EXAMINING THE ROLE OF RESOURCES, BELIEFS, AND BEHAVIOR IN THE
POLICY PROCESS:
A STUDY OF COLORADO CLIMATE AND ENERGY POLITICS AND POLICY

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Dissertation directed by Associate Professor Christopher M. Weible

ABSTRACT

As they strive to influence the selection and adoption of public policies, the individuals most active within a given policy area (“policy actors”) display a variety of behaviors. These behaviors include utilizing policy-related information, engaging in political activities, and interacting with other actors to realize their policy goals. Beliefs and resources offer two different rationales for explaining policy actor behavior. To influence policy, actors utilize resources in an attempt to sway decision makers, influence public opinion, recruit allies, or attract additional resources. Beliefs are considered to be a primary factor affecting behavior, with actors seeking out others with similar beliefs and then sharing resources and engaging in political activities to realize their policy preferences. This dissertation utilizes three theoretical frameworks, the Advocacy Coalition Framework (ACF), Resource Dependence Theory (RDT), and Policy Analytical Capacity (PAC), to develop an improved understanding of the comparative effects of resources and beliefs on behavior. These frameworks are used as theoretical lenses to conduct a detailed study of the Colorado climate and energy policy subsystem. This dissertation offers a collection of contributions to the existing policy process literature. Methodological contributions include a new approach for understanding political landscapes that places a greater focus on the role of resources and political activities, and a collection of best practices for using hyperlink networks to study policy actors online. In addition, the dissertation provides important theoretical contributions
to the three theoretical frameworks. Contributions to the ACF include developing the framework’s theory about the interactions and effects of resources, extreme beliefs, and political activities. Contributions to PAC include relating capacity to political activities, while contributions to the RDT framework include relating organizational resource dependence to friend and foe interactions. Finally, this dissertation furthers the collective knowledge on climate politics and policy by expanding our understanding of the beliefs, policy preferences, information sources, political activities, and the interactions of climate policy supporters and opponents.

The form and content of this abstract are approved. I recommend its publication.

Approved: Christopher M. Weible
DEDICATION

To my lovely wife Katie, who has had the “patience of a saint” throughout this endeavor. To my mother and father for instilling in me the confidence and work ethic needed to complete this undertaking.
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invaluable experience in conducting international and interdisciplinary collaborative research, two critical approaches that I hope to utilize throughout my professional career.

Finally, I would like to thank my family and friends for providing me with the necessary support for beginning my doctoral studies, and perhaps even more importantly, to complete them. My mother and father have always been my biggest cheerleaders, constantly reminding me that I could accomplish anything that I set my mind to. My in-laws, Don and Linda Feitz and my amazing sister- and brother-in-law, Leslie and Chris Feitz, offered endless moral support and encouragement throughout this process. My friends offered all-important breaks and helpful distractions from those times where my dissertation had become unbearable. Last but certainly not least, I am grateful for the support, patience, and encouragement provided by my wife Katie. I could not have done this without her.
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CHAPTER I
INTRODUCTION

The foundation of democracy rests upon the relationship between a government and its people. A key component of this relationship is the ability of the people to advocate in favor of governmental policies that represent their principles and values. This relationship is often characterized by an enduring struggle among those individuals most active within a given policy area (“policy actors”) who engage in a variety of behaviors to influence governmental policy in a manner that reflects their principles and values. These behaviors include evaluating and disseminating policy-related information, engaging in a variety of political activities ranging from analyzing policy options to coalition building, and interacting with other actors to achieve mutually beneficial outcomes.

Beliefs and resources offer two different rationales for explaining the behavior of policy actors. Resources are the individual- and organizational-level assets and tools used by policy actors in their efforts to influence governmental policy. Policy actors utilize resources, such as money, information, and professional staff in an attempt to sway decision makers, influence public opinion, recruit individuals to support a policy objective, or attract additional resources. Beliefs are a set of normative and policy-focused convictions or principles held by policy actors. Beliefs are argued to be a primary factor affecting behavior, with policy actors seeking out others with similar beliefs and then sharing resources and engaging in political activities to realize their policy preferences. Despite their prominence within theories of politics and policy, uncertainties remain within the literature in regard to
the attributes and interactions of resources and beliefs and their effects on policy actor behavior. Accordingly, this dissertation pursues the following objectives:

- Objective 1: To understand the relationships between resources, beliefs, and policy actor behavior within political landscapes.
- Objective 2: To explain the comparative effects of resources and beliefs in affecting the behavior of actors engaged in the policy process.
- Objective 3: To examine how hyperlink networks can be used to examine the beliefs, resources, and online behavior of competing groups of policy actors.

These objectives were developed to further the existing knowledge of beliefs, resources, and behavior of policy actors participating in the policy process. Accomplishing these objectives will provide a better understanding of the factors affecting policy actor behavior, which is instrumental for understanding politics and the policy process.

To accomplish these objectives, this dissertation utilizes three theoretical frameworks. The Advocacy Coalition Framework (ACF, Sabatier & Jenkins-Smith, 1993), Resource Dependence Theory (RDT, Pfeffer & Salancik, 1978), and the Policy Analytical Capacity framework (PAC, Howlett, 2009) are used to develop an improved understanding of the comparative effects of resources and beliefs on policy actor behavior. The ACF offers an approach for examining policy subsystems involving a wide range of individuals with diverse beliefs and substantial goal conflicts, who are engaged in enduring technical disputes. Within the ACF, individuals are conceived of as being boundedly-rational and relying upon a belief system that shapes their political behavior. The framework offers a theoretical approach for identifying the belief systems of individuals and partitioning actors into advocacy coalitions on the basis of belief similarity (Sabatier & Jenkins-Smith, 1993). Within this dissertation,
the ACF is used as the primary platform for organizing the inquiry and guiding the analysis, with the RDT and PAC theoretical frameworks and additional literatures are integrated into the platform.

Whereas the ACF provides a theoretical approach for examining how beliefs guide the behavior of policy actors, PAC and RDT provide a complementary approach for examining the extent that resources affect policy actor behavior. PAC focuses on the capacity of individuals and their organizations to acquire and utilize information in the policy process (Howlett, 2009) and provides a typology of individual and organizational resources used by policy actors. Individual resources within the framework consist of an individual’s education, formal training, and access to a variety of tools and techniques for analyzing and disseminating policy-related information. At the organizational level, resources consist of the organizational resources available to an individual, including the organization’s priority in addressing a given policy issue as well as its willingness to devote resources to the issue.

RDT (Pfeffer & Salancik, 1978) compliments PAC by providing the theoretical rationale for examining how resources influence the extent that individuals and organizations interact with others. The framework conceptualizes individuals and organizations as engaging in regular exchanges of monetary, physical, or informational resources. Within these regular exchanges, individuals and organizations continuously endeavor to decrease their resource dependence while increasing the dependence of others (Kotter, 1979). In combination, RDT’s theoretical focus on the effects of resource dependence and the PAC’s resource typology provide an appropriate tool for examining how resources affect policy actor behavior.

Collectively, these three theoretical frameworks are utilized to further the field’s understanding of policy actor resources, beliefs, and behavior. This dissertation utilizes these
three frameworks to conduct a study of a single policy subsystem consisting of climate and energy issues within the state of Colorado. The subsystem is bounded by a functional substantive dimension (climate and energy policy) as well as a territorial dimension (the state of Colorado). Operating within the subsystem is a collection of policy actors who possess a level of expertise on climate and energy policy and directly or indirectly attempt to influence policy within the state of Colorado over an extended period of time. This dissertation examines policy actor resources, beliefs, and behavior in three parts. The first part consists of a political context analysis that examines the resources, beliefs and behavior of actors within the policy subsystem, while the second part conducts a series of explanatory analyses on resources, beliefs, and behavior, and the third part consists of an exploratory analysis of an emerging methodological approach for studying policy actor behavior online. These three parts are comprised of six stand-alone chapters. Of these six chapters, three of the chapters have been published in peer-reviewed journals and an edited book and the remaining three chapters have been submitted to peer-reviewed journals.

This introductory chapter begins with an overview of the format of the dissertation. The following section provides an overview of the Colorado climate and energy policy subsystem along with a justification for why it provides an effective case. The methods and analysis section provides an overview of the data collection and analytical methods used to study resources, beliefs, and behavior of policy actors in the subsystem. Finally, the chapter concludes with an explanation of the dissertation’s broad impacts, including the theoretical and practical contributions.
Dissertation Format

The dissertation is comprised of a multi-method study of a single policy subsystem, with the analysis consisting of three parts: a political context analysis, an explanatory analysis, and an exploratory analysis of an emerging methodological approach for studying policy actors. Table 1.1 lists the research questions for each of the six empirical dissertation chapters:
<table>
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<th>Section</th>
<th>Description/Research Question</th>
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<td>Chapter II</td>
<td>What is the political landscape of the Colorado climate and energy subsystem?</td>
<td>Published in <em>Review of Policy Research</em></td>
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<tr>
<td><strong>Part 2: Explanatory Analysis of Resources, Beliefs, and Behavior</strong></td>
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<td>Chapter III</td>
<td>What are the comparative effects of risk perceptions, climate-related knowledge, and ideological beliefs on the policy preferences of climate policy actors?</td>
<td>Published in <em>Risk, Hazards &amp; Crisis in Public Policy</em></td>
</tr>
<tr>
<td>Chapter IV</td>
<td>What factors impact a policy actor's decision to utilize various information sources in their policy work?</td>
<td>Published in the edited book, <em>Culture, Politics and Climate Change: How Information Shapes our Common Future</em></td>
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<tr>
<td>Chapter V</td>
<td>What factors impact the decisions of climate policy supporters and opponents to engage in political activities?</td>
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<tr>
<td>Chapter VI</td>
<td>What are the comparative effects of beliefs and resources on a policy actor's willingness to interact with friends and foes?</td>
<td>Submitted to <em>Public Administration</em></td>
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<td><strong>Part 3: Exploratory Analysis of Hyperlink Networks</strong></td>
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<td>Chapter VII</td>
<td>How can hyperlink network analysis be used to examine the connections of policy actors?</td>
<td>Submitted to the <em>Review of Policy Research</em></td>
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<tr>
<td><strong>Conclusion</strong></td>
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<tr>
<td>Chapter VIII</td>
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<td>N/A</td>
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Collectively, these six chapters offer a comprehensive description of the Colorado climate and energy policy subsystem. Although written as individual, stand-alone chapters, the six chapters build upon each other by first conducting a detailed political context analysis, followed by explanatory analyses on the resources, beliefs, and behavior of actors within the subsystem, and conclude by examining an emerging methodological approach for studying the online behavior of policy actors.

These six chapters also demonstrate the author’s growth as a scholar. The second chapter on the political landscape of the Colorado climate and energy policy subsystem was co-written with Dr. Chris Weible. A version of chapter four was also co-written with Dr. Weible and published in an edited book, but was expanded as a solo-authored chapter in this dissertation that includes a more detailed study of the information sources used by advocacy coalitions within the subsystem. The other four empirical chapters were written entirely by the author of this dissertation and submitted for publication in peer-review journals. The following section of this introductory chapter provides a detailed description of the Colorado climate and energy policy subsystem along with a justification of its effectiveness for examining climate and energy policy debates.

**Case: Colorado Climate and Energy Policy Subsystem**

The context for this study is the climate and energy policy subsystem within the state of Colorado. The subsystem provides an effective case for studying climate and energy political landscapes. Although climate and energy landscapes can vary considerably across the states, ranging from supportive landscapes that result in a state enacting progressive climate policies (Mark & Lynd Luers 2010; Rabe, 2007) to unsupportive landscapes that result in an inability or unwillingness to enact climate policies, these political landscapes are
traditionally comprised of a common set of features. These features include a variety of actors from diverse backgrounds that support or oppose climate policies, an energy portfolio that represent a state’s concern for climate change, and an assessment of the state’s vulnerability to climate change that compels or constrains its willingness to act.

A diverse number of climate and energy policy actors are present within Colorado, including actors working in government, industry, non-profit organizations, and academia:

- Actors working in government represent the local, state, and federal levels of government.
  - At the local level, these actors are affiliated with a range of municipal and county governments, including the City and County of Denver, Boulder County, and the city of Longmont, among others.
  - Actors represent a diverse group of state agencies, including the Colorado Energy Office, the Department of Regulatory Agencies, and the Department of Agriculture, among others.
  - At the federal level, actors are affiliated with key agencies involved in climate and energy policy, including the Environmental Protection Agency, the Department of Energy, and the National Oceanic and Atmospheric Administration, among others.
- Actors working in industry represent a wide array of Colorado industries, including the energy industry (BP, Encana, and Xcel Energy) and environmentally-friendly or sustainable businesses (Esource, Eco Products, and Namaste Solar).
- Actors affiliated with non-profit organizations represent both pro-environmental views (Environmental Defense Fund, National Resource Defense Council, and the American
Wind Energy Association) as well as pro-economy views (Independence Institute, Colorado Oil and Gas Association, and the Western Energy Alliance).

- Actors working in academia represent a multitude of departments and schools within the major public universities as well as private and smaller, regional institutions.

These policy actors include supporters and opponents of climate change policy that are actively engaged in efforts to achieve their policy goals. Supporters and opponents of climate policy have been engaged in policy debates that have often been intense, with distortions of scientific claims and ethically questionable behavior among individuals on both sides seeking to gain an advantage in shaping policy-related knowledge, public opinion, and climate and energy policies (Oreskes & Conway, 2010; Parris, 2007). Within these policy debates, climate policy supporters have advocated in favor of a variety of policy options designed to either mitigate or adapt to the effects of climate change, including carbon taxes, cap and trade policies, renewable energy and energy efficiency policies, and climate adaptation plans. On the other side, climate policy opponents, including skeptics, deniers, or contrarians (Boykoff, 2010), oppose climate change policies on the basis that these policies pose direct threats to economic growth, the free market, and national sovereignty (McCright & Dunlap, 2003). As the following six chapters describe in considerable detail, the Colorado climate and energy policy subsystem is comprised of two competing advocacy coalitions attempting to influence Colorado’s climate and energy policies in a manner that reflects their policy beliefs. These advocacy coalitions consist of a large coalition of climate policy supporters (referred to throughout this dissertation as the ‘Pro-Climate Coalition’ or the ‘Supporters Coalition’) and a small coalition of climate policy opponents (referred to as the ‘Anti-Climate Coalition’ or the ‘Opponents Coalition’).
The state has long been a major producer of traditional energy with several major fossil fuel-rich basins, major production of coalbed methane, and high levels of natural gas production and reserves (US Energy Information Administration, 2011). Throughout the state’s history, Colorado energy policy has focused on taking advantage of the state’s vast traditional energy reserves. However, the state has seen a considerable shift in the composition of its energy policy due to the emergence of a prominent renewable energy sector. In recent years, Colorado’s renewable energy sector has grown partly in response to the state’s adoption of a renewable energy portfolio standard via ballot initiative in 2004 and a further strengthening of the standard by the legislature in 2010 (Database of State Incentives for Renewables & Efficiency, 2010). These changes to the state’s energy policy portfolio represent a shift in the state’s concern over climate change. Although the majority of the state’s energy policies focus on taking advantage of the state’s traditional energy reserves, the adoption of several renewable energy policies represents a growing concern over the need to mitigate the state’s contribution to climate change.

The state has been identified as vulnerable to both current and predicted impacts of climate change, including shorter and warmer winters and increased periods of drought (Ritter 2007). Scientists project that in the ensuing decades, climate change in Colorado will produce temperature increases of 3 to 4 degrees Fahrenheit, longer and more intense wildfires during the summer seasons, and an increase in water shortages. In an effort to address the predicted impacts of climate change, former Colorado Governor Bill Ritter launched the Colorado Climate Action Plan in November of 2007. This plan called for a 20% reduction of the state’s greenhouse gas emissions by 2020. This plan for the state was created in a collaborative manner involving a diverse set of stakeholders, including business and
community leaders, conservationists, scientists and concerned citizens (Ritter, 2007). The state’s adoption of a climate action plan is representative of climate policy at the state level as more than 30 states have created a climate action plan (EPA, 2011; ICLEI, 2011) that outline climate policy goals and identify a set of recommendations for addressing climate change.

The Colorado climate and energy policy subsystem provides a typical case for examining climate and energy policy debates. A typical case (Gerring, 2007) is representative of a broader set of cases, which allows the case to provide insight into a wide array of phenomena as well as test hypotheses that are generalizable to the broader set of cases. The Colorado case is considered to be representative of the common set of features associated with the climate and energy political landscapes of the states. The collection of supporters and opponents of climate policy within the subsystem are representative of the types of stakeholders that are commonly engaged in efforts to influence the climate and energy policy at the state level (Bomberg, 2012; Bushinsky, 2010; Mark & Lynd Luers, 2010; Rabe, 2007). The combination of traditional energy resources and an emerging renewable energy industry is representative of the energy portfolios that exist within the other states (Database of State Incentives for Renewables & Efficiency, 2010). The state’s concern over the threats of climate change and its adoption of a climate action plan is generalizable to the more than 30 states that have adopted an action plan (EPA, 2011; ICLEI, 2011). Together, this set of common features that are associated with climate and energy political landscapes provide a typical case that is generalizable in varying degrees to the diverse set of state and local climate and energy policy subsystems that exist.
Methods of Data Collection & Analysis

Data for the six chapters were collected using a web-based questionnaire administered in the spring of 2011 to policy actors in Colorado that were actively engaged in climate and energy policy issues (Elgin & Weible, 2013; Weible & Elgin, 2013). The sample was collected using a purposive sampling technique that first identified policy actors engaged in climate and energy issues through internet searches of government and non-government webpages. In addition, newspapers and online publications were also searched to identify the names of policy actors not identified in the initial search. An additional list of names for the sample were collected through preliminary interviews with five policy actors engaged in climate and energy issues, and the interviewees were asked for the names of individuals that should be included in the sample. A total of 793 policy actors were identified through these collective efforts, and 272 actors returned fully completed surveys for an overall response rate of 34%. While all six empirical chapters rely upon the survey for data collection and analysis, chapter seven’s focus on hyperlink networks utilizes a mixed methods research design that incorporated two additional rounds of data collection.

Methods Utilized in the Six Empirical Chapters

This section provides an overview of the methods utilized in each of the six empirical chapters, including the research question, hypotheses, and methods of analysis. The theoretical rationale for each hypothesis is listed in detail within each of these six chapters. These six chapters are organized into three parts: a political context analysis; an explanatory analysis of resources, beliefs and behavior; and, an exploratory analysis of hyperlink networks.
The research question in Part 1: Political Context Analysis is used to develop an understanding of the political landscape of the Colorado climate and energy subsystem. Part one consists of a single chapter, Chapter II.


Overview: Chapter II examines the political landscape of the subsystem, focusing on coalitions of supporters and opponents of climate policy and their respective beliefs, interactions, individual and organizational resources, and the political activities in which they engage. The chapter offers a new approach to understanding the political context of policy issues that improves upon current efforts by describing both the contextuality of politics and estimating the political feasibility of alternatives.

Research Question: What is the political landscape of the Colorado climate and energy subsystem?

Hypothesis: N/A

Methods: This chapter conducts a stakeholder analysis that combines aspects of PAC and the ACF. Under this approach, several of the essential features of the ACF are used to describe the context of the policy subsystem. These essential features include identifying advocacy coalitions and examining the beliefs, networks, resources, and political activities of the coalitions. PAC is used as a framework for assessing the analytical capacity among policy actors and organizations active within a policy topic or subsystem. At the individual level, capacity relates to an individual’s level of education, years of experience, and skills (Elgin, Pattison, & Weible, 2012; Howlett, 2009; Wellstead, Stedman, & Lindquist, 2009). At the organizational level, capacity relates to the organization’s priority in addressing a
particular policy issue, whether the organization possesses the knowledge, skills, and people needed to respond to the policy issue, and the organization’s ability to engage in long-term planning (Craft & Howlett, 2012; Howlett & Oliphant, 2010). Applying the two frameworks together, this chapter conducts a descriptive stakeholder analysis of the Colorado climate and energy policy subsystem. The results are presented in a four-part analysis identifying (1) beliefs and coalition membership, (2) coalition networks, (3) coalition resources, and (4) coalition strategies. This chapter demonstrates that the combination of the PAC and the ACF offer a complementary approach for understanding individuals, organizations, advocacy coalitions, and policy subsystems.

Building upon the political context analysis, the research questions in Part 2: Explanatory Analysis of Resources, Beliefs, and Behavior are used to conduct a series of explanatory analyses. Part 2 consists of four chapters.

Chapter III - The Effects of Risk, Knowledge, and Ideological Beliefs on Climate Policy Preferences: A Study of Colorado Climate and Energy Policy Actors

Overview: Chapter III examines the factors that influence the climate and energy policy preferences of policy actors within the subsystem. The chapter furthers the existing knowledge on climate politics and policy by developing an improved understanding of the factors influencing the policy preferences of climate policy actors. This improved description of the politics associated with this issue may potentially lead to a better understanding of the positions of supporters and opponents of climate policy, which may in turn lead to more constructive policy debates.

Research Question: What are the comparative effects of risk perceptions, climate-related knowledge, and ideological beliefs on the policy preferences of climate policy actors?
**Policy Preferences Hypothesis:** Higher levels of climate risk perceptions, climate-related knowledge, and ideological beliefs about the role of government, will have independent, positive and statistically significant effects on the policy preferences of policy actors.

**Methods:** The methods of analysis consist of two parts. The first part is a descriptive analysis of the dependent variable (climate policy preferences relating to a carbon tax, cap and trade, and renewable energy policy), the independent variables (risk perceptions, climate knowledge, and ideological beliefs about the role of government), and the control variables (organizational affiliation, gender, and race). The second part consists of an explanatory analysis comprised of a series of ordinal logistic regressions with the carbon tax, cap-and-trade, and renewable energy policy preferences and an aggregated ‘Climate Policy Preferences Scale’ as the dependent variables. In order to better understand the individual and aggregate effects of the risk, knowledge and belief measures, separate models were estimated using individual measures of risk perception, climate knowledge, and ideological beliefs as well as aggregated scales in the form of a ‘Risk Perceptions Scale’, a ‘Climate Knowledge Scale’, and an ‘Ideological Beliefs Scale’.

**Chapter IV - Examining the Role of Information Sources and Processing Tools in Colorado Climate and Energy Policy Debates**

**Overview:** Chapter IV examines the factors affecting the decisions of policy actors to engage in the behavior of utilizing various sources of information in their political activities. The chapter provides an improved understanding of the information utilized by supporters and opponents of climate policy as well as the factors that lead individuals to utilize various sources of information in policy debates.
**Research Question:** What factors impact a policy actor’s decision to utilize various information sources in their policy work?

**Information Sources Hypothesis:** *Coalition members will seek information sources that support the tools and techniques they utilize to examine and evaluate information.*

**Methods:** The methods consist of two parts. The first part is a descriptive analysis of the dependent variable (eight types of information sources), the independent variables (formal training, tools and techniques, organizational capacity, and pro-climate beliefs), and the control variables (organizational affiliation, years of experience). The second part consists of an explanatory analysis comprised of a series of ordinal logit models and an ordinary least squares (OLS) regression model used to explain the factors that affect the decisions to utilize various sources of climate and energy-related information. In order to better understand the factors impacting a policy actor’s decisions to utilize various information sources, separate models were estimated with each information source as the dependent variable.

**Chapter V - The Role of Political Activities in Realizing Policy Objectives: A Study of the Colorado Climate and Energy Policy Subsystem**

**Overview:** Chapter V examines the factors impacting the decisions of policy actors to engage in political activities. The chapter furthers the existing knowledge on the political activities utilized by supporters and opponents to influence climate policy as well as the factors impacting the decisions to engage in various political activities.

**Research Question:** What factors impact the decisions of climate policy supporters and opponents to engage in political activities?
Extreme Beliefs & Political Activities Hypothesis: Policy actors with extreme policy core beliefs on climate change will be more likely to be engaged in a greater number of political activities.

Resources & Political Activities Hypothesis: Actors with access to higher levels of resources will engage in a greater number of political activities.

Methods: The methods consist of two parts. The first part is a descriptive analysis of the dependent variable (four types of political activities), the independent variables (climate beliefs, formal training, tools and techniques, and organizational capacity), and the control variables (organizational affiliation, years of experience). The second part consists of an explanatory analysis comprised of a series of probit and instrumented variable equations. Given the likelihood of endogeneity between the dependent variable and the collaborative tools and analytical tools explanatory variables, each model was tested for endogeneity. Hausman tests revealed the presence of endogeneity in three of the probit models. The endogenous models were reformulated with instrumented variables included, while traditional probit models were used for the model where endogeneity was not present.

Chapter VI - Collaboration and Advice with Friends and Foes in Climate Policy Debates

Overview: Chapter VI examines the factors that lead policy actors to interact with their friends and foes. Conflict and cooperation are an integral part of human nature and, thus, are key components within prominent theories of policy and politics (Huckfeldt, Johnson and Sprague, 2004; Salisbury et al. 1987). Although cooperation between political allies is well understood within the politics and policy literature, cooperation between political foes remains understudied. Given the prominent role of conflict within politics and
policy, developing an improved understanding of the instances and the extent that foes cooperate may help promote greater cooperation and understanding among policy actors. The chapter provides an improved understanding of the effects of resources and beliefs on friend and foe interactions, which may lead to a better understanding of instances where cooperative interactions between political foes are more likely to occur.

**Research Question:** What are the comparative effects of beliefs and resources on a policy actor’s willingness to interact with friend and foes?

**Extreme Beliefs & Interactions Hypothesis:** Individuals with extreme beliefs will be less likely to collaborate with or utilize advice from foes while individuals with moderate beliefs will be more likely to collaborate with or utilize advice from foes.

**Resources & Interactions Hypothesis:** Individuals with high levels of individual and organizational resources will be less likely to collaborate with or utilize advice from foes than individuals with lower levels of individual and organizational resources.

**Methods:** The methods of analysis consist of two parts. The first part consists of the descriptive and bivariate analyses for the dependent variables (collaboration with friends and foes and utilizing advice from friends and foes), the independent variables (extreme beliefs, formal training, tools and techniques, and organizational capacity), and the control variables (coalition membership, organizational affiliation, years of experience, and gender). The second part consists of an explanatory analysis comprised of ordinal logistic regression models with the ‘Collaboration with Friends and Foes’ and the ‘Advice from Friends and Foes’ measures as the dependent variables.
Finally, the research question in *Part 3: Exploratory Analysis of Hyperlink Networks* is used to examine how hyperlink networks can be utilized to complement existing approaches for understanding advocacy coalitions.

**Chapter VII - Utilizing Hyperlink Network Analysis to Examine Climate Change Supporters and Opponents**

**Overview:** Chapter VII examines the applicability of using hyperlink networks to study the resources, beliefs, and behavior of opposing advocacy coalitions, while drawing increased attention to the methodological processes associated with conducting hyperlink network analysis, and the methodology’s strengths and weaknesses. The chapter demonstrates the considerable potential of using hyperlink network analysis to study opposing groups of policy actors, but that a strong need exists for greater utilization of a series of best practices for improving the validity, reliability, and generalizability of hyperlink-based research.

**Research Question:** *How can hyperlink network analysis be used to examine the connections of policy actors?*

**Hyperlinking & Actor Beliefs Hypothesis:** *Network actors are more likely to form hyperlinks with allies (other organizations that support similar policy core beliefs) than with opponents (other organizations that support dissimilar policy core beliefs).*

**Hyperlinking & Organizational PAC Hypothesis A:** *Organizations with higher levels of policy analytical capacity will have a higher number of inlinks from other organizations, while organizations with lower levels of policy analytical capacity will have lower levels of inlinks from other organizations.*
Hyperlinking & Organizational PAC Hypothesis B: Organizations with lower levels of policy analytical capacity will have a higher number of outlinks to other organizations, while organizations with higher levels of policy analytical capacity will have fewer outlinks to other organizations.

Hyperlinking & Organizational Type Hypothesis A: Government and academic/research organizations will link to organization types similar to their own.

Hyperlinking & Organizational Type Hypothesis B: Businesses and non-profit organizations will link to organization types different from their own.

Methods: This chapter uses a mixed methods research design with data collected in three phases. The first phase consisted of the survey of policy actors in the Colorado climate and energy policy subsystem. The second phase consisted of using a web crawler to identify the hyperlink networks of supporters and opponents of climate policy. The third phase consisted of a systematic review and coding of the websites within each hyperlink network.

The methods of analysis consist of two parts. The first part is a descriptive analysis of the hyperlink network analysis measures for two hyperlink networks consisting of a small, diffuse Anti-Climate Network and a larger, diffuse Pro-Climate Network. The second part presents the results from testing the five hypotheses. A combination of bivariate statistical tests, including $X^2$, Analysis of Variance (ANOVA), and Fisher’s Exact Test were used to test the hypotheses on links to allies and opponents, the relationship between resources and hyperlinks, and links by organization type.

**Broad Impacts & Contributions**

The aim of this dissertation is to develop an improved understanding of how resources and beliefs affect the behaviors of policy actors attempting to influence the policy
process. Accordingly, this dissertation is designed to make dual contributions to academia and to understanding climate and energy issues. This section reviews the contributions in each of the two areas before outlining a plan for achieving these impacts.

**Contributions to Academia**

The contributions to academia consist of two components. The first component consists of contributions to the policy process literature. In combining the ACF and PAC frameworks, this dissertation provides a new approach for understanding political landscapes by focusing on how policy actors utilize resources at the individual and organizational levels. To further the emerging body of literature on studying the online interactions of policy actors, Chapter VII examines the applicability of using hyperlink networks to study the resource, beliefs, and online behavior of policy actors. Increased attention is drawn to the methodological processes associated with conducting hyperlink network analysis and the methodology’s inherent strengths and weaknesses, before identifying a collection of best practices for hyperlink network analysis. In addition, the dissertation furthers the existing literature’s understanding of how policy actors utilize information within the policy process. Chapter IV demonstrates that individual and organizational resources have a strong impact on a policy actor’s decision to utilize various sources of information. Through Chapter V, this dissertation also furthers the policy process literature’s knowledge on political activities, by expanding upon the interest group literature’s focus on interest groups to include the political activities utilized by actors working in government, business, academic, and non-profits organizations engaged in the policy process. This contribution draws greater attention to the wide array of policy actors that engage in political activities as well as the relative effects of resources and beliefs on political activities. Finally, this dissertation also
contributes to the policy process literature’s understanding of interactions with friends and foes. Expanding upon previous studies that have primarily examined a single type of interaction, Chapter VI examines two different types of interactions (collaboration and utilizing advice) within a single study. Furthermore, the chapter builds upon previous research on friend and foe interactions by expanding upon the traditional focus of whether or not individuals interact, to examine the frequency of interactions between friends and foes.

The second component consists of contributions to the ACF, PAC, and RDT theoretical frameworks. The contributions to the ACF include developing the framework’s understanding of resources, extreme beliefs, and the political activities of policy actors. The dissertation addresses the underdeveloped role of resources within the framework by examining the effects of individual and organizational resources on the behavior of coalition members. The dissertation also builds upon previous ACF research by being the first to examine whether extreme beliefs matter. The extremity of beliefs of coalition members are examined through the construction of a formal measure that utilizes the absolute values of a battery of policy core belief measures. The dissertation also contributes to the ACF’s theoretical explanation of the behavior of coalition members by examining the political activities that members engage in and the factors affecting the decisions to engage in these activities. The contribution to PAC consists of expanding upon previous applications by relating capacity to political activities. Individual- and organizational-levels of capacity were found to be strongly associated with decisions to engage in political activities. The contribution to RDT consists of further confirming the importance of resource dependence on behavior. Low levels of organizational resources, which were associated with higher levels of
resource dependence, were found to increase the likelihood that policy actors would interact with their foes.

This dissertation offers a collection of theoretical contributions to the broad policy process literature as well as to the ACF, PAC, and RDT frameworks. These contributions will be disseminated via publications in academic journals with theoretical emphases, such as *Public Administration* and the *Journal of Environmental Policy & Planning*, as well as conference presentations.

**Contributions to Understanding Climate and Energy Issues**

The contributions to understanding climate and energy issues consist of five components. The first component consists of contributions to the literature’s understanding of policy actors engaged in climate and energy policy, which will include contributing to the knowledge on the climate and energy related beliefs held by policy actors. The second contribution consists of a greater understanding of the factors influencing the policy preferences of climate policy actors, by drawing attention to the prominent roles of ideological beliefs and risk perceptions in the formation of these preferences. The third component consists of contributions to the literature’s understanding of the resources possessed by policy actors supportive of and opposed to climate policy, which will include furthering the literature’s knowledge on the individual and organizational resources possessed by policy actors. The fourth component consists of contributions to the literature’s understanding of the political activities used by climate and energy policy actors, which will include furthering the literature’s knowledge of the activities used by supporters and opponents of climate policy. Finally, the fifth component consists of furthering the extant literature’s understanding of the interactions among opposing groups of policy actors. In
contrast to traditional characterizations of climate politics and policy as overwhelmingly adversarial, this dissertation demonstrates that supporters and opponents of climate policy frequently engage in cooperative interactions with each other. In addition, opponents of climate policy are found to be more likely than climate policy supporters to interact with their political foes.

Collectively, these five contributions further our collective understanding of climate and energy politics and policy. These contributions will be disseminated via publications in academic journals and edited books with an emphasis on climate change, such as *Risk, Hazards & Crisis in Public Policy, Review of Policy Research*, the edited book *Culture, Politics and Climate Change: How Information Shapes our Common Future*, and conference presentations.
CHAPTER II
A STAKEHOLDER ANALYSIS OF COLORADO CLIMATE AND ENERGY ISSUES USING POLICY ANALYTICAL CAPACITY AND THE ADVOCACY COALITION FRAMEWORK¹

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Chapter Summary
Noticeably absent from the tools and techniques in policy analysis are methods for understanding political contexts, including the beliefs, networks, resources, and activities of policy actors. In combination, Policy Analytical Capacity and the Advocacy Coalition Framework offer one appropriate solution. We apply both approaches to analyze the Colorado climate and energy policy subsystem using questionnaire data. In the policy subsystem, we identify a large proclimate change coalition and a smaller anticlimate change coalition. Member beliefs between rival coalitions diverge in regard to the cause, severity, and solutions needed to address climate change adaptation and mitigation issues. Both coalitions report similar levels of individual and organizational capacity to generate and analyze information and to engage in similar activities and strategies. This chapter contributes to the public policy literature by applying both Policy Analytical Capacity and the Advocacy Coalition Framework and by emphasizing individual, organizational, and subsystem levels in conducting a stakeholder analysis.

Lasswell (1936) famously defined politics as who gets what, when, and how. Although this definition provides a set of basic journalistic questions that can be used to understand political contexts, it offers little guidance toward a deeper understanding of the beliefs, networks, resources, strategies, and activities of policy actors attempting to influence public policy. Many of the tools and techniques for practitioners and academics for analyzing policy issues come from the policy analysis literature. The policy analysis literature has devoted considerable attention to enhancing the techniques found in eightfold paths, benefit-cost analysis, multicriteria analysis, and equity analysis, all of which provide detailed, technical means for informing clients concerning societal problems and in advising them in choosing among a range of alternatives (e.g., Patton & Sawicki, 1990; Bardach, 2011; Weimer & Vining, 2010). Yet, the major policy analysis textbooks continue to overlook the questions and techniques concerning who gets what, when, and how in describing political landscapes, in conducting stakeholder analysis, or for understanding the political feasibility of alternatives (as might be discussed in Meltzner, 1972; May, 1986; Brugha & Varvasovsky, 2000; Weible, 2007). The emphases on efficiency and cost effectiveness are certainly laudable evaluation criteria. However, equal emphasis must also be placed on developing approaches for describing the contextuality of politics and estimating the political feasibility of alternatives. Arguably in many contexts, the answers to the questions of who gets what, when, and how are even more influential in the adoption of policies than issues of efficiency and cost effectiveness.

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2 The recent edition of Weimer and Vining (2011) incorporates sections of policy process theories. The next step is to describe how policy process theories both provide needed insight into the political context and can be used to structure problem-oriented advice to clients. What is needed is a concerted effort described in the text for translating these theories into tools used in providing advice to clients (see Lasswell, 1971).
The purpose of this chapter is to combine two techniques for understanding the political context of a policy issue. The first involves the Advocacy Coalition Framework (ACF) as developed in the 1980s by Paul Sabatier and Hank Jenkins-Smith (Sabatier, 1988; Sabatier & Jenkins-Smith, 1993). Recent efforts by Weible (2007) demonstrated the utility of the ACF in providing a theoretical basis for describing political contexts (see also Brecher, Brazill, Weitzman, & Silver, 2010). In understanding politics, the ACF has multiple strengths, including detailed conceptual descriptions for measuring belief systems and suggestions for measuring networks. One of the underdeveloped areas within the framework is the development of a systematic understanding of coalition resources and strategies (Weible et al., 2011).

One approach for understanding resources in a subsystem is Policy Analytical Capacity (PAC). As a concept, PAC refers to “information acquisition and utilization in the policy process” (Howlett, 2009, p. 162). One of the strengths of PAC is its use as an informal framework for guiding researchers in identifying the resources related to acquiring and utilizing information at the individual, organizational, and systems levels. One of the limitations of PAC, however, is the lack of guidance for understanding how individual, organizational, and system-level capacity fits into a broader conceptualization of the political setting, something the ACF accomplishes well. In this chapter, we apply the ACF and PAC to conduct a stakeholder analysis of the climate and energy policy context in Colorado.

The policy actors examined in this chapter are the individuals involved in climate and energy issues within the Colorado climate and energy policy subsystem. Colorado possesses a balance of traditional energy resources along with an expanding renewable energy sector. Colorado faces threats from climate change in the form of shorter and warmer winters, a
thinner snowpack, earlier melting of the snowpack and increased spring runoff, prolonged periods of drought, increases in the number of wildfires, and substantial losses of alpine forests because of pine beetle infestations. Like many other states, efforts to address climate change within Colorado have shifted to the state and local levels (Rutland & Ayett, 2008) after a stalled effort at the national level. In 2007, with the input of a variety of stakeholders, Colorado adopted the Colorado Climate Action Plan (Ritter, 2007), which called for a 20% reduction of state greenhouse gas emissions by 2020. Colorado is a typical state in regard to state-level climate policy, as it is one of more than 30 states to have completed a climate action plan (Environmental Protection Agency, 2011; ICLEI: Local Governments for Sustainability, 2011). Nonetheless, Colorado exists in a country with an adversarial political system (Bomberg, 2012) that has precluded a strong endorsement for climate policies (Lachapelle, Borick, & Rabe, 2012).

This chapter begins with descriptions of the ACF and PAC before describing the methods and a summary of the results. In the results section, we identify the advocacy coalitions within the policy subsystem by their beliefs. We also support the theoretical arguments for coalitions by direct survey measurements of coalition building and “belief homophily” that states that people of similar beliefs interact more than people of dissimilar beliefs (Henry, Lubell, & McCoy, 2011; McPherson, Smith-Lovin, & Cook, 2001). We then examine the PAC of coalitions by focusing on the capacity at the individual and organizational levels. The next step of the analysis is examining the activities and strategies used by each coalition to influence policies. The results show that the Colorado climate and energy policy subsystem contains a large proclimate change coalition and a smaller
anticlimate change coalition. The two coalitions have similar levels of PAC at the individual and organizational levels and engage in similar activities and strategies.

Policy Analytical Capacity and the Advocacy Coalition Framework

This chapter conducts a stakeholder analysis that combines aspects of PAC and the ACF. Drawing from Howlett (2009), PAC, as a concept, refers to the ability of individuals and organizations to acquire and utilize knowledge in the policy process. PAC also serves as an informal framework to assess the analytical capacity among policy actors and organizations active within a policy topic or subsystem. At the individual level, capacity might relate to an individual’s level of education, years of experience, and skills (Elgin, Pattison, & Weible, 2012; Howlett, 2009; Wellstead, Stedman, & Lindquist, 2009). Skills can involve different areas of formal training, including the ability to conduct applied research, statistical methods, policy analysis, policy evaluation, trends analysis/forecasting, and modeling of various scenarios. Less formal skills can include community-level impact analyses, political feasibility analyses, or facilitation and consensus building. At the organizational level, capacity relates to the organization’s priority in addressing a particular policy issue, whether the organization possesses the knowledge, skills, and people needed to respond to the policy issue, and the organization’s ability to engage in long-term planning (Craft & Howlett, 2012; Howlett & Oliphant, 2010). At the subsystem level, capacity relates to the structure of the governance networks (including government and nongovernment organizations) and whether such networks promote learning and adaptive policy change toward sustainable outcomes (McNutt, 2012; Perl & Newman, 2012).

Policy actors and organizations with high levels of PAC are argued to have a higher probability of shaping policy agendas and impacting the design and content of policies, a
better understanding of the context in which policies are implemented and ability to evaluate policy outputs and outcomes—that is, they are more likely to be influential in determining who gets what, when, and how. However, PAC does not provide guidelines for analyzing how its capacity measures fit into the broader system toward political influence and contexts, which is one of the strengths of the ACF.

The ACF was developed in the 1980s to provide a synthesis of top-down and bottom-up approaches in the implementation literature; an approach for understanding coalitions, learning, and policy change; and a need to incorporate science and technology into policy process theories (Sabatier, 1986, 1987, 1988; Sabatier & Jenkins-Smith, 1993). An ACF approach to stakeholder analysis takes some of the essential features of the framework to describe the context of a policy subsystem. Much of the existing ACF research aims to explain the formation and stability of coalitions, learning within and between coalitions, or policy change (Weible et al., 2011). An ACF guided stakeholder analysis is more descriptive than explanatory by describing coalition members, beliefs, networks, resources, and strategies. Adapting the stakeholder analysis guidelines from Weible (2007), this chapter approaches an ACF stakeholder analysis through four parts.

Analyzing Coalition Beliefs

The ACF assumes that actors are motivated by a hierarchical belief system (see Sabatier & Jenkins-Smith, 1999, 133). At the broadest level are deep core beliefs, which span multiple subsystems and involve normative assumptions concerning human nature that are the product of childhood socialization. Deep core beliefs are predicted to be extremely

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3 Sabatier and Weible (2007; pg. 191-192) describe the ACF operating at the macro, meso, and micro levels of analysis. These three levels remain underdeveloped conceptually and theoretically within the ACF. This is an area that needs scholarly attention.
difficult to change. At the intermediate level, policy core beliefs span the scope of a subsystem and are a collection of normative and empirical beliefs that are the foundation for uniting allies and dividing opponents, forming coalitions, and coordinating activities among coalition members. Policy core beliefs are also very resistant to change but are much more prone to being altered than deep core beliefs. This particular chapter measures deep core beliefs by the degree of conservative and liberal ideology on social and fiscal issues and policy core beliefs by severity, causes, and solutions to issues related to climate change.

**Coalition Network**

The ACF assumes that coalitions engage in nontrivial degree of coordination. The best efforts to studying coalition coordination structure are through network analysis as found recently in Henry (2011), Ingold (2011), and Matti and Sandström (2011). The arguments are that coalition members connect primarily to other members via information, ally, disagreement, and collaboration networks and that these networks are formed by a “belief homophily” argument (Henry et al., 2011; McPherson et al., 2001). Belief homophily states that people of similar beliefs interact more than people of dissimilar beliefs. This chapter analyzes coalition membership interactions by asking direct questions concerning “belief homophily” in collaborating as well as a question concerning engaging in coalition building.

**Coalition Resources and Policy Analytical Capacity**

Sabatier and Weible (2007) and Weible (2007) outline six categories of resources: finances, leadership, access to authority, access to scientific and technical information, mobilizable supporters, and leadership. Nonetheless, few studies have analyzed coalition resources, and the framework has produced little insight into the manner in which resources
are used by policy actors and advocacy coalitions within a subsystem (important exceptions include a recent effort by Nohrstedt [2011]).

Table 2.1: Comparison of the ACF and PAC Frameworks at Three Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Policy Analytical Capacity (PAC)</th>
<th>Advocacy Coalition Framework (ACF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Level</td>
<td>The PAC of an individual relates to an individual’s education, levels of formal training, and ability to employ a variety of tools and techniques.</td>
<td>Individuals are boundedly-rational and rely upon a hierarchical belief system in filtering and interpreting stimuli and in making policy-related decisions.</td>
</tr>
<tr>
<td>Organizational/Coalition Level</td>
<td>The PAC of an organization relates to the organization’s priority in addressing a particular policy issue, the financial and informational resources of the organization, and whether the organization possesses the knowledge, skills, and people needed to respond to a policy issue.</td>
<td>Policy actors will strive to translate their beliefs into policies and seek allies, share resources, and develop strategies for policy influence. When these individuals coordinate with others, they form an advocacy coalition.</td>
</tr>
<tr>
<td>Subsystem Level</td>
<td>The PAC seeks to understand the extent that the subsystem is capable of learning and adapting to societal issues.</td>
<td>The ACF seeks to draw conclusions about the interactions of coalitions over time and the tendency for learning and policy change within a policy subsystem.</td>
</tr>
</tbody>
</table>

Instead of using the ACF’s categories of resources, this chapter adopts the logic of PAC. Table 2.1 presents a comparison of the two frameworks listing the individual, organizational/coalition, and subsystem levels of analysis of each framework. At the individual level, PAC details important individual-level resources for processing and utilizing information. The ACF, in turn, provides a conceptualization of individuals as boundedly rational actors who select and assimilate stimuli by beliefs and have a tendency to remember losses more than gains. In this respect, the ACF provides a rationale for motivation based on beliefs and recognizes the cognitive constraints of individuals, whereas PAC lists individual resources useful for information acquisition and utilization.

PAC then emphasizes the capacity of the organization and asks questions concerning whether the organization possesses the resources needed to respond to a policy issue, whether the issue is a priority for the organization, and whether the organization is able to engage in
long-term thinking on climate issues. The ACF assumes individuals usually operate within organizations and combines most of these organizations into advocacy coalitions by emphasizing their network connections and political involvement on the issue. In combination, the ACF provides PAC with a greater understanding of how analytical capacity relates to broader policy processes.

Both PAC and the ACF generalize to the policy subsystem. For the PAC, the emphasis is on the degree that people governing the subsystem are capable of learning and adapting to information. For the ACF, the emphasis is on understanding the long-term patterns of coalition behavior, learning, and policy change within a policy subsystem that intersects with, and is nested within, other policy subsystems and the broader political system. The combination of the PAC and the ACF offers a complementary approach for understanding individuals, organizations, coalitions, and policy subsystems.

**Coalition Strategies**

A final component of an ACF approach to stakeholder analysis involves the identification of coalition strategies. Even more than resources, strategies within the ACF are an underdeveloped concept without a clear articulation. Past scholarship within the ACF on coalition strategies is thin with some devoting attention to venue shopping (see, e.g., Nagel, 2006, and Meijerink, 2008) or narratives (Shanahan, Jones, & McBeth, 2011). In this chapter, we operationalize strategies by a set of activities that coalitions and their members engage in to influence the policy process.

**Case Study: Colorado Climate and Energy Policy Setting**

Colorado provides a good case study to examine climate and energy policies because of its vast traditional energy resources, the rise of its renewable energy sector, and its
vulnerability to climate change. Colorado has long been a major producer of traditional energy with several major fossil fuel-rich basins, major production of coalbed methane, and vast reserves and high levels of natural gas production (US Energy Information Administration, 2011). In recent years, Colorado’s renewable energy sector has grown partly in response to the state’s renewable energy portfolio standard via a ballot initiative in 2004 and a subsequent strengthening of the standard by the legislature in 2010 (Database of State Incentives for Renewables & Efficiency, 2010). The Colorado case is also a good study because of its vulnerability to both current and predicted impacts of climate change, including shorter and warmer winters and increased periods of drought (Ritter, 2007). Scientists project that in the ensuing decades, climate change in Colorado will produce temperature increases of 3 to 4 degrees Fahrenheit, longer and more intense wildfires during the summer seasons, and an increase in water shortages.

Former Colorado Governor Bill Ritter launched an initiative to address climate change statewide, which resulted in the creation of the Colorado Climate Action Plan in November 2007. This plan called for a reduction of the state emission of greenhouse gases by 20% by 2020. The state’s plan was created in a collaborative manner from a diverse set of stakeholders including “business and community leaders, conservationists, scientists and concerned citizens” (Ritter, 2007, p. 2). This adoption of a state climate action plan is representative of climate policy at the state level (Environmental Protection Agency, 2011; ICLEI: Local Governments for Sustainability, 2011) and in a country without climate policies at the national level.
Methods

The sample was collected through a modified snowball sample targeting those individuals involved in Colorado climate and energy issues. Names for the sample were first identified by searching the Internet for government and nongovernment organizations and the people therein who were involved in climate and energy issues. In the next step, we searched newspapers and online publications to identify names of individuals not identified in our initial search. As a third step, we conducted preliminary interviews with five people involved with Denver and Colorado climate and energy issues and asked interviewees of the names of individuals that should be included in our sample. The total sample was 793 individuals. Our survey was based upon a modified version of the survey used by Wellstead and colleagues (2009) to study policy-focused employees within the Canadian federal government. The survey was administered online from February through April of 2011. Of the total population sampled, 272 individuals returned fully completed surveys for a response rate of 34% and 87 returned partially completed surveys (the inclusion of which equals 359 respondents and a 45% response rate). Only the fully completed surveys were analyzed in this chapter.

Results

The results are presented in a four-part analysis as directed by the ACF stakeholder analysis identifying (1) beliefs and coalition membership, (2) coalition networks, (3) coalition resources, and (4) coalition strategies.

Identifying Beliefs and Advocacy Coalition Membership

We identify two advocacy coalitions within the Colorado climate and energy policy subsystem consisting of a large proclimate change coalition with 205 policy actors from our
sample and a small anticlimate change coalition of 55 policy actors.\textsuperscript{4} The coalitions were identified utilizing a modified version of Zafonte and Sabatier’s (1998) method of cluster analysis and silhouette means. Utilizing a battery of questions on policy core beliefs relating to the causation and severity of climate change and several proposed policy solutions (see Table 2.3 for questions), we utilized the $k$-means clustering technique (MacQueen, 1967) to partition actors into clusters based on the similarity of their policy beliefs. We conducted cluster analyses that partitioned actors into two, three, or four advocacy coalitions and then evaluated the “goodness of fit” of the various coalitions by assessing the average silhouette values of the clustered coalitions. Clustering actors into two advocacy coalitions produced the best fit with an average silhouette value of 0.66, whereas clustering actors into three and four coalitions produced mean silhouette values of 0.40 and 0.35, respectively.

Table 2.2 shows the descriptive characteristics of the anticlimate change and proclimate change coalitions. The organizational affiliation of policy actors within the anticlimate change coalition are dominated by business organizations (53%) with government actors a distant second (22%), whereas the majority of actors in the proclimate change coalition represented the government sector (33%) with business a closer second (28%). There is a statistically significant difference between the two coalitions in their members’ affiliation composition (p>0.05, based on an independent sample, Kruskal–Wallis test).

\textsuperscript{4} We refer to these coalitions as large and small rather than dominant and minority coalitions. Our reasoning is that our description is based on the size of the coalition and not on their influence on public policy.
Table 2.2: Advocacy Coalition Membership and Deep Core Belief Measures

<table>
<thead>
<tr>
<th></th>
<th>Anticlimate Change Coalition</th>
<th>Proclime Change Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of policy actors</td>
<td>55</td>
<td>205</td>
</tr>
<tr>
<td>Number and percent of policy actors by affiliation*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>12 (22%)</td>
<td>67 (33%)</td>
</tr>
<tr>
<td>Business</td>
<td>29 (52%)</td>
<td>58 (28%)</td>
</tr>
<tr>
<td>Nonprofit</td>
<td>7 (13%)</td>
<td>47 (23%)</td>
</tr>
<tr>
<td>Academic/Research</td>
<td>7 (13%)</td>
<td>31 (15%)</td>
</tr>
<tr>
<td>Deep core beliefs*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiscal***</td>
<td>3.65</td>
<td>2.65</td>
</tr>
<tr>
<td>Social***</td>
<td>2.93</td>
<td>1.77</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001
*Deep Core Belief scale:
1= “very liberal”, 2= “liberal”, 3= “moderate”, 4= “conservative”, 5=’’very conservative’’.

Table 2.2 also shows the deep core beliefs for the two coalitions. The deep core beliefs of actors in the proclimate change coalition held a more liberal policy stance on fiscal policy than actors in the anticlimate coalition as well as a considerably more liberal stance on social policy (p<0.001 for both measures).

As policy core beliefs were the basis for partitioning policy actors into advocacy coalitions, the coalitions differed significantly in regard to their policy core beliefs on climate change. Table 2.3 lists the beliefs of the anticlimate change and proclimate change coalitions. With regard to whether human behavior was the principal cause of climate change, the anticlimate change coalition had a mean belief closest to “somewhat disagree,” with nonprofits reporting a considerably higher intensity of disagreement, whereas the proclimate coalition had a mean belief of “somewhat agree” (p<0.001). In regard to whether the severity of predicted impacts on society from climate change are vastly overstated, the anticlimate change coalition somewhat agreed with businesses having a higher level of intensity of agreement than the other sectors. In contrast, the proclimate change coalition strongly disagreed concerning the potential overstatement of the predicted severe impacts of
climate change (p<0.001). When asked whether “decisions about energy and its effect on climate are best left to the economic market, and not to government,” the anticlimate change coalition had an overall mean belief of “neither agree nor disagree” with nonprofits agreeing the most. The proclimate change coalition generally tended to disagree somewhat (p<0.001).
<table>
<thead>
<tr>
<th></th>
<th>Anticlimate Change Coalition</th>
<th>Proclimate Change Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>Business</td>
</tr>
<tr>
<td>Severity of predicted impacts is overstated***</td>
<td>-0.25</td>
<td>-1</td>
</tr>
<tr>
<td>Human behavior is the principal cause***</td>
<td>0.67</td>
<td>0.66</td>
</tr>
<tr>
<td>Decisions on climate &amp; energy are best left to the market ***</td>
<td>0.17</td>
<td>-0.24</td>
</tr>
<tr>
<td>Carbon tax is required ***</td>
<td>1.58</td>
<td>1.07</td>
</tr>
<tr>
<td>Cap &amp; trade is required***</td>
<td>1.58</td>
<td>1.24</td>
</tr>
<tr>
<td>Renewables policy is required***</td>
<td>0.00</td>
<td>0.41</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001
Policy Core Beliefs Scale: -2=“strongly agree”, -1 = “agree”, 0=“neither agree nor disagree”, 1 = “disagree”, 2= “strongly disagree”.
P<0.05 difference between organizations in the anti-climate change coalition on severity of climate change.
When asked their beliefs on whether a carbon tax was needed to combat climate change, the anticlimate change coalition somewhat disagreed, with government and nonprofits expressing the strongest disagreement, whereas the proclimate change coalition somewhat agreed uniformly (p<0.001). Concerning whether cap-and-trade policies were needed to combat climate change, the anticlimate change coalition somewhat disagreed, whereas the proclimate change coalition somewhat agreed (p<0.001). Finally, respondents were asked whether policies promoting renewable energy generation were needed to combat climate change. The anticlimate change coalition members responded with a mean position that involved some disagreement, whereas the proclimate change coalition members expressed a mean belief of strongly agree (p<0.001).

These findings demonstrate the fundamentally different policy core beliefs of the two coalitions on a variety of aspects of energy and climate change, ranging from the cause and severity to whether solving climate change was best left to the economic market to whether carbon taxes, cap-and-trade mechanisms or renewable energy policies are proper solutions to addressing climate change. Within the anticlimate change coalition, there were noticeable differences between different types of organizations on beliefs, whereas the proclimate change coalition expressed more uniform beliefs across all organization types.

**Examining Networks of the Advocacy Coalitions**

The second step of the analysis was to examine how the coalitions interconnect by asking direct questions about collaboration and coalition building. The logic of coalitions rests on the notion of “belief homophily” (Henry et al., 2011). This can be measured via traditional forms of network analysis as recently found in Henry (2011) or as far back as Zafonte and Sabatier (1998). In this chapter, we take a more direct approach by asking the
frequency of which policy actors collaborated with others who have similar beliefs compared with others with dissimilar beliefs. In support of the belief homophily argument, Table 2.4 shows that both coalitions collaborated with those who shared their beliefs on climate and energy issues on a weekly basis (p<0.01) while they collaborated with individuals who did not share their beliefs on climate and energy on a monthly basis.
<table>
<thead>
<tr>
<th>Collaboration Patterns</th>
<th>Anticlimate Change Coalition</th>
<th>Proclimate Change Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>Business</td>
</tr>
<tr>
<td>With similar beliefs**</td>
<td>Monthly</td>
<td>Weekly</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent of Coalition Members who participated in coalition building in the past year*</th>
<th>Anticlimate Change Coalition</th>
<th>Proclimate Change Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>Business</td>
</tr>
<tr>
<td>75%</td>
<td>76%</td>
<td>71%</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test between coalitions with significance levels at *p<0.05, **p<0.01, ***p<0.001. There is a P<0.05 difference between organizations in the anti-climate change coalition on severity of climate change.
In addition, the belief homophily question was complemented by asking policy actors if they were actively engaged in coalition building in the past year (yes or no). The findings from Table 2.4 indicate that similar proportions of actors in the anticlimate change and proclimate change coalitions engaged (71% and 86%, respectively) in coalition building, with statistically significant (p<0.05) differences between the coalitions. Although the measures of coalitions in Table 2.4 do not show who coordinates with whom in a coalition, the results provide original measures and indirect support for the logic of coalition formation.\(^5\)

**Examining the Individual Policy Analytical Capacity of the Coalitions**

Table 2.5 presents the individual PAC of members within each coalition. We find that members of both coalitions have similar levels of education with a mean education of master’s or a professional degree with means ranging from 4.8 to 5.4 (insignificant at p<0.05). Members in the two coalitions also possessed similar levels of experience, with most involved 6–9 years in climate and energy policy issues (means between 3 and 4).

---

\(^5\) Many applications of the ACF identify coalitions based only on beliefs (Weible et al., 2009). While this paper has indirect measures of network relations, these measures are rudimentary compared to the techniques found in Henry (2011), among many others. In this regard, it might be more appropriate to consider the coalitions in this paper “belief coalitions” (Zafonte and Sabatier, 2004).
Table 2.5: Individual Policy Analytical Capacity of the Coalitions

<table>
<thead>
<tr>
<th></th>
<th>Anticlimatic Change Coalition</th>
<th>Proclimatic Change Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>Business</td>
</tr>
<tr>
<td>Education&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.83</td>
<td>5.21</td>
</tr>
<tr>
<td>Years of experience&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.08</td>
<td>4.03</td>
</tr>
<tr>
<td>Percent of affiliation members who have received formal training:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics&lt;sup&gt;*&lt;/sup&gt;</td>
<td>67%</td>
<td>52%</td>
</tr>
<tr>
<td>Modeling&lt;sup&gt;*&lt;/sup&gt;</td>
<td>50%</td>
<td>34%</td>
</tr>
<tr>
<td>Training in applied research</td>
<td>42%</td>
<td>21%</td>
</tr>
<tr>
<td>Policy evaluation</td>
<td>33%</td>
<td>45%</td>
</tr>
<tr>
<td>Trends analysis</td>
<td>33%</td>
<td>38%</td>
</tr>
<tr>
<td>Policy analysis&lt;sup&gt;**&lt;/sup&gt;</td>
<td>25%</td>
<td>34%</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001

<sup>a</sup>Education scale: 1= "not a high school graduate", 2= "high school graduate", 3= "some college", 4= "bachelor's degree", 5= "master's or professional degree", 6= "PhD, MR, or JD".

<sup>b</sup>Years of experience scale: 1= "less than 1 year", 2= "1-5 years", 3= "6-9 years", 4= "10-14 years", 5= "15-20 years", 6= "greater than 20 years".
We then examined the levels of formal training in applied research, modeling, policy analysis, policy evaluation, statistics, and trends analysis among coalition members. Members of the anti-climate change and pro-climate change coalitions reported similar proportions of actors with formal training in applied research (overall coalition means range from 31% versus 36%, respectively), policy evaluation (38% and 44%, respectively), and trends analysis (35% and 24%, respectively). The anti-climate change and pro-climate change coalitions had more noticeable differences in regard to the proportions of actors with formal training in modeling (38% versus 22%, respectively), policy analysis (31% versus 50%, respectively), and statistics (60% versus 43%, respectively) with differences significant at the p <0.05 level for each of these measures of formal training.

The results show that the two advocacy coalitions have relatively similar levels of individual PAC in regard to education, experience, and formal training on a variety of analytical techniques. The two coalitions were most noticeably different in regard to the proportion of coalition members that had training in modeling, statistics, and policy analysis with the anticlimate change coalition possessing higher levels of capacity in modeling and statistics and the proclimate change coalition possessing a higher level of capacity in conducting policy analysis. Additionally, it appears that all coalition affiliations offer some skills to the policy process. Academic/researchers may have the highest proportion with training in statistics and modeling whereas businesses have the highest training per coalition for policy analysis.

**Examining the Organizational Policy Analytical Capacity of the Coalitions**

Table 2.6 presents the organizational level PAC of each coalition. We used three measures to examine the PAC of organizations within each coalition: (1) organizational
priority; (2) the adequate knowledge, skills, and people; and (3) urgent day-to-day issues took precedence over long-term efforts.
Table 2.6: Organizational Policy Analytical Capacity of the Coalitions

<table>
<thead>
<tr>
<th></th>
<th>Anticlimatic Change Coalition</th>
<th></th>
<th></th>
<th>Proclimatic Change Coalition</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>Business</td>
<td>Non-profit</td>
<td>Academic/Research</td>
<td>Govt</td>
<td>Business</td>
</tr>
<tr>
<td>Organizational priority&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.5</td>
<td>3.93</td>
<td>3.57</td>
<td>3.43</td>
<td>3.34</td>
<td>3.78</td>
</tr>
<tr>
<td>Adequate knowledge, skills, and people&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.00</td>
<td>4.00</td>
<td>3.71</td>
<td>3.57</td>
<td>3.38</td>
<td>3.81</td>
</tr>
<tr>
<td>Urgent day-to-day issues take precedence&lt;sup&gt;c&lt;/sup&gt;</td>
<td>4.17</td>
<td>3.41</td>
<td>3.71</td>
<td>3.29</td>
<td>3.82</td>
<td>4.03</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test between and within coalitions, with significance levels at *p<0.05, **p<0.01, ***p<0.001.

<sup>a</sup>Scale: 1 = “much lower”, 2 = “lower”, 3 = “about the same”, 4 = “higher”, 5 = “much higher”.

<sup>b</sup>Scale: 1 = “very low capacity”, 2 = “low capacity”, 3 = “medium capacity”, 4 = “high capacity”, 5 = “very high capacity”.

<sup>c</sup>Scale: 1 = “strongly disagree”, 2 = “disagree”, 3 = “neutral”, 4 = “agree”, 5 = “strongly agree”.
When asked whether their organization made addressing climate and energy issues an organizational priority compared with other issues (with a scale ranging from 1 = “much lower” up to 5 = “much higher”), most coalition members in both coalitions expressed that their organization made climate and energy issues a higher priority than other issues. Within the anticlimate change coalition, businesses expressed that climate and energy policy were a higher priority (mean = 4) while government expressed the lowest level of priority reporting that their organization addressed climate and energy issues somewhere between “lower priority” and “about the same.” In the proclimate change coalition, academic and research organizations and nonprofits reported their organizational priorities on climate and energy to be higher than others (means ~4). In contrast, government officials as part of the proclimate change coalition reported the lowest priority that climate and energy issues were about the same as other priorities. There was not a significant difference between the coalitions for the organizational priority question with mean ranging from 2.5 (governments in the anticlimate change coalition) to 4.00 (academic/research organizations in the proclimate change coalition).

We then asked coalition members to assess whether their organization had adequate knowledge, skills, and people to respond to climate change and energy issues and policies. The two coalitions reported nearly identical levels of adequate knowledge, skills, and people reporting means closest to high capacity with means ranging from 3.00 (government organizations in the anticlimate change coalition) to 4.17 (academic/research organizations in the proclimate change coalition). In the anticlimate change coalition, businesses reported that their organization had high capacity in terms of adequate knowledge, skills, and people, whereas government reported that their capacity was medium. Within the proclimate change
coalition, academic and research organizations reported that their organization had high
capacity in terms of adequate knowledge, skills, and people, whereas government
organizations reported that their capacity was medium.

Finally, respondents were asked whether their organization had the ability to think
long term on climate and energy issues or whether urgent, day-to-day issues took precedence
and kept them from doing so. Both coalitions reported that they agreed that urgent, day-to-
day issues took precedence (p <0.05). Within the anticlimate change coalition, day-to-day
issues took the most precedence within government (mean = 4.2), whereas in the proclimate
change coalition, day-to-day issues took the greatest precedence in business (mean = 4.0).
There was a considerable difference among the organizations within the anticlimate change
coalition between government and academic/research organizations.

Together, these three measures suggest that the two coalitions had similar levels of
capacity at the organizational level. Within each coalition, government organizations had the
lowest levels of organizational capacity, with government in the anticlimate change coalition
scoring lowest on all three measures and government within the proclimate change coalition
having the lowest levels of capacity in regard to organizational priority and adequate
knowledge, skills, and people.

**Examining the Activities and Strategies of the Coalitions**

Finally, we examine the activities and strategies employed by the two coalitions. We asked
collection members if throughout the previous year they had participated in a variety of
activities and strategies, including appraising policies, conducting research, consulting with
the public, evaluating policies, implementing policies and programs, informing officials, and
negotiating in multi-stakeholder consensus-based processes. The percent of members within
each organization reporting the affirmative for each activity is presented in Table 2.7. Table 2.7 also presents the activities and strategies of the coalitions as percent of members engaged in each activity.
Table 2.7: Activities and Strategies of the Coalitions

| Percent of affiliation members who have participated in these activities in the past year: | Anticlimate Change Coalition | Proclimate Change Coalition |
|---|---|---|---|---|---|---|
| | Govt | Business | Non-profit | Academic/ Research | Govt | Business | Non-profit | Academic/ Research |
| Implemented Policies or Programs | 83% | 34% | 57% | 14% | 72% | 48% | 62% | 52% |
| Appraised Policy Options | 75% | 48% | 57% | 43% | 64% | 60% | 70% | 52% |
| Informed Officials | 75% | 66% | 86% | 29% | 81% | 66% | 83% | 65% |
| Evaluated Policy Processes, Results, and Outcomes | 67% | 59% | 71% | 71% | 73% | 64% | 62% | 58% |
| Consulted w/ the Public | 67% | 55% | 43% | 71% | 72% | 60% | 81% | 61% |
| Negotiated in a Multi-Stakeholder Consensus Based Process | 42% | 66% | 57% | 14% | 54% | 57% | 62% | 42% |
| Conducted Climate/ Energy Research | 33% | 66% | 71% | 86% | 54% | 59% | 66% | 90% |

Note: Independent-Samples Kruskal-Wallis test between and within coalitions, with significance levels at *p<0.10, **p<0.01, ***p<0.001.
P<0.05 difference among organizations in the anti-climate change coalition on implementation.
P<0.05 difference among organizations in the pro-climate change coalition on conducting research.
The coalitions had nearly similar levels of activity in appraising policy options, conducting climate and energy research, consulting with the public, evaluating policy processes and results, implementing policies and programs, informing officials, and negotiating in consensus-based processes. Within the anticlimate change coalition, there were statistically significant (p <0.05) differences between organizations in regard to implementing policies and programs with means of 0.14 for academics/researchers and 0.83 for government. Within the proclimate change coalition, there were statistically significant (p<0.05) differences between organizations in regard to conducting research with a significantly higher mean of 0.90 for the academic/research category.

Additionally, organizations within each coalition are taking on different roles within the subsystem. Government organizations in both coalitions are more involved with implementing policies and programs. There are higher percentages that indicate business, and nonprofit organizations are involved with negotiating in multistakeholder consensus-based processes. Academic and research organizations are most involved in climate/energy research, whereas government organizations are involved in conducting policy analysis, informing officials, and implementing policies and programs. Although not definitive in this study, greater attention to the respective forms of engagement by organizations in policy subsystems is needed.

**Conclusion**

Analyzing political, regulatory, and stakeholder landscapes can be conducted through many different lenses (see, for example, Davis, 2012). This chapter adopted the principles outlined in PAC to conduct a stakeholder analysis via ACF of Colorado climate and energy
subsystem. The result provided greater insight into the resources and strategies used by policy actors and advocacy coalitions as they attempt to translate their beliefs into policies.

Within the Colorado climate and energy subsystem, we identified a large proclimate change coalition and smaller antclimate change coalition. The two coalitions held fundamentally different beliefs in regard to the cause of climate change, its severity, whether solving climate change should be left to the economic market, and whether carbon taxes, cap-and-trade, and renewable energy policies were solutions to climate change. Both coalitions are more likely to collaborate with others they agree with than disagree with, and most members in both coalitions engage in coalition building.

Despite fundamentally different beliefs, we find the two coalitions to be relatively similar in several other regards. The coalitions had relatively similar levels of individual capacity in regard to education, experience, and formal training in a variety of analytical techniques. The coalitions also had similar levels of capacity at the organizational level, with organizations in both coalitions expressing that they had high capacity to address climate change and energy issues because they possessed the adequate knowledge, skills, and people needed to do so and that climate and energy issues were a high organizational priority but that urgent day-to-day issues took precedence over longer term thinking. The two coalitions also utilized similar activities and strategies in an attempt to translate their beliefs into policies. In all, this stakeholder analysis of the Colorado climate and energy issues suggests, at the subsystem level, that the large proclimate change coalition is in a stronger position than the smaller antclimate change coalition. However, both coalitions are supported by members with high individual and organizational PAC, suggesting that the small antclimate change coalition remains capable of engaging in political debates. Given that Colorado does support
a Climate Action Plan, the results from this analysis suggest that the proclimate change coalition has had some success in influencing the policy process. However, any speculation concerning the relative influence and success of these coalitions in Colorado needs further empirical support.

Our analysis offers two contributions to the public policy literature. The first contribution is the joint application of the ACF and PAC to provide greater insight into how policy actors and coalitions utilize resources within a policy subsystem. Applying these two conceptual frameworks can be used to address the limitations inherent within each. PAC provides the ACF with a greater understanding of how policy actors, coalitions, and subsystems utilize resources in an effort to achieve policy change. At the same time, PAC benefits from this integration as ACF offers a greater understanding of how capacity impacts the policy process through its focus on policy actors, advocacy coalitions, and policy subsystems. The use of PAC within the ACF does not mean that resource typology outlined in Weible (2007) should be discarded or is unimportant. Rather, this approach suggests how different concepts and approaches can be used within the ACF to gain descriptive and explanatory leverage. In this respect, the effort in this chapter supports the arguments to view the ACF as an actual “framework” that can support different theoretical, modeling, and measurement approaches (see Weible et al., 2011). Such experimentation can be very useful for challenging current approaches as well as offering plausibly better approaches. In this chapter, we found that the PAC shifted the analysis toward assessing individual and organizational level resources in a way that is new to the framework. Whether this approach is preferred to prior measures of resources in the ACF requires further inquiry and may depend on the research objectives.
The second contribution is the conscious analysis of different levels: individual, organizational/coalition, and subsystem levels. These levels are part of the ACF and PAC, but it was the inclusion of PAC that offered measures of organizational level capacity, something mostly ignored in prior ACF research, which tends to favor coalitions over organizations. The emphasis on individual abilities of the PAC also steered the analysis toward measures of formal training, education, and experience, something that is not inconsistent with the ACF but rarely emphasized to the extent herein.

Generalizing these results should be done with a degree of caution. The relatively small number of individuals from our survey that were identified as members of the anti-climate change coalition may reflect the actual size and characteristics of the actual coalition or a selection bias from our modified snowball sampling procedures. Additionally, the results would be strengthened with a stronger relational foundation for identifying coalitions using network analysis. The point of this chapter, however, was not to advance the study of how to apply network analysis to identify coalitions but rather to conduct a stakeholder analysis of a pertinent issue using the ACF and PAC and, thereby, to provide an analysis of resources and strategies of coalitions. In this effort, this chapter does provide direct measures of the belief homophily hypothesis underpinning the rationale for coalitions to exist and a question asking actors if they engage in coalition building.

These caveats aside, our research provides another contribution to efforts to understand political landscapes via stakeholder analysis by combining aspects of the ACF and PAC. The combination is useful for both approaches but should not be viewed as the ultimate coupling. This analysis shows how the ACF, if viewed as a framework capable of supporting alternate theories and models, can support the inclusion of the logic of PAC in
conducting a stakeholder analysis to generate an interpretation of the subsystem that the ACF, in traditional form, would not accomplish. For many research questions, a combination of PAC and ACF would be very suitable. The analysis shows how the PAC’s measures of capacity at the individual, organizational, and system levels are possibly even more important when combined with the theoretical logic of the ACF. If we assume that most, if not all, policy issues involve some degree of politics, complementing a PAC analysis with another framework, like the ACF, makes sense.
CHAPTER III
THE EFFECTS OF RISK, KNOWLEDGE, AND IDEOLOGICAL BELIEFS ON CLIMATE POLICY PREFERENCES:
A STUDY OF COLORADO CLIMATE AND ENERGY POLICY ACTORS

Chapter Summary

Responding to the impacts of climate change will require communities to develop an improved understanding of the factors influencing the policy preferences of supporters and opponents of climate policy. The literature on climate politics and policy has identified risk perceptions, climate-related knowledge, and ideological beliefs on government intervention as key factors impacting the general public’s support for climate policies, but two important gaps within the literature remain unaddressed. The factors impacting policy preferences have been understudied among policy actors, a critical sub-population actively involved in the policy process. To examine the factors impacting the policy preferences of policy actors, this article conducts an analysis of questionnaire data administered in 2011 to policy actors involved in climate and energy policy in the state of Colorado. The results indicate the policy preferences of policy actors are largely affected by risk perceptions and ideological beliefs regarding government intervention. Contrary to previous studies, climate-related knowledge was found to have minimal impact on policy preferences when examined alongside risk perceptions and ideological beliefs. These findings draw attention to the need to develop a better understanding of the risk perceptions and ideological beliefs of climate policy actors.

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6 Note: This chapter has been published in Risk, Hazards & Crisis in Public Policy. Full citation: Elgin, D.J. (2014). The Effects of Risk, Knowledge, and Ideological Beliefs on Climate Policy Preferences: A Study of Colorado Climate and Energy Policy Actors. Risk, Hazards & Crisis in Public Policy, 5(1), 1-21.
Throughout the development of climate policies. This article concludes with an overview of several approaches that appear to be worthy of this task, including participatory policy analysis, community risk assessments, and stakeholder analysis.

Responding to the adverse impacts of climate change will require policy actors with conflicting policy preferences, ideological beliefs, knowledge, and risk perceptions to work together to identify common policy solutions. However, climate change poses a “wicked” policy problem (Sabatier & Weible, 2007) where the adoption of climate policies are hindered, in part, by significant differences in policy preferences, intense technical disputes, and the involvement of a diverse group of actors working to realize their policy goals. These hindrances include intense debates about the validity of climate change science, the accuracy of the predicted impacts (Schneider & Mastrandrea, 2010), and the social, economic, and environmental impacts associated with the adoption of climate policies. The uncertainty that results from these policy debates highlight the paradoxical nature of American climate politics and policy, where the majority of Americans report themselves as being concerned about climate change but view taking action as less important than a variety of other national and environmental issues (Leiserowitz, 2010). Effectively responding to the predicted impacts of climate change will require society to develop a better understanding of the policy preferences of both supporters and opponents as well as a detailed understanding of the factors that impact their preferences.

The literature on climate politics and policy has produced considerable knowledge on the effects of risk perceptions, climate-related knowledge, and ideological beliefs on the general public’s climate policy preferences. However, two important gaps within the climate politics and policy literature remain unaddressed. The factors affecting the policy preferences
of policy actors, a critical sub-population actively involved in the policy process have been understudied. Policy actors are defined as a collection of individuals working in government, business, academia, and non-profit organizations that possess a high level of expertise on a given policy topic, which they utilize to influence a policy domain over extended periods of time (Zaller, 1992; Sabatier & Weible, 2007). Given their level of expertise and sustained efforts to influence climate policy, policy actors present a unique opportunity for understanding the factors that affect the policy preferences of those actors most actively involved in the policy process. In addition, existing research has not simultaneously examined the comparative effects of risk, knowledge, and ideological beliefs. While the factors have had positive, statistically significant effects on climate policy preferences when examined independently, the possibility exists that all three factors will not have positive, statistically significant effects when examined simultaneously. Accordingly, this article asks the following research question: What are the comparative effects of risk perceptions, climate-related knowledge, and ideological beliefs on the policy preferences of climate policy actors? Answering this question will further the existing knowledge on climate politics and policy by developing an improved understanding of the factors influencing the policy preferences of climate policy actors. This improved understanding may potentially lead to a better understanding of the positions of supporters and opponents of climate policy, which may in turn lead to more constructive policy debates.

Building upon previous research, this article examines the comparative effects of risk perceptions, climate-related knowledge, and ideological beliefs on the policy preferences of climate policy actors in the state of Colorado. The state faces a multitude of climate change threats, including shorter and warmer winters, a smaller snowpack, prolonged periods of
drought, increases in the number of wildfires, and substantial losses of alpine forests due to pine beetle infestations. Like many other states, efforts to address climate change within Colorado shifted to the state level (Rutland & Ayett, 2008) after efforts stalled at the national level (Bushinsky, 2010). Accordingly, the state in 2007 sought the input of a variety of stakeholders to inform the development and adoption of the Colorado Climate Action Plan (Ritter, 2007), which calls for a 20% reduction of state greenhouse gas emissions by 2020.

This article begins with a review of the literature on climate change policies, and the associated literature on risk, knowledge, and ideological beliefs on government intervention. The article then describes Colorado climate and energy politics and policy as well as the methods of analysis. The findings are presented in two parts. The first part presents the descriptive findings on climate policy actors in Colorado, including their policy preferences, risk perceptions, climate-related knowledge, ideological beliefs, and key demographics. The second part is an explanatory analysis that utilizes a series of ordinal logistic regressions to examine the factors that affect the policy preferences of climate policy actors. The results indicate that unlike the broader public, the policy preferences of climate policy actors are largely affected by their risk perceptions and ideological beliefs regarding government intervention. Contrary to previous studies on the broader public, climate-related knowledge was found to have a minimal impact on the preferences of policy actors. These results draw attention to the need to develop a better understanding of the risk perceptions and ideological beliefs held by policy actors throughout the development of climate policies. This article concludes with an overview of several approaches that appear to be worthy of this task, including participatory policy analysis, community risk assessments, and stakeholder analysis.
Literature Review

The research question and research design are influenced by two areas within the climate politics and policy literature. The first consists of the common policy approaches for mitigating the effects of climate change. The second consists of the factors that commonly impact the policy preferences of the general public. These two areas of literature are reviewed before developing a hypothesis that is used to examine the factors that influence the preferences of climate policy actors.

Climate Policy Responses

Climate change and its predicted impacts present a complex policy problem unlike any the world has ever seen. A warming of two degrees Celsius is predicted to present a wide array of adverse impacts throughout the world (Intergovernmental Panel on Climate Change, 2007), including prolonged periods of drought, increased wildfires, rises in sea level, subsequent coastal flooding, species extinction, and a collection of public health issues. The ability of communities to respond to these adverse impacts will require policy actors with conflicting policy preferences, beliefs, knowledge, and risk perceptions to work together to identify common policy solutions.

However, the formulation of policies for mitigating and/or adapting to these risks faces a series of complex challenges associated with adopting the proper temporal perspective, accurately predicting climate impacts, and accurately assessing vulnerability. Schipper and Pelling (2006) note that climate change risks consist of a combination of short-term climate variability with extreme shocks, as well as longer-term variability that can lead to fundamental societal changes. Accordingly, climate policies are commonly tasked with the difficult prospect of focusing on either the short-term or long-range impacts of climate
change, or attempting to simultaneously account for both timeframes. A second challenge involves conducting a thorough assessment of the potential risks of climate change. These risk assessments commonly require policy actors to carefully predict and reach agreement on the social, economic, and political trends associated with potential policy solutions (Adger & Kelly, 1999). However, reaching agreement on the risks of climate change has proven to be a difficult task as supporters and opponents of climate policy have been shown to consistently disagree over the causes and severity of climate change impacts (Elgin & Weible, 2013; Leiserowitz, 2010; Oreskes & Conway, 2010). A final challenge to the formulation of climate policies involves assessing a community’s vulnerability to climate change, including determining the range of impacts that could potentially occur as well as the associated odds of an occurrence. This arduous task involves accurately modeling the local climate, forecasting changes to the climate, and predicting the elements of risk over extended time horizons (Tol, Frankhauser & Smith, 1998), a series of analytical tasks that are prone to uncertainties (Schneider & Mastrandrea, 2010). Collectively, these challenges further underscore the “wicked nature” of climate policy and the difficulty associated with formulating climate policies.

Further complicating matters is a considerable shift in the venues in which climate change policies are debated. After the rejection of the Kyoto Protocol in 1997, climate policy in the U.S. has continuously shifted towards lower levels of government (Bushinsky, 2010). Support for climate policies across the states can vary considerably, ranging from supportive political landscapes that encourage the adoption of progressive climate policies (Mark & Lynd Luers 2010; Rabe, 2007) as well as unsupportive landscapes that result in an inability or unwillingness to enact climate policies. While a state’s policy options are often reflective
of the state’s political landscape, a collection of common policy options have consistently arisen to the top of state policy agendas. The fundamental policy options for responding to climate change consist of mitigation policies that arrest the scope of change by reducing greenhouse gas emissions or increasing the use of carbon sinks that absorb emissions, and adaptation policies that minimize the adverse effects by bolstering the vulnerabilities of societies and their infrastructures (Fussel, 2007). U.S. Climate policy has traditionally placed a stronger focus on mitigation policies (Pielke, 1998), though adaptation policies are receiving increasing attention as an alternative or complementary approach to mitigation (Smit, Burton, Klein & Wandel, 2000).

Carbon taxes, cap-and-trade policies, and policies promoting the adoption of renewable energy technologies are three common mitigation policies that have been increasingly considered in recent years. Carbon taxes are a market-based policy that establishes a price on carbon and charges emitters a tax based on their emissions. The revenues generated from the tax are used to fund energy research, development and deployment, or to upgrade the existing energy infrastructure, or subsidize the impact of the tax on disadvantaged populations. A key rationale behind carbon taxes is that the tax properly accounts for the impact of the environmental externalities associated with fossil fuel consumption and subsequently levels the playing field for newer low-carbon technologies (Cullenward, 2010). Similarly, cap-and-trade policies offer another market-based approach, but differ in several important aspects. Under a cap-and-trade policy, governments establish limits on the overall level of carbon emissions that industry can emit within a given timeframe. After setting strict emissions limits, governments then establish a market for carbon credits, which provides a legal right for industry to emit a given amount of
greenhouse gases. The total number of credits that exist within a market are set as equal to the overall emissions limit, with emissions limits decreased in future years. A key rationale for cap-and-trade policies is that the trading of emissions credits is based on the market’s potential to minimize costs, with industry provided the opportunity to determine how to comply at the lowest possible cost, through either implementing new technologies for reducing emissions or purchasing additional emissions credits (Cullenward, 2010). As a third option, renewable energy policies mitigate greenhouse gas emissions by promoting the use of renewable energy technologies with minimal levels of carbon emissions. Prominent renewable energy policies include Renewable Energy Portfolio Standards and Public Benefit Funds. Renewable Energy Portfolio Standards mandate that a given percentage of a community’s energy production come from renewable sources, with the standards increased in subsequent years (Carley, 2009). Under these policies, electric and natural gas utilities are typically responsible for ensuring that they supply the necessary levels of renewable energy. In contrast, Public Benefit Funds assess and collect small fees from utility customer bills. These fees are then allocated to fund programs and initiatives that promote renewable energy generation in a variety of ways, including research, development and deployment of new renewable energy technologies. Collectively, these policies provide a diverse set of approaches to mitigating the effects of climate change policy, ranging from market-based approaches that account for the externalities of carbon emissions or allow stakeholders to decide how to most efficiently reduce their emissions, to renewable energy policies that promote or incentive the use of low-carbon technologies.
Factors Impacting the Public’s Policy Preferences

Preferences for various climate policies differ across policy actors due to a collection of factors. The literature on climate change policy and public opinion has identified risk perceptions, climate change knowledge, and ideological beliefs on the proper role of government as factors affecting an individual’s support for climate policies. Among these three factors, risk and knowledge are strongly supported within previous research (O’Connor, Bord, Yarnal & Wiefek, 2002) with perceived risk identified as a key role in an individual’s understanding of climate change (Bord, O’Connor & Fisher, 2000), while knowledge and ideological beliefs have been argued to have a more moderate role.

Risk Perceptions. Climate change policy has been argued to be inherently concerned with risk management, with the development of climate policies focused on assessing the potential impacts of climate change, determining the likelihood that various impacts will occur, and comparing the ability of various policy options to mitigate risk (Schneider & Mastandrea, 2010). Noticeable differences have been found to exist between traditional definitions of risk and the broader public’s understanding of the risks associated with climate change (Leiserowitz, 2010). Risk has traditionally been defined as the probability that an outcome will occur multiplied by the level of impact, with both positive and negative risks occurring. However, climate change risk among the broader public has been framed in negative connotations with risk primarily referring to threats, hazards, or danger. This conceptualization of the negative risks associated with climate change leads individuals to overwhelmingly focus on ‘dread risk’ (Leiserowitz, 2010), or the catastrophic and fatal consequences and a perceived lack of control.
Given climate change policy’s inherent focus on risk, an individual’s risk perceptions play an important role in their preference for climate policies. An individual’s perception of risk has been found to have a strong impact on policy preferences, with risk perceptions found to be a strong predictor of behavioral intentions to address climate change (O’Connor, Bord & Fisher, 1999; Slovic, 1987). In addition, gender has been found to have a notable impact, with women more likely to perceive a higher level of risk than men (Leiserowitz, 2010). However, Leiserowitz (2010) argues that these gender differences can be largely attributed to a small population of white males who perceive lower levels of climate risk than all other demographic groups. This subpopulation of white males is argued to be one example of a collection of interpretive communities that perceive climate change risks in drastically different ways (Leiserowitz, 2005).

Interpretive communities are groups of individuals with common cultural worldviews, and sociodemographic characteristics that share common risk perceptions (Leiserowitz, 2005). The risk perceptions held by these communities are argued to be socially constructed, with individuals in these communities predisposed to focus on, or amplify certain risks while ignoring or discounting others. At opposite ends of the risk perceptions spectrum are interpretive communities of ‘alarmists’ and ‘naysayers’. Alarmists attach high-risk perceptions to climate change and subscribe to images that are considerably worse than those predicted by scientific research. Due to these perceptions, alarmists are more likely to support policies for mitigating climate change and are more likely to have taken personal action to mitigate their own personal contributions to climate change. In contrast, naysayers perceive climate change as an extremely low or nonexistent risk. The low-risk perceptions that naysayers attach to climate change can be attributed to a variety of
rations, including a belief that climate change is a natural occurrence, is overhyped, is based on questionable science, or is associated with conspiracy theories. In between these diametrically opposed ends of the spectrum lies the majority of the American public.

Members of the general public have been found to regard climate change as real and attach high levels of risk to the issue, but consistently regard climate change as a low policy priority. Collectively, the literature on risk perceptions highlights the multitude of risk perceptions held by the American public.

**Knowledge.** In addition to risk, the literature has placed considerable focus on the role of knowledge in influencing climate policy preferences. In recent years, knowledge about climate change has expanded beyond the exclusive domains of climatologists and environmental activists to the average American (Kellestedt, Zahran & Vedlitz, 2008). Furthermore, while scientists were once the primary sources of information on climate change, politicians and interest groups representing both sides of the debate have taken on a larger role in climate change discourse (Trumbo, 1996). This shift in knowledge dissemination has resulted in considerable debates between supporters and opponents over the validity and accuracy of various forms of climate-related knowledge.

While public debates over climate-related knowledge continue to intensify, the association between higher levels of education and stronger support for climate policy preferences has emerged as a consistent theme within the literature. An increased ability among individuals with higher levels of education to gather and interpret science-based information has been associated with elevated levels of environmental concerns. Knowledge, specifically knowledge of extreme weather events, has been identified as a key factor in an individual’s climate policy preferences (Luakkonen et al., 2009). Similarly, O’Connor, Bord
and Fisher (1999) have found that increases in an individual’s climate change knowledge increased their overall willingness to address climate change. More specifically, individuals with higher levels of education have been found to be more likely to support policies for mitigating the effects of climate change (Leiserowitz, 2006). Among these lines, O’Connor, Bord, Yarnal and Wiefek (2002) argue that individuals that lack knowledge of the causal role of greenhouse gases on climate change as well as the behaviors associated with these emissions are unlikely to support mitigation policies. While individuals may be concerned about climate change and possess a desire to do the right thing, they will be unlikely to do so if they lack a fundamental understanding of the major causes of climate change.

While the literature demonstrates a strong connection between higher levels of education and support for climate change policy, studies demonstrate a poor understanding of climate change among the American public. The majority of citizens have been found to obtain their knowledge on climate change not through scientific publications but through the mass media (Corbett & Durfee, 2004). The public’s preferences for mass media as opposed to scientific publications as a source of knowledge can be attributed to preferences for journalistic language and imagery (Nelkin, 1995). This preference for journalistic narratives leads Americans to place less of an emphasis on seeking out and evaluating scientific information as it relates to the adoption of climate policies. Collectively, the existing research on the role of climate-related knowledge and education demonstrates a strong association between higher levels of education and greater support for climate policies, but that a poor understanding of climate change exists among the American public.

**Ideological Beliefs on Government Intervention.** Ideological beliefs about the proper role of government are a third factor impacting climate policy preferences. Positive perceptions of
government and its ability to effectively intervene have been associated with higher levels of support for climate policies (O’Connor, Bord, & Fisher, 1999). These perceptions of government are divided along partisan lines, with liberals more likely to support government intervention to address climate change while conservatives oppose climate change policies on the basis that these policies pose direct threats to economic growth, the free market, and national sovereignty (McCright & Dunlap, 2003). Lorenzoni, Pidgeon and O’Connor (2005) argue that public opinion on climate change within the US is heavily partisan, with Democrats considerably more likely to favor climate policies while Republicans are less inclined (O’Connor, Bord, Yarnal & Wiefick, 2002).

Collectively, the literature draws attention to the effect that ideological beliefs on government intervention can have on climate policy preferences. Supporters of climate change have been identified as more likely to have a liberal ideology, pro-environmental attitudes (Kellstedt, Zahran & Vedlitz, 2008), and egalitarian values (Leiserowitz, 2006). Conversely, opponents of climate change policies have been identified as more likely to be politically conservative and hold anti-environmentalism attitudes and anti-egalitarian values (Leiserowitz, 2006). Following the literature, ideological beliefs supporting government intervention on climate change are predicted to be associated with higher levels of support for climate policies.

Previous research has provided considerable insight into the effects of risk perceptions, climate-related knowledge, and ideological beliefs on support for climate policies. While the literature has devoted a considerable focus to studying the factors that influence the policy preferences of the general public, the factors influencing the preferences of policy actors have received considerably less attention. Given their expertise on climate
and energy policy, and their continuous efforts to influence climate policy, policy actors present a unique opportunity for understanding the factors that affect the policy preferences of those individuals most actively involved in the policy process. In order to develop this improved understanding, this article builds upon previous research by testing the following hypothesis:

*Policy Preferences Hypothesis: Higher levels of climate risk perceptions, climate-related knowledge, and ideological beliefs about the role of government, will have independent, positive and statistically significant effects on the policy preferences of policy actors.*

Research on climate policy preferences has consistently identified risk perceptions, knowledge, and political beliefs favoring government intervention as having positive effects on an individual’s preference for climate policies. However, these three factors have yet to be examined simultaneously. While each factor has been shown to have a positive, statistically significant effect on climate policy preferences when examined independent of the other two factors, the possibility exists that all three factors will not have positive, statistically significant effects. Testing this hypothesis will provide an improved understanding of the comparative effects of risk, knowledge, and ideological beliefs on the policy preferences of climate policy actors.

**Methods**

Data for this study was collected using a web-based questionnaire administered in the spring of 2011 to policy actors in Colorado that were actively engaged in climate and energy policy issues (Elgin & Weible, 2013; Weible & Elgin, 2013). The sample was collected using a purposive sampling technique that first identified policy actors engaged in climate and energy issues through internet searches of government and non-government webpages. In the
second step, newspapers and online publications were also searched to identify the names of policy actors not identified in the initial search. In the final step, preliminary interviews were conducted with five policy actors engaged in climate and energy issues, and the interviewees were asked for the names of individuals that should be included in the sample. A total of 793 policy actors were identified through these efforts, and 272 actors returned fully completed surveys for an overall response rate of 34%.

Colorado provides an effective case study to examine climate and energy policies due to the diversity of its policy actors, the state’s vast traditional energy resources, the rise of its renewable energy sector, and its vulnerability to climate change. A diverse number of climate and energy policy actors are present within Colorado, including actors working in government, industry, non-profit organizations, and academia. These policy actors include supporters and opponents of climate change policy that are actively engaged in efforts to achieve their policy goals. The state’s energy policy has traditionally focused on ensuring that the state is a major producer of traditional energy and takes advantage of its major fossil fuel-rich basins and energy reserves (US Energy Information Administration, 2011). In recent years, Colorado’s renewable energy sector has seen considerable growth due in part to the state’s adoption of a renewable energy portfolio standard via ballot initiative in 2004 and a further strengthening of the standard by the legislature in 2010 (Database of State Incentives for Renewables & Efficiency, 2010). The state has been identified as vulnerable to a variety of climate change impacts, and scientists project that in the ensuing decades, climate change in Colorado will produce temperature increases of 3 to 4 degrees Fahrenheit, longer and more intense wildfires during the summer seasons, and an increase in water shortages. In an effort to address the predicted impacts of climate change, former Colorado

**Operational Measures**

**Dependent Variables**

**Climate Policy Preferences:** Policy preferences are measured using three questions consisting of a policy actor’s support for a carbon tax, cap-and-trade policy, and policies that promote greater generation of renewable energy. For each measure, respondents were asked to report their level of agreement or disagreement that the policy was required to combat climate change. Each question utilized a five-point Likert scale ranging from -2= Strongly Disagree to +2= Strongly Agree. These three measures were then aggregated by their means into a single-scaled ‘Climate Policy Preferences Scale’ (Cronbach’s Alpha = 0.76).

**Independent Variables**

**Risk Perceptions:** A policy actor’s risk perceptions were measured using two questions relating to the severity of impacts and whether human behavior was the principal cause. To measure the severity of impacts, policy actors were asked to report their level of agreement or disagreement with the statement that “the severity of predicted impacts on society from climate change are vastly overstated”. The assumption for the human behavior measure was that policy actors that did not believe that human behavior was the principal cause would have lower risk perceptions. The human behavior component was measured by asking actors their level of agreement or disagreement with the statement that “human behavior is the principal cause of climate change”. Both questions utilized a five-point Likert scale of -2= 
Strongly Disagree to +2= Strongly Agree. The two measures were then aggregated by their means into a ‘Risk Perceptions Scale’ (Cronbach’s Alpha= 0.83).

**Climate Knowledge:** A policy actor’s knowledge of climate change was measured using a battery of questions pertaining to their formal education, policy-related and science-based coursework, years of involvement, and the frequency that they utilize climate-related information from a variety of sources. Actors were asked to report their level of education, ranging from some high school to a Ph.D., MD, or JD. Policy-related coursework was measured by asking actors how many college courses they had taken in economics, public policy, political science, or the law, with answers ranging from none to greater than ten. Science-based coursework was measured by asking actors how many college courses in engineering or climate or energy science they had taken, with responses ranging from none to greater than ten. An actor’s experience was measured by asking the number of years they’d been involved in climate and energy policy, with answers ranging from less than one year to greater than twenty years. The information sources scale asked actors how often they used academic research, newspapers, government reports, industry reports, and reports from non-profit organizations in their climate and energy-related policy work with the frequency of use scale ranging from daily to never. The information sources questions were aggregated by their means into an ‘Information Sources Scale’ (Cronbach’s Alpha= 0.79). Exploratory factor analysis was used to create a scale for climate-related knowledge using the education, coursework, years of involvement, and information source variables. Due to low factor loadings and a lower Cronbach’s Alpha score, the science-based coursework question was not included in the scale. The ‘Climate Knowledge Scale’ was then constructed by
aggregating the formal education, policy-related coursework, experience, and information sources measures by their means (Cronbach’s Alpha= 0.71).

**Government Ideological Beliefs:** A policy actor’s ideological beliefs on the appropriate role of government were measured using three questions on the necessity of government intervention and the actor’s fiscal and social policy beliefs. Beliefs on the necessity of government intervention were measured by asking actors to indicate their level of agreement or disagreement with the statement that “decisions about energy and its effect on climate were best left to the government and not to the economic market”. Respondents were asked to use a five-point Likert-scale ranging from -2= Strongly Disagree to +2= Strongly Agree.

As Frankhauser, Smith & Tol (1999), note social safety nets for individuals impacted by climate change are an important component within climate policies. Accordingly, a social policy variable was included to capture an actor’s beliefs in this area, with actors asked to respond using a scale ranging from very liberal to very conservative. Similarly, a fiscal policy variable was created by asking actors to respond using a scale ranging from very liberal to very conservative. The three measures were aggregated by their means into a ‘Government Ideological Beliefs Scale’ (Cronbach’s Alpha= 0.72).

**Control Variables:** Three measures relating to an actor’s organizational affiliation, gender, and race served as control variables. The organizational affiliation measure asked whether actors were affiliated with academic, business, government, or non-profit organizations. Gender was measured using a dichotomous variable, with males coded as ‘0’ and females coded as ‘1’. Race was measured by asking actors to report whether they were American Indian or an Alaska Native, Asian, Black or African American, Hispanic or Nation, Native Hawaiian or Other Pacific Islander, or White (not of Hispanic origin).
A key component of the policy actor definition is that policy actors are actively engaged in efforts to realize their policy goals. A political activities variable was subsequently included in the descriptive analysis in order to measure the activities in which policy actors engage as they strive to realize their policy goals. Political activities were measured via a survey question on eight types of political activities commonly identified within the interest group literature (Baumgartner & Leech, 1998). Policy actors were asked to report whether they had participated in the following types of political activities within the past year: appraising policy options; conducting research on climate-related issues and/or energy policy; participating in coalition building (e.g. networking, information sharing); evaluating policy processes, results and outcomes; implementing or delivering policies or programs on climate-related issues and/or energy policy; informing elected and appointed officials; negotiating in a multi-stakeholder consensus based process. Activity engagement was coded as a dichotomous variable with ‘1’ representing an actor’s engagement in the activity within the previous year and ‘0’ for non-engagement.

**Findings**

The results are presented in two parts. The first part (table 3.1) presents the descriptive results for the dependent, independent, and control variables. The second part (tables 3.2 through 3.4) presents the results from an explanatory analysis on the factors affecting policy preferences, which consist of a series of ordinal logistic regression models.

**Descriptive Analysis**

Table 3.1 lists the descriptive results for the sample of policy actors in Colorado. The majority of policy actors were female (53.6%), with men comprising 46.4% of the sample. The race of policy actors was overwhelmingly white (94.6%), with actors of all other races
representing a minority of the sample (5.4%). Policy actors were primarily affiliated with business organizations (32.7%) followed closely by government (31.6%) and lower levels of actors in non-profits (20.7%) and academia (14.3%).
Table 3.1: Descriptive Results: Policy Actor Demographics, Political Activities, Risk Perceptions, Knowledge, Ideological Beliefs, and Policy Preferences

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>122 (46.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>141 (53.6%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>94.1%</td>
</tr>
<tr>
<td>All Other Races</td>
<td>5.9%</td>
</tr>
<tr>
<td><strong>Organizational Affiliation</strong></td>
<td></td>
</tr>
<tr>
<td>Academic/Research</td>
<td>38 (14.3%)</td>
</tr>
<tr>
<td>Business</td>
<td>87 (32.7%)</td>
</tr>
<tr>
<td>Government</td>
<td>84 (31.6%)</td>
</tr>
<tr>
<td>Non-profit</td>
<td>55 (20.7%)</td>
</tr>
<tr>
<td><strong>Participation in Political Activities</strong></td>
<td></td>
</tr>
<tr>
<td>Appraised policy options</td>
<td>60%</td>
</tr>
<tr>
<td>Conducted research on climate-related issues or policy</td>
<td>64%</td>
</tr>
<tr>
<td>Consulted with the public</td>
<td>68%</td>
</tr>
<tr>
<td>Participated in coalition building</td>
<td>82%</td>
</tr>
<tr>
<td>Evaluated policy processes, results and outcomes</td>
<td>65%</td>
</tr>
<tr>
<td>Implemented or delivered policies or programs</td>
<td>54%</td>
</tr>
<tr>
<td>Informed officials</td>
<td>73%</td>
</tr>
<tr>
<td>Negotiated in multi-stakeholder consensus processes</td>
<td>53%</td>
</tr>
<tr>
<td>Severity of Predicted Impacts</td>
<td>Agreement (1.1)</td>
</tr>
<tr>
<td>Human Behavior is the Principal Cause</td>
<td>Agreement (1.0)</td>
</tr>
<tr>
<td><strong>Risk Perceptions Scale</strong></td>
<td></td>
</tr>
<tr>
<td>Formal Education Level</td>
<td>Master’s or Professional Degree (4.9)</td>
</tr>
<tr>
<td># of Courses in Political Science, Public Policy, Economics or Law</td>
<td>5-10 Courses (2.9)</td>
</tr>
<tr>
<td># of Courses in Engineering or Climate or Energy Science</td>
<td>Less than 5 (2.4)</td>
</tr>
<tr>
<td>Years of Involvement</td>
<td>6-9 Years (3.2)</td>
</tr>
<tr>
<td>Information Sources Scale</td>
<td>Monthly (3.3)</td>
</tr>
<tr>
<td><strong>Climate Knowledge Scale</strong></td>
<td></td>
</tr>
<tr>
<td>Solutions not best left to the market</td>
<td>Agree (1.1)</td>
</tr>
<tr>
<td>Fiscal Policy</td>
<td>Moderate (0.1)</td>
</tr>
<tr>
<td>Social Policy</td>
<td>Liberal (1.0)</td>
</tr>
<tr>
<td><strong>Government Ideological Beliefs Scale</strong></td>
<td></td>
</tr>
<tr>
<td>Carbon Tax Policy</td>
<td>Moderate Agreement (0.6)</td>
</tr>
<tr>
<td>Cap &amp; Trade Policy</td>
<td>Minimal Agreement (0.1)</td>
</tr>
<tr>
<td>Renewable Energy Policy</td>
<td>Agreement (1.2)</td>
</tr>
<tr>
<td><strong>Climate Policy Preferences Scale</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderate Agreement (0.6)</td>
</tr>
</tbody>
</table>

Climate and energy policy actors in Colorado engaged in a variety of political activities for realizing their climate policy goals. Policy actors had the highest level of engagement in building a coalition that represented their policy preferences (82% of actors), followed by informing elected and appointed officials (73%), consulting with the public on climate and energy issues (68%), and evaluating climate policy process, results, and outcomes (65%). Policy actors had more moderate levels of engagement in conducting
climate and energy research (64%), appraising climate policy options (60%), implementing climate policies or programs (54%), and negotiating in multi-stakeholder consensus processes on climate change (53%). These results demonstrate a high level of engagement in climate-related political activities among policy actors in Colorado.

The lower section of Table 3.1 lists the mean risk perceptions, climate-related knowledge, and ideological beliefs for the sample of policy actors. Two variables were used to measure risk perceptions. Policy actors reported higher levels of risk perceptions agreeing that the severity of the predicted impacts was not overstated and that human behavior was the principal cause of climate change. The ‘Risk Perceptions Scale’ that combined the two measures into a single scale demonstrated an overall high level of risk perceptions among policy actors.

Five variables were used to measure climate-related knowledge. Policy actors were highly educated with a Master’s degree as the mean level of education. Policy actors reported taking an average of five to ten courses in political science, public policy, economics, or the law. In contrast, policy actors reported taking lower levels of engineering, climate or energy science coursework, with a mean of less than five courses. Actors possessed moderate levels of experience working in climate and energy policy issues, with an average of six to nine years of experience. The ‘Information Sources Scale’ measured the frequency that policy actors utilized climate-related information. Policy actors reported moderate levels of use, utilizing the majority of information sources on a monthly basis. The ‘Climate Knowledge Scale’ was used to aggregate the five measures into a single-scale. Policy actors had a mean value of 3.6, indicating moderate to high levels of climate-related knowledge.
Three variables were used to measure ideological beliefs on government intervention. Policy actors reported agreement with the belief that decisions about climate and energy were not best left to the market. Policy actors considered themselves to be moderate on fiscal policy and to be liberal on social policy. The ‘Ideological Beliefs Scale’ was used to aggregate the three variables into a single measure of a policy actor’s support for government intervention. Policy actors had a mean value of 0.7, indicating moderate support for government intervention.

The final section of Table 3.1 lists the climate policy preferences of policy actors. Policy actors differed in regard to their preferences for climate change policies. Policy actors expressed the highest level of support for renewable energy policies as a policy option for mitigating the effects of climate change, followed by moderate support for a carbon tax, and minimal support for cap-and-trade policy. The ‘Climate Policy Preferences Scale’ was used to aggregate the three measures into a single measure of policy preferences. The mean value for the scale was 0.6, indicating moderate support for climate change policies among policy actors in Colorado.

**Explanatory Findings**

Table 3.2 presents an overview of the explanatory models and the expected relationships for each of the independent and control variables. The risk perceptions, climate knowledge, and government intervention independent variables are all expected to be positively related to an actor’s preference for climate policy. Among the control variables, organizational affiliation is expected to have a combination of positive and negative relationships depending on the organization type. Dichotomous variables for academic, business and non-profit affiliations were included within the models with all coefficients
interpreted in regard to the omitted category of government affiliation. Caucasian race and female gender are expected to have positive relationships. Gender was measured using a dichotomous female variable with the coefficients interpreted in regard to males. A dichotomous variable of White (not of Hispanic origin) was included within the models with the coefficients interpreted in regard to the other races.

**Table 3.2: Explanatory Model**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Expected Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>Climate Policy Preferences</td>
<td></td>
</tr>
<tr>
<td>Carbon Tax</td>
<td></td>
</tr>
<tr>
<td>Cap &amp; Trade Policy</td>
<td></td>
</tr>
<tr>
<td>Renewable Energy Policy</td>
<td></td>
</tr>
<tr>
<td>Climate Policy Preference Scale</td>
<td></td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>+</td>
</tr>
<tr>
<td>Severity of Predicted Impacts</td>
<td></td>
</tr>
<tr>
<td>Caused by Human Activity</td>
<td></td>
</tr>
<tr>
<td>Climate Change Knowledge</td>
<td>+</td>
</tr>
<tr>
<td>Formal Education</td>
<td></td>
</tr>
<tr>
<td>Policy-Related Courses</td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td></td>
</tr>
<tr>
<td>Information Sources</td>
<td></td>
</tr>
<tr>
<td>Science-Related Courses</td>
<td>+</td>
</tr>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
</tr>
<tr>
<td>Organizational Affiliation</td>
<td>+/-</td>
</tr>
<tr>
<td>Academic</td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td></td>
</tr>
<tr>
<td>Non-Profits</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>+</td>
</tr>
<tr>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>+</td>
</tr>
<tr>
<td>Caucasian</td>
<td></td>
</tr>
</tbody>
</table>
The explanatory analysis consisted of a series of ordinal logistic regressions with the carbon tax, cap-and-trade, renewable energy, and ‘Climate Policy Preferences Scale’ as the dependent variables. In order to better understand the individual and aggregate effects of the risk, knowledge and belief measures, separate models were estimated using the individual measures of risk perception, climate knowledge, and ideological beliefs as well as the ‘Risk Perceptions Scale’, ‘Climate Knowledge Scale’, and the ‘Ideological Beliefs Scale’. Robust standard errors were included to control for heteroscedasticity and variance inflation factor tests were conducted to test for multicollinearity within the models.\footnote{Variance inflation factors were less than two, indicating that multicollinearity was not an issue within the models.}

The first series of models examined the impact of the individual measures of risk, knowledge, and ideological beliefs on an actor’s policy preferences. Pseudo $R^2$ values for the models ranged from 0.10 to 0.23 and $X^2$ probabilities demonstrated a high level of significance across the models ($p<0.001$). The individual measures of risk were strongly related to policy preferences. The severity of predicted impacts had statistically significant, positive relationships across all four models. Whether climate change was human-caused was also strongly related, with statistically significant, positive relationships in three of the four models. In contrast, the five measures of climate knowledge were weakly related, with a lack of statistical significance in the majority of the models. The exception is the ‘Information Sources Scale’ where more frequent use of climate-related information was related to higher levels of support for renewable energy policy. The individual measures of government intervention beliefs were also weakly related to policy preferences. The exception is the belief that climate solutions are not best left to the market where higher levels of support for
this belief were related to higher levels of support for renewable energy policy. Finally, the control variables were also weakly related to policy preferences, and organizational affiliation, female gender, and Caucasian race did not have statistically significant relationships in any of the four models. Collectively, the results of the individual measures models demonstrate significant differences in the effects of the three independent variables on a policy actor’s climate policy preferences.

**Table 3.3: Explanatory Analysis with Individual Measures**

<table>
<thead>
<tr>
<th></th>
<th>Carbon Tax</th>
<th>Cap &amp; Trade Policy</th>
<th>Renewable Energy Policy</th>
<th>Climate Policy Preferences Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity of Impacts</td>
<td>0.74***</td>
<td>0.57**</td>
<td>0.58**</td>
<td>0.91***</td>
</tr>
<tr>
<td>Human-Caused</td>
<td>0.32*</td>
<td>0.25</td>
<td>0.43*</td>
<td>0.37*</td>
</tr>
<tr>
<td>Years Involved</td>
<td>0.10</td>
<td>-0.04</td>
<td>-0.11</td>
<td>-0.01</td>
</tr>
<tr>
<td>Level of Education</td>
<td>0.25</td>
<td>-0.02</td>
<td>-0.16</td>
<td>0.08</td>
</tr>
<tr>
<td># of Policy-Related Classes</td>
<td>-0.01</td>
<td>-0.09</td>
<td>0.04</td>
<td>-0.04</td>
</tr>
<tr>
<td># of Science-Related Classes</td>
<td>-0.06</td>
<td>-0.09</td>
<td>-0.10</td>
<td>-0.14</td>
</tr>
<tr>
<td>Information Sources Scale</td>
<td>0.20</td>
<td>0.12</td>
<td>0.42*</td>
<td>0.20</td>
</tr>
<tr>
<td>Solutions not best left to the market</td>
<td>0.14</td>
<td>-0.01</td>
<td>0.38*</td>
<td>0.19</td>
</tr>
<tr>
<td>Fiscal Policy</td>
<td>0.17</td>
<td>0.33</td>
<td>0.35</td>
<td>0.37</td>
</tr>
<tr>
<td>Social Policy</td>
<td>0.36</td>
<td>0.14</td>
<td>-0.04</td>
<td>0.26</td>
</tr>
<tr>
<td>Academic</td>
<td>-0.16</td>
<td>-0.49</td>
<td>0.72</td>
<td>-0.13</td>
</tr>
<tr>
<td>Business</td>
<td>0.09</td>
<td>0.40</td>
<td>-0.20</td>
<td>0.22</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>-0.14</td>
<td>-0.28</td>
<td>0.34</td>
<td>-0.14</td>
</tr>
<tr>
<td>Female</td>
<td>-0.28</td>
<td>0.14</td>
<td>-0.41</td>
<td>-0.12</td>
</tr>
<tr>
<td>Caucasian</td>
<td>0.08</td>
<td>0.61</td>
<td>-1.04</td>
<td>0.12</td>
</tr>
<tr>
<td>Pseudo R² / R²</td>
<td>0.17</td>
<td>0.10</td>
<td>0.23</td>
<td>0.14</td>
</tr>
<tr>
<td>Prob&gt;Chi² / F-Stat</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001.

The second series of models used the ‘Risk Perceptions Scale’, ‘Climate Knowledge Scale’, and the ‘Ideological Beliefs Scale’ to examine the aggregate impacts of each individual measure on an actor’s policy preferences. Measures of goodness of fit and statistical significance were nearly identical to the previous models, with Pseudo R² values ranging from 0.10 to 0.22 and a high level of significance across the models (p<0.001). Risk perceptions once again had the strongest relationship to policy preferences, with positive and statistically significant effects in all four models. Similar to the individual measures models,
the ‘Climate Knowledge Scale’ and the number of science-related classes had a lack of statistical significance in the majority of the models. The lone exception was a positive, statistically significant effect for the ‘Climate Knowledge Scale’ on support for a carbon tax.

In contrast to the individual models, the ‘Ideological Beliefs Scale’ was found to have a positive, statistically significant effect in all four models. An increase in ideological beliefs favoring government intervention was consistently related to an increase in support for climate policies. Finally, the control variables were once again weakly related to policy preferences, with the organizational affiliation, female gender, and Caucasian race consistently non-significant in any of the four models.

Table 3.4: Explanatory Analysis with Scale Measures

<table>
<thead>
<tr>
<th></th>
<th>Carbon Tax</th>
<th>Cap &amp; Trade Policy</th>
<th>Renewable Energy Policy</th>
<th>Climate Policy Preferences Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Scale</td>
<td>1.01***</td>
<td>0.75***</td>
<td>1.00***</td>
<td>1.18***</td>
</tr>
<tr>
<td>Climate Knowledge Scale</td>
<td>0.45*</td>
<td>-0.10</td>
<td>-0.04</td>
<td>0.12</td>
</tr>
<tr>
<td># of Science-Related Classes</td>
<td>-0.04</td>
<td>-0.08</td>
<td>-0.11</td>
<td>-0.13</td>
</tr>
<tr>
<td>Government Ideological Beliefs Scale</td>
<td>0.69**</td>
<td>0.50*</td>
<td>0.74**</td>
<td>0.90***</td>
</tr>
<tr>
<td>Academic</td>
<td>0.01</td>
<td>-0.35</td>
<td>0.73</td>
<td>0.03</td>
</tr>
<tr>
<td>Business</td>
<td>0.04</td>
<td>0.40</td>
<td>-0.17</td>
<td>0.22</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>-0.09</td>
<td>-0.22</td>
<td>0.40</td>
<td>-0.09</td>
</tr>
<tr>
<td>Female</td>
<td>-0.26</td>
<td>0.19</td>
<td>-0.25</td>
<td>-0.07</td>
</tr>
<tr>
<td>Caucasian</td>
<td>-0.02</td>
<td>0.44</td>
<td>-0.95</td>
<td>-0.02</td>
</tr>
<tr>
<td>Pseudo R² / R²</td>
<td>0.16</td>
<td>0.10</td>
<td>0.22</td>
<td>0.13</td>
</tr>
<tr>
<td>Prob&gt;Chi² / F-Stat</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01, ***p<0.001.

Discussion

This article examined the factors influencing the policy preferences of climate and energy policy actors in Colorado. In order to develop a better understanding of the factors influencing policy preferences, this article asked the following research question: What are the comparative effects of risk perceptions, climate-related knowledge, and ideological beliefs on the policy preferences of climate policy actors? This article hypothesized that higher levels of climate change risk perceptions, knowledge, and support for government
intervention, would have positive and statistically significant effects on the policy preferences of policy actors. This hypothesis was partially supported within both versions of the explanatory models. Risk perceptions had the strongest relationship to policy preferences, with positive and statistically significant effects in the majority of the individual and scaled versions of the models. Ideological beliefs on government intervention had the second strongest relationship among the independent variables. When examined individually, the ideological belief measures were largely non-significant across the four models. However, when aggregated into a single-scale measure, ideological beliefs were found to have a positive, statistically significant effect across all four models of policy preferences. This finding draws attention to the strong effects that a collection of ideological beliefs can have on an actor’s policy preferences, a topic that the Advocacy Coalition Framework (Sabatier & Jenkins-Smith, 1993) has studied at great length. Finally, climate-related knowledge had little effect on policy preferences in either the individual or scale versions of the models. While previous research has found that climate-related knowledge can have a positive effect on an actor’s support for climate policies, these findings suggest that knowledge plays a minor role when examined alongside risk perceptions and ideological beliefs.

These findings provide nuance to the previous findings on climate-related knowledge. Collectively, the findings draw attention to the need to consider the risk perceptions and ideological beliefs held by policy actors. Greater acknowledgement of the influence of risk perceptions and ideological beliefs may lead to a better understanding of the positions of supporters and opponents of climate policy, which could in turn lead to more constructive policy debates and the identification of policies that garner the support of both groups. Fortunately, the public policy literature has identified several methods that can be used to
better understand the policy preferences, risk perceptions, and ideological beliefs of climate policy actors.

The post-positivist policy literature argues strongly for the need to expand the role of policy actors within policymaking and to better acknowledge the role of beliefs and values within the policy process (deLeon, 1988). deLeon (1992) has argued for the use of participatory policy analysis as a means for opening the policymaking process to greater involvement of policy actors. The participatory policy analysis process involves a two-sided learning experience where policy actors work together to evaluate policy alternatives. This process provides policy actors with an improved opportunity to voice their perceptions and beliefs and develop policy solutions that better reflect their policy preferences. Durning (1993) has detailed a collection of participatory policy analysis methods that can be used to ascertain the values and beliefs of policy actors. Methods that may be particularly relevant to climate policy include interpretative methods where policy actors work together to provide formal policy advice, and stakeholder policy analysis where stakeholders work together to analyze data, process information, and translate opinion inputs into policy advice.

Outside of post-positivist approaches, community risk assessments and stakeholder analysis can also be used to develop an improved understanding of the policy preferences, risk perceptions, and support for government intervention among climate policy actors. Van Aalst, Cannon and Burton (2006) highlight the value of using community risk assessments for exploring climate change adaptation policies. This approach, which has been used by a variety of community-based and non-government organizations, uses participatory methods to assess hazards, vulnerabilities, and capacities in support of community-based disaster risk reduction. The approach uses a variety of methods, including risk mapping, asset inventories
and likelihood surveys, historical and seasonal calendars, focus groups, surveys and interviews to identify strategies for reducing a society’s vulnerability to climate change. In addition, Elgin and Weible (2013) have proposed a stakeholder analysis that can be used to develop an improved understanding of the political contexts surrounding climate and energy policy. The approach emphasizes measuring the beliefs, networks, resources, and activities of policy actors in order to develop a better understanding of the contextuality of climate and energy politics and estimating the political feasibility of climate policy alternatives. Collectively, the participatory policy analysis, community risk assessment, and stakeholder analysis approaches provide important tools for developing a better understanding of policy actor beliefs and risk perceptions which can be used to identify policy alternatives that can attract the support of a large number of climate policy actors.

Generalizing the results of this study should be done with a degree of caution. The self-reporting of policy preferences, risk perceptions, and support for government intervention may be subject to issues of social desirability bias (Singleton & Straits 2010), with actors reporting preferences, beliefs, knowledge, and perceptions that they believe to be valued by society. As a result, these indirect measures could have influenced the findings and additional research is needed in order to confirm the validity of these measures and their effects on policy preferences. In addition, while Colorado is reasonably assumed to be a typical case for examining climate and energy policy debates, it is possible that the sample of policy actors is not entirely representative of policy actors within other states. The homogenous nature of the sample in regard to race is of particular concern. Further research focusing on the climate and energy policy landscapes of other states is necessary in order to
determine the generalizability of the policy preferences, risk perceptions, and ideological beliefs of Colorado’s climate and energy policy actors.

These caveats aside, this article offers several contributions to the literature on climate politics and policy. The article builds upon previous research on the effects of risk, knowledge, and ideological beliefs on the policy preferences of the general public climate by examining the effects on the important sub-population of policy actors actively engaged in efforts to realize their policy goals. In addition, this article is the first to examine the effects of risk, knowledge, and beliefs in a comparative context, demonstrating that the policy preferences of policy actors are largely affected by their risk perceptions and ideological beliefs on government intervention. Finally, this article has drawn attention to the need to develop a better understanding of the risk perceptions and ideological beliefs among climate policy actors when considering the adoption of climate policies and has identified several methods from the public policy literature that appear worthy of this task.
CHAPTER IV

EXAMINING THE ROLE OF INFORMATION SOURCES AND PROCESSING TOOLS IN COLORADO CLIMATE AND ENERGY POLICY DEBATES

Chapter Summary

Throughout their efforts to influence governmental policies, supporters and opponents of climate policy are exposed to policy-related information from a wide array of sources. While the policy process literature provides a variety of explanations for how individuals utilize information, critical questions remain unanswered in regard to the types of information utilized by supporters and opponents of climate policy and the factors affecting information use. In combination, the Advocacy Coalition Framework and the Policy Analytical Capacity framework provide an appropriate method for identifying the factors that affect the decisions of policy actors to utilize various sources of information in their policy activities. To examine the decision factors, this chapter conducts descriptive and explanatory analyses of survey data administered in 2011 to individuals involved in climate and energy policy in the state of Colorado. The results of the descriptive analysis indicate that coalitions of climate policy supporters and opponents utilize a variety of information sources at similar frequencies despite differences in climate change beliefs, individual experience and training, organizational resources, and use of various information-related tools and techniques among

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their members. The results of the explanatory analysis demonstrate that a policy actor’s decision to utilize various sources of information is strongly impacted by the use of collaborative and analytical tools and techniques for processing information and to a lesser degree by the actor’s organizational resources. Collectively, these results provide an improved understanding of the information utilized by supporters and opponents of climate policy, which could eventually lead to more constructive policy debates.

Despite a strong consensus within the scientific community on the need to mitigate and adapt to the impacts of climate change (Andregg, Prall, Harold & Schneider, 2010; Mastrandrea & Schnieder, 2010; Oreskes, 2007), supporters and opponents of climate change policy are engaged in intense policy debates. The second chapter of this dissertation examined the beliefs of policy actors within the policy process, identifying a large coalition of climate policy supporters and a small coalition of climate policy opponents (Elgin & Weible, 2013). Within climate policy debates, climate policy supporters advocate in favor of a variety of policy options designed to either mitigate or adapt to the effects of climate change, including carbon taxes, cap & trade policies, renewable energy and energy efficiency policies, and climate adaptation plans. On the other side, climate policy opponents, including skeptics, deniers, or contrarians (Boykoff, 2010), oppose climate change policies on the basis that these policies pose direct threats to economic growth, the free market, and national sovereignty (McCright & Dunlap, 2003). The debates between these groups is fueled by information related to a wide variety of climate change topics, with supporters utilizing scientific and technical information as the impetus for adopting climate policies while opponents have leveraged the mass media and conservative thinks tanks to disseminate information that casts doubt upon the causes and impacts of climate change. Among these
diametrically opposed groups, information plays a critical role in efforts to influence policy with information used to either support a group’s policy positions or attack the positions of its opponents.

However, critical questions remain unanswered in regard to the types of information utilized by supporters and opponents and the factors affecting information use. These unanswered questions include: To what extent are supporters and opponents of climate change utilizing information from similar sources? Do supporters of climate policy have a greater reliance on research from academic institutions and government organizations? Are opponents of climate policy more reliant on information produced by their own organizations or from industries opposed to climate policies? What factors impact a policy actor’s decision to utilize various information sources in their policy work? Developing an improved understanding of the information sources utilized by supporters and opponents of climate change and the factors impacting their use may lead to a better understanding of the positions of supporters and opponents of climate policy, which may lead to more constructive policy debates.

The Advocacy Coalition Framework (Sabatier & Jenkins-Smith, 1993) and the Policy Analytical Capacity (Howlett, 2009) framework can be used in combination to develop a better understanding of how climate change policy actors utilize information. The Advocacy Coalition Framework (ACF) offers a theoretical platform that can be used to examine political landscapes involving substantial goal conflicts, enduring technical disputes, and a variety of policy actors. Policy Analytical Capacity (PAC) refers to “information acquisition and utilization within the policy process” (Howlett, 2009, p. 162) and provides a typology of information-related resources used by policy actors. PAC provides an informal framework
for examining the level of resources related to acquiring and utilizing information at the individual and organizational levels. Utilizing these frameworks in combination, this chapter examines the information sources relied upon by two rival advocacy coalitions within the Colorado climate and energy policy subsystem.

This chapter begins with a review of the relevant literature on the role of information in the policy process and within climate policy debates followed by reviews of the ACF and PAC literature, before posing a hypothesis for testing the factors affecting the decisions of policy actors to utilize various sources of information in their policy activities. The chapter then describes the context of climate and energy policies in Colorado. Data for this study were collected via a survey administered in 2011 to ‘policy actors’, individuals who possessed a level of expertise on climate and energy policy and have worked to influence policy in the state of Colorado over an extended period of time. The results are presented in two parts. The first part is a descriptive analysis of the advocacy coalitions and their corresponding beliefs, the use of information sources among coalition members, and the individual- and organizational-level PAC of the coalitions. The second part is an explanatory analysis that examines the factors that affect the decisions of policy actors to utilize various sources of information in their policy activities. The results demonstrate that a policy actor’s decision to utilize various sources of information is strongly impacted by the use of collaborative and analytical tools and techniques for processing information and to a lesser degree by the actor’s organizational resources. Collectively, these results provide an improved understanding of the information utilized by supporters and opponents of climate policy, which could eventually lead to more constructive policy debates.
Theoretical Background and Approach

The literature on policy actors has generated a number of expectations and findings about the factors that affect the information sources utilized by policy actors. Some of these expectations derive from a model of the individual rooted in bounded rationality where cognitive limitations force policy actors to select and interpret information based on a variety of heuristics including their beliefs and interests (Simon, 1947). These heuristics lead to the conscious or unconscious selection and interpretation of information (Festinger, 1957; Lord et al., 1979). Information sources utilized by policy actors may also be interpreted through the prism of a priori beliefs and used to reinforce a worldview, mobilize supporters, and shape government agendas and policy (Sabatier & Jenkins-Smith 1993).

Information has been identified as one of the most important resources for policy actors attempting to influence the policy process (Howlett & Ramesh, 1995; Lasswell, 1956; Lindblom, 1959). Policy actors play a crucial role in supplying policy-related information and research for influencing policy decisions. Those policy actors that are most effective in channeling their research to ‘policymakers’, legislators or bureaucrats with the power to make formal policy decisions, have an advantage in defining the problem as well as identifying policy solutions. The value of information to policymakers can be attributed, in part, to the information costs associated with searching for policy-relevant information as well as limited information processing capabilities that limit an individual’s ability to sift through large amounts of policy information (Bobrow & Dryzek, 1987; Jones & Baumgartner, 2005; Simon, 1985).

However, policy actors face a collection of barriers that hinder their ability to provide information to policymakers and influence policy decisions. Knott & Wildavsky (1980) note
that policymakers can be either ignorant of available knowledge on a policy issue or be aware of the available knowledge but elect not to utilize it. As Whittorck (1982) notes, the possibility also exists that information provided by policy actors may be distorted or used in a manner in which it was not originally intended. In addition, policymakers or their institutions may possess a strong mistrust or skepticism towards information provided by outside sources or prefer to utilize information from sources they are already familiar with (Rich, 1991). Landry, Amara, and Lamari’s (1998) empirical study on Canadian policymakers found that information utilization depended more heavily on factors relating to the behavior and dissemination activities of researchers and other policy actors as well as the context, than on the attributes of the research products themselves. Needless to say, the barriers that policy actors face in providing information for influencing policy decisions are plentiful.

The ACF (Sabatier & Jenkins-Smith, 1993) and the PAC (Howlett, 2009) framework can be used in combination to develop a better understanding of how climate policy actors utilize information. The ACF offers a theoretical tool that can be used to examine policy subsystems involving substantial goal conflicts, enduring technical disputes, and a variety of policy actors (Sabatier & Jenkins-Smith, 1993). PAC offers an approach for developing a better understanding of the factors that determine the use of various information sources among policy actors. Within this chapter, the ACF is utilized as a theoretical construct for depicting the landscape of policy actors, by dividing opposing groups of policy actors into advocacy coalitions on the basis of belief similarity. In contrast, PAC is used to help answer the research questions by providing a theoretical framework for examining information acquisition and utilization among supporters and opponents of climate policy.
Advocacy Coalition Framework

The ACF was developed in the late 1980’s by Paul Sabatier and Hank Jenkins-Smith out of the concern that political science’s primary focus on the role of government institutions had missed many of the critical features of public policy-making (Sabatier, 1986; Sabatier, 1987; Sabatier, 1988; Sabatier & Jenkins-Smith, 1993). In response, the framework was developed to respond to complex policy problems involving goal conflicts, technical or scientific disputes and the involvement of multiple actors from inside and outside of government. The ACF rests upon three foundational premises operating at the individual, coalition, and subsystem-levels (Sabatier & Jenkins-Smith, 1993). At the subsystem-level, the ACF assumes that, because policymaking is complex, participants must specialize in a topical area in order to be influential. This specialization occurs within policy subsystems (Heclo, 1978) that consist of participants who regularly attempt to influence policy within a functional/substantive dimension (such as climate policy) and a territorial dimension (such as Colorado). At the individual-level, the ACF focuses on policy actors, including government officials as well as individuals working in nonprofits, businesses, academia, consulting firms, and the media (Zaller, 1992), that utilize their expertise to influence a policy domain. The ACF assumes that policy actors are boundedly-rational (Simon, 1985) and rely upon a three-tiered hierarchical belief system (deep core beliefs, policy core beliefs, and secondary beliefs) for making policy-related decisions. To influence policy decisions, policy actors utilize information along with other available resources in order to bolster their argument or attack an opponent’s (Sabatier, 1991; 1998), influence public opinion, recruit individuals to support a policy objective, or attract additional resources (Sabatier & Jenkins-Smith, 1993). At the coalition-level, the ACF assumes that policy actors will strive to translate their policy
beliefs into actual policies and that they will seek out allies, share resources, and develop strategies in order to do so. If policy actors engage with each other in a nontrivial degree of coordination they form an advocacy coalition.

Information sources, in the form of scientific and technical information, play a critical role within the ACF. Scientific and technical information is used by coalition members to define the causes and severity of a policy problem and estimate the impacts of proposed policy solutions (Sabatier, 1988). The scientific and technical information collected by coalitions is used in an advocacy fashion, serving to bolster the coalition’s pre-existing beliefs or to legitimize its arguments against its opponents (Weible, Sabatier & McQueen, 2009). The belief systems of coalition members are central to the utilization of scientific and technical information, as members perpetually filter new information through their belief systems, accepting information that confirms their existing beliefs while screening out conflicting information (Sabatier & Jenkins-Smith, 1993). Given the importance of belief systems in interpreting information, the policy core beliefs of coalition members are expected to be critical factors affecting the use of information sources.

This chapter uses the ACF in a descriptive rather than an explanatory manner, with the framework used as a theoretical tool for describing the political landscape of climate politics and policy in Colorado. The framework offers an effective tool for describing policy beliefs, coalition members, networks, and resources and examining how these elements interact at the individual, organizational, and subsystem levels (Elgin & Weible, 2013). With the ACF used to describe the political landscape, PAC is then utilized to develop a hypothesis for examining information acquisition and utilization among supporters and opponents of climate policy.
Policy Analytical Capacity

The PAC’s theoretical focus on the capacity of individuals and their organizations to acquire and utilize information in the policy process (Howlett, 2009) offers one approach for developing a better understanding of the factors that affect the use of various information sources among advocacy coalitions. Combining individual- and organizational-levels of focus, PAC can be used to identify the resources related to acquiring and utilizing information. Achieving high levels of PAC is associated with a recognized demand or market for policy research, a supply of qualified researchers, access to quality data, policies and procedures to facilitate interactions between researchers, and a culture that encourages openness and risk taking (Riddell, 1998). At the individual level, PAC is comprised of several dimensions, including level of training and access and use of tools and techniques commonly used within a profession (Wellstead, Stedman & Lindquist 2009). While individual-level resources play an important role in the ability of individual actors to utilize information, the majority of policy actors do not possess the personal resources to participate in policy issues over extended periods of time. As a result, policy actors attempt to leverage the resources of the organizations that they are affiliated with, including government agencies, businesses, nonprofit organizations, or academic/research organizations, in their pursuit of policy objectives. At the organizational level, PAC relates to the organizational support available to policy actors, including an organization’s priority in addressing a particular issue as well as its willingness to devote resources to the issue (Craft & Howlett, 2012; Howlett & Oliphant, 2010). The argument is one of resource dependency (Pfeffer & Salancik, 1978), where organizations provide policy actors assets in shaping policy debates.
In addition to its focus on individual and organizational-level factors, a value in utilizing PAC is the development of a better understanding of the capacity of policy actors to utilize a variety of tools and techniques for processing information. Tools used by policy actors, defined as decision making aids in government and policy affairs, can range from analytically-focused tools for examining and evaluating information to collaborative tools that focus on outreach and building consensus (Weible & Elgin, 2013). Analytical tools can include environmental impact analysis, risk analysis, economic and financial analysis, modeling, and political feasibility analysis. Collaborative tools can include facilitation and consensus building, collaborating with those with similar or dissimilar beliefs, and other informal tools and techniques.

Drawing from the literature on information use in the policy process and the PAC’s focus on information acquisition and utilization, this study evaluates the following original hypothesis:

*Information Sources Hypothesis: Coalition members will seek information sources that support the tools and techniques they utilize to examine and evaluate information.*

PAC focuses on the successive processes of acquiring and utilizing information within the policy process. In the first process, the ability of policy actors to acquire pertinent policy-related information is determined by the actor’s capacity to process and evaluate policy information, with the use of analytical- and collaborative-based tools playing a key role. The use of analytical tools and techniques such as risk analysis, environmental impact analysis, and economic analysis, allows policy actors to examine and evaluate climate-related information. In contrast, collaborative tools, such as facilitation and consensus building, collaborating with other policy actors, and problem mapping, allows policy actors to engage
and build consensus around proposed policy solutions. Given the importance of these tools and techniques in information acquisition, it is anticipated that tools and techniques will be a primary factor affecting a policy actor’s decision to utilize various information sources throughout their efforts to influence the policy process. Testing this hypothesis will provide an improved understanding of the factors that impact a policy actor’s decision to utilize various sources of information, by examining the effects of analytical and collaborative tools for acquiring and disseminating policy-related information.

Case: Colorado Climate and Energy Policy Subsystem

The causes of climate change are well established within scientific research, and human activities have been identified with high levels of confidence as the prime driver of climate change (Mastrandrea & Schneider, 2010). Despite the scientific consensus, the majority of Americans identify climate change as a low policy priority (Leiserowitz, 2010). The lack of support from the American electorate in combination with a lack of political will within government and resistance from special interests and industry groups, has led to a lack of policies to address climate change (Azar, 2010). After national efforts to address climate change stalled in 2004, efforts to mitigate and adapt to climate change shifted to the state level (Bushinsky, 2010).

The climate and energy political landscapes of the states vary considerably, consisting of supportive landscapes that result in a state enacting progressive climate policies (Mark & Lynd Luers 2010; Rabe, 2007) as well as unsupportive landscapes that result in an inability or unwillingness to enact climate policies. These landscapes can be characterized by political debates over the certainty and causes of climate change and appropriate public policy
responses. These debates have often been intense, with distortions of scientific claims and ethically questionable behavior among individuals on both sides seeking an edge in shaping policy-related knowledge and public opinion (Oreskes & Conway, 2010; Parris, 2007). Supporters of climate change have been identified as more likely to have a liberal ideology, pro-environmental attitudes (Kellstedt, Zahran & Vedlitz, 2008), and egalitarian values (Leiserowitz, 2006). Conversely, opponents of climate change policies have been identified as more likely to be politically conservative and hold anti-environmentalism attitudes and anti-egalitarian values (Leiserowitz, 2006). These conflicting ideologies, beliefs, and values have resulted in significant differences in how supporters and opponents of climate change policies interpret and utilize policy-related information.

The information available to supporters and opponents for use in climate change policy debates has increased significantly in recent years (Kellstedt, Zahran & Vedlitz, 2008). While access to information on climate change was primarily limited to scientists and environmental activists (Kellstedt, Zahran & Vedlitz, 2008), climate change information is increasingly found within popular culture and the mass media, with the media identified as a primary source of climate change knowledge for the majority of Americans (Corbett & Durfee, 2004). The dissemination of climate-related information has also seen a significant shift in recent years. While scientists were once the primary sources of information on climate change, politicians and interest groups representing both sides of the debate have taken on a larger role in climate change discourse (Trumbo, 1996). Despite being comparatively smaller in number (Leiserowitz, 2010), opponents of climate change have been particularly active in using the mass media and other information sources to express their policy beliefs on climate change.
Beginning in the late 1980’s, a cohesive climate change opposition group supported by industry utilized the mass media to express their skepticism of climate change in a manner that has significantly impacted both climate change policy and the public’s understanding of climate change (Boykoff, 2010). Opponents of climate change policy have been identified as engaging in efforts to cast doubt on the causes and impacts of climate change by arguing that the scientific basis for the predicted impacts of climate change are uncertain, unreliable, and fundamentally unproven (Oreskes, 2004). As part of these efforts, opponents have mobilized conservative think tanks in an effort to redefine climate change as non-problematic (McCright & Dunlap, 2003). Under this strategy, a collection of conservative think tanks produced and circulated a variety of policy studies, press releases, editorials and books expressing doubt on the causes and impacts of climate change. In addition, these think tanks sponsored climate change policy forums, speeches and press conferences challenging climate change, inviting policymakers to these events, and disseminating event transcripts to policymakers. Collectively, the efforts of climate change opponents were designed to inform policy decisions by providing policymakers with information intended to influence their beliefs and decisions related to climate policy.

This study uses climate and energy issues in the state of Colorado as a context for examining climate policy debates. Colorado provides an effective case to examine climate and energy policies due to the state’s diverse number of policy actors, vast traditional energy resources, the rise of its renewable energy sector, and its vulnerability to climate change. A diverse number of policy actors are present within the Colorado climate and energy policy subsystem, including actors working in government, industry, non-profit organizations, and academia. These policy actors include supporters and opponents of climate change policy.
who are actively engaged in efforts to translate their policy beliefs into tangible policies. Historically, Colorado has been a major producer of traditional energy, with the state possessing several major fossil fuel-rich basins as well as vast reserves of coalbed methane and natural gas (US Energy Information Administration, 2011). More recently, Colorado’s energy production and use has seen a considerable growth in the renewable energy sector partly in response to the state’s passage of a renewable energy portfolio standard via ballot initiative in 2004 and a further strengthening of the standard by the legislature in 2010 (Database of State Incentives for Renewables & Efficiency, 2010). The state also provides an effective case due to its vulnerability to a variety of climate change impacts, including shorter and warmer winters, a thinner snowpack, and increased periods of drought (Ritter, 2007). In an effort to address the predicted impacts of climate change, former Colorado Governor Bill Ritter launched the Colorado Climate Action Plan in November of 2007, which called for a 20% reduction of the state’s greenhouse gas emissions by 2020. The state’s adoption of a climate action plan is representative of climate policy at the state level (EPA, 2011; ICLEI, 2011) and Colorado can be considered to be a typical case (Gerring, 2001) for examining climate and energy policy debates.

Methods

A web-questionnaire was administered in the spring of 2011 to policy actors in Colorado actively involved in climate and energy issues (see Elgin & Weible, 2013 for a detailed description). The sample was collected through a purposive sample targeting individuals involved in Colorado climate and energy issues by first searching the internet for government and nongovernment organizations and the people therein. Additionally, newspapers and online publications were also searched. The online search was
complemented by preliminary interviews with five individuals involved with Colorado climate and energy issues. The total sample identified through these efforts was 793 individuals. Of the total population sampled, 272 people returned fully completed surveys for a response rate of 34%.

**Operational Measures**

**Dependent Variable**

**Information Sources.** Survey respondents were asked to report the frequency in which they utilized seven types of information sources: reports from their own organization, reports from non-profits, reports from city and state governments, reports from consultants, industry reports, academic research, and newspapers and news magazines. Responses were measured using a five point Likert scale of daily, weekly, monthly, yearly, and never, and were coded in order ranging from 5 = Daily through 1 = Never. An information frequency scale was then created by averaging the means of the seven information sources (average factor loading= 0.66; Cronbach’s alpha = 0.701).

**Independent Variables:**

**Formal Training.** Individual PAC, in the form of a policy actor’s formal training, was measured by asking respondents: “In which of the following areas have you received formal training?” Responses included applied research, modeling, policy analysis, policy evaluation, statistical methods, and trends analysis and/or forecasting. The formal training questions were then aggregated by their means into a single-scaled “Sum of Formal Training” variable (average factor loading= 0.38; Cronbach’s Alpha= 0.59).

**Tools and Techniques Used.** Individual PAC, in the form of information processing tools and techniques used by policy actors, was measured through the following question: “How often
have you used the following tools and techniques as part of your work in the past year?”
Choices included political feasibility analysis, risk analysis, modeling, “collaborating with
those who you agree with”, “collaborating with those you disagree with”, environmental
impact analysis, facilitation and consensus building, economic analysis, and informal tools
and techniques. Respondents were asked to respond using a scale coded from 5 to 1
consisting of daily, weekly, monthly, yearly, and never. Two additional scales were then
created via confirmatory factor analysis. The first scale consists of analytical tools and
techniques including modeling, environmental impact analysis, economic analysis, risk
analysis, and political feasibility analysis (average factor loading= 0.48; Cronbach’s alpha=
0.80). The second scale consists of collaborative tools and techniques including collaborating
with those you agree with, collaborating with those you disagree with, facilitation/consensus
building, and informal tools/techniques (average factor loading= 0.64; Cronbach’s alpha=
0.80).

Organizational Capacity. Three measures from previous PAC research (Craft & Howlett,
2012; Howlett & Oliphant 2010) were used to measure organizational capacity, consisting of
organizational priorities, organizational resources, and ability to engage in long-term
planning on climate change. Measuring climate and energy issues as an organizational
priority was done by asking respondents: “Compared with other issues that your organization
responds to, how much of a priority are climate-related issues and energy policies?” The
sample was asked to respond using a five point Likert scale consisting of much higher,
higher, about the same, lower, and much lower. To measure organizational resources,
respondents were asked: “Compared to similar organizations, does your organization have
adequate knowledge, skills, and people to respond to climate-related issues and energy
policies?” The sample was asked to respond using a five-point scale consisting of very high capacity, high capacity, medium capacity, low capacity, and very low capacity. To measure the ability of the organization to engage in long-term planning processes associated with climate change adaptation, respondents were asked their level of agreement or disagreement with the following statement: “Urgent day-to-day issues seem to take precedence over thinking long-term.” The sample was asked to respond using a five-point scale consisting of strongly disagree, disagree, neutral, agree, and strongly agree, with responses coded from 5 to 1. An organizational capacity scale was then created by taking the mean of the three variables (average factor loading = 0.88; Cronbach’s alpha = 0.70).

Pro-Climate Beliefs. Pro-climate beliefs were measured using a battery of survey questions relating to the ACF concept of policy core beliefs. Survey respondents were asked to report their beliefs on the severity of climate change, its causes, and possible policy approaches for mitigating carbon emissions, including carbon taxes, cap and trade systems, and policies promoting renewable energy generation. Respondents were asked to use a five-point scale ranging from -2 = Strongly Disagree to +2 = Strongly Agree. These individual questions were then aggregated by their means into a single-scaled item, ‘Pro-Climate Change Beliefs’ (average factor loading= 0.72; Cronbach’s Alpha= 0.87).

Control Variables. Two survey questions derived from the PAC served as control variables. The effect of a policy actor’s organizational affiliation on their use of information was controlled for using a survey question asking actors whether they were affiliated with an academic/research, business, government, or non-profit organization. A policy actor’s years of experience was controlled for using a survey question asking them how many years they’d
been involved in climate and energy policy, with responses ranging from less than a year to greater than 20 years.

**Results**

The results are presented in two parts. The first part (tables 4.1 through 4.4) presents the descriptive analyses for advocacy coalition membership and policy beliefs, coalitional use of information sources, and the individual and organizational capacity of the coalitions. The second part (table 4.5) presents the results from an explanatory analysis using ordered logit models and an ordinary least squares (OLS) regression model used to explain the factors that affect the decisions to utilize various sources of climate and energy-related information.

**Descriptive Analysis**

Advocacy coalitions were identified using a combination of cluster analysis and silhouette means (Zafonte & Sabatier, 1998). Using the $k$-means clustering technique, the battery of policy core belief questions on the causes, severity, and potential policy solutions for addressing climate change were used to partition policy actors into clusters based upon the similarity of their beliefs. Policy actors were partitioned into two, three, and four advocacy coalitions, with average silhouette values used to determine the goodness of fit for each cluster. Clustering policy actors into two advocacy coalitions produced the best fit with an average silhouette value of 0.66, while clustering actors into three and four advocacy coalitions produce silhouette values of 0.40 and 0.35, respectively. The two advocacy coalitions identified consisted of a large coalition of climate policy supporters (‘Supporters
Coalition’) consisting of 205 members, and a small coalition of climate policy opponents (‘Opponents Coalition’) consisting of 55 policy actors.\(^9\)

Table 4.1 lists the descriptive characteristics and policy beliefs for the two advocacy coalitions. The two coalitions were found to have statistically significant differences in regards to the organizational affiliations of their members (p< 0.05, based on an independent sample, Chi-square test). Within the Opponents Coalition, the organizational affiliation of members is dominated by business organizations (53%), with government organizations a distant second (22%). In contrast, the majority of members in the Supporters Coalition are affiliated with the government sector (33%) with business a close second (28%).

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\(^9\) The advocacy coalitions are referred to as large and small rather than dominant and minority coalitions. The reasoning is that this description is based on the size of the coalition as opposed to their influence on public policy within the subsystem.
Table 4.1: Advocacy Coalition Membership and Belief Measures

<table>
<thead>
<tr>
<th></th>
<th>Opponents Coalition</th>
<th>Supporters Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of policy actors</td>
<td>55</td>
<td>205</td>
</tr>
<tr>
<td>Policy actors by affiliation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government*</td>
<td>12 (22%)</td>
<td>67 (33%)</td>
</tr>
<tr>
<td>Business*</td>
<td>29 (52%)</td>
<td>58 (28%)</td>
</tr>
<tr>
<td>Nonprofit*</td>
<td>7 (13%)</td>
<td>47 (23%)</td>
</tr>
<tr>
<td>Academic/Research*</td>
<td>7 (13%)</td>
<td>31 (15%)</td>
</tr>
<tr>
<td>Deep core beliefs(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiscal***</td>
<td>3.65</td>
<td>2.65</td>
</tr>
<tr>
<td>Social***</td>
<td>2.93</td>
<td>1.77</td>
</tr>
<tr>
<td>Policy core beliefs(^b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity of predicted impacts is overstated (Reversed)***</td>
<td>0.65</td>
<td>-1.6</td>
</tr>
<tr>
<td>Human behavior is the principal cause***</td>
<td>-0.65</td>
<td>1.45</td>
</tr>
<tr>
<td>Decisions on climate &amp; energy are best left to the market (Reversed)***</td>
<td>0.15</td>
<td>-1.46</td>
</tr>
<tr>
<td>Carbon tax is required***</td>
<td>-1.20</td>
<td>1.02</td>
</tr>
<tr>
<td>Cap &amp; trade is required***</td>
<td>-1.35</td>
<td>0.40</td>
</tr>
<tr>
<td>Renewables policy is required***</td>
<td>-0.35</td>
<td>1.62</td>
</tr>
<tr>
<td>Pro-Climate Beliefs Scale***</td>
<td>-0.72</td>
<td>1.26</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001

\(^a\)Deep Core Belief scale: 1=“very liberal”, 2=“liberal” 3=“moderate”, 4=“conservative”, 5=“very conservative”.

\(^b\)Policy Core Belief scale:
-2=“strongly disagree”, -1 = “agree”, 0=“neither agree nor disagree”, 1 = “disagree”, 2=“strongly disagree”.

Table 4.1 also lists the deep core and policy core beliefs of the two coalitions. The deep core beliefs of members of the Supporters Coalition were found to be more liberal on fiscal policy and considerably more liberal on social policy than members of the Opponents Coalition (p< 0.001 for both measures). The two coalitions also differed significantly in their policy core beliefs on climate change (p<0.001 for all measures). The Supporters Coalition strongly disagreed with the statement that the predicted impacts of climate change were overstated, strongly believed that human behavior was the principal cause, and strongly disagreed with the belief that decisions on climate change were best left to the market. The coalition also supported the adoption of all three proposed climate policy options, with minimal support for a cap & trade policy, moderate support for a carbon tax, and strong support for renewable energy policies. In contrast, the Opponents Coalition believed that the
severity of climate change was overstated, disagreed that human behavior was the principal cause, and believed that decisions on climate change were best left to the market. The coalition also opposed the adoption of all three proposed policy solutions, with minimal opposition to renewable energy policies, moderate opposition to a carbon tax, and strong opposition to a cap & trade policy. The ‘Pro-Climate Change Beliefs Scale’ measured the overall intensity of the climate change beliefs held by coalition members, with negative values indicating opposition to climate change policy and positive values indicating support. The Opponents Coalition had a mean belief of -0.72, indicating moderate opposition to climate change policy, while the Supporters Coalition had a mean belief of 1.26, indicating strong support. Collectively, these findings demonstrate the fundamentally different policy core beliefs of the two coalitions.

Key unanswered questions on information sources were whether supporters had a greater reliance on research from academic and government institutions and whether opponents were more reliant on information produced by their own organizations or by industry. Table 4.2 lists the frequency of information use by the two coalitions across the seven types of information sources. Mean values were used to report the frequency that each of the information sources were utilized across the two coalitions and between the organizational types within each coalition. Reports by a policy actor’s own organization, were found to be used at a slightly higher level of frequency within the Opponents Coalition with a mean value closest to “weekly”, while the Supporters Coalition had a mean value of “monthly” (p< 0.05). Reports from non-profits were utilized by both coalitions on a monthly basis (p< 0.05). Within the Supporters Coalition, statistically significant differences were found between organization types with non-profits utilizing the reports on a weekly basis.
while the other organization types utilized reports from non-profits on a monthly basis (p<0.001). The use of academic research was not found to have statistically significant differences between the coalitions. However, members of the Supporters Coalition working in academic/research organizations were found to utilize academic research on a weekly basis while all other organization affiliations used this information on a monthly basis (p<0.001). Statistically significant differences were also found between and within the coalitions in regard to the use of industry reports. The Opponents Coalition utilized industry reports on a weekly basis, while the Supporters Coalition utilized the reports on a monthly basis (p<0.05). Within the Opponents Coalition, members working in non-profits and business organizations utilized industry reports on a weekly basis, while members working in government and academic/research organizations utilized these reports on a monthly basis (p<0.05). The information frequency scale, which was created to reflect the frequency of use across all information sources, shows that the two coalitions used the majority of information sources on a monthly basis (means of 3.26 and 3.10 for the Opponents and Supporters Coalitions, respectively).
<table>
<thead>
<tr>
<th></th>
<th>Opponents Coalition</th>
<th>Supporters Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gov't</td>
<td>Business</td>
</tr>
<tr>
<td>Reports from Own Organization</td>
<td>3.58</td>
<td>3.66</td>
</tr>
<tr>
<td>Reports from Non-Profits</td>
<td>2.58</td>
<td>2.59</td>
</tr>
<tr>
<td>Academic Research</td>
<td>2.92</td>
<td>3.00</td>
</tr>
<tr>
<td>Reports from City &amp; State Governments</td>
<td>3.08</td>
<td>3.48</td>
</tr>
<tr>
<td>Reports from Consultants</td>
<td>2.75</td>
<td>3.31</td>
</tr>
<tr>
<td>Reports from Industry</td>
<td>3.00*</td>
<td>3.79*</td>
</tr>
<tr>
<td>Information Frequency Scale</td>
<td>3.04</td>
<td>3.43</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001

Exact wording: "How often do you use the following types of information in your climate and energy related policy work?" (5 = "Daily", 4 = "Weekly", 3 = "Monthly", 2 = "Yearly", 1 = "Never").
Overall, the coalitions are found to utilize information sources, regardless of source, on a monthly basis, but with two notable caveats. First, the coalitions differ in regard to the use of information from an actor’s own organization and industry reports with the Opponents Coalition utilizing these sources on a weekly basis, while the Supporters Coalition utilizes these sources on a monthly basis. Second, organizations within the two coalitions utilize information at different rates. Organizations within the Opponents Coalition typically utilize information sources on a monthly basis with the exception of industry reports, which are utilized by non-profit organizations and business organizations on a weekly basis. In contrast, a greater level of diversity in the frequency of use of information sources is seen among organizations within the Supporters Coalition, as non-profit, academic/research, and business organizations utilize information from their own organizations most frequently, while government organizations rely more frequently on newspapers and news magazines.

Table 4.3 presents the individual PAC of members within each coalition. Members of both coalitions are highly educated with a master’s degree as the mean level of education. Both coalitions have similar levels of experience, with members having an average of six to nine years of experience in climate and energy issues. Members in both coalitions have largely similar levels of formal training in a variety of areas, though statistically significant differences are found between the coalitions in regard to training, with the Opponents Coalition having higher levels of training in statistics and modeling, while the Supporters Coalition had higher levels of training in policy analysis (p<0.05 for all three areas).
Table 4.3: Individual Policy Analytical Capacity of the Coalitions

<table>
<thead>
<tr>
<th></th>
<th>Opponents Coalition</th>
<th>Supporters Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Govt</td>
<td>Business</td>
</tr>
<tr>
<td>Education*</td>
<td>4.83</td>
<td>5.21</td>
</tr>
<tr>
<td>Years of experience*</td>
<td>3.08</td>
<td>4.03</td>
</tr>
<tr>
<td>Percent of coalition members who have received formal training:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>67%*</td>
<td>52%*</td>
</tr>
<tr>
<td>Modeling</td>
<td>50%*</td>
<td>34%*</td>
</tr>
<tr>
<td>Training in applied research</td>
<td>42%*</td>
<td>21%*</td>
</tr>
<tr>
<td>Policy evaluation</td>
<td>33%</td>
<td>45%</td>
</tr>
<tr>
<td>Trends analysis</td>
<td>33%</td>
<td>38%</td>
</tr>
<tr>
<td>Policy analysis</td>
<td>25%</td>
<td>34%</td>
</tr>
<tr>
<td>Frequency of use of tools and techniques</td>
<td>3.25</td>
<td>3.61</td>
</tr>
<tr>
<td>Collaborate with those you agree</td>
<td>3.25</td>
<td>3.18</td>
</tr>
<tr>
<td>Collaborate with those you disagree</td>
<td>2.42*</td>
<td>2.11*</td>
</tr>
<tr>
<td>Facilitation/Consensus Building</td>
<td>3.00</td>
<td>3.41</td>
</tr>
<tr>
<td>Informal Tools</td>
<td>2.00</td>
<td>2.52</td>
</tr>
<tr>
<td>Environmental Impact</td>
<td>2.83</td>
<td>2.79</td>
</tr>
<tr>
<td>Economic/Financial Analysis</td>
<td>1.92</td>
<td>2.48</td>
</tr>
<tr>
<td>Risk Analysis</td>
<td>1.42</td>
<td>1.50</td>
</tr>
<tr>
<td>Political Feasibility</td>
<td>2.91</td>
<td>3.13</td>
</tr>
<tr>
<td>Sum of Collaborative Tools</td>
<td>2.02</td>
<td>2.26</td>
</tr>
<tr>
<td>Sum of Analytical Tools</td>
<td>2.02</td>
<td>2.26</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001
*Education scale: 1= "not a high school graduate", 2="high school graduate", 3="some college", 4="bachelor's degree", 5="master's or professional degree", 6="PhD, MR, or JD".
Actors were also asked about the frequency in which they used tools and techniques for processing climate and energy information. Statistically significant differences between the coalitions were found in regard to collaborating with other actors who they agree with, facilitation and consensus building, and conducting political feasibility analysis. The Supporters Coalition was found to engage in facilitation and consensus building strategies on a monthly basis while the Opponents Coalition engaged on a yearly basis (p<0.05). The Supporters Coalition was also found to conduct political feasibility analysis on a yearly basis, while the Opponents Coalition rarely conducted this analysis (p<0.01). Both coalitions were found to utilize collaborative tools on a monthly basis, while utilizing analytical tools on a yearly basis. Statistically significant differences were also found within the Opponents Coalition in regard to utilizing facilitation and consensus-building tools and techniques. Non-profits were found to utilize facilitation and consensus-building on a monthly basis, while actors from other organizational affiliations utilized these tools and techniques on a yearly basis.

Table 4.4 presents the organizational PAC of the coalitions. Three measures were used to examine the PAC of organizations within each coalition: (1) organizational priority; (2) adequate knowledge, skills, and people; and (3) urgent day-to-day issues took precedence over long-term efforts. Policy actors in both coalitions reported that their organization made climate and energy issues a higher priority, while statistically significant differences are found within each coalition. In the Opponents Coalition, business and non-profit organizations reported that climate and energy issues were a higher priority while academic/research and government organizations reported that they were a similar priority to other issues (p< .05). Within the Supporters Coalition, non-profit, business, and
academic/research organizations reported that climate and energy issues were a higher priority while they were about the same in government organizations (p<.05). When asked whether their organization had adequate knowledge, skills, and people to address climate change and energy issues, member of both coalitions reported high capacity as the mean value. Statistically significant differences are found within the Supporters Coalition, with members working in academic/research, business and non-profit organizations reporting high levels of capacity for their organizations while member working in government organizations reported that their organizations possessed medium capacity (p<.01). Coalition members were asked whether their organization had the ability to think long term on climate and energy issues or whether urgent, day-to-day issues took precedence and kept them from doing so. Both coalitions reported mean responses closest to “agree”. Finally, the organizational capacity variable comprised of the individual measures of organizational priority, skills, knowledge and people, and long-term planning variables was examined. The opponents and Supporters Coalitions held mean organizational capacities of 3.21 and 3.18, respectively, indicating medium capacity. Within the Opponents Coalition, noticeable differences are found with businesses reporting high capacity while academic/research and non-profits reported medium capacity and government organizations reported low capacity (p<.05). In comparison, less variance in organizational PAC is found among organizations in the Supporters Coalition with all organizational types reporting moderate capacity (p<.05).
Table 4.4: Organizational Policy Analytical Capacity of the Coalitions

<table>
<thead>
<tr>
<th></th>
<th>Opponents Coalition</th>
<th>Supporters Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Govt</td>
</tr>
<tr>
<td>Organizational priority(^a)</td>
<td>3.50</td>
<td>2.5*</td>
</tr>
<tr>
<td>Adequate knowledge, skills, and people(^b)</td>
<td>3.69</td>
<td>3.00</td>
</tr>
<tr>
<td>Urgent day-to-day issues take precedence(^c)</td>
<td>3.60*</td>
<td>4.17</td>
</tr>
<tr>
<td>Organizational Capacity Scale</td>
<td>3.21</td>
<td>2.44*</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test between and within coalitions, with significance levels at *p<0.05, **p<0.01, ***p<0.001.

\(^a\)Scale: 1= “much lower”, 2= “lower”, 3= “about the same”, 4= “higher”, 5= “much higher”.

\(^b\)Scale: 1= “very low capacity”, 2= “low capacity”, 3= “medium capacity”, 4= “high capacity”, 5= “very high capacity”.

\(^c\)Scale: 1= “strongly disagree”, 2= “disagree”, 3= “neutral”, 4= “agree”, 5= “strongly agree”
Overall, these results suggest similar levels of organizational PAC among the coalitions. Greater variance is found in regard to the PAC of organizations within the Opponents Coalition while organizations within the Supporters Coalition reported similar levels of PAC. Within both coalitions, business, non-profit and academic/research organizations consistently reported the highest mean scores for organizational PAC variables, while government organizations reported the lowest.

**Explanatory Analysis**

Table 4.5 presents the multivariate analysis explaining the factors impacting decisions to utilize various information sources among coalition members. A series of ordinal logit models with robust standard errors were conducted with each information source as the dependent variable. Independent variables consisted of the ‘Sum of Formal Training Scale’, the collaborative and analytical tools scales, the ‘Organizational Capacity Scale’, and the ‘Pro-Climate beliefs Scale’. Control variables consisted of organizational affiliation (with government as the reference) and a policy actor’s years of involvement in climate and energy policy.

Given the likelihood of endogeneity between the information sources dependent variable and the pro-climate beliefs explanatory variable, each model was tested for endogeneity. Endogenous models are subject to simultaneity bias between the dependent and independent variables, resulting in the endogenous independent variables being correlated with the error term and biasing the overall results of the model. Controlling for endogeneity involves the process of identifying an instrumented variable that is correlated with the endogenous variable but is uncorrelated with the error term and then utilizing the Hausman test (Halcoussis, 2005) to determine whether the results of the original endogenous model
and the instrumented models are statistically different. The number of physical science classes taken by coalition members was utilized as an instrumental variable due to its correlation to the endogenous pro-climate beliefs scale (regression coefficient of 0.10; p<0.05) and the lack of a correlation with the error term in the regression models (Halcoussis, 2005). A Hausman test revealed the presence of endogeneity between the pro-climate beliefs scale and the information sources variables (p<0.05). However, the inclusion of the number of physical sciences classes taken as an instrumental variable was not statistically significant within the models and did not produce changes in the significance or coefficients of the other explanatory variables. As a result, the pro-climate beliefs variable remained in the final specifications of the explanatory models.

The final models have Pseudo R² scores ranging from 0.11 to 0.18. In addition, an OLS regression with robust standard errors was conducted with the sum of information sources scale as the dependent variable. The OLS model shows good fit with an adjusted R² of 0.51. All coefficients in Table 4.5 are unstandardized.
Table 4.5: Explanatory Analysis of Information Source Use by Coalition Members

<table>
<thead>
<tr>
<th>Sum of Formal Training</th>
<th>Own Org’s Reports</th>
<th>Non-Profit Reports</th>
<th>Academic Research</th>
<th>City &amp; State Government Reports</th>
<th>Consultant Reports</th>
<th>Industry Reports</th>
<th>Newspapers &amp; news magazines</th>
<th>Sum of Information Sources²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative Tools Scale</td>
<td>0.64***</td>
<td>0.87***</td>
<td>0.77***</td>
<td>1.02***</td>
<td>1.09***</td>
<td>0.97***</td>
<td>0.83***</td>
<td>0.41***</td>
</tr>
<tr>
<td>Analytical Tools Scale</td>
<td>0.54</td>
<td>0.66**</td>
<td>0.63**</td>
<td>0.59**</td>
<td>0.58*</td>
<td>0.49*</td>
<td>0.03</td>
<td>0.21**</td>
</tr>
<tr>
<td>Organizational Capacity Scale</td>
<td>0.82***</td>
<td>0.46*</td>
<td>0.66**</td>
<td>0.30</td>
<td>0.36</td>
<td>0.36</td>
<td>0.54*</td>
<td>0.24***</td>
</tr>
<tr>
<td>Pro-Climate Beliefs Scale</td>
<td>-0.37*</td>
<td>0.21</td>
<td>0.26</td>
<td>-0.26</td>
<td>-0.22</td>
<td>-0.43**</td>
<td>-0.03</td>
<td>-0.07</td>
</tr>
<tr>
<td>Business</td>
<td>0.20</td>
<td>-0.17</td>
<td>-0.35</td>
<td>-0.19</td>
<td>0.29</td>
<td>0.86*</td>
<td>0.33</td>
<td>0.07</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>-0.76*</td>
<td>1.31***</td>
<td>-0.30</td>
<td>-0.19</td>
<td>-0.11</td>
<td>-0.34</td>
<td>0.20</td>
<td>0.01</td>
</tr>
<tr>
<td>Consultant</td>
<td>-0.05</td>
<td>0.19</td>
<td>1.34</td>
<td>-0.36</td>
<td>0.14</td>
<td>-0.01</td>
<td>0.44</td>
<td>0.15</td>
</tr>
<tr>
<td>Academic</td>
<td>-0.03</td>
<td>0.96*</td>
<td>1.82***</td>
<td>-0.40</td>
<td>-1.10*</td>
<td>-0.71</td>
<td>0.53</td>
<td>0.05</td>
</tr>
<tr>
<td>Years of Involvement</td>
<td>0.11</td>
<td>0.16</td>
<td>0.07</td>
<td>0.04</td>
<td>-0.03</td>
<td>-0.03</td>
<td>0.24*</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Constant</th>
<th>0.57**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudo R² / R²</td>
<td>0.11</td>
</tr>
<tr>
<td>Prob&gt;Chi² / F-Stat</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Note: Models are ordinal logit analysis with robust standard errors except for the 'Sum of Information Sources' dependent variable where ordinary least square regression with robust standard errors was used (coefficients omitted from exhibit, for the collaborative technique scale the constant = 0.50 and for the analytical techniques scale the constant = 0.17).

***p<0.001, **p<0.01, *p<0.05
Table 4.5 indicates that the use of collaborative and analytical tools and techniques and organizational capacity are consistently and positively associated with the use of information sources. Collaborative tools had the strongest association, with significance across all eight information types \((p<0.001)\). Analytical tools had the second strongest association with significance in six of the sources \((p<0.05)\), but were not associated with the use of an organization’s own reports and newspapers and news magazines as information sources. Organizational capacity was less strongly associated, with statistical significance in five of the information sources \((p<0.05)\). Higher levels of organizational PAC resulted in statistically significant increases in the sum of information sources variable as well as the use of reports from an actor’s own organization, reports from non-profit organizations, academic research, and newspapers and news magazines.

The other variables were not as consistent in their effects on the use of information sources. Pro-climate change beliefs were significant in two of the models, with an increase in beliefs associated with a decreased use of reports from an actor’s own organization \((p<0.05)\) and industry reports \((p<0.01)\). Each of the organization types had both positive and negative coefficients with no more than two statistically significant relationships \((p<0.05)\). Years of involvement was found to have a positive, statistically significant relationship to the use of newspapers and news magazines \((p<0.05)\). Formal training had no explanatory power within any of the models.

These findings support the hypothesis that coalition members would seek information sources that supported the tools and techniques they utilized to examine and evaluate information. The use of collaborative tools was significant in all eight of the information source models while the use of analytical tools was significant in six of the models. These
findings provide an improved understanding of the factors that impact a policy actor’s decision to utilize various sources of information, demonstrating that collaborative and analytical tools are strongly associated with the use of a variety of information sources.

**Discussion & Conclusion**

The purpose of this chapter was to provide insight into the factors affecting information use to develop a better understanding of climate and energy policy debates, with Colorado as a representative case. This chapter identified four research questions related to the information sources utilized by supporters and opponents of climate change policy.

The first question asked to what extent supporters and opponents utilized similar information sources. The results broadly demonstrate that despite possessing a wide range of climate change beliefs and individual and organizational capacity, the Supporters and Opponents Coalitions utilized similar information sources, ranging from academic research to reports produced by a policy actor’s own organization, to newspapers and news magazines. However, the two coalitions differed in regard to the frequency that they utilized several information sources. Within both coalitions newspapers and news magazines were used at the highest frequency among the sources examined, with a mean frequency of weekly. This finding supports previous research by Corbett and Durfee (2004) and Boykoff (2010), among others, who have identified the mass media as a primary source of providing climate information.

The second question asked whether supporters had a greater reliance on research from academic and government organizations, while the third question asked whether opponents of climate policy were more reliant upon information produced by their own organization or from industries opposed to climate policies. The findings partially deviate from initial
expectations. In contrast to the expectation that supporters of climate policy would be more reliant on academic and government research, no statistically significant differences were found, with both coalitions utilizing these sources on a monthly basis. However, the findings partially support the expectation that opponents of climate change have a greater reliance on reports from their own organizations and industry reports as information sources, as coalition members were found to utilize these sources at a higher rate than members of the Supporters Coalition.

The final question concerned the factors impacting a policy actor’s decision to utilize various information sources in their policy work. The findings demonstrate that the use of information sources is largely driven by the use of collaborative-based tools and techniques, followed by analytically-focused tools, and organizational resources. Analytical and collaborative tools were found to have statistically significant relationships across the majority of information sources. Collaborative tools, such as facilitation and consensus building, were found to lead to an increased frequency of use across all information sources. Analytical tools, such as modeling, environmental impact analysis, economic analysis, and political feasibility analysis, resulted in an increased frequency of use in six of the eight information source variables. These results suggest that information use among coalition members is strongly associated with the ability to use tools to disseminate information to other members, while the ability to analyze information is less strongly associated. Accordingly, these results also tentatively suggest that both coalitions are more frequently engaged in disseminating existing climate-related information than in analyzing new policy-related information. In contrast to collaborative and analytical tools, organizational-level PAC was found to have a more modest impact on the use of information sources. Higher
levels of PAC at the organizational-level resulted in an increased frequency of use in five of the models. Collectively, these findings provide support for this chapter’s hypothesis that policy actors will seek information sources that support the tools and techniques they utilize to examine and evaluate information.

Generalizing these results should be done with a degree of caution. The relatively small number of individuals from the survey that were identified as members of the Opponents Coalition may reflect the actual size and characteristics of the coalition, or potential selection bias from the purposive sampling procedures. The methods used to measure aspects of PAC pose another limitation within the study. In addition, a degree of endogeneity exists between the dependent variable of information sources and the independent variable of pro-climate beliefs, and the lack of a statistically significant relationship between beliefs and information sources should be interpreted cautiously. The selection of physical science courses as an instrumental variable was largely determined by the questions collected in the survey of policy actors, and as a result, other theoretically relevant instrumental absent from the survey were not explored. However, the inclusion of the physical science courses instrumental variable met the appropriate criteria (Halcoussis, 2005) and produced similar, non-significant coefficients within a two-stage least squares model.

These caveats aside, this chapter offers several contributions to the literature on the policy process and climate change politics and policy by answering key questions relating to the factors that impact decisions to utilize various sources of information and the information sources used by supporters and opponents of climate policy. The chapter contributes to the policy process literature’s explanations for how policy actors utilize information, by
demonstrating that the use of collaborative and analytical tools and techniques for processing information, and organizational resources, have a strong impact on a policy actor’s decision to utilize various sources of information. The chapter also furthers the literature’s knowledge on climate politics and policy by demonstrating that despite possessing a wide range of climate change beliefs and individual and organizational PAC, supporters and opponents of climate change policy utilize a variety of information sources at similar levels of frequency in an effort to realize their policy goals. Finally, the improved understanding of the information sources utilized by supporters and opponents of climate change and the factors impacting their use may lead to a better understanding of the positions of supporters and opponents of climate policy. This improved understanding may lead to the identification of common beliefs between the groups that could be used, in turn, to develop climate policies that attract the support of both groups.
CHAPTER V
THE ROLE OF POLITICAL ACTIVITIES IN REALIZING POLICY OBJECTIVES:
A STUDY OF THE COLORADO CLIMATE AND ENERGY POLICY SUBSYSTEM

Chapter Summary
To translate their climate and energy policy beliefs into tangible policies, supporters and
opponents of climate policy have engaged in a variety of political activities. While the
literature on climate policy has produced important insight into the individual activities used
by supporters and opponents of climate change, a comparative examination of the political
activities of supporters and opponents as well as an analysis of the factors that impact the
decisions to engage in various activities are critically absent. This chapter addresses these
gaps within the literature using an analysis of questionnaire data administered in 2011 to
advocacy coalition members involved in climate and energy policy in the state of Colorado.
In combination, the Advocacy Coalition Framework and Policy Analytical Capacity offer
one appropriate solution for developing an improved understanding of the political activities
of policy actors and the factors impacting activity engagement. The results indicate that,
despite considerable differences in climate-related beliefs and coalition size, coalitions of
supporters and opponents engage in similar political activities. Coalition members with
higher levels of resources in the form of collaborative and analytical tools and organizational
capacity engaged in a greater number of political activities. The use of collaborative tools
was found to have the strongest effect, while analytical tools and organizational capacity
were found to have secondary effects. Contrary to expectations, coalition members that held
more extreme beliefs did not engage in a greater number of political activities.
To translate their climate and energy policy beliefs into tangible policies, supporters and opponents of climate change policies have engaged in a variety of political activities. After efforts to address climate change shifted to a sub-national focus in 2004, (Bushinsky, 2010), supporters of climate policy have engaged in political activities to secure the adoption of state and local policies that reflect their policy beliefs (Moser, 2007; Rabe, 2007; Rabe & Borick, 2012). The political activities of supporters include producing scientific and technical research and data to support their beliefs, broadly disseminating scientific and technical knowledge on climate change, and lobbying policymakers and other decision makers (Bryner, 2008). Despite being comparatively smaller in number (Leiserowitz, 2010), opponents of climate change have been particularly successful in utilizing political activities to question the validity of scientific research on climate change and recast climate change as a non-problematic issue (Boykoff, 2010; McCright & Dunlap, 2003; Oreskes, 2004).

Political activities used by climate change opponents include mobilizing conservative think tanks to produce and circulate policy studies and other materials that cast doubt on climate change as well as hosting a series of climate change policy forums designed to influence policymakers (McCright & Dunlap, 2003). Across the political landscapes of the states, political activities have played a key role in both the adoption and the rejection of climate policies.

While the literature on climate policy has produced important insight into the individual activities used by supporters and opponents, a comparative examination of the political activities of supporters and opponents as well as an analysis of the factors that impact the decisions to engage in various activities are critically absent. This chapter adopts the following research question: What factors impact the decisions of climate policy
supporters and opponents to engage in political activities? Exploring this research question can be used to answer critical, but unanswered questions on climate policy and politics, including: Are supporters and opponents of climate change utilizing similar or different activities? Do beliefs or access to resources have a larger impact on activities? Developing an improved understanding of political activities will provide important contributions to the research on climate politics and policy and the policy process. Contributions to the climate politics and policy literature will include an improved knowledge of the policy beliefs of climate policy supporters and opponents, and the political activities utilized by these groups to influence climate policy. The contributions to the policy process literature include an improved understanding of the political activities utilized by a diverse group of actors working inside and outside of government and the effects of resources and extreme beliefs on political activity engagement.

The Advocacy Coalition Framework (Sabatier & Jenkins-Smith, 1993) and the Policy Analytical Capacity framework (Howlett, 2009) can be used to develop a better understanding of the political activities of supporters and opponents of climate change policy. The Advocacy Coalition Framework (ACF) offers a theoretical platform that can be used to examine policy subsystems involving substantial goal conflicts, enduring technical disputes, and the activities of a variety of actors within and outside of government. The framework provides a theoretical basis for examining supporters and opponents of climate change policy, by dividing opposing groups of actors into advocacy coalitions on the basis of belief similarity. The Policy Analytical Capacity (PAC) framework’s focus on information acquisition and utilization within the policy process provides a typology of resources available to actors engaging in political activities. The framework’s focus on individual- and
organizational-level analytical capacity provides a theoretical basis for examining the resources of climate policy supporters and opponents.

Utilizing these two theoretical frameworks, this chapter examines the political activities of members of rival advocacy coalitions within the Colorado climate and energy policy subsystem. Colorado faces a variety of threats from climate change, including shorter and warmer winters, a thinner snowpack, prolonged periods of drought, increased wildfires, and substantial losses of alpine forests due to pine beetle infestations. Similar to many other states, policy efforts to address climate change within Colorado have shifted to the state and local level (Rutland & Ayett, 2008) and the state adopted the Colorado Climate Action Plan (Ritter, 2007), which calls for a 20% reduction of state greenhouse gas emissions by 2020.

This chapter begins with reviews of the ACF and PAC frameworks. The chapter then provides a description of the Colorado climate and energy policy subsystem as well as the methods of analysis. The findings are presented in two parts. The first part presents the descriptive results on the advocacy coalitions and their corresponding beliefs, the political activities of coalition members, and the individual and organizational resources of the coalitions. The second part is an explanatory analysis that uses a combination of instrumental variable estimations to examine the factors that affect the decisions of climate actors to engage in various political activities.

The results indicate that members of two diametrically opposed advocacy coalitions engaged in similar political activities. Members of both coalitions were found to engage in a variety of activities in an effort to realize their policy beliefs, including analytical activities involving conducting research and appraising policy options, and collaborative activities that focused on consulting with the public or negotiating with other stakeholders. The explanatory
findings demonstrate that actors with higher levels of resources in the form of collaborative and analytical tools and organizational capacity engaged in a greater number of political activities. Contrary to expectations, actors that held extreme beliefs did not engage in a greater number of political activities.

**Theoretical Frameworks for Examining the Activities of Climate Actors**

The interest group literature has provided an extensive body of literature on the political activities utilized by interest group members to influence policy decisions. Interest groups, which are comprised of a collection of individuals or organizations that join together to advance their desired political and policy outcomes (Birkland, 2011) utilize an array of political activities (Baumgartner & Leech, 1998; Birkland, 2011), in an attempt to sway the actions of other policy actors and influence public opinion, media coverage, and public policies (Dahl, 1961). Baumgartner and Leech’s (1998) extensive review of the interest group literature identifies a wide variety of interest group activities along with a general agreement that most interest groups partake in multiple activities, including disseminating research that supports an interest group’s policy preferences, activities that focus on informing the public through a highly-visible manner, and negotiating with other interest groups. While the interest group literature provides a detailed understanding of the factors affecting the decisions of interest groups to engage in activities designed to influence Congressional committees and administrative agencies, the literature deemphasizes the role of other actors in the policy process (Denzau & Munger, 1986). The literature’s traditional focus on the ‘iron triangle’ of interest groups, congressional committees, and bureaucratic decision makers overlooks the roles that a large number of policy actors, including business organizations and academics, play within the policy process.
Through an expanded focus on the actors involved within a policy subsystem, the ACF and PAC frameworks offer one solution for examining how political activities are used by a wide variety of policy actors that operate outside of the traditional iron triangle. The ACF focuses on the policy subsystem (Heclo, 1978) where a variety of actors working in government, business, academia, and non-profit organizations regularly attempt to influence policy within a functional/substantive dimension and a geographic location. Similarly, PAC focuses on the capacity of individuals working inside and outside of government as well as government and non-government organizations to utilize information in the policy process. In combination, the ACF and PAC offer one approach for developing an improved understanding of the political activities utilized by supporters and opponents of climate policy.

Sabatier & Jenkins-Smith’s ACF was developed in the late 1980’s out of the concern that political science’s primary focus on the role of government institutions had missed many of the critical features of public policy-making (Sabatier, 1986; 1987; 1988; Sabatier & Jenkins-Smith, 1993). The framework rests upon three foundational premises operating at the subsystem, individual, and coalitional-levels. At the subsystem-level, the ACF assumes that due to the complexity of policymaking, participants must specialize within a topical area in order to be influential, with specialization occurring within policy subsystems (Heclo, 1978). At the individual-level, the framework assumes that due to bounded rationality (Simon, 1985), actors will rely upon a three-tiered hierarchical belief system for making policy-related decisions. The hierarchical belief system is comprised of deep core beliefs consisting of normative beliefs about human nature, policy core beliefs pertaining to a particular policy subsystem, and secondary beliefs that relate to the detailed issues associated with a policy. At
the coalition-level, the ACF assumes that actors will strive to translate their policy beliefs into actual policies and that they will seek out allies, share resources, and develop strategies in order to do so. If actors engage with each other in a nontrivial degree of coordination they form an advocacy coalition.

While the ACF literature has produced important findings on how beliefs affect the behavior of actors (Fenger & Klok, 2001; Jenkins-Smith & Sabatier, 1994; Zafonte & Sabatier, 1998), the relationship between belief extremity and actor behavior remains underdeveloped. A notable exception is research by Lubell (2005), which found that actors that expressed more extreme beliefs were less likely to trust other actors with different beliefs. Given the importance of beliefs within the ACF, but its underdeveloped understanding of extreme beliefs, this chapter evaluates the following original hypothesis:

*Extreme Beliefs & Political Activities Hypothesis: Policy actors with extreme policy core beliefs on climate change will be more likely to be engaged in a greater number of political activities.*

Building upon Lubell’s (2005) findings, this hypothesis assumes that given the extremity of their beliefs, an inherent distrust of actors with differing beliefs, and a strong desire to see their beliefs realized, actors with extreme policy core beliefs will possess an increased motivation to engage in a greater number of political activities. Testing this hypothesis will address an underdeveloped area within the ACF literature by providing an improved understanding of the effects of belief extremity on political activities.

Resources offer a second explanation for why actors decide to participate in various political activities. Actors operate in a political environment characterized by conflicts over scarce resources (Salisbury, Heinz, Laumann & Nelson, 1987), with the availability of
resources either expanding or contracting depending on the salience of a policy issue. Given the scarcity of resources within a political environment, actors with access to greater levels of resources can be assumed to be more likely to engage in political activities while actors with lower levels of resources can be assumed to be less likely to engage in political activities.

With its theoretical focus on the capacity of individuals and their organizations to acquire and utilize information in the policy process (Howlett, 2009), PAC offers one approach for developing a better understanding of how resources impact the use of political activities. PAC relates to analytical capacity at the individual- and organizational-levels for effectively utilizing data and information in policymaking activities. Achieving high levels of PAC is associated with a recognized demand for policy research, a supply of qualified researchers, access to quality data, and policies and procedures for facilitating interactions between researchers (Riddell, 1998). At the individual level, PAC is comprised of several dimensions, including formal training and the use of tools and techniques commonly associated with processing policy-related information (Wellstead, Stedman & Lindquist, 2009). While individual-level resources play a critical role in the ability of actors to utilize information, the majority of actors are not expected to possess the level of personal resources required to participate in policy issues over prolonged periods of time. Actors, thus, attempt to leverage the organizational resources of government agencies, businesses, nonprofit organizations, or academic/research organizations in pursuit of policy objectives. At the organizational level, PAC relates to the organizational support available to actors, including an organization’s priority in addressing a particular policy issue as well as its willingness to devote resources to the issue (Craft & Howlett, 2012; Howlett & Oliphant, 2010). The
argument is one of resource dependency (Pfeffer & Salancik, 1978), where organizations provide policy actors assets and deficiencies in shaping public policy debates.

To examine the impact of resources on political activities, this chapter evaluates the following original hypothesis:

*Resources & Political Activities Hypothesis: Actors with access to higher levels of resources will engage in a greater number of political activities.*

The supporting rationale for this hypothesis is that higher levels of PAC provide greater resources that actors can utilize to engage in political activities. Individual-level PAC, including formal training and access to common tools for analyzing and disseminating policy-related information, can be assumed to provide policy actors with a greater set of resources that can be leveraged in various political activities ranging from conducting policy-related research to briefing decision makers. Similarly, organizational-level PAC in the form of organizational resources and priorities for addressing a given policy issue can be assumed to provide actors with a greater set of resources that can be leveraged in various political activities. Testing this hypothesis will provide an improved understanding of the effects of resources on political activities, by comparatively examining the effects of individual- and organizational-level resources.

**Case: Colorado Climate and Energy Policy Subsystem**

The state of Colorado provides an effective case for examining climate and energy policies due to its similarities to the climate and energy policy environments of other states. The state’s climate and energy policy environment has been historically concerned with the state’s traditional energy resources, but has more recently expanded its focus to include the growth of the state’s renewable energy sector. Colorado has long been a major producer of
traditional energy with several major fossil fuel-rich basins, including coalbed methane and natural gas production (US Energy Information Administration, 2011). In recent years, the state’s renewable energy sector has grown partly in response to the adoption of a renewable energy portfolio standard via ballot initiative in 2004 and a further strengthening of the standard by the legislature in 2010 (Database of State Incentives for Renewables & Efficiency, 2010). In addition, a diverse number of actors are present within the Colorado climate and energy policy subsystem, including actors working in government, industry, non-profit organizations, and academia. These actors include supporters and opponents of climate change policy who are actively engaged in efforts to translate their policy beliefs into tangible policies. Finally, climate change is a critical issue in Colorado with the state identified as vulnerable to a variety of adverse impacts (Ritter, 2007). Scientists project that in the ensuing decades, the state will experience temperature increases of 3 to 4 degrees Fahrenheit, longer and more intense wildfires during the summer seasons, and an increase in water shortages. In an effort to address these predicted impacts, former Governor Bill Ritter launched the Colorado Climate Action Plan in November of 2007. The state’s adoption of a climate action plan is representative of climate policy at the state level (EPA, 2011; ICLEI, 2011) and the state can be considered to be a typical case (Gerring, 2001) for examining climate and energy policy debates.

**Methods**

A web-questionnaire was administered in the spring of 2011 to policy actors within the Colorado climate and energy policy subsystem. The sample was collected utilizing a purposive sampling technique that targeted actors involved in Colorado climate and energy issues. The names of actors were obtained by searching the internet for government and
nongovernment organizations and the actors affiliated with these organizations. In addition, newspapers and online publications were also searched. Finally, preliminary interviews were held with five actors involved with Denver and Colorado climate and energy issues and the interviewees were asked to provide the names of actors that should be included in the sample. In total, 793 actors were identified through the sampling efforts. Of the total population sampled, 272 returned fully completed surveys for a response rate of 34%.

**Operational Measures**

**Dependent Variable:**

**Political Activities.** Political activities were measured using a survey question that asked actors about their engagement in four types of political activities identified within the climate politics and policy literature. Survey respondents were asked to report whether they had participated in the following types of political activities within the past year: appraising policy options (Reddy & Assenza, 2007); conducting research on climate-related issues and/or energy policy (McCright & Dunlap, 2003; Micahelowa, 1998); consulting with the public (Boykoff, 2010; Moser, 2010); and negotiating in a multi-stakeholder consensus based process (Betsill & Bulkeley, 2006; Peterson & Rose, 2006). Activity engagement was coded as a dichotomous variable with ‘1’ representing an actor’s engagement in the activity within the previous year and ‘0’ representing that an actor did not engage in the activity.

**Independent Variables:**

**Climate Beliefs.** The climate beliefs of actors were measured using a battery of survey questions derived from the ACF. Survey respondents were asked to report their beliefs on the severity of climate change, its causes, the role of the market in addressing climate change, and possible policy approaches for mitigating carbon emissions, including carbon taxes, cap
and trade systems, and policies promoting renewable energy generation. Responses were coded using a five-point Likert-scale ranging from -2 = Strongly Disagree to +2 = Strongly Agree. These six questions were then aggregated by their means into a single-scaled variable, ‘Pro-Climate Change Beliefs Scale’ (Cronbach’s Alpha= 0.87; average factor loading = 0.72). In addition, an ‘Extreme Beliefs Scale’ was constructed to measure the extremity of an actor’s climate beliefs. The scale was constructed by taking the absolute values of the ‘Pro-Climate Change Beliefs’ scale, with values ranging from 0 for moderate beliefs to 2 for extreme beliefs.

Individual and Organizational Resources. The individual- and organizational-level resources of coalition members were measured using a battery of PAC-focused survey questions. Individual-level resources were measured using a formal training independent variable and two tools and techniques independent variables. Organizational-level resources were measured using three independent variables.

Formal Training. To measure formal training in analytical techniques, respondents were asked, “In which of the following areas have you received formal training?” Responses included applied research, modeling, policy analysis, policy evaluation, statistical methods, and trends analysis and/or forecasting. The formal training questions were then aggregated

10 Respondents were asked to express their level of agreement and disagreement with the following questions: (1) “The severity of predicted impacts on society from climate change are vastly overstated” (reversed, factor loading = 0.88); (2) “Human behavior is the principal cause of climate change” (factor loading = 0.82); (3) “Decisions about energy and its effect on climate are best left to the economic market, and not to government” (reversed, factor loading = 0.69); (4) “An energy and/or carbon tax is required to combat climate change” (factor loading = 0.80); (4) “A cap and trade system of permits for the emission of greenhouse gas is required to combat climate change” (factor loading = 0.70); (5) “Government policies to promote renewable energy generation are required to combat climate change” (factor loading = 0.80).
by their means into a single-scaled ‘Sum of Formal Training’ variable (Cronbach’s Alpha = 0.59; average factor loading = 0.59).

Tools and Techniques Used. Individual-level resources, in the form of tools and techniques used by policy actors, was measured by asking respondents the following question: “How often have you used the following tools and techniques as part of your work in the past year?” Responses included political feasibility analysis, risk analysis, modeling, “collaborating with those who you agree with”, “collaborating with those you disagree with”, environmental impact analysis, facilitation and consensus building, economic analysis, and informal tools and techniques. The frequency of use was coded using a scale of 5 to 1 consisting of daily, weekly, monthly, yearly, and never. Two additional scales were created from the nine questions via confirmatory factor analysis. The first scale consists of analytical tools and techniques including modeling, environmental impact analysis, economic analysis, risk analysis, and political feasibility analysis (Cronbach’s alpha = 0.80; average factor loading = 0.48). The second scale consists of collaborative tools and techniques including collaborating with those a policy actor agreed with, collaborating with those they disagreed with, facilitation/consensus building, and informal tools/techniques (Cronbach’s alpha = 0.80; average factor loading = 0.64).

Organizational Capacity. Three survey questions from the PAC literature were used to measure organizational capacity, with questions pertaining to an organization’s priorities, resources, and ability to engage in long-term planning on climate change. Measuring climate and energy issues as an organizational priority was done by asking respondents: “Compared with other issues that your organization responds to, how much of a priority are climate-related issues and energy policies?” Responses were measured using a five-point Likert-scale
of much higher, higher, about the same, lower, and much lower. For the question on organizational resources, respondents were asked: “Compared to similar organizations, does your organization have adequate knowledge, skills, and people to respond to climate-related issues and energy policies?” Responses consisted of a five-point scale ranging from very high capacity to very low capacity. To measure the organization’s ability to engage in long-term planning processes associated with climate change mitigation and adaptation, respondents were asked to respond to the following statement: “Urgent day-to-day issues seem to take precedence over thinking ‘long-term’.” Responses consisted of a five-point scale consisting of strongly disagree, disagree, neutral, agree, and strongly agree. An ‘Organizational Capacity Scale’ was then created by taking the mean of the three variables (Cronbach’s alpha = 0.70; average factor loading = 0.88).

**Results**

The results are presented in two parts. The first part examines the beliefs, resources, and political activities of climate policy supporters and opponents. Tables 5.1-5.4 present the descriptive results for policy beliefs, the individual and organizational level resources of the coalitions, and political activities. The second part (table 5.5) presents the results from an explanatory analysis on the factors affecting activity use, which consists of a series of probit and instrumented probit models.

**Descriptive Results**

The ACF was used as a theoretical framework for identifying supporters and opponents of climate policy. This analysis identifies two competing advocacy coalitions within the Colorado climate and energy policy subsystem. The coalitions consist of a large coalition of climate policy supporters (‘Supporters Coalition’) with 205 members from the
survey sample and a small coalition of opponents (‘Opponents Coalition’) with 55 members. The advocacy coalitions were identified using a modified version of Zafonte and Sabatier’s (1998) method of cluster analysis and silhouette means. Utilizing the battery of policy core belief questions, the $k$-means clustering technique partitioned actors into coalitions based upon the similarity of their beliefs. Actors were partitioned into two, three, and four advocacy coalitions, with the average silhouette values for each cluster used to determine the goodness of fit. Clustering policy actors into two advocacy coalitions produced the best fit with an average silhouette value of 0.66, while clustering actors into three and four coalitions produced mean silhouette values of 0.40 and 0.35, respectively.

Table 5.1 presents the descriptive characteristics for the Supporters and Opponents coalitions. Within the Opponents Coalition, actors were primarily affiliated with business organizations (53% of actors), while the Supporters Coalition consists of a more even distribution between actors affiliated with the government sector (33%) and business (28%). The differences in organizational affiliation between the two coalitions were statistically significant ($p<0.05$, based on an independent sample, Kruskal-Wallis test).
Table 5.1: Advocacy Coalition Membership and Belief Measures

<table>
<thead>
<tr>
<th></th>
<th>Supporters Coalition</th>
<th>Opponents Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of actors</td>
<td>205</td>
<td>55</td>
</tr>
<tr>
<td>Number and percent of actors by affiliation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government*</td>
<td>67 (33%)</td>
<td>12 (22%)</td>
</tr>
<tr>
<td>Business*</td>
<td>58 (28%)</td>
<td>29 (52%)</td>
</tr>
<tr>
<td>Nonprofit*</td>
<td>47 (23%)</td>
<td>7 (13%)</td>
</tr>
<tr>
<td>Academic/Research*</td>
<td>31 (15%)</td>
<td>7 (13%)</td>
</tr>
<tr>
<td>Policy core beliefs^a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity of predicted impacts is overstated (Reversed)***</td>
<td>-1.60</td>
<td>0.65</td>
</tr>
<tr>
<td>Human behavior is the principal cause***</td>
<td>1.45</td>
<td>-0.65</td>
</tr>
<tr>
<td>Decisions on climate &amp; energy are best left to the market (Reversed)***</td>
<td>-1.46</td>
<td>0.15</td>
</tr>
<tr>
<td>Carbon tax is required***</td>
<td>1.02</td>
<td>-1.20</td>
</tr>
<tr>
<td>Cap &amp; trade is required***</td>
<td>0.40</td>
<td>-1.35</td>
</tr>
<tr>
<td>Renewables policy is required***</td>
<td>1.62</td>
<td>-0.35</td>
</tr>
<tr>
<td>Pro-Climate Change Beliefs Scale****</td>
<td>1.26</td>
<td>-0.72</td>
</tr>
<tr>
<td>Extreme Beliefs Scale****b</td>
<td>1.26</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Note: †Chi-squared tests between coalitions, with significance levels at *p<0.05, **p<0.01, ***p<0.001.

^aPro-Climate Change Beliefs Scale:
-2=“strongly disagree”, -1 = “disagree”, 0= “neither agree nor disagree”, 1 = “agree”, 2= “strongly agree”.

bExtreme Beliefs Scale:
0= moderate beliefs to 2= extreme beliefs

Table 5.1 also presents the policy core beliefs of the two coalitions. As policy core beliefs were used to partition actors into the advocacy coalitions, the two coalitions differed considerably in their beliefs on climate and energy issues (p<0.001 for all policy core belief measures). Members of the Opponents Coalition believed that the severity of potential climate change impacts was overstated, disagreed that humans were the primary cause of climate change, and believed that decisions for addressing climate change were best left to the market. The coalition was opposed to three common policy options for addressing climate change, demonstrating slight opposition to renewable energy policy and higher levels of opposition to the adoption of a carbon tax or cap and trade policy. Members of the Supporters Coalition held fundamentally different beliefs on climate change, including
strongly disbelieving that the potential impacts of climate change were overstated, strongly believing that human behavior was the principal cause, and strongly disbelieving that decisions on climate change were best left to the market. The coalition supported the adoption of all three of the climate policy options, ranging from minimal support for a cap and trade policy, to moderate support for a carbon tax, and strong support for renewable energy policies.

The ‘Pro-Climate Change Beliefs Scale’ was created in order to obtain an overall measure of the intensity of the climate change beliefs held by coalition members. The scale calculates the average belief score based upon the seven policy core belief variables, with the scale ranging from -2 for strong opposition to climate change and +2 for strong support for climate change. Members of the Opponents Coalition held a mean belief of -0.72 indicating moderate opposition to climate change policy, while members of the Supporters Coalition had a mean belief of 1.26, indicating strong support for climate policy. The ‘Extreme Beliefs Scale’ measured the extremity of a policy actor’s climate beliefs, with a value of 0 indicating moderate beliefs and a value of 2 indicating extreme beliefs in support of or in opposition to climate policy. Members of the Opponents Coalition had a mean belief of 0.75 while members of the Supporters Coalition had a mean value of 1.26, indicating that the Supporters Coalition held slightly more extreme beliefs than the Opponents Coalition.

Table 5.2 presents the individual PAC of coalition members. Members of both coalitions were highly educated with a master’s degree as the mean level of education. Both coalitions had similar levels of experience in climate and energy issues, with members possessing an average of six to nine years of experience. Members in both coalitions had similar levels of formal training in a variety of areas, though statistically significant
differences are found between the coalitions in three areas. The Opponents Coalition is found to have higher levels of training in statistics and modeling, while the Supporters Coalition had higher levels of training in policy analysis (p<0.05 for all three areas).

Actors were also asked about the frequency in which they used a variety of tools and techniques for processing climate and energy information. Statistically significant differences between the coalitions were found in regard to collaborating with other actors they agreed with, facilitation and consensus building, and conducting political feasibility analysis. Members of the Supporters Coalition engaged in facilitation and consensus building on a monthly basis while members of the Opponents Coalition engaged on a yearly basis (p<0.05). Members of the Supporters Coalition was also found to conduct political feasibility analysis on a yearly basis, while members of the Opponents Coalition rarely conducted this analysis (p<0.01). In both coalitions members were found to utilize collaborative tools on a monthly basis, while utilizing analytical tools on a yearly basis.
Table 5.2: Individual Policy Analytical Capacity of the Coalitions (by means)

<table>
<thead>
<tr>
<th></th>
<th>Supporters Coalition</th>
<th>Opponents Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education*</td>
<td>4.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Years of experience*</td>
<td>3.1</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Percent of members receiving formal training:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>43%*</td>
<td>60%*</td>
</tr>
<tr>
<td>Modeling</td>
<td>22%*</td>
<td>38%*</td>
</tr>
<tr>
<td>Training in applied research</td>
<td>36%</td>
<td>31%</td>
</tr>
<tr>
<td>Policy evaluation</td>
<td>44%</td>
<td>38%</td>
</tr>
<tr>
<td>Trends analysis</td>
<td>24%</td>
<td>35%</td>
</tr>
<tr>
<td>Policy analysis</td>
<td>50%*</td>
<td>31%*</td>
</tr>
<tr>
<td><strong>Frequency of use of tools &amp; techniques</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborate with those you agree</td>
<td>3.9*</td>
<td>3.6*</td>
</tr>
<tr>
<td>Collaborate with those you disagree</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Facilitation/Consensus Building</td>
<td>2.6*</td>
<td>2.2*</td>
</tr>
<tr>
<td>Informal Tools</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Environmental Impact</td>
<td>2.4</td>
<td>2.3</td>
</tr>
<tr>
<td>Economic /Financial Analysis</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>Risk Analysis</td>
<td>2.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Political Feasibility</td>
<td>1.9**</td>
<td>1.5**</td>
</tr>
<tr>
<td><strong>Sum of Analytical Tools</strong></td>
<td>2.3</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>Sum of Collaborative Tools</strong></td>
<td>3.2</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001

*Education scale: 1= “not a high school graduate”, 2= “high school graduate”, 3= “some college”, 4= “bachelor’s degree”, 5= “mater’s or professional degree”, 6= “PhD, MR, or JD”.

**Years of experience scale: 1= “less than 1 year”, 2= “1-5 years”, 3= “6-9 years”, 4= “10-14 years”, 5= “15-20 years”, 6= “greater than 20 years”.

†Frequency of use of tools & techniques: 5= daily, 4= weekly, 3= monthly, 2=yearly, 1=never.

Table 5.3 presents the organizational PAC of the coalitions. Four measures were used to examine the organizational PAC of the organizations within each coalition: (1) organizational priority; (2) adequate knowledge, skills, and people for responding to policy issues; (3) whether urgent day-to-day issues took precedence over long-term planning on climate and energy issues; and, (4) the ‘Organizational Capacity Scale’. The two coalitions had similar but statistically non-significant differences on each of the organizational capacity measures, with medium to high levels of organizational capacity. The coalitions were found to make climate and energy policy issues a higher priority, and to have high capacity in the form of the knowledge, skills, and people required to address complex climate and energy
policy issues, but were found to let urgent day-to-day issues take precedence over long-term planning on climate and energy issues. The ‘Organizational Capacity Scale’, which was constructed to measure the overall organizational capacity by taking the means of the three variables, was nearly identical for the two coalitions with each coalition reporting a medium level of organizational capacity. Collectively, these results provide greater insight into the organizational resources that can be leveraged by coalition members engaging in political activities.

Table 5.3: Organizational Policy Analytical Capacity of the Coalitions

<table>
<thead>
<tr>
<th></th>
<th>Supporters Coalition</th>
<th>Opponents Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational prioritya</td>
<td>3.74</td>
<td>3.50</td>
</tr>
<tr>
<td>Adequate knowledge, skills, and peopleb</td>
<td>3.70</td>
<td>3.69</td>
</tr>
<tr>
<td>Urgent day-to-day issues take precedencec</td>
<td>3.90</td>
<td>3.60</td>
</tr>
<tr>
<td><strong>Organizational Capacity Scaled</strong></td>
<td>3.18</td>
<td>3.21</td>
</tr>
</tbody>
</table>

Note: Independent-Samples Kruskal-Wallis test between and within coalitions, with significance levels at *p<0.05, **p<0.01, ***p<0.001.

aScale: 1= “much lower”, 2= “lower”, 3= “about the same”, 4= “higher”, 5= “much higher”.
bScale: 1= “very low capacity”, 2= “low capacity”, 3= “medium capacity”, 4= “high capacity”, 5= “very high capacity”.
cScale: 1= “strongly disagree”, 2= “disagree”, 3= “neutral”, 4= “agree”, 5= “strongly agree”
dScale: 1= “very low capacity”, 2= “low capacity”, 3= “medium capacity”, 4= “high capacity”, 5= “very high capacity”.

Table 5.4 presents the political activities of coalition members. Overall, the findings show similar levels of activities between supporters and opponents of climate policy, with no statistically significant differences between the two coalitions. Of the political activities used by coalition members, consulting with the public had the highest levels of use, followed by conducting research, appraising policy options, and negotiating with other stakeholders.
Table 5.4: Political Activities by Coalition

<table>
<thead>
<tr>
<th></th>
<th>Supporters Coalition</th>
<th>Opponents Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>Appraised Policy Options</td>
<td>62%</td>
<td>55%</td>
</tr>
<tr>
<td>Conducted Research</td>
<td>64%</td>
<td>62%</td>
</tr>
<tr>
<td>Consulted with the Public</td>
<td>69%</td>
<td>58%</td>
</tr>
<tr>
<td>Negotiated in Multi-Stakeholder Consensus Process</td>
<td>54%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Note: Chi-squared test between coalitions, with significance levels at *p<0.05, **p<0.01, ***p<0.001

Exact wording: “In the past year, have you participated in the following activities? (Check if applicable)” (1 = Participated, 0=Did Not Participate.

Explanatory Analysis

Table 5.5 presents the multivariate analysis examining the factors affecting the political activities of actors within the Colorado climate and energy policy subsystem.

Separate models were developed with each of the four political activities as the dependent variable. Independent variables consisted of the ‘Extreme Beliefs Scale’ and the three PAC resource measures: the ‘Sum of Formal Training Scale’, the collaborative and analytical tools scales, and the ‘Organizational Capacity Scale’. Control variables consisted of organizational affiliation (with government as the reference category) and a policy actor’s years of involvement in climate and energy policy.
Table 5.5: Explanatory Analysis of the Political Activities of Coalition Members

<table>
<thead>
<tr>
<th></th>
<th>Conducted Research (Instrumented Probit)</th>
<th>Appraised Policy Options (Probit)</th>
<th>Consulted with the Public (Instrumented Probit)</th>
<th>Negotiated in Multi-Stakeholder Consensus (Instrumented Probit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Beliefs Scale</td>
<td>-0.14</td>
<td>0.24</td>
<td>0.05</td>
<td>0.18</td>
</tr>
<tr>
<td>Sum of Formal Training</td>
<td>0.05</td>
<td>0.10</td>
<td>0.07</td>
<td>0.10</td>
</tr>
<tr>
<td>Collaborative Tools Scale</td>
<td>-0.39</td>
<td>0.40**</td>
<td>1.05***</td>
<td>1.08***</td>
</tr>
<tr>
<td>Analytical Tools Scale</td>
<td>1.23^</td>
<td>0.15**</td>
<td>-0.39</td>
<td>-0.14</td>
</tr>
<tr>
<td>Organizational Capacity Scale</td>
<td>0.33</td>
<td>0.35**</td>
<td>-0.08</td>
<td>0.00</td>
</tr>
<tr>
<td>Business</td>
<td>0.02</td>
<td>-0.52**</td>
<td>-0.09</td>
<td>0.45</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>0.27</td>
<td>-0.27</td>
<td>-0.14</td>
<td>0.01</td>
</tr>
<tr>
<td>Consultant</td>
<td>0.48</td>
<td>-0.90</td>
<td>-0.83</td>
<td>-0.89*</td>
</tr>
<tr>
<td>Academic</td>
<td>1.11*</td>
<td>-0.86**</td>
<td>-0.66*</td>
<td>-0.61*</td>
</tr>
<tr>
<td>Years of Involvement</td>
<td>-0.09</td>
<td>0.14*</td>
<td>0.04</td>
<td>-0.03</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.01**</td>
<td>-2.79***</td>
<td>-2.17***</td>
<td>-3.48***</td>
</tr>
<tr>
<td>Prob&gt;Chi^2 / F-Stat</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Note: Models consist of probit and instrumented probit models with jackknife standard errors. ***p<0.01, **p<0.05, *p<0.10. ^ denotes instrumented variables.
Initially, probit regressions with robust standard errors were formulated for each of the four political activity variables. Analysis of the initial models revealed the likelihood of endogeneity in the form of simultaneous causality between the dependent variables and the collaborative and analytical tools explanatory variables. Endogenous models that are subject to simultaneity bias result in the endogenous independent variables being correlated with the error term and biasing the overall results of the model. Controlling for endogeneity involves the process of identifying an instrumented variable that is correlated with the endogenous variable but is uncorrelated with the error term and then utilizing the Hausman test (Halcoussis, 2005) to determine whether the results of the original endogenous model and the instrumented models are statistically different. The results of the Hausman tests confirmed that three of the four models suffered from endogeneity. Given the endogeneity inherent within three of the four models, the identification of instrumental variables was necessary for mitigating the endogeneity effects. The ‘Analytical Tools Scale’ was endogenous within the ‘Conducted Research’ model, while the ‘Collaborative Tools Scale’ was endogenous within the ‘Consulted with the Public’, and ‘Negotiated in Multi-Stakeholder Consensus Processes’ models. The lone model that did not suffer from endogeneity was the ‘Appraised Policy Options’ model which remained a probit model in the final explanatory analysis.

Instrumental variables were identified on the basis of previous research by Weible and Elgin (2013), which identified significant relationships between an actor’s level of involvement in climate and energy issues (from city to international) and the use of collaborative and analytical tools. Actors primarily involved in climate and energy issues at the city and state levels were more likely to utilize collaborative tools and techniques. Due to a closer proximity to citizens and a greater need for local engagement, actors involved in
climate and energy policy at the local and state levels possess a greater motivation to utilize collaborative tools that are less technocratic in nature and place a greater focus on engaging local stakeholders. In contrast, actors primarily involved in climate and energy issues at the national and international levels were more likely to utilize analytical tools and techniques. Actors involved in climate and energy issues at the national and international levels were found to utilize more technocratic, analytical tools that allowed them to analyze complex policy problems that occur over larger geographic areas. The use of a ‘Level of Involvement’ variable as an instrument for the ‘Analytical Tools Scale’ and the ‘Collaborative Tools Scale’ is appropriate as it mitigates the concerns of simultaneous causality within the political activities models. Similarly, an actor’s level of involvement is predicted to affect whether they engage in a political activity while, critically, an actor’s engagement in a political activity is not predicted to affect their level of involvement in climate and energy politics and policy.

In the next step, linear regressions were utilized to examine the relationship between each of the levels of involvement and the collaborative and analytical tools variables, with instrumented variables selected on the basis of having the strongest, statistically significant correlations to the endogenous variables. The linear regressions revealed that the extent of an actor’s involvement at the state ($R^2=0.38; p<0.001$) and local levels ($R^2=0.29; p<0.001$) were indeed correlated with the ‘Collaborative Tools Scale’. An actor’s involvement at the national ($R^2=0.32; p<0.001$) and international ($R^2=0.30; p<0.001$) levels were correlated with the ‘Analytical Tools Scale’. The three endogenous models were then reformulated as instrumental variable equations. The Wald Test for Exogeneity was conducted for each version of the instrumental variable equation to confirm that the instrument successfully
resolved the endogeneity issue. In the final instrumental variable equations, national-level involvement was instrumented for analytical tools in the ‘Conducted Research’ model while city-level involvement was instrumented for collaborative tools in the ‘Consulted with the Public’ and ‘Negotiated in Multi-Stakeholder Processes’ models. Jackknife standard errors were used to control for heteroscedasticity within the four models.

Across the four political activity models, extreme beliefs were found to have no statistically significant effects on an actor’s engagement in political activities. Holding extreme beliefs, whether supportive or opposed to climate policy, did not provide a greater motivation for actors to engage in political activities. Individual resources in the form of formal training were also consistently non-significant across the models. However, the instrumental variables for the collaborative and analytical tool variables demonstrated positive effects of individual resources on political activity engagement. Collaborative tool use was strongly associated with political activities, with positive, statistically significant effects on appraising policy options, consulting with the public, and negotiating in multi-stakeholder processes (p<0.01 for each activity). In contrast, analytical tools were found to have a positive effect on appraising policy options (p<0.05). While individual-level resources in the form of collaborative and analytical tools were found to have significant, positive effects in the majority of the models, organizational-level resources were found to have minimal effects on political activities. Organizational capacity was found to have a positive effect on appraising policy options (p<0.05), but was non-significant in the other three models.

The control variables had mixed effects within the four models. The organizational affiliation control variables, which were interpreted relative to government organizations,
demonstrated a combination of positive and negative relationships across the four models. Affiliation with an academic organization was found to have statistically significant effects within all four models. Academic actors were more likely than government actors to conduct climate and energy research (p<0.10), but were less likely to appraise policy options (p<0.05), consult with the public (p<0.10), or negotiate in consensus processes (p<0.10). Actors affiliated with business organizations were largely unassociated with political activities, but were found to be less likely to appraise policy options (p<0.01). Affiliation with non-profit or consulting organizations did not have statistically significant effects within any of the four models. Finally, the years of involvement control variable had a significant, positive effect on appraising policy options (p<0.10) but was non-significant in the other models.

Collectively, these findings provide important insight into the factors affecting the political activities of supporters and opponents of climate policy. Possessing extreme beliefs, regardless of whether they were supportive of or opposed to climate policy, were not found to have statistically significant effects on any of the political activities. In contrast, resources were found to have a range of effects on political activities. Individual resources in the form of collaborative and analytical tools had positive effects in the majority of the models, with collaborative tools having the strongest explanatory power. Finally, organizational resources in the form of organizational PAC had minimal explanatory power, with statistically significant relationships in only one of the models.

**Discussion & Conclusion**

This chapter examines the political activities of advocacy coalition members within the Colorado climate and energy policy subsystem in order to develop a better understanding
of the political activities of climate policy supporters and opponents. The chapter asked: Which factors impacted the decisions of climate policy supporters and opponents to engage in political activities? This research question was examined using a pair of extreme beliefs and resource hypotheses derived from the ACF and PAC literatures.

The first hypothesis, derived from the ACF, was that extreme beliefs would be associated with engagement in a greater number of political activities among policy actors. The results of the explanatory analysis did not support the hypothesis. Contrary to initial expectations, more extreme beliefs did not provide a greater motivation to engage in political activities among coalition members within the Colorado climate and energy policy subsystem. Given the lack of statistically significant findings, this chapter’s focus on extreme beliefs would appear to be a minor contribution to the ACF literature. However, the operationalization of extreme beliefs provides an important methodological contribution. By constructing a formal measure of extreme beliefs that utilizes the absolute values of the policy core belief measures, this chapter was the first to examine the extremity of beliefs held by coalition members, an important but critically underdeveloped area within the ACF literature. This chapter’s initial efforts to explore how extreme beliefs affect the behavior of coalition members provides a starting point from which future studies can expand upon to develop an improved understanding of how beliefs affect the behavior and actions of policy actors.

The second hypothesis, derived from the PAC, was that higher levels of resources would be associated with a greater number of political activities. The supporting rationale for the hypothesis was that higher levels of resources in the form of PAC would allow actors to engage in a greater number of activities. The explanatory findings largely supported this
hypothesis. Individual-level resources in the form of collaborative and analytical tools were found to have positive, statistically significant effects in three of the four models. In contrast, organizational-level resources had minimal impact on the political activities of climate actors. Organizational capacity was weakly associated, but was positively related to a policy actor’s likelihood of appraising policy options. Collectively, these findings underscore the importance of individual- and organizational-level resources on the political activities of actors, with individual-level resources having a consistent effect while organizational resources had a secondary effect.

While these results have provided important insight into the political activities of supporters and opponents of climate change policy, the findings are subject to several limitations. For one, the list of political activities included within the survey is far from exhaustive. While the four activities included in the survey were intended to represent the diverse types of activities that supporters and opponents of climate policy engage in (Betsill & Bulkeley, 2006; Micahelowa, 1998; Moser, 2010; Reddy & Assenza, 2007), more traditional political activities such as litigation and formal lobbying were not included within the survey. In addition, due to the degree of endogeneity that existed between the political activities dependent variable and the collaborative and analytical tools independent variables, the results of the explanatory models should be interpreted cautiously. To control for endogeneity, the extent of an actor’s involvement in national and state climate and energy issues were used as instrumental variables. The selection of these variables as instruments is justifiable given the combination of previous research (Weible & Elgin, 2013) and the variables meeting the requirements of being correlated to the endogenous collaborative and analytical tools scales while being uncorrelated with the error term in the regression models.
(Halcoussis, 2005). Finally, while this chapter examines political activities it fails to examine the important relationship between activities and policy change. Further research in the form of longitudinal studies would provide critical insight into how the political activities employed by supports and opponents relates to the ultimate goal of policy change.

Despite these limitations, this chapter offers several important theoretical contributions to the policy process literature and the literature on climate change politics and policy. The chapter builds upon previous ACF research by being the first to examine whether extreme beliefs matter, finding that extreme beliefs had no effect on the political activities of actors in the Colorado climate and energy policy subsystem. The chapter also builds upon previous PAC research by relating capacity to political activities, demonstrating that individual-level resources in the form of collaborative and analytical tools are strongly associated with an actor’s decision to engage in a political activity. Finally, the chapter furthers the literature’s knowledge on climate politics and policy by answering critical, but unanswered questions about climate politics and policy. Despite fundamental differences in beliefs, supporters and opponents of climate change policy utilize similar political activities in an effort to translate their climate policy beliefs into tangible policies.
CHAPTER VI

COLLABORATION AND ADVICE WITH FRIENDS AND FOES IN CLIMATE POLICY DEBATES

Chapter Summary

Perhaps nowhere is the inclination to interact with friends over foes more apparent than in the realms of politics and policy. Although prominent theories of the policy process have acknowledged instances of both cooperative and adversarial interactions between foes, these theories tend to focus overwhelmingly on interactions of an adversarial nature. To further the collective knowledge on policy-based interactions, this chapter examines the factors that lead foes to positively interact with one another. Belief intensity and resource dependence offer two complementary rationales for explaining interactions between opposing groups. Utilizing the Advocacy Coalition Framework in combination with Resource Dependence Theory and the Policy Analytical Capacity framework, this chapter examines the comparative effects of resources and beliefs on the interactions of supporters and opponents of climate policy within the adversarial policy subsystem of Colorado climate and energy policy. Despite the contentious nature of the subsystem, a majority of individuals interacted with both friends and foes on an equal basis, with opponents more likely than supporters to interact with foes. Extreme beliefs were found to make individuals more likely to interact primarily with friends, while higher levels of resources had mixed effects on an individual’s interactions. Given the prominent role of conflict within climate change politics and policy, these findings offer an improved understanding of the instances and the extent that foes cooperate, which

11 Note: This chapter has been submitted to Public Administration.
may help promote greater cooperation and understanding among supporters and opponents of climate policy.

Interactions between individuals overwhelmingly occur between ‘friends’ who share feelings of affection or personal regard for one another. In contrast, conventional wisdom holds that interactions between ‘foes,’ who differ in beliefs or principles, are considerably less likely to occur. The propensity of individuals to interact with friends over foes can be attributed, in part, to a collection of factors and social benefits. These societal factors include social norms, homophily, reciprocity, and trust while the social benefits of emotional support and political ambitions serve as driving forces that lead individuals to regularly interact more with friends and less with foes. Due to fundamental belief differences, interactions among foes are commonly cast in an adversarial light, with these interactions often described as arguments or attempts to shame or publicly embarrass one another. This tendency to characterize interactions between foes as adversarial overlooks those less common, but important instances where foes interact in a cooperative nature. These non-adversarial interactions between foes offer an opportunity for developing an improved understanding of cooperation between individuals with fundamentally different beliefs.

Conflict and cooperation are an integral part of human nature and, thus, are key components within prominent theories of policy and politics (Huckfeldt, Johnson & Sprague, 2004; Salisbury, Heinz, Laumann, & Nelson, 1987). Although cooperation between political allies is well understood within the politics and policy literature, cooperation between political foes remains understudied. Given the prominent role of conflict within politics and policy, developing an improved understanding of the instances and the extent that foes cooperate may help promote greater cooperation and understanding among the polity.
Belief extremity and resource dependence offer two complementary rationales for why opposing groups interact in a cooperative manner. Policy beliefs (beliefs) have been shown to be a strong factor guiding the behavior of individuals (Sabatier & Jenkins-Smith, 1993). The extremity of beliefs held by an individual is assumed to have a significant impact, with individuals possessing more moderate beliefs being more likely to interact with foes than individuals with extreme beliefs (Henry, Lubell & McCoy, 2011; Ingold & Varone, 2012; Leach & Sabatier, 2005; Lubell, 2005, 2007). In contrast, resources have been identified as key components within the policy process as well as established predictors of policy change (Baumgartner & Leech, 1998; Jones & Baumgartner, 2005; Sabatier & Jenkins-Smith, 1993). The majority of individuals engaged in the policy process do not possess the requisite resources for participating in the process over extended periods of time and, accordingly, will seek out available resources to sustain the pursuit of their policy objectives (Weible, 2005). Issues of resource dependence have been shown to have an impact on the interactions of individuals engaged in the policy process (Weible & Sabatier, 2005), with a dependence on scarce resources leading individuals to occasionally interact with their political foes. This chapter examines the comparative effects of belief intensity and resource dependence to answer key questions regarding interactions between friends and foes, including: What are the comparative effects of moderate and extreme levels of beliefs on an individual’s willingness to interact with friend and foes? How does resource interdependence impact an individual’s willingness to interact with friends and foes? Developing an improved understanding of the effects of resources and beliefs on friend and foe interactions may lead to a better understanding of instances where cooperative interactions between foes are more likely to occur.
The Advocacy Coalition Framework (ACF, Sabatier & Jenkins-Smith, 1993) in combination with Resource Dependence Theory (RDT, Pfeffer & Salancik, 1978) and the Policy Analytical Capacity (PAC, Howlett, 2009a) framework can be used to understand the comparative effects of resources and beliefs on an individual’s interactions. Utilizing these three frameworks, this chapter examines the comparative effects of resources and beliefs on the interactions of advocacy coalition members within the Colorado climate and energy policy subsystem. The subsystem provides a typical case (Gerring, 2007) for examining climate and energy policy debates due to the diverse number of individuals involved, the high-level of conflict and belief incompatibility between supporters and opponents of climate policy, and the state’s adoption of a climate policy plan that is representative of climate policy at the state level. In contrast to the frequent depiction of climate change politics and policy as inherently antagonistic, a majority of individuals interacted equally with both friends and foes, with opponents more likely than supporters to interact with their foes. Extreme beliefs were found to make individuals more likely to interact primarily with friends, while higher levels of resources had mixed effects on an individual’s interactions.

**Theoretical Overview**

Among the wide array of interactions that occur within the realms of politics and policy, collaborating and utilizing advice are two of the most common interactions. Individuals engaged in the policy process collaborate with others to accomplish a common purpose, such as the formal adoption of a mutually preferred policy. The types and extent of collaboration among individuals engaged in policy and politics are diverse (Hall, 1999), ranging from intermittent or ad hoc collaborations to achieve a minor goal, permanent or regular collaboration via a formal arrangement, or the establishment of collaboration.
networks among a collection of individuals working interdependently to achieve broad goals. In contrast, advice within the policy process can be characterized by a supply and demand function (Howlett, 2009b), with individuals seeking out policy or political advice from those possessing the requisite knowledge or information. The exchange of advice among individuals can occur in a variety of different forms, including formal policy advice (deLeon, 1989), the exchange of informal advice related to identifying solutions or reformulating difficult problems (Cross, Borgatti & Parker, 2001), or the regular exchange of advice between members of an epistemic community (Adler & Haas, 1992). Drawing upon previous empirical research, this chapter utilizes collaborating and utilizing advice as two theoretical constructs for examining the interactions between friends and foes engaged in the policy process.

The ACF along with RDT and PAC can be used in combination to develop a better understanding of how resources and beliefs comparatively affect friend and foe interactions. The ACF provides a theoretical framework that can be used to identify the belief systems of individuals and to then partition them into competing advocacy coalitions on the basis of belief similarity (Sabatier & Jenkins-Smith, 1993). This chapter utilizes the ACF to provide the theoretical rationale for examining an individual’s beliefs and interactions with friends and foes. Individuals were partitioned in to two coalitions on the basis of belief similarity, which allows for a systematic approach for identifying an individual’s interactions with friends (members of their advocacy coalition) as well as interactions with foes (from an opposing coalition). In combination, RDT and PAC provide a platform for examining the extent that resources affect an individual’s interaction with friends and foes. RDT (Pfeffer & Salancik, 1978) provides the theoretical rationale for examining how resources influence the
extent that individuals interact with others, while PAC provides a typology of resources utilized by individuals engaged in the policy process. Utilizing these three frameworks, this chapter develops a pair of hypotheses that can be used to examine the comparative effects of beliefs and resources on friend and foe interactions.

The ACF offers an approach for examining policy subsystems involving diverse beliefs, substantial goal conflicts, and enduring technical disputes across a variety of individuals working within and outside of government. The ACF operates at the subsystem-, individual-, and coalition-levels (Sabatier & Weible, 2007). At the subsystem-level, the ACF assumes that, because policymaking is complex, participants must specialize in a policy area in order to be influential. This specialization occurs within policy subsystems that consist of participants who regularly attempt to influence policy within a functional/substantive dimension (such as climate policy) and a territorial dimension (such as Colorado). At the individual-level, the ACF assumes that individuals are boundedly-rational and rely upon a belief system in shaping political behavior. At the coalition-level, the ACF assumes that individuals will seek out allies, share resources, and develop strategies in order to ensure that policies reflect their beliefs.

Within the ACF, beliefs are viewed as the primary factor that influences behavior. Individuals have been shown to seek out and coordinate with others who hold similar beliefs (Matti & Sandstrom, 2011; Nohrstedt, 2010; Zafonte & Sabatier, 1998) and share resources and develop strategies in an effort to realize their common beliefs. Belief similarity among individuals is argued to promote a sense of trust (Leach & Sabatier, 2005), with individuals more likely to trust others whom they perceive share beliefs (Henry, Lubell & McCoy, 2011; Lubell, 2007). In combination, the concepts of belief similarity and trust can lead individuals
to systematically seek out interactions with others with similar beliefs. In turn, belief homophily can lead to an intensification of the ‘devil-shift’ phenomenon (Ingold & Varone, 2012; Sabatier & Jenkins-Smith, 1999). Under this phenomenon, individuals tend to view their opponents as more evil and less trustworthy than they may actually be, thereby further reinforcing an individual’s reluctance to interact with foes. Collectively, the ACF literature demonstrates the strong effect that an individual’s beliefs have on their interactions, with individuals more likely to interact with others who share similar beliefs but to shun interactions with those who hold divergent beliefs.

Although the ACF literature has produced considerable research on the beliefs held by a wide array of individuals (Fenger & Klok, 2001; Ingold, 2011; Weible, 2007; Zafonte & Sabatier, 1998), substantially less research has focused on the extremity of the beliefs held by individuals and the subsequent effects on interactions with friends and foes. Previous research has demonstrated differences in belief intensity related to organizational affiliation with coalition members working in government agencies more likely to possess moderate beliefs than individuals working in interest-groups (Sabatier & Jenkins-Smith, 1993). Building partly upon these early findings, Lubell’s (2005; 2007) research has furthered the framework’s understanding of the role of extreme beliefs. Examining the relationships between beliefs, trust, and behavior, individuals who expressed more extreme beliefs were found to be less likely to trust others with divergent beliefs. In addition, extreme, divergent beliefs were found to prevent individuals from agreeing on the most fundamental parameters of a policy problem and reduced the likelihood of consensus and collective action. This chapter develops a measure of belief intensity to examine how beliefs ranging from moderate
to extreme affect an individual’s willingness to interact with friends and foes. Accordingly, this chapter evaluates the following original hypothesis:

*Extreme Beliefs Hypothesis: Individuals with extreme beliefs will be less likely to collaborate with or utilize advice from foes while individuals with moderate beliefs will be more likely to collaborate with or utilize advice from foes.*

While belief extremity offers one rationale, resource dependence offers a second, complementary rationale for explaining why opposing groups interact in a cooperative manner. According to Pfeffer and Salancik’s (1978) RDT, organizational behaviors can be explained by the surrounding environment, with the control of critical resources within the environment exerting a strong influence on an organization’s behavior. Broadly, the theory argues that organizations engage in the exchange of monetary, physical or informational resources, and continuously alter their relationships with others in an effort to decrease their dependence while increasing the dependence of other organizations (Kotter, 1979). The theory identifies two types of interdependence relating to outcomes and behaviors. In situations involving outcome interdependence, the outcomes of one organization are mutually determined by the outcomes achieved by another organization. In situations of behavior interdependence, the actions of an organization are dependent on another organization, with organizations engaged in either competitive or symbiotic relationships. Pfeffer and Salancik (1978) identify three critical factors in determining the dependence of one organization on another. The first factor is the importance of the resource and the degree to which it is required by the organization for continued operation. A second factor is the degree to which the organization has discretion over the allocation and use of resources. The final factor is the degree to which other resource alternatives exist and are accessible by the
organization. Organizations typically overcome issues of resource dependency by increasing their coordination with other organizations, and exerting control over others by increasing behavioral interdependence (Getz, 2001; Oliver & Holzinger, 2008). Although the theory was originally developed to explain interactions at the organizational level, the theory has been applied at the individual-level to examine interactions between individuals (Fenger & Klok, 2001; Rowley, 1997; Weible, 2005).

PAC augments RDT by providing a typology of individual and organizational resources used within the policy process. The framework focuses on the capacity of individuals and their organizations to acquire and utilize information in the policy process (Howlett, 2009a). PAC relates to the analytical capacity at the individual- and organizational-levels for collecting and effectively utilizing data and information in policymaking activities. Achieving high levels of PAC is associated with a recognized demand or market for policy research, a supply of qualified researchers, access to quality data, policies and procedures to facilitate interactions between researchers, and a culture that encourages openness and risk taking (Riddell, 1998). At the individual level, PAC is comprised of several dimensions, including level of formal training and the access to and use of tools and techniques commonly used within a profession (Wellstead, Stedman & Lindquist, 2009), such as analytical and collaborative tools. Although individual-level resources play a role in the ability of individuals to utilize information, the majority of individuals lack the personal resources to participate in policy issues over prolonged periods of time. Individuals, thus, attempt to leverage the organizational resources of government agencies, businesses, nonprofit organizations, or academic/research organizations in pursuit of policy objectives. At the organizational level, PAC relates to the organizational support available to individuals,
including an organization’s priority in addressing a particular issue as well as its willingness to devote resources to the issue (Craft & Howlett, 2012; Howlett & Olijphant, 2010). The argument is one of resource dependency (Pfeffer & Salancik, 1978), where organizations provide individuals assets and deficiencies in shaping public policy debates. In combination, RDT’s theoretical focus on the effects of resource dependence and the PAC’s resource typology provide an appropriate tool for examining how resource dependency affects an individual’s friend and foe interactions.

Previous research has utilized both the ACF and RDT to examine the impact of resources on interactions among coalition members. Fenger and Klok (2001) focusing on the concept of interdependency among individuals in a subsystem, found coalition members to be interdependent on each other in regard to resources. Resource interdependency has been found to provide an improved understanding of the development and stability of strong forms of coordination among individuals and advocacy coalitions (Weible & Sabatier, 2005). Although individuals primarily coordinate with and seek information from members of their coalition, cross-coalition interactions have been shown to occasionally occur due to issues of resource dependence (Weible, 2005). Perceived influence in the form of effective control of critical resources was found to be a significant factor explaining a coalition member’s willingness to coordinate and utilize information and advice from members of rival coalitions (Weible, 2005). However, these findings on the role of resource dependence were preliminary and a need exists for more systematic and empirical data validation. Defining resources as an individual’s individual- and organizational-level PAC, this chapter evaluates the following original hypotheses:
**Resource Hypothesis:** Individuals with high levels of individual and organizational resources will be less likely to collaborate with or utilize advice from foes than individuals with lower levels of individual and organizational resources.

Together, the three frameworks can be used to examine how the level of resources possessed by individuals impacts their willingness to interact with friends and foes. Although previous research has demonstrated the resource interdependency of individuals, it has not examined in-depth whether an individual’s level of resources makes them more or less likely to interact with foes. Testing this hypothesis will provide an improved understanding of the effects of low and high levels of resources on an individual’s interactions. In turn, this new insight can be used to identify opportunities where opposing groups of individuals may be more likely to interact with their opponents in a cooperative manner.

**Case: Colorado Climate and Energy Policy Subsystem**

The context for this study is the climate and energy policy subsystem within the state of Colorado. Colorado provides an effective case to examine climate and energy policies due to its diverse number of actors, vast traditional energy resources, the rise of its renewable energy sector, and its vulnerability to climate change. Individuals engaged in climate and energy policy work in a diverse groups of areas, including government, industry, academia, and non-profit organizations. These actors include supporters and opponents who are actively engaged in efforts to influence policy. The state has long been a major producer of traditional energy with several major fossil fuel-rich basins, major production of coalbed methane, and high levels of natural gas production and reserves (US Energy Information Administration, 2011). In recent years, Colorado’s renewable energy sector has grown partly in response to the state’s adoption of a renewable energy portfolio standard via ballot initiative in 2004 and
a further strengthening of the standard by the legislature in 2010 (Database of State Incentives for Renewables & Efficiency, 2010). The state has been identified as vulnerable to both current and predicted impacts of climate change, including shorter and warmer winters and increased periods of drought (Ritter 2007). Scientists project that in the ensuing decades, climate change in Colorado will produce temperature increases of 3 to 4 degrees Fahrenheit, longer and more intense wildfires during the summer seasons, and an increase in water shortages. In an effort to address the predicted impacts of climate change, former Colorado Governor Bill Ritter launched the Colorado Climate Action Plan in November of 2007. The state’s adoption of a climate action plan is representative of climate policy at the state level (EPA, 2011; ICLEI, 2011) and Colorado can be considered to be a typical case (Gerring, 2001) for examining climate and energy policy debates.

Methods

An online survey was administered in the spring of 2011 to individuals in Colorado actively involved in climate and energy issues. The sample was collected through a modified snowball sample targeting individuals involved in Colorado climate and energy issues by first searching the internet for government and nongovernment organizations and the people therein. Additionally, newspapers and online publications were also searched. The online search was complemented by preliminary interviews of five people involved with climate and energy issues. The total sample identified through these efforts was 793 individuals. Of the total population sampled, 272 people returned fully completed surveys for a response rate of 34%.
Operational Measures

Dependent Variables

The dependent variables for this study consist of two indicators of friend and foe interactions in the form of collaborating and utilizing advice. Interactions among friends were operationalized by asking survey respondents the frequency that they interacted with other individuals whom shared their beliefs, while interactions among foes were operationalized by asking respondents about the frequency of interactions with individuals whose beliefs they did not share. The two friend and foe indicators were operationalized by calculating the difference between the frequency that individuals collaborated or utilized advice from foes and the frequency that they collaborated or utilized advice from friends. By subtracting the frequency that an individual interacted with foes from the frequency that they interacted with friends, the two indicators control for the relative frequency of friend and foe interactions. In doing so, these indicators account for both the positive and negative poles (Goertz, 2006) of friend and foe interactions by controlling for those individuals that have high frequencies of interactions with friends and foes as well as those individuals with low levels of interactions.

Collaboration with friends and foes was measured using two survey questions asking respondents the frequency that they collaborated with those who shared their beliefs on climate and energy policy and those who did not. Respondents were asked to answer using a five-point Likert scale consisting of daily, weekly, monthly, yearly, and never, with responses coded in order from 5= daily through 1= never. The ‘Collaboration with Friends and Foes’ dependent variable was constructed by subtracting the frequency that an individual collaborated with foes who did not share their beliefs from the frequency that they
collaborated with friends who shared their beliefs. The corresponding values for this measure ranged from -4 for collaborating only with foes to +4 for collaborating only with friends, with the value of zero representing equal collaboration with friends and foes. Utilizing advice from friends and foes was measured in a similar manner using two questions asking respondents the frequency that they utilized advice from those whose beliefs they disagreed with and those they agreed with. The ‘Advice from Friends and Foes’ dependent variable was constructed in the same manner as the ‘Collaboration with Friends and Foes’ dependent variable, with values for the measure ranging from -4 for utilizing advice only from foes to +4 for utilizing advice only from friends, with the value of zero representing equally utilizing advice from friends and foes.

**Independent Variables**

**Extreme Beliefs.** Survey respondents were asked to respond to a battery of questions pertaining to the ACF’s concept of policy core beliefs (Sabatier & Jenkins-Smith, 1993) hereafter referred to as “beliefs”, which consisted of the individual’s fundamental policy positions associated with climate and energy policy in Colorado. To measure beliefs, individuals were asked to report their beliefs on the severity of climate change, its causes, and possible policy approaches for mitigating carbon emissions, including carbon taxes, cap and trade policy, and policies promoting renewable energy generation. Respondents were asked to use a five-point scale ranging from -2 = Strongly Agree to +2 = Strongly Disagree. These individual questions were then aggregated by their means into a single-scaled ‘Policy Core Beliefs Scale’ (Cronbach’s alpha = 0.87; average factor loading= 0.72). An ‘Extreme Policy Core Beliefs Scale’ was then constructed to measure the extremity of policy core beliefs by taking the absolute values of the ‘Policy Core Beliefs Scale’. Values for the
‘Extreme Policy Core Beliefs Scale’ ranged from 0 for moderate beliefs to 2 for extreme beliefs.

**Resources.** An individual’s resources were measured using four PAC variables pertaining to formal training, use of collaborative and analytical tools, and organizational capacity. To measure formal training, respondents were asked, “In which of the following areas have you received formal training?” Responses included applied research, modeling, policy analysis, policy evaluation, statistical methods, and trends analysis and/or forecasting. The formal training questions were then aggregated by their means into a single-scaled ‘Sum of Formal Training’ variable (Cronbach’s Alpha= 0.59<sup>12</sup>; average factor loading= 0.59). To measure the tools and techniques used by individuals, respondents were asked: “How often have you used the following tools and techniques as part of your work in the past year?” Choices included political feasibility analysis, risk analysis, modeling, environmental impact analysis, facilitation and consensus building, economic analysis, and informal tools and techniques. Respondents were asked to respond using a scale coded from 5 to 1 consisting of daily, weekly, monthly, yearly, and never (Wellstead, Stedman & Howlett, 2011). Two scales were created via confirmatory factor analysis from the seven questions. The first scale consists of analytical tools and techniques including modeling, environmental impact analysis, economic analysis, risk analysis, and political feasibility analysis (Cronbach’s alpha = 0.80; average factor loading= 0.48). The second scale consists of collaborative tools and techniques including facilitation/consensus building and informal tools/techniques (Cronbach’s alpha = 0.63; average factor loading= 0.58).

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<sup>12</sup> The 0.59 value is slightly lower than the generally accepted threshold of 0.60. However, similar low thresholds have been utilized within the literature (Santos, 1999).
Organizational resources were measured using three PAC questions pertaining to organizational priorities, organizational resources, and the organization’s ability to engage in long-term planning on climate change. Measuring climate and energy issues as an organizational priority was done by asking survey respondents: “Compared with other issues that your organization responds to, how much of a priority are climate-related issues and energy policies?” Responses consisted of a five-point Likert scale that included much higher, higher, about the same, lower, and much lower. To measure organizational resources, respondents were asked: “Compared to similar organizations, does your organization have adequate knowledge, skills, and people to respond to climate-related issues and energy policies?” The sample was asked to respond using a five-point scale ranging from very high capacity to very low capacity. To measure the ability of the organization to engage in long-term planning processes that are associated with climate change adaptation, respondents were asked their level of agreement or disagreement with the following statement: “Urgent day-to-day issues seem to take precedence over thinking ‘long-term.’” The sample was asked to respond using a five-point scale ranging from strongly disagree to strongly agree. An ‘Organizational Capacity Scale’ was then created by taking the mean of the three variables (factor loading = 0.88, Cronbach’s alpha = 0.70), with values for the scale ranging from 1= very low capacity to 5= very high capacity.

Control Variables. Four measures derived from the survey served as control variables. An individual’s coalition membership was controlled for using the ‘Opponents Coalition Member’ variable. Inclusion of the ‘Opponents Coalition Member’ variable within the model was used to control for differences between the two coalitions in collaborating and utilizing advice from friends and foes. Members of the Opponents Coalition were coded as one while
member of the Supporters Coalition were coded as zero. The effect of an individual’s organizational affiliation on their interactions was controlled for using a survey question asking whether they were affiliated with an academic/research, business, government, or non-profit organization. The inclusion of this variable controls for any differences in collaboration or utilizing advice that may occur due to an actor’s organizational type. An individual’s years of experience was controlled for using a survey question asking how many years they’d been involved in climate and energy policy, with responses ranging from less than a year to greater than 20 years. The inclusion of the years of experience variable controls for the differences in collaboration or utilizing advice that could occur as a result of a greater number of years of experience. Finally, gender was controlled for due to the belief that women would be more likely to interact with foes than their male counterparts. Female gender was coded as a dichotomous variable, with females coded as one and males coded as zero.

Results

The analysis identifies two competing advocacy coalitions within the subsystem, a large coalition of climate policy supporters with 205 members (‘Supporters Coalition’) and a small coalition of opponents of climate policy with 55 members (‘Opponents Coalition’). The advocacy coalitions were identified using a modified version of Zafonte and Sabatier’s (1998) method of cluster analysis and silhouette means. Utilizing the battery of belief questions, the $k$-means clustering technique (MacQueen, 1967) partitioned individuals from the survey into coalitions based upon the similarity of their beliefs. Cluster analyses partitioned individuals into two, three, and four advocacy coalitions, with the average silhouette values for each cluster used to determine the “goodness of fit”. Clustering
individuals into two advocacy coalitions produced the best fit with an average silhouette value of 0.66, while clustering individuals into three and four coalitions produced mean silhouette values of 0.40 and 0.35, respectively.

Table 6.1 presents the descriptive characteristics for the advocacy coalitions. Each coalition was comprised of individuals working in government, industry, academic, and non-profit organizations. The organizational affiliations within each coalition were statistically significant (p<0.05). Within the Opponents Coalition, members were primarily affiliated with business organizations (52% of individuals), while the Supporters Coalition consisted of a more even distribution between members affiliated with government (33%) and business (28%) organizations. Throughout the remaining sections, advocacy coalitions are used as a theoretical construct to distinguish between climate policy supporters and opponents. Accordingly, it is important to note that it is the individuals, and not the advocacy coalitions that hold beliefs, possess resources, and interact with friends and foes.
Table 6.1: Membership, Beliefs, and Policy Analytical Capacity of the Coalitions (by Mean)

<table>
<thead>
<tr>
<th>Opponents Coalition</th>
<th>Supporters Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advocacy Coalition Membership and Belief Measures</strong></td>
<td></td>
</tr>
<tr>
<td>Number of Coalition Members</td>
<td>55</td>
</tr>
<tr>
<td>Majority of Members by Organizational Affiliation</td>
<td>Business</td>
</tr>
<tr>
<td>Affiliation^</td>
<td>29 (52%)</td>
</tr>
<tr>
<td><strong>Policy Core Beliefs Scalea</strong>*</td>
<td>-0.72</td>
</tr>
<tr>
<td><strong>Extreme Policy Core Beliefs Scaleb</strong>*</td>
<td>0.75</td>
</tr>
<tr>
<td><strong>Individual Policy Analytical Capacity</strong></td>
<td></td>
</tr>
<tr>
<td>Education^c</td>
<td>5.11</td>
</tr>
<tr>
<td>Years of experience^d</td>
<td>3.54</td>
</tr>
<tr>
<td><strong>Percentage of members receiving formal training</strong></td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>60%*</td>
</tr>
<tr>
<td>Modeling</td>
<td>38%*</td>
</tr>
<tr>
<td>Training in applied research</td>
<td>31%</td>
</tr>
<tr>
<td>Policy evaluation</td>
<td>38%</td>
</tr>
<tr>
<td>Trends analysis</td>
<td>35%</td>
</tr>
<tr>
<td>Policy analysis</td>
<td>31%*</td>
</tr>
<tr>
<td><strong>Frequency of use of tools and techniques</strong></td>
<td></td>
</tr>
<tr>
<td>Facilitation/Consensus Building</td>
<td>2.19*</td>
</tr>
<tr>
<td>Informal Tools</td>
<td>3.27</td>
</tr>
<tr>
<td>Environmental Impact</td>
<td>2.33</td>
</tr>
<tr>
<td>Economic/Financial Analysis</td>
<td>2.69</td>
</tr>
<tr>
<td>Risk Analysis</td>
<td>2.31</td>
</tr>
<tr>
<td>Political Feasibility</td>
<td>1.48**</td>
</tr>
<tr>
<td><strong>Collaborative Tools^e</strong></td>
<td>2.74*</td>
</tr>
<tr>
<td><strong>Analytical Tools^e</strong></td>
<td>2.14</td>
</tr>
<tr>
<td><strong>Organizational Policy Analytical Capacity</strong></td>
<td></td>
</tr>
<tr>
<td>Organizational priority^f</td>
<td>3.50</td>
</tr>
<tr>
<td>Adequate knowledge, skills, and people^g</td>
<td>3.69</td>
</tr>
<tr>
<td>Urgent day-to-day issues take precedence^h</td>
<td>3.60</td>
</tr>
<tr>
<td><strong>Organizational Capacity Scale</strong></td>
<td>3.21</td>
</tr>
</tbody>
</table>

Note: X^2 test with significance levels at ^p<0.05, ^^p<0.01, ^^^p<0.001
Independent Samples Kruskal-Wallis test with significance levels at *p<0.05, **p<0.01, ***p<0.001

^aPolicy Core Belief scale:
-2=“strongly agree”, -1 = “agree”, 0= “neither agree nor disagree”, 1 = “disagree”, 2= “strongly disagree”.

^bExtreme beliefs scale: 0= moderate beliefs to 2= extreme beliefs

^cEducation scale: 1= “not a high school graduate”, 2= “high school graduate”, 3= “some college”, 4= “bachelor’s degree”, 5= “mater’s or professional degree”, 6= “PhD, MR, or JD”.

^dYears of experience scale: 1= “less than 1 year”, 2= “1-5 years”, 3= “6-9 years”, 4= “10-14 years”, 5= “15-20 years”, 6= “greater than 20 years”.


^fScale: 1= “much lower”, 2= “lower”, 3= “about the same”, 4= “higher”, 5= “much higher”.

^gScale: 1= “very low capacity”, 2= “low capacity”, 3= “medium capacity”, 4= “high capacity”, 5= “very high capacity”.

^hScale: 1= “strongly disagree”, 2= “disagree”, 3= “neutral”, 4= “agree”, 5= “strongly agree”.

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The top part of Table 6.1 also presents the beliefs and the extremity of beliefs for the two coalitions. As beliefs were used to partition individuals into the advocacy coalitions, the two coalitions differed considerably in their beliefs on climate and energy issues (p<0.001 for all belief measures). The Opponents Coalition believed that the severity of potential climate change impacts was overstated, disagreed that humans were the primary cause of climate change, and that decisions for addressing climate change were best left to the market. The Opponents Coalition also opposed three common policy options for addressing climate change, demonstrating slight opposition to renewable energy policy and higher levels of opposition to the adoption of a carbon tax and cap & trade policy. The Supporters Coalition held fundamentally different beliefs on each of the six policy core belief measures. The coalition strongly disagreed with the belief that the potential impacts of climate change were overstated, strongly believed that human behavior was the principal cause, and strongly disagreed with the belief that decisions on climate change were best left to the market. The coalition supported the adoption of all three proposed climate policy options, ranging from minimal support for a cap & trade policy, to moderate support for a carbon tax, and strong support for renewable energy policies. The ‘Policy Core Beliefs Scale’ measured the overall intensity of the climate change beliefs held by coalition members, with negative values indicating opposition to climate policy and positive values indicating support. The Opponents Coalition had a mean belief of -0.72, indicating moderate opposition to climate policy, while the Supporters Coalition had a mean belief of 1.26, indicating strong support (p<0.001). The ‘Extreme Beliefs Scale’ measured the extremity of an individual’s climate beliefs, with a value of zero indicating moderate beliefs and a value of 2 indicating extreme beliefs on climate policy. The mean values for the two coalitions were 0.75 for the Opponents Coalition
and 1.26 for the Supporters Coalition, indicating a higher level of extreme beliefs among policy supporters (p<0.001).

The bottom part of Table 6.1 presents the individual and organizational PACs of the two coalitions. Measures of PAC at the individual level consisted of education, years of experience, formal training, and the use of various information processing tools and techniques. Coalition members were highly educated with a master’s degree as the mean level of education. Both coalitions had similar levels of experience, with members having an average of six to nine years of experience in climate and energy issues. Members in both coalitions had largely similar levels of formal training in a wide variety of areas, though statistically significant differences are found between the coalitions in regard to training in statistics, modeling, and policy analysis (p<0.05 for all three areas). The Opponents Coalition was found to have higher levels of training in statistics and modeling, while the Supporters Coalition had higher levels of training in policy analysis. Individuals were also asked about the frequency in which they used a variety of tools and techniques for processing climate and energy information. Statistically significant differences between the coalitions were found in regard to facilitation and consensus building and conducting political feasibility analysis. The Supporters Coalition was found to engage in facilitation and consensus building strategies on a monthly basis while the Opponents Coalition engaged on a yearly basis (p<0.05). The Supporters Coalition was also found to conduct political feasibility analysis on a yearly basis, while the Opponents Coalition rarely conducted this analysis (p<0.01). Both coalitions were found to utilize collaborative tools on a monthly basis (p<0.05), while utilizing analytical tools on a yearly basis.
The bottom part of Table 6.1 also presents the organizational PAC of the coalitions. Four measures were used to examine the organizational PAC of the organizations within each coalition: (1) organizational priority; (2) adequate knowledge, skills, and people for responding to policy issues; (3) whether urgent day-to-day issues took precedence over long-term planning on climate and energy issues; and, (4) an organizational capacity scale. The two coalitions had similar but statistically non-significant differences on each of the organizational capacity measures. Members of both coalitions responded that their organizations made climate and energy policy a higher priority than other policy issues. Irrespective of coalition, respondents indicated that their organizations had high capacity in regard to adequate knowledge, skills, and people for responding to climate and energy policy issues. When asked whether urgent day-to-day issues took precedence over long-term planning on climate and energy policy issues, members of both coalitions responded that they agreed. The ‘Organizational Capacity Scale’ was created by averaging the means of the three organizational variables into a single scale, with values ranging from 1= very low capacity to 5= very high capacity. The two coalitions had nearly identical mean scores, with a value of 3.21 for the Opponents Coalition and 3.28 for the Supporters Coalition, indicating medium levels of organizational PAC. Collectively, the results outlined in Table 6.1 provide greater insight into the individual and organizational resources that exist among members within each coalition, with similar levels of individual and organizational-level resources found between the two coalitions.

Table 6.2 presents the median values for the four individual measures on the frequency that coalition members interacted with friends and foes. The scales for the four measures ranged from 1= never to 5= daily interactions. The coalitions had non-significant
differences in the frequency that they utilized advice from those they agreed with, with coalition members utilizing advice on a weekly basis. However, statistically significant differences were found in regard to the frequency that the coalitions utilized advice from those they agreed with. Members of the Opponents Coalition utilized advice from foes on a weekly basis while members of the Supporters Coalition utilized advice from foes on a monthly basis (p<0.05). Statistically significant differences were also found in regard to the frequency that individuals collaborated with those that shared their views, with both coalitions collaborating with friends on a weekly basis (p<0.05). However, non-significant differences were found in regard to the frequency that members collaborated with those who did not share their views, with both coalitions collaborating with foes on a monthly basis.

Table 6.2: Descriptive Analysis of Friend and Foe Interactions (by Median)

<table>
<thead>
<tr>
<th>Individual Measures</th>
<th>Opponents Coalition</th>
<th>Supporters Coalition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilize advice from people you agree with</td>
<td>4.0 (Weekly)</td>
<td>4.0 (Weekly)</td>
</tr>
<tr>
<td>Utilize advice from people you disagree with</td>
<td>4.0 (Weekly)*</td>
<td>3.0 (Monthly)*</td>
</tr>
<tr>
<td>Collaborate with those who share views</td>
<td>4.0 (Weekly)*</td>
<td>4.0 (Weekly)*</td>
</tr>
<tr>
<td>Collaborate with those who do not share views</td>
<td>3.0 (Monthly)</td>
<td>3.0 (Monthly)</td>
</tr>
</tbody>
</table>

Note: Kruskal-Wallis test of significance. *(p<0.05), **(p<0.01), ***(p<0.001).


Figure 6.1 presents the frequency distribution for the ‘Collaboration with Friends and Foes’ and ‘Advice from Friends and Foes’ measures. Values for the two measures ranged from -4 for utilizing advice or collaborating only with foes to +4 for utilizing advice or collaborating only with friends, with a value of zero indicating equal interactions with friends and foes. The figure demonstrates that the majority of members in both coalitions interact equally with both friends and foes. In terms of collaboration, 34 members of the Opponents Coalition (64.2%) collaborated equally with friends and foes while 83 members of the
Supporters Coalition (41.3%) collaborated equally. In regards to utilizing advice, 42 members of the Opponents Coalition (76.4%) utilized advice equally from friends and foes while 115 members of the Supporters Coalition (56.1%) utilized advice equally.

However, the two histograms demonstrate a noticeable degree of right-skewedness, as coalition members were more likely to interact with friends than foes. The mean values for the two measures demonstrate statistically significant differences between the two coalitions. The mean values for the ‘Collaboration with Friends and Foes’ measure is 0.34 for the Opponents Coalition and 0.98 for the Supporters Coalition, indicating that opponents are most likely to collaborate equally with friends and foes while supporters are slightly more likely to collaborate with friends (p<0.001). In contrast, the mean values for the ‘Advice from Friends and Foes’ measure are 0.33 for the Opponents Coalition and 0.60 for the Supporters Coalition, indicating that opponents are more likely to equally utilize advice from friends and foes while supporters are slightly more likely to utilize advice from friends (p<0.05).

Collectively, the results shown in Figure 6.1 demonstrate that a plurality of coalition members interact equally with friends and foes. Furthermore, these results suggest that the two coalitions are not completely polarized. In contrast to the frequent depiction of climate politics and policy as being highly contentious, the results provide evidence that supporters and opponents of climate policy are regularly collaborating with and utilizing advice from their respective foes.
Table 6.3 presents the multivariate analysis examining the comparative effects of resources and beliefs on friend and foe interactions. Ordinal logistic regression models were constructed with the ‘Collaboration with Friends and Foes’ and the ‘Advice from Friends and Foes’ scales as the dependent variables\textsuperscript{13}. The independent variables in the models consisted of the ‘Extreme Policy Core Beliefs’ measure and the four resource measures (formal

\textsuperscript{13} Each model was tested for multicollinearity issues. The mean Variance Inflation Factor statistics for the two models was 1.31, indicating that multicollinearity was not a problem within the models.
training, collaborative tools, analytical tools, and organizational PAC). Control variables consisted of coalition membership, organizational affiliation, years of involvement, and female gender. The two models were estimated with robust standard errors and were found to be highly significant with significance levels ranging from 0.001 to 0.002.
<table>
<thead>
<tr>
<th>Table 6.3: Explanatory Analysis of Friend and Foe Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Collaboration with Friends &amp; Foes</strong></td>
</tr>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>Extreme Beliefs Hypothesis</td>
</tr>
<tr>
<td>Extreme Policy Core Beliefs</td>
</tr>
<tr>
<td>Resource Hypothesis</td>
</tr>
<tr>
<td>Formal Training</td>
</tr>
<tr>
<td>Collaborative Tools</td>
</tr>
<tr>
<td>Analytical Tools</td>
</tr>
<tr>
<td>Organizational PAC</td>
</tr>
<tr>
<td>Control Variables</td>
</tr>
<tr>
<td>Opponents Coalition Member</td>
</tr>
<tr>
<td>Business</td>
</tr>
<tr>
<td>Non-profit</td>
</tr>
<tr>
<td>Academic</td>
</tr>
<tr>
<td>Years of Involvement</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Pseudo R²</td>
</tr>
<tr>
<td>Prob&gt;Chi²</td>
</tr>
<tr>
<td><strong>Advice from Friends &amp; Foes</strong></td>
</tr>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>Extreme Beliefs Hypothesis</td>
</tr>
<tr>
<td>Extreme Policy Core Beliefs</td>
</tr>
<tr>
<td>Resource Hypothesis</td>
</tr>
<tr>
<td>Formal Training</td>
</tr>
<tr>
<td>Collaborative Tools</td>
</tr>
<tr>
<td>Analytical Tools</td>
</tr>
<tr>
<td>Organizational PAC</td>
</tr>
<tr>
<td>Control Variables</td>
</tr>
<tr>
<td>Opponents Coalition Member</td>
</tr>
<tr>
<td>Business</td>
</tr>
<tr>
<td>Non-profit</td>
</tr>
<tr>
<td>Academic</td>
</tr>
<tr>
<td>Years of Involvement</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Pseudo R²</td>
</tr>
<tr>
<td>Prob&gt;Chi²</td>
</tr>
</tbody>
</table>

Note: Models are ordinal logit regressions with robust standard errors. *(p<0.10), **(p<0.05), *** (p<0.01).
Extreme beliefs were found to have consistent, statistically significant effects on an individual’s interactions with friends and foes. An increase in the extremity of beliefs was found to increase the extent that an individual collaborated with or utilized advice from friends, regardless of coalition membership (p<0.05 and p<0.10, respectively). In contrast, the four resource measures were found to have minimal effects within the two models. An increase in organizational PAC was found to increase the extent that an individual collaborated with friends (p<0.01). In contrast, the four resource measures had non-significant effects on utilizing advice from friends and foes. Collectively, these results demonstrate the significant effects that extreme beliefs exert on friend and foe interactions along with the minimal effects of individual and organizational resources.

The four control variables had mixed effects on the two measures of interaction. Membership in the Opponents Coalition had consistently negative effects on the extent that individuals collaborated or utilized advice primarily from friends while the other control variables differed in their effects. The organizational affiliation, years of experience, and gender variables did not have significant effects on collaboration. In contrast, two of these three control variables had statistically significant effects on the extent that an individual utilized advice from friend and foes. Academics were more likely to utilize advice from friends, when compared to individuals working in government (p<0.01). Females were found to be more likely than males to utilize advice from foes (p<0.01).

Table 6.4 reviews the results of the hypothesis tests with the coefficients from the multivariate models interpreted as the percentage change in odds. Reinterpreting the log-odds ratios of the ordinal logistic regressions as the percentage change in odds provides a more intuitive understanding of the comparative effects of resources and extreme beliefs on friend
and foe interactions. For each hypothesis, the statistically significant variables in the multivariate models are presented as the percentage change in odds.
Table 6.4: Results of Hypothesis Tests

Extreme Beliefs Hypothesis: Individuals with extreme beliefs will be less likely to interact with foes while individuals with moderate beliefs will be more likely to interact with foes.

Result: Supported

<table>
<thead>
<tr>
<th>Measure</th>
<th>Collaboration with Friends &amp; Foes (Percentage Change in Odds)</th>
<th>Advice from Friends &amp; Foes (Percentage Change in Odds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Policy Core Beliefs</td>
<td>+93.9%**</td>
<td>+85.9%*</td>
</tr>
</tbody>
</table>

Resource Hypothesis: Individuals with high levels of individual and organizational resources will be less likely to interact with foes than individuals with lower levels of individual and organizational resources.

Result: Partially Supported

<table>
<thead>
<tr>
<th>Measure</th>
<th>Collaboration with Friends &amp; Foes (Percentage Change in Odds)</th>
<th>Advice from Friends &amp; Foes (Percentage Change in Odds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational PAC</td>
<td>+75.3%***</td>
<td>+4.3%</td>
</tr>
</tbody>
</table>

Percentage change in odds for a one-unit increase in the independent variable. *(p<0.10), ***(p<0.05), ***(p<0.01).
The first hypothesis was that individuals with extreme beliefs would be less likely to interact with foes while individuals with moderate beliefs would be more likely to interact with foes. The findings supported the hypothesis. A one-unit increase in belief intensity was found to increase the odds that an individual would collaborate primarily with friends by 93.9% (p<0.05). Similarly, an increase in belief intensity was found to increase the odds that an individual utilized advice primarily from friends by 85.9% (p<0.10).

The second hypothesis was that individuals with high levels of individual and organizational resources would be less likely to interact with foes than individuals with lower levels of resources. The results of this hypothesis were partially supported. None of the four individual-level resource measures were found to have a statistically significant effect on collaborating or utilizing advice from friends and foes. However, organizational resources were found to have a significant effect on collaboration. A one-unit increase in organizational PAC increased the odds that individuals would collaborate primarily with friends by 75.3% (p<0.05). Collectively, these findings suggest that higher levels of organizational resources increase the frequency that individuals collaborate with friends, while higher levels of individual resources have no statistically significant effects on interactions with friends or foes.

Finally, the ‘Opponents Coalition Member’ control variable was also reinterpreted as the percentage change in odds. Members of the Opponents Coalition were -56.1% less likely than members of the Supporters Coalition to collaborate primarily with friends. In addition, members of the Opponents Coalitions were -58.1% less likely than members of the Supporters Coalition to utilize advice primarily from friends. These findings suggest that
members of the Opponents Coalition are more likely than their counterparts in the Supporters Coalition to collaborate with or utilize advice from their respective foes.

**Discussion & Conclusion**

This chapter examined the comparative effects of resources and beliefs on the interactions of advocacy coalition members within the Colorado climate and energy policy subsystem. The chapter identified two key research questions regarding interactions between friends and foes. The first research question sought to determine the comparative effects of moderate and extreme beliefs on an individual’s interactions with friends and foes. Although the majority of coalition members interacted equally with friends and foes, belief intensity was found to have a strong positive effect on an individual’s interactions with friends. An increase in belief intensity from moderate to more extreme beliefs was found to strongly increase the odds that an individual would interact primarily with friends. These results support previous research studying the role of beliefs in determining political behavior by demonstrating that extreme beliefs, regardless of coalition membership, made individuals considerably more likely to primarily collaborate with or utilize advice from friends.

The second research question asked how low or high level of resources impacted an individual’s willingness to interact with friends and foes. Access to resources was found to have mixed effects on interactions. Higher levels of individual-level resources in the form of formal training or the use of analytical or collaborative tools did not have statistically significant effects on friend or foe interactions. In contrast, higher levels of organizational resources were found to increase the extent that an individual collaborated with friends. These results highlight the strong effect of resource dependence at the organizational level on collaboration with friends and foes, with individuals with access to higher levels of
organizational resources more likely to interact with friends while individuals with lower levels of organizational resources are more likely to interact with foes.

Answering these two critical research questions provides several contributions to the broader policy and politics literature on conflict and cooperation. High levels of interactions between foes were evident within this study, with more than half of the respondents reporting equal interaction with friends and foes. These findings are relevant when viewed in contrast to the prominent view of politics as inherently combative, as respondents self-reported that they interacted equally with friends and foes. In addition, extreme beliefs were found to matter within two different types of network interactions. Although network studies have regularly examined a single type of interaction, such as a collaboration network (Berardo, 2009; deLeon & Varda, 2009; Henry, Lubell, & McCoy, 2011; Lubell, 2007), the extant research has less commonly examined two or more different types of networks within a single study (Weible & Sabatier, 2005). Furthermore, this study builds upon previous network research by expanding upon the traditional focus of whether or not individuals interact, to examine the frequency of interactions between two generic types of actors in the form of friends and foes. Finally, this study also confirms the importance of resource dependence. Although extreme beliefs polarized interactions, low levels of organizational resources increased the likelihood that individuals would interact with foes.

This study also provides several implications for climate politics and policy research. Despite holding fundamentally different beliefs on the severity of climate change, its causes, and the policy solutions for addressing the problem, the majority of supporters and opponents of climate policy were found to collaborate and utilize advice from their respective foes. These findings provide nuance to traditional characterizations of climate politics and policy.
as overwhelmingly adversarial (Boykoff, 2010; Leiserowitz, 2010; McCright & Dunlap, 2003) by demonstrating that supporters and opponents frequently engage in cooperative interactions with each other. Opponents of climate policy are also shown to be more likely than supporters to interact with their foes. Although previous research has argued that opponents of climate change policy are obstinate in their opposition, these findings suggest that opponents of climate change are more likely to collaborate with or utilize advice from their respective foes. These findings demonstrate that despite being comparatively smaller in size and holding policy beliefs that differ considerably from the majority view, opponents of climate policy are more likely than supporters to engage in cooperative interactions with their opponents. Accordingly, these findings offer cautious hope that cooperative interactions between opponents and supporters of climate change could eventually lead to a negotiated compromise on climate and energy policy solutions. Adopting a greater focus on cooperative interactions in future studies of climate policy and politics may lead to the identification of opportunities where cooperative interactions are more likely to occur, which may in turn lead to more constructive policy debates.

Drawing conclusions from this study must account for the cross-sectional research design and the use of self-reported survey items. For example, the use of self-reported survey questions to measure friend and foe interactions may be influenced by social desirability bias, as survey respondents could potentially have overstated the frequency that they collaborate with and utilize advice from foes. Network studies that replace the use of survey questions with rigorous network analysis of friend and foe interactions offer an additional approach for further assessing the validity of these findings. Although this study’s use of a self-reported survey questions presents a non-trivial limitation, the study provides
two noteworthy contributions to the network literature. The study examines not only whether foes interact, but also the frequency of these interactions. Furthermore, this study expands upon the traditional focus of examining a single collaboration network by also examining the advice networks of friends and foes. The extent that the results of this study are generalizable is an empirical question to pursue, though one would expect the results to be most relevant to other adversarial environmental or energy issues.

This chapter offers several contributions to the policy and politics literature on conflict and cooperation. The chapter addresses key unanswered questions relating to the comparative effects of beliefs and resources on friend and foe interactions. Although higher levels of resources are found to have a mixed effect, extreme beliefs are found to strongly decrease an individual’s interactions with foes. In contrast to politics and policy being broadly characterized as fundamentally adversarial, the findings demonstrate that the majority of supporters and opponents of climate policy interact with friends and foes at the same frequency. In addition, opponents of climate policy are found to be more likely than climate policy supporters to interact with foes. Given the prominent role of conflict within climate change politics and policy, these findings offer an improved understanding of the instances and the extent that foes cooperate, which may help promote greater cooperation and understanding.
CHAPTER VII

UTILIZING HYPERLINK NETWORK ANALYSIS TO EXAMINE CLIMATE CHANGE SUPPORTERS AND OPPONENTS

Chapter Summary

Hyperlink network analysis, which utilizes the links between websites to map communication structures on the internet, offers an emerging methodology for studying the web-based networks of supporters and opponents of public policies. Reasons for the appeal of using hyperlink network analysis include the ability to utilize web crawlers to collect large amounts of data as well as the ability to apply quantitative and qualitative methods to examine the interactions of network actors. While hyperlink network analysis has been used in variety of diverse subjects, including computer science, communication studies, and sociology, the methodology is relatively new to the fields of political science and public policy. This chapter utilizes a mixed-methods research design to examine the applicability of using hyperlink networks to study policy supporters and opponents, while drawing increased attention to the methodological processes associated with conducting hyperlink network analysis, and the methodology’s strengths and weaknesses. Using data on the Colorado climate and energy policy subsystem, the study utilizes hyperlink network analysis measures along with a collection of hypotheses to examine the online networks of supporters and opponents of climate policy. The results demonstrate the considerable potential of using hyperlink networks to study opposing groups, but highlight the need for greater adoption of a

14 Note: This chapter has been submitted to the Review of Policy Research.
collection of best practices designed to increase the validity, reliability, and generalizability of hyperlink network analysis research.

While networks are inherently traditional forms of social organization, they have recently been empowered by the emergence of internet-based information and communication tools (Castells, 2000). Online networks provide individuals and organizations with a low transaction-cost tool that allows them to mobilize supporters and disseminate policy ideas in a more efficient manner than through traditional networks (Birkland, 2011; McNutt, 2006). These networks provide an especially powerful tool to policy actors, individuals who possess expertise within a policy domain and utilize this expertise to influence policy decisions (Zaller, 1992). One approach for examining the online networks of policy actors is hyperlink network analysis, which utilizes the links between websites (known as a hyperlink) to map communication structures on the internet (Park, 2003). Hyperlinks serve as the basic structural element of the internet (Park, 2003) and allow policy actors to link their websites in a multitude of ways, including exchanging information, directing users to the websites of ally organizations, or drawing attention to the actions of their opponents.

Hyperlink networks analysis is an emerging methodology that uses traditional social network analysis (Jackson, 1997) to study the online relations that exist among individuals or organizations (Park & Thelwall, 2003). A hyperlink network is comprised of a collection of nodes in the form of websites, with the hyperlinks between websites representing the network ties. Contributing factors to the appeal of using hyperlink networks include the ability to utilize web crawlers to collect large amounts of data to map the relationships between network actors (Margetts, 2009) and to apply both quantitative and qualitative research methods to examine interactions within the network. After identifying a set of starting points
and entering a series of parameters, web crawler software is used to collect detailed data on the individual websites and hyperlinks that comprise an online network. Upon identification of a network, qualitative methods can be used to study the websites of network actors while quantitative methods can be used to study the interactions and structures that comprise a network. While hyperlink network analysis has been used in variety of diverse subjects, including computer science, communication studies, and sociology (Thelwall, 2006), the methodology has only recently seen an increase in use within the fields of political science and public policy (McNutt & Wellstead, 2010; Rayner, McNutt & Wellstead, 2013).

Accordingly, the literature on hyperlink network analysis and politics and policy can arguably be categorized as nascent due to the relatively few applications as well as an underdeveloped focus on the methodological processes associated with hyperlink network analysis and the methodology’s strengths, weaknesses, and basic assumptions.

To ascertain a better understanding of how hyperlink network analysis can be used to study policy actors, this chapter conducts a multi-method exploratory analysis. The Advocacy Coalition Framework (Sabatier & Jenkins-Smith, 1993) and the Policy Analytical Capacity (Howlett, 2009) frameworks are used as theoretical platforms for examining the online interactions of supporters and opponents of climate policy within the Colorado climate and energy policy subsystem. This chapter begins with a review of the relevant literature on hyperlink network analysis and the two theoretical platforms. The article then describes the Colorado climate and energy policy subsystem as well as the methods of data collection and analysis. The results of the study are presented in two parts. The first part is a descriptive analysis of the hyperlink networks of policy actors against and in favor of climate policy. The second part tests a series of hypotheses related to utilizing hyperlink network analysis to
study policy actors. Collectively, the results demonstrate the considerable potential of using hyperlink network analysis to study opposing groups of policy actors, but that a strong need exists for greater utilization of a series of best practices for improving the validity, reliability, and generalizability of hyperlink-based research.

**Literature Review**

Policy actors and the organizations that they are affiliated with use hyperlinks to link to other websites or webpages for a variety of reasons, including information exchange, alliance building, and message amplification (Park, Kim & Barnett, 2004), as well as drawing critical attention to the efforts of their opponents. As a unit of analysis, the hyperlinks established by policy actors can be studied at either the webpage- or website-level. A webpage consists of a single page of information, such as a homepage, while a website is comprised of a collection of webpages. Throughout its relatively young history, hyperlink network analysis has relied upon a variety of methodological approaches for studying the hyperlinks that comprise a network. Early attempts involved the use of human coders to carefully search the individual webpages that comprise a website (Stein, 2009). Park (2003) notes that while this process works well for a small number of websites, human coding of a large number of websites involves a high labor cost and is susceptible to coding errors. More recently, hyperlink studies have sought to avoid the limitations of human coding by utilizing webcrawlers in combination with social network analysis.

Popular webcrawlers for studying hyperlink networks include Issue Crawler (Rogers, 2009) and the Virtual Observatory for the Study of Online Networks (VOSON) system (Ackland, 2010). While webcrawlers may differ slightly by approach, the use of a webcrawler typically involves the process of selecting seed websites and then establishing a
series of parameters for the crawl. Seed websites serve as the starting points for the crawl with the webcrawler mapping the hyperlinks associated with each seed before moving onto the webpages that received a hyperlink from the seeds. The boundaries of the crawl are determined by the parameters established by the webcrawler user, with parameters including the type of hyperlink to be examined (directed hyperlinks, reciprocated hyperlinks, or co-links), the number of outbound links to crawl per website, and a depth level that determines the number of pages to be crawled within a given website.

Social networks analysis (SNA) methods are commonly used to examine the networks identified by webcrawlers. Under this methodology, websites or webpages represent the nodes within the network and the hyperlinks (or edges) between webpages or websites represent the ties. Previous studies utilizing hyperlink network analysis have utilized both webpages and websites as units of analysis, electing to focus on either the hyperlinks between individual webpages or to aggregate the individual webpages that comprise a website into a single network node. In utilizing SNA methods, research on hyperlink networks has focused on the hyperlinks within a network (Jackson, 1997) as well as network structure (Lusher, Koskinen & Robbins, 2013). Hyperlink-focused research is commonly concerned with the individual hyperlinks within a network, including the types of hyperlinks that exist between network actors and the factors affecting the presence or absence of hyperlinks between actors. The hyperlinks established by actors consist of both inlinks, the linkages that an actor receives from others, as well as outlinks, which consist of the linkages they establish to others. In contrast, structure-focused analysis focuses on the overall characteristics of a network, with measures of centrality and density as key network measures (Park & Thelwall, 2003). Centrality measures the degree to which a network is
organized around a central actor by comparing the proportion of hyperlinks to a central actor to all other hyperlinks in a network. Density measures the level of network integration by measuring the degree to which sites are connected to one another within a network.

Research on hyperlink networks has provided important insight into the interactions of network actors. Previous research demonstrates that a small number of websites tend to both host and attract a large number of links from other network actors (Thelwall, 2008). Websites with a higher level of inlinks are argued to have a greater level of authority, on the basis that webmasters establish hyperlinks at higher rate to websites that are viewed as reputable or authoritative sources (Rogers, 2002). Websites that are perceived to have high levels of authority or prestige are argued to play a critical role within a hyperlink network (Wu & Hsu, 2005), with these websites acting as a hub or broker among other network actors (Park & Thelwall, 2003).

In recent years, the hyperlink network analysis methodology has seen increasing application within the fields of political science and public policy. Rogers and Marre (2000) used hyperlink analysis to map the online science and technology debates between supporters and opponents of climate change. Findings from the study included evidence of distinctive linking styles based on organization type and evidence that network actors take substantive positions, respond to the positions taken by others, and are strategic when establishing hyperlinks to other websites. The methodology has also been used to examine the linking practices of the websites of U.S. Congressional candidates (Foot et al., 2003), with linking practices found to vary by website, and the presence or absence of a hyperlink found to indicate recognition as well as purposeful non-recognition of other political actors. Park, Kim, and Barnett (2004) used hyperlink analysis to examine the communication networks of
Korean politicians over a two-year period and found that these networks became more integrated and interactive over time. Barnett and Sung (2006) examined the relationship between linkages and national culture, finding culture to be an organizing mechanism within these networks. Lusher & Ackland (2010) used hyperlink analysis in combination with exponential random graph models to examine the hyperlinking behaviors of asylum advocacy groups, finding that these networks exhibited many of the characteristics of human social networks, including reciprocity, transitivity, and homophily. Finally, McNutt and Wellstead (2010) examined the centrality, internationalization and actor composition for nine forestry and climate change networks in Canada and the U.S., and found that government websites dominated the networks due to high levels of centrality.

While hyperlink research has produced important findings on the online networks of policy actors, the methodology is subject to several notable limitations. Schneider and Foot (2004) highlight the ephemeral nature of hyperlinks, noting that hyperlinks may only last for a relatively brief period of time as webmasters update or build new versions of a website. This process commonly results in broken hyperlinks, which hinder the analysis of hyperlink network data. A second limitation exists in regard to the creation of a hyperlink which is subject to a variety of different interpretations (Ackland & O’Neill, 2011). Hyperlinks have been argued to represent the act of conferring authority or endorsing other sites (Kleinberg, 1999), as well as reflecting trust of another actor (Davenport & Cronin, 2000), or serving as communicative and strategic choices on the part of webmasters (Rogers & Marres, 2000). While some analyses of hyperlink networks have assumed that a hyperlink serves as a recommendation or endorsement of a website, hyperlinks have also been shown to be based on a hostile or satirical relationship (Sunstein, 2001). Disagreements about hyperlink
meanings have led some to argue that a general theory of link analysis is not possible (Thelwall, 2006). Despite these differences, there is a general consensus that hyperlink analysis is an appropriate and worthwhile method for examining online interactions (Lusher, Koskinen & Robbins, 2013; McNutt, 2006).

This review of the literature demonstrates the vast potential of using hyperlink network analysis to examine the interactions of policy actors while also drawing attention to the methodology’s limitations. In the next section, appropriate theoretical frameworks for studying the online interactions of policy actors are identified along with a series of hypotheses for developing a better understanding of how hyperlink network analysis can be used to study policy actors.

**Theoretical Frameworks and Hypotheses for Examining the Hyperlink Networks of Policy Actors**

The Advocacy Coalition Framework (ACF), the Policy Analytical Capacity (PAC) framework and the extant literature on hyperlink networks provide a collection of expectations on the structure of the hyperlink networks of policy actors. These expectations are that policy actors will be more likely to form hyperlinks with allies than with opponents, that actors with higher levels of resources will have a higher number of inlinks and lower levels of outlinks, and that the majority of network actors will link to actors of a similar organization type. This section provides an overview of the extant literature within these three areas along with a series of original hypotheses that are used to examine the structure of the hyperlink networks of opposing groups of policy actors.

The ACF is commonly used to examine policy subsystems involving substantial goal conflicts, enduring technical disputes, and the activities of a variety of actors within and
outside of government. The framework rests upon three foundational premises at the subsystem, individual, and coalitional-levels (Sabatier & Jenkins-Smith, 1993). At the subsystem-level, the ACF assumes that, because policymaking is complex, individuals must specialize in a topical area in order to be influential. This specialization occurs within policy subsystems (Heclo, 1978) that consist of participants that attempt to influence policy within a functional/substantive dimension (such as climate policy) and a territorial dimension (such as Colorado). At the individual-level, the ACF assumes that boundedly-rational (Simon, 1985) policy actors utilize a hierarchical belief system to guide their policy-related behavior and actions. At the coalition-level, the ACF assumes that policy actors will work to translate their individual policy-related beliefs into tangible policies and will seek out allies with whom they can share resources and develop strategies for realizing policy goals. Policy actors establish an advocacy coalition when they engage with like-minded actors in a nontrivial degree of coordination.

In recent years, ACF research has increasingly utilized network analysis to examine how policy actors and advocacy coalitions interact and exchange resources. As Henry, Lubell and McCoy (2011) note, the ACF includes an explicit theory of networking in which policy actors form collaborative ties on the basis of their shared policy beliefs. Belief similarity has been shown to be a key explanation for the interactions between network actors as well as the overall structure of policy networks (Weible, 2005; Weible & Sabatier, 2005), with actors interacting primarily with actors that hold similar beliefs while avoiding interactions with actors that possess divergent beliefs. More recently, network-focused ACF research has examined the comparative effects of beliefs and resources on network structure, with beliefs found to have the stronger effect. Henry (2011) examined the roles of ideological beliefs and
resource access in the formation of collaborative policy networks. The findings demonstrated support for the ACF’s view that collaborative networks are formed on the basis of shared ideology or, at the least, shared aversion to a rival ideology, rather than on access to resources. Furthermore, ideological beliefs were found to have a polarizing effect, with shared beliefs making actors more likely to collaborate while divergent beliefs fostered distrust and non-collaboration. Matti and Sandstrom (2011) have provided further evidence on the importance of beliefs within the networks of advocacy coalitions. Examining rival hypotheses regarding the nature of the coordination networks of advocacy coalitions, perceived belief correspondence, and not perceived influence within the network, was found to be the driving mechanism in coordination among network actors.

To formally test whether the ACF’s assumptions on network actor beliefs are applicable to hyperlink networks, the following original hypothesis is proposed:

*Hyperlinking & Actor Beliefs Hypothesis: Network actors are more likely to form hyperlinks with allies (other organizations that support similar policy core beliefs) than with opponents (other organizations that support dissimilar policy core beliefs).*

Studying the networks of advocacy coalitions remains an important area of emphasis within the ACF literature. While the ACF literature has utilized a variety of methodologies to study networks, hyperlink network analysis has yet to be utilized. Empirically testing this hypothesis will provide an important assessment of whether hyperlink networks can be used to study advocacy coalitions.

PAC is theoretically concerned with information acquisition and utilization within the policy process (Howlett, 2009). A strength of the framework is its ability to allow scholars to
identify and determine the level of individual- and organizational-level resources of policy actors for acquiring and utilizing information. At the individual level, PAC is comprised of a policy actor’s level of education, years of experience, and skill level (Wellstead, Stedman & Lindquist, 2009). While individual-level PAC plays an important role in a policy actor’s ability to utilize information, the majority of actors do not possess the personal resources to participate in policy subsystems over extended periods of time. As a result, policy actors attempt to leverage the resources of the organizations that they are affiliated with to pursue policy objectives. The level of PAC possessed by an organization is determined by whether the organization has adequate knowledge, skills, and people to respond to a policy issue (Craft & Howlett, 2012; Howlett & Oliphant, 2010), the organization’s priority for addressing a particular policy issue, and whether the organization has the ability to engage in long-term planning on a policy issue.

PAC and its typology of organizational-level resources can be utilized to assess how resources affect the number of inlinks that a network actor receives and the number of outlinks that it establishes. It can be assumed that actors with higher levels of PAC are more likely to be viewed as reputable or authoritative sources within the network, due to possessing greater resources for analyzing and evaluating policy-related information. Accordingly, actors with higher levels of PAC are expected to attract a higher number of inlinks from other actors. Conversely, it can also be assumed that actors that have lower levels of PAC would possess lower levels of resources for analyzing and evaluating policy-related information and, therefore, would be more likely to link establish hyperlinks to actors with higher levels of PAC. To formally test these relationships, the following hypotheses are proposed:
Hyperlinking & Organizational PAC Hypothesis A: Organizations with higher levels of policy analytical capacity will have a higher number of inlinks from other organizations, while organizations with lower levels of policy analytical capacity will have lower levels of inlinks from other organizations.

Hyperlinking & Organizational PAC Hypothesis B: Organizations with lower levels of policy analytical capacity will have a higher number of outlinks to other organizations, while organizations with higher levels of policy analytical capacity will have fewer outlinks to other organizations.

While the ACF and PAC can be categorized as theoretical frameworks and, hence, hypotheses can be drawn from their theoretical logic, the following two hypotheses are drawn from insights from the hyperlink network literature. The hyperlink network literature provides a series of expectations regarding the influence of organizational type on hyperlinking patterns of network actors. Organizational type has been found to strongly impact a network actor’s level of influence within a network (Rogers & Marre, 2000). State actors are viewed as having a particularly valuable resource within networks in that their decisions are binding on society and are backed by the rule of law (Coleman & Perl, 1999). In a study of climate change policy networks in Germany, Jost and Jacob (2004) found that subject expertise and closeness to government were found to be considerably more important than the resources possessed by the organization. Research by Rogers and Marres (2000) on climate change debates on the internet provides important findings on how various organization types within a hyperlink network link to each other. Within this study, alliances were strongly evident between non-profits and government, with high rates of linkages.
between the actors. The findings demonstrate the non-randomness of hyperlinks among organizations, with organizations utilizing hyperlinks to represent their alliances. Similarly, Rogers (2010) found organizational type to be a highly influential factor in the hyperlink practices of websites (Rogers, 2010). Governmental websites were found to commonly link to other government websites at a high rate. Business organizations, on the other hand, tended to have few hyperlinks and hyperlinks between competing business organizations were commonly rare. In contrast, nonprofit organizations frequently linked to multiple organization types, including government, business, and other nonprofits. The following hypotheses are used to examine how organizations link to other organizations within hyperlink networks:

*Hyperlinking & Organizational Type Hypothesis A: Government and academic/research organizations will link to organization types similar to their own.*

*Hyperlinking & Organizational Type Hypothesis B: Businesses and non-profit organizations will link to organization types different from their own.*

This collection of hypotheses is used to examine the applicability of using hyperlink networks to study policy actors. Testing these hypotheses will provide a greater understanding of whether network actors are more likely to link to allies than opponents, the relationships between resources and inlinks and outlinks, and whether actors link to similar organization types. Collectively, the findings from these hypotheses will expand upon the literature’s understanding of the methodological processes associated with conducting a hyperlink network analysis and the methodology’s strengths and weaknesses.
Case: The Colorado Climate and Energy Policy Subsystem

The Colorado climate and energy policy subsystem provides an effective case for examining climate and energy politics and policy due to its diverse groups of policy actors, combination of traditional and renewable energy resources, and efforts to address the predicted impacts of climate change. The subsystem is comprised of a diverse number of policy actors working in government, industry, non-profit organizations, and academia. These policy actors include supporters and opponents of climate change who are actively engaged in efforts to translate their beliefs on climate and energy policy into tangible policies. The state has long been a major producer of traditional energy due to its major fossil fuel-rich basins and major production of natural gas and coalbed methane (US Energy Information Administration, 2011). Due in part to concern over the impacts of climate change, the state’s renewable energy sector has expanded as the result of the adoption of a renewable energy portfolio standard via ballot initiative in 2004 and a further strengthening of the standard by the legislature in 2010 (Database of State Incentives for Renewables & Efficiency, 2010). Climate change is a critical issue within Colorado as the state has been identified as vulnerable to a variety of climate impacts (Ritter, 2007). In the ensuing decades, the state is predicted to experience temperature increases of three to four degrees Fahrenheit, shorter winters, increased droughts and water shortages, and more intense wildfires during the summer seasons. In an effort to mitigate and adapt to the predicted impacts of climate change, former Governor Bill Ritter created the Colorado Climate Action Plan in November of 2007, which called for a 20% reduction in greenhouse gas emissions by 2020.
Methods and Operational Measures

This chapter uses a mixed methods research design with data collected in three phases. The first phase consisted of a survey of policy actors in the Colorado climate and energy policy subsystem. The second phase consisted of using a web crawler to identify the hyperlink networks of supporters and opponents of climate policy. The third phase consisted of a systematic review and coding of the websites within each hyperlink network.

In the first phase, data were collected through a survey administered in the spring of 2011 to policy actors involved in climate and energy issues in Colorado. The survey sample was collected using a purposive sampling technique, with names for the sample first identified by searching the internet for government and nongovernment organizations and the policy actors therein who were involved in climate and energy issues. In the second step, newspapers and online publications were searched to identify names of policy actors not identified in the initial search. As a third step, preliminary interviews were conducted with five policy actors involved in Colorado climate and energy issues, with interviewees asked for the names of policy actors that should be included in the sample. The total sample size was 793 policy actors and 272 policy actors returned fully completed surveys for a response rate of 34%\(^{15}\).

The ACF’s theoretical construct of advocacy coalitions was utilized to identify supporters and opponents of climate policy. Advocacy coalitions were identified using a modified version of Zafonte and Sabatier’s (1998) method of cluster analysis and silhouette

\(^{15}\) 87 respondents returned partially completed surveys, the inclusion of which equals 359 respondents and a 45% response rate. Only fully completed surveys were analyzed for this study.
means. Utilizing a battery of policy core belief questions pertaining to the severity, causes, and appropriate policy solutions for addressing climate change, the \( k \)-means clustering technique partitioned policy actors into coalitions based upon the similarity of their beliefs\(^{16}\). Cluster analysis and average silhouette values were used to assess the goodness of fit for partitioning actors into two, three, and four advocacy coalitions. Clustering policy actors into two advocacy coalitions produced the best fit with an average silhouette value of 0.66, while clustering actors into three and four coalitions produced mean silhouette values of 0.40 and 0.35, respectively. The two coalitions consisted of a large coalition of policy actors in favor of climate policy (‘Pro-Climate Coalition’) with 205 members from the survey sample and a small coalition of policy actors opposed to climate policy (‘Anti-Climate Coalition’) with 55 members.

The second phase of the data collection involved the identification of the hyperlink networks for the two rival coalitions. Network data collection was performed in the fall of 2014 using the survey data collected in the spring of 2011. While the gap between collection of survey and network data might suggest that actors identified in the survey would differ from those identified in the networks, the lineup of allies and opponents within a policy subsystem have been shown to be relatively stable (Sabatier, 1987). Therefore, the actors

\(^{16}\) Respondents were asked to express their level of agreement and disagreement with the following questions: (1) “The severity of predicted impacts on society from climate change are vastly overstated” (reversed, factor loading = 0.88); (2) “Human behavior is the principal cause of climate change” (factor loading = 0.82); (3) “Decisions about energy and its effect on climate are best left to the economic market, and not to government” (reversed, factor loading = 0.69); (4) “An energy and/or carbon tax is required to combat climate change” (factor loading = 0.80); (4) “A cap and trade system of permits for the emission of greenhouse gas is required to combat climate change” (factor loading = 0.70); (5) “Government policies to promote renewable energy generation are required to combat climate change” (factor loading = 0.80).
identified within the hyperlink networks are expected to be largely similar to the actors that participated in the survey.

The ‘Anti-Climate Network’ and the ‘Pro-Climate Network’ were identified using VOSON, a web-based piece of software designed for the purpose of collecting and analyzing online network data (Ackland, 2010). In the first step, seed URL’s were entered into VOSON with these URL’s serving as the starting points for each network. As seed URL’s strongly influence the structure of a hyperlink network, seeds were carefully selected through a search of the websites of advocacy coalition members. In total, 218 websites for the 260 members of the two advocacy coalitions were identified, representing 83.8% of all coalition members. Within the 55-member Anti-Climate Coalition, websites were identified for 46 members representing 83.6% of coalition members. Within the 205-member Pro-Climate Coalition, 172 member websites were identified, seven of which were duplicates, resulting in a total of 165 websites that represented 83.9% of coalition members.

In the next step, the parameters for the webcrawls were established. Parameters were narrowly defined so that the webcrawls were more restrictive in nature, due to the belief that a less restrictive set of parameters would incorporate a larger number of actors that may not be related to climate and energy policy. The webcrawls for each coalition were restricted to a crawl depth of one where the crawler included only the webpages directly linked to by the seeds sites. The crawlers were instructed to crawl a maximum of 10 inlinks and 10 outlinks per webpage and to stop after 50 ‘unproductive’ webpages that did not have a new outlink. The tie parameter was set to identify directed hyperlinks between two nodes. The directed hyperlink tie setting is least restrictive when compared to reciprocated hyperlinks (mutual hyperlinks between two nodes) and co-links that establish a tie between two nodes on the
basis of a mutual connection to a third node. The node type of the network was set to the default setting of pagegroup, where the webpages that comprised a website were aggregated into a single node. For example, each of the individual webpages of the Colorado Department of Public Health (CDPHE) that were identified by the webcrawler were aggregated into a single network node reflecting the CDPHE website. Upon completion, the initial crawls produced networks consisting of 165 nodes in the Anti-Climate Network and 588 nodes in the pro-climate coalition.

As others have noted (Lusher & Ackland, 2010), the raw data produced by a webcrawler can be inherently noisy due to the incorporation of webpages or websites that may not be directly related to the issue of interest. Therefore, a systematic review of each network member’s website was conducted to determine its relevance to climate and energy policy. As the exclusion of non-related webpages can alter the overall structure of the hyperlink network as well as impact key network measures such as density and centrality, hyperlinks to non-related webpages were carefully removed from the network using VOSON’s ‘pruning’ feature. The pruning feature was used to remove irrelevant websites, such as www.adobe.com (which links to download information for Adobe Acrobat Reader), from the hyperlink networks. A total of 10 websites within the Anti-Climate Network and 21 websites in the Pro-Climate Network were removed from the hyperlink networks due to a lack of relevance to climate and energy policy issues.

An additional phase of data cleanup was conducted using VOSON’s ‘pagegrouping’ feature. While the parameters defined pagegroups as the node type for the crawls, slight variations in a URL address are not always caught by webcrawlers. For example, the U.S. Department of Energy’s Office of Energy Efficiency and Renewable Energy (EERE) utilizes
www.eere.buildinggreen.com and www1.eere.energy.gov as a URL. Using the ‘pagegrouping’ feature, these webpages were aggregated together into a single EERE network node. A total of 25 webpages within the Anti-Climate Network and 88 webpages within the Pro-Climate Network were pagegrouped. After utilizing the pagegrouping and pruning features, the final hyperlink networks consisted of 130 nodes in the Anti-Climate Network and 488 nodes in the Pro-Climate Network.

In the third and final phase of data collection, network nodes were reviewed and coded to allow for testing of the hypotheses. For the first hypothesis, network actors were coded on the basis of coalition membership and the network actors that they linked to. Reviews of each network revealed the presence of both Anti-Climate and Pro-Climate coalition members that were originally identified via the survey’s belief measures as well as a large number of actors that did not participate in the survey. Network actors whose policy beliefs were not captured in the survey and whose membership in an advocacy coalition could not be verified were coded as ‘non-respondents’, with a code value of 0. Members of the Anti-Climate Coalition were coded as a 1 while members of the Pro-Climate Coalition were coded as a 2. Using this tripartite coding system, the hyperlinks within each network were coded on the basis of whether a network actor linked to allies, opponents, or non-respondents. Links to allies consisted of a hyperlink between network actors that were members of the same coalition (i.e., members of the Pro-Climate Coalition linking to one another), while links to opponents consisted of a hyperlink between members of an opposing coalition (i.e., a member of the Anti-Climate Coalition linking to a member of the Pro-Climate Coalition). Links to non-respondents consisted of links to network actors that did not
participate in the survey and, hence, it could not be determined whether the actor was an ally or opponent.

Actors within each network were also coded on the basis of their organization type. The detailed reviews of each network actor revealed the presence of a variety of organization types, consisting of academic, business, government, non-profit, social network, or media organizations and each network actor was coded accordingly. The hyperlinks for each network actor were then coded for whether the actor linked to their own organization type and whether they linked to a different organization type.

Finally, network actors were also coded for PAC, where applicable. Utilizing the survey responses in combination with PAC, a measure of PAC was constructed for network members that participated in the survey. The PAC resource measure was constructed using three questions pertaining to an organization’s priorities, its ability to engage in long-term planning and its personnel, skills, and abilities related to climate change and energy policy. Responses to the three questions were coded from 1 (representing very low levels of organizational resources) to 5 (representing very high levels). An organizational capacity scale was then created by taking the mean of the three variables (Cronbach’s alpha = 0.70). In total, PAC resource measures were available for 165 actors, representing 31.8% of all actors.

**Findings**

The findings from the analysis consist of two parts. The first part (figure 7.1) presents the descriptive results and the hyperlink network analysis measures for the two networks. The second part (tables 7.1-7.3) presents the results from testing the three hypotheses.
Descriptive Results: Hyperlink Network Analysis Measures

Figure 7.1 presents the graphical depictions of the two networks. The hyperlink networks consist of a small, diffuse Anti-Climate Network and a larger, diffuse Pro-Climate Network. The Anti-Climate Network consisted of 130 network actors, with 124 hyperlinks between actors, while the Pro-Climate Network consisted of 488 actors with 538 hyperlinks. The Anti-Climate Network included 11 isolated nodes, while the Pro-Climate Network had 39 isolated nodes. The detailed reviews of the networks revealed that these isolated nodes consisted of network seeds that did not establish hyperlinks to other websites. Overall, members in the Anti-Climate Network averaged 0.95 hyperlinks while members of the Pro-Climate Network averaged 1.1 hyperlinks. The density and centrality measures were used to measure the level of network integration. Density is calculated by measuring the number of hyperlinks within a network as a proportion of the total possible number of hyperlinks that could exist within a network, with a value of 0 representing a sparse network and a value of 1 representing a dense network. Both networks had extremely low levels of density, with a density value of 0.007 for the Anti-Climate Network and 0.002 for the Pro-Climate Network. Centrality is calculated by measuring the degree to which a network is dominated by a single actor or a small group of actors, with the measure calculated by the number of hyperlinks to a single actor relative to the total number of hyperlinks within the network, and a value of 0 representing a decentralized network and a value of 1 representing a highly centralized network. Both networks were found to be heavily decentralized, with centrality measures of 0.03.
Anti-Climate Network

Pro-Climate Network

Hyperlink Network Analysis Measures for Each Coalition’s Hyperlink Network

<table>
<thead>
<tr>
<th>Measure</th>
<th>Anti-Climate Network</th>
<th>Pro-Climate Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Seeds</td>
<td>46</td>
<td>172</td>
</tr>
<tr>
<td>Network Size (# of nodes)</td>
<td>130</td>
<td>488</td>
</tr>
<tr>
<td>Number of Edges (# of hyperlinks)</td>
<td>124</td>
<td>528</td>
</tr>
<tr>
<td>Isolates</td>
<td>11</td>
<td>39</td>
</tr>
<tr>
<td>Density</td>
<td>0.007</td>
<td>0.002</td>
</tr>
<tr>
<td>Centrality</td>
<td>0.03</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Figure 7.1: Graphical Depiction of the Hyperlink Networks

Collectively, the hyperlink network analysis measures provide a detailed understanding of the online networks of policy actors supporting and opposing climate policy. The identified networks are relatively proportional to the size of the original advocacy coalitions identified in the survey, with a large number of actors in the Pro-Climate Network and a smaller number of actors in the Anti-Climate Network. Despite differences in size, the two networks had similar structures with low levels of density and centrality. While these descriptive measures provide an initial point for analyzing the networks of opposing groups of policy actors, bivariate tests are used in the following section to assess the potential of using hyperlink network analysis to study policy actors.
**Bivariate Results: Hypothesis Testing.** In the second step, the hypotheses on links to allies and opponents, the relationship between resources and hyperlinks, and links by organization type were tested.

*Hyperlinking & Actor Behavior Hypothesis: Network actors are more likely to form hyperlinks with allies (other organizations that support similar policy core beliefs) than with opponents (other organizations that support dissimilar policy core beliefs).*

Table 7.1 presents the frequency of hyperlinks among policy actors within each hyperlink network. Chi-squared tests revealed statistically significant differences among the hyperlinks that comprised each network (p<0.001 for the Anti-Climate network and p<0.01 for the Pro-Climate Network). Within the Anti-Climate Network, members of the Anti-Climate Coalition linked to opponents from the Pro-Climate Coalition 19.2% of the time and to non-respondents 80.8% of the time, but did not establish any hyperlinks to their fellow allies from the Anti-Climate Coalition. Within the Pro-Climate Network, members of the Pro-Climate Coalition linked to fellow allies from their coalition 21.6% of the time, while linking to opponents 0.9% of the time, and to non-respondents 77.5% of the time.

**Table 7.1: Hyperlinks among Network Allies and Opponents**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Anti-Climate Network***</th>
<th>Pro-Climate Network**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperlinks</td>
<td>26</td>
<td>102</td>
</tr>
<tr>
<td>Ally</td>
<td>0 (0.0%)</td>
<td>22 (21.6%)</td>
</tr>
<tr>
<td>Opponent</td>
<td>5 (19.2%)</td>
<td>1 (0.9%)</td>
</tr>
<tr>
<td>Non-Members</td>
<td>21 (80.8%)</td>
<td>79 (77.5%)</td>
</tr>
</tbody>
</table>

Note: Chi-2 tests of significance within coalition networks. *(p<0.05), **(p<0.01), ****(p<0.001).

These findings partially support the hypothesis that members would link to allies at a higher rate than opponents. Coalition members within the Pro-Climate Network were found to link to allies 20% of the time and to opponents 0.9% of the time. However, coalition
members in the Anti- Climate Network did not link to their fellow opponents, but linked to opponents from the Pro-Climate Network 18.5% of the time. These findings suggest unique hyperlinking patterns among coalition members within the two networks. Within the Pro-Climate Network, the higher rate of hyperlinks to allies and lower rate of links to opponents suggests that hyperlinks in the networks have a positive connotation. These hyperlinks are likely established in order to endorse other network actors or demonstrate a level of trust or cooperation between two actors. In contrast, the lack of links to allies combined with the elevated rates of links to opponents suggests that hyperlinks within the Anti-Climate Network have negative connotations. These hyperlinks are likely established in order to criticize other network actors on the basis of opposing climate change beliefs. These findings reiterate previous concerns expressed within the literature regarding assumptions about the meaning of hyperlinks and highlight the need for further research on hyperlink meanings.

Hyperlinking & Organizational PAC Hypothesis A: Organizations with higher levels of policy analytical capacity will have a higher number of inlinks from other organizations, while organizations with lower levels of policy analytical capacity will have lower levels of inlinks from other organizations.

Hyperlinking & Organizational PAC Hypothesis B: Organizations with lower levels of policy analytical capacity will have a higher number of outlinks to other organizations, while organizations with higher levels of policy analytical capacity will have fewer outlinks to other organizations.

Table 7.2 presents the relationship between a network actor’s PAC and the number of inlinks they receive and the number of outlinks they establish. An analysis of variance test found statistically non-significant relationships between PAC and inlinks and outlinks. In
both instances, the findings demonstrate the lack of a clear relationship between PAC hyperlinks. Actors possessing very low levels of PAC received an average of four inlinks while actors with very high levels of PAC received an average of zero inlinks. The number of outlinks established by actors varied considerably, with actors that had low and high levels of PAC establishing an average of three hyperlinks but actors with the highest level of PAC establishing an average of one hyperlink.

Table 7.2: Inlinks & Policy Analytical Capacity

<table>
<thead>
<tr>
<th>Policy Analytical Capacity</th>
<th>Mean Number of Inlinks</th>
<th>Standard Deviation</th>
<th>Mean Number of Outlinks</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low Capacity (1)</td>
<td>4.0</td>
<td>5.7</td>
<td>3.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Low Capacity (2)</td>
<td>1.3</td>
<td>1.9</td>
<td>3.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Moderate Capacity (3)</td>
<td>1.3</td>
<td>2.9</td>
<td>2.8</td>
<td>3.3</td>
</tr>
<tr>
<td>High Capacity (4)</td>
<td>1.9</td>
<td>2.6</td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Very High Capacity (5)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: Analysis of variance test of significance. *(p<0.05), **(p<0.01), *** (p<0.001).

*Hyperlinking & Organizational Type Hypothesis A: Government and academic/research organizations will link to organization types similar to their own.*

*Hyperlinking & Organizational Type Hypothesis B: Businesses and non-profit organizations will link to organization types different from their own.*

Table 7.3 presents an overview of the hyperlinks by organization type across the two networks. VOSON’s network matrix was used to examine the interactions by organization type, with binary dichotomous variables used to determine whether an organization linked to its own type or a different organization type, with Fisher’s exact test used to test for significance.
<table>
<thead>
<tr>
<th></th>
<th>Anti-Climate Network</th>
<th></th>
<th>Pro-Climate Network</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of Network Actors w/</td>
<td>Link to Own Organization Type*</td>
<td>Link to Different Organization Type</td>
<td># of Network Actors w/</td>
</tr>
<tr>
<td></td>
<td>Outlinks (% of Network)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic</td>
<td>10 (7.7%)</td>
<td>2</td>
<td>3</td>
<td>54 (11.2%)</td>
</tr>
<tr>
<td>Business</td>
<td>41 (31.5%)</td>
<td>8</td>
<td>11</td>
<td>74 (15.3%)</td>
</tr>
<tr>
<td>Government</td>
<td>23 (17.7%)</td>
<td>5</td>
<td>4</td>
<td>98 (20.3)</td>
</tr>
<tr>
<td>Non-Profits</td>
<td>30 (23.1%)</td>
<td>1</td>
<td>12</td>
<td>154 (31.8%)</td>
</tr>
<tr>
<td>Media</td>
<td>20 (15.4%)</td>
<td>0</td>
<td>10</td>
<td>95 (19.6%)</td>
</tr>
<tr>
<td>Social Networks</td>
<td>6 (4.6%)</td>
<td>0</td>
<td>0</td>
<td>9 (1.9%)</td>
</tr>
<tr>
<td>Total</td>
<td>130 (4.6%)</td>
<td>16</td>
<td>40</td>
<td>484 (1.9%)</td>
</tr>
</tbody>
</table>

Note: Fisher’s exact test of significance. *(p<0.05), **(p<0.01), *** (p<0.001).
Within each network, statistically significant differences were found in regard to whether actors linked to their own or a different organizational type (with the exception of actors in the Anti-Climate Network linking to different types). Contrary to expectations, the majority of actors linked to organization types that were different from their own. The exception is government organizations, which linked to other governments at a higher rate than non-government organizations. Businesses were expected to link primarily to non-business organizations due to the competitive nature of business. While businesses linked to different organization types, they were also found to link to other business organizations at a considerable rate. Among hyperlinks established by businesses in each network, 42.1% of business hyperlinks in the Anti-Climate Network and 34.2% of business hyperlinks in the Pro-Climate Network linked to other businesses. These findings partially support the hypotheses, demonstrating that with the exception of government, organizations will predominately link to dissimilar organization types.

**Discussion**

This chapter utilized a multi-method research design to examine the applicability of using the emerging hyperlink network analysis methodology to study the online networks of opposing groups of policy actors. The descriptive component revealed the existence of a small, diffuse network of policy actors opposed to climate policy and a larger, diffuse network of policy actors in favor of climate policy. The bivariate component tested five hypotheses. The hypothesis that network actors would link to allies at a higher rate than opponents was partially supported as members of the Pro-Climate Network linked to allies at a higher rate, but members of the Anti-Climate Network linked primarily to opponents. These findings tentatively suggest unique hyperlinking patterns among the two networks,
with members of the Pro-Climate Network establishing hyperlinks with positive connotations while the members of the Anti-Climate Network establish hyperlinks with negative connotations. The hypotheses that the number of inlinks that an organization received and the number of outlinks they established was related to the organization’s level of resources were not supported. Finally, the hypotheses that non-business organizations would link predominately to actors of the same organization type while business and non-profit organizations would link primarily to actors of a different organization type were partially supported. While business organizations did indeed link primarily to non-business organizations, only government actors were found to link predominately to actors with a similar organization type.

Collectively, the findings demonstrate the strong potential of using hyperlinks to study network actors, but that a collection of best practices are needed in order to ensure the validity, reliability, and generalizability of research on hyperlink networks. The existing literature on hyperlink networks has highlighted the inherent difficulties that are associated with assuming to know what a hyperlink represents. The results of the hypothesis tests underscore the danger of such assumptions, as assumptions related to the relationship between hyperlinks and organizational type and links to opponents and allies were only partially supported. In conducting future research, scholars studying hyperlink networks should be careful to not presume to know what a hyperlink represents, as hyperlinks can represent a variety of relationships ranging from endorsement to criticism of another website. Methodological triangulation offers one approach for developing an improved understanding of what the hyperlinks within a network represent (Thelwall, 2008). Interviews with webmasters offer a particularly promising approach, due to the ability to explicitly ask
webmasters about their rationale for establishing particular links. Future research should consider utilizing webmaster interviews to more effectively determine the types of hyperlinks that exist within a given network.

This chapter also demonstrated the importance of detailing the parameters used to establish a webcrawl as well as any changes made to the network data after the initial crawl. Given the differences in the approaches of webcrawlers in constructing hyperlink networks, scholars should include descriptions of the parameters that they’ve established for their crawls as well as the rationale for establishing particular parameters. Scholars must also be cautious in the selection of seeds used to establish a network. An analysis of the hyperlinks of the seeds use to establish each network reveals a degree of similarity, with a mean of 2.7 outlinks per seed within the Anti-Climate Network and a mean of 2.9 outlinks per seed within the Pro-Climate Network. While the mean number of outlinks per seed are similar, multiplying the mean number of outlinks per seed by the number of network seeds (Anti-Climate=46; Pro-Climate=172) reveals considerable differences in the initial sizes of the networks, with 106.9 outlinks in the Anti-Climate Network and 365.8 inlinks in the Pro-Climate Network. As demonstrated by this hypothetical example, the number of seeds used to establish a network can strongly influence the number of hyperlinks that exist within a network, and future studies utilizing hyperlink network analysis should engage in cautious selection of network seeds.

In addition, systematic reviews of network actors are critical, given that the raw data produced by a webcrawler can be inherently noisy (Lusher & Ackland, 2010). Removing non-relevant websites as well as aggregating individual webpages from a website into a single network actor are important steps for refining hyperlink networks. However, as these
actions can change the fundamental composition of a hyperlink network, scholars should explicitly state any changes they make as well as the effects of these changes on the network. Finally, due to the ephemeral nature of hyperlinks (Schneider & Foot, 2004), time is of the essence in conducting reviews of the networks produced by webcrawlers. Waiting too long to review the hyperlinks within a network can lead to the destruction of a working hyperlink, which makes the analysis and interpretation of these hyperlinks exceptionally difficult. The collection of best practices outlined in this discussion offer an initial list that scholars can draw upon to ensure that the decision to use hyperlink network analysis to study opposing groups of policy actors produces findings with high levels of validity, reliability, and generalizability.

This study is subject to several limitations. While the Colorado climate and energy policy subsystem is representative of other climate and energy policy subsystems, the findings from this study may not be generalizable to subsystems that differ by policy topic. Given the nascent nature of hyperlink network analysis, a strong need exists for studying a variety of different subsystems in order to confirm both the validity and generalizability of the methodology. A second limitation exists in regard to this study’s methods for identifying advocacy coalitions. While previous ACF research has placed a significant focus on the relationships and interactions of coalition members via survey questions asking actors who they collaborate with, this chapter uses measures of belief homophily and engagement in coalition building. This method for identifying coalitions meets the ACF’s definition of an advocacy coalition (Sabatier & Jenkins-Smith, 1993), but the presence of a collaboration list would have been an important component for comparing interactions between the coalition members within each network. Finally, the hyperlink network analysis measures used in this
study are overly descriptive in nature and fail to incorporate more rigorous statistical approaches for analyzing networks. Exponential random graph models (Lusher & Ackland, 2009; Lusher, Koskinen & Robbins, 2013) provide a more rigorous methodological approach for studying hyperlink networks that allows for a better understanding of patterns of network ties, and allow researchers to draw inferences about whether observed data are consistent with expectations (Lusher, Koskinen & Robbins, 2013). More specifically, these models allow researchers to determine to what degree a network is constructed due to processes of homophily, reciprocity, and transitivity, or some combination of these factors. Increased use of exponential random graph models in future studies will allow researchers to obtain a better understanding of the social processes that structure the hyperlink networks policy actors.

These limitations aside, this chapter offers an important contribution to the emerging hyperlink network literature by examining the applicability of using hyperlink networks to study policy actors. This chapter drew increased attention to the methodological processes associated with conducting hyperlink network analysis, and the methodology’s inherent strengths and weaknesses. The results demonstrate the strong appeal of using hyperlink networks to study opposing groups of policy actors, but that scholars should engage in a number of best practices designed to increase the validity, reliability, and generalizability of hyperlink network analysis.
CHAPTER VIII
CONCLUSION

Policy actors are involved in an enduring struggle to influence governmental policy in a manner that reflects their principles and values. Throughout their efforts to influence public policies, policy actors engage in a variety of behaviors, including evaluating policy-related information, participating in political activities, and interacting with political friends and foes. Beliefs and resources provide two different rationales for explaining the behaviors of policy actors. Policy actors utilize individual- and organizational-level resources in an attempt to sway decision makers, influence public opinion, recruit individuals to support a policy objective, or attract additional resources. At the same time, beliefs have been considered to be a primary factor influencing policy actor behavior, with actors seeking out others with similar beliefs and then sharing resources and engaging in political activities to realize their policy preferences. Despite their prominence within theories of politics and policy, fundamental questions about the effects of resources and beliefs on policy actor behavior have remained unanswered. Accordingly, this dissertation pursued the following objectives:

- Objective 1: To understand the relationships between resources, beliefs, and policy actor behavior within political landscapes.
- Objective 2: To explain the comparative effects of resources and beliefs in affecting the behavior of actors engaged in the policy process.
- Objective 3: To examine how hyperlink networks can be used to examine the beliefs, resources, and online behavior of competing groups of policy actors.
These objectives were developed to provide a better understanding of the factors affecting policy actor behavior, which is instrumental for understanding politics and the policy process. To accomplish these objectives, this dissertation applied the Advocacy Coalition Framework (ACF), Resource Dependence Theory (RDT), and the Policy Analytical Capacity (PAC) framework to develop an improved understanding of the comparative effects of resources and beliefs on policy actor behavior. Within this dissertation, the ACF was used as the primary platform for organizing the inquiry and guiding the analysis, with RDT and PAC, and additional literatures integrated into the platform. The ACF provided a theoretical approach for examining how beliefs guide the behavior of policy actors, while RDT and PAC provided a complementary approach for examining how resources affected policy actor behavior. Collectively, these three theoretical frameworks were utilized to further the field’s understanding of policy actor resources, beliefs, and behavior.

Using the ACF, RDT, and PAC to examine the effects of resources and beliefs on the behavior of actors engaged in the policy process, this dissertation conducted a study of Colorado climate and energy issues in three parts. The first part conducted a political context analysis, while the second part conducted an explanatory analysis on resources, beliefs, and behavior, and the third part conducted an exploratory analysis of an emerging methodological approach for studying policy actor behavior online.

This concluding chapter begins with an overview of the findings as they relate to the dissertation’s three objectives. The following section discusses the collective limitations of the dissertation and why these limitations are non-fatal to the research design, findings, and
contributions. Finally, the chapter concludes by discussing the theoretical implications of the dissertation’s findings.

Findings

This dissertation identified three objectives for developing a better understanding of the effect of resources and beliefs on policy actor behavior. These three objectives were answered via six empirical chapters that utilized a combination of descriptive, explanatory, and exploratory approaches for studying resources, beliefs, and behavior within the Colorado climate and energy subsystem. This section provides an overview of the dissertation’s findings as they relate to the three objectives, while the chapter appendix provides overviews of the research questions, associated hypotheses, and findings for each of the six chapters. On the following page, Table 8.1 summarizes this dissertation’s research questions and associated findings, providing brief overviews of the objectives, research questions, and the associated findings for each chapter.
<table>
<thead>
<tr>
<th>Objective 1: To understand the relationships between resources, beliefs, and policy actor behavior within political landscapes.</th>
<th>Chapter II</th>
<th>Research Questions</th>
<th>Associated Findings</th>
</tr>
</thead>
</table>
| What is the political landscape of the Colorado climate and energy subsystem? | • Two opposing advocacy coalitions with different policy beliefs  
  • Larger, Pro-Climate Coalition and a smaller Anti-Climate Coalition  
  • Despite belief differences, coalitions were similar in regard to:  
    • Individual and organizational PAC  
    • Engagement in political activities |

<table>
<thead>
<tr>
<th>Objective 2: To explain the comparative effects of resources and beliefs in affecting the behavior of actors engaged in the policy process.</th>
<th>Chapter III</th>
<th>Research Questions</th>
<th>Associated Findings</th>
</tr>
</thead>
</table>
| What are the comparative effects of risk perceptions, climate-related knowledge, and ideological beliefs on the policy preferences of climate policy actors? | • Risk perceptions had the strongest effect on climate policy preferences  
  • Collections of ideological beliefs had secondary effects on preferences  
  • Climate-related knowledge played a minor role on policy preferences |

<table>
<thead>
<tr>
<th>Chapter IV</th>
<th>Research Questions</th>
<th>Associated Findings</th>
</tr>
</thead>
</table>
| What factors impact a policy actor’s decision to utilize various information sources in their policy work? | • Supporters and opponents utilized similar information sources  
  • Opponents had a greater reliance on reports from their own organizations and industry reports  
  • Use of information sources was largely driven by use of collaborative-based tools and techniques, followed by analytically-focused tools, and organizational resources |

<table>
<thead>
<tr>
<th>Chapter V</th>
<th>Research Questions</th>
<th>Associated Findings</th>
</tr>
</thead>
</table>
| What factors impact the decisions of climate policy supporters and opponents to engage in political activities? | • The coalitions engaged in similar political activities, ranging from analytical- to collaborative-based activities  
  • Extreme beliefs did not provide greater motivation to engage in political activities  
  • Higher levels of individual and organizational resources were associated with higher political activity engagement |

<table>
<thead>
<tr>
<th>Chapter VI</th>
<th>Research Questions</th>
<th>Associated Findings</th>
</tr>
</thead>
</table>
| What are the comparative effects of beliefs and resources on a policy actor’s willingness to interact with friends and foes? | • The majority of members of both coalitions interacted equally with friends and foes  
  • Members of the Opponents Coalition were more likely to interact with foes  
  • Extreme beliefs strongly increased the odds an actor would interact primarily with friends  
  • Access to resources had mixed effects on interactions  
  • Higher levels of organizational resources increased the extent an actor collaborated primarily with friends |

<table>
<thead>
<tr>
<th>Objective 3: To examine how hyperlink networks can be used to examine the beliefs, resources, and online behavior of competing groups of policy actors.</th>
<th>Chapter VII</th>
<th>Research Questions</th>
<th>Associated Findings</th>
</tr>
</thead>
</table>
| How can hyperlink network analysis be used to examine the connections of policy actors? | • Existence of a small network of climate policy opponents and a larger, network of climate policy supporters  
  • The five hypothesis tests revealed mixed support for several of the key assumptions of the hyperlink network literature  
  • The findings demonstrated the strong potential of using hyperlinks to study coalitions, but that a collection of best practices were necessary for ensuring the validity, reliability, and generalizability of hyperlink network research |
Objective 1: To understand the relationships between resources, beliefs, and policy actor behavior within political landscapes.

This dissertation furthers the existing knowledge on the relationships between beliefs, resources, and policy actor behavior within policy subsystems. This study of the Colorado climate and energy policy subsystem revealed the existence of two competing advocacy coalitions that employed a collection of resources in an effort to influence climate and energy policies in a manner that reflected their respective policy beliefs. The two coalitions held fundamentally different beliefs in regard to the cause of climate change, its severity, whether solving climate change should be left to the economic market, and whether carbon taxes, cap-and-trade, and renewable energy policies were solutions to climate change. These beliefs were shown to be a guiding factor influencing behavior, with policy actors seeking out other actors with similar beliefs. The intensity of the beliefs held by actors was also found to strongly influence their interactions with both friends and foes, with an increase in belief intensity from moderate to more extreme beliefs strongly increasing the odds that a policy actor would interact primarily with friends.

Despite holding fundamentally different beliefs, the two coalitions were found to possess relatively similar levels of resources. The two coalitions possessed similar levels of individual capacity in the form of advanced education, considerable experience in climate and energy policy, and formal training in a variety of analytical techniques. The coalitions also had similar levels of capacity at the organizational level, with organizations in both coalitions expressing that they had high capacity to address climate change and energy issues. Finally, the coalitions utilized a combination of individual- and organizational-level
resources to engage in a variety of political activities that would translate their policy beliefs into tangible policies.

**Objective 2: To explain the comparative effects of resources and beliefs in affecting the behavior of actors engaged in the policy process.**

This dissertation conducted a series of explanatory analyses examining how resources and beliefs influence the behavior of policy actors. Chapter three demonstrated that beliefs play a prominent role in influencing an actor’s policy preferences. Collections of ideological beliefs on the appropriateness of government intervention were found to have a positive, statistically significant effect on an actor’s climate policy preferences. The beliefs held by policy actors were subsequently shown to have a strong impact on an actor’s behavior, as policy actors engaged in efforts to influence climate policy in a manner that reflected their beliefs.

The behaviors examined in this dissertation included utilizing various sources of policy-related information, engaging in a variety of political activities, and interacting with friends and foes. Chapter four examined the information sources that actors utilized in an effort to influence the policy process. Resources, in the form of collaborative-based tools and techniques, analytically-focused tools, and organizational capacity were found to strongly influence an actor’s use of various information sources. In contrast, an actor’s policy beliefs were not found to have a significant effect on an actor’s decision to utilize various information sources. Chapter five examined the comparative effects of extreme beliefs and resources on the decisions of actors to engage in political activities. Contrary to initial expectations, more extreme beliefs did not provide a greater motivation to engage in political activities among coalition members. However, resources were found to have a strong effect
as access to higher levels of collaborative and analytical tools and techniques had a positive, statistically significant effect on the likelihood that an actor would participate in various political activities. Finally, chapter six examined the comparative effects of resources and beliefs on a policy actor’s interactions with political friends and foes. Increases in belief intensity were found to strongly increase the odds that an actor would interact primarily with friends. In contrast, access to resources was found to have mixed effects on interactions. Individual-level resources did not have statistically significant effects on friend or foe interactions but access to higher levels of organizational resources were found to increase the extent that an individual collaborated with friends.

Collectively, these four chapters provide an improved understanding of the relationships that resources and beliefs have on policy actor behavior. Resources were found to have a strong effect on decisions to utilize various information sources as well as decisions to engage in various political activities. In contrast, beliefs were found to have a strong effect on an actor’s policy preferences and on their interactions with friends and foes. Accordingly, these findings provide further support for the complementary roles of resources and beliefs in influencing policy actor behavior.

**Objective 3: To examine how hyperlink networks can be used to examine the beliefs, resources, and online behavior of competing groups of policy actors.**

To ascertain a better understanding of how hyperlink network analysis can be used to study policy actors, chapter seven conducted a multi-method exploratory analysis. This analysis developed and tested a collection of hypotheses relating to key assumptions associated with utilizing hyperlink network analysis to study policy actors. The results of these tests did not support the majority of these key assumptions and highlighted a strong
need for the adoption of a series of best practices for improving the validity, reliability, and generalizability of hyperlink-based research.

In total, chapter seven identified four best practices for utilizing hyperlink network analysis. These practices included not assuming to know what hyperlinks represent, explicitly stating the parameters used to establish a network, conducting timely and systematic reviews of the websites of network actors, and refining networks by removing non-relevant actors. Collectively, these best practices offer an initial list that scholars can draw upon to ensure that using hyperlink network analysis methods to study opposing groups of policy actors produces findings with high levels of validity, reliability, and generalizability.

Synthesized Findings

This dissertation provided an improved understanding of how resources and beliefs affect the behavior of policy actors engaged in the policy process. In examining the political landscape of the Colorado climate and energy policy subsystem, this dissertation identified two opposing advocacy coalitions comprised of supporters and opponents of climate policy. These coalitions possessed fundamentally different beliefs regarding the severity, causes and appropriate policy solutions for responding to climate change, but possessed similar levels of individual- and organizational-level resources. Resources and beliefs were found to have distinct effects on the behavior of policy actors working to influence the policy process. Beliefs were shown to have a strong effect on an actor’s policy preferences while extreme beliefs were found to have a strong effect on an actor’s interactions with their political friends and foes. In contrast, individual- and organizational-level resources were found to have a minimal effect on an actor’s interactions with friends and foes but strong effects on an
actor’s use of climate-related information sources and the political activities that they utilized to influence climate policy. Finally, this dissertation demonstrated the utility of the hyperlink network analysis methodology for studying how resources and beliefs affect a policy actor’s online behavior. A collection of best practices were identified to ensure that future research utilizing hyperlink network analysis to study the behavior of opposing groups of policy actors produces findings with high levels of validity, reliability, and generalizability. Together, these findings further the collective knowledge of resources, beliefs, and policy actor behavior, which is instrumental for understanding politics and the policy process.

**Limitations**

This dissertation’s research design was developed in a manner intended to mitigate factors that could limit the results of its findings. Despite these efforts, a collection of limitations remain. This section highlights four of these limitations along with the reasons why these limitations are nonfatal to the overall quality of the dissertation.

One limitation exists in regard to this study’s sampling methods. Survey respondents were selected via a modified snowball sampling method. The snowball method, which is reliant upon referrals from other participants, increases the likelihood that policy actors not known to the initial survey respondents are underrepresented in the sample. However, this limitation is nonfatal to the overall quality of the dissertation. A list of individuals actively involved in climate and energy policy does not exist, and snowball-sampling methods have been identified as a valid and reliable sampling method for populations that are not easily identified (Singleton & Straits, 2010). Furthermore, the snowball method utilized to collect the data for this limitation was comprised of three stages that ensured that the method sufficiently captured the population of climate and energy policy actors in Colorado. In the
first stage, internet searches of government and non-government webpages were conducted to identify policy actors engaged in climate and energy policy. In the second stage, newspapers and online publications and documents were searched to identify the names of policy actors not identified in the initial search. Finally, preliminary interviews were conducted with five policy actors engaged in climate and energy issues, and these interviewees were asked for the names of any policy actors that should be included in the sample. Together, these three stages of data collection provided a comprehensive approach to identifying policy actors within the Colorado climate and energy policy subsystem.

Another limitation exists in regard to the methods used to identify advocacy coalitions. While previous ACF research has placed a significant focus on the relationships and interactions of coalition members via membership lists and network analysis, this dissertation uses measures of belief homophily and coalition building. Although this method for identifying coalitions departs from traditional ACF methods, the use of indirect measures of belief homophily and evidence of coalition-building meet the ACF’s definition of an advocacy coalition as consisting of individuals with similar beliefs that engage in a nontrivial degree of coordination (Sabatier & Jenkins-Smith, 1993).

A third limitation exists in regard to the small sample size of the anti-climate coalition, which could raise concerns about the likelihood of statistically significant findings related to climate change opponents and the generalizability of the findings. However, this limitation is nonfatal to the overall quality of the dissertation. Existing research has shown that opponents of climate policy are considerably smaller in size than their rivals who support the adoption of climate policies (Leiserowitz, 2010), and the small anti-climate coalition identified in this dissertation is considered to be representative of the broader population of
climate policy opponents. Furthermore, the majority of the explanatory findings in this dissertation focus on explaining the resources, beliefs, and behavior of policy actors, regardless of coalition membership. This approach allows for a greater generalizability of the findings while mitigating concerns about the smaller number of actors in the anti-climate coalition.

Finally, the methods used to measure aspects of PAC provide another limitation. While this dissertation offers several innovative measures of PAC that advance the literature on the framework, the measures of PAC could be further detailed and more exhaustive. As an example, formal training is a key PAC variable, but the associated measures pay little attention to the quality of the training. Furthermore, the inclusion of measures relating to more effective decision making or greater influence due to higher levels of PAC are noticeably absent. Further analysis in the form of longitudinal studies is needed to assess whether PAC leads to more effective decision making or greater influence within the policy process. Despite the limitation of the PAC measures, this dissertation offers a number of options for measuring PAC that improve upon measures previously identified in the literature on the informal framework.

Theoretical Contributions

Despite the limitations outlined in the previous section, this dissertation offers several theoretical contributions to the policy process literature and the literature on climate change politics and policy. This section provides an overview of these theoretical contributions.

Contributions to the Policy Process Literature and Related Theories

This dissertation provided several theoretical contributions to the policy process literature. In combining the ACF and PAC, this dissertation provided a new approach for
understanding political landscapes by focusing on how policy actors utilize resources at the
individual and organizational levels. The dissertation also provided an important
methodological contribution by examining the applicability of using hyperlink networks to
study the online interactions of policy actors. A collection of best practices was identified for
increasing the validity, reliability, and generalizability of hyperlink network analysis for
studying policy actors online.

The dissertation also furthered the literature’s understanding of the effects of
resources on policy actor behavior by demonstrating that individual and organizational
resources have a strong impact on a policy actor’s decision to utilize various sources of
information. The dissertation furthered the policy process literature’s knowledge on political
activities, by expanding upon the interest group literature’s traditional focus to include the
political activities utilized by actors working in government, business, academic, and non-
profits organizations engaged in the policy process. This contribution provided an improved
understanding of political activities by drawing greater attention to the wide array of policy
actors that engage in political activities and the interaction between resources and beliefs and
their relative influences on political activities. Finally, this dissertation contributed to the
policy process literature’s understanding of interactions among friends and foes. The
dissertation expanded upon existing studies that regularly examine a single type of
interaction, by examining two different types of interactions (collaboration and utilizing
advice) within a single study. Furthermore, the dissertation builds upon previous research on
friend and foe interactions by expanding upon the traditional focus of whether or not
individuals interact (Berardo, 2009; deLeon & Varda, 2009; Henry, Lubell, & McCoy, 2011;
Lubell, 2007), to examine the frequency of these interactions.
This dissertation also provided theoretical contributions to the ACF, PAC, and RDT theoretical frameworks. The contributions to the ACF include developing the framework’s understanding of resources, extreme beliefs, and the political activities of policy actors, which have been identified as understudied components within the framework (Weible et al., 2011). The dissertation addressed the underdeveloped role of resources within the framework by examining the effects of individual and organizational resources on the behavior of coalition members. In addition, the dissertation built upon previous ACF research by being the first to examine whether extreme beliefs matter. The extremity of beliefs of coalition members were examined through the construction of a formal measure of extreme beliefs that utilized the absolute values of a battery of policy core belief measures. Finally, this dissertation contributed to the ACF’s understanding of the behavior of coalition members by examining the political activities that members engage in and the factors affecting the decisions to engage in these activities.

The contribution to PAC consisted of expanding upon previous applications by relating capacity to political activities. Although previous research on PAC has highlighted the importance of capacity in utilizing information within the policy process (Elgin, Pattison, & Weible, 2012; Howlett & Oliphant, 2010; Rayner, McNutt, & Wellstead, 2013), its connection to the political activities utilized by policy actors working to influence the policy process had not been previously examined. Individual- and organizational-levels of capacity were found to be strongly associated with decisions to engage in political activities. Finally, the contribution to RDT consisted of further confirming the importance of resource dependence on behavior (Getz, 2001; Oliver & Holzinger, 2008; Weible, 2005). Low levels of organizational resources, which were associated with higher levels of resource
dependence, were found to increase the likelihood that policy actors would interact with their foes.

**Contributions to Understanding Climate and Energy Issues**

In addition to its theoretical contributions, this dissertation also contributed to the collective knowledge on climate and energy issues in three specific areas. The first area consisted of contributions to the literature’s understanding of policy actors engaged in climate and energy policy, by providing a detailed understanding of the climate and energy beliefs held by supporters and opponents of climate policy. This dissertation expanded upon previous research on the respective beliefs of supporters and opponents of climate policy (Kellstedt, Zahran, & Vedlitz, 2008; Lachapelle, Borick, & Rabe, 2012; Leiserowitz, 2007) by examining a variety of beliefs, including the severity, causes, and preferred policy solutions for addressing climate change as well as how these beliefs impacted policy actor behavior. The second area consisted of contributions to the literature’s understanding of the political activities used by policy actors supporting and opposing climate change. This dissertation expanded upon the existing literature’s frequent approach of examining the political activities of supporters and opponents in isolation from one another (Moser, 2007; McCright & Dunlap, 2007), by examining the political activities utilized by supporters and opponents within the same policy subsystem. In doing so, this dissertation found that despite possessing fundamentally different beliefs, supporters and opponents engaged in similar political activities. Finally, the third area consisted of furthering the existing literature’s understanding of the interactions among opposing groups of policy actors. In contrast to traditional characterizations of climate politics and policy as overwhelmingly adversarial (Boykoff, 2010; Leiserowitz, 2010; McCright & Dunlap, 2003), this dissertation found that
supporters and opponents of climate policy frequently engaged in cooperative interactions with each other. In addition, opponents of climate policy were found to be more likely than climate policy supporters to interact with their political foes.

This dissertation has provided an improved understanding of how resources and beliefs affect the behavior of policy actors engaged in the policy process. Resources and beliefs were found to have distinct effects on the behavior of policy actors working to influence the policy process. Beliefs were shown to have a strong effect on an actor’s policy preferences while extreme beliefs were found to have a strong effect on an actor’s interactions with their political friends and foes. In contrast, individual- and organizational-level resources were found to have a minimal effect on an actor’s interactions with political friends and foes but strong effects on an actor’s use of various climate-related information sources and their engagement in political activities. Together, these findings further the collective knowledge of resources, beliefs, and policy actor behavior, which are instrumental for understanding politics and the policy process.

Chapter Appendix: Chapter Summaries


Research Question: What is the political landscape of the Colorado climate and energy subsystem?

Hypothesis: N/A

Findings: Within the Colorado climate and energy subsystem, this chapter identified a large proclimate change coalition and smaller anticlimate change coalition. The two coalitions held fundamentally different beliefs in regard to the cause of climate change, its
severity, whether solving climate change should be left to the economic market, and whether carbon taxes, cap-and-trade, and renewable energy policies were solutions to climate change. Both coalitions were found to be more likely to collaborate with others they agreed with than those they disagreed with, and most members in both coalitions were actively engaged in efforts to build their coalitions.

Despite fundamentally different beliefs, the two coalitions were found to be relatively similar in several other regards. First, the coalitions had similar levels of individual capacity in the form of education, experience, and formal training in analytical techniques. Second, the coalitions had similar levels of capacity at the organizational level, with organizations in both coalitions expressing that they had high capacity to address climate change and energy issues. Finally, the two coalitions also engaged in similar political activities in an attempt to translate their beliefs into policies.

Chapter III - The Effects of Risk, Knowledge, and Ideological Beliefs on Climate Policy Preferences: A Study of Colorado Climate and Energy Policy Actors

Research Question: What are the comparative effects of risk perceptions, climate-related knowledge, and ideological beliefs on the policy preferences of climate policy actors?

Policy Preferences Hypothesis: Higher levels of climate risk perceptions, climate-related knowledge, and ideological beliefs about the role of government, will have independent, positive and statistically significant effects on the policy preferences of policy actors.

Findings: This chapter examined the factors influencing the policy preferences of climate and energy policy actors in Colorado. The hypothesis that higher levels of climate change risk perceptions, knowledge, and support for government intervention, would have
positive and statistically significant effects on policy preferences was partially supported within the explanatory models. Risk perceptions had the strongest relationship to policy preferences, with positive and statistically significant effects in the majority of the models. Ideological beliefs on government intervention had the second strongest relationship among the independent variables. When examined individually, the ideological belief measures were largely non-significant across the four models. However, when aggregated into a single-scale measure, ideological beliefs were found to have a positive, statistically significant effect across all four models of policy preferences. This finding drew attention to the strong effects that a collection of ideological beliefs can have on an actor’s policy preferences. Finally, climate-related knowledge had little effect on policy preferences in any of the models. While previous research has found that climate-related knowledge can have a positive effect on an actor’s support for climate policies, these results suggested that knowledge plays a minor role when examined alongside risk perceptions and ideological beliefs.

These results provided nuance to previous research on climate-related knowledge. Collectively, the findings drew attention to the need to consider the risk perceptions and ideological beliefs held by policy actors when studying climate policy preferences. Greater acknowledgement of the influence of risk perceptions and ideological beliefs may lead to a better understanding of the positions of supporters and opponents of climate policy, which could in turn lead to more constructive policy debates and the identification of policies that garner the support of both groups.
Chapter IV - Examining the Role of Information Sources and Processing Tools in Colorado Climate and Energy Policy Debates

Research Question: What factors impact a policy actor’s decision to utilize various information sources in their policy work?

Information Sources Hypothesis: Coalition members will seek information sources that support the tools and techniques they utilize to examine and evaluate information.

Findings: The purpose of the fourth chapter was to provide insight into the factors affecting information use to develop a better understanding of climate and energy policy debates. The results broadly demonstrated that despite possessing a wide range of climate change beliefs and individual and organizational capacity, coalitions of supporters and opponents utilized similar information sources, ranging from academic research to reports produced by a policy actor’s own organization, to newspapers and news magazines. In contrast to the expectation that supporters of climate policy would be more reliant upon academic and government research, no statistically significant differences were found, with both coalitions utilizing these sources on a monthly basis. However, the results partially supported the expectation that opponents of climate change would have a greater reliance on reports from their own organizations and industry reports as information sources, as coalition members were found to utilize these sources at a higher rate than members of the Supporters Coalition.

The results demonstrated that the use of information sources is largely driven by the use of collaborative-based tools and techniques, followed by analytically-focused tools, and organizational resources. Analytical and collaborative tools were found to have statistically significant relationships across the majority of information sources. Collaborative tools, such
as facilitation and consensus building, were found to lead to an increased frequency of use across all information sources. Analytical tools, such as modeling, environmental impact analysis, economic analysis, and political feasibility analysis, resulted in an increased frequency of use in six of the eight information source variables. These results suggested that information use among coalition members is strongly associated with the ability to use tools to disseminate information to other members, while the ability to analyze information is less strongly associated. Accordingly, these results also tentatively suggested that both coalitions are more frequently engaged in disseminating existing climate-related information than in analyzing new policy-related information. In contrast to collaborative and analytical tools, organizational-level PAC was found to have a more modest impact on the use of information sources. Higher levels of PAC at the organizational-level resulted in an increased frequency of use in five of the models. Collectively, these findings provided strong support for this chapter’s hypothesis that policy actors would seek information sources that support the tools and techniques they utilize to examine and evaluate information.

Chapter V - The Role of Political Activities in Realizing Policy Objectives: A Study of the Colorado Climate and Energy Policy Subsystem

Research Question: What factors impact the decisions of climate policy supporters and opponents to engage in political activities?

Extreme Beliefs & Political Activities Hypothesis: Policy actors with extreme policy core beliefs on climate change will be more likely to be engaged in a greater number of political activities.

Resources & Political Activities Hypothesis: Actors with access to higher levels of resources will engage in a greater number of political activities.
**Findings:** This chapter examined the political activities of advocacy coalitions within the Colorado climate and energy policy subsystem in order to develop a better understanding of political activities and the factors affecting their use. The results indicated that despite considerable differences in size and climate-related beliefs, the Opponents and Supporters Coalitions engaged in similar political activities. Both coalitions were found to engage in a variety of political activities, ranging from analytical activities involving conducting research to collaborative activities focusing on consulting with the public or negotiating with other stakeholders.

In addition, this chapter examined the factors that impacted the decisions of interest groups and policy actors to engage in political activities. To examine the factors that impacted the decisions that affected the decisions to engage in political activities, this chapter tested two original hypotheses on political activities that were derived from the ACF and PAC frameworks. The first hypothesis, derived from the ACF, was that extreme beliefs would be associated with engagement in a greater number of political activities among policy actors. The results of the explanatory analysis did not support the hypothesis. Contrary to initial expectations, more extreme beliefs did not provide a greater motivation to engage in political activities among coalition members within the Colorado climate and energy policy subsystem.

The second hypothesis, derived from the PAC, was that higher levels of resources would be associated with a greater number of political activities. The supporting rationale for the hypothesis was that higher levels of resources in the form of PAC would allow actors to engage in a greater number of activities. The explanatory findings largely supported this hypothesis. Individual-level resources in the form of collaborative and analytical tools were
found to have positive, statistically significant effects in three of the four models. In contrast, organizational-level resources had minimal impact on the political activities of climate actors. Organizational capacity was weakly associated, but was positively related to a policy actor’s likelihood of appraising policy options. Collectively, these findings underscore the importance of individual- and organizational-level resources on the political activities of actors, with individual-level resources having a consistent effect while organizational resources had a secondary effect.

Chapter VI - Collaboration and Advice with Friends and Foes in Climate Policy

Debates

**Research Question:** What are the comparative effects of beliefs and resources on a policy actor’s willingness to interact with friend and foes?

**Extreme Beliefs & Interactions Hypothesis:** Individuals with extreme beliefs will be less likely to collaborate with or utilize advice from foes while individuals with moderate beliefs will be more likely to collaborate with or utilize advice from foes.

**Resources & Interactions Hypothesis:** Individuals with high levels of individual and organizational resources will be less likely to collaborate with or utilize advice from foes than individuals with lower levels of individual and organizational resources.

**Findings:** This chapter examined the comparative effects of resources and beliefs on the interactions of advocacy coalition members within the Colorado climate and energy policy subsystem. This chapter found that the majority of coalition members interacted equally with friends and foes. However, members of the Opponents Coalition were found to be more likely to interact with foes when compared to their counterparts in the Supporters Coalition. To examine the comparative effects of resources and beliefs on a policy actor’s
interactions, this chapter tested two original hypotheses that were derived from the ACF and RDT frameworks.

The first hypothesis, derived from the ACF, was that individuals with extreme beliefs would be less likely to interact with their foes when compared to individuals with moderate beliefs. Belief intensity was found to have a strong positive effect on an individual’s interactions with friends. An increase in belief intensity from moderate to more extreme beliefs strongly increased the odds that an individual would interact primarily with friends. These results supported previous research studying the role of beliefs in influencing political behavior by demonstrating that extreme beliefs, regardless of coalition membership, made individuals considerably more likely to primarily collaborate with or utilize advice from friends.

The second research question, derived from the RDT framework, was that policy actors with high levels of resources would be less likely to interact with foes when compared to actors with moderate levels of resources. Access to resources was found to have mixed effects on interactions. Higher levels of individual-level resources in the form of formal training or the use of analytical or collaborative tools did not have statistically significant effects on friend or foe interactions. In contrast, higher levels of organizational resources were found to increase the extent that an individual collaborated with friends. These results highlighted the strong effect of resource dependence at the organizational level on collaboration with friends and foes, with individuals with access to higher levels of organizational resources more likely to interact with friends while individuals with lower levels of organizational resources are more likely to interact with foes.
Chapter VII - Utilizing Hyperlink Network Analysis to Examine Climate Change

Supporters and Opponents

Research Question: How can hyperlink network analysis be used to examine the connections of policy actors?

Hyperlinking & Actor Beliefs Hypothesis: Network actors are more likely to form hyperlinks with allies (other organizations that support similar policy core beliefs) than with opponents (other organizations that support dissimilar policy core beliefs).

Hyperlinking & Organizational PAC Hypothesis A: Organizations with higher levels of policy analytical capacity will have a higher number of inlinks from other organizations, while organizations with lower levels of policy analytical capacity will have lower levels of inlinks from other organizations.

Hyperlinking & Organizational PAC Hypothesis B: Organizations with lower levels of policy analytical capacity will have a higher number of outlinks to other organizations, while organizations with higher levels of policy analytical capacity will have fewer outlinks to other organizations.

Hyperlinking & Organizational Type Hypothesis A: Government and academic/research organizations will link to organization types similar to their own.

Hyperlinking & Organizational Type Hypothesis B: Businesses and non-profit organizations will link to organization types different from their own.

Findings: This chapter utilized a multi-method research design to examine the applicability of using the emerging hyperlink network analysis methodology to study the online networks of opposing groups of policy actors. The descriptive component revealed the existence of a small, diffuse network of policy actors opposed to climate policy (Anti-
Climate Network’) and a larger, diffuse network of policy actors in favor of climate policy (‘Pro-Climate Network’). The bivariate component tested five hypotheses. The hypothesis that network actors would link to allies at a higher rate than opponents was partially supported as members of the Pro-Climate Network linked to allies at a higher rate, but members of the Anti-Climate Network linked primarily to opponents. These findings tentatively suggested unique hyperlinking patterns among the two networks, with members of the Pro-Climate Network establishing hyperlinks with positive connotations while the members of the Anti-Climate Network established hyperlinks with negative connotations. The hypotheses that the number of inlinks that an organization received and the number of outlinks they established was related to the organization’s level of resources were not supported. Finally, the hypotheses that non-business organizations would link predominately to actors of the same organization type while business organizations would link primarily to non-business organizations were partially supported. While business organizations did indeed link primarily to non-business organizations, only government actors were found to link predominately to actors with a similar organization type.

Collectively, the findings demonstrated the strong potential of using hyperlinks to study network actors, but that a collection of best practices are needed in order to ensure the validity, reliability, and generalizability of research on hyperlink networks. First, scholars conducting research on hyperlink networks should not presume to know what a hyperlink represents, as hyperlinks can represent a variety of different relationships. Second, studies of hyperlink networks should explicitly state the parameters (and the associated rationale) used to establish a network, as these parameters can strongly influence the structure of the network. Third, scholars should conduct systematic reviews of the websites of network
actors, as the practices of removing non-relevant websites as well as aggregating individual webpages from a website into a single network actor are important steps for refining hyperlink networks. Finally, due to the ephemeral nature of hyperlinks, time is of the essence in conducting reviews of the networks produced by webcrawlers. Waiting too long to review the hyperlinks within a network can lead to the destruction of a working hyperlink, which makes the analysis and interpretation of these hyperlinks exceptionally difficult. This collection of best practices offers an initial list that scholars can draw upon to ensure that using hyperlink network analysis methods to study opposing groups of policy actors produces findings with high levels of validity, reliability, and generalizability.
REFERENCES


Weible, C.M. & Elgin, D.J. (2013). Contrasting capacities from city to international levels of government in addressing climate and energy issues. Cityscape, 15(1), 171-188.


