

CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

Reducing Greenhouse Gases with Emerging Public Policies: An Impact Analysis on the Role of
the Global Warming Solutions Act's Programs and Resources in California's Mission to
Reduce the Effects of Global Warming

A thesis submitted in partial fulfillment of the requirements

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Table of Contents

Copyright Page	ii
Signature Page	iii
Abstract	v
Introduction	1
Background on the Issue	4
Origins of Global Warming	4
Global Warming and Emissions in California	5
Stakeholders	7
California's Public Policy Approaches	7
Section Summary	10
Literature Review	12
Common Research Themes	12
Developing Global Warming Policies	13
Public Policy Implementation Trends	14
Areas Where More Research is Needed	16
Section Summary	16
Research Question and Aim	18
Methodology/Research Design	19
Qualitative Data	19
Quantitative Data	20
Validity Measurements	21
Discussion	22
Areas of Focus	22
Collaborative Governance	24
Limitations	25
Ethical Consideration	25
Conclusion	27
References	28
Appendix A	32
Appendix B	34

Abstract

Reducing Greenhouse Gases with Emerging Public Policies: An Impact Analysis on the Role of the Global Warming Solutions Act's Programs and Resources in California's Mission to Reduce the Effects of Global Warming

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Global warming is an overarching issue worldwide that has caused an increase in extreme weather events and coastal flooding, impacted food security, and created a loss of both biodiversity and unique ecosystems. Certain regions around the world appear to be more proactive in the fight to reverse, or at least contain, the effects of global warming. One such area is California that is currently implementing the Global Warming Solutions Act to minimize the main source of global warming: greenhouse gas emissions.

The purpose of this research paper is to assess the effectiveness of programs and resources implemented under the Global Warming Solutions Act to predict its success in reducing emissions to specific levels by 2020, as promised in the Act's framework.

The research method will include interviews to collect qualitative data from government agencies implementing programs and/or providing resources related to the Act. Quantitative data will also be collected through surveys administered to students and faculty on the

implementation team for the California State University, Northridge Climate Action Plan and also those teaching and studying under its Institute of Stability.

Data collected will be used to determine relationships between the policy's programs and resources to assess their effectiveness or ineffectiveness. The results will help predict the overall probability of the Global Warming Solution Act's ability to fulfill its commitment to reduce greenhouse gas levels in California to what they were in 1990, by next year (California Air Resources Board, 2018).

Introduction

The scientific team for the International Panel on Climate Change currently projects that people worldwide have a little over a decade to drastically reduce the factors contributing to global warming to avoid catastrophic climate change (Race, 2018). In not doing so, earth will continue to experience an increase in extreme weather events and coastal flooding, impacts on food security, and loss of biodiversity and unique ecosystems. Meeting this goal is do-able and there is already a lot of knowledge and awareness about what needs to be done. It will require a change from everyone and a new way of thinking and living, but it is not impossible.

While complete and conclusive facts and factors about global warming remain unknown, research does show that it is an overarching issue worldwide (United Nations, 2019). Global warming is happening now, producing drastic climate change and in recent decades has become a priority for politicians and lawmakers around the globe.

Global warming is a unique problem because it affects every human being, as well as all wildlife and ecosystems, and can have detrimental effects on future generations and the future of the planet. In fact, there are very notable and specific, dire consequences from global warming that include increased vulnerability for the world's infant and senior populations, in addition to half of the world's total population having to relocate because of rising sea levels, and various breeds of animals becoming totally extinct (The Climate Reality Project, 2018).

Certain regions in the United States, particularly California, appear to be more proactive in the fight to reverse, or at least contain, the effects of global warming and are applying innovative practices to minimize its main source: greenhouse gas emissions.

Greenhouse gases include carbon dioxide, methane, nitrous oxide and fluorinated gases (U.S. Environmental Protection Agency, 2017). Carbon dioxide is the most prevalent as it makes

up over 80 percent of the greenhouse gases in the atmosphere and is produced from every day, ongoing activities such as industrial plants burning coal and oil, driving gas-powered cars, rotting trash sitting in landfills and using chemicals to manufacture products like cement (ibid). When these gases enter the atmosphere they linger for years, which creates a warming affect across earth.

Global warming is a very complex, wicked problem with seemingly no specific or feasible solutions (Levin, Cashore, Bernstein, and Auld, 2012). Adding to its complexity is the fact that even the most aggressive efforts implemented to reduce emissions produce no immediate results making it hard to evaluate their effectiveness. In fact, practices enacted now to combat climate change may take decades to produce results (The National Academies of Sciences, Engineering, Medicine, 2010).

Complex societal issues are the responsibility of public administrators as their main roles and responsibilities include implementing laws, policies and regulations that govern the public, the general population's quality of life and protect regions that billions of people call home. The field of public administration teaches practitioners how to apply systems thinking to counteract complexity. Looking at global warming as a crisis, administrators must dissect each component and determine how changing one part of the global warming crisis affects another until several solutions are put in place to improve the system.

Currently, the global warming issue is stuck in a vicious cycle as the public at large, in all capacities, are currently executing daily practices that promote global warming and, in turn, are negatively affecting everyone's quality of life from a public health and environmental sustainability perspective. As such, there is a dire need for administrators to prioritize global

warming as a top public policy issue and enforce effective measures that range from education and citizen engagement to laws and mandates (Selin and Mann, 2019).

The following research paper will look at the role of public administration in reducing greenhouse gases and evaluate its effectiveness, with a concentration on California. It will also review and analyze the types public policy measures that have been employed to reduce emissions to assess the true effectiveness of each measure and determine if the state is on track to reach set goals. And, if not, determine what needs to be done on a policy level to ensure success.

The overall goal of this research paper is to determine how effective the role of public administration is in California's mission to reduce the effects of global warming, with a focus on the Global Warming Solutions Act. The following will attempt to answer: Is the Global Warming Solutions Act effective in reducing greenhouse gases in the state? Is the policy on track to reach set goals to lower emissions?

Background on the Issue

The following section will provide a background on the idea of global warming, how it has evolved to become a trending topic and the various stakeholders involved. It will also provide research specific to California on the release of greenhouse gas emissions and the state's public policy approaches, which include incentives, cap-and-trade programs and information on the Global Warming Solutions Act.

Origins of Global Warming

Global warming is not a new issue as there has been talk of it since the late nineteenth century when Swedish scientist Svante Arrhenius first started researching how industrial-produced carbon dioxide could affect the earth's atmosphere (Weart, 2019). Nearly a century later, in 1963, the Conservation Foundation released a report produced from a scientific conference entitled *Implications of Rising Carbon Dioxide Content of the Atmosphere*, which was the catalyst for bringing early ideas and theories about climate change into the twentieth century. The report warned that carbon dioxide would produce "considerable biological, geographic and economic consequences within the not too distant future" (The Conservation Foundation, i).

Not too long after, there was a series of World Climate Conferences in 1979, 1990, and the third and most recent taking place in 2009. These conferences brought leaders and scientists from over 100 countries together to discuss research, resources and networks to monitor and make predictions on the future of climate change (Zillman, 2009). The outcomes included the development of international climate treaties and establishing common environmental stability goals for nations around the world.

Today, global warming has become a trending topic and has transitioned from a scientific issue to a management issue, as its effects are now viewed as social and economic issues. Since the consequences of greenhouse gas emissions are becoming more noticeable and prevalent, political leaders and lawmakers are implementing policies to carry on the work of early scientists and transitioning the fight against global warming from a science-based issue to a matter of public administration.

Global Warming and Emissions in California

California has been positioned as an exemplary state in regard to landmark measures taken to reduce the effects of global warming and greenhouse gas emissions (Environmental Defense Fund, 2019). The state has implemented several public policies to provide renewable energy, conserve water, decrease emissions caused by vehicles, and divert waste from landfills that increases greenhouse gases.

Specific to California, global warming has caused increased air pollution and severe weather conditions including wildfires, droughts and heat waves (ibid). “Californians already experience the worst air quality in the nation. Hotter temperatures lead to more smog, which can damage lungs, and it increases childhood asthma, respiratory and heart disease, and death,” the state attorney general’s office cautions (The Climate Reality Project, no page). “Certain segments of the population are at greater risk, including the elderly, infants, persons with chronic heart or lung disease, people who can’t afford air conditioning, and those who work outdoors” (ibid). In addition to health concerns, climate change is having adverse effects on California’s landscape. For example, water levels in lakes and rivers have significantly subsided, wildfires have destroyed national parks and entire neighborhoods, while flooding and mudslides have eroded hillsides and mountains, in addition to also washing away homes and communities (The

Climate Reality Project, 2018). Warmer temperatures statewide have made these conditions worse and are contributing to California's compounding drought issues. The decline in snowfall, which is one of the major sources of fresh water for the state, is the biggest factor in the depleting water supply (ibid).

The largest global warming contributor is transportation that releases 41 percent of emissions in California, followed by industrial emissions at 23 percent (California Air Resources Board, 2018).

Ignorance also plays an essential role in the cause. A national lack of public education on the harmful effects our daily practices had on the environment until global warming became a trending topic, coupled with a lack of clean energy alternatives in past decades, add to the blame. With present-day technology, we now have low to zero emission vehicles and have found means to harvest the sun for power and create natural gas. In California, there are policies that tap into those technological advances. The state also has unique policies that enforce the recycling of materials and green waste and prohibit the free distribution of plastic bags and sale of plastic straws. These practices are tactics to counteract the harm inflicted on the environment and the overproduction of waste in landfills that contribute to the release of greenhouse gases.

According to Energy Upgrade California, a statewide initiative, citizen engagement is needed to successfully reduce emissions and can be achieved by increasing energy efficiency, embracing clean energy alternatives and supporting clean technology. They believe the state's biggest areas of individual impact are related to reducing energy use in homes, cars and businesses, while better leveraging clean energy resources available across the state (Energy Upgrade California, 2019).

Stakeholders

In addition to the general public contributing to and having an interest in global warming, many companies, industries, and government agencies are also stakeholders. These include utility companies, gas and oil companies, Public Works agencies, emergency responders and government agencies like the Federal Emergency Management Agency. Global warming exposes these stakeholders to a lot of risks and opportunities. No single adaptation approach can work in all different contexts, rather it will differ depending on the harm it can cause or benefit it can provide that specific stakeholder.

Political stakeholders, such as elected officials and lobbyists are also very instrumental in the global warming public policy arena with personal benefits that usually revolve around garnering campaign funds and reelection.

Specific to California, there is the Climate Action Team that was created to help the state implement its Global Warming Solutions Act, which will be discussed in the sections below. The team is comprised of 18 state agencies that focus on the environment, wildlife, consumer and business relations, utilities, transportation, and planning and research that work together towards reducing emissions (California Air Resources Board, 2018).

It is apparent that when making decisions about global warming, along with fact-based evidence, multi-stakeholder participation is very crucial to take into consideration.

California's Public Policy Approaches

Research shows governments around the world are looking to California as a model for how to reduce climate-changing gases, improve the quality of life for their people and strengthen their economies while also protecting the environment (Environmental Defense Fund, 2019).

In 2006, California lawmakers passed Assembly Bill 32, also known as the Global Warming Solutions Act. This act is and unique because it holds California to more long-term, widespread and stricter emissions standards than any similar acts in the U.S. (Hanemann, 2007). It is also monumental as it sets an aggressive goal to reduce greenhouse gas levels in California to what they were in 1990, by 2020 (California Air Resources Board, 2018).

Following the Global Warming Solutions Act was the passing of Assembly Bill 398 (AB 398) in 2017. This bill really pushed California into the spotlight as a leader in global warming public policies with even more aggressive goals that changed the Global Warming Solutions Act's promise to "reduce emissions to 1990 levels by 2020" and "raised its goal for greenhouse gas emissions to 40 percent below 1990 levels by 2030" (Environmental Defense Fund, 2019).

Reducing emissions locally lowers levels around the world, which is why many states adopted cap-and-trade programs, including California that began implementing the program in 2013.

Cap-and-trade is a system designed to reduce pollution in our atmosphere by putting a cap on greenhouse gas emissions that drive global warming. The trade part is a market for companies to buy and sell allowances that let them emit a certain amount of emissions, as supply and demand sets the price. Trading gives companies a strong incentive to save money by cutting emissions in the most cost-effective ways. Carbon dioxide and related pollutants that drive global warming are main targets of such caps. Other pollutants that contribute to smog can also be capped. The cap-and-trade rule applies to certain small businesses as well as large electric power plants, industrial plants and fuel distributors. Around 450 businesses responsible for about 85 percent of California's total greenhouse gas emissions must comply (Center for Climate and Energy Solutions, 2017).

This program will assist in reaching goals established in Assembly Bills 32 and 398 mentioned above. Its effectiveness is shown by the fact that California's emissions trading system is expected to reduce greenhouse gas emissions by more than 16 percent between 2013 and 2020, 40 percent reduction by 2030 and 80 percent by 2050 if the bill gets renewed again (ibid).

Incentives are additional tactics implemented to support emissions-reducing initiatives and takes a citizen engagement approach as it puts the responsibility of lowering emissions in the hands of California residents. Outside of tax breaks provided by the federal government, California is currently offering incentives for purchasing or leasing electric low/no emissions vehicles through its Clean Rebate Vehicle Program. Rebates range from \$1,500 to \$5,000 depending on the type of car purchased and household income (California Clean Vehicle Rebate Project, 2019). Also, utility companies like Southern California Edison offer discounts towards electricity bills to offset the costs of charging cars at home, and rebates to install charging stations at homes and businesses. Local governments including Los Angeles County and the cities of Malibu, Oakland, San Francisco and Torrance offer free electric vehicle charging stations for their employees and constituents.

A benefit to this approach is more California commuters will be incentivized to buy low/no emission cars and reduce the amount of emissions caused by vehicles. This is significant because transportation is the largest source of emissions in the state.

According to Green Car Reports, California leads in the sale of electric vehicles and is projected to reach goals set for lowering emissions to rates last seen in 1990 with the help of vehicles that produce low to no emissions (2018). Providing residents with monetary incentives for purchasing a car that is better for the environment has proven to be successful so far.

Since the Clean Rebate Program started in 2009, it has issued over \$480 million in rebates (Green Car Congress, 2018). In addition, in 2018, Governor Jerry Brown approved a \$2.5 billion budget to spend on incentives for electric cars (Environmental and Energy Study Institute, 2018). Also in 2018, the California Public Utilities Commission approved \$768 million to public utilities toward emissions reduction and rebate projects and \$29.5 million to evaluate their programs (Weber, 2018).

Section Summary

Ideas of global warming have existed since the late nineteenth century but gained global attention after a series of World Climate Conferences that started in the late 1970s. Today daily talks of global warming are the norm and its effects on the planet are visible and widespread.

In California, several landmark measures have been enacted to lower the state's greenhouse gas emissions levels, as the state has experienced a variety of negative effects from global warming that range from droughts to wild fires. Of all the factors contributing to local emissions, transportation is the biggest producer of emissions in California. As such, the state is spending millions on incentive programs for residents who buy or lease low to no emissions vehicles. This may be directly related to the state also leading in the sale of hybrid and electric vehicles.

California is implementing several public policy approaches in addition to government-funded incentives. The most notable is its Global Warming Solutions Act that has set lofty goals for the reduction of emissions.

Everyone is a stakeholder as the general public has an interest in reducing emissions to preserve the planet and their own quality of life. But interests also extend to actors like utility

companies, emergency responders, public administrators and local, state and federal government agencies.

The next section will add to the above background with fact-based information from studies and research that goes more in depth on the topics of global warming and developing related public policies.

Literature Review

The following literature review includes a synopsis of research about global warming and public policies that expands on common themes about global warming; discusses related public policies, effective ways to develop them and implementation trends; provides insight on the complexity of global warming; and identifies gaps in existing research.

Common Research Themes

There seems to be a consensus among scholars and theologians that measures taken to stop and eventually reverse the effects of global warming need to transition from voluntary actions to mandates enacted by local governments. As of 2010, 70 percent of jurisdictions across the United States are either planning on implementing or had adopted some form of global warming policies or programs, which is up from the approximately 50 percent of jurisdictions that were doing so as of 2008 (Bedsworth and Hanak, 2013).

Public policies have shown to be effective in the fight against global warming as unmandated citizen engagement has not produced results. Studies show there are several attitudes towards global warming that make policies necessary. The first include those who are unbothered by the ideas of global warming, climate change and harmful emissions because there is no drastic phenomenon occurring right now that disrupts their quality of life. As such, they are unwilling to seek more sustainable options, reduce emissions-producing practices and are unaware of their contributions to global warming. There is another group who are well versed on global warming and its policies, and have faith in the capability of scientists so they too are unmotivated to act independent of mandates and are less concerned with the current state of the planet (Kellstedt, Zahran, and Veditz, 2008).

However, global warming is a trending, mainstream topic and there is a large population concerned with its affects. Awareness among the general public can be attributed to extreme weather conditions that have garnered worldwide attention like the melting polar caps in the Antarctic, tsunamis in Asia and wildfires and hurricanes in the U.S. This awareness has been further enhanced by the media, portrayal in Hollywood movies, documentaries and recent attention in congressional hearings and political campaigns (Kellstedt et al, 2008).

Developing Global Warming Policies

Research shows two main goals to consider when creating effective climate change policies are mitigation and adaptation. Mitigation policies focus on reducing greenhouse gases caused by emissions and pollution. Adaptation focuses on “the inevitable changes resulting from climate disruption” (Ganesh and Smith, 114).

Research also labels global warming as a “super wicked problem” because of four factors that hinder the creation of effective policies, which are: 1) limited time to fix the problem; 2) “those who cause the problem also seek to provide a solution;” 3) “the central authority needed to address it is weak or non-existent;” and 4) the future of climate change is unpredictable, which devalues current policy responses (Levin et al, 137). Additional factors contributing to its complexity include there are several, interlinked factors that cause global warming and they must all be addressed to solve the problem (Head, 2008). Any focus on just the main factors, without considering causes that are less impactful, will be ineffective. Also “the impacts are global, national, regional and local simultaneously” (Head, 113).

When developing public policies to address wicked problems, policy makers usually focus on the aspects of the problem that are easy to recognize and manage, versus considering all problems that are factors and creating policies for those as well (Head, 2008). Policy makers take

an out-of-sight-out-of-mind approach creating inefficiency because all parts of the system are not being taken into consideration when policies and solutions are conceptualized.

Since the issue of global warming transitioned from a scientific to an administrative concern that requires ongoing management, there has been minimal attention given to how humans have contributed to the problem; more focus is on industrial contributions. As such, the public, in addition to stakeholders, need to be engaged and educated about the effects of global warming. And the daily practices of both can become underlying factors when policies are enacted to influence behavioral changes that will combat the issue on a large-scale yet grassroots effort (Head, 2008).

Another approach to policy issues that must be managed, are economic approaches that influence behavioral changes through incentives, taxes, tax credits and subsidies (Jamieson, 2010).

One of the overarching challenges with global warming is implementing policies that will be sustainable over long periods of time even though they may not produce results in the first decade after being enacted. Policy formation is cyclic, and an important element is evaluation (Benoit, 2013). Evaluation helps to assess if the policy will be effective or not, if revisions to the approach need to be made, if it can produce long-term effective change, and whether or not it has accomplished what it was implemented to. As such, it is difficult to evaluate global warming policies in the usual time frames it takes to evaluate other policies.

Public Policy Implementation Trends

Economics are increasingly becoming the vanguard of policy making. Policies that seem to be effective in addressing areas of concern have no validity if they create too much of a financial burden to implement and/or do not create internal revenue streams to sustain them

(Jamieson, 2010). Most policy decisions are now made after an initial cost/benefit analysis has been conducted to assess their financial aspects, despite their seemingly positive effects on society.

Policies promoting sustainability, clean energy and protecting the environment are becoming more rampant among the longstanding, main policy areas: budget/taxes, healthcare and education. Almost half of U.S. states have energy and environment in their top five public policy focus areas, with states like California and Florida that have it listed as their number one policy issue (Dermody, 2016). States with larger populations, higher household incomes and citizens who embrace and support local measures to protect the environment are more likely to adopt global warming-related public policies (Bedsworth and Hanak, 2013).

Developing clean energy policies are more popular and garner more bipartisan support than those more specific to global warming that includes energy efficiency and renewable energy (Bedsworth and Hanak, 2013).

But despite their popularity, energy efficiency policies are also difficult to formulate ethically because, unlike policies pertaining to budgets and taxes that are more straightforward, values must be considered. Global warming policies are suggesting how people should live, how they should care about the planet and reprimand the public for carrying out daily practices that they may not think are worth changing (Jamieson, 2010). As such, to influence behavioral changes there also has to be a shift in values, which is personal and not the responsibility of lawmakers to influence.

Policies related to global warming that have had the most success being implemented included collaborations with local government agencies and private companies (Bedsworth and Hanak, 2013). And policies that promote the public's self-interests and provide incentives or forms of monetary rewards are the most likely to produce widespread behavioral changes.

Areas Where More Research is Needed

Examining the term global warming, it is important to analyze the global aspect. This is an issue that affects all areas on planet Earth. And just how its causes are intertwined, efforts to reduce its impact are as well. There is countrywide, national and regional information on the causes, effects and efforts related to global warming; however, there is no research that shows if policies from one region benefit or hurt another, or how far the effects of individual and local efforts span and/or their global influence.

Specific to California, the Global Warming Solutions Act is a landmark policy that researchers claim is on track to reach emission-lowering goals by 2020. However, a more indepth policy analysis needs to be conducted to determine the root of its effectiveness, weaknesses the implementation process has created that will have future implications, if the most effective resources and networks have been employed to provide optimum results, and if it will lower statewide emissions by next year.

To do so, the policy's implementation structure needs to be dissected. The implementation structure includes interstate collaborations, networks, programs, resources, and other components that contribute to the execution of the policy.

Section Summary

Research shows that global warming has transitioned from a scientific issue to a public administration issue, and the need for related public policies has become apparent as global warming effects have increased and gained visibility.

Global warming has been labeled a super wicked problem that requires public policies that are multifaceted to address its complexity and the application of several strategies to address the common goal of reducing emissions. But many challenges exist, particularly with assessing

the effectiveness of policies although results are not immediately measurable and may not be for many years.

Overall, more research is needed to determine how the practices of various regions across the globe intersect each other's efforts. And specific to California, there is a lack of research that provides information on the actual implementation structure of the Global Warming Solutions Act, specifically its programs and resources, which will reflect directly on either its success or failure.

Research Question and Aim

In what ways will the current implementation structure of the Global Warming Solutions Act, particularly its programs and resources, affect California's ability to reach emission reduction targets by 2020?

The aim of this research paper is to explore the Act through an in-depth policy analysis to either add to or debunk research on its projections for success by looking at the programs and resources components of the implementation structure.

The following sections of this research paper will focus on the structure's resources and programs to make an assessment and projection on the Global Warming Solution Act's effectiveness and probability for success.

Methodology/Research Design

To answer the research question from the previous section, a mixed methods approach will be used to collect both qualitative and quantitative data.

Qualitative Data

Qualitative data will be used to explore and evaluate programs and resources being used to implement and assess the Global Warming Solutions Act through a series of interviews with key personnel from agencies who provide and oversee those components. The sample size will include at least five people from half of the agencies named as collaborators in the Act and/or that support emissions reduction, with at least half of those chosen being large agencies that are either government appointed to implement the policy or that contribute majority of their time and staff towards monitoring and reducing emissions in California. Examples of agencies that will be contacted for interviews are:

- California Air Resources Board – implements the Act, creates emissions regulations, and monitors and keeps data on California’s greenhouse gas emissions
- Public Works departments that represent large cities in Northern, Central and Southern California – Public Works’ Environmental Programs divisions monitor trash services and have strategic plans to divert waste from landfills; various forms of waste contribute to greenhouse gases
- Major utility companies like Southern California Edison and Pacific Gas & Electric – can provide insight on the increase or decrease in energy efficiency and their projections on reducing emission through the use of clean and natural energy

Questions will seek to document expert opinions on California’s current state regarding emissions, determine key programs and resources that are factors in the increase and/or decrease

of greenhouse gases, assess their relationship and causality to the Global Warming Solutions Act, and collect expert, data-based projections on what is needed (from a programs and resources perspective) to lower emissions to 1990 levels by next year.

The goal for the interviews is for stakeholders to share their perspective on the effectiveness or ineffectiveness of key programs and resources for the Global Warming Solutions Act. Responses will be used to hypothesize whether those strategies that are currently employed will make the policy effective. Each individual perspective will be analyzed to find consistencies and differences that will be used to create a consensus categorized by both the agency and individual.

See sample interview questions in Appendix A.

Quantitative Data

Quantitative data collected via surveys will be used to determine on a scale of one to five, what specific programs and resources are most effective in the Global Warming Solutions Act and how much they contribute to its success or failure. The goal is to get numerical data on individual components to determine the level of effectiveness each brings to the Act's overall execution. The data will also be used to link programs and resources that have similar scores to determine their relationship and establish if particular programs and resources may cause others to fail or succeed and/or how they affect one another's effectiveness.

Programs and services that score high will be used as results indicators to determine what are the most effective components of the Act, while those with low scores will be considered performance indicators to show inefficiency and areas that need improvement (Badawy, El-Aziz, Idress, Henfry and Hossam, 2016). The overall results from this research will identify key

performance indicators (KPIs) that can be observed and monitored throughout the Act's implementation and used to more accurately predict its outcome.

Survey participants will be solicited from the California State University, Northridge (CSUN) Climate Action Plan's implementation team and its Institute of Stability, which will include both students and faculty. This population is familiar with the Global Warming Solutions Act, as they are imitating its execution on a smaller scale at CSUN and have conducted research on programs and resources related to the Act and reducing emissions. The sample size will include 100 participants, with a ratio of 75 percent students and 25 percent faculty. Surveys will be administered electronically via email and through a designated website.

See sample survey in Appendix B.

Validity Measurements

The measure of validity for both the qualitative and quantitative research and data will be internal consistency and inter-rater reliability (Morling, 2015). Internal consistency will be achieved when programs and resources assessed both qualitatively and quantitatively produce consistent results (ibid). Similarly, when individuals who are interviewed and take the survey provide similar feedback on certain programs and resources, then inter-rater reliability will be achieved (ibid).

Discussion

Greenhouse gas emissions are unavoidable as their production happens daily around the world. The systematic character of emissions makes this issue extremely complex and super wicked. Emissions are the cornerstone of systems that make up societies, protect the environment, help industries thrive, and improve living standards for billions of people; however, they are also the foundation for global warming and its detrimental consequences that include climate change. A 2012 study by Levin, Cashore, Bernstein and Auld discusses super wicked problems and notes that they exist because the same people who are causing the problem are also trying to fix it. This creates a vicious cycle because emissions are essential to people's every day lives but also what is ruining their quality of life and the future of the planet they call home.

Studying the issue of global warming and the time frame to enact public policy measures to address it should encourage policy makers to be more proactive than reactive. A scientist discovered in 1896 that carbon dioxide was heating up the earth's atmosphere, but it took centuries, and several catastrophic events, for lawmakers to create policies to address it (Weart, 2019). There is a need for the analysis of administrative and scientific trends in the legislative branch and among government agencies so that more preventive policies are created, and policymakers are not forced to implement drastic policies like the Global Warming Solutions Act out of desperation to invoke change.

Areas of Focus

Considering this research paper seeks to determine the effectiveness of programs and resources used to implement the Global Warming Solutions Act, it is important to look at its

areas of focus for the Global Warming Solutions Act and examples of related programs and resources that will be measured for this research paper.

The six areas of focus for the Act include fuel usage and transportation; renewable and clean energy; efficiency; waste; water; agriculture; and land preservation (Hanneman, 2007). For each of these areas there are several programs and resources employed to assist with effectiveness and aid in the overall efficacy of the Act. The following are a couple of examples.

To address the fuel usage and transportation area of focus, California has created the Clean Rebate Vehicle Program that offers up to \$5,000 in rebates to residents who purchase or lease low to no emissions vehicles (California Clean Vehicle Rebate Project, 2019). To add to this program, utility companies like Southern California Edison offer discounts towards electricity bills to offset the costs of charging cars at home, and rebates to install charging stations at homes and businesses. In addition, many cities throughout California offer resources to support this program like free charging stations at government buildings and certain, frequented areas like beaches and shopping centers.

To address waste, Public Works departments statewide are implementing diversion programs. In doing so, they have adopted strategic plans to divert 50 percent of waste that is deposited in landfills by 2025. Green waste (grass, plants, tree branches, etc.) are now diverted from landfills to facilities where it is converted to compost and mulch. Food waste is now being collected separately, recycled and turned into fuel. And various cities throughout California are offering restaurants and large multi-family businesses resources like food waste receptacles and signage to support this program.

Potential findings from evaluating and analyzing programs like these can contribute to a better understanding of the Global Warming Solutions Act's implementation structure and

whether the tactics employed are the most feasible for execution and reaching set goals. This research can also help the implementation of AB 398 that piggybacks on the Global Warming Solutions Act's promise to "reduce emissions to 1990 levels by 2020" and "raised its goal for greenhouse gas emissions to 40 percent below 1990 levels by 2030" (Environmental Defense Fund, no page). Knowing what programs and resources were successful for the Global Warming Solutions Act can help create more effective solutions for its subsequent Bill (AB 398), make California a more effective administrator of global warming policies and increase its visibility nationally and globally as a trendsetter and case study for proven results to thwart global warming and climate change.

Collaborative Governance

An analysis of data collected through this research can also help look at the challenges of collaborative governance in public policy implementation and the role it plays when addressing complex, public issues such as global warming.

Considering collaborative governance is a more recent concept when compared to other public administration forms of governance, this research can add to existing studies as it examines and determines effectiveness in policy execution between government agencies, the public sector and large, for-profit companies that usually have "adversarial relationships" (Ansell and Gash, 547). Learning how programs and resources are implemented in the Global Warming Solutions Act can provide insight on successes and failures with this type of collaboration and help create the framework for future public policies that need to rely on diverse stakeholder groups to be effective.

Limitations

The above proposed research does have limitations that include bias and the possible lack of reliability.

Biases can come from the qualitative data as those who are interviewed may provide answers that speak highly of, and only provide limited, positive feedback on programs their agencies are associated with. Their attitudes towards the way other programs have been implemented, or towards the staff implementing them (whether it be they are pleasant and easy to work with or difficult) can also influence their answers.

However, confirmation bias will be avoided as the overall research for this paper will be original and not rely on data from existing studies and research.

Lack of reliability can occur in both the qualitative and quantitative data samples. For example, if there are inconsistent reports on certain programs and resources that result from the interviews, an accurate analysis cannot be made because there are no common themes or indicators to formulate data that will aid this research. Also, when assessing the quantitative data, if there are inconsistencies among the results indicators and performance indicators, again no true assessment of KPIs can be determined and the data cannot be used.

Ethical Considerations

The issue of global warming is not necessarily a confidential topic and the proposed research methods will contain questions that not all participants may feel contain answers that are privileged information. However, to ensure those interviewed feel comfortable in giving their honest opinions about their agencies and the programs and resources that will be inquired about, there will be assurance that this researcher will be the only person conducting the interviews, nicknames will be given to the participants, and there will be a confidentiality agreement that

states the researcher/interviewer will not discuss specific information provided with anyone. In addition, if specific qualitative data is used in the study, and possibly published, it will be anonymous.

The quantitative data will be collected through online surveys where the participants have the option to answer the questions discretely when they are in a private setting or when they feel most comfortable.

Conclusion

California has set aggressive goals to lower emissions with its Global Warming Solutions Act. The state has experienced sizeable climate change consequences and decided to take a proactive and progressive approach to preserve its landscape and protect its citizens. In doing so, it has produced a landmark public policy that has the potential to be the blue print for future nationwide policies with similar implementation structures and goals.

The literature review has shown that there is a consensus that global warming is inevitable and also a wicked problem that will require various approaches to create an effective solution. It also shows that the threat of global warming and its consequences have existed for decades, but because of the lack of education and citizen engagement, it was always viewed as a scientific problem. But with its consequences becoming more rampant, the public's attitude has shifted and, as such, global warming has also transitioned into an administrative problem.

With additional research on the effectiveness of the Global Warming Solutions Act's programs and resources, public administrators will have more indicators to determine if the policy is on course to reach set goals for 2020, and if AB 398 is equipped to continue the Act's progress and further reduce emissions levels by 2030. If the data produces adverse results about these two important components of the implementation structure, it is important that the data is released now to policy makers. It may be too late to change the trajectory of the Global Warming Solutions Act but will be essential in helping AB 398 revisit the policy formulation phase to develop a better strategy to reach set goals.

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Appendix A: Interview Questions

1. What is the name of your organization and job title?
2. What are your job duties related to the Global Warming Solutions Act and/or reducing greenhouse gas emissions?
3. Name the top three ways your organization's programs and/or resources are assisting the Global Warming Solutions Act in reducing emissions by 2020.
 - a. Why would you label these as the top three?
 - b. Are there any measurement tools or data to support your claims?
4. Name the top three challenges you have experienced with programs and/or resources, and why do you feel they have been challenges?
 - a. Are there any measurement tools or data to support your claims?
5. What organization do you think is the biggest contributor as far as providing services and/or resources that directly contribute to the work done for the Global Warming Solutions Act and/or reducing greenhouse gas emissions and why? Feel free to name your own organization if you feel it is the biggest contributor.
6. What organization do you think has been the biggest hinderance to the Global Warming Solutions Act and/or reducing greenhouse gas emissions or does not provide adequate services and/or resources?
 - a. In your opinion, what are the main factors that account for this organization's ineffectiveness?
7. What do you think is ultimately the most effect program and/or resource being implemented for the Global Warming Solutions Act and/or reducing greenhouse gas emissions and why?

8. Do you think California will be able to lower emissions to 1990 levels by next year?
 - a. If yes, what do you think are the main contributors, as far as programs and resources, to reaching this goal? Are there any measurement tools or data to support your projection? Do you think these practices are sustainable to continue lowering emissions past the 2020 date?
 - b. If no, what do you think are the main contributors to its inability, again as far as programs and resources, and what needs to change to effectively lower emissions? Are there any measurement tools or data to support your projection?
9. What's your opinion on the future of lowering emissions in California, considering programs, resources and any other information or data you have?

Appendix B: Survey Questions

On a scale of 1 to 5, please rate the following programs and resources with one being the most ineffective and five being the most effective in helping the Global Warming Solutions Act achieving its emissions goals by the year 2020.

Circle one:

1. AB 32 (Global Warming Solutions Act) Cost of Implementation Fee Regulation

1 2 3 4 5

2. California Air Resource Board Gas Emission Inventory Program

1 2 3 4 5

3. California Air Resource Board Investment Plan

1 2 3 4 5

4. California Air Resource Board Mandatory GHG Reporting Program

1 2 3 4 5

5. California's Global Climate Action Summit

1 2 3 4 5

6. Cap-and-Trade Program (California)

1 2 3 4 5

7. Clean Rebate Vehicle Program

1 2 3 4 5

8. Climate Change Scoping Plan (California)

1 2 3 4 5

9. Pacific Gas & Electric's Clean Energy Rebate Program

1 2 3 4 5

10. Southern California Edison's Clean Energy Rebate Program

1 2 3 4 5

11. Waste Diversion Programs

1 2 3 4 5