

**DO POLITICAL PRECONDITIONS AFFECT
ENVIRONMENTAL OUTCOMES? EXPLORING THE
LINKAGES BETWEEN PROPORTIONAL
REPRESENTATION, GREEN PARTIES,
ENVIRONMENTAL QUALITY AND THE KYOTO PROTOCOL**

by

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ABSTRACT

Is there a relationship between positive environmental changes, a quick ratification of the Kyoto Protocol and preconditions such as green party presence and a Proportional Representation (PR) electoral system? The findings suggest that Proportional Representation electoral systems are correlated with green parties in legislatures. PR is also correlated with a faster time to ratify the Kyoto Protocol after December 1997, as well as the change in percentage of world total carbon emissions. The presence of green parties in cabinet and legislatures does not have a statistically significant relationship to the dependent variables. Finding very little correlation between PR, green party presence, and better environmental outcomes may indicate that even in a PR system, those politicians with an environmental agenda often set aside their convictions and go along with the majority in the coalition they have joined.

Keywords: global climate change; green party; Kyoto Protocol; electoral systems; proportional representation; environmental policy; Global Climate Change

EXECUTIVE SUMMARY

This project will answer the question: Is there a relationship between positive environmental changes, a quick ratification of the Kyoto Protocol and political preconditions such as green party presence and a Proportional Representation (PR) electoral system? Can green parties in legislatures and cabinet be associated with a quick ratification of the Kyoto Protocol? Furthermore, is a PR system associated with green party electoral success and is it associated with better environmental outcomes when compared with other industrialized democracies?

This project will cover the period from 1997 to 2005 and examine 35 industrialized democratic countries with two types of electoral systems in which green parties have had varying degrees of success. Not all of the countries have ratified the Kyoto Protocol, and some have ratified it, but do not seem to be implementing policies which would lessen global climate change (GCC), as the data on environmental quality show. Green parties' goals involved reducing pollution to lessen GCC in their respective countries, and the Kyoto Protocol, a regime designed to address industrial polluters' impacts on the environment, was seen as the most effective way to do this. However, coalition theory explains how green party members are essentially forced to cooperate in policymaking once they actually win seats in the legislature and may not have held the Kyoto Protocol as a top priority between 1997 and 2003. In addition to this exploration, correlation tests are done to determine if proportional representation and green parties in cabinet and the legislature can be associated with positive changes in environmental quality.

The findings suggest that Proportional Representation electoral systems are correlated with green parties in legislatures. PR is also correlated with a faster time to ratify the Kyoto Protocol after December 1997, as well as the change in percentage of world total carbon emissions. Green parties in legislatures are not correlated with a faster time to ratify the Kyoto Protocol and the presence of green parties in cabinet does not have a statistically significant relationship to the dependent variables. Finding very little correlation between PR, green party presence, and better environmental outcomes may indicate that even in a PR system, those politicians with an environmental agenda must often set aside their convictions and go along with the legislative majority in the coalition they have joined. However it seems that at least in a PR system, there is enough belief in

the utility of the Kyoto Protocol to quickly ratify it. This becomes apparent when noted that the European Union was a key proponent of the Kyoto Protocol and the highest concentration of PR systems are found in Europe. Due to the fact that there was not a significant relationship between green party presence in legislatures and cabinets and improvement in environmental outcomes, coalition theory most accurately describes how green party members actually behaved once they entered the legislature and cabinet. To form a majority, they would have to side with the left and shelve their environmentalist agenda, in favour of the more popular social welfare one. The findings of this study indicate that by changing electoral systems, countries may be moving a step closer to realizing environmental improvement. However, a commitment to effective environmental policies must be widely shared.

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1: RESEARCH PLAN

Introduction

The environmental movement is a global phenomenon, as demonstrated by the 76 national green parties and networks in the world today.¹ This may be due in part to the threat of climate change and the social, environmental and economic uncertainty it foretells for the world as a whole. These issues have become more important in the 21st century as green parties gain popularity on every continent and the United Nations focuses attention on alleviating climate change with a voluntary Protocol. But can green parties in legislatures and electoral systems be associated with ratifying the Kyoto Protocol more quickly and improving environmental quality? The goal of this paper is to assess whether political preconditions affect the adherence to the Kyoto Protocol and thus the environmental quality of countries around the world. For each country, the variables: type of electoral system, existence of green parties in national legislatures and in cabinet, environmental quality, and months taken to ratify the Kyoto Protocol will be examined. This project will hypothesize that in Western democracies proportional representation systems allow green parties to be elected and once in legislatures these parties are faster to ratify the Kyoto Protocol and improve environmental outcomes. Green parties in legislatures, (and even more so in cabinets), might push legislators and their constituencies to enact and support policies which could lead to better environmental outcomes. However, due to a lesser level of support for environmental parties, they might only be successful in this venture in countries where the electoral system allows them to enter positions in the legislature with a small number of votes.

This project will also attempt to answer the question: is the Kyoto Protocol being taken seriously as an effective means of alleviating climate change? Do green parties live up to their mandates once elected? Furthermore, is it a proportional representation system that allows a green party to be successful at the polls, or is it perhaps a collective public fear of environmental damage?

This project does deal with a limited time span due to data constraints, however it will test if the relationships between political variables and environmental variables make

¹ Mike Feinstein. "Green Federations, Networks, and National Green Parties".
<http://www.globalgreens.org/parties>.

sense or not. This project focuses on the years 1997 to 2005, compares 35 Western industrialized democracies, and explores the idea that green parties and a proportional representation system are associated with quickly enacting the Kyoto Protocol and improving environmental outcomes. The 35 countries were chosen because they are all industrialised democracies with similar standards of living and all have made commitments to the Kyoto Protocol or at least improving environmental quality. However, sampling only 35 countries does limit the findings because the larger the sample size, the more accurate the predictions that can be made from it. This project is a limited pilot study and dummy variables are used for the independent variables because of data and scope limitations. Electoral System is the first independent variable. This is coded “1” for all forms of proportional electoral systems, and “0” for all forms of non-proportional systems. The other two independent variables relate to the presence of green parties in legislatures and cabinets. Green parties in cabinet during the period 1997 to 2003 are coded as “1”, and having no green party representation during this time period coded as “0”. For legislatures the same coding system is used, with “1” representing green politicians serving in legislatures during this time and “0” representing no green party member in the legislature. The following variables and data sources are used:

Table 1: List of Variables and Sources

<i>Variable</i>	<i>Source</i>
1. <i>Electoral System (form of PR or non-proportional)</i>	<i>ACE. The Electoral Knowledge Network. “Comparative Data”²</i>
2. <i>Green Party Members in National Legislature (yes or no)</i>	<i>Compiled from data from European Greens, John Field, The Green Party of Aotearoa New Zealand, Gene Frankland; Paul Lacardie; and Benoit Rihoux³</i>
3. <i>Green Party Members in Cabinet (yes or no)</i>	<i>As for variable #2.</i>
4. <i>Environmental Sustainability Index 2005</i>	<i>Daniel C Esty., Marc Levy, Tanja Srebotnjak, and de, Alexander Sherbinin (2005). 2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship. New Haven: Yale Centre for Environmental Law and Policy, 2005</i>
5. <i>Change in carbon emissions per capita in each country between 1997 and 2003</i>	<i>Norris, Pippa. “Democracy Cross National Data Release 3.0 2009”.⁴</i>
6. <i>Change in electricity consumption per capita between 1997 and 2003.</i>	<i>As for variable # 4.</i>
7. <i>Change in % in share of world</i>	<i>As for variable # 4</i>

² ACE. The Electoral Knowledge Network. “Comparative Data <http://aceproject.org/epic-en/CDTable?question=ES005&view=country>

³ European Greens. “National Election results since 1979”. http://www.europeangreens.org/cms/default/dokbin/289/289025.national_election_results_since_1979@en.pdf and John Field. “The History of the Green Party”. The Green Party of Aotearoa New Zealand, 1996-2010 <http://www.greens.org.nz/page/history-green-party> and Gunnar Helgi Kristinsson, “The Icelandic Parliamentary election of 8 May 1999”. *West European Politics* 23, no.1, (January 2000), p187-194 and Gene Frankland; Paul Lacardie; and Benoit Rihoux. *Green parties in transition: the end of grass-roots democracy?* (Burlington, VT: Ashgate, 2008).

⁴ Norris, Pippa. “Democracy Cross National Data Release 3.0 2009”. John F. Kennedy School of Government, Harvard. <http://ksghome.harvard.edu/~pnorris/data/Data.htm>

<i>total carbon emissions between 1997 and 2003.</i>	
8. <i>Change in commercial energy usage per capita between 1997 and 2003.</i>	<i>As for variable # 4</i>
9. <i>Length of time in months to ratify Kyoto Protocol after December 1997.</i>	<i>United Nations Framework Convention on Climate Change. "Status of Ratification of the Kyoto Protocol".⁵</i>

This project will test these variables to determine if countries that had green parties in legislatures or cabinet during the studied time period would have been more likely to ratify the Kyoto Protocol as soon as possible. The environmental data measures the changes in five indicators between 1997 and 2003. 1997 was chosen because it was the year the Kyoto Protocol was open for signature. Thus, green parties in legislatures and cabinets were aware of its existence and the steps their countries would have to take to implement it which involved improving environmental conditions.

⁵ United Nations Framework Convention on Climate Change. "Status of Ratification of the Kyoto Protocol". <http://unfccc.int/playground/items/5524.php>.

1.1 Introduction to Electoral Systems

Electoral Systems are a means of translating votes into seats in legislatures, often based on geographical constituencies which may have different sized populations. Frequently the weight of each vote is proportional to the number of seats a party receives in the legislature. Thus in a Single Member Plurality electoral system a vote from an elector living in a sparsely populated rural area is worth more than one from an urban centre. In a proportional system, candidates are divided evenly among the electorate, so each vote carries the same weight. The International Institute for Democracy and Electoral Assistance reports that electoral systems are rarely chosen by design; instead they are often adopted from a colonial legacy or the influence of neighbours. Furthermore, they have often been chosen so that a particular political interest can gain a short term advantage.⁶

Most people divide electoral systems into plurality and proportional representation (PR). The general argument for plurality is that it produces stable governments more often than PR because it encourages a two-party system to develop which in turn is much more likely to produce a one party government. Proponents of SMP systems say this creates a much more stable government with fewer instances of spontaneous elections. To counter this, the obvious benefit of PR is that more and different opinions are represented in the government. The great debate is on which of these is more important. Political scientists tend to favour PR and in particular Single Transferable Vote, while established political parties prefer SMP systems.⁷ There have been very few studies done on green party members to determine where their preferences lie but one would hypothesize that they would prefer a system that allows them to win seats in the legislature and cabinet.⁸ To define proportional representational systems, Arend Lijphart suggests dividing them into two categories: List PR, where voters choose a list of

⁶ International Institute for Democracy and Electoral Assistance. *Electoral System Design: the new International IDEA handbook*. 2005

⁷ Arend Lijphart and Groffman, Bernard. *Choosing An Electoral System*. (Toronto: Praeger, 1984) p. 6.

⁸ Some examples are: Matthew Flinders. "Explaining Majoritarian Modification: the Politics of Electoral Reform in the United Kingdom and British Columbia". *International Political Science Review* 31, no. 1, (January 1, 2010),p. 41

James W. Lamare and Jack Vowles. 1996. "Party Interests, Public Opinion and Institutional Preferences: Electoral System Change in New Zealand". *Australian Journal of Political Science*. 31, no.3, pp.321-346. <http://www.informaworld.com/10.1080/10361149651085>.

candidates from a particular party, and single transferable vote (STV), where individuals are ranked by voters. List PR is then divided into “highest averages: divisor” and “largest remainders: quota”. Then they are further divided, depending on what divisor or quota system they employ.⁹

Most Western democracies use some form of proportional representation, however, Canada, Australia, the United Kingdom and the United States are notable exceptions. Although Canada’s Single Member Plurality (SMP) system has allowed numerous parties to be elected, the general rule in SMP systems is that two parties are developed and remain in power. However, using a referendum, New Zealand did successfully transition to a Mixed Member Proportional system from an SMP one and held its first PR election in 1996. Critics of Canada’s electoral system say it rewards regional-based protest parties such as the Bloc Quebecois whose agenda is not inclusive of all Canadians. It is also notable that there is an active electoral reform movement in Canadian provincial politics.

Green and other small parties seem to thrive in countries with proportional representation systems, as proven in this study. This may be because PR systems do not generally divide countries into geographic regions. One issue that does not seem to be region-specific in Canada is concern for the environment,. A moderate level of support for the green party is spread out across the country but because there is not a majority of supporters in any particular geographical district, the green candidate is unsuccessful. Although Canadians express alarm about climate change, the practice of meeting Kyoto Protocol targets has not been successful while many European countries with proportional representation systems have been able to make progress on the climate change issue.

⁹ Arend Lijphart. *Electoral Systems and Party Systems: a study of twenty seven democracies*. (Oxford: Oxford University Press, 1994). p. 153.

1.2 Introduction to Green Parties

The history of green parties is relatively short compared with well-known institutions such as the Canadian Liberal Party or Britain's Labour Party. Each state's political culture has shaped the development of its green party, although there have recently been global conferences to bring green party members from various countries together.

In The Promise of Green Politics, Douglas Torgerson examines the most successful green party to date-Germany's Die Grunen. He claims that their policies incorporate a long-term outlook of the future, that they present a "radical" agenda and were founded on the principles of "ecology, social responsibility, grassroots democracy and non-violence", and that they do not place themselves on the left or right but rather "in front", the justification being that environmental issues transcend ideology. Many scholars believe Die Grunen is a unique case as they have fused the radical and somewhat anarchist elements of the New Left movement with a belief in reformism for the German political system. In the United States and in other countries, there is a cleavage between radicalism and reformism in the environmental movement, but this observation does not apply to the German Greens. Torgerson notes that in 1985, Rudolphe Bahro left Die Grunen to start a fundamentalist green movement. Since this time, greens have critiqued the established political institutions in Germany but still maintained a reformist discourse which the author calls "radical reformism".¹⁰

The success of green parties at the national level in Europe and has led to numerous studies of small parties on that continent and what goals they want to achieve. John S. Dryzek wrote on the development of the environmental social movement and attempts to explain why some states are "greener" than others. The "inclusive" state attempts to accept the social movement of environmentalism into the state so that its followers can affect public policy.¹¹

¹⁰ Douglas Torgerson. *The Promise of Green Politics: Environmentalism and the Public Sphere*. (London: Duke University Press, 1999) pp. 36-40.

¹¹ John S. Dryzek. *Green States and Social Movements: environmentalism in the United States*. (New York: Oxford University Press, 2003)

Ferdinand Müller-Rommel noted in 1989 that there had been a value shift in European green parties. They had formed around the issue of nuclear energy programs, and were successful in having nuclear energy banned from Austria, but issue change led to global climate change (GCC) becoming a greater concern for the environmental movement.¹² Green parties are characterized by left wing politics, and a desire for peace in an egalitarian society. They also have a sympathetic orientation toward the developing world and they employ Poguntke's concept of grassroots decision making.

Ferdinand Muller-Rommel approaches the study of green parties with a comparative lens, drawing conclusions about green parties in Europe and New Zealand through his research into electoral system design. Muller-Rommel's text essentially looks at who votes green and where they live.¹³ Environmental outcomes or the consequences of voting green do not factor into this work.

European green parties have experienced varying degrees of success in national elections. In France early green party attempts at success were made 1974 when an "ecology list" was formed, but the electoral system also proved an obstacle. In Austria, the "United Greens" (VGOe) formed their own green reformist party with an individualist platform which was rather unique for Europe. They advocated a reduction in state intervention in social and economic policy and wanted deregulation and privatization of industry. A third of their party program was devoted to environmental issues and the characteristic that most other green parties possess- solidarity with the developing world- was not found in it. Austria also contained a second green party, called ALOe which supported radical change, but at an individual level and not a class-based, collective one.¹⁴

¹² Haerper in Müller-Rommel, Ferdinand. *New politics in Western Europe: The rise and success of green parties and alternative lists*. (Boulder: Westview Press, 1989), p. 35.

¹³ Ferdinand, Müller-Rommel, *New politics in Western Europe: The rise and success of green parties and alternative lists*. (Boulder: Westview Press, 1989), p. 5-15.

¹⁴ Haerper in Müller-Rommel, Ferdinand. (Boulder: Westview Press, 1989), p. 35

In Belgium in 1981, four greens were elected to the national Parliament. At the time of the printing of Muller-Rommel's book in 1989, the electoral system in New Zealand was a Single Member plurality one, and thus biased in favour of the larger parties. The green party essentially began in New Zealand in the late 1960s as the "Values Party", but a challenging hurdle for this group was that a party needed 15% of the vote before they could receive public funding. After the electoral system was changed, the New Zealand greens achieved electoral success.

Like Canada, Belgium has linguistic duality. However, Belgium has a proportional representation system instead of single member plurality. Flanders in the North is composed of Flemish speakers and Wallonia in the south is French. Thus, two green parties were formed in the 1970s and remain active and in parliament today: "Agalev" is Flemish and "Ecolo" is French and consequently due to the duality of its culture, Belgium has a rather fractionalized political system. At the time of Kris Deschouwer's writing, 11 parties sat in the lower house of the Belgium Parliament. There is also religious duality in Belgium between Catholics and the secularists. He also notes that support for greens is far greater in cities than in rural areas.¹⁵

The United Kingdom's green party has had a long and active history but like Canada's Green Party, it has never achieved national electoral success. The United Kingdom's Green party movement traces their origins to a group of committed activists and founders of the magazine the *Ecologist* in Coventry, England. They ran for Parliament in 1973, but were unable to win seats due to the nature of the UK district system which has conditions that are averse to helping small parties get elected, according to Lin Tabak.¹⁶

In the 1980s, green parties were beginning to shift their focus away from banning nuclear energy to the state of climate change. A major dilemma is that nuclear energy does not cause emissions which alter the earth's climate; however, with disasters like Chernobyl in the 1980s, green parties had to address the environmental danger that this

¹⁵ Kris Deschouwer in Ferdinand Müller-Rommel, *New Politics*, (Boulder: Westview Press, 1989), p. 39

¹⁶ Lin Tabak, "An Introduction to the European Green party and how you can play your part in it".http://www.europeangreens.org/cms/default/dokbin/257/257172.egp_supporters_introduction_to_green_eur@en.pdf

energy source poses and people, in turn, looked to green parties for guidance on energy supply issues. Other forms of energy do create carbon and other types of emissions and green parties had tough decisions to make on which type of energy to publically endorse.¹⁷

To summarize, green parties exist in a variety of cultures because environmental issues such as climate change are universal problems and people everywhere feel the need to live in a sustainable environment. To study the evolution of green parties it is necessary to look at comparative case studies because clearly what one group did in one state will have some effect on others, especially as globalization creates more connections between far flung populations. It is also important to study green party reaction to the Kyoto Protocol, as climate change is an issue that most green parties feel is extremely important.

1.3 Introduction to the Kyoto Protocol

In a study of per country carbon emissions, the Kyoto Protocol must be taken into account. The Protocol recognizes that carbon dioxide gases are responsible for global warming and are created by the burning of fossil fuels. Many developing states signed, although it has been noted that the industrialization stage that these states are currently in, is quite destructive to the environment and these countries also have many times the population that developed countries had when they industrialized. Many scholars have suggested that signing was simply a symbolic gesture, as several countries have increased carbon emissions as standards of living rise. Sheila Olmstead and Robert Stavins criticize the Protocol for setting goals which only apply to the short term, in particular the period between 2008 and 2012, and nearly all economists see it as insufficient to address the problem of climate change.¹⁸

The Kyoto Protocol was a product of the United Nations Framework Convention on Climate Change (UNFCCC) in 1997. A Protocol is a United Nations instrument that is less formal than a treaty; however, like a treaty, the Kyoto Protocol was open for signature in

¹⁷ Paul G. Harris. "Europe and the Politics and Foreign Policy of Climate Change" in Harris, Paul, ed. *Europe and Global Climate Change*, (Northampton: Edward Elgar Publishing, 2007), pp.3-40

¹⁸ Olmstead, Shelia and Stavins, Robert N. "An International Policy Architecture for the Post Kyoto Era". *American Economic Review* 96, no. 2, May 2006.

its first year from 1998-1999. As well as meeting a number of other conditions, the Annex I countries committed to reducing their greenhouse gas emission levels to at least 5 percent below 1990 levels between 2008 and 2012, but there are no specifications on how this must be achieved. The Annex I consists of the European Community and the 24 OECD (Organization of Economic Cooperation and Development) countries in 1992 plus the CEITs (“Countries with Economies in Transition”) with the exception of Yugoslavia.¹⁹ By signing and ratifying this Protocol, governments publically accepted the idea that anthropogenic climate change is harming the planet and they had to enact policies which would reduce greenhouse gas emissions. However, the United States refused to ratify, which made sceptics question the usefulness of the Protocol. They wondered how any tangible result could be produced from a Protocol that one of the world’s largest producers of greenhouse gas (GHG) emissions refused to be a party to. The Protocol finally entered into force on 16 February 2005, when 55 parties to the UNFCCC, accounting for 55% of global GHG emissions in 1990, had ratified.²⁰ The Kyoto Protocol does include binding targets for 37 industrialized countries and the European Union states.²¹

After attending the 1997 conference in Kyoto, Japan, government representatives had to take the proposal back to their own countries for approval and ratification. The Protocol is an example of “soft law” because there is no international enforcement mechanism but it depends on “hard law” within states in order to actually meet GHG reduction targets. European countries, though producers of fossil fuels, were some of the first to ratify the Protocol.

The Kyoto Protocol is an attempt to internationally regulate a global problem with serious consequences. However, its voluntary compliance aspect makes it a small step toward the goal of halting climate change. For the purposes of this study, A “Policy Climate” refers to the state of a society wherein conditions are right for developing policy on particular issues. This project examines how some states develop a “green

¹⁹ Oberthür,S; Ott, H; and Tarasofsky, RG. *The Kyoto Protocol: international climate policy for the 21st century*. (Wuppertal: Springer, 1999) pp. 33-35.

²⁰ United Nations Framework Convention on Climate Change. “Status of Ratification of the Kyoto Protocol”. <http://unfccc.int/playground/items/5524.php>.

²¹ United Nations Framework Convention on Climate Change. “Kyoto Protocol”. http://unfccc.int/kyoto_protocol/items/2830.php.

consciousness” through the election of green parties, by creating a dialogue about the Kyoto Protocol, and by beginning to make policies to address climate change. The International Energy Agency defines “renewable energy” as that which is “carbon free” or “carbon neutral” and can help countries meet targets set by the Kyoto Protocol.²² The most common assumption is that increases in GDP are the most significant correlated variable for the increase in CO₂ emissions which contribute to climate change. This poses a dilemma for policy makers as economics strives for progress marked by high GDP and thus higher standards of living, but the fact remains that this is altering the climate, perhaps disastrously. Nicholas Stern concludes that climate change is a significant threat to society, but not an inevitable disaster if steps are taken to reduce and eliminate it. He states that if nothing is done to prevent climate change, significant GDP loss will result and be greater than the losses incurred if policies which focused on renewable energy were introduced.²³

Paul Harris and the Intergovernmental Panel on Climate Change (IPCC) in their “Third Assessment Report” note the primary cause of climate change is aggregate carbon collected in the earth’s atmosphere and can be directly attributed to human action since the industrial revolution. In 1979, the first World Climate Conference was held and the IPCC was created in 1988. In 1990 the second World Climate Conference was held and the IPCC published their first assessment of the situation in response to the fears of scientists that human activity is drastically altering the global mean temperature. In December 1990 the United Nations established the International Negotiating Committee (INC) for the Framework Convention on Climate Change, and this was ratified by 50 states in 1994. In 1992 the Rio Earth Summit was held and the countries involved decided to reduce GHGs to 1990 levels by the year 2000. Not a single Annex I (or developed country) country actually achieved this. Five years after the Rio Summit, none of the states who had attended were reducing their GHG levels and in response to the fears of scientists that human activity is drastically altering the global climate, a number of nations developed the Kyoto Protocol in 1997.²⁴

²² International Energy Agency. “Energy Policies of IEA Countries: Germany 2007” OECD Review. 2008

²³ Nicholas Stern. (2006) “Stern Review: The Economics of Climate Change”.

Also try Lijphart, A and Groffman, B. *Electoral Laws and Their Political Consequences*. New York: Algora, 2003

²⁴ Paul G. Harris. “Europe and the Politics and Foreign Policy of Climate Change” in Harris, Paul, ed. *Europe and Global Climate Change*, (Northampton: Edward Elgar Publishing, 2007)pp. 3-40

Britain and Germany signed on to the largest cuts in greenhouse gas emissions below their 1990 levels, although Britain did not have green parties elected in Parliament. The United States demanded an emissions trading system, but the Bush Administration withdrew their support for the Kyoto Protocol in 2000, citing fears of economic damage. With the United States as one of the world's largest per capita polluters, many wondered if US withdrawal had crippled the protocol permanently. By 2001, the focus for the Annex I countries was on aiding developing countries in reducing emissions. Once again, a dilemma occurred because these countries said there had been no checks on the developed countries when they themselves industrialized. At the "Conference of the Parties" (COP 1) in 1995, the Berlin Mandate was created to advocate common but differentiated responsibility in this regard. For a long time, the Organization of Petroleum Exporting countries and the US had agreed that the science of climate change was uncertain. China and the G77 called for no action on the climate change issue, while the Alliance of Small Island States (AOSIS) called for immediate action, because as sea levels rise, these countries are threatened. In addition, Australia, a country with a first-past-the-post electoral system and which has never had a green party serve in Parliament, was granted permission to actually increase carbon emissions under the Kyoto Protocol.²⁵

After the ratification of the Kyoto Protocol and acceptance of its binding targets by many of the world's industrialized countries, pressure to reduce carbon dioxide (CO₂) emissions in the period between 2008 and 2012 has increased. Many countries have been successful in their attempts to do this, but unfortunately, many others have not and the problem has become worse. Harrison and Sundstrom delve into why this is in "The Comparative Politics of Climate Change". They note that after the international talks are over, policy decisions to curb GHGs are domestic in nature, and must reflect the interests of as much of the electorate as possible. One observation they make is that in 1997, the countries of the European Union chose to ratify the Kyoto Protocol, despite a deep ratification commitment to reduce GHG emissions. Australia did not ratify, even though it had a much smaller ratification commitment. The authors also note that in a world public opinion poll conducted in 2003, Western Europeans were much more concerned

²⁵ Paul G. Harris. "Europe and the Politics and Foreign Policy of Climate Change" in Harris, Paul, ed. *Europe and Global Climate Change* (Northampton: Edward Elgar Publishing, 2007), pp. 3-40

about climate change than residents of Russia, Canada and the United States, countries where green politicians have never achieved office despite many years of campaigning.²⁶

Adherence to the commitment to reduce GHGs is supported by policy making by national governments. When governments see the environment as a high priority, policies such as those encouraging the development of renewable energy or carbon capture and storage are more likely to occur. Green parties are advocating for this, but seem to only possess a voice in countries with proportional representation (PR) electoral systems.

To examine how countries are implementing the Kyoto Protocol, a study of the change in carbon emissions by country can be conducted. The Protocol recognizes that anthropogenic greenhouse gases such as carbon and sulphur dioxide are responsible for global warming and are created by the burning of fossil fuels for transport and electricity purposes, raising livestock and manufacturing. In addition, many developing states signed the Protocol but not China, one of the world's major polluters. Vocal critics note that these states are currently in an industrialization stage that is quite destructive to the environment and these countries also have many times the population that developed countries had when they industrialized. Many scholars have suggested that signing was simply a symbolic gesture, as several countries have increased carbon emissions as standards of living rise.

1.4 Framework for Analysis

The purpose of this paper is to show that two political preconditions have a quantifiable effect on the adherence to the Kyoto Protocol and thus the environmental quality of countries around the world. For each country, the variables: type of electoral system, existence of green parties in national legislatures and cabinet, environmental quality, and time taken to ratify the Kyoto Protocol since 1997 will be examined. It will be noted if the independent variables of type of electoral system, and green parties in both the legislature and cabinet have an effect on the time taken to ratify the Kyoto Protocol.

²⁶ Kathryn Harrison and Lisa McIntosh Sundstrom. "The Comparative Politics of Climate Change". *Global Environmental Politics*. 7,no.4, November 2007, pp. 1-18

This project will hypothesize that in Western democracies proportional representation systems allow green parties to be elected and once in legislatures and cabinets these parties might contribute to signing and ratifying the Kyoto Protocol and improvement in environmental outcomes. Furthermore, countries with green parties in cabinet will be even more likely to quickly ratify the Kyoto Protocol and improve environmental conditions. To put it another way PR seems to be necessary for a “green” government, though the research may prove otherwise.

1.5 Research Questions

This project will attempt to answer a series of questions. Firstly, are proportional representation systems positively correlated with green party presence in the legislature and cabinet? Secondly, can proportional representation systems and green party presence in cabinet and the legislature be associated with better Environmental Sustainability Index (ESI) scores? In addition, does PR matter in terms of GHG levels and energy consumption? To put it another way, does a country with a proportional representation system score better in terms of lowering GHG emissions and energy consumption? Do green parties have an effect on GHG emissions and energy consumption? To put it another way, can a small party actually affect policy in a meaningful way so that it creates meaningful results? Will a country with green parties in the legislature or cabinet be more likely to quickly ratify the Protocol and reduce GHG emissions and energy consumption? Is a country with green parties in the cabinet more effective at this?

Does PR have an effect on the number of months it took to ratify the Kyoto Protocol after December 1997? Do green parties in legislature and in cabinet positions have an effect on the time it took to ratify the Kyoto Protocol? This will be tested by examining countries with PR, green parties in legislatures, and in cabinet and the time it took a state to ratify the Kyoto Protocol since December 1997.

In order to address the questions, this project essentially tests two groups of independent variables against two groups of dependent variables. The first group of dependent variables examines Environmental Sustainability, changes in GHG emission levels, and changes in energy consumption. These may be an indicator of policy action

which happened before ratification of the Kyoto Protocol because of the environmentalist agenda of green party members in cabinets and legislatures. The second dependent variable is a policy commitment to do something about GCC, as specified in this project as the number of months to ratify the Kyoto Protocol after December 1997. In this case, the policy commitment to act comes after the positive environmental changes, perhaps because politicians can see that a goal is both achievable and will make them more popular at election time. The independent variables for this project are the Environmental Sustainability Index 2005, the change in carbon emissions per capita in each country between 1997 and 2003, the change in electricity consumption per capita between 1997 and 2003, the change in % in share of world total carbon emissions between 1997 and 2003, the change in commercial energy usage per capita between 1997 and 2003, and the length of time to ratify Kyoto after December 1997.

This project will include quantitative analysis of proportional representation systems in developed countries, how they help green parties attain power and if these preconditions affect environmental outcomes and the signing and ratification of the Kyoto Protocol. The ways in which these factors affect the likelihood that a country will sign and ratify the Kyoto Protocol and the time it takes to do this will be taken into account. The assessment of environmental conditions follows the logic that if a state has ratified, it is more likely to enact policies to attempt to lower greenhouse gas emissions. If states have green parties in their legislatures and cabinet they may be even more likely to enact these policies. Literature review and quantitative statistical analysis using Excel and SPSS will be used to examine these variables. Green parties will be examined to determine if, once in power, they focused their energies on the Kyoto Protocol, and thus believe it is an effective method of addressing climate change.

2: GENERAL LITERATURE REVIEW

The literature review examines how others define what the purpose and mandate of a green party is and outlines some theories of why they have achieved electoral representation against substantial odds. This review will also examine what scholars believe is the connection between electoral systems, green parties and the Kyoto protocol and if these groups are really successful in achieving positive environmental outcomes. The central question then becomes do proportional representation systems lead to green parties being elected which then leads to an adherence to the Kyoto Protocol as shown by better environmental outcomes? Electoral systems will be examined first and then green parties. Green political parties are those which place environmental issues at the forefront of their policy agenda. Unfortunately, in countries with first-past-the-post, majoritarian or Single Member Plurality electoral systems, these parties are rarely elected, although they may receive many votes. Green parties in legislatures, (and even more so in cabinets), might push legislators and their constituencies to enact and support policies which could lead to better environmental outcomes. However, due to a lesser level of support for environmental parties, they might only be successful in this venture in countries where the electoral system allows them to enter positions in the legislature with a small number of votes. One goal of this paper is to answer the question is there a link between Proportional Representation electoral systems and green parties being elected and does the presence of these factors make countries adhere to the Kyoto Protocol in a more timely way ?

2.1 Electoral system development

Ferdinand Muller-Rommel is one of the most prolific scholars in this area and consistently explains green party development and election to national parliaments as a result of institutional factors such as electoral systems.²⁷ As will be proven in this study, Green and other small parties thrive in countries with proportional representation systems and there are theories about why PR systems exist in some countries yet not in others. Cusack, Iversen and Soskice have examined the origins of electoral systems in the industrialized democracies. They distinguish between highly organized and unorganized economies at the end of the 19th century, as well as societies with craft guild traditions and those with unions. They found that PR systems developed in highly specialized economies where traditional craft guilds with apprenticeship systems already addressed collective goals. In countries with majoritarian systems there was no specialization of the economy and at the turn of the 20th century, industrial unions formed to protect employee rights from employers. The architects of the electoral systems in these countries knew that workers were not organized enough to collectively vote left leaning parties into legislatures, Thus, FPTP seemed like the most logical choice for the existing elite who wanted parties elected which represented the needs of businesses, not the needs of employees.²⁸

Rokkan's explanation, which is the standard, for the development of the proportional representation system was that PR was adopted as a method for a divided right to defend a clear separation of the upper and working classes against the even distribution ideals of the left which were gaining popularity in Europe. However, Cusack, Iversen and Soskice find evidence that PR in fact strengthens left-wing parties and economic redistribution and PR developed in industrialized countries with skilled workers in labour unions and craft guilds. England, for example, did not have this craft

²⁷ Ferdinand Muller-Rommel. "The Lifespan and Political Performance of Green Parties in Western Europe" *Environmental Politics*, 11, no. 1, (Spring 2002), pp 1 - 16

²⁸ Thomas, R Cusack; Torben Iversen, and David Soskice. "Economic Interests and the Origins of Electoral Systems". *American Political Science Review*.100, no. 3, (August 2007), pp 373-391

guild tradition, or at least it had vanished many years before, so it developed a plurality system.²⁹

The International Institute for Democracy and Electoral Assistance notes that electoral systems are rarely chosen by design; instead they are often adopted from a colonial legacy or the influence of neighbouring states. Furthermore, they have often been chosen so that a particular political interest can gain a short term advantage.³⁰ Miranda Schreurs links the success of Green parties in legislatures with proportional representation systems and notes that the United States, with its single member plurality system, has never had a member of a Green party attain office.³¹

2.2 What does the electoral system say about the status of a green party?

This project identifies 35 countries, all which have green parties, yet with the exception of France, only in those with PR systems have green parties achieved electoral success. There are various theories as to why this is so and various examples from around the world that support these theories.

The United Kingdom is a good example of a country with a strong ecological movement which lacks the electoral system needed for it to win any seats, even when the green party branches out from purely environmental issues. In the 2005 election, the UK Greens promised to provide 40% of energy from renewable sources by 2020, but they also strongly opposed the Iraq war. Although public opinion was divided on the Iraq war, the Liberal Democrats also opposed it, and due to the first-past-the-post system, the greens did not win any seats.³² The greens actually won about 40,000 more votes than the Democratic Unionists, who received nine seats in parliament, however, due to the electoral system structure, no green representative was elected.³³

²⁹ Cusack, Thomas, R.; Iversen, Torben; and Soskice, David. "Economic Interests and the Origins of Electoral Systems". *American Political Science Review*. 100, no. 3, (August 2007). Pp.373-391

³⁰ International Institute for Democracy and Electoral Assistance. "Electoral System Design: the new International IDEA handbook". 2005, pp 3-17

³¹ Schreurs, Miranda A. *Environmental Politics in Japan, Germany and the United States*. (New York: Cambridge University Press, 2002).

³² Neil Carter and Christopher Rootes. "The Environment and Greens in the 2005 elections in Britain". *Environmental Politics*, 15, no.3, pp. 473-478.

³³"2005 UK General Election Results Summary". <http://www.ukpolitical.info/2005.htm>.

A comparative look at German and Canadian cases can offer important lessons to green parties who want to achieve representation. In 2008 the green party of Canada won almost seven percent of the popular vote without receiving a single seat in the House of Commons. This was because the almost one million voters who selected green were spread out across many geographic ridings and the SMP system meant that not one of the candidates had a plurality of the vote in her riding.³⁴ To contrast, Geoffrey Roberts shows that Germany's electoral system was extremely important in helping the Greens get elected. Germany has a mixed member proportional system. A German political party needs only 5% of the votes cast for a party to have Bundestag representation. Each person gets two votes: one for a constituency candidate and one for a party list. Voters are also permitted to choose representation from two different parties. The German Greens were first elected in 1983 and have retained seats ever since. Today they are seen as one of the most powerful green parties in the world.³⁵

Demonstrating that proportional representation systems aid green parties is the case of New Zealand, which changed electoral systems during the period studied and then had green party politicians elected. New Zealand is geographically isolated and has a small population, but also a strong environmentalist presence. Rihoux and Rudig believe electoral system change was the reason greens were able to become Members of Parliament in New Zealand. After the electoral system was changed, greens went from being a very minor party to a potential coalition member and helped to provide the legislative majority due to the adoption of a Mixed Member Proportional representation system. Essentially this system copied Germany's: each voter received two votes: one for a member of parliament and one for a party. For many years before this, New Zealand had had a first-past-the-post system and had been two-party dominant.³⁶

There has been relatively little research done on the linkage between the electoral system and the presence of green parties in the legislature. Kitschelt and Hellemans surveyed Belgium green party members in 1990. Through one-on-one interviews they found that the more activist members of the party felt rather alienated because of the

³⁴ Andrew Steele. "Not Quite a Green Machine". *Globe and Mail*. October 15, 2008

³⁵ Geoffrey Roberts. *German Electoral Politics*. (New York: Manchester University Press, 2006)

³⁶ Jack Vowles. *Proportional Representation on Trial*. (Auckland: Auckland University Press, 2002). Pp.1-21

compromises the party was forced to make once it entered the legislature. However, they did not examine the structural components of the Belgium political system which initially allowed the greens to enter government.³⁷

Alan Cairns conducted one of the first important studies of the Canadian electoral system in 1968 and his observations remain accurate to this day. He notes that in Canada, the number of votes does not translate proportionately into the same numbers of seats in the legislature. For example, the NDP party may receive votes all across Canada but often do not win seats because they do not have the most votes in a particular constituency. As a small party and one that did not even exist when Cairns published this article, the Green Party seems to reflect this situation in that they receive support from many regions but not enough to win seats.³⁸

As has been noted, The Canadian Green Party, which, while fielding candidates in all ridings, has a difficult time winning seats. As one of the few scholars researching the Canadian green party, Cara Camcastle shows that they provide a specific plan to reduce GHG emissions with a cap-and-trade system. To cover the higher costs of fuel associated with this, lower-income individuals and families would be given a tax break, which seems to help confirm the Iversen and Soskice thesis mentioned below. Camcastle also found most members of the GPC are middle class university educated individuals and that more of the GPC's members come from the private sector and the self employed than from the public sector, but she does not explore their thoughts on the Canadian electoral system.³⁹ Despite these important studies, there is very little literature available which surveys green party members' opinions on the Kyoto protocol or the electoral system in their home countries.

Iversen and Soskice wrote about how electoral systems shape the nature of political parties and the makeup of the coalitions that govern the state. They argue that centre-left governments dominate in PR systems and also that PR systems redistribute tax dollars more than FPTP systems. One interesting test done in their 2006 article is to add up the

³⁷ Herbert Kitschelt and Staf Hellemans. *Beyond the European Left: ideology and political action in the Belgium green party*. (Durham: Duke University Press, 1990)

³⁸ Cairns, Alan. "The Electoral system and the Party System in Canada, 1921-1965". *Canadian Journal of Political Science*. March 1968.

³⁹ Cara Camcastle. "The Green Party of Canada in Political Space and the New Middle Class Thesis". *Environmental Politics* 16, no.4, (August 2007) , pp. 625-642

number of years right and left parties have dominated governments for both proportional and majoritarian systems. Not surprisingly, in majoritarian systems, right of spectrum governments comprise 76% of all governments since World War II, while in PR systems, this shrinks to just 26%.⁴⁰ This corroborates the project hypothesis that green parties are more successful in proportional representation systems.

2.3 Inglehart's post materialism thesis and the rise of the politically minded environmentalist

With the publication of the 700-page Stern Review by the Treasury Board of the United Kingdom, the climate change issue appears to move firmly into the realm of mainstream governance.⁴¹ But this was not always the case. Ronald Inglehart's important work on post-materialism can partially explain the rise in popularity of green parties and the increase in mass affluence and salience of environmental issues, which encourages support for the Kyoto Protocol. Inglehart explains that with material needs addressed by the social welfare state in the 1960s and 70s, citizens of developed countries, especially those born after World War II, focused more on values like aesthetics, esteem and belonging to a social network. Consequently, he found other issues they supported and wanted the government to attend to, included the state of the environment, and in particular, abolishing nuclear proliferation. This shift in values in developed countries was well documented and remains an important theory for explaining green party success today. Following up on his research of the 1970s, Inglehart also explains value shift from 1970 to 2006 to determine what has changed. He claims the *scarcity hypothesis* must be interpreted with the *socialization hypothesis*. For these environmental activists, it was not simply that there was a post-war lack of scarcity in Western society, but also that citizens had been socialized within the environmental movement and that establishing new parties

⁴⁰ Iversen, Torben; and Soskice, David. "Electoral Institutions and the Politics of Coalitions: why some democracies redistribute more than others". *American Political Science Review*.100, no.2. (May 2006).pp 165-181.

⁴¹ Nicholas Stern .*The Stern Review: The Economics of Climate Change*. (London: Great Britain Treasury, 2006).

was seen as an effective method of achieving radical policy goals. This is important for this study because 1970-2006 were the formative years for green parties.⁴²

Stephen Bernstein has studied why some norms that are articulated by the green movement are selected over others to define policy making behaviour. His explanation is a “socio-evolutionary” one, focusing on the shift in environmental governance over the last thirty years. He points to a “surprising convergence” of liberal economic and environmental norms which he calls “liberal environmentalism”. Thus, due to problems like global climate change which according to Stern, clearly have a negative economic impact, the idea of individual gains from a liberal economic agenda have to be reconciled with the fact that healthy economies depend on a healthy environment, a collective good. In terms of the broader scope of this project involving the examination of 33 countries, Bernstein’s theory of “liberal environmentalism” fits the variables being tested. Higher levels of pollution will be disastrous for the global economy in the long term. Bernstein certainly agrees with the Neo-Gramscian perspective that a dominant class shapes international norms, but he claims no Gramscian approach takes the environment into account and that instead there has been a change in attitudes of the average voter.⁴³ Richardson and Rootes have also noted the increased salience in Europe of environmental issues, beginning in the late 1980s, which translated into more votes for green parties and seems to corroborate Inglehart’s thesis.⁴⁴

If Inglehart’s post materialism thesis is accurate, mass opinion has not remained static but has been rapidly moving toward environmental concerns and other non-materialistic values. Thus mass opinion is beginning to lean toward worry about issues such as climate change and the desire for governments to rectify this somehow.

According to Mogens Pedersen, green parties have to follow a party-lifespan model. In Pedersen’s *party lifespan approach*, he claims parties have to pass through four distinct phases. For the purposes of his project, Pedersen’s *threshold of representation* and *threshold of relevance* will be most important. The *threshold of relevance* examines

⁴² Ronald Inglehart. “Changing Values Among Western Publics From 1970 to 2006”. *West European Politics* 31, no 1-21-2). (January-March 2008). Pp.130-146.

⁴³ Bernstein, Stephen. “Ideas, Social Structure and the Compromise of Liberal Environmentalism”. *European Journal of International Relations*. 6; (2000), p. 464

⁴⁴ Richardson, Dick and Rootes, Chris, eds. *The Green Challenge: the development of Green Parties in Europe*. (London: Routledge, 1995).p. 43

if the party, once in government, has had a meaningful impact on policy-making.⁴⁵ By studying states where green parties have had success, we can see if these politicians have actually acted on their convictions and produced better environmental outcomes.

2.4 Coalition Theory and the reality of green party behaviour in legislatures and cabinet

Coalition theory describes the behaviour of parties which typically receive a smaller vote share, such as the greens. Coalitions of smaller parties form in order to enter government, to block bills within legislatures, and to reach compromise on policymaking in cabinets. If a coalition is formed before an election, the green party may publically side with another small party and ask the voters to choose either. Thus, a compromise between the two groups on party platform must be reached. In many European countries, both cabinet and the legislature contain coalitions. A coalition in the legislature consists of two or more parties cooperating with each other to block policy proposals from cabinet, while a coalition in cabinet consists of a number of parties attempting to reach a compromise on policymaking. Due to their smaller vote share, green parties have been forced to work in coalitions. A green party may be elected on the promise of improving environmental quality but their ability to enact environmentally friendly policy once in office may be severely limited by their coalition position. Benoit Rihoux and Wolfgang Rudig claim the least studied aspect of green parties is what they actually do while in power.⁴⁶

Many green party scholars would say that coalition building, or the series of deals and compromises a green party must make both before and after elections, is a characteristic of European politics. Benoit Rihoux and Wolfgang Rudig have conducted in depth studies of Europe's green parties which involve qualitative interviews of green politicians in order to gain new insight into their involvement as coalition partners. They found that coalition theory explains why some green parties are in power, but is not true for the entirety of European countries. In Western European elections, green parties have enough electoral support that they do not need to cooperate with the other smaller parties to enter the government; however, they do have to work with them once they are elected.

⁴⁵ Mogens Pedersen. "Towards a New Typology of Party Lifespans and Minor Parties". *Scandinavian Political Studies*. 5:1.pp 1-16.

⁴⁶ Benoit Rihoux and Wolfgang Rudig. "Analysing Greens in Power: setting the agenda". *European Journal of Political Research* 45 (2006). Pp 1-33

A major difference between the green parties of Eastern and Western Europe is that they prefer to form coalitions before elections in Eastern Europe, whereas they tend to form coalitions after being elected in Western European countries. There are 2 suggestions why: the type of electoral system in Western Europe may be more beneficial for greens or there may be more voters who are primarily supporters of green parties.⁴⁷ This is congruent with Jae-Jae Spoon's thesis as well. These countries may also have quicker ratification of the Kyoto Protocol and better environmental outcomes.⁴⁸

Green Parties, although more popular in Europe than in North America, have consistently served as minor parties in legislatures.⁴⁹ As the minor party, they are forced to work in coalitions. Nicole Bolleyer has studied how small parties interact with their larger coalition partners in European governments. As coalition partners, Bolleyer argues that the more dominant player or "pivotal position" in a coalition is the party with the centralist ideology, and that the minor player is always the one with a more right or left agenda. This is because the majority of the voters will have moderate political ideologies. A small party in the formation phase of a coalition must address four factors: the number of coalition alternatives, the security to enter government, the visibility of each participant's bargaining power and the predictability of the formation process. Once the small party is ensconced in the legislature as part of a coalition in the coalition phase, it still needs to consider the presence of alternative coalitions, the concessions received during coalition formation and the internal interaction mode which can be either bargaining or hierarchy, supported by the number and relative sizes of coalition partners.⁵⁰ Thus, in order to stay in the legislature and part of a coalition, green politicians may have to follow the majority parties, who may see the economic downside of limiting greenhouse gas emissions.

⁴⁷ Benoit Rihoux and Wolfgang Rudig. "Analysing Greens in Power: setting the agenda". *European Journal of Political Research* 45 (2006). Pp 1-33

⁴⁸ Jae Jae Spoon. "Catch-All For All: Behaviour and Policy Preferences of the British and French Green Parties". Paper prepared for presentation at the "Kirchheimer Reconsidered: Applications and Implications of the Catch - All Thesis Forty Years Later" Conference, University of Iowa, July 26 - 28, 2007

⁴⁹ Jae Jae Spoon. "Catch-All For All: Behaviour and Policy Preferences of the British and French Green Parties". Paper prepared for presentation at the "Kirchheimer Reconsidered: Applications and Implications of the Catch - All Thesis Forty Years Later" Conference, University of Iowa, July 26 - 28, 2007

⁵⁰ Nicole Bolleyer. "Small Parties: from party pledges to government policy". *West European Politics* 30, no. 1, (January 2007). Pp 121-147

Since this project will test the strength of association between green party members in cabinet and several dependent variables, it is important to assess how these politicians interact in cabinet and as coalition partners once elected. Very few green party politicians have ever become cabinet ministers but it is not unheard of, and it is worth studying, although very few studies exist of green party politicians in cabinets in national governments. Jean Blondel has interviewed cabinet ministers about their levels of satisfaction; however the author did not manage to interview cabinet ministers from green parties. The author found that ministers from coalition governments are more active as departmental heads than ministers from single party governments, although obviously, there has never been an all-green party government. Martin and Vanberg agree with this position. They state that in modern governments, with the complexity of issues that arise and the specialization of cabinet ministers, policymaking is left to specific ministries. The legislature then acts as a check. If bills are too controversial, (reflecting some aspect of a smaller party's ideology for example), they will not be passed by the legislature. Thus, this check forces cabinet ministers to take a more moderate approach to policymaking.⁵¹

Wolfgang Rudig explores the challenges facing green party members who serve in cabinet due to their smaller numbers. In Slovenia, for example, a green minister of the environment attempted to ban nuclear power in the 1990s, but economic decline exacerbated other problems which the legislature had to focus on instead. This minister eventually switched parties. In the Ukraine, another green environment minister attempted to focus on the nuclear power issue, but in this post-Soviet country, nuclear power began to be seen as a major asset in the 1990s. Rudig studies the few cases where green party members have become cabinet ministers and notes they have had to become rather conciliatory on policy position in countries such as Finland and Italy. However, in Sweden, green party members in the legislature and cabinet were able to bargain with the ruling Social Democrats to be given more jurisdiction over the environment, gender equality and economic decisions,⁵²

Jae-Jae Spoon states that as a “niche” party with a unique ideological stance greens have been successful in being elected to legislatures and cabinet positions because of

⁵¹ Lanny W. Martin and George Vanberg. “Policing the Bargain: Coalition Government and Parliamentary Scrutiny” *American Journal of Political Science*, Vol. 48, No. 1 (January 2004), pp. 13-27.

⁵² Wolfgang Rudig. “Between Ecotopia and Disillusionment”. *Environment*;44, no. 3, (April 2002), p.22

their appeal to a certain group of voters, not because they modified their behaviour to become “catch-all” parties. Thus, they have not entered cabinet and legislature positions with the intention of moderating a policy position to suit the other coalition members, because as Spoon states, they are thinking ahead to the next election and the satisfaction of green voters.⁵³

Muller-Rommel’s 2002 analysis of European green parties came to the conclusion that green parties are increasing in popularity and that there are varied differences between them from country to country. They also are more likely to achieve electoral success if they already hold elected office in particular countries because they are more visible as a party and the electorate can see how they meet the challenges of working in government. Strong green parties, (or those that have achieved the *threshold of representation* and possibly the *threshold of relevance*), exist for example, in Belgium and Germany, while weak ones exist in France, Italy and the United Kingdom. Muller-Rommel notes that once they had achieved the threshold of representation, green parties were unable to focus solely on their environmental policy agenda due to budget constraints and never achieved the threshold of relevance.⁵⁴

To Iversen and Soskice, the electoral system is the most important predictor of coalition and thus green party behaviour because greens side with the left in coalitions and PR systems create more leftist governments. These authors would agree with Bolleyer’s centrist ideology theory. They believe that a coalition can swing more to the left or right in terms of policy-making once they have been elected. In their article, they attempted to understand why some democracies redistribute more than others and why some democracies consistently elect leftist governments and others, more right-of-spectrum governments. They determine that parties represent socio-economic classes, which they functionally divide into “lower”, “middle” and “high”. In plurality systems, a centre-right party is more likely to win and redistribute less to the lower socio-economic class. They also believe that in non-PR systems, the winning party is always the one that

⁵³ Jae Jae Spoon. “Catch-All For All: Behaviour and Policy Preferences of the British and French Green Parties”. Paper prepared for presentation at the “Kirchheimer Reconsidered: Applications and Implications of the Catch - All Thesis Forty Years Later” Conference, University of Iowa, July 26 - 28, 2007

⁵⁴ Ferdinand Muller-Rommel. “The Lifespan and Political Performance of Green Parties in Western Europe”. *Environmental Politics* 11, no. 1, (Spring 2002), p.1-11.

appears the most moderate because the majority of the voters have moderate views.⁵⁵ Poguntke believes that greens, once in power, had to accept the status quo in the legislature without being able to implement their own agenda. As coalition partners in legislatures and cabinets, this makes them susceptible to the wishes of the larger party.⁵⁶ The PR system allows multiple interests to be represented, but if one of these parties represents a niche interest, it will have to moderate its stance on policy once it has entered into a coalition arrangement whether this happens before the election, in the legislature, or in the cabinet.

2.5 The Kyoto Protocol in theory and green party effect on it

Why do the governments of states choose to sign on to international treaties like Kyoto? Essentially there must be a benefit which is higher than the potential economic cost of limiting greenhouse gas emissions and the political cost of trying to get industries to do this. This fits with the hypothesis of this project as well, because the stated goal of a green party is to protect the environment. Also, the object of proportional representation is to have the wishes of more of the electorate realized which does include industrial interests but also post material environmentalist interests. Nested game theory states that in fact, greens can be successful and are getting state governments to sign on to protocol.⁵⁷

The Kyoto Protocol, being an international treaty, is based on voluntary compliance and has no enforcement mechanism therefore it can be classified as “soft law”. The costs and benefits of ratifying Kyoto are not as immediately tangible, as for instance, a government being defeated in a vote of no-confidence. It is up to states to make policy that is in line with its objectives, and thus ecologically oriented political parties still have a role to play in its implementation. Geoffrey Garrett believes that despite international agreements such as Kyoto, national governments still possess a lot

⁵⁵ Torben Iversen and David Soskice. “Electoral Institutions and the Politics of Coalitions: why some democracies redistribute more than others” *American Political Science Review* 100, no.2 (May 2006), 165-181.

⁵⁶ Poguntke, Thomas. “Green Parties in National Governments: from protest to acquiescence?” In Muller-Rommel, Ferdinand and Poguntke, Thomas; eds. *Green Parties in National Governments*. (London: Frank Cass, 2002)

⁵⁷ Michael Finus. “Game Theory and International Environmental Co-operation: A Survey with an Application to the Kyoto-Protocol”, 2000. Fondazione Eni Enrico Mattei

of autonomy over policy choices and proves this point through an analysis of the political power of the left in the era of global markets.⁵⁸ Thus, even though countries may sign the Kyoto Protocol that does not necessarily mean the government in power will follow it. This is plainly obvious when examining the data on GHGs from Annex I countries.

To test the theory that left-wing and green governments lowered pollution levels, Eric Neumayer used a time series analysis of 21 OECD countries. He found that in fact, green party strength in the legislature is correlated with lower pollution levels and that coalitions in Europe have formed between these green parties and left wing parties. Neumayer does not mention the Kyoto Protocol as his study focuses on the period from 1990 to 1999, and he claims European Union decisions on pollution management are made at the national level.⁵⁹

2.6 How Game theory and “nested games” explain the Kyoto Protocol

The Kyoto protocol, due to its voluntary nature, makes politicians and industry alike wary of the possible economic implications of limiting greenhouse gas emissions when no other country will, and the uncertainty of outcomes from it. The Kyoto protocol is an example of a “nested game” because international politics must be reconciled with domestic compromises. It can be explained by nested game theory which explains how governments coordinate between international obligations and domestic policy. Nash’s classic Prisoner’s Dilemma assumes the actors cannot learn new information about the choices of other actors and are not playing an iterated game. George Tsebelis employs the theory of “nested games” to determine why political actors would make an apparently suboptimal choice. He argues that in democracies, games are not played in isolation. In fact, political actors are playing a number of games and each one has some effect on the others. The apparently suboptimal result of government action against climate change is that it may limit the efficiency of the market, but it may also have politically beneficial outcomes.⁶⁰ By agreeing to reduce greenhouse gas emissions through the mechanisms of

⁵⁸ Geoffrey Garrett. *Partisan Politics in the Global Economy* (New York: Cambridge University Press, 1998), 5-25 and 39

⁵⁹ Eric Neumayer. “Are left-wing party strength and corporatism good for the Environment? Evidence from panel analysis of air pollution in OECD countries”. *Ecological Economics* 45,2003, p. 203- 220

⁶⁰ Tsebelis, George. *Nested games: rational choice in comparative politics*. Published Berkeley : University of California Press, 1990. P. 5-9

the Kyoto Protocol, governments may cause economic damage at first, but ultimately improve environmental conditions. If the government is made up of popular green party politicians these improved environmental conditions may guarantee re-election.

Using game theory, political scientists ask what conditions are necessary within states and between states to ratify an international treaty. Michael Finus notes that when countries do not cooperate and sign International Environmental Agreements (IEAs), they maximize the negative effects of atmospheric pollution, not only in their countries but in all others as well. Thus, from a worldwide perspective, cooperating in IEA provides more benefits than detrimental costs of limiting greenhouse gas emissions. However, this assumes that the vast majority of countries follow these standards. Since there is no enforcement mechanism in an IEA, each party will try to behave rationally but also to maximize individual benefit. If states cooperate, there may also be no guarantee that the benefits will apply homogenously across all countries. This is the argument made by developing countries, (except for the Alliance of Small Island States), AOSIS, who are in the process of industrializing and do not want their emissions to be curbed. The AOSIS has been asking countries to take a firm stance on climate change, as rising sea levels caused by melting ice and extreme weather patterns are threatening their existence⁶¹

2.7 What factors affect a country's environmental performance?

The link between environmental outcomes and policy has been studied, but not nearly as comprehensively as one would suspect. In the past few decades, political scientists have attempted to analyze environmental policy, but as Detlef Jahn explains, there has been a lack of scholarship on the connection between environmental policy and societal impact. Jahn compared 18 European democracies and found that while economic factors like GDP and development factors like level of industrialization affect a country's environmental performance, political factors are important as well. Jahn agrees with Crepez that neo-corporatist countries and welfare states are more likely to have a positive impact on the environment relative to other developed countries, however, he also believes, as will be shown in this study, that actors such as Green parties have a great

⁶¹ Michael Finus. "Game Theory and International Environmental Co-operation: A Survey with an Application to the Kyoto-Protocol". 2000. Fondazione Eni Enrico Mattei

influence as well.⁶² Scruggs has also compared environmental performance using multiple indicators in seventeen western countries since 1970. One important conclusion he makes is that higher levels of neo corporatism have a significant positive effect on environmental performance.⁶³

Green party platforms often include a focus on renewable energy and although there are many green party case studies, particularly of Germany, the examination of cross-national substantive policy impact by greens serving in the legislature has not yet been pursued extensively by scholars. Neumayer seems to come closest to this goal.⁶⁴ In 2006 Rudig believed scholars still needed to wait a few years before a quantitative study of the impact of green party government formation could be implemented.⁶⁵ Today, in 2010, green parties have been in power long enough to examine the quantifiable results of their progress.

To explain why some states have signed the Kyoto Protocol and others have not, Keleman and Vogel use the regulatory politics perspective to link domestic politics to adherence to international regimes. In countries with a strong environmentalist presence, where seats are filled by green parties in the national legislature, domestic environmental standards tend to be more stringent and there is more pressure from both the government and electorate to sign on to international treaties.⁶⁶

Since the ratification of the Kyoto Protocol and acceptance of its binding targets by many of the world's industrialized countries, pressure to reduce carbon dioxide (CO₂) emissions in the period between 2008 and 2012 has increased. Many countries have been successful in their attempts to do this, but unfortunately, many others have not and the problem has become worse. Harrison and Sundstrom delve into why this is in "The

⁶²Jahn, Detlef. "Environmental Performance and Policy Regimes: Explaining Variations in 18 OECD Countries". *Policy Science* 31, no 2, 1998. p 107-133

⁶³Lyle Scruggs. *Sustaining Abundance: Environmental Performance in Industrial Democracies*. Cambridge: Cambridge University Press: 2003. 14

⁶⁴Eric Neumayer. "Are left-wing party strength and corporatism good for the environment? Evidence from panel analysis of air pollution in OECD countries". *Ecological Economics* 45, 2003, p. 203- 220.

⁶⁵Wolfgang Rudig. "Is Government Good for greens? Comparing the electoral effects of government participation in Western and East-Central Europe". *European Journal of Political Research* 45, 2006, p 127-154.

⁶⁶Vogel, David and R. Daniel Kelemen. "Trading Places: the US and EU in international environmental politics", MS, Rutgers University, 2007.

Comparative Politics of Climate Change”. They note that after the international talks are over, policy decisions to curb GHGs are domestic in nature, and must reflect the interests of as much of the electorate as possible. The authors also note that in a world public opinion poll conducted in 2003, Western Europeans were much more concerned about climate change than residents of Russia, Canada and the United States.⁶⁷

Binder and Neumayer conducted what they believe to be the first cross-country time series regression analysis of air pollution levels and environmental non-governmental organization strength in 2005. They found that there is a statistically significant relationship between these.⁶⁸ In a similar 2003 study, Eric Neumayer found that parliamentary green/left/libertarian party strength is associated with lower levels of airborne pollutants and therefore, the rise of green parties have had a measurable positive effect on environmental indicators.⁶⁹

To measure how a country is living up to its Kyoto commitments, we can examine environmental quality. For a more comprehensive look at environmental quality, teams of researchers at Columbia and Yale Universities developed the 2005 Environmental Sustainability Index which provides a measure of how likely a country will be to maintain high environmental standards in the future, based on 76 data sets including air quality and resource management. The higher a country’s ESI score, the better that country is doing environmentally. Thus it is a relative composite score. It will be used in this study as one of the dependent variables.⁷⁰

It is obvious that disparities in industry and standards of living account for variations in per capita air pollution levels. However, governance is also an important factor because industry does not grow organically and must be regulated and permitted by the government. Class structure and standard of living is also greatly influenced by political preconditions. Markus Crepaz attempts to explain national variation in air pollution levels by focusing on the type of interest representation in each country. By

⁶⁷ Harrison, Kathryn and Sundstrom, Lisa McIntosh, “The Comparative Politics of Climate Change”. *Global Environmental Politics* 7, no.4. November 2007.

⁶⁸ Neumayer, Eric and Binder, Seth. “Environmental Pressure Group Strength and Air Pollution: an empirical analysis”. *Ecological Economics* 55 (2005) 527– 538

⁶⁹ Neumayer, Eric. “Are left-wing party strength and corporatism good for the Environment? Evidence from panel analysis of air pollution in OECD countries”. *Ecological Economics* 45 ,2003, p 203- 220

⁷⁰ Yale Centre for Environmental Law and Policy and Centre for International Earth Science Information Network. “2005 Environmental Sustainability Index”.1-2

this, he means the methods by which private interests are turned into public policies. Crepaz believes interest representation can take two forms: corporatism (which is embodied in countries such as Sweden, Austria and Germany), and pluralism, which is found in Canada, the United States and Australia. Crepaz uses a panel of 16 countries at two different points in time: 1980 and 1991. From both quantitative and qualitative analysis, he determines that due to its institutional structure, corporatism has the ability to produce environmental policies which result in lower levels of airborne pollutants.⁷¹

The following figure compares carbon emission per capita by country from 1997 to 2003. It involves more countries than the Crepaz study, but uses a shorter time span of six years instead of 11. The purpose of this graph is to show which countries reduced their carbon footprint and which worsened it during the formative years of the Kyoto Protocol.

⁷¹ Markus M.L. Crepaz, "Explaining National Variations of Air Pollution Levels: political institutions and their impact on environmental policy-making". *Environmental Politics*. September 1995

Figure 1: Change in Carbon Emissions Per Capita (in metric tons) from 1997 to 2003⁷²

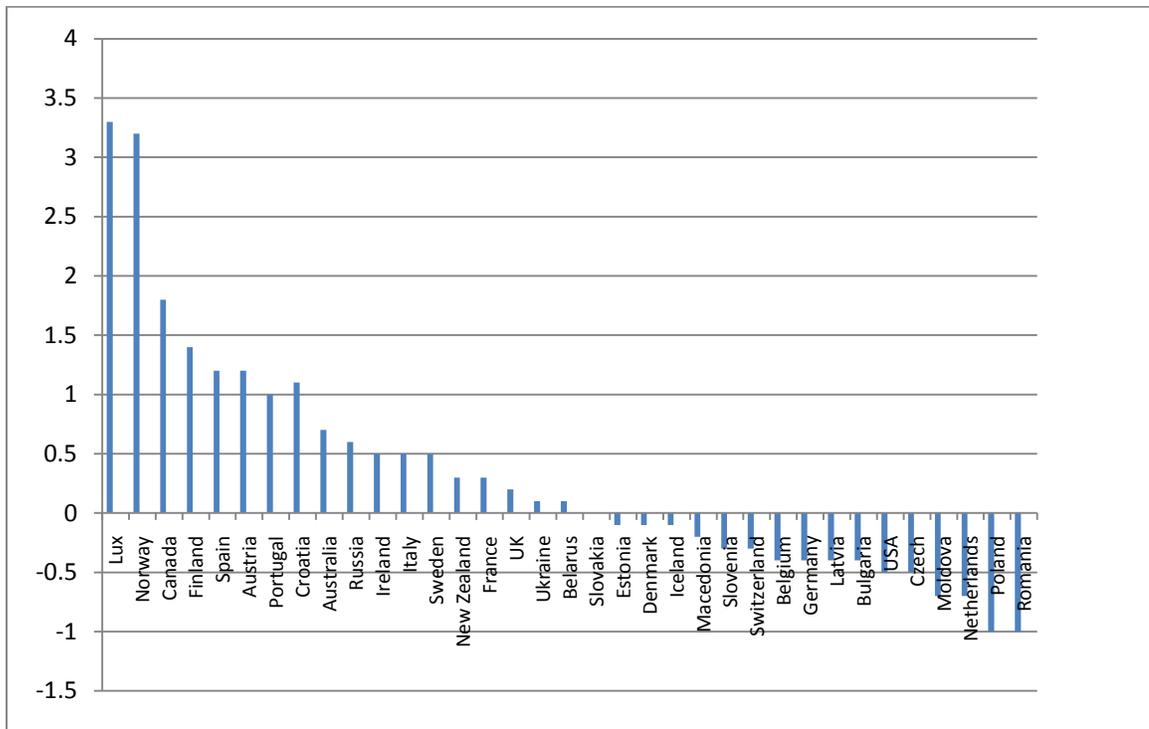


Figure one shows that countries such as Canada, Norway and Australia dramatically increased carbon emissions between 1997 and 2003, however the United States, a country with a SMP electoral system, actually decreased emissions. The only country that did decrease carbon emissions and has an SMP system is the USA. During this time, period, The United States renounced its signing of the Kyoto Protocol, and other factors such as an economy or petroleum industry in decline may account for this decrease. However, the vast majority of countries that did reduce carbon emissions went

⁷² Norris, Pippa. "Democracy Timeseries Data Release 3.0, January 2009". John F. Kennedy School of Government, Harvard. <http://ksghome.harvard.edu/~pnorris/data/Data.htm>.

on to ratify the Kyoto Protocol. They also have proportional representation electoral systems. This implies some correlation between these factors.

Figure 2: 2005 Environmental Sustainability Index by Country⁷³

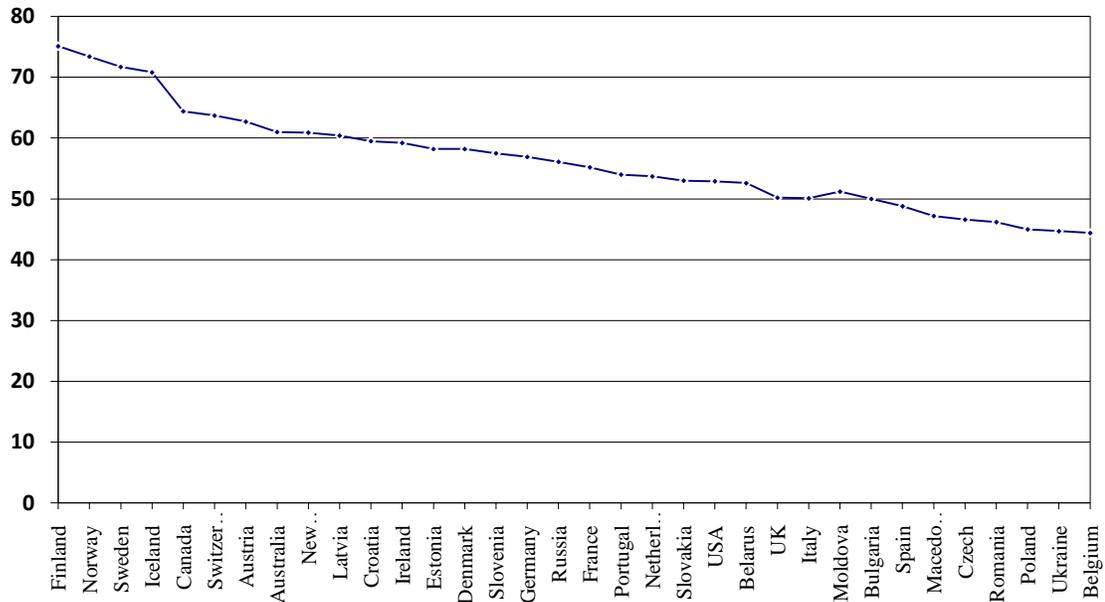


Figure two demonstrates how countries, including the ones in the study, stack up against each other in terms of their Yale Environmental Sustainability Index score for 2005. Luxembourg has no ESI score because it is too small. Finland and Norway with proportional representation systems are doing well, but the USA with its first-past-the-post system, is not, despite the decrease in per capita carbon emissions in the last table. This is because the ESI does not examine the change in carbon overtime but is more like a snapshot of a country, focusing on the air and water quality of a particular year, in this case, two years after 2003, which was the last year included in the previous figure. The USA, despite the decrease in CO2 emissions, still has one of the world's highest per capita rates of carbon emissions. Also, amount of waste and number of vehicles in use per populated land area are also included in the ESI and the United States has a high rate of personal vehicle use. Although the Czech Republic may produce less waste and use

⁷³ Daniel C Esty., Levy Marc Levy, Tanja Srebotnjak, and de, Alexander Sherbinin *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship.* (New Haven: Yale Centre for Environmental Law and Policy, 2005)

less vehicles per capita than the USA, it has less institutional capacity to improve its environmental situation, and this lowers its ESI score.⁷⁴

⁷⁴ Daniel C Esty., Levy Marc Levy, , Tanja Srebotnjak, and de, Alexander Sherbinin (2005). *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship*. New Haven: Yale Centre for Environmental Law and Policy

3: FINDINGS

3.1 Hypotheses

1. Proportional Representation will be associated with green party representation in the legislature and in cabinet.
2. The Environmental Sustainability index will be shown to be positively influenced by the presence of green parties in the legislature, green parties in cabinet and proportional representation.
3. Proportional Representation systems and Green parties in the legislature and cabinet are associated with better environmental outcomes as indicated by a change in per capita carbon emissions, per capita energy consumption, change in the % of world total carbon emissions, and change in commercial energy consumption.
4. Green parties in cabinet and the legislature and proportional representation are associated with a faster ratification of the Kyoto Protocol as measured by the number of months taken to ratify the Protocol since December 1997.

3.2 Variables

Independent Variables:

1. Presence of Green Party Members in Cabinet between 1997 and 2003. Coded 1 or 0 for yes/no.
2. Type of Electoral system. Coded 1 for all forms of proportional representation, including Mixed Member Proportional, and 0 for all other electoral systems.
3. Green party members in legislatures between 1997 and 2003. Coded 1 or 0 for yes/no.⁷⁵

Dependent variables:

1. Environmental Sustainability Index 2005.
2. Change in carbon emissions per capita in each country between 1997 and 2003.
3. Change in electricity consumption per capita between 1997 and 2003.
4. Change in % in share of world total carbon emissions between 1997 and 2003.
5. Change in commercial energy usage per capita between 1997 and 2003.
6. Length of time to ratify Kyoto after December 1997.

⁷⁵ Norris, Pippa. "Democracy Cross National Data Release 3.0 2009". John F. Kennedy School of Government, Harvard. <http://ksghome.harvard.edu/~pnorris/data/Data.htm..>
And Richard Rose. *International Encyclopaedia of Elections*. (Washington: CQ Press, 2000). Pp 1-395

3.3 Data

The following table presents the 35 countries used in the data set, months to ratify the Kyoto Protocol after December 1997, and the Environmental Sustainability Index for each country. After the ratification period, all countries entered into force at the same time, with the notable exception of the United States, Australia and Croatia. Australia, however, eventually ratified the Protocol in 2007.

Table 2: A Preliminary Look at Environmental Sustainability Index and Months Taken to Ratify Kyoto after December 1997⁷⁶

Country	ESI 2005 ⁷⁷	Months to ratify Kyoto after December 1997 ⁷⁸
Australia	61	120
Austria	62.7	53
Belarus	52.6	80
Belgium	44.4	53
Bulgaria	50	53
Canada	64.4	60
Croatia	59.5	Did not ratify
Czech Rep.	46.6	47
Denmark	58.2	53
Estonia	58.2	58
Finland	75.1	53
France	55.2	53
Germany	56.9	53
Iceland	70.8	53
Ireland	59.2	53
Italy	50.1	53
Latvia	60.4	55
Luxembourg	No data	53
Macedonia	47.2	83
Moldova	51.2	64

⁷⁶ “Kyoto Protocol Status of Ratification” 10 July 2006.

⁷⁷ Yale Centre for Environmental Law and Policy and Centre for International Earth Science Information Network. “2005 Environmental Sustainability Index”. (New Haven: Yale University Press, 2005).

⁷⁸ United Nations Framework Convention on Climate Change. “Kyoto Protocol Status of Ratification” 10 July 2006. http://unfccc.int/files/essential_background/kyoto_protocol/application/pdf/kpstats.pdf.

Netherlands	53.7	53
New Zealand	60.9	60
Norway	73.4	53
Poland	45	60
Portugal	54.2	53
Romania	46.2	39
Russia	56.1	83
Slovakia	52.8	53
Slovenia	57.5	58
Spain	48.8	53
Switzerland	63.7	67
Sweden	71.7	53
Ukraine	44.7	76
UK	50.2	53
USA	52.9	Did not ratify

This table shows how a country's Environmental Sustainability Index measures against the number of months it took the country to ratify the Kyoto Protocol after December 1997. The following two tables present the countries in the data set with Proportional representation systems, non-proportional systems and also notes whether or not they have had green party members elected to the cabinet or legislature.

Table 3: Countries in the Data Set with Proportional Representation Systems and Green Party Representation

Country	Some form of PR electoral system? ⁷⁹	Green Parties in legislature? ⁸⁰	Green Party members in Cabinet? ⁸¹
Austria	✓	✓	
Belgium	✓	✓	✓
Bulgaria	✓	✓	
Croatia	✓	✓	
Czech Republic	✓		
Denmark	✓		
Estonia	✓		
Finland	✓	✓	✓
Germany	✓	✓	✓
Iceland	✓	✓	
Ireland	✓	✓	
Italy	✓	✓	✓
Latvia	✓	✓	✓
Luxembourg	✓	✓	
Macedonia	✓		
Moldova	✓		
Netherlands	✓	✓	
New Zealand	✓	✓	
Norway	✓		

⁷⁹ ACE: The Electoral Knowledge Network. "Comparative Data".

⁸⁰ European Greens. "National Election results since 1979".

http://www.europeangreens.org/cms/default/dokbin/289/289025.national_election_results_since_1979@en.pdf and John Field. "The History of the Green Party". The Green Party of Aotearoa New Zealand, 1996-2010 <http://www.greens.org.nz/page/history-green-party> and Gunnar Helgi Kristinsson, "The Icelandic Parliamentary election of 8 May 1999". *West European Politics*; Jan2000, Vol. 23 Issue 1, p187-194 and Gene Frankland; Paul Lacardie; and Benoit Rihoux. *Green parties in transition: the end of grass-roots democracy?* (Burlington, VT : Ashgate, 2008).

⁸¹ Ibid

Poland	✓		
Portugal	✓	✓	
Romania	✓		
Russia	✓		
Slovakia	✓	✓	✓
Slovenia	✓		
Spain	✓	✓	
Switzerland	✓	✓	
Sweden	✓	✓	
Ukraine	✓	✓	✓

Table 4: Green Parties and Countries without Proportional Representation

Country	Some form of PR electoral system. ⁸²	Green Parties in legislature. ⁸³	Green Party members in Cabinet? ⁸⁴
Australia			
Belarus		✓	
Canada			
France		✓	✓
UK			
USA			

From tables three and four, it is apparent that green parties have been elected to legislatures and cabinets in non-proportional systems. The following table tests the hypothesis that there is a significant relationship between ESI, Green Party members in cabinet, and Green Party members in the legislature, and proportional electoral systems.

⁸² ACE: The Electoral Knowledge Network. "Comparative Data". <http://aceproject.org/epic-en>

⁸³ European Greens. "National Election results since 1979". http://www.europeangreens.org/cms/default/dokbin/289/289025.national_election_results_since_1979@en.pdf and John Field. "The History of the Green Party". The Green Party of Aotearoa New Zealand, 1996-2010 <http://www.greens.org.nz/page/history-green-party>

⁸⁴ Ibid

Table 5: Correlations between ESI, Green Party Members in Cabinet, Green Party Members in the legislature, and Electoral System.

		Electoral system	Green Parties in legislatures between 1997 and 2003	Green Cabinet members	ESI 2005
Electoral system.	Pearson Correlation	1	.372*	.094	.016
	Sig. (2-tailed)		.028	.591	.927
	N	35	35	35	34
Green Parties in legislatures between 1997 and 2003	Pearson Correlation	.372*	1	.510**	.177
	Sig. (2-tailed)	.028		.002	.318
	N	35	35	35	34
Green Cabinet members	Pearson Correlation	.094	.510**	1	-.067
	Sig. (2-tailed)	.591	.002		.706
	N	35	35	35	34
ESI 2005	Pearson Correlation	.016	.177	-.067	1
	Sig. (2-tailed)	.927	.318	.706	
	N	34	34	34	34

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Results:

Table five shows a significant relationship between green parties in legislatures and electoral systems, corroborating the hypothesis that forms of electoral systems facilitate electoral success for green parties in legislatures. Surprisingly, there is no significant correlation between electoral systems and green parties in cabinet. There are no significant correlations between ESI, Electoral Systems, and Green Parties. This is surprising because it was predicted that having green parties elected would lead to developing policy which would improve environmental outcomes. However, there may have not been enough time between 2003 and 2005 when the ESI was measured to see the real impact of green policies. As well, the ESI measures, among other things, the ability of a country to improve its environmental conditions and some of the countries with PR and green parties in power may not be as capable of this as others.

The following table tests the hypothesis that a decrease in carbon emissions per capita in each country is associated with Green Party members in cabinet, Green Party members in legislatures, and proportional electoral systems.

**Table 6: Correlations Between Change in carbon emissions per capita
in each country , Green Party Members in Cabinet,
Green Party Members in Legislatures, and Electoral System**

		Change in carbon emission per capita in each country
Electoral system.	Pearson Correlation	-.069
	Sig. (2-tailed)	.692
	N	35
Green Parties in legislatures between 1997 and 2003	Pearson Correlation	.137
	Sig. (2-tailed)	.432
	N	35
Green Cabinet members	Pearson Correlation	-.076
	Sig. (2-tailed)	.665
	N	35
Change in carbon emission per capita in each country	Pearson Correlation	1
	Sig. (2-tailed)	
	N	35

Results:

Surprisingly, in Table 6 there is no significant relationship between the change in carbon emissions between 1997 and 2003 and the independent variables. This may indicate a possible change of mandate once green parties actually attain power. As stated previously, green parties have to work in coalitions once in the legislature, and may work with other left-leaning parties to create policies which are more focused on poverty reduction and social welfare than the environment.

The following table tests the hypothesis that there are correlations between the change in electricity consumption per capita in each country, Green Party members in Cabinet, green Party Members in government, and proportional electoral systems.

Table 7: Correlations Between Change in electricity consumption per capita in each country , Green Party Members in Cabinet, Green Party Members in Government, and Electoral System Correlations

		Change in electricity consumption per capita kwh
Electoral system.	Pearson Correlation	.216
	Sig. (2-tailed)	.212
	N	35
Green Parties in legislatures between 1997 and 2003	Pearson Correlation	.084
	Sig. (2-tailed)	.631
	N	35
Green Cabinet members	Pearson Correlation	-.015
	Sig. (2-tailed)	.931
	N	35
Change in electricity consumption per capita kwh	Pearson Correlation	1
	Sig. (2-tailed)	
	N	35

Results:

In table 7, it is shown that there is no significant relationship between the change in electricity consumption per capita between 1997 and 2003 and the independent variables. However, electricity could be derived from renewable sources. The data does not indicate where the electricity originates from. Increasing reliance on renewable energy is a key green party proposal in almost every country.

The following table test the hypothesis that there is a correlation between number of months to ratify the Kyoto Protocol after December 1997, Green Party members in cabinet, Green Party Members in government, and proportional electoral systems.

**Table 8: Correlations Between change in % of world total carbon emissions
between 1997 and 2003 , Green Party Members in Cabinet,
Green Party Members in Legislatures, and Electoral System Correlations**

		Change in % of world total carbon emissions
Electoral system.	Pearson Correlation	-.373*
	Sig. (2-tailed)	.035
	N	32
Green Parties in legislatures between 1997 and 2003	Pearson Correlation	-.009
	Sig. (2-tailed)	.960
	N	32
Green Cabinet members	Pearson Correlation	-.146
	Sig. (2-tailed)	.425
	N	32
Change in % of world total carbon emissions	Pearson Correlation	1
	Sig. (2-tailed)	
	N	32

Results:

In table 8, the important significant relationship is between the change in the % of world total carbon emissions and electoral systems. Thus, in countries with a form of PR, % of world total carbon emissions decreased, while it increased in other countries and in some remained static. Decrease in carbon emissions may be caused by several factors, some of which are a decrease in usage of petroleum and coal, a declining economy, and a decrease in industrial production, so it would be a wise idea to also track changes in GDP during the time frame.

The following table tests the hypothesis that there is a correlation between change in commercial energy usage per capita between 1997 and 2003, Green Party members in cabinet, Green Party members in legislatures, and PR.

**Table 9: Correlations Between Change in Commercial Energy Usage Per Capita
Between 1997 and 2003 , Green Party Members in Cabinet,
Green Party Members in Legislatures, and Electoral System Correlations**

		Change in commercial energy usage per capita
Electoral system.	Pearson Correlation	.122
	Sig. (2-tailed)	.491
	N	34
Green Parties in legislatures between 1997 and 2003	Pearson Correlation	.306
	Sig. (2-tailed)	.078
	N	34
Green Cabinet members	Pearson Correlation	-.016
	Sig. (2-tailed)	.927
	N	34
Change in commercial energy usage per capita	Pearson Correlation	1
	Sig. (2-tailed)	
	N	34

Results:

Table 9 shows there is no significant relationship between the independent variables and the change in commercial energy usage. However, green parties do advocate the use of renewable energy sources and the data does not take into account which sources commercial energy is derived from, so it is possible businesses are using the same amount of energy as before but technically it is greener because during production and transmission it emits fewer pollutants.

The following table tests the hypothesis that there is a correlation between months to ratify the Kyoto Protocol after December 1997, Green Party members in cabinet, Green Party members in legislatures, and PR.

**Table 10: Correlations Between months to ratify the Kyoto Protocol
after December 1997 , Green Party Members in Cabinet,
Green Party Members in Cabinet, Green Party Members in Legislatures,
and Electoral System Correlations**

		months to ratify Kyoto after December 97
Electoral system	Pearson Correlation	-.400*
	Sig. (2-tailed)	.021
	N	33
Green Parties in legislatures between 1997 and 2003	Pearson Correlation	-.330
	Sig. (2-tailed)	.061
	N	33
Green Cabinet members	Pearson Correlation	-.158
	Sig. (2-tailed)	.379
	N	33
months to ratify Kyoto after December 97	Pearson Correlation	1
	Sig. (2-tailed)	
	N	33

Results:

Table 10 shows a significant relationship between months to ratify the Kyoto Protocol, and the dummy variable for PR electoral systems. Thus, the hypothesis was corroborated in part because having a form of proportional representation did in fact lead to a faster time to ratify the Kyoto Protocol. This indicates that in countries with proportional representation, governments were pressured to commit to making policy to reduce GHG emissions.

4: CONCLUSIONS

Many studies of green parties focus on specific cases, but in this approach a comparative analysis is done of 35 states to determine if patterns emerge between the presence of green parties in legislatures and type of electoral system, as well the links between these variables and the ratification of the Kyoto Protocol coupled with changes in environmental indicators.

There are four main hypotheses which are being tested in this project. The first is that proportional representation systems are associated with the presence of green parties in legislatures. There is a significant positive correlation between the dummy variables for PR and the variable which indicates green parties in the legislature but not in cabinet. This hypothesis was corroborated. This might imply that in order for a green party to win seats, the electoral system must offer a proportional formula for transferring votes into seats, because green parties have not yet achieved the popularity of large parties. Surprisingly, PR systems were not correlated with green party presence in the cabinet

The second hypothesis is that proportional representation would be associated with a better ESI score and this was not corroborated. Green party presence also was not associated with a better ESI score.

The third hypothesis was that electoral systems and green parties would be associated with better environmental outcomes, as indicated by a change in carbon emissions, a change in commercial energy usage, a change in electricity consumption and a change in the % of world total carbon emissions. This assumes policies are designed by green parties in power that reduce individual and industry consumption. Apart from the change in the % of world total carbon emissions positively correlated with the dummy variable for PR electoral systems, no association was found between the dependent and independent variables.

The fourth hypothesis was partly corroborated. This stated that both proportional representation and green parties in government would lead to a faster time to ratify the Kyoto protocol. The most significant relationship in this study was between the type of electoral system and the time in months to ratify the Kyoto Protocol after

signing. There was also a positive correlation between green party members in the legislature and the number of months, but there was no correlation with green party cabinet ministers. This might be because so few countries in the study actually had green party members in cabinet during the time frame.

Finding very little correlation between PR and better environmental outcomes may indicate that even in a PR system, those politicians with an environmental agenda must often set aside their convictions and go along with the legislative majority in the coalition they have joined. However there could be a time lag between when policies are enacted and when they begin to have an effect. It seems that at least in PR system, there is enough belief in the utility of the Kyoto Protocol to quickly ratify it. This becomes apparent when noted that the European Union was a key proponent of the Kyoto Protocol and the highest concentration of PR systems are found in Europe.

Coalition theory most accurately describes how green party members actually behaved once they entered the legislature and cabinet. To form a majority, they would have to side with the left and shelve their environmentalist agenda, in favour of the more popular social welfare one.

One limitation of this study is the complexity of the subject. There are many competing factors which affect environmental outcomes and a state's speed in ratifying the Kyoto Protocol. Interest groups may be extremely vocal and industry may have a strong influence on the government. Countries are industrialized to varying degrees and produce different exports which create different levels of pollution. One state may produce fossil fuels while another produces computers. One state may require vast amounts of energy to heat buildings in winter while another state's climate may not require this. One serious limitation of a comparative study is that even within the industrialized countries there are great disparities in carbon emissions per capita and other factors which are difficult to control. A significant limitation of this study is time. Green parties may not have been a political force long enough to actually have an effect on environmental outcomes.

In the literature there are a lack of studies on political preconditions and subsequent international treaty and environmental outcomes. However, this area is

important in an advanced democracy with a large government because so many policy decisions affect industry and resource use, which in turn affects the environment. It is clear that there is a strong link between proportional representation and the presence of green parties in national governments. Green parties are certainly not preferred by a majority of citizens. Climate change may not be a priority issue for the average voter and the green party may not be seen as the best choice in many cases.

In further research, cultural variables should be included such as the levels of post-materialist values in a country. The policy implications of this study are that environmentalists should consider electoral system policy as well as how smaller parties gain access to legislatures and cabinets and make their platforms known to voters.

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