War II coal was the main domestic energy source. Secondly, over 90 per cent of the oil used in West-Germany is imported, mostly from Arabic countries. Thus, events in the world energy market, or world oil market have significant impacts on West-Germany's energy supply and demand.

In comparison to the Federal Republic of Germany, Canada has large resources of fossil fuels and uranium, and exports a fair amount of its resources. However, much of crude oil and natural gas reserves are located in geographical areas that make them difficult or costly to exploit. Further development, mining, drilling, and extraction of fossils fuels requires on the one hand better knowledge of possible impacts on the environment, particularly in northern Canada, and on the other hand more sophisticated technological equipment.

Based on statistical data, energy production and consumption in the Federal Republic of Germany and Canada are analyzed for the time period of this study. Of particular interest on the supply side is the mix of energy resources, particularly the distribution among fossil fuels and renewable resources. On the demand side, the share of non-renewable energy resources and renewable ones are compared, as well as the distribution of energy demand by sector. In addition, the development of gross national product and net energy consumption will be analyzed for each country. By doing so, it will be demonstrated that domestic economic conditions have a larger impact on energy production and consumption than environmental concerns; and that a prosperous economy does not necessarily require high energy consumption.
The major point of this chapter is to reveal West-German and Canadian energy production and consumption related to: the oil crises in 1973 and 1979/1980, the world recessions in 1975 and 1982, the Three Mile Island nuclear accident in Pennsylvania, USA, and the 1986 nuclear plant accident in Chernobyl, USSR. The impact of these events on the domestic energy policies of both countries will also be analyzed.

**Energy Production and Consumption**

Several developments are reflected in Figure 1, Energy Supply by Type in FRG. After the OPEC oil embargo in 1973 and the second oil crisis from 1979/80, coal retained the same levels in West-Germany's primary energy supply (1973:4115 PJ; 1980:4067 PJ),\(^1\) but since the 1986, coal consumption has declined (1986:3724 PJ; and 1986:3476 PJ). Although the share of coal in the energy supply mix is declining significantly, its share among the mix of energy supply resources is higher than that of oil. In 1986, coal supply

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\(^1\)All data for the Federal Republic of Germany were provided by the Bundesministerium fuer Wirtschaft (Ministry of Economy); one peta joule (PJ) equals \(10^{15}\) joule
Figure 1
Energy Supply by Type in FRG
1973-1987, in PJ

was at 3724 PJ, while oil was at 3008 PJ. At the same time, the proportion of oil is continually decreasing. In 1973, the use of oil amounted to 4944 peta joule (PJ); fifteen years later the oil consumption was 3212 PJ. Simultaneously with the decrease of oil in the energy supply mix, the share of natural gas increased, and reached its peak in 1987. In 1973, the amount of natural gas used was at 1139 PJ, and increased up to 1996 PJ in 1987.

Since 1973, hydro electric consumption remained at almost the same rate in the energy supply mix. The supply share of hydro electricity differs over the years 1973 to 1988 among 0.5 PJ. In regard to the hydro electric supply resources, particularly since 1980, the proportion of nuclear energy has steadily increased. During the period of study, the energy produced from nuclear increased more than eleven times. While in 1973, 116 PJ was produced by nuclear plants, in 1988, 1371 PJ were produced.

Other renewable energy sources are of minor significance in terms of their share on the primary energy supply, they are not even listed in federal energy statistics.
As Figure 2 indicates, Canadian energy supply is composed of various renewable and nonrenewable energy sources.¹ These resources are, according their overall amount of production: oil, natural gas, coal², hydro, thermal and nuclear.

Immediately after 1973, Canadian oil production increased dramatically. The energy production from oil achieved its climax in 1977 (5200 PJ), decreased until 1984 (3451 PJ) and is again increasing slightly (3690 PJ). Within the years of this study, the supply of coal increased by a large amount. In 1973 coal supply was at 625 PJ and it increased more than 270 per cent to 2695 PJ in 1987. By in 1982, the coal supply was almost twice as much as in 1973 (1973:625 PJ; 1982:1185 PJ). In the following two years, an increase of around 400 PJ up to 1590 PJ can be observed. Since 1984, the supply of coal varied by about 100 PJ. Without question, coal is Canada’s third major energy supply source (1973:625 PJ; 1987:1695 PJ). For the years between 1970 and 1985, the energy production related to natural gas almost stagnates (1970:2618 PJ, 1985:2688 PJ). However, after 1985 a ten per cent increase can be observed (1985:2688 PJ; 1987:2964 PJ).

¹All data for Canada were gathered from several publications of Statistics Canada. For conversion of Canadian figures see appendix.

²The figures of coal include also the amount used for electricity produced through coal-burning.
Figure 2
Energy Supply by Type, in Canada in PJ, 1973-1987

With regard to electricity supply resources, nuclear energy supply increased by about five fold (1973: 51 PJ; 1987: 262 PJ). Between 1982 and 1983, it increased about 40 per cent (1982: 119 PJ; 1983: 166 PJ). Although, the rate of nuclear energy (1973: 51 PJ; 1987: 262 PJ) has increased steadily, it has not yet reached the amount of thermal (1987: 348 PJ). Thermal energy achieved its first peak in 1984 at 333 PJ, declined to some extent until 1986 at 292 PJ, and increased again in 1987 to 348 PJ. In Canada, hydro electricity occupies the fourth position in the energy supply mix. Between 1973 and 1987, the energy supplied by hydro almost doubled (1973: 587 PJ, 1987: 1130 PJ). In comparison to other electricity supply resources, the share of hydro increases continually and regularly.

Figure 3 shows significant decrease of oil demand in West-Germany after 1973. While in 1973 oil demand was at 6122 PJ, it decreased roughly to 78 per cent in 1987 at 4785 PJ. From the 1973 oil crisis until the end of the world recession in 1975, oil demand decreased to 5305 PJ. In the following five years, however, it increased to 5443 PJ. With the second oil crisis in 1980 and the 1982 world recession, energy consumption of oil dropped to 4682 PJ. The decline of oil consumption lasted until 1984, and has since been steadily increasing.
Figure 3
Energy Demand by Type, in FRG in PJ, 1973-1987

Source: see Figure 1
Similar observations can be made for coal demand. After the first oil crisis in 1973 and the 1975 world recession, coal consumption declined from 3436 PJ to 2959 PJ in 1975. Between 1975 and 1980, a slight increase in the coal consumption of about 450 PJ occurred. In 1982 and 1983, coal consumption declined slightly to 3399 PJ and to 3448 PJ in 1984. Ever since, the demand for coal has continued to decline. In 1987, the demand was only 150 PJ higher than in 1975 at 2959 PJ.

Between 1973 and 1987, the demand for natural gas increased about 70 per cent (1973:1130 PJ; 1987:1912 PJ). In contrast to oil and coal energy demand, the demand for natural gas increased slightly after the 1973 OPEC oil embargo, from 1130 PJ to 1143 PJ. Within the last half decade of the 1970s, a 65 per cent increase in natural gas demand has occurred. In 1980, a climax was reached at 1887 PJ. Until the end of the world recession in 1982, the demand was at 1616 PJ was almost 13 per less than it had been in 1980. Ever since, the demand for natural gas has steadily increased and reached its recent climax in 1987 at 1912 PJ.

With regard to electricity demand, the West-German government releases data subdivided in two categories: hydro electricity, and nuclear energy. Notably, hydro electricity demand declined steadily over the period of study. In 1987, the demand for hydro electricity amounted to approximately 10
per cent of the demand in 1973 (1973:239 PJ; 1987:210 PJ). It appears that none of the external factors had significant impact on hydro electric demand. In contrast to the decline of hydro electric demand, the demand for nuclear energy increased permanently over the period (1973:116 PJ, 1985:1206 PJ). Only once, in 1986--the year of the Chernobyl accident--nuclear energy demand drop slightly to 1134 PJ. After 1986, an increase in nuclear energy demand can be noted.

As Figure 4 indicates, Canada experienced large increases in oil demand immediately after the OPEC oil crisis. The energy demand for oil reached its peak in 1975 (1973:3844 PJ; 1987:3127 PJ). Ever since, a permanent decline can be observed.¹ Between the years 1977 and 1980 demand decreased slightly (1977:3587 PJ; 1980:3447 PJ). However, in the of 1982 a larger decrease can be observed. Since then oil demand has increased until 1987 oil demand when it leveled off at around 3130 PJ.

¹At the time of writing, only electricity demand data were available from Statistics Canada for the period after 1982. Statistics Canada does not, however, provide any breakdown of electricity.
Figure 4
Energy Demand by Type, in Canada in PJ, 1973-1987

Source: see Figure 2
Significant changes can be observed in the energy demand for coal. In 1973, the demand was at 763 PJ, in 1987 the demand is up to 1816 PJ. After the first oil crisis in 1973 coal demand decreased from 763 PJ down to 706 PJ in 1975. However, after the 1973 oil embargo and after the augmentation of the world economy in 1975, increases in the coal demand occurred. Apparently the 1982 world recession did not have a significant impact in reducing coal demand. Moreover, increases in the demand after the recession can be detected. Currently in Canada, coal is the third major energy demand resource after oil and natural gas.

During the period of this study, the demand for natural gas increased around 30 per cent (1973:1468 PJ; 1987:1902 PJ). After the 1973 oil embargo until 1975, the demand decreased slightly to 1420 PJ. Ever since, demand has increasing steadily. After the 1982 world recession, the demand for natural gas increased, and reached its climax in 1984 at 1937 PJ. Recently, the demand has slowly decreased again.

In contrast to the West-German data, no breakdowns by electricity source are made by Statistics Canada. It appears that the demand for electricity is regularly increasing. But no effects from the oil crises, world recessions, or the two nuclear power plant accidents can be observed. During the
period of study, however, electricity demand increased by roughly 58 per cent (1973: 897 PJ; 1987: 14 PJ).

In the Federal Republic as well as in Canada, the energy produced is used for residences, followed by industry and transportation. Figure 5 shows that, in 1987, in West-Germany 46 per cent of the total energy was consumed by the residential sector.\textsuperscript{1} In comparison to 1973, the 1987 residential energy demand increased around 2 per cent (1973: 11092 PJ total energy demand; 1987: 11373 PJ total energy demand). No correlation to the oil crises, world recessions and nuclear plant accidents is evident.

An overall increase in the transportation sector proportion of consumption can be observed.\textsuperscript{2} In 1973, the West-German transport sector amounted to 18 per cent of the total energy demand, in 1987, the share rose to 24.8 per cent. However, the demand increases and decreases in waves. After the transportation sector reach its first height in 1983 with 23.9 per cent of the total, it declined until 1985.

\textsuperscript{1}Energy demand in the residential sector includes various needs for energy use in households such as lighting and space heating of buildings: public and private ones.

\textsuperscript{2}Energy demand in transportation sector includes energy used for travelling by car, plane and train.
FIGURE 5
DOMESTIC NET ENERGY CONSUMPTION
BY SECTOR, IN THE FRG
IN PER CENT, 1980-1988

Source: see Figure 1
Since 1985, the demand of the transportation sector has increased. Again, it seems that none of the chosen factors has had any significant impact on this particular sector. However, it does appear that the demand from the transportation sector has increased, at roughly the same degree as the demand of the industrial sector has decreased.

As Figure 6 indicates, the residential sector in Canada has the major share of consumed energy\(^1\). Within the years 1978 and 1987, the residential share increased by about three percentage points (1978: 33 per cent; 1987: 36.1 per cent). In 1978, the total net energy consumption was at 6826 PJ, in 1987 at 7383 PJ. The figure shows variation in the energy demand of the residential sector. After the second oil crisis in 1979/1980, the demand by the residential sector increased until 1982. In the following three years a drop of almost 5 per centage points occurred (1982: 36.6 per cent of total; 1986: 31.9 per cent of total). In 1987, however, the share reached 36.1 per cent of the total the same amount as 1982. No other correlation to the chosen external events can be observed.

\(^1\)Data valid before 1978 were not available in regard to total energy consumption and distribution by sector.
FIGURE 6
ENERGY DEMAND IN CANADA
DISTRIBUTION BY SECTOR
IN PER CENT. 1976-1989

Source: see Figure 2
Furthermore, Figure 6 reveals a steady decline of energy consumption in the transportation sector, plus a decline of almost one percentage point in the industrial sector (1978: 28.1 per cent; 1987: 27.2 per cent). In 1980 it reached its climax with 27.1 per cent of the total energy consumption and then declined until 1986. In 1985, the share of industry was about 0.1 percentage point below its share in the previous and following years. In 1987, the consumption climbed close to the previous year with a difference of 0.7 per cent points. No other possible correlations to any of the external factors can be drawn.

Non-energy use\(^1\) increased steadily up three per cent points during 1978 and 1987 (1978: 6.9 per cent; 1987: 8.9 per cent). The own-use\(^2\) was in 1987 almost twice as high as in 1978. It appears, that between 1983 and 1985 own-use jumped from 5.1 per cent to 10.1 per cent. After that, the own-use is increases slightly. No significant relation to any of the external factors can be observed.

With regard to energy consumption and gross national product it appears that both economies were able to achieve an increasing gross national product with significantly less

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\(^1\)Non-energy use refers to produced goods which require primary energy resources, e.g. petrochemical production

\(^2\)Own-use, or so called producer consumption, refers to energy consumed by producing energy
energy consumption. Figure 7 shows that Net Energy Consumption (NEC) in West-Germany reached its peak in 1979 and declined significantly until 1982 (1979:104 index points; 1982:92 index points).\footnote{The time period 1978-1988 for indices were chosen in order to provide a comparable data to Canadian GNP and NEC. Canadian NEC data were not available for the years before 1978.} Ever since, NEC has been steadily increasing. Even the 1982 world recession had no apparent impact on the West-German NEC. Nevertheless, by the end of the 1980s NEC was up to 99 index points, almost the level of 1978. Since the peak in 1979, less energy was used to produce the same level or more goods and services. The GNP remained the same in 1978 and 1979, and until the 1982 world recession, the index increased up to 105 points, and fell one point in 1982. The GNP is, however, increasing and in 1987 was 16 per cent above the 1978 level.

Figure 8 shows, that Net Energy Consumption (NEC) in Canada increased by four index points between 1978 and 1980. After 1981 significant decreases can be observed. In 1981 the NEC index was at 100 points, in 1982 at 95 points and in 1983 at 93 points. But after these years of steadily declining energy consumption, the Canadian energy consumption increased and peaked in 1987 at 114 index points. After 1979 the NEC index was significantly below
Figure 7
INDECES OF
Gross National Product (GNP) and
Net Energy Consumption (NEC),
FRG, 1978-1988

the GNP index. The Canadian GNP was to some degree affected.

The 1979 and 1986 nuclear plant accidents had no significant impact on the energy supply produced by nuclear power. Instead of reduction in the energy supply through nuclear energy it experienced a major boom. In 1973 the share of nuclear in the primary energy production was at 116 PJ, in 1987 the share increased to 1234 PJ, an increase of more than 1100 per cent. by the world recession in 1982. The loss of GNP in 1982 amounted to four index points to the previous and following year of the world recession. Since then, the GNP has grown.

In conclusion, the Federal Republic of Germany achieved significant changes in the energy supply mix which can be related to several world events. The 1973 oil embargo initiated major shifts in the energy policy agenda, the 1975 and 1982 world recession intensified the implementation of these changes, and the 1978/1980 oil crisis contributed to major alterations in the attitude towards energy production and consumption. For instance, large decreases in the oil production took place. In 1987, the West-German energy production of oil amounted to 2881 PJ, approximately 58 percent of the amount of energy produced in 1973. In addition, the energy production through coal decreased by about 16 percent between 1973 at 4115 PJ, down to 3476 PJ in 1987.
Figure 8

Indices of Gross National Product (GNP) and Net Energy Consumption (NEC), Canada, 1978-1988

In contrast energy produced by natural gas increased by about 75 per cent between 1973 (1139 PJ) and 1987 (1996 PJ). The share of hydro in the primary energy production increased, but only by 26 per cent between 1973 (138 PJ) and 1987 (174 PJ).

With the declining share of oil in energy production, one of the objectives of the national energy programme was achieved. Rohlich and Mohnfeld emphasize that this process was achieved within the boundaries of the market oriented approach of the West-German system.\(^1\) In other words, the federal government let the market regulate itself, with little intervention from the government.

The increasing role of nuclear power in the total energy supply may be explained by the fact that nuclear plants finally went onto the electric supply grid after years of planning and construction. The future will show what impact the rejection of the nuclear waste disposal and recycling plant in Bavaria had on West-Germany's nuclear energy policy. At the same time, the West-German federal government eliminated some regulations about ensured nuclear waste

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\(^1\)Eike Rohling and Jochen Mohnfeld "Energy policy and the energy economy in the FR Germany: An overview" *Energy Policy* (UK) December 1985, 535-545
disposal options.¹ Thus, the expectations of opponents of nuclear energy, about West-Germany's phasing out nuclear power in the near future, may not be met.

In Canada, energy supplied by oil increased by about 83 per cent, from 2006 PJ in 1973 to 3690 PJ in 1987. During the period of this study, an increase in the energy supply of coal can also be observed. In 1973 the amount was 625 PJ, but by 1987 the energy produced by coal was 1695 PJ. Natural gas measured as well. In 1973, natural gas contributed 2618 PJ to the total primary energy production, in 1987 the amount increased to 2964 PJ. Hydro electricity's share almost doubled within the study period (1973: 587 PJ; 1987: 1130 PJ). Nuclear energy increased over the years of research more than five times. In 1973, nuclear produced 51 PJ and contributed 262 PJ to the energy supply in 1987. One of Canada's national energy targets, to increase the share of nuclear energy to meet thermal's share in the energy supply mix will soon be achieved. Nevertheless, thermal energy production increased to significant degree. In 1973, 20 PJ energy were supplied through thermal, compared to 348 PJ in 1987.

On the demand side, it is of interest to recall the energy distribution among the three sectors: industry,

residence, and transportation. Industry's share significantly decreased over the period. In 1973, industry consumed 37.7 per cent of the total amount, but by 1987, it had fallen to 29.2 per cent. The residential and transportation sectors, however, increased. In 1973, the residential sector consumed 44.3 per cent of the total, in 1987, 46 per cent. The share consumed by the transportation sector increased from 18 per cent in 1973 to 24.8 per cent in 1987.

In the Federal Republic of Germany oil demand decreased about one third between 1973 and 1988. One conclusion can be drawn from this process—oil is used more efficiently now than it was before the 1973 oil embargo. This statement can be applied to other resources by considering the declining consumption of all fossil fuel energy sources and hydro. One exception is nuclear energy, its demand increases continually. This increasing demand can be referred to the increasing share of nuclear energy in the electricity production.

West-German's residential energy demand was roughly stable until 1985 and reached a peak in 1986. Since then,

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1 see Figure 5, p. below

2 However, it is not clear if this increase can directly referred to residences or buildings or, as in the Canadian case, if it can refereed to increasing non-energy use and producer consumption.
the use of energy in this sector has declined to the pre-peak level. At the same time, as the residential share of energy use reached its climax, industry achieved a record low energy use. The decline in energy consumption of this sector may have several reasons. One might be the world recession and its impacts upon the West-German economy. During these years, as less goods and services were produced, the economy experienced a decline in consumer demand. At the same time as industrial production declined, more efficient use of energy by this sector also seems to have taken place. But none of the data reveal, if and to what extent, savings and more efficient use of energy took place. For instance, it is not clear in which industrial sector savings were, or were not, achieved. Apparently, transportation is the sector which was least affected by changes. Apart from a minor decline in 1985, the proportion of energy used by transportation increased continually.

In Canada, different observations can be made. The demand of industry also decreased. In 1978, it accounted for 28.1 per cent of total, but in 1987, it was 27.2 per cent of total. As it did in the Federal Republic of Germany, residential energy consumption increased. In 1978, consumption was 33 per cent of the total and in 1987 it had increased to 36.1 per cent of total energy demand. In contrast to West-Germany, the demand in the transportation sector decreased. In 1978, it was 25.7 per cent of total
energy demand. In 1987, the consumed energy was 23.1 per cent of total. In addition, the Canadian statistics subdivides energy demand in two further categories: non-energy and own-use. In both sectors, the energy demanded increased over the years of the study. Non-energy use demand was 6.9 per cent of the total in 1978, and in 1987 it was 8.9 per cent of the total. Own-use was 5.8 per cent of total in 1978, and climbed to 11 per cent in 1987.

In Canada, as the curve shows, long and cold winters heavily shape Canadian residential energy demand. The data for industry imply that no significant changes in energy use were made. A current study, released by the Canadian government shows that in almost every single industry, no significant changes in the energy efficiency were made. In Canada, in contrast to the Federal Republic of Germany, the demand of the transportation sector declined. This might be explained by the fact that more gas efficient cars are now used by Canadians.

\footnote{For further information see Canada: Department of Energy, Mines and Resources \textit{Canadian Industry Program for Energy Conservation 1989/1990}; the program is industry-administered and government sponsored in order to promote and monitor energy efficiency throughout the Canadian manufacturing and mining industries. The programme was established in May 1975 and its objectives are: promote energy productivity improvement in Canadian industry, maintain an effective forum for industry/government dialogue on energy utilizing and productivity matters, forecast aggregate energy productivity improvement based on Canadian energy programs, and collect data and report on energy productivity of Canadian industry.}
Within the period of analysis, the West-German and Canadian gross national product increased with less net energy consumption. In their objective to separate the growth of gross national product from the net energy consumption note, the Federal Republic of Germany and Canada were successful. As figures 7 and 8 show, West-German net domestic energy consumption only reached again in 1988 the 1978 level of demand. At the same time, the economy is growing, but slowly. In contrast, the Canadian economy has grown rapidly in the past few years and with the boom, the net domestic energy consumption increased. Only in the early eighties was demand below the figure of 1978, at other times it was above this level.
Chapter IV
Soft Energy Paths

According to critics of current energy policies, present West-German and Canadian energy policy concepts are predominantly supply oriented. That means that both states try to ensure that adequate supplies exist in order to meet present and estimated future energy demands. The predicted energy demand is seen as "given". Therefore, energy studies predict the most likely energy demands and provide concepts to meet these assumed demands through increases on the supply side. The focus is on the quantity of energy needed to meet expected demands. Fossil fuels and nuclear energy are considered as appropriate energy resources in order to provide society with the expected amount of energy. Most of the current energy supply industry, the oil refining and high energy consuming industries are in favour of this approach. It is argued by them that the conversion of their industry in order to produce energy or refined products with any other kind of resources than those that are currently used is not economical or technologically feasible.
Within the last few decades, critics of the supply oriented approach have voiced their concerns and have developed a demand oriented concept. This concept emphasizes the consumption rather than the production side and focuses on conservation and more efficient use of energy. An important niche in this demand oriented approach has been carved by those who argue for a soft energy path, that is, by those who desire to maximize the use of economically and technologically feasible renewable energy this limiting environmental damage and resource depletion. However, advocates of a soft energy path are split into two major groups. Some critics consider conservation and the phase out of fossil fuels and nuclear power as the only possibility in order to create a sustainable society. Others however, concede that continued but limited use of fossil fuels is indispensable in order to met future energy demand. The more radical approach has been proposed by Amory B. Lovins. The more compromising approach has been taken by groups presenting concrete options of future energy consumption in West-Germany and Canada.
The Radical Philosophy of Soft Energy Paths

In 1972, Amory B. Lovins presented a different approach to determine society's energy demand. In the book *Soft Energy Path: Toward a Durable Peace*\(^1\), the author explains and discusses the advantages of his concept. Lovins states that the current energy problems derive from the present strong dependence on nonrenewable energy resources. These problems can be solved by switching to renewable energy resources and by implementing serious conservation. While the hard energy path "emphasizes the use of high technology, especially nuclear power, to produce a continuous increase in energy supply that will in turn fuel the rapidly growing demands of rapidly growing economies", the soft energy path refers to energy conservation in order to "reduce energy demand to manageable levels that can be met by renewable, decentralized, ecologically sustainable energy sources."\(^2\) Moreover he emphasizes the decreased cost of his approach and its greater rationality in that energy is treated as a means rather than an end.


According to Lovins, the main advantages of soft energy path technologies are based on five distinct characteristics.¹

1. They rely on renewable energy flows that are always there whether we use them or not, such as sun, and wind and vegetation: on energy income, not on depletable energy capital.

2. They are diverse, so that as a national treasury runs on many small tax contributions, so national energy supply is an aggregate of very many individually modest contributions, each designed for maximum effectiveness in particular circumstances.

3. They are flexible and relatively low technology—which does not mean unsophisticated, but rather, easy to understand and to use without esoteric skills, accessible rather than arcane.

4. They are matched in scale and in geographic distribution to end-use needs, taking advantage of free distribution of most natural energy flows.

5. They are matched in energy quality to end-use needs.

The Oko-Institut Soft Energy Path Study for the Federal Republic of Germany

In 1979, the Oko-Institut of Freiburg² undertook a soft energy path study for the specific conditions of the Federal Republic of Germany.³ The study's initial objective was to

¹(Lovins 1977, 38-39)

²(Krause, Bossel, and Mueller-Reissmann 1980)

³The Oko-Institut Freiburg, founded in 1977, is a non-government funded research institut, concerned with environmental problems
examine whether it is technologically and economically feasible that West-Germany’s future economic growth can be supplied without nuclear energy and will drastic declines in the oil supply.\(^1\) As well it set out to determine, whether the Federal Republic of Germany could be energy self-sufficient by 2030, even assuming that nuclear energy and oil and natural gas would no longer be components of the energy supply mix.

The study projects West-Germany's energy demand for the three main consumption sectors of residences, transportation and industry in three different scenarios or options. These scenarios are: ‘Business as Usual’, ‘Coal and Gas’, and ‘Solar and Coal’. For each scenario possible areas of energy savings are provided with emphasis on the means and extent of these savings.\(^2\)

All three scenarios assume increasing economic growth and social prosperity. Furthermore several assumptions were made. Within fifty seven year from 1973, living space will increase 1.7 times; car driving 1.5 times; flying will quadruple and showering and bathing will climb 1.8 times:

\(^1\)(Krause, Bossel, and Mueller-Reissmann 1980, 2/3)

\(^2\)(Krause, Bossel, and Mueller-Reissmann 1980, chapter 5)
industrial production will increase to 2.3 times and the gross national product will increase 3.2 times. On the other hand, it is assumed that by 2030 the population will decrease to about 45 million people compared to 61 million people in 1980. Although each of the three scenarios is focusing on different mix in the energy supply sources, all three, however, are based on the assumption that nuclear energy will be phased out after 1990.

The first scenario "Business as Usual" assumes that present energy supply sources will remain constant in terms of total energy supply, mix, and proportion. The main objective of this scenario is to stress the possible energy supply alternatives among the three scenarios. Figure 9 demonstrates that even though the energy demand decreases continuously after the mid eighties, significant dependence upon fossil fuels, and in particular on oil and coal will remain throughout the whole period of the energy study. Because of West-Germany's dependence on oil it will continue to be subject to oil crises. Furthermore, it is expected that increases in the pricing of oil and gas in the international energy market will take place and eventually, the West-German government and industry will no longer be

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1(Krause, Bossel, and Mueller-Reissmann 1980, p. 34)
Figure 9
ENERGY PRODUCTION WITH
SOFT ENERGY SCENARIO
"BUSINESS AS USUAL"
FOR FRG 1973-2030
IN PETAJOULE

able to pay the price for these resources.¹ From this prospective alone the scenario "Business as Usual" is seen as unrealistic and undesirable. In addition, however, the continued use of fossil fuels will engender very negative environmental impacts in spite of expected refinements in coal and oil consumption technologies. Their contribution to the greenhouse effect and acid rain will continue. Furthermore, the exploitation of oil and gas is getting increasingly difficult and complicated. Arctic oil and off shore drilling will be indispensable, and the possible consequences on that ecosystem are unknown.

The second scenario of "Coal and Gas" assumes that oil and nuclear power can be completely eliminated by 2030. Figure 10 shows that these substitutions the share of coal is expected to increase, while natural gas will remain the same after 1980. Nuclear will be "phased-out" by 1990, and oil by the year 2030. Hydro plays a minor role in the energy production.

This scenario, however, contains several problems as seen by the authors. Dependence on imported natural gas will still tie West-Germany to the ups and downs of the international energy market. Furthermore, the economic feasibility of intensified use of domestic coal mining is

¹(Krause, Bossel, and Mueller-Reissmann, 1980, 158)
questioned. Moreover, in the long run a substitute for coal has to be discovered since coal is a finite resource. This option also comes with environmental cost. The increasing use of coal will cause augmentations of carbon dioxide and other chemical emissions which result in environmental deterioration. Therefore, careful monitoring of the amount of coal burning and tighter emissions standards are a few prerequisites for the applicability for the "Coal and Gas" scenario.

The third scenario "Solar and Coal" assumes that the finite resources of oil and natural gas as well as nuclear energy can be phased out. The energy produced currently by those three sources will be replaced by a more intensive and efficient use of coal and by renewable energy resources such as biomass, hydro, solar and wind. Indeed, renewable energy sources will provide 44 per cent of total production by the year 2030 with the rest provided by coal. It is noteworthy that rather than increasing. Among the renewable energy sources, biomass will occupy the leading share in future energy production followed closely by solar and hydro. The absolute amount of coal will in fact decrease very slightly compared to 1973. This will be possible because the amount of primary energy is slated to be only 54 per cent of the
Figure 10
ENERGY PRODUCTION WITH
SOFT ENERGY SCENARIO
"COAL AND GAS"
FOR FRG 1973-2030
IN PETAJOULE

Source: see figure 9
one in 1980.¹ In contrast to the two other scenarios, the environmental impacts of the "Solar and Coal" scenario are much smaller. Consequently, the impact upon the global atmosphere will decrease, and steps to achieve a more sustainable environment will have be undertaken. In addition, the multifaceted energy production by various types offers the option for the Federal Republic of Germany to a gain self-reliance in its energy production. Consequently, the Federal Republic of Germany will be relieved from ups and downs in the international energy market.

All these three scenarios envisage decreased energy consumption in order to achieve this several measures can be taken. Conservation is still the best way to reduce energy demand and to reduce environmental impacts. On the one hand, the essential energy savings will be achieved through more efficient use of the produced energy, which means that waste heat of any kind of burning plants will be collected and distributed to energy users by the use of pipelines linking power and waste heat to entire districts. Conservation could also be achieved through better house and building insulation, better insulated transmission systems, and more energy efficient electrical equipment.

¹ Differences which may occur to original figures of the Oko-Institut study are caused by roundings and conversion
Table 1
Energy Production by Type in FRG 1973-2030
"Solar and Coal" Scenario
in Peta Joule\(^1\)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>3369</td>
<td>3223</td>
<td>3076</td>
<td>3223</td>
<td>3369</td>
<td>3369</td>
<td>3223</td>
</tr>
<tr>
<td>Oil</td>
<td>6153</td>
<td>5860</td>
<td>2930</td>
<td>1758</td>
<td>439</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gas</td>
<td>1040</td>
<td>1904</td>
<td>1758</td>
<td>1172</td>
<td>586</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uranium</td>
<td>114</td>
<td>439</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hydro</td>
<td>64</td>
<td>64</td>
<td>82</td>
<td>87</td>
<td>87</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>Wind</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>102</td>
<td>205</td>
<td>351</td>
<td>386</td>
</tr>
<tr>
<td>Solar</td>
<td>0</td>
<td>0</td>
<td>219</td>
<td>524</td>
<td>685</td>
<td>747</td>
<td>720</td>
</tr>
<tr>
<td>Biomass</td>
<td>49</td>
<td>58</td>
<td>146</td>
<td>586</td>
<td>879</td>
<td>1465</td>
<td>1465</td>
</tr>
<tr>
<td>Other*</td>
<td>336</td>
<td>263</td>
<td>234</td>
<td>117</td>
<td>58</td>
<td>87</td>
<td>117</td>
</tr>
<tr>
<td>Total</td>
<td>11127</td>
<td>11813</td>
<td>8461</td>
<td>6994</td>
<td>6311</td>
<td>6109</td>
<td>6010</td>
</tr>
</tbody>
</table>

* including imports of electricity and statistical differences

Source: see figure 9

\(^1\)Differences which may occur to original figures of the Oko-Institut study are caused by roundings and conversion
Figure 11
ENERGY PRODUCTION WITH
SOFT ENERGY SCENARIO
"SOLAR AND COAL"
FOR FRG 1973-2030
IN PETAJOULE

Source: see figure 9
Not surprisingly, the authors indicate that the third scenario is the most realistic and appropriate one. Their argument is fourfold. Firstly, the tendency to substitute oil is already present. Secondly, since natural gas is a finite resource, its substitution has to be considered sooner or later. Thirdly, domestic coal will achieve an even greater share in the total energy supply resources contribution, and this will be more appropriate since great amounts of coal are still available in West-Germany. The dependence on the international energy market will be temporarily reduced. Fourthly, renewable resources are already used and their use will continue to grow.

The Friends of the Earth Soft Energy Path Study for Canada

In 1983, the Friends of the Earth (FOE) reported to the Department of Energy, Mines, and Resources, and Environment Canada the study *2025: Soft Energy Futures for Canada.*\(^1\) The study examines the possibility of a soft energy path for Canada until the year 2025. Studies were undertaken for each province and the Northwest Territories. The report concludes that a soft energy path is economically and technologically possible for Canada and the implementation of a soft energy

\(^1\)(Friends of the Earth Canada 1983)
approach remains to be a political but a not partisan
decision.¹

The study demonstrates the technical feasibility and the
cost-effectiveness of a soft energy path in comparison to a
traditional hard energy path and current energy supply and
demand.² The study assumes in the scenario "Business as
Usual" an economic increase of more than 200 per cent in
gross domestic product (GDP) and moderate population growth
of 50 per cent compared to 1978. The analysis indicates that
in 2025 it would be technically feasible and cost-effective
to operate Canada's economy with 77 per cent reliance on
renewable resources in contrast to 16 per cent used
presently. As well, it is possible to decrease energy use by
12 per cent

In the scenario "Consumer Saturation" a 140 per cent
economic growth and a 50 per cent population growth is
assumed. The study indicates that this scenario will use 34
per cent less secondary energy in 2025 than in 1978. In
addition, 82 per cent of that energy will be provided by
renewable resources. The energy use per capita will fall

¹(Friends of the Earth Canada 1983)

²The demographic and economic variables as well as their names are
developed by the Statistical Analysis Division of Statistics
Canada and depend upon the Long Term Stimulating Model (LTSL), a
highly disaggregated, material balanced model of the Canadian
economy.
between one-half and two fifth of its 1978 level and the energy use per capita per dollar of GDP will fall one quarter of the 1978 level.

Within the 47 years of the study period, the share of energy production through renewable sources will increase drastically. Renewable energy supply will be up 56 per cent in the "Business as Usual" and up 60 per cent in the "Consumer Saturation" scenario. The major renewable energy resources will be biomass and hydro generated electricity. Biomass, which consists of unfossilized organic material, will be primarily used in the residential and commercial sector. A modest growth of solar energy use is expected by 2025 with major application for low temperature process heat and water heating. This type of energy will be the least important of renewable sources in both scenarios.

In comparison to 1978 as 69 per cent of electricity was produced through renewable energy resources, the share of these resources in generating electricity increases up 75 per cent by 2000, and by 2025 the share of these resources will amount over 90 per cent. The generated electricity will be produced primarily through hydro (over 90 per cent), and

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1Biomass includes unfossilized organic material used for energy production, including crop wastes, fuel crops, wood, animal waste, forestry waste, pulp and mill wastes and municipal solid wastes. Furthermore, biomass fluids, generating low temperature heat, are converted fluids from biomass in the form of methanol, ethanol, biogas and vegetarian oil.
the remaining portion will be supplied through wind, biomass and solar. Nuclear power will be phased out by 2025.

As a consequence of the increasing mix of energy production resources, changes in the use of energy will appear. In the residential sector, the energy consumption will decline by 2025 to approximately half of the 1978 consumption. This significant decrease will result from improvements in energy efficient houses. These changes will be achieved through gradual replacement of the existing housing stock with better and tighter insulation and through retrofitting of older houses.

According to the study, abundant possibilities exist to achieve energy savings in the commercial sector, through a shift from fossil fuels to electricity in order to supply space heating and hot water. But again, major savings will be achieved through efficiency gains which result from the improvement of energy efficient buildings.

The industrial sector--the highest energy consumer out of the four sectors--will retain its lead by 2025 (Table 2). However, the study demonstrates, that industrial needs will
TABLE 2
"CONSUMER SATURATION"
ENERGY DEMAND BY SECTOR,
CANADA, IN PETAJOULE
1978-2025

<table>
<thead>
<tr>
<th>Sector</th>
<th>1978</th>
<th>2025</th>
<th>% of 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residence</td>
<td>1271</td>
<td>675</td>
<td>53.1</td>
</tr>
<tr>
<td>Commercial</td>
<td>808</td>
<td>423</td>
<td>52.3</td>
</tr>
<tr>
<td>Industry</td>
<td>2226</td>
<td>1034</td>
<td>82.3</td>
</tr>
<tr>
<td>Transportation</td>
<td>1668</td>
<td>996</td>
<td>59.0</td>
</tr>
</tbody>
</table>

be satisfied largely by biomass solids\(^1\) and by increased efficiency.

In the transportation sector, more biomass fluids than refined petroleum will be consumed with alcohol dominating the field. Moreover, in those provinces in which hydro-electricity is available, electric cars are seen to be feasible.

While it is not my purpose to compare the hypothetical models of Germany and Canada certain observations can be drawn. It appears that various factors lead to different decreases in the energy demand among the two countries. On the one hand, the higher energy demand for residences in Canada may be related to the different climatic conditions between the two countries. In the transportation sector more savings will be achieved in Canada than in the Federal Republic of Germany. The decreasing energy demand related to the transportation sector can be explained by the extension of the public transportation system, and further through the growing utilization of more gas efficient automobiles. In contrast, in the Federal Republic of Germany the public transportation system is already sophisticated\(^2\), and gas

\(^{1}\) Biomass solids are biomass used as solid in the form of chips, roundwood and waste wood.

\(^{2}\) Although complaints about various cuts in the public transportation system exists, in comparison to Canadian circumstances, the system is far more developed and serves more extensive.
efficient cars are already more often used than this is the case in Canada. In the Federal Republic of Germany in the industrial sector slightly more reduction in the energy demand will be achieved than in Canada. The decrease in the industrial sector can be explained by the more efficient waste heat use, and improved productivity.

The Environmental Impacts of a Soft Energy Path

The environmental impacts of the proposed soft energy path by the Oko-Institut have to be proven, since the study implies that the "Solar and Coal" option would be the best alternative. However, the environmental soundness of this energy path in regard to its emphasis of coal has to be examined carefully. The negative environmental impacts of utilizing coal in the energy supply mix are multifaceted. Several environmental risks exists through coal mining: the destruction of the earth surface and the risk of fire-damp explosions. As well, the energy production from coal causes negative atmospheric impacts. One should question whether the mining and further burning of coal is actually the best solution, since emissions not only pollute the air but also the water. Other available and less environmentally dangerous options have to be taken into consideration. In order to implement the proposed soft energy path, further significant changes in the coal burning technology in terms of reducing
emissions have to be developed and tighter emissions standards have to be implemented.

In 1984, David Brooks et al. examined the environmental impacts of the soft energy path and the hard energy path in *A Preliminary Assessment of the Relative Environmental Impacts of a Hard and a Soft Energy Path for Canada*. The analysis is based on the Friends of the Earth analysis. The study expresses some concerns in respect to possible negative environmental impacts which result from the increased burning of wood, biomass and coal and from increasing deforestation.

This study indicates that in both energy paths the most important environmental impacts result from primary energy production with effects on water and land resources. Furthermore, environmental impacts result as well from energy consumption. All in all however, the study concludes that despite the increased deforestation, burning and mining of coal and wood, and improved land use, the soft energy path is more environmentally friendly than the present hard energy path.

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2If a similar study for the Federal Republic of Germany has been undertaken it is not known by the author

3(Brooks et al. 1984, 26)

4For detailed information see (Brooks et al. 1984)
environmental impacts are multifaceted. Firstly, the mining and drilling of fossil fuels can be reduced through efficient use of energy. Secondly, emissions related to burning fossil fuels can also be reduced. Thirdly, nuclear energy will not be necessary any more.

Implementation of a Soft Energy Path

Both studies, by the Oko-Institut and Friends of the Earth, demonstrate that a soft energy path is economically and technologically feasible for each of the two countries. However, the implementation of this energy path remains a political question rather than a scientific or an economic one. Nevertheless, some difficulties will occur in the application of this policy and have to be considered before effective implementation can take place.

First of all, a change of thinking among all members of the society has to take place in order to achieve a sustainable society. Changes in human habits and customs regarding the evaluation of energy as an almost free commodity have to take place. As well, the widespread opinion that energy is merely a commodity in order to reach a higher living standard has to be modified. Positive changes in energy consumption are indispensable prerequisites if we are to achieve rational consumerism and responsible citizenship.
For individuals various opportunities arise to transform the supply policies of business and the general economy. Changes in consumer behaviour can have a great impact on the offered goods and services. Through the increased environmental consciousness and responsible action of each individual in energy savings can be achieved. Profound changes in the consumer’s perception of consumption have to take place. People have to comprehend that the necessity exists for a careful use of energy resources and energy consumption.

Changes in the energy market will follow from changes in consumer behaviour. In the long run, these changes will force industry to modify its approach toward energy consumption. Some of these changes may be the rejection by consumers of environmentally unfriendly products: instead of nonrenewable products, durable, reusable or recyclable ones could be bought; instead of aluminium cans, glass bottles could be used; china dishes instead of Styrofoam; instead of currently getting new plastic bags in the grocery stores, old ones could be used. Products with less packaging should be selected this providing savings in energy production and in waste disposal.

The mix of energy supply sources will be different between the two countries dependent on the specific regional
conditions in terms of availability of renewable sources. In other words, no general energy policy which will be due for the Federal Republic of Germany and for Canada, regarding each of them as one whole country, can be developed. The different accessibility of energy sources in each province and region have to be considered. Each local, Laender and provincial government must develop very carefully its own options and resources. While some governments have to undertake some innovations in their electrical systems, others have to undertake major shifts from nuclear power, coal-fired or/and oil fired electrical systems. Furthermore, in Canada a few will be able to run their entire transportation system with electricity or natural gas, others, however, will be able to run their whole transportation system through locally produced biomass fluids.

On the national level, multifaceted options exist to guide West-Germans and Canadians toward a soft energy path. In order to achieve a greening of the market, governments have to implement various mechanisms. One mechanism will be to create incentives for business as well as for individuals in order to use energy more efficiently, as well as to reduce the energy consumption of Canadians.

In various sectors and areas it will be possible for governments to reinforce a change in the relationship of
energy consumption and environmental concerns. These governmental tools are user-pay taxation, setting standards of emissions and energy efficiency, environmental laws, procurement policies, taxation or banning of non-environmentally friendly products, prohibition of various energy wasting household equipments and machineries, and subsidization of those industries which increase energy efficiency and energy efficient products as well as environmentally friendly goods and services. Furthermore, the development of renewable energy supply resources and technologies will be necessary regulations in order to lead West-Germans and Canadians to a sustainable society.

One mechanism for the West-German and Canadian national government to guide society towards efficient use of energy will be to set up regulations, such as those for the insulation of houses and buildings. In Canada particularly the installation of energy and water meters will lead people to use energy and water more conscious, and therefore more efficiently.

Most importantly however, in order to achieve a more efficient use of energy, energy prices have to be adjusted so as to reflect their replacement costs. The main result of higher energy prices will be a shift to conservation and efficiency. In addition, governments have to set up
nationwide standards of energy efficiency both for products as well as the means of production.

Taxation is a further means to nudge citizens to participate in energy saving programmes. The government should set less or no taxes on environmentally friendly products and at the same time higher taxes for those products which use more energy and which are not as environmentally friendly as others. Even though people’s motivation is triggered by monetary incentives, sooner or later people will recognize that the environmental impacts will be less negative. They will recognize that nature will sustain itself longer and it will lead to a more worthwhile life on earth. They will be even more willing to buy environmentally friendly and energy efficient products.

In order to guarantee that people do comprehend why energy efficiency is indispensable, education and training programmes as well as the flow of information has to be significantly improved. These training programmes have to be established for architects, house designers, engineers, inspectors and private persons. In addition, training programs for the new biomass industry have to be established in order to guarantee a successful transfer from using infinite energy resources to finite ones.
In sum, as the Oko-Institut and the Friends of the Earth study demonstrate a soft energy path is technologically and economically feasible for the Federal Republic of Germany and Canada. A shift from nonrenewable energy resources to renewable ones is possible and desirable. While nuclear, oil and natural gas will be "phased-out" in the Federal Republic of Germany by the years 1990, 2020 and 2030, in Canada dependence on oil will decrease and nuclear energy will be phased out by the year 2025. Energy savings can be achieved in both states through improved energy-efficiency in insulation and architecture in the residential and in the commercial sector. Furthermore, through a shift from fossil fuels to renewable resources, mainly to biomass and hydro-electricity, energy savings will be achieved.

In order to implement a soft energy path, multifaceted changes and shifts within society and energy policy have to be undertaken. Foremost, people have to become aware of the fact that energy is not merely a commodity in respect of economic prosperity, and its use is not a measure of societal's quality of life. Secondly, incentives for business and individuals are necessary in order to induce changes in consumer behaviour. Therefore, governments at all levels have to cooperate in the implementation of policies which provide incentives for business and consumers to change their attitude toward energy consumption.
One option that the West-German and Canadian national government have is to guide business and private consumers toward a refined consciousness through higher taxation of non-environmentally friendly products. In the ideal case a ban of environmentally unfriendly products can be enacted. In addition, tighter emission standards will force the industry to develop, to construct and to use more sophisticated filters which reduce the emissions. The user-pay model would be another possibility to reinforce a changes in the energy consumption approach as well as to reinforce a more effective protection of the environment.
This thesis has compared the national energy policies of the Federal Republic of Germany and Canada from 1973 until the end of the 1980s. The purpose of this paper was to examine whether economic and/or environmental concerns were responsible for changes in West-German and Canadian national energy policies. Specific attention was given to several world events and their respective impacts on West-German and Canadian energy policies. The analysis demonstrates that these events influenced and shaped West-German and Canadian energy policies to varying degrees.

The analysis reveals that the energy policies of both national governments depended primarily on domestic economic conditions. Prior to the 1980s, innovations in the West-German and Canadian domestic energy policies were determined by the availability and accessibility of energy resources. Therefore, events jeopardizing their national energy supply such as the 1973 and 1979/1980 oil crises had significant and
longlasting effect on the West-German and Canadian energy policy agenda.

Although fundamental differences exist between the West-German and Canadian domestic energy supply, it appears that both national governments responded and modified their domestic energy policy agendas in the same way in response to various events. The Federal Republic of Germany is strongly dependent on imported energy resources such as oil, natural gas and uranium. The only major domestic West-German finite energy resource is coal. However, the demands of West-German industry demands for the production of goods and services require large amounts of energy. Thus, any interferences in the world energy market has profound impacts on West-German society.

In contrast, Canada possesses large reserves of fossil fuels, uranium and hydro-electric generating potential. Given these resources, it might be assumed that Canada would be energy self-reliant. However, within Canada, the uneven geographical distribution of these natural energy resources complicates energy self-reliance from the economic point of view. Most of the nonrenewable energy resources are mined and drilled in the western provinces. The distribution of these resources and the transmission of the produced energy toward central Canada and the Atlantic provinces is very limited and cost intensive. For the energy consuming
provinces in central Canada and the Maritimes, it makes more economic sense to import the required energy resources than to buy these resources from the western provinces.

The intensity of the impacts of the chosen world events on West-German and Canadian national energy policies can be detected through the intervention of the national governments in areas of Laender and provincial legislative authority. The oil crises of 1973 and 1979/1980 had a major impact on both West-German and Canadian national energy policies. As a result of the OPEC oil embargo, the West-German and Canadian government introduced their energy policies "away from oil" and "off oil" respectively. The purpose of these programmes was to encourage the substitution of other energy sources for oil land to compensate those facing higher costs as a result of such substitution.

The West-German national government enacted a temporarily restriction of the driving times for all vehicles. In Canada, the 100 km/h speed limit on highways was implemented. Further, the Canadian national government interfered directly in provincial jurisdiction by controlling the import and export of energy resources through the National Energy Board. Furthermore, the Canadian national government demanded intensified extraction of domestic oil in order to distribute Canadian oil to the eastern provinces to prices below the world oil price. A significant increase in
Canadian oil production can be observed, lasting until 1975. As well, the Canadian national government forced the further extension of the trans-Canada oil pipeline from west to east to ensure energy supply for the provinces east of the Ottawa Valley, since the eastern provinces had previously met their energy demand primarily through imports.

The two energy programmes "away from oil" and "off oil" demanded a diversification of the energy production resources. Emphasis was given to those alternatives resources which could be used as substitutes for oil and which were simultaneously economically viable. Both national governments considered nuclear energy to be one of the best options, as opposed to various alternative energy resources such as solar, wind and biomass. Moreover, in the Federal Republic of Germany further attention was given to increased production of hydro electricity. Nuclear energy became one of the major competitive energy resources for the Canadian hydro electricity supply after the two oil crises. The proportion of nuclear energy increased significantly in the energy supply mix, especially in the provinces of Ontario and Quebec.

While the first oil crisis in 1973 enforced profound changes in West-German and Canadian energy policies, the second oil crisis in 1979/1980 confirmed both national governments in their chosen energy path. Furthermore, the
second oil crisis reinforced further the use of nuclear energy. The West-German national government considered its established energy programme as appropriate; therefore, it did not see any need to implement changes in the national energy policy which could be directly related to the second oil crisis. As a result of the second oil crisis, however, the Canadian national government enacted the far-reaching National Energy Program (NEP) which took decisive action in an area in which the provinces considered that they had supreme provincial legislative power. The National Energy Program encompassed regulation and control of natural energy resources exports and imports. In addition, the National Energy Program demanded a Canadianization of energy resources and oil refining companies. The energy producing provinces, and especially Alberta, strongly opposed this programme introduced by Ottawa. However, since the Canadian national government has the power to override provincial legislation, the energy producing provinces had little power and no option to object against national energy policies. The drastic response of the Canadian federal government was an attempt by the national government, however, to compensate for the effects on the domestic energy market caused by the oil shortages.

In contrast to the two oil crises, the world recessions of 1975 and 1982 had no direct influence on the current West-German and Canadian energy policy agendas. The recessions
represented a risk for the West-German and Canadian economies. In both countries, decreases in the energy production and consumption can be observed, and both economies experienced a downfall in the consumption of goods. The data in chapter three show that, during the years of the recessions 1975 and 1982, industrial energy demand declined while the demand of each of the two other sectors, transportation and residence, remained the same or increased. Indirectly, however, the recession of 1982 may have had some effect, at least on Canadian energy policy. In 1984, the Canadian electorate voted against the Liberal government which had presided over both the NEP and the recession and elected a Conservative government committed to strengthening the role of the market in energy as in other sectors of the economy. In 1985, the Canadian government dismantled the Liberal's National Energy Program, deregulated the oil and gas sectors and allowed market forces to rule as part of its program of "economic renewal". Later in the decade, the government further deregulated the energy sector, and the economy in general, when it considered a Free Trade Agreement with the United States.

The statistical data demonstrates that both the West-German and Canadian national governments implemented innovations in their energy policies. The energy supply mix was diversified and the proportion of oil in the overall energy supply mix decreased significantly over the period of
study in both states. The data reveal that diversification of the energy supply mix was achieved largely by expansion in the use of nuclear energy.

Immediate changes in national energy policy by the West-German and Canadian governments in response to the two nuclear plant accidents as Three Mile Island (1979) and Chernobyl (1986) are difficult to detect. Both national governments maintained their arguments that their type of nuclear plant was technologically "safe" and that such accidents were unlikely to happen, in West-Germany or in Canada. In addition, members of the nuclear industry supported the views of their respective governments by emphasizing the technological security and superiority of current nuclear plants developed and run by them. However, these two nuclear plant accidents did stimulate public debate in regard to the nuclear energy issue.

As suggested above, profound and long lasting changes in the West-German and Canadian national energy policies were primarily a consequence of economic, rather than environmental, considerations. However, the greenhouse effect and acid rain are the result in part of emissions caused by burning coal and other fossil fuels. In response to growing public concern over these environmental hazards, both the West-German and Canadian national governments enacted legislation to protect the environment from problems
arising from the burning of fossil fuels. Catalytic converters, environmental impact assessments for energy power station projects and tighter emission standards are just some examples of the changes resulting from increased awareness of environmental problems carried out by policy-makers. Several scientists demand further and more drastic changes in the energy policies in order to achieve a sustainable society. However, the likelihood of future changes in energy policy in response to environmental concerns may well depend on the respective political environments within in which energy policies are formulated in West-Germany and in Canada.

In the Federal Republic of Germany, Laender governments generally have supreme legislative power concerning local energy issues, although the federal government has the authority to make framework laws which co-ordinate energy policies in the national interest. Hence, while the operation has and administration of nuclear power plants fall under Laender responsibility, the national government, has the last word on whether a nuclear plant should be built and whether a nuclear plant should go on the energy transmission system; the West-German federal government did use this power once in the case of the nuclear plant in Brockdorf in 1985.

In Canada, as in West-Germany, the provincial governments have the power to legislate the area of
provincial natural resources, including energy resources. Again, however, the Canadian federal government has the authority to formulate a national energy policy and thereby to override provincial jurisdiction. As shown, the Canadian national government used this right several times in order to compensate Canadians for the effects of the oil crises in 1973 and 1979/1980. Oil price regulation, as well as regulation and control of import and export of energy resources through the National Energy Board were some governmental approaches to compensate the effects of the energy crises for Canadians. However, an obvious difference between Canada and West-Germany lies in the existence in the former of the potential for conflict between interests of energy producing provinces (including the western provinces, and potentially, Newfoundland) on the one hand and the interests of energy consuming provinces, such as Ontario, on the other. Any attempt by the federal government to intervene in the area of energy policing is therefore made more complex by the differing interests of the various provinces and regions of Canada.

Furthermore, this paper demonstrates that citizens of the two countries have used different methods to influence the energy policy decision-making process. In the Federal Republic of Germany, citizen initiatives were established to demonstrate the public's disagreement and disapproval with the national energy policy by focusing on the nuclear power
issue. Simultaneously, various other issues related to energy and the environment became part of public discourse. Members of the environmental movement promoted the use of renewable energy resources instead of nonrenewable ones; thus, instead of oil, natural gas and coal, they advocated use of solar, wind, biomass and hydro resources. In addition, supporters of the movement demand a phase-out of nuclear power. However, among the advocates of the environmental movement, no coherent opinion dominates in the question of how fast a nuclear phase out is feasible and possible. The merit of the environmental movement is that the public discourse about energy policies and environmental concerns have been brought to the attention of the citizens. One consequence of this increasing awareness and growing concern about environmental impacts of energy policies is the emergence of the political party the Gruenen (Greens). Since the early 1980s the Gruenen have represented the interests of the environmental movement in the West-German parliament--the Bundestag.

In contrast to West-Germany, there is no single national environmental movement with a parliamentary presence in Canada. The absence of such a movement can be explained by three factors. First, the Canadian political culture has not been transformed to the same extent by the emergence of a post-materialist value system among the younger generation which, in West-Germany, has motivated many values to support
the Gruenen. Secondly, the Canadians' environmental concerns focus primarily on local and for provincial issues. As a result environmental interests are frequently shaped by the division between energy-producing and energy-consuming provinces (noted above) and it is rare for environmentalists across the country to take a unified stand on one issue. Thirdly, it appears that there is no demand in Canada for a national environmental party since Canadians are more likely than West-Germans to try to influence domestic energy policies effectively through lobbying politicians and bureaucrats at all levels of government.

West-German and Canadian critics of the current energy policies of their national governments have recently begun to promote a more environmentally benign energy path especially since both national governments decided, as a consequence of the 1973 oil crisis, to extend their energy supply mix with nuclear energy in order to substitute oil. Still today, nuclear energy is considered to be a competitive substitute for oil. Furthermore, nuclear energy is regarded as a technologically "safe" and environmentally sound resource; government officials and nuclear industry members state that "safe" nuclear waste treatment and disposal are possible. Both governments emphasize that the supply of uranium is ensured. West-German nuclear energy proponents argue that dependence on imports of uranium will be avoided through guaranteed supply by different suppliers. In Canada, since
the country has free access to its own uranium mines the security of supply argument is apparently even stronger.

However, since critics of present energy policies, and especially of nuclear power, argue that, even if uranium supplies are guaranteed, it is still unwise to rely on a single source of energy. Furthermore, critics of nuclear power question the safety of nuclear plants and the idea of "safe" waste disposal. They warn of possible environmental risks caused by accidents and the unclarified storage issue. The nuclear power accidents in Harrisburg in 1979 and Chernobyl in 1986 confirmed and substantiated the concerns voiced by these critics, since the nuclear plant accidents revealed the potential risks of utilizing nuclear energy. Moreover, although scientists regard salt mines as the best option for West-German permanent nuclear disposal while the Canadian shield is considered to be the best option for Canada's permanent nuclear disposal, several elements of uncertainty remain in respect to the technical feasibility of these projected disposal sites. In addition, critics argue that society's vulnerability to terrorism and blackmail increases through reliance on nuclear energy. The risk of attack and sabotage of nuclear plants, as well as of nuclear waste disposal sites, requires intense security efforts.

However, not everyone has opposed the extension of nuclear power. In both countries protests occurred largely
in those areas in which nuclear plants and nuclear waste disposal sites were to be built. But, in some cases, municipalities have reacted positively to the construction of a nuclear plant in their neighbourhood because of economic considerations. It is hoped by these proponents that a nuclear power plant would bring new job opportunities and ensure the economic infrastructure of their township.

The two oil shortages and the two nuclear plant accidents reinforced the discussion about the wisdom of the present energy path. Critics of the current hard energy path in both states have developed soft energy path proposals in an attempt to prove that a soft energy path is economically and technologically feasible. The soft energy path approach emphasizes a reduction in both energy consumption and production. This means that the objective of this approach is to use less energy while maintaining the present living standard. The distinct feature of the soft energy path is the assumption that the energy needs of a society will be met exclusively through renewable energy resources, such as biomass, hydro, solar and wind. All nonrenewable resources like oil, natural gas coal and uranium will no longer be necessary for energy production.

However, proponents of the soft energy path are subdivided in two streams. Some argue that current energy demands can be met without any finite energy resources;
others, in contrast, state that society's energy demand cannot only be met by relying on renewable resources and that, to provide the society with enough energy, nonrenewable energy resources will have to be used.

For the Federal Republic of Germany and for Canada soft energy path studies have been undertaken. These studies indicate that a nuclear phase out is possible without jeopardizing the West-German and Canadian electricity supply. However, both studies assume that, at least to some extent, some nonrenewable energy resources are necessary in order to meet society's energy demand.

The West-German soft energy path study suggests a new mix of energy supply resources. In this path, one half of the energy demand will be met through domestic coal, while the second half will be met through renewable resources such as biomass, hydro, solar and wind. However, this path contains some problems. On the one hand, even if one assumes that coal will be used more efficiently, it is a finite resource. After several years of further extraction, existing sources will be totally exploited and either a substitute will have to be found, or coal will have to be imported. Through importing coal, West-Germany's dependence on the world energy market will increase again, and the vulnerability of West-Germany's economy and society to international events will also increase. In the long run,
therefore, no significant changes to present dependencies on the world energy market will be accomplished; just the sources of dependence will change from oil to coal. An addition problem is that coal burning emits chemical substances, primarily carbon dioxide and sulfur dioxide, both of which are currently considered to be among the main elements causing the greenhouse effect and acid rain. Therefore, the environmental soundness of this suggested path may be open to question.

The Canadian soft energy path study indicates that Canadian domestic energy demand can be met with a nuclear phase out, and without any major additional extraction of oil and natural gas. Renewable energy resources such as biomass, hydro, solar and wind will provide the major energy supply. As in the West-German study, the suggested soft energy path does not recommend a total renunciation of nonrenewable energy resources. Consequently, negative environmental impacts caused by the use of nonrenewable energy resources will still occur. Moreover, as the current debate surrounding Hydro-Québec's Great Whale (James Bay Two) project illustrates, major hydro-electric projects may also have serious and negative environmental consequences. However, the scenarios recommended by the West-German and the Canadian studies appear to be based on the option of "the lesser of evils". Even though the further use of nonrenewable energy resources and consequently further
negative environmental impacts cannot totally eliminated, the potential of these negative impacts may at least be reduced.

If it is agreed that both studies have shown the economic and technological feasibility of a modified version of the soft energy path, and if West-Germans and Canadians appear to be willing to accept profound changes in their present life styles, it will be the task of the policy-makers to implement the necessary changes in energy policies. Both the West-German and Canadian political systems provide legislators with the power to enact a soft energy path for the two countries.

Various options exists for the West-German and Canadian government to enforce a change in the mix of energy supply resources, as well in the attitudes and the behaviour of the consumers to energy consumption. Both national governments have the authority to intervene directly in the energy policies which are subject of Laender and provincial legislation. Both national governments can determine which energy resources should be used for the energy production.

Further possible tools for the policy-makers to modify present behaviour of the members of their societies include preferential taxation of environmentally friendly products and energy resources, as well as the subsidization of the development and installation of renewable energy resources.
and technologies. Furthermore, the user-pay model gives incentives for each environmental polluter to reduce his contribution to destruction of the environment. In addition, tighter emission standards for industry and vehicles, as well as tighter housing insulation standards contribute to reduce the negative impacts on the environment.

As stated above, both national governments have already implemented some regulations in order to compensate for the impacts of a modern industrial society on the environment. The demand for catalytic converters, speed limits, tighter emission standards and insulation standards, as well as environmental impact assessments, reflect the innovations which have already taken place. However, it appears that much more needs to be done in order to achieve a sustainable society. One has to remember that it is man who needs nature in order to survive. Preservation of a high quality of life cannot only be measured in economic terms; responsibility toward the environment and its conservation are further prerequisites. Therefore, society has seriously to evaluate which energy resources should be components of the energy supply mix. It will be the task of the public and scientists to persuade policy-makers that further changes in energy policies are necessary if the global environment is to be rescued from further deterioration.
Appendix

Conversion for statistical data

General:
- only the first number after decimal point is listed;
- in order to compare domestic consumption, each energy production statistic is without exports and imports;
- all Canadian figures in regard to energy supply and demand are converted into peta joule (PJ) $10^{15}$; Statistics Canada publishes conversion factors for tera joule (TJ) $10^{12}$, therefore all figures were first converted into tera joules and from there in peta joule;
- all figures for the FRG were already provided in peta joule;
- all Canadian per capita figures are converted on the basis of UN population estimates; the figures for the years 1976, 1982, and 1986 are Canadian Census data;
- all West-German per capita figures are converted on the basis the UN population estimates;
- in contrast to the Canadian subdivision of residences and commercial, West-German statistics do not distinguish between these two categories. In regard to accomplish comparative data, the two Canadian subcategories residences and commercial were added up by the author in the category residences;
- figures for the West-German Soft Energy Path study were originally provided in Mio. SKE per year, they were converted into peta joule with the factor 29.3.
Canada

Supply and consumption resources:

Coal: conversion factor 27.7
   all figures in thousands of tones

Natural Gas: conversion factor 37.88
   1973 figures in billion cubic feet
   1975 figures in gigalitres
   1978-1990 figures in million cubic tones,

Petroleum/oil: conversion factor 38.51
   1973 figures in thousands barrels a day
   1975-1977 figures in thousands cubic meters a day
   1980 up to day figures in thousands cubic meters

Electricity: conversion factor 3.6
   Hydro, nuclear and thermal:
   1980-82 figures in thousand megawatt/hours (or also called gigawatt/hours)
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