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California Energy Policy Alternatives for Commercial Buildings to Create Energy Resiliency, Reduce Carbon Emissions, and Lessen Dependency on Electrical Utilities for the Future California Economy

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ABSTRACT

California Energy Policy Alternatives for Commercial Buildings to Create Energy Resiliency, Reduce Carbon Emissions, and Lessen Dependency on Electrical Utilities for the Future

by Russell B. Garcia

Purpose: The purpose of this Policy Delphi study was to identify and assess the energy efficiency policies for commercial buildings in California that experts believe are most important and likely to be implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.

Methodology: The methodology for this Policy Delphi study was descriptive, and used to forecast the future relative energy policy for energy efficiency in commercial buildings in California. Inside the theoretical framework of policy analysis, this Policy Delphi study was designed around the insights of a nominated expert panel. The sample population was 24 experts randomly drawn from a list of individuals who were nominated by one of three advisors. Individuals were nominated for their expertise with energy policy, building industry, economy, and business. The panel was asked to identify policy options, and systematically rate those options in three structured rounds, to achieve consensus on a common set of future policies.

Findings: The analysis of data from the Policy Delphi expert panel's ratings identified that 20 policy statements were considered to be of high priority in this study. Secondly, seven policy statements received consensus on high ranking of importance. Finally, only one policy statement received consensus on high rankings of importance and likelihood of implementation.

Conclusions: Based on the research findings, 10 conclusions were drawn including: (a) increasing ratepayer investments in energy efficiency for clean energy distributed resources for California Integrated Resource Planning policy for utilities was unmistakably the highest priority identified in this study and (b) energy efficiency policies affecting commercial buildings in California may be difficult to implement in the near future.

Recommendations: Further research is recommended in the following areas: (a) replication of this study using a different expert panel selected utilizing the same or different selection criteria and (b) analyzing data on the effectiveness of the high importance policy statements.

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CHAPTER I: INTRODUCTION

Energy policy within the United States has endured a long transition since the 1970s, moving away from carbon-based fuels toward multiple sources of energy and responsiveness to consumption (Bourne, Childs, Philippidis, & Feijoo, 2012). The availability of energy and rising prices have been shaping the lives of American citizens and the economy since the electrical grid was created (National Academy of Sciences, 2009). According to the U.S. Energy Information Administration, "the United States is among the highest per capita consumers of electricity in the world, using approximately four times as much electricity as the most consumptive country in the world, China" (as cited in Craig, 2016, p.1). The electricity is generating greenhouse gas (GHG) emissions. Given the global consensus to reduce fossil fuel consumption and GHG emissions, expectations are escalating for governments to develop effective policies for energy resilience, energy independence, and energy security while combating climate change (Trencher et al., 2016).

Ballard (2015) suggested America's energy infrastructure is vulnerable and stressed by the rising demand for electricity and climate change. Energy usage in commercial buildings contributes to the majority of the stress accounting for over 40% of total energy consumption in the United States (Cao, Dai, X., & Liu, J., 2016). Energy consumption is being addressed through policy to help reduce energy usage. Efficiency standards for commercial buildings are set by energy codes in the United States and policymakers have employed these codes to regulate the energy efficiency of buildings (Jacobson & High, 2010). Levinson (2013) described how energy efficiency standards for retrofitting buildings have the ability to mandate a minimum level of operational performance and support energy policies. Kahn (2016) asserted that California must show the way with new energy efficiency standards in buildings.

Halper (2014) explained that industries such as (a) energy efficiency, (b) technologies for energy, and (c) energy management started because of efforts toward environmental and climate change policy in California. Cook (2013) wrote, "Building energy codes and electric appliance standards have played a prominent role in California's energy policy for almost 40 years" (p.68). Research indicates that policies concerning energy efficiency and building standards were adopted to reduce carbon emissions. Burton (2014) noted California is the most energy efficient state in the nation.

California Governor Jerry Brown is working on a new landmark climate change and energy policy. According to Kahn (2016), Brown is adopting Senate Bill 350, the Clean Energy and Pollution Reduction Act, mandating California to double the energy efficiency in buildings and require the utilities to get half of their energy from renewable resources by 2030. Jackson (2017) wrote that California Governor Jerry Brown said the state is leading the world in pursuing a sustainable decarbonized future. This leadership involves making decisions for California in the near and far term. Gardels (2015) explained that Governor Brown is making long-term tough decisions on climate change and energy policy in California.

Emerging clean energy technologies are a potential driving force to support energy policy and energy efficiency for commercial buildings. According to Alphabet (2015), waste to heat power technology can reduce greenhouse gas emissions and generate clean electricity. Liu (2015) noted another enabling clean energy technology is energy storage, which can support large-scale renewable energy and commercial buildings. Lambruschi (2015) wrote, “Energy storage technology providers can optimize the economic value of their investment by providing multiple services, supported by a suitable tariff and revenue streams” (p. 24). The complex relationship with energy efficiency in commercial buildings lays the foundation for analysis for energy policy within commercial buildings.

Background

Gould (2015) noted that climate change is threatening the planet’s ecosystem. Lazo (2015) described how the threat to the ecosystem is being combated through energy and climate change. Muhovic-Dorsner (2005) explained how it is critical to pursue climate justice when formulating climate change policy in California. The four main courses in California for energy and climate change policy include (a) tailpipe emissions standards for cars and trucks, (b) low carbon fuel standard for gasoline, (c) energy efficiency for commercial buildings, and (d) renewable portfolio standards for electricity utilities (Wara 2014). Dean (2016) demonstrated that California has reduced its carbon footprint utilizing GHG targets and mitigation since 2005.

California Energy and Climate Policy

Levinson (2013) noted that the California Energy Commission (CEC) is responsible for predicting future energy needs and promoting energy efficiency by setting the state’s building efficiency standards and enforcing those standards by working with local governments and reporting out through the Integrated Energy Policy Report (IERP). Levinson also revealed the IERP comprises data intended for policy direction regarding public interest, energy, energy efficiency, renewables, and transportation.

Energy and climate change policy are interrelated in California with regards to building and energy standards, smog regulation, and emissions standards. Kahn (2016) described the birth of California's climate change policy beginning in 1967 with Ronald Reagan creating the California Air Resource Board and the California Energy Commission. In 1975, Jerry Brown showed early efforts as the governor to encourage energy efficiency in building standards adopted in 1983 (Davis & Charest, 2013). This action was followed up that same year, 1975, with the Department of Housing and Community Development adopting energy conservation standards, which paved the way for the first generation of efficiency standards (California Energy Commission Blog (CEC), 2016). California building code was authorized through Public Resources Code Sections 25402 and required the California Energy Commission (CEC) to establish performance standards with prescriptive and performance options (CEC, 2016).

In 1984, the California Smog Check program began to reduce pollutants; this approach continued in 1999, with the California Fuel Cell Partnership (Kahn, 2016). Research indicates energy efficiency and building standards were policies adopted to reduce carbon emissions and manage energy consumption. Michaud (2007) explained that California took a step toward addressing climate change in 2000 with the California Action Registry, which is a voluntary effort for companies to measure and report their carbon emissions. This milestone was followed up when Gray Davis, in 2002, made California the first state to regulate greenhouse gas (GHG) emissions from vehicles and also created the first renewable energy portfolio standards (Kahn, 2016).

Doughman (2007) described how Assembly Bill 32 (AB 32) requires the state to reduce greenhouse gas emissions to 1990 levels by the year 2020. This legislation prompted California to get a fourth of its energy from alternative clean energy technologies including solar photovoltaic, geothermal, and wind (Danelsky, 2015). There are further implications in the research demonstrating California continues to push energy and climate change policy in 2016. Lacey (2016) described that some states, including California, are pushing ahead to comply with the current EPA carbon emissions standards with a wide range of climate change policies.

There are examples in the research showing California is collaborating with other countries to set the tone for best practices in their economies. Davis and Charest (2013) stated that California and Quebec, Canada, have shared best practices for developing a market for carbon emissions to support their energy and climate change policies. In August 2017, Governor Brown traveled to Beijing, China, and attended an energy conference and met with the country's leader, President Xi Jinping, to promote the awareness that California and China are leading the world with efforts toward change (Hernandez & Nagourney, 2017). Hernandez and Nagourney (2017) described the trip to China as important timing for Governor Brown with the recent resignation of David H. Rank, the charge d'affaires of the American Embassy in Beijing, in protest of President Trump's decision to back out of the Paris climate agreement.

Energy Issues Facing California

There are challenges facing the California economy and research identifies certain industries that will be affected by the state's energy and climate change policies. The industries that emit the most GHG emissions today, such as the building industry, will be directly affected by rising costs (Freeman, Sidhu, & Poghosyan, 2008). The commercial building industries have opposing views and suggest more stringent energy and climate policy will have a negative impact on businesses bottom line. This observation is supported by Berliant (2010), who conveyed that although California is a leader in investing in clean energy jobs, opponents suggest the law will cost jobs and is too expensive for the economy. Although there has been an increase in clean energy jobs, there is a perception from economists that the current energy and climate policy will drive down the economy. According to Galbraith (2015), as energy costs in the state necessarily rise, it will be a challenge to retain employment levels. Cook (2013) emphasized that energy efficiency requires investments in new behaviors and products.

Energy Resiliency

Energy and electrical grid resiliency have become a high priority for the United States and California. One of the most pressing issues for the modern energy infrastructure is grid resiliency (Headrick, 2016). The evidence of resiliency becoming a priority could stem from the enactment of the Energy Independence and Security Act (EISA) in 2007 that established grid modernization as a national policy through maintenance of a secure and reliable electricity infrastructure (Stamber, Kelic, Taylor, Henry, & Stamp, 2017). According to Krishnamurthy and Kwasinski (2016), resiliency is based on metrics equivalent to those of accessibility to energy considering the presence of energy storage and electronic interfaces in the electric grid; resiliency metrics are derived under natural and man-made disastrous conditions.

Krishnamurthy and Kwasinski (2016) described how the resiliency of power systems during extreme events can be improved with islanded, electric grid tie modes, and combinations of renewable energy sources and controls. The U.S electric grid is evolving to be comprised of significant amounts of energy storage, distributed energy generation, and demand response that will increase energy security, reduce the environmental impact, and lower the cost of electricity (Stamber et al., 2017). Improving system resiliency and developing new energy conservation tools are needed to help encourage governments to adopt more energy efficient building codes and use more renewable energy sources (Vine, 2011). Headrick (2016) noted the thermostat could be the hub that everything integrates around and will provide central control systems, which give utilities and building owners a portal to monitor and adjust the draw on the electric utility grid.

Government agencies and utilities in the United States offer subsidies to help end users offset costs of Energy Efficient Measures (EEMs) and provide Demand-Side Management (DSM) programs to reduce energy use, decrease the strain on the electrical grid, and increase resiliency (Roy, Seraspe, & Desai, 2016). Technological changes in the structure of the electric grid can be influenced by regulatory and economic changes intended to accelerate the economic appeal of new technology options for the public (Stamber et al., 2017). Stamber et al. (2017) gave examples in the State of California with its increasing penetration of distributed generations and the largest installed distributed photovoltaic capacity in the United States with 2,800 megawatts.

Driving Forces and Variables

California's electricity's grid expands to 30 million people and regulatory issues are considered for the access to the electric grid, price of energy, monopoly prevention, unbundling of energy services, and incentivizing investments (Eichman, Mueller, Tarroja, Schell, & Samuelsen, 2013). Eichman et al. (2016) described how the electricity generation and distribution must be able to utilize generation technology resources that are harvested from natural gas, coal, nuclear, hydroelectric, biomass, geothermal, solar, wind, and geothermal. California's utopian vision of the future and response to climate change may succeed through entrepreneurial innovator (Hart, 2013). Hart (2013) recounted, "If people see energy and climate change as a challenge, there will be opportunities to save the world and make a pretty good profit on it" (p.72).

Doughman (2007) explained that energy efficiency in California and the carbon emission reduction goals should be achieved through investment and not prolonged litigation. This research is corroborated by Kahn (2016) providing an example of a $3 billion solar rebate program that gave the state new jobs and a new industry. The data suggest these incentives drove policy goals and influenced policy makers. California regulators attribute the energy savings to its progressive energy policies, energy efficiency standards, and program investments (Levinson, 2013).

The research identifies investment programs, such as the cap-and-trade program for carbon emissions, which will play an instrumental role in shaping the California economy. A cap-and-trade system allows firms to have the flexibility to achieve their carbon emissions level (Freeman et al., 2008). Caron, Rausch, and Winchester (2015) asserted there is a possibility of California trading emission permits with the European Union. Kahn (2016) explained the California Air Resources board is credited with helping to create the carbon market so California can achieve its carbon emission goals with low costs.

Hernandez and Nagourney (2017) reporteded additional market drivers during the summer of 2017, indicating that Governor Jerry Brown will continue his efforts to battle carbon emissions despite President Trump exiting the Paris Climate Agreement.

California's confrontations with the Trump administration of moving toward energy resiliency, and away from climate change policy, are dicey (Hernandez & Nagourney, 2017). In 2017, California created legislation, SB 100, to drive the state toward 100 percent clean energy by 2045. Passage of SB 100 will accelerate the state current RPS standards from 50 percent to 60 percent by 2030 and policy to 100 percent clean energy by 2045 (Navarro, 2017).

Energy Technologies for Commercial Buildings

Gardels (2015) proposed that California is shaping the world and has become a "Renaissance Florence" for the "technology-driven economy" (p. 5). Kahn (2016) explained in 2002 the renewable energy standards were developed and started large solar installation development, igniting the market for clean energy technologies. Research indicates technologies like building management controls will consume much less energy and empower the building owner and utilities with supervision and automation of the energy usage (Zhou, 2015). Danelski (2015) noted California produced more energy last year from solar plants than the rest of the country. Fiander (2015) described how other technologies such as lighting control systems are being incorporated into California's state building code Title 24.

California is a prime market for electrical storage and electric vehicles when combined with utility off-peak charging rates and solar photovoltaic (Stadler et al., 2013). Lambruschi (2015) wrote, "Energy storage technology providers can optimize the economic value of their investment by providing multiple services, supported by a suitable tariff and revenue streams" (p. 24). According to Alphabet (2015), waste to heat power technology can reduce greenhouse gas emissions and generate clean electricity.

Liu (2014) noted an enabling clean energy technology is energy storage which can support large-scale renewable energy. Hubble & Ustun (2016) suggested new technologies such as stationary battery technology could play a larger role in future climate change legislation. These technologies are vital components for distributed power to meet cooling and energy demands for commercial buildings (McLarty, Brouwer, & Ainscough, 2015).

Funding Support for Energy and Climate Policy

Public sector involvement. Manet (2012) asserted there is a financially liquid secondary market developing for energy efficiency financing and one of the popular programs is Property Assessed Clean Energy (PACE). Webster (2014) wrote, "PACE allows property owners to finance energy efficiency and water conservation projects through property tax assessments" (p. 1). Hoops (2012) identified PACE as innovative policymaking addressing the concerns of climate change. The literature suggests this driving force of new financing may stem from California's building code Title 24.

The Title 24 Building Energy Efficiency Standards are commonly known as Title 24 and are considered the most aggressive and progressive among prominent building energy codes in the United States (Chandler, 2017). Cook (2013) explained Title 24 has the most aggressive standards with energy efficiency for commercial buildings and plays a vital role in helping achieve the state's energy goals. While the research reports elements of progressive emerging patterns with energy policy in California, it lacks emphasis on the role of the private sector within the commercial building industry and the implications with how energy policy is implemented while improving the economy.

Private sector involvement. Private sector businesses appear to be taking a leadership role and funding energy and climate change policy. Kahn (2016) explained that technology companies are supporting energy demand response programs that help pay for energy efficiency projects and reduce demand with the electrical utility grid. Private investors, such as former hedge-fund manager, Tom Steyer, have spent $29.6 million to help fund energy upgrades for commercial buildings and schools (Lazo, 2015). Mehta (2014) revealed Steyer is willing to spend money to win climate change legislation. According to Walsh (2014), Steyer is convinced that the biggest threat facing our world is climate change and he is determined to have climate change on the ballot.

Statement of the Research Problem

While research has commenced regarding energy and climate change policy, California continues to experience a sense of urgency with new challenges each year which stem from a vulnerable energy infrastructure and rising energy and regulation compliance costs. According to the Public Policy Institute of California, by the year 2025, between seven and eleven millions new people will take up residence. In the report produced by the institute titled, California 2025: Taking on the Future, the shift in growing population and expansion of the state's economy will put new burdens on the energy and commercial building infrastructure (Hanak & Baldssare, 2005). The costs of energy and security continue to rise substantially and the response to the question becomes much more critical. Kahn (2016) noted that Californians may pay more for energy production, fuel prices, electricity, and their carbon emissions based on policy and the economy. Problems with high electricity rates may boost energy efficiency as envisioned by policymakers (Mormann, Reicher, & Hanna, 2016). By the year 2025, California will have already needed to achieve goals and milestones for energy and climate policies such as Assemble Bill 32 and Senate Bill 350 while navigating through the changing environment with clean energy generations and new technologies. New and emerging types of energy technologies are likely to be adopted into effective energy and climate policy by the year 2025 to increase energy efficiency for commercial buildings. According to Hong et al. (2015), a big problem is commercial buildings consume 47% of the total energy consumption and the electricity consumption inside buildings will increase at a higher rate than other building types.

California energy and climate policy tend to focus more on reducing carbon emissions, enforcing energy savings requirements, and modernizing infrastructure than on energy efficiency incentives, technologies, and funding mechanisms. According to Dean (2016), California's efforts to achieve the carbon emissions target through the year 2020 will be focused on Low Carbon Fuel Standards, cap-and-trade, and renewable energy portfolio standards. Yeh et al. (2016) stated policymakers should evaluate probable carbon emission scenarios and assess economic and environmental impacts when proposing policy instruments and emission targets. Yeh et al. also revealed strategies to achieve carbon emission targets and energy policy goals will include "significant improvements in energy efficiency in the supply and end-use sectors including commercial buildings, transportation, and industrial sectors" (p. 176).

Title 24 is considered the gold standard among energy codes in the United States and designed to help manage building's energy consumption while energy demand is rising (Chandler, 2017). Building energy policy, energy consumption, and the number of end-users in California are projected to rise due to increasing climate change, population growth, and economic growth (Cao et al., 2016). Cao et al. (2016) also noted energy efficiency in commercial buildings is a key solution and implementing energy conservation technologies is an essential way to optimize and finance building energy efficiency and leadership efforts have been made to "implement innovative energy conservation technologies and formulating green building policies" (p.201).

Hyun Woo, Tommelein, and Ballard (2015) explained alleviating the financial hurdles to energy efficiency investments in technologies for commercial buildings requires researching energy-related risks and innovative underwriting for funding these improvements. Regulations governing commercial buildings' energy efficiency have become a foundation of environmental policy and California has been pursuing these policies since 1978 (Hyun Woo et al., 2015). There is little research on emerging building technologies, energy resiliency, and carbon emissions for commercial buildings that support the development of socially responsible energy and climate policy for California. This study will address these gaps in the research and offer policy alternatives to improve the energy efficiency and resiliency of commercial buildings. The key to energy efficiency in commercial buildings is validity of energy savings harvested through technology and human behavior (Khashe, Heydarian, Becenik-Gerber, Wood, 2016).

Purpose Statement

The purpose of this Policy Delphi study was to identify and assess the energy efficiency policies for commercial buildings in California that experts believe are most important and likely to be implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.

Research Questions

1. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?
2. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are most important by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?
3. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts rate as having the highest likelihood of being implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?

Significance of the Problem

Although research about energy policy for energy efficiency in commercial buildings has addressed components of performance standards and implications for California, there is a lack of emphasis on the implications on the California economy, society, integrating building technologies, and funding mechanisms that would allow commercial buildings to meet policy goals economically and efficiently. Wara (2014) noted a model energy policy and climate program should be able to accomplish performance standards given the resources California is willing to commit. There are growing concerns in California that energy and environmental policies incur extensive direct and indirect costs to building owners, businesses, and consumers (Wei, 2014).

California has the most rigorous energy policy for energy efficiency standards for commercial buildings in the country (Doughman, 2007). Doughman (2007) also revealed that California could only implement its policy goals if state agencies have the resources and staff combined with small and large investors making performance standards and emissions reductions a priority. Some critics in California say drastic emissions reductions could cost jobs and harm the economy; however, supporters say the economy is improving and technology is rapidly advancing (Galbraith, 2015).

Energy and climate policies in California have helped reduce energy usage in commercial buildings; however, electricity consumption in buildings will continue to rise (Khashe et al., 2016). According to Cao et al. (2016), energy consumption in commercial buildings is increasing due to increased demand for building functions and population growth, which can be combated by effective policy and building energy efficiency. This study will provide insight into the most practical and important energy policy alternatives that will support California in achieving performance standards within the energy and climate change policies. California policymakers can use this research in setting energy and climate change policies that economically support retrofitting existing commercial buildings and designing new commercial buildings with proven building technologies and innovative funding resources.

Definitions

Demand side management. Refers to techniques to modify energy consumption and distribution (Masa-Bote et al., 2014).

Climate change. The term used to describe the change with the earth's climate such as rising temperatures in the atmosphere and sea level rises which are caused by the greenhouse gas emissions and carbon fuel (Kahrl & Roland-Holst, 2012, p. xx).

Energy efficiency measures. Refers to the improvements made to facilities to reduce energy consumption, minimize energy costs, and improve the operational efficiency to achieve maximum building energy savings (Lin, Liu, & Yang, 2015).

Energy resiliency. The concept to describe the reliability and adversity to the electrical grid by making facilities less vulnerable to power outages while utilizing clean energy generation and storage assets (Lochner, 2016).

GHG. GHG is the acronym for Greenhouse Gases emissions. GHG emissions absorb and emit radiation causing carbon dioxide to be released into the atmosphere when fossil fuels are burned creating pollutants (Greenblatt, 2015).

KPI. KPI is the acronym for Key Performance Indicators. KPIs are performance goals such as energy efficiency and cost reduction goals which are correlated with stakeholders' performance goals (Li, O'Donnell, García-Castro, & Vega-Sánchez, 2017).

Microgrid. Self-contained electric grids containing energy generation, energy storage, and distribution controls which are typical built within a college campus, local governments, and military bases that can operate independently of the central electrical power grid (Nowicki, 2016).

Policy. An action by policymakers that states a projected outcome and is inevitably linked to an implementation mechanism.

Policy alternative. Policy alternatives are statements that identify intended actions and correlated implementation that are likely to create improved or alternative futures.

Policy analysis. Refers to an investigation of the merits of various possible actions with the reason for ranking policy alternatives (Lindbloom, 1993). Policy analysis is a process used by an expert panel to generate a range of energy policy alternatives.

Building retrofitting. Refers to the renovation and modernization of existing commercial buildings to create high-performance building using resources, energy, and materials more efficiently while considering life-cycle costs (Abaza, 2015).

Delimitations

The study was delimited to a panel of 24 experts that matched the selection criteria established for the study and were nominated by one of the three advisors. The study was further delimited by the selection criteria for the participant experts divided into four subgroups: (1) California energy policy experts, (2) building experts, (3) California economy experts, and (4) energy resiliency experts. The panel of 24 well-versed expert was selected in two broad groups and surveyed by the researcher.

Organization of the Study

This study is presented in five chapters. Chapter I provides the background, problem, and purpose of the study. Chapter II exams the relevant literature significant to the study. Chapter III defines the research design, the Policy Delphi panel selection processes, the data collection processes, and the statistical methods employed. Chapter

IV describes the data collected and the findings of the study. Chapter V includes major findings, conclusions, and recommendations for further study.

CHAPTER II: REVIEW OF THE LITERATURE

Introduction

Chapter II is divided into six primary areas of focus. These include section I: future California economy and environment, section II: energy resiliency, section III: the threat of climate change and carbon emissions, section IV: California's electrical utility infrastructure, section V: the need for efficiency in commercial buildings, and section VI: an overview of energy and climate policy for commercial buildings. The remaining sections are comprised of the gaps in the research, conclusion, and synthesis matrix.

Future California Economy and Environment

The new model in California will be partnerships with public and private sectors, investors, research institutions, scientists, and entrepreneurs to invent and scale new innovative technologies that will provide reliable and affordable energy to improve the economy while limiting the impact on climate change (Headrick, 2016). Vine (2011) noted climate change poses new issues to California's electricity sector and energy policy. Armonio (2016) stated "California has become a leader in innovative energy policies" (p. 1).

According to Considine and Manderson (2013), California's energy sector may be a blueprint for the future U.S. energy supply. California leads the country in renewable energy production and has achieved significant improvements in energy efficiency allowing the economy to grow while potentially using less energy moving forward. In November 2017, the California Energy Commission adopted new targets for energy efficiency through the legislation Senate Bill 350 that would double energy efficiency savings for existing commercial buildings by the year 2030 while creating new sub-targets for energy efficiency programs (Walton, 2017).

There are challenges facing industries in California that utilize a business model with heavy pollutants. Freeman et al. (2008) wrote, "The industries that will be most directly affected are those responsible for the most Greenhouse Gases (GHG) emissions today" (p. 26). This observation is supported by Berliant (2010), who conveyed "although California is the leading state in clean energy jobs and investment—its green jobs sector growth was 2.5 times faster than overall economic growth—opponents say the law is too expensive and will cost the state jobs" (p. 1).

Skeptics believe the energy structure of the future in California may not be as dependable as the traditional energy grid powered by conventional fuels (Jackson, 2017). Jackson (2017) recognized there may be economic and cost burdens that could damage clean energy programs. Some of the future challenges are being addressed through the California Public Utilities Council utilizing the Demand Response Auction Mechanism (DRAM) as a model for distributing and managing energy generation throughout the grid (St. John, 2016). St. John (2016) wrote this new model of aggregating grid assets with distributed energy resources is groundbreaking and will create more flexible capacity for the electrical grid. Another example is California's state government requiring energy-efficient commercial buildings, encouraging the use of energy savings performance contracts, and benchmarking energy usage (California | ACEEE, 2017).

Galbraith (2015) emphasized challenges for retaining employment will be created as energy costs in the state necessarily rise. California's future clean energy economy will thrive and companies will be drawn to the state because of the clean energy and climate goals leading to more jobs for Californians (Jackson, 2017). Cook (2013) emphasized that energy efficiency requires investments in new behaviors and products:

> Research across a variety of industries has consistently shown that the diffusion of new ideas and technologies through a market is not instantaneous, but is rather a gradual process in which the adoption rate is initially slow, then faster, then finally slower again as market saturation is approached. (p. 83)

According to the research, there are some industries in California that have benefitted from energy and climate policy. Halper (2014) explained industries such as energy efficiency, technologies for energy, and energy management started because of climate change policy in California.

There are implications suggested in the literature that California is collaborating with other countries to set the tone for best practices in their economies. Davis and Charest (2013) wrote, "California and Quebec both recognize that putting a price on carbon and letting the market find cost-effective and innovative solutions is the wisest approach both environmentally and economically" (p.55). Mecklin (2014) added:

> California's climate change program could seem almost an environmentalists dream, and for that reason many public figures on the left side of the political spectrum in and out of the state have suggested it as a model that the U.S. federal government should follow closely and spread to the rest of the world. (p. 25)

There are private financial investors in California funding climate change policy to help gain public support. A leader in this effort is former hedge-fund manager, Tom Steyer, who has spent $29.6 million to help fund energy upgrades for commercial buildings and schools (Lazo, 2015). Mehta (2014) revealed Steyer is willing to spend money to win climate change legislation. According to Walsh (2014), Steyer is convinced that the biggest threat facing our world is climate change and he is determined to have climate change on the ballot. Steyer stated, "Our mission is to act politically to prevent climate disaster and preserve American prosperity" (as cited in Walsh, 2014, p. 34).

Kahn (2016) explained that technology companies are growing and creating jobs in California with projects that are aligned with energy and climate policy. Stringham, Miller, and Clark (2015) recognized Tesla Motors are making electric vehicles in California and overcoming entry barriers that help the state with greenhouse gas emissions goals. Lewontin (2015) stated that the Los Angeles police department is starting to drive Tesla electric vehicles to save money and help reduce greenhouse gas emissions.

Solar companies are thriving in California and are leading the country with solar energy production. Danelski (2015) reported, "California produced more energy last year from its larger solar plants than all 49 other states combined, according to a report by the U.S. Energy Information Administration" (p. 1). The state is planning the most ambitious renewable energy plan in the United States and recently economized their pledge to renewable energy (Armonio, 2016). Kairam (2017) noted California is leading the nation in distributed energy resources with solar installation and advanced meters.

Hoops (2012) noted there are innovative financing programs for energy efficiency within commercial builgins in California like Property Assessed Clean Energy (PACE). PACE as innovative policymaking addressing the concerns of climate change. Webster (2014) remarked, "PACE allows property owners to finance energy efficiency and water conservation projects through property tax assessments" (p. 1). The Advanced Council of Energy Efficiency Council (ACEEE) identified additional state programs for energy efficiency investments:

- California Capital Access Program that provides small business lenders a loan loss reserve fund loans for energy efficiency retrofits;
- Statewide Energy Efficiency Program (SWEEP) issues bonds to public schools, universities, hospitals, and municipalities;
- Energy Conservation Assistance Act-Education Subaccount (ECAA-Ed) provides 0% revolving loans for renewable and energy efficiency projects for educational agencies;
- Energy Partnership Program provides grants for technical assistance with project design, feasibility studies, performance specifications, and energy audits (California | ACEEE, 2017).

Reyna and Chester (2017) suggested that if these types of investment are made at the same time as enhancing the resiliency of the electrical grid, there could be additional benefits with reducing the costs of energy while lowering greenhouse gas emissions. The literature suggests this driving force of new financing and investments may stem from California's building code Title 24 coupled with energy and climate policy. Cook (2013) explained Title 24 has the most aggressive standards with energy efficiency for commercial buildings and plays a vital role in helping achieve the state's energy goals. The state of California has aggressive goals toward carbon emission reductions, renewable energy, and energy efficiency the majority of which can be achieved through tapping into the energy efficiency of commercial buildings coupled with new clean energy technologies (Walton, 2017). Municipalities in California like San Francisco have adopted policy such as environmental code chapter 20 that requires commercial building owners to publicly disclose their annual energy use and benchmarking data (Palmer & Walls, 2015).

Energy Resiliency

The resiliency of energy power systems is dependent on supplying energy loads to local areas during extreme events that threaten to disrupt the flow of power by utilizing energy storage and distributed energy sources (Akhtar, Van-Hai, & Hak-Man, 2017). Vine (2011) described how the energy sector is the most resilient of all the U.S. economic sectors in responding to changes in the marketplace and environment. Energy and grid resiliency have been supported by policy from the Energy Independence and Security Act (EISA) and seed funded through American Reinvestment and Recovery Act (ARRA), which appropriated 4.5 billion in grid modernization projects in 2009 (Stamber et al., 2017). The preferred adapting strategy for the energy sector in California is a combination of research; technological development; and mitigation and adaptation that is guided by the principle of resiliency (Vine, 2011).

Akhtar et al. (2017) described how resiliency can be enhanced during emergency situations by using Micro Energy Grids (MEGs) and the capability to supply local energy loads. According to Gabbar and Koraz (2017), a MEG could be defined as a local energy distribution system that encompasses distribution lines, metering infrastructure, control systems, and energy sources. Resiliency for microgrids encompasses renewable energy coupled with generators, fuel storage, and batteries (Krishnamurthy & Kwasinski, 2016).

Microgrids with flexible and active DSM are considered to be crucial elements of future smart grids due to the increasing growing power demand and share of renewable energy (Ozadowicz, 2017). Ozadowicz (2017) further explained that due to the increasing energy demand and renewables, more appropriate tools like DSM will be required to manage the heating and cooling, storage units, electric vehicles, small generational units, and the electric load on the grid. Headrick (2016) suggested DSM increases the efficiency and resiliency of the entire electric grid. Studies on building cooling and energy demand have been inaccurate as it relates to climate change on different kinds of commercial buildings with different peak load pattern shifts (Xu, Huang, Miller, Schlegel, & Shen, 2012).

Microgrids are used to meet the combined electricity demands for all types of customers and are capable of improving the resiliency of energy distribution grids and achieving efficient utilization of renewable energy sources (Gabbar & Koraz, 2017). Krishnamurthy and Kwasinski (2016) noted resiliency is calculated for microgrids containing storage, distributed energy sources, and when the microgrid is in island mode which is independent of the electrical grid. Enhancing the capacity and operations of the electrical system to operate under a range of future environmental and socio-economic conditions is resiliency (Vine, 2011).

California's non-residential sector building owners have been investing in energy efficiency measures to reduce peak demand and support grid resiliency (Headrick, 2016). According to Roy et al. (2016), increasing energy resiliency can be improved through optimizing utility incentives for energy efficiency measures in commercial buildings. Grid resilience can also be enhanced by reducing congestion and network failures on the Internet and telephone network (Stamber et al., 2017).

California is testing demonstrations and market reforms promote the potential of distributed resources such as market reform through aggregation, vehicle-to-grid, and contracting large-scale projects for demand response utilizing the demand response auction mechanism (Kairam, 2017). Reyna and Chester (2017) recognized projected electricity increases can be offset through aggressive energy efficient technologies and programs that can reduce energy consumption. HVAC technologies could be enough to offset demand increases and future research should concentrate on quantifying the linkages between electricity demand and supply coupled with the growing presence of renewable energy sources while qualifying the costs of implementing initiatives (Reyna & Chester, 2017).

HVAC controls can support the resiliency of a building and the electric grid creating economic optimization (Salsbury, Mhaskar, & Qin, 2013). Salsbury et al. (2013) summarized the goals of economic optimization is to minimize the total costs for the entire building or costs are minimized independently at several sub-levels within the building. Controls support reducing peak demand and the issues associated with high demand, which include new power plants needing to be building to meet the high demand and sacrificing power generation efficiency by shutting down power plants during off-peak hours. Managing the energy consumption pattern and utilizing energy storage capacity would improve the efficiency of existing power plants while alleviating the need to build new power plants (Salsbury et al., 2013). Demand response is supporting utilities to manage energy consumption through resources such as HVAC controls and battery storage which create grid stability and resiliency (Sun, Wu, Li, & Ren, 2016)

Threat of Climate Change and Carbon Emissions

Adaptation to climate change and mitigation of carbon emissions are closely tied in the electricity sector and California has been a leader in managing climate change while applying energy policy and legislation that directs how the private and public sector will manage climate change (Vine, 2011). Gould (2015) noted climate change is a threat disrupting the life support systems we depend on. California has begun planning for sea level rise where real estate development is in sea level rise vulnerability areas (Gualco-Nelson, 2017). Taking this notion a step further, there are additional implications suggested by the research that the threat is being combated through climate change policy as it addresses environmental justice.

Muhovic-Dorsner (2005) noted that "the most critical discourse about the formulations of the climate change policy is one of environmental justice" (p.18). Elements of environmental justice include protecting the environment when creating legislation such as the reduction of greenhouse gas emissions to prevent global warming (Sze et al., 2009).Vine (2011) summarized how climate change is posing challenges to the energy industry through greenhouse gas emissions, state energy policy, and adapting to changing supply and demand conditions.

Mazmanian, Jurewitz, and Nelson (2013) described three components for establishing a governing framework for mitigating greenhouse gas emissions at the state level that include identification of the range of global warming associated with greenhouse gas emissions, collective action toward addressing the problem, and specifying the appropriate policy for guiding the state's effort. A governing framework is a decision support structure guiding private and public actions toward logic for policy action, policy goals, and policy evaluation criteria for mitigating greenhouse gas emissions (Mazmanian et al., 2013).

Throughout the southwestern United States, climate change could lead to increasing the electricity demand from the need for cooling commercial buildings (Reyna & Chester, 2017). Global climate change is shifting California's mild climate environment to a warmer climate and this will have an impact on increasing the energy usage in commercial buildings throughout the state with higher electrical peak demands (Xu et al., 2012). Climate change could affect customer demand for energy in commercial buildings and warmer climates could lead to more adoption of cooling technologies in buildings (Reyna & Chester, 2017).

Vine (2011) described three challenges for California's electricity sector as a result of climate change that includes increasing temperatures, the adaption of the electricity generation system to changing climatic conditions, and risks to distribution and transmission networks within the electricity infrastructure. Predicting and estimating the impacts of climate change on the electrical grid and building energy usage helps utilities, stakeholders, and policy-makers understand how to improve consumption, distribution, and production of energy (Xu et al., 2012).

California, under Assembly Bill 32, has goals and is committed to reducing carbon emissions to the year 1990 levels by the year 2020 and, under Executive Order S-3-05, to 80 percent reduction by the year 2050 (Burton, Beyer, Bourcier, Mateer, & Reed, 2013). California's primary target for reducing greenhouse gas emissions under AB 32 is the energy sectors (Vine, 2011). A combination of strategies is essential in order to achieve the emission goals including electric vehicles, demand reduction of vehicle miles traveled, reductions of non-energy greenhouse gas emissions, decarbonization of gaseous fuels with sustainable sources, and significant improvements in energy efficiency in transportation, industrial, and commercial buildings (Yeh et al., 2016).

Doughman (2007) demonstrated that reducing carbon emissions should be achieved through investment and not prolonged litigation. This demonstration is correlated with Kahn (2016) providing examples of incentives to reduce carbon emissions such as the California $3 billion solar rebate program giving the state new jobs and a new industry. There are additional incentives available in California. According to a *Los Angeles Times* article in 2015, Pincetl (2015) stated:

> The state's ratepayers have already invested nearly $13 billion in building energy conservation measures since energy deregulation in 2002. It's well known that conservation is the most cost-effective way to reduce energy use—but data are the key. Instead we're spending billions of dollars with little idea of our baseline use. (p.1)

California is already under contract for projects to achieve 43 percent renewable energy by the year 2020 according to the California Public Utilities Commission (Navarro, 2017). All projects that could have an impact on the environment will have to comply with the California Environmental Quality Act (CEQA) which requires an environmental impact report (EIR) and a public agency’s approval (Gualco-Nelson, 2017). Gualco-Nelson (2017) noted CEQA does provide some exceptions like energy savings projects.

The cap-and-trade program for carbon emissions will play an instrumental role in shaping the California economy. Recent legislation extended the cap-and-trade system to increase the reduction of greenhouse gases from the electricity sector (Navarro, 2017).

Freeman et al. (2008) wrote, “The principal advantage of a cap-and-trade system is that it gives firms the flexibility to achieve their emission targets in the most cost-effective way possible while setting an overall limit on the total emissions level” (p. 3). Caron et al. (2015) asserted there is a possibility of California trading emission permits with the European Union.

Legislators should continue to rely on quality and transparent models that analyze future emission standard scenarios (Yeh et al., 2016). Yeh et al. (2016) explained that these models are assessments, which propose environmental and economic impacts while achieving emission targets outlined in the AB 32 policy. Without policy intervention, electricity demand could increase by as much as 41%-87% between the year 2020 and 2060 (Reyna & Chester, 2017). Reyna and Chester (2017) suggested aggressive energy efficiency policies for upgrading HVAC systems and technologies could decrease electricity usage by 28 percent.

California’s Transformational Electrical Infrastructure

Ozadowicz (2017) summarized that the most effective solution for electrical utilities over the last century has been determining the need for the energy generation to meet demand, petition their state regulators to build energy generation, and seek cost reimbursement from customers through increased electrical utility rates. Higher electricity rates and costs are passed to consumers when new electricity production capacity goes into operation and this affects the electrical demand for power with the electrical grid (Considine & Manderson, 2013). Over the past two decades, the electrical energy systems have been going through extensive transformation stemming from growing energy demand, energy policy, renewable energy sources, and energy distributed technologies (Ozadowicz, 2017). This transformation may have stemmed from the years 1996 to 2001 when California's de-regulated energy sectors resulted in disastrous consequences such as government budget deficits, state-wide rolling blackouts, and the state ultimately going bankrupt (Clark & Li, 2010). Electrical utilities are scrambling to adapt to the rise of control technology, wind, and solar power, manage rising electrical rates and produce reliable power for consumers (Headrick, 2016).

Before California was concerned about greenhouse gas reductions and global warming, the legislature was focused on decreasing costs to electricity ratepayers and diversifying energy resources for the electrical grid (Downey, 2015). Downey (2015) noted the state pursued the restructuring of the electricity market to ensure that businesses and citizens receive the economic benefits from a more competitive electricity market. In the year 1995, Net Energy Metering (NEM) was created to stimulate economic growth, reduce utility interconnection costs, diversify California's energy resources, and encourage private investment in renewable energy (Downey, 2016). According to Bloom (2016), the CPUC instituted the NEM program in the year 1996 allowing customers who install renewable energy generational technologies behind the electrical utility meter will receive a financial credit for excess produced electricity.

The California Independent System Operator (CAISO) showed that transforming clean energy renewables into electric grid resources can be accomplished through inverter technologies and the key would be to serve electricity demand through incentives and energy strategies (Kairam, 2017). Stamber et al. (2017) stated Distributed Energy Resources (DER) are being implemented in the electric grid and can displace or offset large-scale, centralized, and capital-intensive energy generation. California is working on solving their electric utility grid problems through leveraging DRAM to create auctions that create DERs such as energy storage, smart thermostats, controls, and electric plug-in vehicles (St. John, 2016). St. John (2016) demonstrated DRAM helps utility partners with their electric resource adequacy requirements during the summers and for future years while lowering the electrical demand.

Kairam (2017) described an opportunity to support the California economy by allowing electric grid operators to trade clean energy resources across the Western United States when the state produces more clean energy than it needs creating a larger market. CAISO and state lawmakers are creating a new process called *regionalization* to integrate a western regional energy market to increase the state's ability to rely on renewables and lower energy costs (Navarro, 2016). Navarro (2016) summarized the potential benefits of a western regional market which include creating about 19,000 more jobs by the year 2030, saving about $500 per year for households, and reduce harmful pollution.

The transition of electric power grids towards renewable energy and distributed energy leads to the addition of MEGs (Ozadowicz, 2017). Gabbar and Koraz (2017) noted MEG's increase their self-healing capability by utilizing adaptive grid topology with multi-local energy sources, reduce energy loss, and integrate numerous types of energy sources such as fossil fuels, wind turbine, solar photovoltaic, hydro, geothermal, combined heating and cooling, combined heat and power, and waste-to-energy. Microgrids pose new challenges with the operation and stability of multiple distribution electric power grids working together (Ozadowicz 2017). Jackson (2017) described additional challenges with distributed renewable energy and how the unreliability could potentially create energy blackouts. Jackson continues to explain that the economist

Travis Fischer said renewables could be the single largest threat to reliable electricity and create more problems with grid reliability, which stems from bad policies.

Solutions for these challenges can come from technologies such as demand response offers consumers a significant role in the delivery of flexibility by reducing or shifting their electricity usage during periods of stress or constraint (Tracey, John, Michael, Richard, & Muneeb, 2018). The integration of DER into the electric grid requires communication of DER elements and automated operational control in concurrence with the utilities human-directed and existing automated control with the rest of the electrical system (Stamber et al., 2017).

Ozadowicz (2017) demonstrated how commercial buildings play a pivotal role as consumers and can be equipped with the technical infrastructure with generation and storage energy technologies and controls to manage the consumption and distribution of energy. The implementation of DER technologies suggests there are policy and security gaps (Stamper et al., 2017). The operator of California's electrical grid CAISO received approval from the state for a structure in which smaller demand response can meet reliability needs at the wholesale level when grouped together to reform the market through aggregation (Kairam, 2017).

Another example of market aggregation is community choice aggregators which allows local communities to share in the cost and benefit of managing electrical utilizes (Halstead, 2017). Halstead (2017) explained how energy customers in the future could buy energy from the utility or their local community choice aggregator which could revolutionize California's electrical infrastructure.

The Need for Efficiency in Buildings

A major driver in the United States for development of energy efficiency programs is the opportunity for utilities to avoid additional costs, be an energy supply option, increase efficiency in commercial buildings, and energy resource planning (Yushchenko & Patel, 2017). A key challenge facing electric utility restructuring is to ensure that public goods, like energy efficiency programs, are enhanced and maintained via government action and regulatory policy (Vine, Rhee, & Lee, 2006). Vine et al. (2006) described how the process and infrastructure need to be planned and implemented for measurement and verification of energy efficiency programs. An example of an energy efficiency program is Retrofit Los Angeles, which is a program to implement energy efficiency projects for existing commercial buildings (Choy & Rosales, 2014). Choy & Rosales (2014) described three program objectives to stimulate building energy retrofits, which include streamlining the process for building owners and contractors to reduce transaction costs, utilize effective outreach and marketing to building owners, and provide financing mechanisms.

Electricity is valued at $431 billion in the United States and commercial buildings use 74% of the nation’s electricity and 50% of the energy consumption in commercial buildings coming from heating, ventilation, and air condition (HVAC) systems (Liang, Quinte, Jia, & Sun, 2015). One-third of California’s total electricity consumption is being consumed from commercial buildings with an estimated costs of about $9 billion per year (Xu et al., 2012). The pressure to increase energy efficiency is mounting and California is part of 24 states in the United States requiring utilities to meet energy efficiency goals (Headrick, 2016). Since the 1970’s, California has had aggressive policy for energy efficiency for commercial buildings (Tonn and Peretz, 2007). Reyna & Chester (2017) noted that over the past four decades California has been a leader in aggressive energy efficiency policies and investing into energy efficiency programs.

Vine et al. (2006) noted California's history of energy efficiency programs can be divided into four periods: (a) pre-Protocol Era (1970's-1994), (b) the Protocol Era (1994-1997), (c) the Restructuring Era (1998-2000), and (d) Transition period (post-2000). Vine et al. (2006) further described the four periods:

- The pre-Protocol Era: when the California Public Utilities Commission (CPUC) authorized a variety of energy efficiency programs consisting of informational services including energy audits, demand-side management, and financial assistance such as rebates to reduce the cost of installation for energy efficiency measures with the incentives tied to the first year savings for shareholders;
- The Protocol Era: when the CPUC established more rigorous measurement and evaluation protocols, terms and conditions, and statewide consistency, which tied shareholder incentives to lifecycle benefits that were led to the passing of Assembly Bill 1890 to restructure the electric industry in California;
- The Restructuring Era: when Assembly Bill 1890 began to implement the major terms with programs utilizing standard performance contracting (SPC), upstream market transformation funding, and utility performance awards were limited, and there were increased expenditures in measurement and evaluation to quantify the benefits to expand the

upstream market transformation;

- The Transition period: during this time California continued to experience uncertainty with dramatic increases in electric utility rates, utility energy efficiency funding, administration, measurement and evaluation, and the resurgence of energy efficiency, which was sparked by the electricity crisis in the year 2000. (pp. 1102-1106)

Tonn and Peretz (2007) explained energy efficiency as a term that covers a broad range of processes, changes in behaviors, and technologies. Energy efficiency measures for commercial buildings include efficient lightings such as light-emitted diode (LED), adjustable speed drive motors, building management controls, efficient HVAC equipment, and insulation (Headrick, 2016). Energy consumption from HVAC is a large portion of the commercial building energy usage in California and space cooling is pivotal in determining the timing electrical demand (Xu et al., 2012).

Emerging clean energy technologies appear to be a potential driving force for efficiency in commercial buildings. Energy efficient technologies can save money, reduce energy usage in commercial buildings while mitigating the environmental impact of energy use (Lee et al., 2015). Energy efficiency and the performance of commercial building HVAC systems can be significantly improved by implementing optimal and intelligent building management controls (Liang et al., 2015).

Controls can be divided into soft control, hard control, hybrid control, and model predictive controls (MPC) to handle time-varying disturbance, slow-moving dynamics, and nonlinear constraints, which could harvest over 27% energy savings (Liang et al., 2015). According to Alphabet (2015), additional technologies such as waste to heat power technology can reduce greenhouse gas emissions and generate clean electricity. Liu (2014) noted another enabling clean energy technology is energy storage, which can support large-scale renewable energy through the use of building management controls. Lambruschi (2015) wrote, "Energy storage technology providers can optimize the economic value of their investment by providing multiple services, supported by a suitable tariff and revenue streams" (p. 24).

Energy efficiency may be supported by a cost-effectiveness analysis that compares the reduction in energy consumption benefits to the costs of energy efficient measures (Yushchenko & Patel, 2017). Yushchenko and Patel (2017) explained the evaluation of a cost-effectiveness is based on indicators including cost of saved energy, lifecycle costs, investment profit, marginal costs, payback time, and benefit to cost ratio compared to expenditures of alternative solutions. Optimizing incentives for building size could be an opportunity to help lawmakers increase the success and energy savings of energy efficiency programs while decreasing the strain on the electric utility grid (Roy et al., 2016).

Lee et al (2015) explained that to improve energy efficiency in commercial buildings, utility incentive programs, and government retrofit guidelines need to promote success stories of commercial buildings that have been retrofitted and are more energy efficiency. California provides many incentives for energy efficiency investments to government sector, industry, schools, and the private commercial building sector (California | ACEEE, 201). Many building owners leverage energy service companies (ESCO's) to identify effective management and retrofit strategies for their commercial buildings while combining incentives, energy and operational savings, and energy saving guarantees to develop cost-effective solutions for energy efficiency projects (Lee et al., 2015). If an organization has energy and climate change goals but lacks in-house experience, hiring an ESCO can help design, develop, and implement energy projects while providing guidance about alternative financing mechanisms for funding projects (Energy Savings Performance Contracts | Department of Energy, 2017).

An example of the challenge with energy efficiency can be seen with state colleges trying to manage their energy systems and budgets while working with the state budget allocation process and budget cuts (Lundin, 2013). These colleges, along with other public government agencies and building owners, face challenges in dealing with shrinking budget resources and fewer personnel to support energy efficiency projects (Lundin, 2013). Policymakers can leverage cost-effectiveness analysis as a tool to use energy efficiency to develop the energy policy that could justify investments by public bodies, building owners, and gain public support (Yushchenko & Patel, 2017). It is also important to predict the impact of climate change on statewide building energy usage so policymakers can respond to concerns impact about energy in the building sector (Xu et al., 2012).

Even though there are new innovative technologies and energy efficiency programs available for commercial buildings to increase energy efficiency, the main challenge is how to meet building owners' investment criteria with effective building retrofit measures (Lee et al., 2015). Energy efficiency building retrofits are a critical component to achieving carbon emission reductions and energy savings (Choy & Rosales, 2014). Choy and Rosales (2014) noted that although technologies and building improvement measures for energy efficiency are readily deployed and available for the marketplace, establishing the best appropriate model for implementation as a standard practice remains a challenge.

Overview of Energy and Climate Policy for Buildings

Kahn (2016) described the birth of California's climate change policy beginning in 1967 with Ronald Reagan creating the California Air Resource Board and the California Energy Commission. Wara (2014) notes Jerry Brown showed early efforts as the governor, encouraging energy efficiency with building standards adopted in 1983. In 1984, the California Smog Check program began to reduce pollutants and was followed in 1999 with the California Fuel Cell Partnership (Kahn, 2016). The California Public Utilities Commission for over 30 years has approved the use of ratepayer funds and authorized major investor-owned utilities to administer energy efficiency programs (Vine et al., 2006).

Energy efficiency and building standards were policies adopted to reduce carbon emissions and support the electrical utilities. Mehdi et al. (2015) explained that California took a step toward addressing climate change in 2000 with the California Action Registry, which is a voluntary effort for companies to measure and report their carbon emissions. California's legislature in the year 2001 continued to mandate energy efficiency and directed the California Energy Commission to investigate additional options and design a plan to decrease energy consumption in existing commercial buildings (Tonn and Peretz, 2007). This milestone was followed up in 2002, when Gray Davis made California the first state to regulate greenhouse gas emissions from vehicles and also created the first renewables portfolio standards (Kahn, 2016).

Vine (2011) listed the policies in years 2003 through 2008:

- Energy Action Plan in 2003;
- Executive order Green Building Initiative in 2004;
- The Million Solar Roof in 2006, executive order for biomass production, and Senate Bill 1368 for greenhouse gas emissions standards for electricity imported;
- Assembly Bill 1470 in 2007 created incentives for solar water heaters and Assembly Bill 2021 that required municipal-owned utilities to prepare 10-year energy efficiency goals;
- The Green Buildings Standards (GBS) code in 2008. (p.75-99)

The following year, 2009, California Renewable Energy Resources Act set a goal for California to supply a third of electricity from renewable energy by the year 2020 (Considine & Manderson, 2013). Considine and Manderson (2013) described how this goal will harvest many new jobs for large renewable energy projects and grow the economy. Kahn (2016) asserted in 2002 that the renewable energy standards were developed and started large solar installation development. Cook (2013) wrote, "Building energy codes and electric appliance standards have played a prominent role in California's energy policy for almost 40 years" (p.68).

Danelski (2015) noted that Arnold Schwarzenegger, California governor from 2003-2011, signed landmark legislation requiring the state's utilities to generate 33% of the energy for the grid from renewable energy resources through the California Renewable Energy Resources Act with the Renewable Portfolio Standards (RPS). Kahn (2016) asserted Schwarzenegger approved $3.3 billion in incentives for the Go Solar California program for rooftop solar panels. The 33% RPS included benefits for new renewable energy construction projects and will have a positive impact on the economy coupled with savings to electricity consumers (Considine & Manderson, 2016). According to Dhanaphatana (2015), Schwarzenegger worked to make California a leader in climate sustainability: "Climate change is an enormous weight that we must lift off of our world. We can lift it, but we must do it together. Together we can do it, together with no challenge and no dilemma is too much" (p. 1).

Slater (2006) noted Schwarzenegger signed Assembly Bill 32 (AB32) and stated this legislation will increase the state product by $60 billion and provide a competitive advantage for the global marketplace. In the year 2007, Doughman (2007) described how AB32 required California to reduce greenhouse gas emissions to 1990 levels by the year 2030. Danelsky (2015) described, "The state now gets about a fourth of its power from non-carbon, alternative sources, which include wind and geothermal, according to state figures" (p. 1). In 2013, California began requiring building owners to provide their energy consumption data and requiring the California Energy Commission to establish a public disclosure program with building energy benchmarking program for commercial buildings through policies Assembly Bill 1103 and Assembly Bill 802 (California | ACEEE, 2017). There are additional implications suggested by the research that California continues to push climate change policy in 2016.

Lacey (2016) suggested some states, including California, are pushing ahead to comply with the current EPA carbon emissions standards by enacting a wide range of climate change policies. According to Danelski (2015), California is implementing tougher climate change policies than the federal government. Halper (2014) determined that California's climate change laws are stricter than the federal Environmental

Protection Agency (EPA) rules for carbon emissions. Kahn (2016) identified that California ranks highest in the nation in just about every renewable-energy category.

California political leaders recognized they could never solve global warming alone. Kahn (2016) noted California only accounts for 1% of global emissions and legislators never thought state policy could solve global warming, but they thought they could demonstrate that reducing carbon emissions is possible. Mary Nichols, the state's chairwoman of the California Air Resource Board, stated, "Our goal has always been to make California a leader and help push action by the federal government" (as cited in Halper, 2014, p. 1). Through the adoption of Assembly Bill 398, the cap-and-trade legislation, California is requiring greenhouse gas emissions be cut to 40% less than the year 1990 levels by the year 2030 (Jackson, 2017).

Nichols (2010) explained that the cap in trade program will accelerate progress toward a clean energy economy. Taking it a step further, Nichols (2017) stated companies with the greatest flexibility to find innovative solutions that increase security, drive green jobs, and clean our environment will help ensure that California stands ready to compete in the booming global market for clean and renewable energy. Kahn (2016) explained that Nichols is credited with helping to create the carbon market so California can achieve its emission goals with low costs.

Jerry Brown actively speaks out against climate change opposition. Kahn (2016) commented, "Brown calls climate change deniers troglodytes and blames global warming for every natural calamity that befalls California" (p. 38). Gardels (2015) explained that Governor Brown is making long-term tough decisions for California to improve the environment and economy. During a visit to China in April 2013, Governor Brown stated, "We can foresee a day in the not-too-distant future when governments, businesses, and the environmental community join together to drive national and international action on climate change from the ground up" (as cited in Davis & Charest, 2013, p. 55).

Governor Brown is working on a new landmark climate change policy. According to Kahn (2016), Brown is adopting Senate Bill 350, the Clean Energy and Pollution Reduction Act, mandating California to double the energy efficiency in commercial buildings and require the utilities to get half of their energy from renewable resources by 2030. Yeh et al. (2016) noted California has additional goals for the year 2030 with AB 32 emission targets and there are six energy models to consider that include: least-cost optimization, stock-turnover, back-casting, electricity dispatch, and macroeconomic, and macro-econometric models to inform state legislators in setting climate policy targets and goals. Leveraging these models will produce positive economic results for the transformation of the California energy system comprising of efficiency improvements for commercial buildings and autos, low or zero carbon electricity, electrification of end-uses, demand reduction, large reductions of non-energy GHG emissions, and aggressive adopting of zero-emission vehicles (Yeh et al., 2016).

Reyna and Chester (2017) described ambitious building energy initiatives including Assembly Bill 758 to develop a comprehensive plan to double energy savings from existing commercial buildings by the year 2030 and the goal for all new commercial buildings be Zero Net Energy (ZNE) by the year 2020. As the sixth largest economy in the world, California has shown that robust energy and climate policy is possible while developing a thriving economy and clean energy creates more jobs in the state than fossil fuels (Kairam, 2017). Considine and Manderson (2013) summarized that California's energy and climate policies would make the state more energy self-sufficient and lessen dependency on importing energy from fossil fuels.

Synthesis Matrix

The literature assessment was conducted to discover related aspects of this topic utilizing the theoretical framework energy policy. Patton (2015) described the literature review as the whole picture of what is known in a particular subject. Data related to California energy policy was synthesized to determine common themes and gaps in the literature. Themes and factors that surfaced within this topic included energy efficiency in commercial buildings, energy resiliency, greenhouse gas emission reductions, climate change, and grid infrastructure. The Synthesis Matrix created for this literature review is located in Appendix A.

Summary

The goal of this study is to contribute to the body of research on effective energy policy in California. The literature review has identified the gaps in the research. There appears to be little research addressing the best incentives for emerging technologies helping to reduce greenhouse gas emissions. Hubble and Ustun (2016) suggested new technologies such as stationary battery technology could play a larger role in future energy policy legislation. Other gaps in the research may include the impact of microgrids and new types of climate energy goals such as carbon neutrality.

Through careful analysis of the historical implications that led to the development of energy policies in California, researchers have identified several emerging patterns within the state's policies that laid the foundation for the creation of AB 32. Gardels (2015) wrote, "California has become like a gigantic Renaissance Florence for the knowledge and tech-driven economy shaping the whole world" (p. 5). Burton (2014) noted California is the most energy efficient state in the nation. While the research reports elements of progressive emerging patterns with energy policy in California, it lacks emphasis on the role of the private sector within the commercial building industry, in addition to the deficient emphasis on how climate and energy policy is implemented while improving the economy.

CHAPTER III: METHODOLOGY

Overview

Chapter III delineates the research design and the methods used to implement this Policy Delphi study. This chapter also includes the purpose of the study, research questions, research design, population and sample, data collection, instrumentation, data analysis, and limitations.

Purpose Statement

The purpose of this Policy Delphi study was to identify and assess the energy efficiency policies for commercial buildings in California that experts believe are most important and likely to be implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.

Research Questions

1. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?
2. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are most important by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?
3. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts rate as having the highest likelihood of being implemented

by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?

Research Design

The descriptive Policy Delphi methodology was selected for this study to forecast the future statewide policies for energy efficiency in commercial buildings in California. The Delphi technique is the best fit for the study since it is a future prediction methodology. Chia-Chien and Brian (2007) described the Delphi technique as a "group discussion process which aims to achieve a convergence of opinion on a specific real world issue" (p.1). Chia-Chien also indicated that the Delphi technique has been used for policy determination studies using a series of questionnaires solicited from experts in a specific topic. Using experts in an autonomous Policy Delphi study will elicit their ideas for future policies in Round One and then through a series of surveys, achieve a consensus and their top policy recommendations in Rounds 2 and 3.

Utilization of industry experts provides legitimacy to the forecasting exercise (Cornish, 1977). Helmer (1967) described the Delphi study as a program that utilizes individual examinations while eliminating the committee activity among the panel of experts. This Policy Delphi study utilized an expert panel who responded to controlled questionnaires to develop energy policy alternatives. Inside the framework of policy analysis, this Policy Delphi descriptive study was designed around the insights of a nominated expert panel. The panel was asked to identify policy options and systematically rate those options in three structured rounds, to achieve consensus on a common set of future policies.

The Policy Delphi methodology is uniquely designed and best suited for identifying the policy alternatives that are the aim of this study. Turoff (1970) noted the Policy Delphi study is designed to harvest probable resolutions of a major policy issue through the strongest possible opposing views. Turoff continued to describe that the Policy Delphi is a "tool for analysis of policy issues and not a mechanism for making a decision," and the decision maker in the Policy Delphi is interested in an "informed group presenting all the options and supporting evidence" rather than "having the group generate a decision" (p. 80).

According to Dalkey, Rouke, Lewis, and Snyder (1972), the Delphi study has three criteria for determining the appropriate research method. The criteria include (a) generating an expert opinion on a particular subject, (b) informed subjective opinion will benefit the study, and (c) the development of the survey will stem from the active role of the expert panel. This study met Dalkey et al.'s criteria and involved collection of experts who participated in three rounds of surveys.

Population

McMillan and Schumacher (2013) noted that the population is the collection of individuals from a total group of similar characteristics. Clayton (1997) explained how the Delphi study requires a selection of experts with similar knowledge of a subject under research. The study population for this current study consists of individuals who have made a contribution to the fields of study or have worked professionally in the energy and building industry within the United States known as *green jobs*. According to the Bureau of Labor Statistics (BLS), green jobs are defined as jobs in business that either provide services or produce goods that benefit the environment and conserve resources or jobs in which workers' duties involve making their establishment's production processes use fewer natural resources (Green Jobs: U.S. Bureau of Labor Statistics, n. d.). The United States had about two million establishments that employed green jobs.

In 2011, there were 3.4 million Green Goods and Services (GGS) jobs, accounting for 2.6 percent of total U.S. employment with California having the largest percentage of GGS jobs by state with about 360,000 employed. The percentage of types of employment related to the study include 13.6% in utilities, 9.7% in construction, 2.9% in manufacturing, 1.1% in trade, 4.1% in professional and scientific services, and 5.7% in administrative services. From the 360,000 employed in California there is no data of how many individuals have the knowledge and experience in energy policy and commercial building energy efficiency. Therefore, it was necessary to establish criteria on the characteristics of experts needed for the study, and to use the advice of noted experts in the field to nominate experts to participate in the study.

Target Population

A target population for a study is the entire set of individuals chosen from the overall population for which the study data are to be used to make inferences. The target population defines the population to which the findings are meant to be generalized. It is important that target populations are clearly identified for the purposes of research study (McMillan & Schumacher, 2013). The target population in this study was identified as business leaders and policy experts within the GGS jobs sector who have gained knowledge in the fields of study with California energy policy, building industry, economy, and energy resiliency in the state.

This Policy Delphi study included 24 experts who were nominees randomly selected from the target population who possessed titles in the building and policy industry that included policy director, program manager, legislator, business development, director, lobbyist, educator, business analyst, and vice presidents. The three types of panelists that create a successful mix of experts are facilitators, stakeholders, and subject matter experts with specific knowledge about the subject of the study (Linestone and Turoff, 1977). Panelists were stakeholders and experts in the topics of California energy policy, building industry, economy, and business. Experts were nominated based on their years of industry experience, professions in commercial buildings and energy conservation, publications, and public speaking engagements. The panel of experts were contributors toward creating energy policy in California or were affected by policy based on doing business in the state.

Sample

Skulmoski and Harman (2007) explained how the Policy Delphi technique should select a sample based on the expert's ability to answer the research questions. This Policy Delphi study invited participants who were selected from a larger population of experts in the United States who are knowledgeable about California energy policy, commercial buildings, energy resiliency, and the economy. Experts on the panel were selected in part based on their accessibility and availability to complete the three rounds of surveys. The review of the literature indicated these four groups represent the stakeholders who are most often involved in shaping energy policy in California.

The sample population was 24 experts randomly drawn from a list of individuals who were nominated by one of three advisors. Individuals were nominated for one of the four subgroups: (1) energy policy, (2) building industry, (3) economy, and (4) energy resiliency experts. The random drawing process utilized the Research Randomizer (https://www.randomizer.org/) website to generate random numbers and assign to participants for research purposes. The first six selected individuals were placed into each of the four subgroups until 24 individuals were chosen for the panel of experts.

According to Ulschak (1983), most Delphi studies have a panel of between 15 and 20. Panelists for this study were nominated by a group of three advisors who collaborated with the author. Selection of the advisors was based on their industry profession, public recognition, published work, or delivered presentations educating the industry about energy policy, climate change policy, building knowledge, or the California utility infrastructure.

The three advisors who consulted with the researcher in recommending expert panelists are identified in Table 1.

The advisors applied the screening criteria listed in Table 2 to select experts to serve on the Policy Delphi study panel. Nominated panelists were contacted by the researcher and asked whether or not they could participate throughout the entire 3 rounds of the study. Screening criteria were divided into four subgroups: (1) California energy policy experts, (2) building experts, (3) California economy experts, and (4) energy resiliency experts. Individuals who have related experiences and backgrounds concerning the target issue, are capable of contributing helpful inputs, and are willing to revise their preceding

Table 1

Advisors Used to Select Panelists

Name and Position	Qualifications
Rex Hime President California Business Properties	1. Former Executive Director of the California State Commission for Economic Development 2. Statewide knowledge of building and energy policy. 3. Extensive background qualifying him as an acknowledged spokesman for the real estate industry and economy. 4. Recognized voice with the real estate industry in California representing the largest commercial real estate consortium.
Dan Fietelberg Principle KPMG	1. Expertise with the development of public-private partnerships for public infrastructure and commercial buildings. 2. The former Vice Chancellor University of California Merced. 3. Former Board of Director of California Foundation on the Environment and the Economy. 4. P3 Bulletin's 2016 Individual Contributor of the Year.
Clay Nesler Vice President Global Energy and Sustainability Johnson Controls	1. Extensive knowledge of building technologies and recognized spokesman. 2. Board member for American Council for an Energy-Efficient Economy 3. Originated the Johnson Controls Institute for Building Efficiency 4. Industrial Advisory Board of the US-China Clean Energy Research.

Decisions for the purpose of reaching consensus are considered qualified to be invited to participate in the Policy Delphi study (Turoff, 1970).

Turoff (1970) explained the three groups of people who are qualified to participate in the Policy Delphi include decision makers who will utilize the outcomes of the study, professional staff members, and the respondents to the questionnaire whose decisions are being pursued. Advisors were asked to nominate seven to 12 professionals who were qualified from the assigned categories and met at least three out of the four requirements in the selection criteria. The researcher then finalized the selection of the expert panelists within the four subgroups who have the knowledge and expertise to connect the need for effective California energy policy, growing economy, efficient commercial buildings, and energy resiliency leading to less dependency on the utility grid (see Table 2).

Once the study was approved by the Brandman University Institutional Review Board (BUIRB), the researcher contacted the selected panelists through email. A random number table was used to select six panelists for each sub-group out of the total recommended individuals from the advisors. After six individuals were selected for each subgroup, the panel of 24 individuals was finalized.

Each of the invited participants received an email from the researcher that contained the introduction, letter of informed consent which included the procedural safeguards, survey instructions, and timeline for the study. Invited participants were instructed by the researcher to reply back if they did not want to participate in the Policy Delphi study. The introduction explained that the experts are one of twenty-four participants and will remain anonymous throughout the rounds of surveys. When the

Table 2

Screening Criteria and Nominators, By Subgroup

Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Policy Experts	Building Experts	Economy Experts	Energy Resiliency Experts
Nominated by,	Nominated by,	Nominated by,	Nominated by,
Rex Hime	Dan Feitelberg	Group	Clay Nesler
Have served in positions with state agencies, legislators, or department heads in California	Have served in positions in the building industry and that demonstrate knowledge about the economy, policy, and building codes in California	Have served in positions as labor market experts, researchers, or economist and are knowledgeable about the economy, building code, and building trends in California	Have served in positions of ownership or business operations and are knowledgeable about energy resiliency in California
Have delivered presentations related to energy policy, building code, or economy in California	Have delivered presentations related to the building industry in California	Have delivered presentations related the economy in California	Have delivered presentations related to energy resiliency in California
Have conducted research, consulted, or authored a publication that relates to energy policy in California	Have conducted research, consulted, or authored a publication that relates to the building industry in California	Have conducted research, consulted, or authored a publication that relates to the economy in California.	Have conducted business, research, consulted, or authored a publication that relates to energy resiliency in California
Have participated on a state board, local board, policymaking, or advisory board related to energy policy in California	Have participated on a state board, local board, or advisory committee related to the building industry in California	Have participated on a state board, local board, or advisory committee related to the economy in California	Have participated on advisory committee related to energy resiliency in California

Policy Delphi study was complete, the list of participants was published in the appendix of the dissertation (Appendix L). Participants had the option to opt out of the list if they did not want their name published. All of the expert panelists and advisors were given a copy of the final dissertation.

The expert panel was limited to inviting 24 professionals and designed to conform to the participant variables described by Weatherman and Swenson (1974). An equal number of professionals allowed for a substantial number of responses in Round One. Most Delphi studies had a total panel size of between15-20 (Ulschak, 1983). The number of 24 participants provided a balance of subject matter experts within different fields of knowledge in energy policy, building energy efficiency, and energy technologies, exceeding recommended panel size described by Ulschak and Weatherman and Swenson. If some participants were unable to complete the Policy Delphi process, the use of 24 participants allowed room for mortalities within the sample and still arrive at a consensus. The researcher determined that a sample size of 15 could still reach a consensus with a mortality rate of up to nine experts.

Upon approval of the BUIRB, the expert participants were selected according to the predetermined process (see Table 3).

Table 3

Policy Delphi Study Panel Selection Process

Steps	Action Taken	Timeline
Step 1	Researcher selected and invited three expert advisors to participate in Policy Delphi Study.	January 2- January 6, 2017
Round 2	Researcher provided the instructions to advisors for nominating experts using the selection criteria	January 8- January 10, 2017
Round 3	Expert advisors and the researcher nominated 12 expert individuals and provided the nominations to the researcher.	January 11- January 15, 2017
Round 4	The researcher used the randomizer to select 24 experts nominated by the expert advisors.	January 16- January 17, 2017

Instrumentation

Historically, the Policy Delphi methodology has been based in two distinct phases for gathering expert opinions. According to Adler and Ziglio (1996), the first phase is exploratory, as experts explore the subject at hand and possible solutions and the second phase is evaluative and requires experts to assess the panelists' views. Concepts from the literature review were used to filter and clarify the input in the Round 1 survey and to develop the list of policy alternatives used in Rounds 2 and 3. This Policy Delphi study encompasses three rounds of survey questionnaires. Panelists received an email prior to Round 1 that included the introduction letter, informed consent letter, survey instructions, and timeline. The instrumentation and site for the Policy Delphi surveys was the Survey Monkey website at www.surveymonkey.com on the internet. The website Survey Monkey, is an internet hosting site that enables a researcher to develop surveys for use over the internet and utilize automated email distribution while collecting the data (Waclawski, 2012).

Round 1 materials were delivered through Survey Monkey via email to each expert selected for the panel. The materials include the survey questionnaire and an example of an energy policy statement. The Round 1 survey included an open-ended question inquiring, “What statewide energy policy alternatives for energy efficiency in commercial buildings are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.” The experts’ responses to the initial broad, open-ended question were collected through Survey Monkey.

Mitchell (1991) explained how open-ended questions in the Delphi methods help the panelists to demonstrate their expertise. Round 1 responses were analyzed by the researcher and organized into a list of similar categories. The list of responses was edited by the researcher to combine similar items into a single statement, to alleviate redundancy, and clarify or eliminate vague or unintelligible statements. The Round 1 list of responses was inserted into the Round 2 survey instrument.

The Round 2 instrument included the results from Round 1. The survey instrument was designed by the researcher for the expert panel to give their responses using the Survey Monkey website. The information and instructions for Round 2 were emailed to each panelist through Survey Monkey. The survey instrument consisted of a list of 50 items. Each item was followed by two 10-point Likert scales: one scale for rating the importance and the second scale rating the likelihood of the implementation. Each participant provided their ratings for items and submitted their answers through

Survey Monkey. Participants were informed they would have the option to change any of their answers from Round 2 after reviewing the results from all the participants. The survey took about 20 minutes to complete for the participants. The ratings from the participants were downloaded from Survey Monkey and processed by the researcher to prepare for Round 3 of the Policy Delphi process.

The purpose of Round 3 is to help build consensus among the expert panel. Round 3 of the Policy Delphi process gives the expert panel information on the ratings of the entire panel for each item and offers them the opportunity to change their ratings. The Round 3 instrument consisted of the same survey items from Round 2. The experts were given their ratings from Round 2 and the median rating for each item. For Round 3 they were asked to review the information provided and determine if they would like to change any of their previous ratings for any survey items. The panelists were allowed the option to provide any comments regarding their reasoning behind the changes in a comment box at the end of the survey within the Survey Monkey instrument in Round 3. Information and instructions for beginning Round 3 were emailed to each of the participants (Appendix H). After data were received and analyzed from Round 3, the participants received the final results of the panel through Survey Monkey via email.

Data Collection

This Policy Delphi study gathered data through survey questionnaires in order to answer questions and develop consensus to predict future energy policy for energy efficiency in commercial buildings. The Policy Delphi technique provides a platform for avoiding challenges with face-to-face discussions and arrive at a consensus while remaining anonymous. The BUIRB required the study to have safeguards for the participants and confirm anonymity. Consent was received from the BUIRB on January 10, 2018. Two steps were implemented to ensure anonymity for all participants: (1) the identity of each participant was not disclosed to the other participants; and (2) all responses from the participants were not credited to the specific expert on the panel. Experts on the panel were informed that three advisors aided in the nomination of the expert panel. They were not informed on how the selections were made or the names of the advisors who nominated them. The names of the panel members were kept anonymous throughout the study, except to the advisors and the Policy Delphi coordinator.

The study employed the Policy Delphi process encompassing three rounds of questionnaires surveying policymakers, state administrators, building experts, scholars, utility experts, and energy technology experts in the building industry. Round 1 materials were delivered through email from Survey Monkey. Panelists were asked to identify "what statewide energy policy alternatives for energy efficiency in commercial buildings are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy." Round 1 responses were collected by Survey Monkey and reviewed by the researcher. The Analyze Tool in Survey Monkey was utilized to identify the themes in the responses. Round 1 list of responses was placed into a survey for use in Round 2. The list contained 50 policy alternatives. The list was compared to the concepts that emerged in the literature review to ensure the final list was comprehensible.

The list was also compared against the following criteria as a basis for the 50 selected policy alternatives:

- The policy alternative was an action that would be accomplished in the future, not an action already fully achieved or implemented;
- The intended action of the policy alternative was clear;
- Each policy alternative statement focused on the main policy concept;
- The policy alternative could plausibly be considered within the discretion and action of state government;
- The policy alternative had a statewide policy scope.

In addition to the selection criteria, the three advisors, with the assistance of the researcher, eliminated policy options for other reasons including a policy was not within the defined scope of the study, a policy statement was incomprehensible or vague; a policy alternative could not be reduced to a sensible length, a policy statement was repetitive, or represented a minor variation of a policy alternative selected for Round 2. The process resulted in a final list that contained 50 policy alternatives used in Round 2.

Round 2 included a survey sent from Survey Monkey with instructions and information explaining the Likert scale survey and the process. The instrument consisted of 50 items and each item was rated for Importance and Likelihood of Implementation. The panelists ranked the survey items using a 10-point Likert scale. Each item was rated for importance, with one being the lowest level of importance and 10 being the highest level of importance, and for Likelihood Implementation, one being the lowest likelihood of being implemented and 10 being the highest likelihood of being implemented. Responses from Round 2 were calculated by the researcher for the median ratings and interquartile range. When the calculations were completed the numbers were placed for each item on the Priority Matrix chart based on the median for importance and the percentage within the interquartile range

Round 3 followed the same email protocol using Survey Monkey as Round 1 and Round 2 with new instructions. An attachment was included in the email providing the panelists the median ranking from all participants for each Round 2 item, their own ranking for each item, and the Priority Matrix. Panelists were asked to review all the rankings for the responses and were the given the option to change any of their initial responses. At the end of the survey, a text box was provided and participants were asked if they would like to make additional comments about their reasoning behind any of their changes. Following Round 3, the responses from the panelists were recalculated and the data was stored securely by the researcher

This Policy Delphi study was presented to the BUIRB for quality review on December 15, 2017. The purpose of the IRB is to protect those partaking in a research study, regarding ethical issues, confidentiality, and protection from harm (Roberts, 2010). The BUIRB form was accessed, and once the form was completed, it was submitted to the BUIRB. Once the form was submitted, it took two weeks for the researcher to receive approval. The BUIRB process required comprehensive and detailed information about the study, the consent process for participants, how their confidential data would be protected for anonymity, and how they would be contacted by the researcher. Before data collection can begin it is required to have signed permission from the IRB committee (Roberts, 2010). This study, upon BUIRB review, posed a minor risk because the possibility of discomfort or harm to the participants was not greater than they would customarily experience. Upon BUIRB approval, a letter was sent to the researcher that included the study's assigned number for the researcher's reference. Prior to collecting data, the researcher received certification by completing the required training to conduct research on human participants (Appendix Q).

Upon approval of the BUIRB, data was collected according to the predetermined process (see Table 4).

Table 4

Policy Delphi Study Schedule

Round	Action Taken	Timeline
Disclosures	Email introduction, informed consent, survey instructions, and timeline	January 18- January 19, 2018
Round 1	Email description of purpose of study, expectations, directions for completing Round 1 survey	February 8th- February 23, 2018
Round 2	Email directions for completing Round 2 and rating the responses from Round 1	March 12- March 14, 2018
Round 3	Email directions for completing Round 3 and rating responses from Round 2	March 15- March 19, 2018

Validity and Reliability

By its process, the Policy Delphi method is a future predicting methodology that uses a systematic, randomized, and confidential process, and the results are based on the expertise of the panelists. As such, the process is inherently valid and reliable. The three survey instruments were sent by the researcher through Survey Monkey to the advisors for review and to help ensure the face validity of each instrument (do the questionnaires appear to measure what the instrument intends to measure, ease of use, clarity of instructions, and the amount of time to complete the survey).

The synthesis matrix (Appendix A) from the Literature Review was used to assist the researcher in understanding and clarifying the policy alternatives submitted in Round 1. The synthesis matrix was also used to determine whether or not a policy alternative suggested by an expert was already fully implemented in state policy, and therefore not appropriate for inclusion in the study. The comparison of the Round 1 policy alternatives to the synthesis matrix further supported the validity and reliability of the final Round 2 and 3 surveys. Triangulation and interrelated reliability are techniques that are utilized to validate findings (Roberts, 2010).

Data Analysis

Panelists' responses were analyzed utilizing descriptive statistics in Rounds Two and Three. The researcher utilized an online statistical program through Survey Monkey to calculate the data. Data were calculated for the median scores, interquartile range, and the percentage of scores occurring within the interquartile range. These calculations were used to determine the importance and likelihood of implementation for each of the 40 policy statements included on the round 2 and 3 survey instruments.

Data presented were comprised of:

- Highest median score for importance among the policy statements necessary by the year 2025;
- Policy statements that received the highest median scores for likelihood of implementation;
- The Interquartile Range (IQR) of expert responses for importance and likelihood of implementation, and the percentage of scores that fell inside the IQR;

- Distribution of ratings from the highest ranked responses to the lowest ranked responses;
- Distribution of policy statement composite rankings on the priority matrix;
- Highest combined median score rankings for importance and likelihood of implementation.

For the purpose of this study, a consensus is achieved when the IQR was two or less among the expert panel. IQR is the central 50 percent interval or distance between quartile one and quartile four (Novick & Jackson, 1974).

Limitations

The most significant strength of the study was the researcher's network and access to the thought leadership of a Policy Delphi panel of 24 building industry experts willing to participate in three rounds of surveys. The Delphi process was designed to lessen biases through the controlled feedback process and allowed the participants to generate thoughtful additional insights undisturbed by outside influences (Chia-Chien & Brian, 2007). In addition, biases and data flaws were reduced through the use of data triangulation strengthening the study. According to Linestone and Turoff (1977), there are five limitations when using the Delphi technique that includes imposing monitor views, assuming that Policy Delphi can be a surrogate for human communications, poor techniques of summarizing, ignoring disagreement, and panelists were not recognized as consultants for the study.

Limitations of the study were driven by the timeframe to gather data and facilitate the Policy Delphi process. Participants were limited to 24. Each participant had one week to complete each round of the survey with a total time frame of one month for the researcher to administrate the surveys. The survey participants had different perspectives from the researcher and some participants may have been reserved with their responses. The expert panel may have crafted their answers toward being politically correct based on their current profession. This may have reduced the quality of the data and influence the other participants in final rounds of the Policy Delphi process. Participants had different knowledge levels and experience affecting the choices in the surveys.

Summary

Forecasts by the year 2025 for California's energy policy for commercial buildings were provided by professionals with subject matter expert knowledge in their qualified fields. The Policy Delphi technique harvested numerous potential outcomes producing results that are beneficial for planning purposes. This study utilized a descriptive design to create influential strategies that could guide California policymakers in the near future. Data were collected from a qualified list of 24 experts who were invited to participate in the Policy Delphi process and considered experts in their respective fields. Selection criteria for the panelists were established based on their experience and industry knowledge with policy, commercial buildings, economy, and energy resiliency. Recognized experts were used to nominate and select the expert panelists.

Three rounds of surveys encompassed the Policy Delphi study. The survey instrument utilized was Survey Monkey and the panelists received email notifications to complete the surveys. The Survey Monkey platform allowed the researcher to leverage automation, communication mediums, and collect survey data. All trends identified by the panelists will be described in Chapter IV.

CHAPTER IV: RESEARCH, DATA COLLECTION, AND FINDINGS

Overview

Chapter IV presents an analysis of the data for the Policy Delphi study. This study was designed to bring a panel of experts to consensus regarding the importance of energy policy alternatives for commercial buildings that are necessary for the state of California to effectively make progress toward energy and carbon reduction policy goals and the likelihood of the implementation of these policy alternatives. The results of this study were collected from the recommendations of the expert panel using a Policy Delphi technique with three rounds of questionnaires. The expert panel identified and rated an energy efficiency policy statement for commercial buildings to answer the study's three research questions. The chapter consists of eight sections: (a) purpose statement, (b) research questions, (c) research method and collection procedures, (d) population, (e) sample, (f) demographic information about the experts, (g) presentation of the data, and (f) summary.

Purpose Statement

The purpose of this Policy Delphi study was to identify and assess the energy efficiency policies for commercial buildings in California that experts believe are most important and likely to be implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.

Research Questions

1. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy

resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?

2. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are most important by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?
3. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts rate as having the highest likelihood of being implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?

Population

The study population was identified as business leaders and policy experts in California who have made a contribution to the fields of study or have worked professionally in the fields of policy, building, economy, and energy industry within the United States known as green jobs. The United States had about two million establishments that employed green jobs. From the 360,000 employed in California there is no data of how many individuals have the knowledge and experience in energy policy and commercial building energy efficiency. Therefore, it was necessary to establish criteria on the characteristics of experts needed for the study and to use the advice of the three advisors for the study to nominate experts to participate in the study.

Sample

This Policy Delphi study invited participants who were selected from a larger population of experts in the United States who are knowledgeable about California energy policy, commercial buildings, energy resiliency, and the economy. Participants were nominated and randomly selected from the target population who possessed titles in the building industry that included policy director, program manager, legislator, business development, director, lobbyist, educator, business analyst, and vice presidents. The sample population was 24 experts randomly drawn from a list of individuals who were nominated by one of three advisors who were recognized experts.

The three advisors worked with the researcher in the selection of the expert panel. The advisors submitted 33 nominations. Individuals were nominated for one of the four subgroups of (a) energy policy, (b) building industry, (c) economy, and (d) energy resiliency experts. The experts met the study's selection criteria and were endorsed by the advisors. The selection criteria encompassed participation in industry committees, delivered public presentations, conducted research, and served in professional positions in their respective industry. Randomly selected participants were informed they were nominated by one of the advisors for the study. The expert panelists were not informed of the identity of the other panelists nor the identity of the advisor who nominated them. The Policy Delphi panel list of experts are located in Appendix P.

Research Methods and Data Collection Procedures

The descriptive Policy Delphi methodology was selected for this study to forecast future statewide policies for energy efficiency in commercial buildings in California. Inside the framework of policy analysis, this Policy Delphi descriptive study was designed around the insights of a nominated expert panel. Utilization of industry experts provides legitimacy to the forecasting exercise (Cornish, 1977). The objective of the Policy Delphi study was to identify the top policy alternatives that the experts believed were important and likely to be implemented by the year 2025. This study utilized three electronic questionnaires that were designed using Survey Monkey software online. Survey Monkey was the software tool utilized to administer the electronic questionnaires, communicate with the expert panel, and to store the data. The survey items were aligned with the study research questions by design. The details of the research methodology, the process for collecting data, and the design for this study is located in Chapter III.

Ideas were elicited from the expert panelists in the autonomous Policy Delphi study for future energy policy alternatives in Round 1 and then the panelists ranked the policy alternatives through Rounds 2 and 3. Responses were analyzed after each round. Policy Delphi studies rely on a group decision mechanism requiring expert perspectives to share their recommendations, evaluate the responses from other panelists, and the opportunity to change their initial responses. This Policy Delphi study utilized an expert panel that responded to controlled questionnaires to develop energy policy alternatives. The expert panel was asked to identify policy options, then systematically rate those options in three structured rounds.

Round 1 requested that the expert panel list the statewide energy policy alternatives for energy efficiency in commercial buildings that are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy. Round 2 asked the expert panel to rate each policy statement utilizing a 10-point Likert scale by degree of importance (1 = low to 10 = high) and likelihood of implementation (1 = not likely to 10 = likely). Round 3 allowed the expert panel to review the median and Interquartile Range (IQR) from each of the policy statements from Round 2 and the opportunity to change their initial responses to determine if the expert panelists could reach consensus on one or more policy statements.

The researcher called and emailed the selected expert panelists to determine if they would participate on January 29th, 2018. The Policy Delphi expert panel received an email letter of introduction on January 30th, 2018. The following day on January 31st, 2018 the panelists received an email from Survey Monkey with a web link for the Policy Delphi study survey. The survey included five sections including the initial letter of introduction, participant's bill of right, informed consent, Policy Delphi process, and Round 1 open ended question. Participants were required to acknowledge and accept the Bill of Rights and informed consent by clicking yes or no before they could move forward with the next sections of the survey. If the panelist clicked no, they could not move on with the survey. If the panelist clicked yes, they were allowed to move on with the survey. The instruction for the expert panel was to respond to the open-ended question, "What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?" The expert panelists were given one week to submit their responses. The survey closed on February 7, 2018 with 30 energy policy alternatives suggested by the expert panel. The data was collected by the researcher and the list of policy alternatives was edited to remove duplicates. After analyzing the submitted responses, the researcher eliminated redundant policy alternatives and identified 15 original policy alternatives for the Round 2 questionnaire. The following criteria were utilized as the foundation for selecting policy alternatives:

1. The policy alternative could be accomplished in the future and was not already implemented or achieved.
2. The proposed action of the policy alternative was clear.
3. Each policy alternative focused on a core policy concept.
4. The policy alternative could reasonably be considered possible within the decision-making authority of the state of California.
5. The policy alternative had a statewide policy scope.

Policy alternatives were eliminated for other reasons including the following: a policy alternative was repetitive, a policy alternative represented a minor variation of a selected policy alternative, a statement was incomprehensible, and a policy was not within the defined scope of the study. The final list comprised of 15 energy policy alternatives and was used to design the questionnaire in Survey Monkey for Round 2.

On February 8th, 2018, an email was sent from Survey Monkey to the expert panel (Appendix J). The email included instructions for completing Round 2 and a link to the Round 2 questionnaire. Instructions for Round 2 requested the expert panel to review and rate the list of energy policy alternatives. The first scale rated the degree of importance using a scale from 1 to 10, with 1 being not important and 10 being most important. The second scale rated the likelihood of implementation using a scale of 1 to 10, with 1 being not likelihood of implementation and 10 being likely of implementation. The email message instructed the expert panel to complete the questionnaire for Round 2 (Appendix J) by February 23, 2018. By February 22, 2018, the minimum number of 15 responses from the expert panel was achieved. The researcher collected the data, identified the median panel response and IQR for each policy alternative, and utilized the data to design the Round 3 questionnaire.

On February 26, 2018, an email was sent from Survey Monkey to the expert panel (Appendix K) with the instructions to complete the Round 3 questionnaire by March 1, 2018. Instructions for the expert panel were to review their individual ratings of the energy policy alternatives, the median, and the IQR. The expert panel was given the opportunity to change their initial response. By March 1, 2018, the Round 3 questionnaire closed with the majority of the expert panel responding. An email was sent to the expert panel with a message of gratitude from the researcher for their time and participation in the study.

Demographic Data

The Policy Delphi panel of 24 experts held leadership professions in the industry including president, vice president, engineer, energy expert, investor, consultant, senior advisor, vice chancellor, commissioner, executive director, and director. Table 5 displays the total number of each of the panelists' professions on the y axis and type of profession on the x axis from highest to lowest. The expert panel comprised of eight directors, four consultants, two energy experts, two vice presidents, two presidents, and one engineer, investor, senior advisor, vice chancellor, commissioner, and executive director.

Table 5

Panelists Professions in the Industry

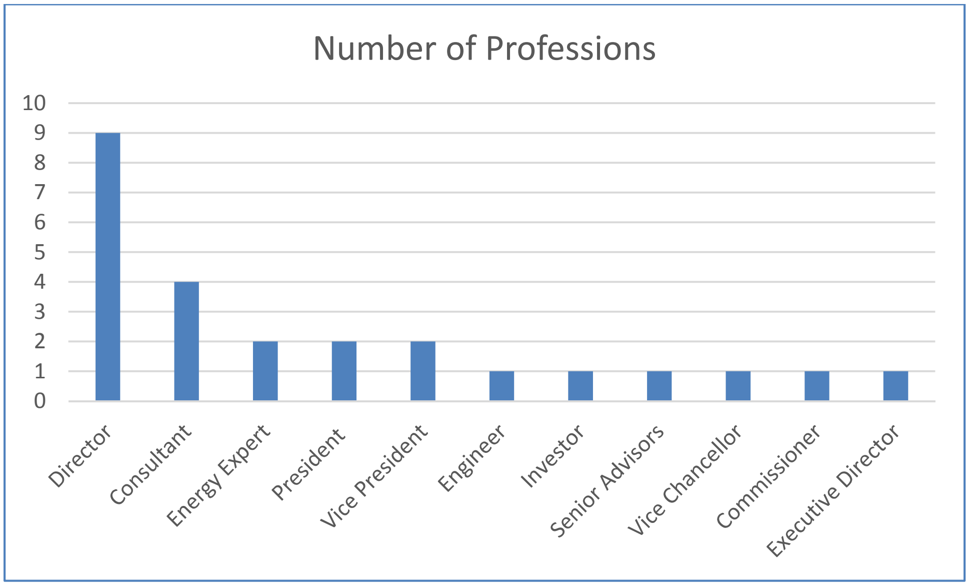


Table 5. The type of organization is listed on the x axis and the number of professions is on the y axis.

The participants worked and served in professional roles from the public and private sector organizations. The public sector industry represented 66% of the expert panel. Thirty three percent of the panelists worked in the private sector industry. Thirty three percent of the professions on the expert panel were directors. Consultant professions were 16% of the expert panel. President, vice president, and energy experts each comprised of 4% that rounded out the 24 expert panelists. The panelists included an engineer, investor, senior advisors, vice chancellor, commissioner, and an executive director.

The organizations represented by the expert panel included non-government organizations (NGO), pubic state and federal departments, higher education institutions, privately held companies, and publicly traded companies. The majority of the expert panel were from the private sector and NGO's. Table 6 displays the number of panelists from each organization.

Table 6

Panelists Organizational Background

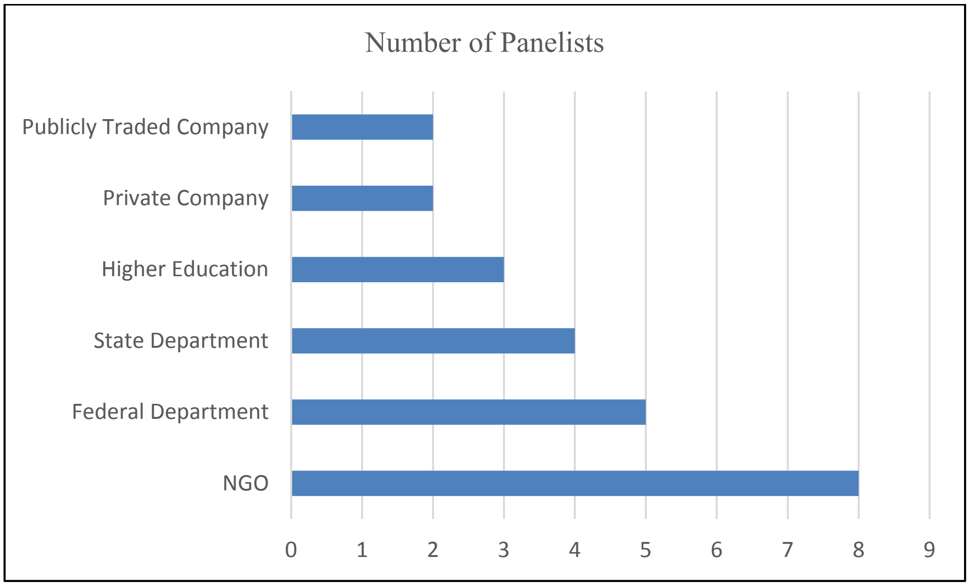


Table 6. The type of organization is listed on the y axis and the number of organizations is on the x axis.

Thirty three percent of the panelists were from NGOs. Experts from state and federal departments combined represented 37.5% of the total experts in the study. Public and private company representatives combined represented 17% of the panel members. Higher education representatives were 12.5% of the expert panel composition.

Panelists were nominated by experts from the field from four sub-group categories, and a random number process was used to determine the final group of experts. Nominated persons also had the ability to decline the invitation. While there were no minimum numbers established, each of the four categories were represented among the panelists. Table 7 show the 4 sub-groups and the numbers of panelists within each subgroup ranked from highest to lowest.

Table 7

Number of Panelists Within Each of the Four Sub-Groups

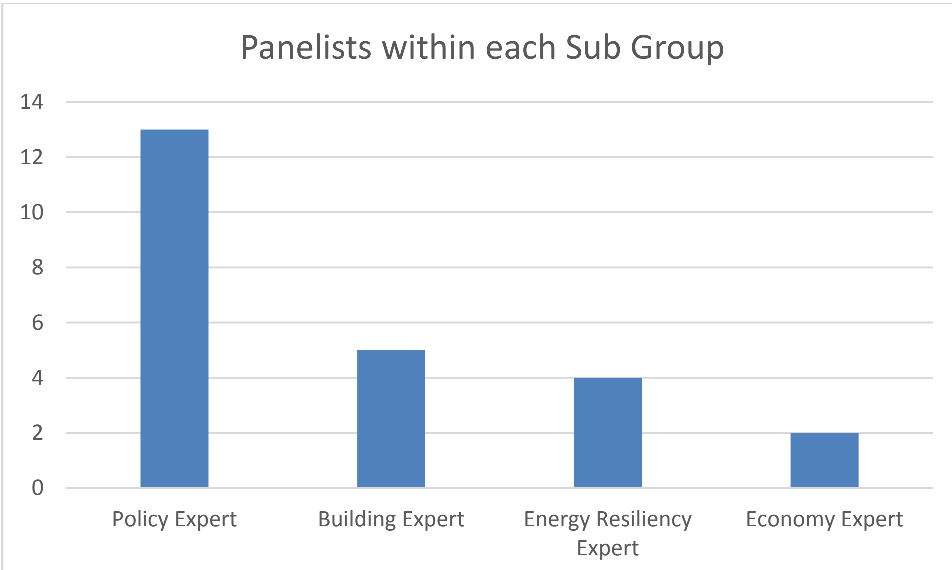


Table 7. The type of organization is listed on the x axis and the number of panelists within each sub group is on the y axis.

Fifty four percent of the expert panel were policy experts. The building expert sub group comprised of twenty percent. Energy resiliency experts included 17% in the study. Eight percent of the expert panel was within the economy expert sub group.

Presentation and Analysis of Data

The Round 1 survey resulted in 30 policy alternatives submitted by the expert panel members who responded to the open-ended question, "What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?" The policy alternatives were synthesized by the researcher to identify 20 policy statements. These policy statements were used to design the Round 2 questionnaire that asked the expert panel to rank each policy alternative by degree of importance (1 = low to 10 = high) and likelihood of implementation (1 = not likely to 10 = likely). Round 2 survey received responses from 17 out of the 24 experts on the panel. Seventeen responses in Round 2 were above the minimum number of 15 responses to continue with the Policy Delphi study, which was established in Chapter 3. Seven experts who participated in Round 1 did not participate in Round 2. The median panelist score for each policy alternative and the IQR was calculated by the researcher. The Round 3 questionnaire was designed using the data from the calculations. The experts on the panel were instructed to review and compare the policy alternatives median rankings while given the opportunity to change their initial responses from Round 2.

The Round 3 questionnaire from the expert panel included three experts who made 46 changes total from their initial responses in Round 2 for importance and likelihood of implementation. The 13 other experts on the panel from Round 2 chose not to make any changes from their initial response in Round 2.

Research Question 1

The first research question, in Round 1, was an open-ended question, "What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?" Table 8 illustrates the final list of policies and their policy number identity in a non-ranking order.

Table 8

List of Policy Alternatives and their Policy Number Identity

Policy Number	Policy Alternative
1	Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.
2	Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.
3	Mandate the commercial building underwriting industry to recognize utility costs in their guidelines.
4	Establish value for the commercial building appraisal industry to recognize utility costs in the appraisal process.
5	Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings.
6	Simplify the electrical utility costs scale on energy efficiency for commercial buildings.
7	Streamline the application and inspection requirements for energy regulations with California Building code Title 24.
8	Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.
9	Require public disclosure for energy benchmarking for commercial buildings.
10	Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria.
11	Require periodic retro commissioning for commercial buildings and require implementation of cost effective energy efficiency measures.
12	Require periodic energy assessments for commercial buildings.
13	Require public disclosure for energy audits with commercial buildings.
14	Provide tax incentive for construction and renovation of commercial buildings that meet energy and environmental criteria such as LEED certification.
15	Broaden utility rate design that recognizes value distributed energy resources in commercial buildings.
16	Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings.
17	Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.
18	Increase ratepayer incentives to pay the full public value of energy efficiency for the commercial building owner.

19	Provide energy efficient requirements for existing buildings to align with Assembly Bill 32 "The Global Warming Solutions Act" to reduce greenhouse gas emissions.
20	Tax incentive for backup power in commercial buildings.

The purpose of this study was to identify the policies for commercial buildings to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities. Some of the policies impacted multiple categories within energy resiliency, reducing carbon emissions, and lessen dependency on utilities. Policy statements 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, and 19 were associated with energy resiliency. The category for reducing carbon emissions including policies 8, 9, 10, 11, 12, 13, 14, 16, 17, and 19. Policy statements 1, 2, 6, 10, 11, 12, 14, 15, 16, 17, and 19 were considered to lessen dependency on electrical utilities.

The central themes that emerged from Round 1 were based on the panelists' responses. Themes identified include incentives, reporting, mandatory upgrades, and guidelines. These themes are also described within the literature review overview on energy and climate policy for buildings. In 2013, California began requiring building owners to provide their energy consumption data and requiring the California Energy Commission to establish a public disclosure program with building energy benchmarking program for commercial buildings through policies Assembly Bill 1103 and Assembly Bill 802 (California | ACEEE, 2017). According to Kahn (2016), Governor Jerry Brown is adopting Senate Bill 350, the Clean Energy and Pollution Reduction Act, mandating California to double the energy efficiency in commercial buildings and require the utilities to get half of their energy from renewable resources by 2030. Kahn noted that Arnold Schwarzenegger, California governor from 2003-2011, approved the Go Solar

California program and incentives with $3.3 billion in rebates for rooftop solar panels. The categorization of the top themes identified by the Policy Delphi panel are shown in Table 9. Seven of the policy statements were identified as guidelines. Six policy statements were identified as incentives. Reporting theme comprised of four policy statements. Three policy alternatives were recognized as mandatory upgrades.

Table 9

Categorized Themes from Round 1

Themes Identified	Number	Policy Alternative
Incentives	4	Establish value for the commercial building appraisal industry to recognize utility costs in the appraisal process.
	5	Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings.
	14	Provide tax incentive for construction and renovation of commercial buildings that meet energy and environmental criteria such as LEED certification.
	16	Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings.
	18	Increase ratepayer incentives to pay the full public value of energy efficiency for the commercial building owner.
	20	Tax incentive for backup power in commercial buildings.
Reporting	8	Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.
	9	Require public disclosure for energy benchmarking for commercial buildings.
	12	Require periodic energy assessments for commercial buildings.
	13	Require public disclosure for energy audits with commercial buildings.

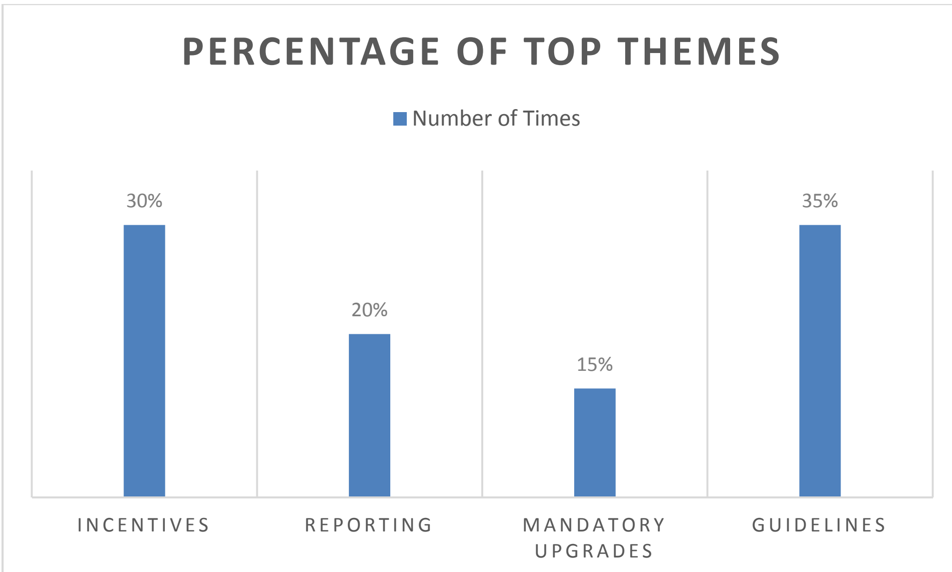
Mandatory Upgrades	10	Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria.
	11	Require periodic retro commissioning for commercial buildings and require implementation of cost effective energy efficiency measures.
	20	Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.
Guidelines	1	Require ratepayer investsments in energy efficiency for California's Integrated Resource Planning Policy for utilities.
	2	Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.
	3	Mandate the commercial building underwriting industry to recognize utility costs in their guidelines.
	6	Simplify the electrical utility costs scale on energy efficiency for commercial buildings.
	7	Streamline the application and inspection requirements for energy regulations with California Building code Title 24.
	18	Broaden utility rate design that recognizes value distributed energy resources in commercial buildings.
	22	Provide energy efficient requirements for existing buildings to align with Assembly Bill 32 "The Global Warming Solutions Act" to reduce greenhouse gas emissions.

The incentive theme included policy statements 4, 5, 14, 16, 18, and 20. Policy statements 8, 9, 12, and 13 were within the reporting theme. Mandatory upgrades theme included policy statements 10, 11, and 17. The guidelines theme was comprised of policy statements 1, 2, 3, 6, 7, 15, and 19. The majority of policy statements were within the guidelines themes with 35% of the 20 policy statements.

Table 10 reflects the percentage of policy statements within each central theme that emerged from Round 1. Policy statements related to guidelines had the highest percentage and mandatory upgrades had the lowest percentage.

Table 10

Top Themes Identified from Round 1



Policy alternatives characterized as guidelines was the largest theme area, with 35% of the alternatives. Thirty percent of the policy statements comprised of incentive themes. Reporting themes represented 20% of the policy statements. Fifteen percent of the policy statements had the theme of mandatory upgrade.

Research Question 2

The second research question was, "What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are most important by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?" Upon completing the data analysis from Round 1, the Delphi coordinator designed Round 2 containing the abbreviated policy statements. Round 2 launched on March 12th, 2018. Participants received an email from Survey Monkey and were asked to complete the survey.

Round 2: Importance. The Round 2 questionnaire listed 20 abbreviated policy statements from the Policy Delphi expert panel. The participants were asked to rate each policy statement for the degree of importance (1 = low to 10 = high) and likelihood of implementation (1 = low to 10 = high). Seventeen of the 24 panelists responded to the Round 2 survey. The researcher calculated the median rating and IQR for each of the policy alternatives. The IQR was utilized to measure the spread within the data for each survey item and provided variability for the expert panel to review. The median scores and IQR for the policy alternatives are shown in the order on the survey located in Appendix J. Whole numbers were used to analyze the data when calculating the IQR for likelihood for implementation. The ratings recorded in Round 2 reflected the informed judgement of the panelists.

The median rank order and IQR for importance of policy statements for Round 2 is listed in Table 11. An IQR of two or less was considered consensus among the expert panel. The median panel scores for importance from the expert panel for Round 2 ranged from 3 to 9. The IQR range for the policy statements in Round 2 was 1 to 4.5.

For this study, a median score of 8 or higher was considered to have importance. Forty percent of the policy statements received a median rating of 8 or higher. Eight of the policy statements that received a median score of 8 or higher included 1, 2, 10, 17, 8, 11, 15, and 16. Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," had the highest median score of 9. Sixty percent of the policy statements had a median score rating of 7.5 or

Table 11

Round 2 Median Rank Order for Importance with IQR

Rank	Policy Statement	Median	IQR
1	1	9	1.5
2	2	9	2
3	10	9	3
4	17	8.5	3
5	8	8	2
6	11	8	2.5
7	15	8	3.5
8	16	8	2
9	3	7.5	3
10	9	7.5	1
11	14	7.5	3.5
12	4	7	4.5
13	5	7	2.5
14	12	7	2
15	13	7	1
16	18	7	2
17	19	7	1.5
18	6	6.5	3
19	7	5	5.5
20	20	3	4

lower. Notable policy statements that received a rating of 7.5 for importance comprised of policy statements 3, 9, and 14. Policy statement 20, "Tax incentive for backup power in commercial buildings," received the lowest rating for importance with a median score of 3.

The IQR rank order for importance of policy statements for Round 2 is listed in Table 12. The IQR scores for importance from the expert panel for Round 2 ranged from 1 to 5.5.

Table 12

Round 2 IQR Rank Order for Importance with Median

Rank	Policy Statement	Median	IQR
1	9	7.5	1
2	13	7	1
3	1	9	1.5
4	19	7	1.5
5	2	9	2
6	8	8	2
7	16	8	2
8	12	7	2
9	18	7	2
10	11	8	2.5
11	5	7	2.5
12	10	9	3
13	17	8.5	3
14	3	7.5	3
15	6	6.5	3
16	15	8	3.5
17	14	7.5	3.5
18	20	3	4
19	4	7	4.5
20	7	5	5.5

Nine policy statements had an IQR score of 2 or less including policy numbers 1, 2, 6, 8, 9, 12, 13, and 16, 18, and 19. An IQR rating of 2 or less in this study indicated consensus. Forty five percent of the policy statements had importance with an IQR of 2 or less. Policy statement 9, “Require public disclosure for energy benchmarking for commercial buildings,” and policy statement 13, “Require public disclosure for energy audits with commercial buildings,” received the lowest score for importance with an IQR rating of 1, indicating consensus among the expert panel.

Fifty five percent of the 20 policy statements had an IQR score of 2 or higher and comprised of policy statements 3, 4, 5, 7, 10, 11, 14, 15, 17, and 20. Table 12 displays that policy statement 7, “Streamline the application and inspection requirements for energy regulations with California Building code Title 24," had the highest IQR of 5.5 for importance. For this study, the policy statements that received a median score of 8 or higher and had an IQR of 2 or lower were considered to have high importance. Table 13 lists the policy statements that were considered to have importance with a median of 8 or higher and an IQR of 2 or less in a ranking order. Twenty percent of the 20 policy statements had a median rating for importance of 8 or more with an IQR of 2 or less including policy statements 1, 2, 8, and 16, indicating consensus among the expert panel. Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," and policy statement 5, "Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings," had the highest median score of 9. Policy statement 6, "Simplify the electrical utility costs scale on energy efficiency for commercial buildings," had the lowest median score of 6.5 with an IQR of 2. Eighty percent of the policies had an IQR of 2 or higher, indicating a lack of consensus among the expert panel. Policy statement 9, "Require public disclosure for energy benchmarking for commercial buildings," received a notable median score rating of 7.5 with and IQR of 1.

Round 3: Importance. Round 3 launched on March 15th, 2018. Participants received an email from Survey Monkey and were asked to complete the survey for Round 3. The Round 3 questionnaire listed the 20 abbreviated policy statements, median rating score, and IQR from the Policy Delphi expert panel in Round 2. The researcher calculated the median rating and IQR for each of the policy alternatives in Round 3. The

Table 13

Round 2 Policy Statements IQR Ranking for Importance

Rank	Policy Number	Abbreviated Policy Statement	Median	IQR
1	1	Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.	9	1.5
2	2	Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.	9	2
3	8	Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures	8	2
4	16	Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings.	8	2

IQR was utilized to measure the spread within the data and provided variability for the expert panel to review. Whole numbers were used to analyze the data when calculating the IQR for importance. The ratings recorded in Round 3 reflected the informed judgement of the panelists.

Table 14 lists the policy statements with frequency of change from the panelists for the median rating and IQR for the importance of policy statements from Round 2 to Round 3. The Round 3 questionnaire was accessed in Survey Monkey by the 17 expert panelists who participated in Round 2. Three expert panelists made changes in Round 3 from their initial responses in Round 2 for importance. The 14 remaining experts on the panel who submitted responses in Round 2 chose not to make any changes in Round 3 from their initial response.

Table 14

Policy Statements with Frequency of Change Ratings between Rounds 2 and 3 for Importance

Policy number	Frequency of change	Round 2		Round 3		Difference	
		Median	IQR	Median	IQR	Median	IQR
5	3	7	2.5	8	2	1	-0.5
6	3	6.5	3	7	2	+0.5	-1
14	3	7.5	3.5	8	3	+0.5	-0.5
17	3	8.5	3	9	2	+0.5	-1
3	2	7.5	3	8	2.5	+0.5	-0.5
9	2	7.5	1	8	1	+0.5	0
15	2	8	3.5	8	3	0	-0.5
1	1	9	1.5	9	1	0	-0.5
11	1	8	2.5	8	2	0	-0.5
19	1	7	1.5	7	1	0	-0.5

Thirty percent of the policy statements had a change made from Round 2 to Round 3 for importance from three expert panelists. Policy statements 5, 6, 14, and 17 had 3 changes. The range of median rating change was .5 to 1. The range of the IQR was -0.5 to -1. Twenty percent of the policy statements had only a change in IQR with -0.5 for importance. The median rank order for importance of policy statements for Round 3 is listed in Table 15. The median panel scores for importance from the expert panel for Round 3 ranged from 3 to 9.

Table 15

Round 3 Median Rank Order for Importance with IQR

Rank	Policy Statement	Median	IQR
1	1	9	1
2	2	9	2
3	10	9	2
4	17	9	2
5	3	8	2.5
6	5	8	2
7	8	8	2
8	9	8	1
9	11	8	2
10	14	8	3
11	15	8	3
12	16	8	2
13	4	7	4.5
14	6	7	2
15	12	7	2
16	13	7	1
17	18	7	2
18	19	7	1
19	7	5	5.5
20	20	3	4

For this study, a median score of 8 was considered to have importance. Sixty percent of the policy statements had a median score of 8 or higher. These policy statements included 1, 2, 3, 5, 8, 9, 10, 11, 14, 15, 16, and 17. Policy statement 1, “Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities,” policy statement 2, “Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities,” policy statement 10, “Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria,” and policy statement 17, “Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency,” had the highest median score of 9. Forty percent of the policy statements received a median score of 7 or lower. Policy statement, “Tax incentive for backup power in commercial buildings,” received the lowest median score of 3 for importance in Round 3.

The IQR rank order for importance of policy statements for Round 3 is listed in Table 16. The IQR range for the policy statements in Round 3 was 1 to 5.5.

Table 16

Round 3 IQR Rank Order for Importance with Median

Rank	Policy Statement	Median	IQR
1	1	9	1
2	9	8	1
3	13	7	1
4	19	7	1
5	2	9	2
6	10	9	2
7	17	9	2
8	16	8	2
9	5	8	2
10	8	8	2
11	11	8	2
12	6	7	2
13	12	7	2
14	18	7	2
15	3	8	2.5
16	14	8	3
17	15	8	3
18	20	3	4
19	4	7	4.5
20	7	5	5.5

Seventy five percent of the policy statements had an IQR of 2 or higher for importance, indicating a lack of consensus. These policy statements included 1, 2, 5, 6, 8, 9, 10, 11, 12, 13, 16, 17, 18, and 19. Policy statement 1, “Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities,” policy statement 9, “Require public disclosure for energy benchmarking for commercial buildings," policy statement, "Require public disclosure for energy audits with commercial buildings," policy statement 13, "Require public disclosure for energy audits with commercial buildings," and policy statement 19, "Provide energy efficient requirements for existing buildings to align with Assembly Bill 32 'The Global Warming Solutions Act' to reduce greenhouse gas emissions," had an IQR of 1 for importance in Round 3. The highest IQR rating for Round 3 was policy statement 7 with an IQR of 5.5.

For this study, the policy statements that an IQR of 2 or lower with a median rating score of 8 or higher were considered to have importance with consensus. Table 17 list the policy statements that had a rating an IQR of 2 or less in a ranking order.
Forty five percent of the policy statements had an IQR or 2 or less with a median rating score of 8 or higher. These policy statements included 1, 2, 5, 8, 9, 10, 11, 16, and 17. Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," policy statement 2, "Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities," policy statement 10, "Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria," and policy statement 17, "Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency," had a median rating score of 9 with an IQR of 2 for importance in Round 3.

Table 17

Round 3 Policy Statements IQR Ranking for Importance

Rank	Policy Number	Abbreviated Policy Statement	Median	IQR
1	1	Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.	9	1
2	2	Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.	9	2
3	10	Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria.	9	2
4	17	Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.	9	2
5	9	Require public disclosure for energy benchmarking for commercial buildings	8	1
6	8	Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.	8	2
7	5	Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings	8	2
8	11	Require periodic retro commissioning for commercial buildings and require implementation of cost effective energy efficiency measures	8	2
9	16	Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings	8	2

Table 18 shows the median and IQR changes from Round 2 to Round 3 for importance of policy statements. All the median changes for the policy statements were an increase of importance. All the rating changes for the policy statements indicated a lower IQR for importance, resulting in an increase in the consensus among the expert panel members.

Table 18

Median and IQR Policy Statement Changes from Rounds 2 and 3 for Importance

	Changes			
	Median		IQR	
Policy Statements	R-2	R-3	R-2	R-3
1. Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.	9	9	1.5	1
2. Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning for utilities.	9	9	2	2
3. Mandate the commercial building underwriting industry to recognize utility costs in their guidelines.	7.5	8	3	2.5
4. Establish value for the commercial building appraisal industry to recognize utility costs in the appraisal process.	7	7	4.5	4.5
5. Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings.	7	8	2.5	2
6. Simplify the electrical utility costs scale on energy efficiency for commercial buildings.	6.5	7	3	2
7. Streamline the application and inspection requirements for energy regulations with California Building code Title 24.	5	5	5.5	5.5
8. Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.	8	8	2	2
9. Require public disclosure for energy benchmarking for commercial buildings.	7.5	8	1	1
10. Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria.	9	9	2.5	2
11. Require periodic retro commissioning for commercial buildings and require implementation of cost effective energy efficiency measures.	8	8	2.5	2

12. Require periodic energy assessments for commercial buildings	7	7	2	2
13. Require public disclosure for energy audits with commercial buildings	7	7	1	1
14. Provide tax incentive for construction and renovation of commercial buildings that meet energy and environmental criteria such as LEED certification	7.5	8	3.5	3
15. Broaden utility rate design that recognizes value distributed energy resources in commercial buildings	8	8	3	3
16. Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings	8	8	2	2
17. Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.	8.5	9	3	2
18. Increase ratepayer incentives to pay the full public value of energy efficiency for the commercial building owner.	7	7	2	2
19. Provide energy efficient requirements for existing buildings to align with Assembly Bill 32 "The Global Warming Solutions Act" to reduce greenhouse gas emissions.	7	7	1.5	1
20. Tax incentive for backup power in commercial buildings.	3	3	4	4

There were four policy statements that changed the IQR rating to 2 or less from Round 2 and Round 3 including policy statements 5, 10, 11, and 17. Policy statement 6, "Simplify the electrical utility costs scale on energy efficiency for commercial buildings," and policy statement 10, "Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria," had a IQR rating of 2.5 in Round 2 that changed to an IQR rating of 2 in Round 3.

These policies have common themes found in Chapter 2 with the need for efficiency in buildings, "Energy efficiency may be supported by a cost-effectiveness analysis which compares the reduction in energy consumption benefits to the costs of energy efficient measures" (Yushchenko & Patel, 2017). Ten percent of the policy statements had an increase to importance from Round 2 to Round 3 including policy statements 5 and 9. Policy statement 5, "Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings," had a change of a median rating 7 in Round 2 to a median rating 8 in Round 3. Policy statement 9, "Require public disclosure for energy benchmarking for commercial buildings," had an increase in median rating from 7.5 in Round 2 to a median rating 8 in Round 3.

Research Question 3

The final research question was, "What statewide energy policy alternatives for energy efficiency in commercial buildings do experts rate as having the highest likelihood of being implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy." For this study, the policy statements that received a median score of 8 or higher were considered to have a high likelihood of being implemented. Round 2 launched on March 12th, 2018.

Table 19 lists the policy statements with frequency of change from the panelists for the median rating and IQR for likelihood of implementation of policy statements from Round 2 to Round 3. The Round 3 questionnaire was accessed in Survey Monkey by the 17 expert panelists who participated in Round 2. Three expert panelists made changes in Round 3 from their initial responses in Round 2 for importance. The 14 other experts on the panel who submitted responses in Round 2 chose not to make any changes in Round 3 from their initial response.

Fifty five percent of the policy statements had a median rating change from Round 2 to Round 3 for likelihood of implementation from three expert panelists. Policy statements 4, 5, 6, 10, 11, 17, and 20 had 3 changes. The range of median rating change was -0.5 to 1. The range of the IQR was -2 to 1.5. Thirty percent of the policy statements had only a change in IQR for likelihood of implementation.

Table 19

Policy Statements with Frequency of Change Ratings between Rounds 2 and 3 for Likelihood of Implementation

Policy number	Frequency of change	Round 2		Round 3		Difference	
		Median	IQR	Median	IQR	Median	IQR
4	3	4	4	5	2	1	-2
5	3	5	2.5	5	2	1	-0.5
6	3	5	4	5	4.5	+0.5	+1
10	3	5	3.5	4.5	4	-0.5	+0.5
11	3	7	3.5	6.5	2	-0.5	-1.5
13	3	7	3	6	3.5	-1	-0.5
17	3	5	1	4	1.5	+1	+0.5
20	3	2	1	2.5	2.5	+0.5	+1.5
2	2	8	2	8	4	0	+2
12	2	5	3	4	3	-1	0
14	2	3	2.5	2.5	2.5	-0.5	0
16	2	6	4	6	4.5	0	+0.5
18	2	3	2	2.5	2.5	+0.5	+0.5
7	1	4	2	4	2.5	0	+0.5
8	1	3	2	3	2.5	0	+0.5
9	1	8	4.5	8	5	0	+0.5
19	1	3	1	3	1.5	0	+0.5

Round 2: Likelihood of implementation. Table 20 shows the median rank order of the policy statements for likelihood of being implemented from the expert panel. The median panel scores for likelihood of implementation for Round 2 ranged from 2.5 to 9.

Table 20 displays that in Round 2, policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," had the highest median rating of 9. Fifteen percent of the 20 policy statements had a median score of 8 or higher for likelihood of being implemented. Policy statement

Table 20

Round 2 Median Rank Order for Likelihood of Implementation with IQR

Rank	Policy Statement	Median	IQR
1	1	9	1
2	2	8	2
3	9	8	5
4	11	6.5	2
5	13	6	3.5
6	16	6	4.5
7	4	5	2
8	3	5	1
9	5	5	2
10	6	5	4.5
11	10	4.5	4
12	7	4	2.5
13	15	4	2.5
14	17	4	1.5
15	12	4	3
16	8	3	2.5
17	19	3	1.5
18	14	2.5	2.5
19	18	2.5	2.5
20	20	2.5	2.5

2, “Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities,” and policy statement 9, “Require public disclosure for energy benchmarking for commercial buildings,” had a median rating of 8 for likelihood of implementation in Round 2. Seventeen policy statements had a median score of lower than 8. The lowest median score was policy 20, “Tax incentive for backup power in commercial buildings,” for likelihood of importance.

The IQR rank order for likelihood of implementation for the policy statements for Round 2 is listed in Table 21. An IQR of 2 or less for the policy statement indicated consensus among the expert panel that there is a high likelihood of implementation. The IQR range for the policy statements in Round 3 was 1 to 5.

Table 21

Round 2 IQR Rank Order for Likelihood of Implementation with Median

Rank	Policy Statement	Median	IQR
1	1	9	1
2	3	5	1
3	17	4	1.5
4	19	3	1.5
5	11	6.5	2
6	4	5	2
7	5	5	2
8	2	8	2
9	7	4	2.5
10	15	4	2.5
11	8	3	2.5
12	14	2.5	2.5
13	18	2.5	2.5
14	20	2.5	2.5
15	13	6	2.5
16	12	4	3
17	10	4.5	4
18	16	6	4.5
19	6	5	4.5
20	9	8	5

Seven of the policy statements had an IQR of 2 or less including policy statements 1, 3, 4, 11, 17, and 19 indicating consensus among the experts. Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," and policy statement 3, "Mandate the commercial building underwriting industry to recognize utility costs in their guidelines," had the lowest IQR rating of 1 for Round 2. Sixty-five percent of the 24 policy statements had an IQR of 2 or higher including policy statements 2, 7-10, 12-16, 18, and 19 indicating a lack of consensus. Table 9 shows that in Round 2, Policy statement 9, "Require public disclosure for energy benchmarking for commercial buildings," had the highest IQR with a score of 5.

For this study, the policy statements that an IQR of 2 or lower with a median rating score of 8 or higher were considered to have consensus among the panelists for likelihood of implementation. Table 22 list the policy statements that had a rating an IQR of 2 or less and a median rating of 8 or higher in a ranking order.

Table 22

Round 2 Policy Statements of Likelihood of Implementation

Rank	Policy Number	Abbreviated Policy Statements	Median	IQR
1	1	Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.	9	1
2	2	Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.	8	2

Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," had the highest median rating of 9 with an IQR of 1 in Round 2. The only other policy statement with a median rating of 8 or higher and an IQR of 2 or less was policy statement 2, "Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities." Ninety percent of the 20 policy statements had a median score of lower than 8.

Round 3: Likelihood of implementation. The median rank order for likelihood of implementation of policy statements for Round 3 is listed in Table 23. The median panel scores for likelihood of implementation from the expert panel for Round 3 ranged from 2 to 9.

Table 23

Round 3 Median Rank Order for Likelihood of Implementation with IQR

Rank	Policy Statement	Median	IQR
1	1	9	1
2	2	8	4
3	9	8	4.5
4	11	7	3.5
5	13	7	3
6	16	6	4
7	10	5	3.5
8	17	5	1
9	3	5	1
10	5	5	2.5
11	6	5	4
12	12	5	3
13	15	4	2.5
14	4	4	4
15	7	4	2
16	8	3	2
17	14	3	2.5
18	18	3	2
19	19	3	1
20	20	2	1

For this study, the policy statements that received a median score of 8 or higher and had an IQR of 2 or lower were considered to have a likelihood of being implemented. Three of the policy statements received a median score of 8 or higher. These policy statements included 1, 2, and 9. Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," had the highest median score of 9. Eighty five percent of the policy statements including had a median score of 8. Policy statement 20, "Tax incentive for backup power in commercial buildings," had the lowest median score of 2.

The IQR rank order for likelihood of implementation of policy statements for Round 3 is listed in Table 24. The IQR scores from the expert panel for Round 3 ranged from 1 to 4.5.

Table 24

Round 3 IQR Rank Order for Likelihood of Implementation with Median

Rank	Policy Statement	Median	IQR
1	1	9	1
2	3	5	1
3	17	5	1
4	19	3	1
5	20	2	1
6	7	4	2
7	8	3	2
8	18	3	2
9	5	5	2.5
10	14	3	2.5
11	15	4	2.5
12	12	5	3
13	13	7	3
14	11	7	3.5
15	10	5	3.5
16	2	8	4
17	4	4	4
18	6	5	4
19	16	6	4
20	9	8	4.5

Forty percent of the policy statements had an IQR of 2 or less for likelihood of implementation in Round 3. Policy statements 1, 3, 17, 19, and 20 had the lowest IQR rating of 1. Policy statement 7, "Streamline the application and inspection requirements for energy regulations with California Building code Title 24," policy statement 8, "Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures," and policy statement 18, "Increase ratepayer incentives to pay the full public value of energy efficiency for the commercial building owner," had an IQR rating of 2 for Round 3. Sixty percent of the policy statements in Round 3 had an IQR rating of 2.5 or higher, indicating a lack of consensus. Policy statement 9, "Require public disclosure for energy benchmarking for commercial buildings," had the highest IQR rating of 4.5.

For this study, the policy statements that an IQR of 2 or lower with a median rating score of 8 or higher were considered to have a high likelihood of implementation with consensus. Table 25 lists the policy statements that had a rating an IQR of 2 or less and the median rating in a ranking order.

Table 25

Round 3 Policy Statements of Likelihood of Implementation

Rank	Policy Number	Abbreviated Policy Statements	Median	IQR
1	1	Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.	9	1
2	3	Mandate the commercial building underwriting industry to recognize utility costs in their guidelines.	5	1
3	17	Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.	5	1
4	7	Streamline the application and inspection requirements for energy regulations with California Building code Title 24.	4	2
5	8	Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.	3	2
6	18	Increase ratepayer incentives to pay the full public value of energy efficiency for the commercial building owner.	3	2
7	20	Tax incentive for backup power in commercial buildings.	2	1

Policy statement 1, “Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities,” had the only median rating of 8 or higher with an IQR of 2 or less in Round 3. Ninety five percent of the 20 policy statements had a median score of lower than 8. Policy statement 2, “Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities,” had a change in IQR rating from Round 2 to Round 3 with IQR rating of 2 to an IQR rating of 4.

Table 26 shows the median and IQR changes from Round 2 to Round 3 for likelihood of implementation of policy statements. The median rating changes varied with increases and decreases for the policy statements of likelihood of implementation. IQR had increases and decreases from Round 2 to Round 3 for the policy statements.

Table 26

Median and IQR Policy Statement Changes from Rounds 2 and 3 for Likelihood of Implementation

	Changes			
	Median		IQR	
Policy Statements	R-2	R-3	R-2	R-3
1. Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities	9	9	1	1
2. Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning for utilities.	8	8	2	4
3. Mandate the commercial building underwriting industry to recognize utility costs in their guidelines.	5	5	1	1
4. Establish value for the commercial building appraisal industry to recognize utility costs in the appraisal process.	5	4	2	4
5. Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings.	5	5	2	2.5
6. Simplify the electrical utility costs scale on energy efficiency for commercial buildings.	5	5	4.5	4

7. Streamline the application and inspection requirements for energy regulations with California Building code Title 24.	4	4	2.5	2
8. Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.	3	3	2.5	2
9. Require public disclosure for energy benchmarking for commercial buildings.	8	8	5	4.5
10. Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria.	4.5	5	4	3.5
11. Require periodic retro commissioning for commercial buildings and require implementation of cost effective energy efficiency measures.	6.5	7	2	3.5
12. Require periodic energy assessments for commercial buildings	4	5	3	3
13. Require public disclosure for energy audits with commercial buildings	6	7	3.5	3
14. Provide tax incentive for construction and renovation of commercial buildings that meet energy and environmental criteria such as LEED certification	2.5	3	2.5	2.5
15. Broaden utility rate design that recognizes value distributed energy resources in commercial buildings	4	4	2.5	2.5
16. Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings	6	6	4.5	4
17. Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.	4	5	1.5	1
18. Increase ratepayer incentives to pay the full public value of energy efficiency for the commercial building owner.	2.5	3	2.5	2
19. Provide energy efficient requirements for existing buildings to align with Assembly Bill 32 "The Global Warming Solutions Act" to reduce greenhouse gas emissions.	3	3	1.5	1
20. Tax incentive for backup power in commercial buildings.	2.5	2	2.5	1

There were eight policy statements with changes for median from Round 2 to Round 3 for likelihood of implementation including policies 4, 11, 12, 13, 14, 17, 18 and 20. The changes ranged from .5 to 1 for the policies. These policies are supported in Chapter 2, “Policymakers can leverage cost-effectiveness analysis as a tool to use energy efficiency to develop the energy policy that could justify investments by public bodies, building owners, and gain public support” (Yushchenko & Patel, 2017). Fifty Five percent of the policy statements had no changes. Fifteen policy statements had changes for IQR from Round 2 to Round 3 for likelihood of implementation including policies 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 16, 17, 18, 19, 20. Changes in IQR ranged from .5 to 2. Policy statement 2, “Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning for utilities,” and policy statement 4, “Establish value for the commercial building appraisal industry to recognize utility costs in the appraisal process,” had the largest change in IQR with 2 from Round 2 to Round 3 for likelihood of implementation of policies.

High Priority Policies for Importance and Likelihood of Implementation

The purpose of this Policy Delphi study was to discover policy alternatives that experts believe are important for the state of California and have a likelihood of being implemented. The expert panel supported this purpose through rating the degree of importance and likelihood of implementation for the 20 policy statements recommended in Round 1.

A graphical representation of a priority matrix in Figure 1 shows of the interaction between the expert panel median ratings for the importance and likelihood of implementation of policy alternatives in Round 3. The priority matrix contains nine cells with degree of importance on the vertical axis and likelihood of implementation on the horizontal axis. A 10-point scale specifies the values importance with the high at the top and low at the bottom. A 10-point scale specifies the values for likelihood of implementation with low on the right and high on the left. Three arrows cross three cells each within the nine cells, which are representative of the high, medium, and low groupings. The top left-hand corner of the priority matrix encompasses the policy alternatives that have the highest degree of importance and the highest likelihood of

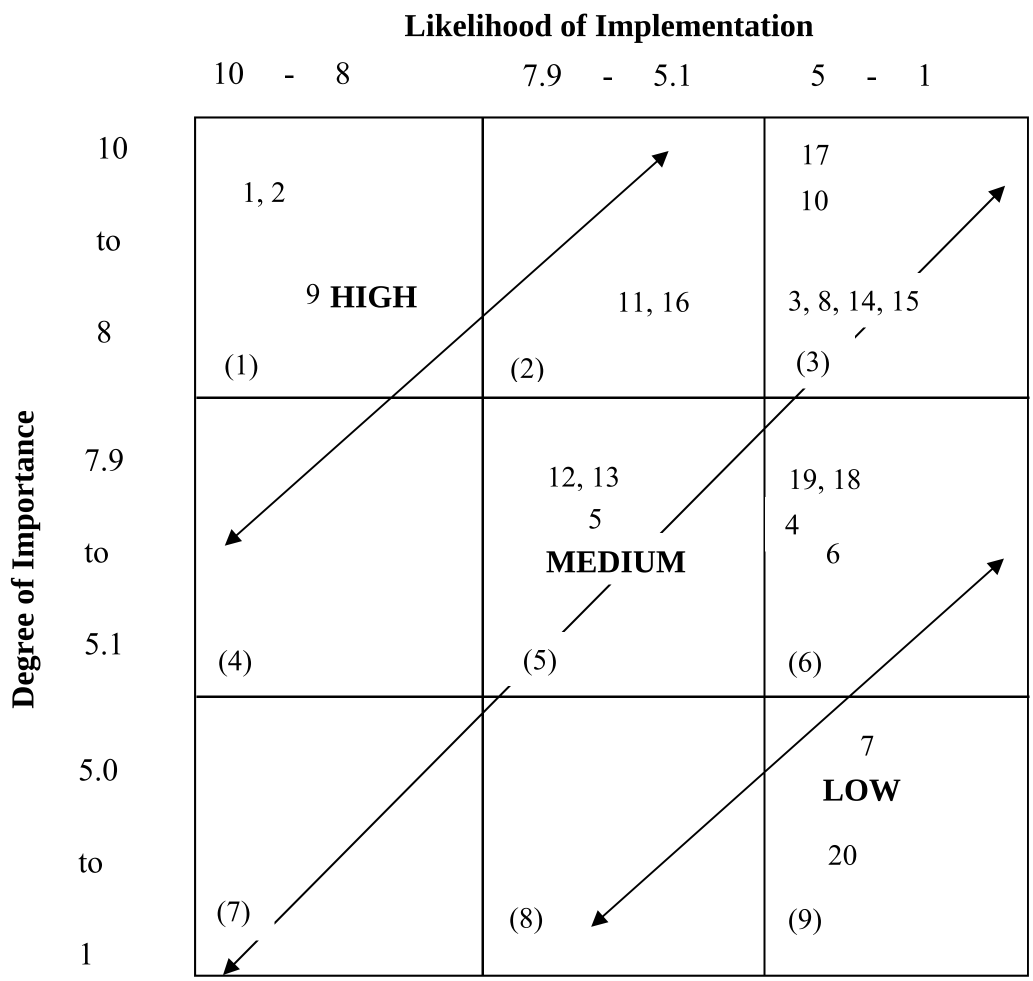


Figure 1. Priority matrix displaying Round 3 policy statements composite expert panel median ratings for importance and likelihood of implementation. The numbers in parentheses indicate the cell numbers.

implementation. The cell in the bottom right-hand corner of the priority matrix contains the policy alternatives that have the lowest degree of importance and the lowest likelihood of implementation.

The policy alternatives with a median expert panel score of 8 were considered to have a high degree of importance. The policy alternatives with a median expert panel score of 8 or higher were considered high for likelihood of implementation. Policy alternatives in the highest and medium priority cells were considered for further research. Figure 1 demonstrates the priority matrix of the policy alternatives combined panel median ratings for importance and likelihood of implementation. The numbers in parentheses indicate the cell numbers inside the priority matrix. The following policies were placed on the priority matrix:

- Fifteen percent of the policy statements scored in the high priority cell. The high-priority cells in Figure 2 include policy statements 1, 2, and 9. Cell 1 included Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," policy statement 2, "Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities," and policy 9, "Require public disclosure for energy benchmarking for commercial buildings."
- The medium-priority cells include policy statements 3, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19.
- Ten percent of the policy statements scored in the low priority cell. The low-priority cells include policy statements 7 and 20. Policy statement 7, "Streamline the application and inspection requirements for energy regulations with California Building code Title 24," and policy statement 20, "Tax incentive for backup power in commercial buildings," scored in cell 9, indicating low importance and low likelihood of implementation.

Summary

This purpose of this Policy Delphi study was to determine if there was consensus among a panel of experts regarding the importance of energy policy alternatives for commercial buildings that are necessary for the state of California to effectively make progress toward energy and carbon reduction policy goals and the likelihood of the implementation of these policy alternatives. The results of this study were collected from the recommendations of 24 experts on a panel using a Policy Delphi technique whom identified and assessed the energy efficiency policy alternatives for commercial buildings to answer the study's three research questions.

The expert panel participated in the three rounds of the Policy Delphi process. Round 1 requested that the expert panel list the statewide energy policy alternatives for energy efficiency in commercial buildings that are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy. Twenty policy alternatives were recommended in Round 1. Round 2 asked the expert panel to rate the degree of importance, using a scale from 1-10, with 10 being the highest, and rate the degree of likelihood of implementation, using a scale from 1 to 10, with 10 being the highest. The researcher analyzed the data from Round 2 to determine the expert panel's median response rate and IQR for each policy alternative. Round 3 allowed the expert panel to review the other panelist's responses, median score, and IQR from Round 2 and the opportunity to change their initial responses to reach consensus.

Table 27 shows 55% of the policy statements had a median rating change from Round 2 to Round 3 for likelihood of implementation from three expert panelists. Policy statements 4, 5, 6, 10, 11, 17, and 20 had 3 changes. The remaining policy statements were left unchanged.

Table 27

Median and IQR for Policy Statements Findings of Importance and Likelihood of Implementation for Round 3

	Round 3			
	Importance		Likelihood	
	M	IQR	M	IQR
1. Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.	9	1	9	1
2. Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning for utilities.	9	2	8	4
10. Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria.	9	2	5	3.5
17. Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.	9	2	5	1
8. Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.	8	2	3	2
9. Require public disclosure for energy benchmarking for commercial buildings.	8	1	8	4.5
16. Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings.	8	2	6	4

Table 27 shows the median and IQR findings for policy statements with high importance and the likelihood of implementation for policy statements. Policy statement 1, “Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities,” is the strongest finding in this study with a median rating of 9 for importance and 9 for likelihood of implementation with consensus. Policy statements 1, 2, 10, and 17 had a median rating of 9 of importance for the policies in Round 3, and are also important findings of this study. It is important to note though that though the expert panel believed these policies to be important, they did not rate these policies as likely to be implemented. Policy statements 1, 8, and 17 had an IQR of 2 or less for likelihood of implementation, which indicated strong agreement among the expert panel.

Seven policy statements in this study are considered findings with high importance. Sixty five percent of the 20 policy statements had a median rating of below 8 for importance in Round 3. Policy statement 20, "Tax incentive for backup power in commercial buildings," had the lowest median rating of 3 for importance and a median rating of 2 for likelihood of implementation.

Table 28 list the number of findings for each categorized themes. The categorized themes include incentives, reporting, mandatory upgrades, and guidelines.

Table 28

Rank of Categorized Themes for the Policy Statements Findings

Rank	Categorized Theme	Policy Statements	Number of findings
1	Reporting	10, 11	2
2	Guidelines	1, 2	2
3	Mandatory Upgrades	12, 13, 19	2
4	Incentives	9, 18	1

Reporting, guidelines, and mandatory upgrades themes each had two of the policy statements that were findings in this study. These policy statements include 1, 2, 8, 9, 10, and 17. Policy statement 16, "Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings" was the only finding for the categorized theme of incentives.

Three priorities were determined through their placement on the priority matrix to be of both high importance and likelihood of implementation. Policy 1 had strong consensus with and IQR of 1. Policies 2 and 9 did not have consensus for likelihood of implementation with IQRs of 4 and 4.5 respectively. Regardless of the lack of consensus for policies 2 and 9, each had high median ratings for both Importance and Likelihood of Implementation are recognized as additional findings of this study.

Chapter 4 contained the review of the process and the data collected for this Delphi study. Twenty policy statements were rated to determine if there was a consensus that the expert panel believe are necessary to effectively make progress toward energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities for the future California economy. The data were systematically analyzed, and number of notable findings emerged from the analysis. These findings were summarized and used in Chapter 5 to develop conclusions and recommendations for action. The policy alternatives identified as findings in this study, comprise a collection of future policy options for consideration by policy makers in the state of California within the immediate and longer-range future.

CHAPTER V: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter includes the purpose of the study, research questions, summary of the major findings, unexpected findings, the researcher's conclusions, implications for future action, and recommendations for further research.

Purpose Statement

The purpose of this Policy Delphi study was to identify and assess the energy efficiency policies for commercial buildings in California that experts believe are most important and likely to be implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.

Research Questions

1. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?
2. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are most important by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?
3. What statewide energy policy alternatives for energy efficiency in commercial buildings do experts rate as having the highest likelihood of being implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?

Methodology

The descriptive Policy Delphi methodology was selected for this study to forecast future statewide policies for energy efficiency in commercial buildings in California. Inside the framework of policy analysis, this Policy Delphi descriptive study was designed around the insights of a nominated expert panel. Industry experts on a panel provides legitimacy to the forecasting exercise (Cornish, 1977). The objective of the Policy Delphi study was to identify the top policy alternatives that the experts believed was important and likely to be implemented by the year 2025.

This study utilized three electronic questionnaires that were designed using Survey Monkey software online and used during the Delphi process to systematically solicit experts' input. Communications from the researcher with the expert panel were conducted via email and Survey Monkey. During Round 1, expert panelists responded to an open ended question designed to produce policy alternatives. A set of 20 policy statements was developed from the policy alternatives recommended by the expert panel. The expert panelists utilized the set of policy statements in Round 2 and rated each policy on the degree of importance and likelihood of implementation by the year 2025. During Round 3 the expert panel was asked to review the median rating and IQR for each policy statement and given the opportunity to change any of their initial response from Round 2.

Major Findings

To address Research Question 1, the expert panel was asked to identify, "What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?" Twenty policy statements were identified from the summarization of the data provided from the expert panelists. Each of these policies was associated with one or more of the categories identified in the purpose study that included energy resiliency, reducing carbon emissions, and lessen dependency on electrical utilities. Ninety five percent of the policies associated with energy resiliency. The category of reducing carbon emissions had 50% of the policies associated. Fifty five percent of the policies were associated with lessening dependency on electrical utilities.

These 20 policies fell into one of four categorized themes including (a) incentives, (b) reporting, (c) mandatory upgrade, and (d) guidelines. The categorized themes for Round 1 with each of the policy statements included seven policies for guidelines, six within incentives, four involved reporting, and three involving mandatory upgrades to commercial buildings. During Round 2, the categorized themes for the policy statements with high importance of 8 or higher with an IQR of 2 or less included three policy statements for the theme with mandatory upgrades, two policies relating to the guidelines theme, two policies regarding reporting, and two policies relating to the incentives theme. The categorized themes for the policy statements in Round 3 with high importance of 8 or higher with an IQR of 2 or less included two policy statements within the reporting theme, two relating to guidelines, two within mandatory upgrades, and one relating to the incentives theme.

To address the second research question, expert panelists were asked to identify, "What statewide energy policy alternatives for energy efficiency in commercial buildings do experts believe are most important by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?" The expert panel rated the degree of importance of the 20 policy statements on a 10-pont Likert scale, with 1 indicating low importance and 10 indicating high importance. For this study, the policy statements that received a median score of 8 or higher and had an IQR of 2 or lower were considered to have high importance and to have achieved consensus among the expert panel.

The range of median panel scores for importance in Round 2 was 3 to 9. Four of the policy statements received a median score of 8 or higher. These policy statements are listed below for Round 2:

1. Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.
2. Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.
3. Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures
4. Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings.

For Round 3, the range of median panel scores for importance was 3 to 9. Sixty percent of the 20 policy statements received a median score of 8 or higher after Round 3. From these 12 policy alternatives rated high in importance, nine had an IQR of 2 or less, indicating consensus among the expert panel. The 9 policy statements that the expert panel reached consensus on concerning high importance for Round 3 included:

1. Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.

2. Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.
3. Require existing building to meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria.
4. Require energy retrofits for existing commercial buildings to meet minimum level of energy efficiency.
5. Require public disclosure for energy benchmarking for commercial buildings.
6. Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.
7. Increase the financial value of energy efficiency to improve the appraisal value of commercial buildings.
8. Require periodic retro commissioning for commercial buildings and require implementation of cost effective energy efficiency measures.
9. Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings.

To address the third research question, the expert panelists were asked to identify," What statewide energy policy alternatives for energy efficiency in commercial buildings do experts rate as having the highest likelihood of being implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?" The expert panelists rated the likelihood of implementation for the 20 policy statements on a 10-point Likert scale of 1 to 10, with 1 indicating low likelihood of implementation and 10 indicating high likelihood of implementation. For this study, a median of 8 or higher with an IQR of 2 or less indicated consensus among the expert panel of a high likelihood of implementation.

Two policy statements in Round 2 had a median rating of 8 or higher with an IQR of 2 or less for likelihood of implementation. The categorized theme for these policy statements was within the guidelines theme. The policy statements for likelihood of implementation in Round 2 included:

1. Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.
2. Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities.

During Round 3, only one of the 20 policy statements had a median rating of 8 or higher and an IQR of 2 or less for likelihood of implementation, indicating consensus on 5% of the research findings. One policy statement that the expert panel reached consensus on regarding a high likelihood of implementation in Round 3:

1. Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities.

Six policy statements in Round 3 received a median rating less than 8 but had an IQR of 2 or less for likelihood of implementation, which indicated consensus among the expert panel. These policy statements had median rating of importance ranging from 2 to 8. The policies included:

1. Mandate the commercial building underwriting industry to recognize utility costs in their guidelines.
2. Require energy retrofits for existing commercial buildings to meet minimum level

of energy efficiency.

3. Streamline the application and inspection requirements for energy regulations with California Building Code Title 24.
4. Require periodic benchmarking for commercial buildings that is subject to implementation cost effective energy efficient measures.
5. Increase ratepayer incentives to pay the full public value of energy efficiency for the commercial building owner.
6. Tax incentive for backup power in commercial buildings.

A priority matrix (see Figure 1 in Chapter IV) was utilized to portray a graphical representation of the interaction between median ratings for importance and likelihood of implementation of policy statements reported in this study for Round 3. Three policy alternatives, representing 15 % of the policy statements were found to be of high priority in this study. Policy statement 1, "Require ratepayer investments in energy efficiency for California's Integrated Resource Planning Policy for utilities," policy statement 2, "Require ratepayer investments for clean energy distributed resources for California Integrated Resource Planning policy for utilities," and policy statement 9, "Require public disclosure for energy benchmarking for commercial buildings," fell into this category. Policy statements 5, 11, and 16 were rated high in the degree of importance and medium in likelihood of implementation. Thirty percent of the policy statements were categorized as high in importance and low in likelihood of implementation. Policy statements 3, 8, 10, 14, 15, and 17 fell into this category within the priority matrix.

Unexpected Findings

The researcher found two unexpected findings following the data collection process in Round 3. After Round 2, the researcher perceived that the expert panel would recognize that eight policy statements received a median rating score of 8 or higher for importance. The researcher did not anticipate that in Round 3 the number of policy statements that received a median rating score of 8 or higher for importance would grow to 12 policy statements with a median rating of 8 or higher. For this study, an expert panel median score of 8 or higher was considered to indicate high importance. Eight policy statements received an expert panel median score of 8 and four policy statements received an expert panel median score of 9. Nine of the 12 policy statements in round 3 had an IQR of 2 or less, indicating consensus among the panel. In summary, it was unexpected that the expert panel would rate four additional policy statements as high importance in Round 3 after reviewing the median rating and IQR from Round 2.

Another unexpected finding followed the data collection from Round 3. After Round 2, there were two policy statements with an 8 or higher for likelihood of implementation with an IQR rating of 2 or less. Policy statements 1 and 2 fell into this category. Following Round 3, only policy statement 1 received a median score of 8 or higher with an IQR rating of 2 or less. Four expert panelists made changes in Round 3 from their initial response in Round 2 and this changed the IQR rating for policy statement 2 from 2 to 4. In summary, it was surprising that the few changes made from Round 2 to Round 3 from the expert panel would push policy statement 2 to an IQR rating of 4, indicating a lack of consensus.

Conclusions

California's growing population and fast changing electrical infrastructure is having effects on commercial buildings and the environment. Pressure is mounting for policy makers to continue to enact policies that will combat climate change, meet the energy demand, and improve the economy. Trencher (2016) explained that given the global consensus to reduce fossil fuel consumption and GHG emissions, expectations are escalating for governments to develop effective policies for energy resilience, independence, and security while combating climate change. As the sixth largest economy in the world, California has shown that robust energy and climate policy is possible while developing a thriving economy and clean energy creates more jobs in the state than fossil fuels (Kairam, 2017). California building code Title 24 is considered the gold standard among energy codes in the United States and intended to help manage building's energy consumption while energy demand is rising (Chandler, 2017). This Policy Delphi study was designed utilizing a panel of industry experts to identify the policy alternatives for commercial buildings in California that are most important and likely to be implemented by the year 2025. Based on the research findings and data from the literature review the researcher drew nine conclusions. The conclusions infer a richer understanding of the energy policies and their potential impact on commercial buildings in California. The resultant conclusions emerged from the findings of this study:

1. Increasing ratepayer investments in energy efficiency for clean energy distributed resources for California Integrated Resource Planning policy for utilities was unmistakably the highest priority identified in this study. The California Public Utilities Commission for over 30 years has approved the use

of ratepayer funds and authorized major investor-owned utilities to administer energy efficiency programs (Vine et al., 2006). Within the structure of the California's Integrated Resource Plan and the utilities, funding is collected through ratepayers by the utilities and appropriations of these funds is applied to subsidy programs to offset the costs of energy improvements for commercial buildings. Implementing updated policies for increasing ratepayer investments to improve the efficiency of clean energy resources and distribution will improve the energy efficiency of commercial building.

2. Energy resiliency was associated with the majority of the policies. The expert panel suggested through their policy statements in Round 1 that energy resiliency was important when proposing new policy alternatives for energy efficiency in commercial buildings.
3. Energy efficiency policies affecting commercial buildings in California will be difficult to implement in the near future. Seven policies that the expert panel rated as important for the state were not believed to be likely implemented by the year 2025. The expert panel indicated that policies for clean energy, minimal levels of energy efficiency for commercial buildings, requirements for public disclosure of building data, and mandatory energy retrofits are challenging for the state to pass through legislation. Choy and Rosales (2014) noted that although technologies and building improvement measures for energy efficiency are readily deployed and available for the marketplace, establishing the best appropriate model for implementation as a standard practice remains a challenge. The expert panels believed the benefits

and costs vary for stakeholders with these policies and consensus shifts between the public and private sectors.

4. Having reliable data is important to improving the energy efficiency of commercial building, but implementing policies requiring data reporting lacks support. The expert panel rated reporting commercial building data as important and yet the panelists believe these policy statements are not likely to be implemented. These policy statements have similarities to local ordinances that have been implemented as policy within cities such as San Francisco and other state legislation such as Assembly Bill 1103 and Assembly Bill 802. In 2013, California began requiring building owners to provide their energy consumption data and requiring the California Energy Commission to establish a public disclosure program with building energy benchmarking program for commercial buildings through policies Assembly Bill 1103 and Assembly Bill 802 (California | ACEEE, 2017). The expert panel believed it is difficult to implement policy on a state level for public disclosures of building and energy data. This type of policy relating to building data for commercial buildings continues to evolve incrementally on a state level while local governments like San Francisco are aggressively implementing this type of policy holistically.
5. Policy makers may find support for enacting energy policies that focus in the areas of requiring reports containing energy efficiency data for commercial buildings, designating mandatory energy efficient building upgrades, and providing guidelines for the design, construction, and operation of energy

efficient commercial buildings. Reyna and Chester (2017) described ambitious building energy initiatives including Assembly Bill 758 to develop a comprehensive plan to double energy savings from existing commercial buildings by the year 2030.

6. Increasing incentives was a policy approach that the experts supported in a limited manner. Increase ratepayer incentives for microgrid, energy storage, and energy efficiency for commercial buildings was the only policy statement in the categorized theme for incentives rated high for importance. The expert panel believed it was necessary for the state to provide incentives to increase energy resiliency, economy, and reduce carbon emissions. Therefore, policies that promote energy investments through incentives may lack support and be difficult to enact. Hyun Woo et al. (2015) explained alleviating the financial hurdles to energy efficiency investments in technologies for commercial buildings requires researching energy-related risks and innovative underwriting for funding these improvements.

7. Requiring existing building to be retrofitted and meet minimal level of energy efficiency that is subject to cost-effectiveness and technical criteria, is an important policy for California to adopt. According to Kahn (2016), Governor Brown has adopted and signed into law in 2015 the Senate Bill 350, the Clean Energy and Pollution Reduction Act, mandating California to double the energy efficiency in commercial buildings and require the utilities to get half of their energy from renewable resources by 2030. Energy efficiency building retrofits are a critical component to achieving carbon

emission reductions and energy savings (Choy & Rosales, 2014). The panelists believed that providing policy to link energy efficiency with combating climate change was necessary to reduce greenhouse gas emissions through a cost-effective approach.

8. Tax incentives are not supported as an effective policy mechanism to improve the energy efficiency of commercial buildings. Tax incentives for backup power in commercial buildings was rated of low importance and low likelihood of implementation with consensus from the expert panel. California provides many incentives for energy efficiency investments to government sector, industry, schools, and the private commercial building sector (California | ACEEE, 201). Panelists believed there was more importance for incentives for energy efficiency than importance for incentives relating to energy storage in commercial buildings.
9. There is a lack of agreement among the experts regarding which policies are necessary to improve the energy efficiency of commercial buildings. The lack of agreement among experts and policy makers may delay or hinder the development of energy efficient commercial buildings. The panelists collectively rated many of the policies to be of high or medium importance, yet they generally scored within the medium to low range for likelihood of implementation. Therefore, the expert panel viewed many of the policies to be important for the state to improve energy efficiency in commercial buildings, yet the panelists were cynical that these important policy statements could be legislated. The expert panelists' wide range of scores on many policies for

importance and likelihood of implementation and the consistent lack of consensus may reflect the lack of agreement among policy makers, business persons, educators, and the public on how best to improve energy efficiency in commercial buildings. Lack of agreement may stem from the orientation of the subgroups referred to in Chapter 3 comprised of policy experts, building expert, economy experts, and energy resiliency experts. Skeptics believe the energy structure of the future in California may not be as dependable as the traditional energy grid powered by conventional fuels (Jackson, 2017). Jackson (2017) recognized there may be economic and cost burdens that could damage clean energy programs. The panel believed there are going to be costs and burdens to some of the stakeholders in California and this would generate headwinds for legislators to implement these policy statements.

10. Providing energy efficient requirements for existing buildings to align with Assembly Bill (AB) 32 "The Global Warming Solutions Act" to reduce greenhouse gas emissions was rated as medium importance with low likelihood of implementation with consensus among the expert panelists. California's primary target for reducing greenhouse gas emissions under AB 32 is the energy sectors (Vine, 2011). A combination of strategies is essential in order to achieve the emission goals including aggressive of electric vehicles, demand reduction of vehicle miles traveled, reductions of non-energy greenhouse gas emissions, decarbonization of gaseous fuels with sustainable sources, and significant improvements in energy efficiency in transportation, industrial, and commercial buildings (Yeh et al., 2016). Expert

panelists believed the strategies that would support the policy for energy efficiency requirements for commercial buildings to align with AB 32 will be difficult for legislators to implement by the year 2025.

11. Utilizing the Survey Monkey website in this study was effective. The online communication platform provided the necessary tools to facilitate the Policy Delphi process. Communication between the researcher and the expert panel was realized and anonymity was assured. The Survey Monkey website helped to limit and expedite the data collection for the three rounds by sending participation invitations to the panelists, emailing message reminders to complete the three rounds of surveys, and 24 hour access to the questionnaires for the panel.

Implications for Action

Given the research findings in this Policy Delphi study and conclusions drawn by the researcher, the following actions are recommended to policy makers on what policies are necessary for advancing energy efficiency in commercial buildings in the new California economy and environment:

1. Utilities must promote the awareness of the amount of investments from ratepayer funds being made in energy efficiency for commercial buildings. The utilities should continue to invest in expanding the subsidy programs for energy efficiency and develop new innovative programs each year. The programs should include and increase the incentives for energy efficiency technologies, energy retrofits for commercial buildings, clean energy technologies, and energy demand response. This is how the public can

understand the amount of investments from ratepayers funds are being applied to energy efficiency in commercial buildings.

2. Policies that are considered necessary and important for the state should receive additional leadership, resources, and public support to accelerate the likelihood of adoption. The California Energy Commission (CEC) needs to broaden their leadership and expand their public workshops to outside their traditional offices to include associations in the energy and building industries such as California Business Properties Association (CBPA), Building & Office Management Association (BOMA), National Association of Industry Office Properties (NAIOP), Energy Services Coalition (ESC), National Association of Energy Service Companies (NAESCO), Advanced Energy Economy (AEE), and the United States Green Building Council (USGBC). This is how leadership among different associations in the building industry can communicate. These workshops must include topics and education about necessary energy policies for commercial buildings, energy efficiency technologies, Energy Savings Performance Contracting (ESPC), energy auditing, clean energy technologies, and cost-effective solutions for energy efficiency in commercial buildings. These workshops will facilitate dialogue between public and private sectors and define the benefits of necessary policies for energy efficiency in commercial buildings.
3. It is vital the state takes advantage of local ordinances such as the city of San Francisco for public disclosure of building and energy data titled Environmental Code Chapter 20. San Francisco's existing commercial

building ordinance applies to commercial buildings with 10,000 square feet or more of space within the city and are required to have energy benchmarking annually and ensure that buildings receive an energy audit every five years by a qualified energy professional. The state needs to leverage the data from the San Francisco program and model the ordinance for a statewide program. This effort could lead to new legislation for public disclosure for building data or amending Assembly Bill 1103.

4. The utilities need to expand their current ratepayer incentive programs to expedite the advancement toward more microgrids, energy storage, and energy efficiency for commercial buildings. The incentive programs should be expanded to more than just technologies and equipment, the programs could be scalable were the incentive would increase as the size of the impact of the project for the buildings and the amount of energy savings increases. Incentives that encourage and reward larger energy efficiency efforts for commercial buildings will harvest more energy savings, increase energy resiliency, stimulate the economy, and reduce carbon emissions exponentially.
5. The CEC must provide models and successful case studies for the public to review relating to cost effective energy projects for commercial buildings that achieve energy efficiency at multiple levels. These levels should include 10% to 50% energy savings and greater than 50% energy savings for commercial building energy retrofits. The cost-effective project models should be shared by energy service companies (ESCO)'s, general contractors, utilities, colleges, state and local governments, and financial institutions that finance energy

savings and renewable energy projects for commercial buildings. The models and successful case studies will showcase best practices and challenges. Best practices will demonstrate the data relating to return on investment, net present value, energy modeling, energy savings, and reduction of carbon emissions for commercial buildings.

6. Benefits for backup power in commercial buildings should be increased and the awareness of benefits to commercial building owners should come from leadership from the public and private sectors. The benefits should include energy and operational savings, utility rebates, revenue from the utilities during peak demand, tax credits, and tax deductions. Funding for the tax credit can be appropriated from the state's Cap-and-Trade auction funds via the California Climate Investments Program (CCIP). The allocation from cap-and-trade proceeds through the CCIP should be increased toward tax incentives for backup power. The message of value relating to tax incentives for backup power should be communicated concurrently from public and private sector leadership. It is necessary for the leadership to encompass the state executive office, CEC, and public utilities along with private sector leadership from commercial buildings owners, energy and building industry associations, ESCO's, general contractors, and consultants knowledgeable in policy, energy, economy, and buildings. The message of value for backup power would be comprised of a positive economic impact, support for the state's electrical infrastructure, increased energy resiliency, and storage capacity for clean energy generation that will reduce carbon emissions.

7. Important policy alternatives for energy efficiency in commercial building should be driven by a collective response of industry experts in policy, energy, building, and the economy. This collective response must be in the form of a team of industry experts that presents at conferences, workshops, and symposiums in the state. The presentation material should be educational and communicate the benefits for all the shareholders for energy efficiency in commercial buildings. Industry experts participating on a team need to collaborate to create the educational and marketing material while arriving at a level of consensus. This consensus from leadership must be shared with the public and private sectors to accelerate consensus in the public and expedite the adoption of vital policies for energy efficiency in commercial buildings.
8. Assembly Bill 32 has milestones and goals for achieving reduction of greenhouse gas (GHG) emissions statewide. These goals include reducing GHG emissions by 15% by the year 2020 and 80% by the year 2050. The state must align energy efficiency requirements for buildings to the reduction percentages of the same year as the GHG reductions goals in AB 32. The energy efficiency requirements must be 15% by the year 2020 and 80% by the year 2050. In addition, the energy efficiency requirements need to receive the same regulations that the Air Resources Board (ARB) adopts pursuant to AB 32. ARB must adopt regulations to achieve the maximum technologically feasible and cost-effective GHG reductions. These regulations must be applied to the energy efficiency requirements to provide support for commercial buildings owners to cost-effectively implement energy efficiency

projects for buildings. Energy efficiency requirements need to leverage and have access to the same funding AB 32 receives including the AB 32 cost of implementation fee regulation and the Greenhouse Gas Reduction Fund (GGRF) that receives funding from the auction proceeds that are part of the Cap-and-Trade program. Aligning energy efficiency requirements for commercial buildings with the goals of AB 32 will alleviate challenges for policy makers to pass and adopt these vital policies for commercial buildings.

Recommendations for Further Research

1. Replicate this study using a different expert panel selected utilizing the same or different selection criteria. A variation of this Policy Delphi study could also be conducted to ensure the panel is well represented by larger population of experts in the state.
2. This Policy Delphi study identified a body of policy statements and achieved robust agreement on their importance by a panel of experts. The Policy Delphi study did not, however, provide data on the effectiveness of these policy statements. It is recommended that further research be conducted that analyzes data on the effectiveness of the high importance policy statements.
3. Conduct a Policy Delphi study or a qualitative study that compares the responses of subgroups within the expert panelists to help define the differences and similarities and the assortment of policy alternatives relating to policy alternatives to increase energy efficiency in commercial buildings.
4. The results of the study highlighted that the panelists reached consensus regarding seven policy statements as having high importance. It is

recommended that a mixed methods research study be conducted to further study the perspectives of policy makers and building owners regarding these seven policy statements.

5. Panelists for this study identified seven policy statements as having high importance; however, the expert panel only rated one of those policy statements as high likelihood of implementation. It is recommended that a study be conducted to identify the barriers to the implementation of policy statements and what support is needed to overcome those barriers.
6. The panel for this study rated the likelihood of implementation for 20 policy statements; however, the panelists only attained consensus on eight of those policies. It is recommended that a study be conducted to identify the barriers to consensus and what support is needed to overcome those barriers.
7. It is recommended that a Policy Delphi study be conducted to identify the state energy policy initiatives that would likely increase the number of state agencies or personnel whom would implement the policy statements identified in this Policy Delphi study.
8. The results of the study highlighted that the panelists could not reach consensus on 30% of policies for importance and 60% of the policies for likelihood of implementation. It is recommended that further research be conducted that analyzes data on bridging the gap between the public and private sector stakeholders regarding policy development for energy efficiency in commercial buildings.
9. Conduct a national study on energy policies for commercial buildings or a

study that compares California with other states.

10. Conduct a mixed methods study that measures the impact of Cap-and-Trade on the development of energy efficient commercial buildings.
11. Conduct a qualitative study on the effects of energy efficient policies and the effects perceived by the buildings tenants and occupants.

Concluding Remarks and Reflections

This research study began with a passion to better understand how progressive California could be toward advancing energy policy for commercial buildings and combating climate change. The energy, building, and technology industries are progressing exponentially each year in the state. I am encouraged after this study about the vast amounts of funding flowing into programs in the state for energy efficiency, reduce greenhouse gas emissions, and technology development. It was refreshing to learn that California is still pursing climate change and energy efficiency policies despite the new views from the federal government that recently dropped climate change from the U. S. national security strategy. Based on what I learned from this study, it is obvious that California is making some important strides to encourage green building standards and sustainability, two issues I am sure you can tell are especially close to my heart.

I was a little discouraged after reviewing the findings with this study that the panelists felt many of the policies they rated important would not likely be implemented in the near future. Why not? If a policy is going to help fix problems and save money, energy, and the environment, then why would there not be more belief, support, and leadership to implement them. While navigating through the Policy Delphi study, I learned that experts believe there are benefits to improving energy efficiency in commercial buildings and the benefits have a ripple effect toward improving the economy and environment in the state.

Emerging technologies such as model predictive controls, battery storage, and solar photovoltaic are enhancing the electrical infrastructure and improving the functionality of commercial buildings. These types of technologies are being deployed throughout the state and the risk of utilizing them continues to lessen. This will have a positive effect in the energy and commercial building industry. The positive effect will encompass job and economic growth while combating climate change, improving people's lives, and protecting the environment.

After completion of this Policy Delphi study, I firmly believe that California has the resources, experts, economy, and leadership to continue to lead the country with progressive energy policies for commercial buildings that are cost effective, protecting the environment, and successful models for other states to follow. All levels of leaders around the globe have an opportunity to work together and fight many of the environmental and energy problems we face today and will continue to face tomorrow. From small businesses to governments, we all have a role in securing stronger economies and a cleaner environment for future generations. I applaud California for shining a spotlight on these issues, especially as they relate to commercial buildings.

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APPENDICES

APPENDIX A

Synthesis Matrix

Theme	Sources
Energy Efficiency in Buildings	Akhtar (2017) Allen (2014) Alphabet (2015) Ballard (2015) Bisel (2011) Burton (2014) Cao (2016) Caron (2015) Childs (2011) Choy (2014) Cook (2013) Craig (2016) Danelski (2015) David (2013) Davis (2013) Doughman (2007) Fiander (2015) Freeman (2008) Gardels (2015) Halper (2014) Halstead (2017) Hoops (2012) Hoover (2016) Hubble (2016) Hyun (2015) Jacobsen (2016) Kahn (2016) Khasha (2016) Lacey (2016) Lambruschi (2015) Lazo (2015) Lee (2016) Levinson (2016) Liang (2015) Liu (2015) Mar (2015) McLarty (2015) Mecklin (2014) Michaud (2007) Mormann (2016) Ozadowicz (2017)

	Salsbury (2013) Stadler (2014) Stringham (2014) Trencher (2016) Wara (2014) Wei (2014) Yeh (2016) Yushchenko (2017) Zhou (2015)
Climate Change	Armonio (2016) Berliant (2010) Bisel (2011) Bloom (2016) Burton (2014) Burton (2013) Clutter (2015) Dean (2016) Gould (2015) Gualco (2017) Halper (2013) Hart (2013) Hernandez (2017) Kairam (2017) Lacey (2016) Lazo (2015) Lewontin (2015) Mazmanian (2013) Meckling (2015) Muhovic (2010) Reyna (2017) Roy (2016) Sze (2009) Walton (2017) Wara (2014) Wei (2014) Xu (2012) Yeh (2012)
Energy Resiliency	Akhtar (2017) Armonio (2016) Berliant (2010) Bisel (2011) Cao (2016) Choy (2014) Cook (2013) Doughman (2007) Freeman (2008)

	Galbriath (2015) Halper (2014) Headrick (2016) Hong (2015) Kahn (2016) Kairam (2017) Khasha (2016) Lambruschi (2015) Liu (2014) Lazo (2015) Mormann (2016) Ozadowicz (2017) Porse (2016) Roy (2016) St. John (2016) Stamber (2017) Tonn (2007) Walton (2017) Wara (2014) Wei (2014)
Electrical Grid Infrastructure	Cook (2013) Considine (20130 Danelski (2015) Gabbar (2017) Halper (2015) Hoops (2012) Hyun (2015) Jackson (2017) Kahn (2016) Kairam (2017) Krishnamurthy (2016) Lambruschi (2015) Lazo (2015) Liu (2015) Gardels (2015) Lambuschi (2015) Manet (2012) Mehta (2014) Mormann (2016) Navarro (2016) Navarro (2017) Ozadowicz (2017) Roy (2016) Salsbury (2013) St. John (2016) Stamber (2017)

	Stringham (2015) Sun (2016) Tonn (2007) Walton (2017) Walsh (2014) Wara (2014) Webster (2014)
Greenhouse Gas Emissions	Allen (2014) Armonio (2016) Bisel (2011) Berliant (2010) Bloom (2016) Burton (2013) Choy (2014) Clutter (2015) Davis (2015) Dean (2016) Dhanaphatana (2015) Gould (2015) Hernandez (2017) Lacey (2016) Lazo (2015) Meckling (2015) Michaud (2007) Mormann (2016) St. John (2016) Sze (2009) Yeh (2016) Walton (2017) Wei (2014) Xu (2012)
Gaps in the research	Burton (2013) Galbriath (2015) Gardels (2015) Gould (2015) Kahn (2016) Mecklin (2014) Navarro (2016) Navarro (2017) Wilson (2014) Xu (2012) Yeh (2016) Yushchenko (2017) Zhou (2015)

APPENDIX B

Electronic Informed Consent Form

INFORMATION ABOUT: California Energy Policy Alternatives for Buildings to Create Energy Resiliency, Reduce Carbon Emissions, and Lessen Dependency on Electrical Utilities for the Future.

RESPONSIBLE RESEARCHER: Russell Garcia

PURPOSE OF STUDY: The purpose of this Policy Delphi study is to identify and assess the energy efficiency policies for commercial buildings in California that experts believe are necessary to be implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.

By participating in this study, you agree to do the following: Participate in a Policy Delphi study that consists of completing three separate online surveys that last approximately 20 minutes each. This Policy Delphi survey instrument consists of three rounds of questionnaires that respondents answer consecutively.

I understand that: No information that identifies me will be released without my separate consent and that all identifiable information will be protected to the limits allowed by law. If the study design or the use of the data is to be changed, I will be so informed and my consent re-obtained. There are minimal risks associated with participating in this research. I understand that the researcher will protect my confidentiality by keeping the identifying codes and research materials in a locked file drawer that is available only to the researcher. I understand that I may refuse to participate in or I may withdraw from this study at any time without any negative consequences. Also, the researcher may stop the study at any time.

ELECTRONIC CONSENT: Please select your choice below. Clicking on the “agree” button indicates that you have read the informed consent form and the information in this document and that you voluntarily agree to participate. If you do not wish to participate in this electronic survey, you may decline participation by clicking on the “disagree” button. The survey will not open for responses unless you agree to participate.

___AGREE: I acknowledge receipt of the complete Informed Consent packet and “Bill of Rights.” I have read the materials and conform to the recommendations above to participate in the study.

___DISAGREE: I do not wish to participate in this electronic survey

APPENDIX C

Letter of Introduction

Dear Mr. McGinnis

My name is Russell Garcia and I am a doctoral candidate in the School of Education at Brandman University. As part of the completion of my Doctorate in Education, I am in the process of completing a Policy Delphi study in California Energy Policy for buildings and I would like to invite you to participate. The study is titled: California Energy Policy Alternatives for Buildings to Create Energy Resiliency, Reduce Carbon Emissions, and Lessen Dependency on Electrical Utilities for the Future. This research effort will explore policy alternatives for energy efficiency for buildings in California utilizing a three-round modified Policy Delphi approach. The goal of the study is to develop consensus among the Policy Delphi panel of experts for effective future energy policy with buildings in California.

A Policy Delphi study relies on a panel of experts to share experience and ideas in a confidential environment. You were nominated by one of the advisors with this study and selected through a randomizer to be on a panel of 24 experts. Your participation in this study will consist of completing three separate online surveys that last approximately 20 minutes each. These surveys will deploy consecutively over the next 30 days. The requested turnaround time for your response is one week. As the researcher, I will be the only individual with access to the data and will be facilitating the Policy Delphi process.

At the conclusion of this study, I will provide you a copy of this dissertation and unless you request otherwise, list your name as a contributor on the expert panel.

Thank you for your consideration, time, and expertise.

Regards,

Russell Garcia

Doctoral Candidate, Brandman University

APPENDIX D

Brandman University

Research Participant's Bill of Rights

BRANDMAN University Chapman University System

BRANDMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD

Research Participant's Bill of Rights

Any person who is requested to consent to participate as a subject in an experiment, or who is requested to consent on behalf of another, has the following rights:

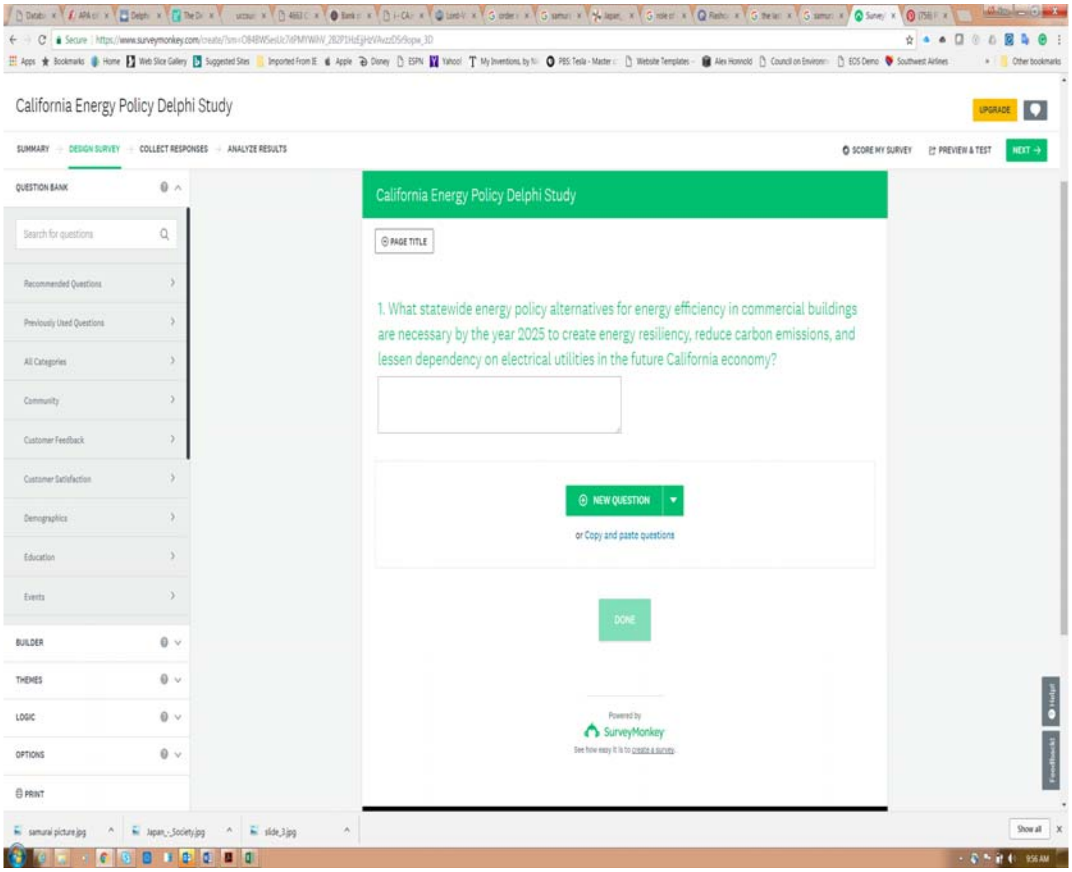
1. To be told what the study is attempting to discover.
2. To be told what will happen in the study and whether any of the procedures, drugs or devices are different from what would be used in standard practice.
3. To be told about the risks, side effects or discomforts of the things that may happen to him/her.
4. To be told if he/she can expect any benefit from participating and, if so, what the benefits might be.
5. To be told what other choices he/she has and how they may be better or worse than being in the study.
6. To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study.
7. To be told what sort of medical treatment is available if any complications arise.
8. To refuse to participate at all before or after the study is started without any adverse effects.
9. To receive a copy of the signed and dated consent form.
10. To be free of pressures when considering whether he/she wishes to agree to be in the study.

If at any time you have questions regarding a research study, you should ask the researchers to answer them. You also may contact the Brandman University Institutional Review Board, which is concerned with the protection of volunteers in research projects. The Brandman University Institutional Review Board may be contacted either by telephoning the Office of Academic Affairs at (949) 341-9937 or by writing to the Vice Chancellor of Academic Affairs, Brandman University, 16355 Laguna Canyon Road, Irvine, CA, 92618.

Brandman University IRB Adopted November 2013

APPENDIX E

Policy Delphi Study Web Page



APPENDIX F

Email Message for Informed Consent from Participants

To: Invited Policy Delphi Panel Member

From: Russell Garcia, Policy Delphi Study Coordinator

Subject: Informed Consent to Participate in the Study

Dear Invited Expert Panel Member,

This message is the informed consent to participate in the study, California Energy Policy Alternatives for Buildings to Create Energy Resiliency, Reduce Carbon Emissions, and Lessen Dependency on Electrical Utilities for the Future.

RESPONSIBLE RESEARCHER: Russell Garcia

PURPOSE OF STUDY: The purpose of this Policy Delphi study is to identify and assess the energy efficiency policies for commercial buildings in California that experts believe are necessary to be implemented by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy.

By participating in this study, you agree to do the following: Participate in a Policy Delphi study that consists of completing three separate online surveys that last approximately 20 minutes each. This Policy Delphi survey instrument consists of three rounds of questionnaires that respondents answer consecutively.

I understand that: No information that identifies me will be released without my separate consent and that all identifiable information will be protected to the limits allowed by law. If the study design or the use of the data is to be changed, I will be so informed and my consent re-obtained. There are minimal risks associated with participating in this research. I understand that the researcher will protect my confidentiality by keeping the identifying codes and research materials in a locked file drawer that is available only to the researcher. I understand that I may refuse to participate in or I may withdraw from this study at any time without any negative consequences. Also, the researcher may stop the study at any time.

I acknowledge that I have received a copy of this form and the Research Participants Bill of Rights.

I have read the above and understand it and conform to the recommendations above.

ELECTRONIC CONSENT: Please select your choice below. Clicking on the "agree" button indicates that you have read the informed consent form and the information in this document and that you voluntarily agree to participate. If you do not wish to participate in this electronic survey, you may decline participation by clicking on the "disagree" button. The survey will not open for responses unless you agree to participate.

___AGREE: I acknowledge receipt of the complete Informed Consent packet and "Bill of Rights." I have read the materials and give my consent to participate in the study.

___DISAGREE: I do not wish to participate in this electronic survey

APPENDIX G

Email Message for Letter of Introduction

To: Invited Policy Delphi Panel Member

From: Russell Garcia, Policy Delphi Study Coordinator

Subject: Letter of Introduction

Dear Invited Delphi Panel Member

My name is Russell Garcia and I am a doctoral candidate in the School of Education at Brandman University. As part of the completion of my Doctorate in Education, I am in the process of completing a Policy Delphi study in California Energy Policy for buildings and I would like to invite you to participate. The study is titled: California Energy Policy Alternatives for Buildings to Create Energy Resiliency, Reduce Carbon Emissions, and Lessen Dependency on Electrical Utilities for the Future. This research effort will explore policy alternatives for energy efficiency for buildings in California utilizing a three-round modified Policy Delphi approach. The goal of the study is to develop consensus among the Policy Delphi panel of experts for effective future energy policy with buildings in California.

A Policy Delphi study relies on a panel of experts to share experience and ideas in a confidential environment. You were nominated by one of the advisors with this study or myself and selected through a randomizer to be on a panel of 24 experts. Your participation in this study will consist of completing three separate online surveys that last approximately 20 minutes each. These surveys will deploy consecutively over the next 30 days. The requested turnaround time for your response is one week. As the researcher, I will be the only individual with access to the data and will be facilitating the Policy Delphi process.

At the conclusion of this study, I will provide you a copy of this dissertation and unless you request otherwise, list your name as a contributor on the expert panel.

Thank you for your consideration, time, and expertise.

Regards,

Russell Garcia

Doctoral Candidate, Brandman University

APPENDIX H

Round One Email Message to Survey Participants

To: Policy Delphi Panel Member

From: Russell Garcia, Policy Delphi Study Coordinator

Subject: Delphi Study, Round One

Dear Expert Panel Member,

The Policy Delphi Study begins with Round One on Monday Jan 8th, 2018 at 7am. The survey will be accessible on SurveyMonkey. Please complete the first round by Jan 11th, 2017.

Next Steps

1. To access the survey click: https://www.surveymonkey.com/create/?sm=O84BWSesUc7itPMYWihV_2B2P1HzEjjHzVAvzzDSr9opw_3D.
2. Click on Round 1 survey titled "California Energy Policy Delphi Study".

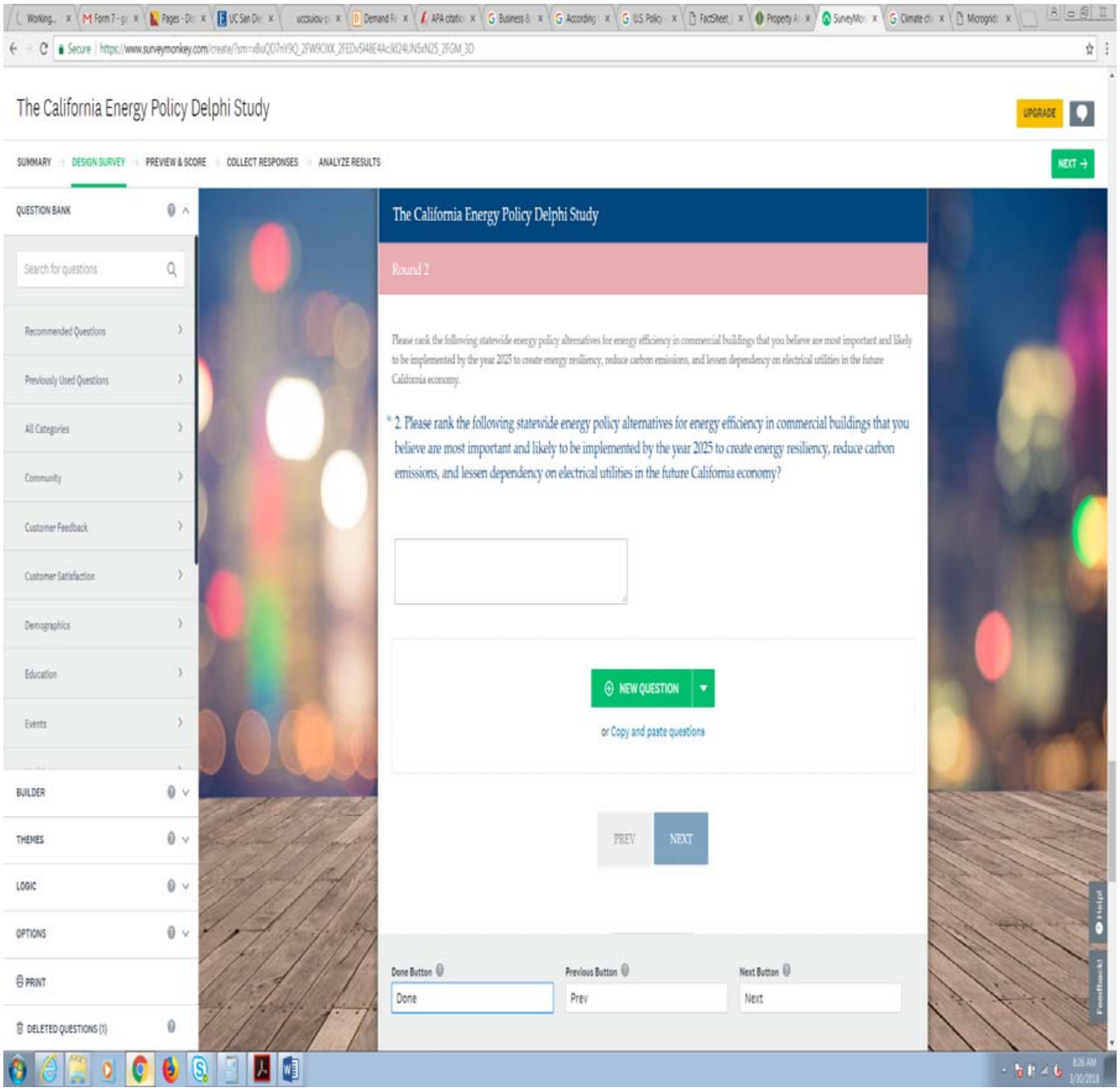
The Survey will have one open-ended question, "What are five statewide energy policy alternatives for energy efficiency in commercial buildings are necessary by the year 2025 to create energy resiliency, reduce carbon emissions, and lessen dependency on electrical utilities in the future California economy?"

3. When you have completed the question press submit.

Thank you

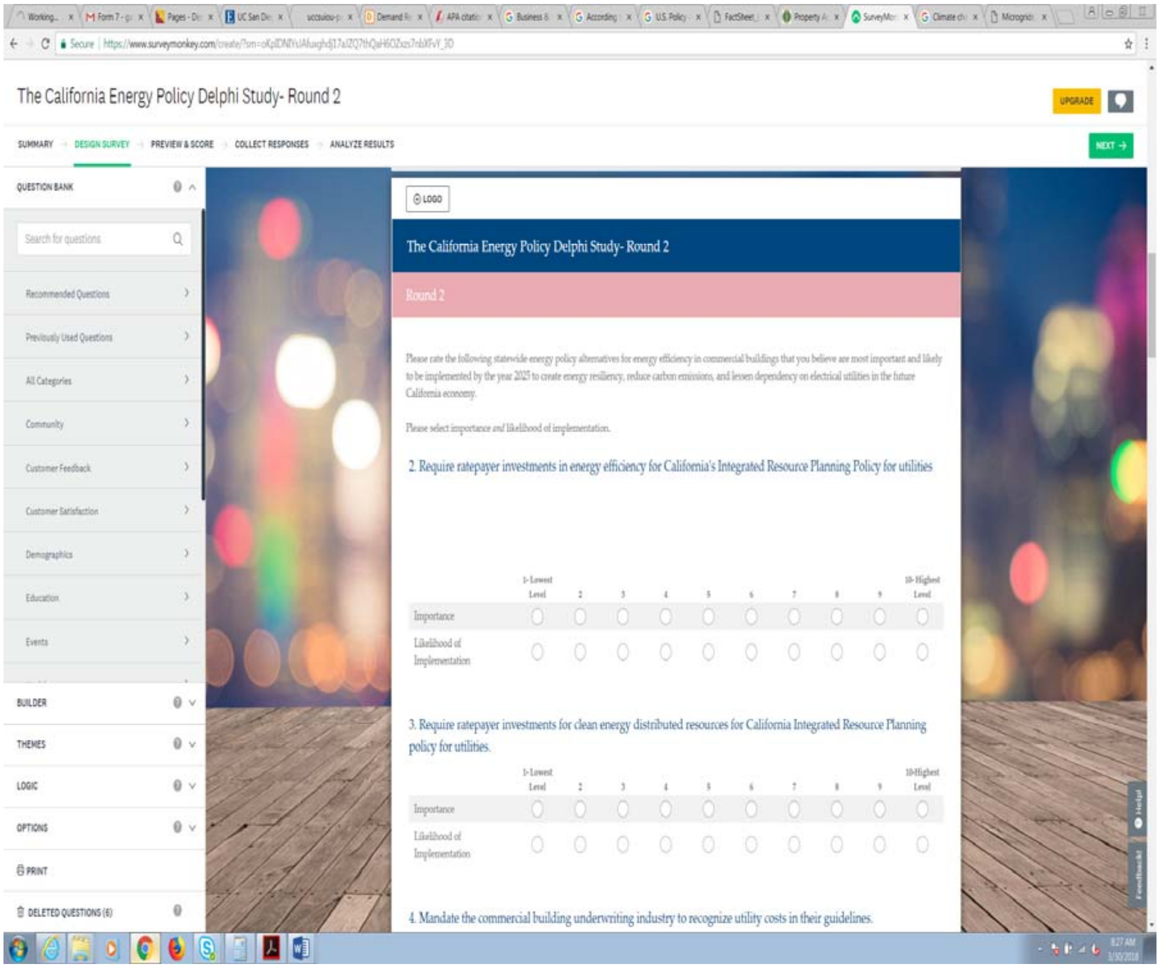
APPENDIX I

Survey Monkey Round One



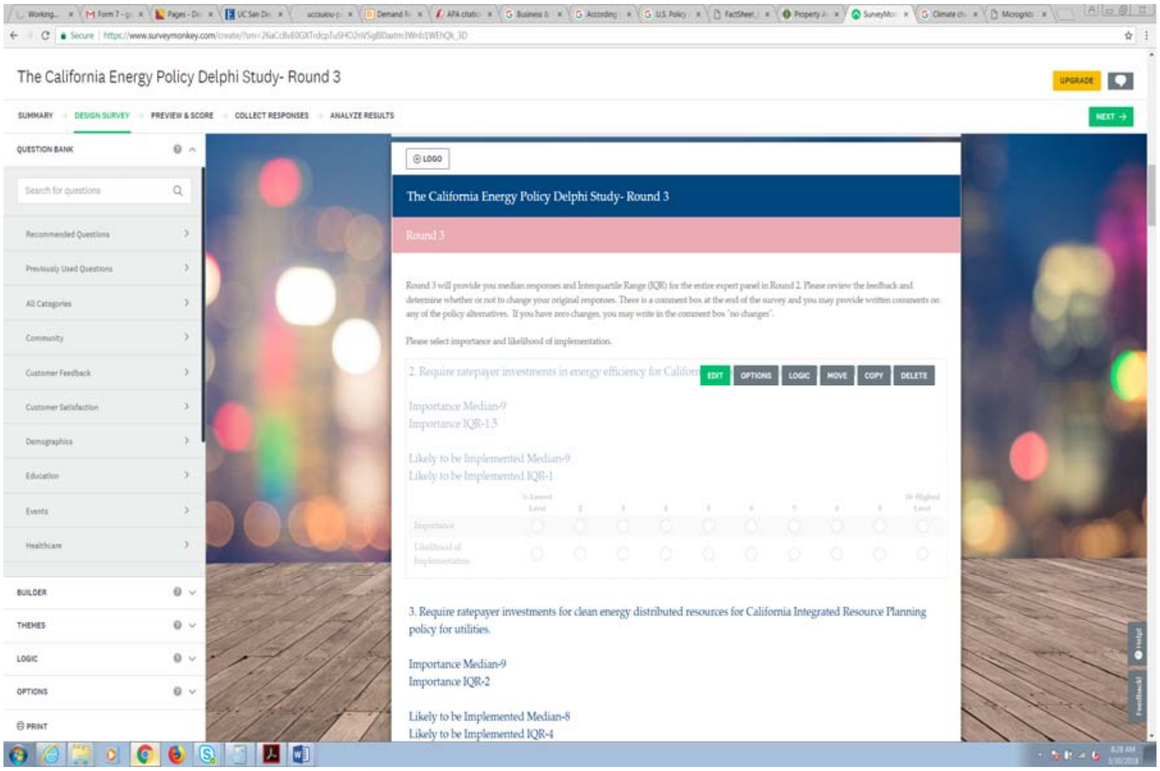
APPENDIX J

Round Two Email Message to Survey Participants



APPENDIX K

Round Three Email Message to Survey Participants



APPENDIX L

Policy Delphi Study Expert Panel List

1. Payam Bozorgchami
   Civil Engineer
   California Energy Commission

2. Daniel Bresette
   Vice President for Policy and Research
   Alliance to Save Energy

3. Andrew Burr
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APPENDIX N

Original Policy Alternatives

Policy Number	Policy Alternative
1	Modernize California's Integrated Resource Planning policies and practices for investor-owned and municipal utilities to better value, plan for and make ratepayer investments in Energy Efficiency and other clean distributed resources that provide cost-effective distribution grid benefits and reductions in GHG emissions.
2	Mandate underwriting industry recognize utility costs in their guidelines.
3	Mandate appraisal industry to recognize utility costs in their appraisal process.
4	Have state establish simple energy (utility costs) scale on the efficiency of buildings.
5	State should market the value of energy efficiency to improve the appraisal value of commercial buildings.
6	The state needs to simplify (not reduce efficiency) of energy regulations. CA T-24 is too complex and burdensome at permit application and inspection requirements.
7	Periodic benchmarking, energy assessment/audit (may include water too), and retro commissioning, coupled with requirement for implementing cost-effective (say, better than 2-year payback) efficiency measures (e.g., Boulder, CO Building Performance Ordinance).

8 Require older existing buildings (not built to more recent code) to meet some minimal level of efficiency (probably based on asset rating--appliances, shell, ducts, etc. characteristics) subject to cost-effectiveness and technical criteria (commercial building analog to Boulder, CO SmartRegs pertaining to residential rental units).

9 Tax incentive, density bonus, and other incentives for construction and renovation meeting energy and environmentally stringent criteria (say, LEED Gold or Platinum or equivalent--e.g., Arlington Co., VA density bonus [doesn't actually require LEED certification but needs to meet equivalent points).

10 Utility rate design that recognizes value--including to reliability and resilience--of distributed energy resources to encourage microgrids and energy storage (not strictly energy efficiency but can complement; distributed generation under this could be PV but natural gas would be ok if efficient CHP maybe with district energy)

11 Ratepayer and tax incentives complementing previous item (11) to encourage microgrid, storage and energy efficiency, particularly for critical infrastructure (which can include multifamily housing, schools, community facilities) resilience (how long and how well can your shelter, hospital, etc. operate during an outage on backup power and/or PV+storage?) Subsidy for critical infrastructure doing this serves public safety needs and also can push economies of scale and scope to lower costs for wider application and market transformation.

12 Mandatory benchmarking with public disclosure.

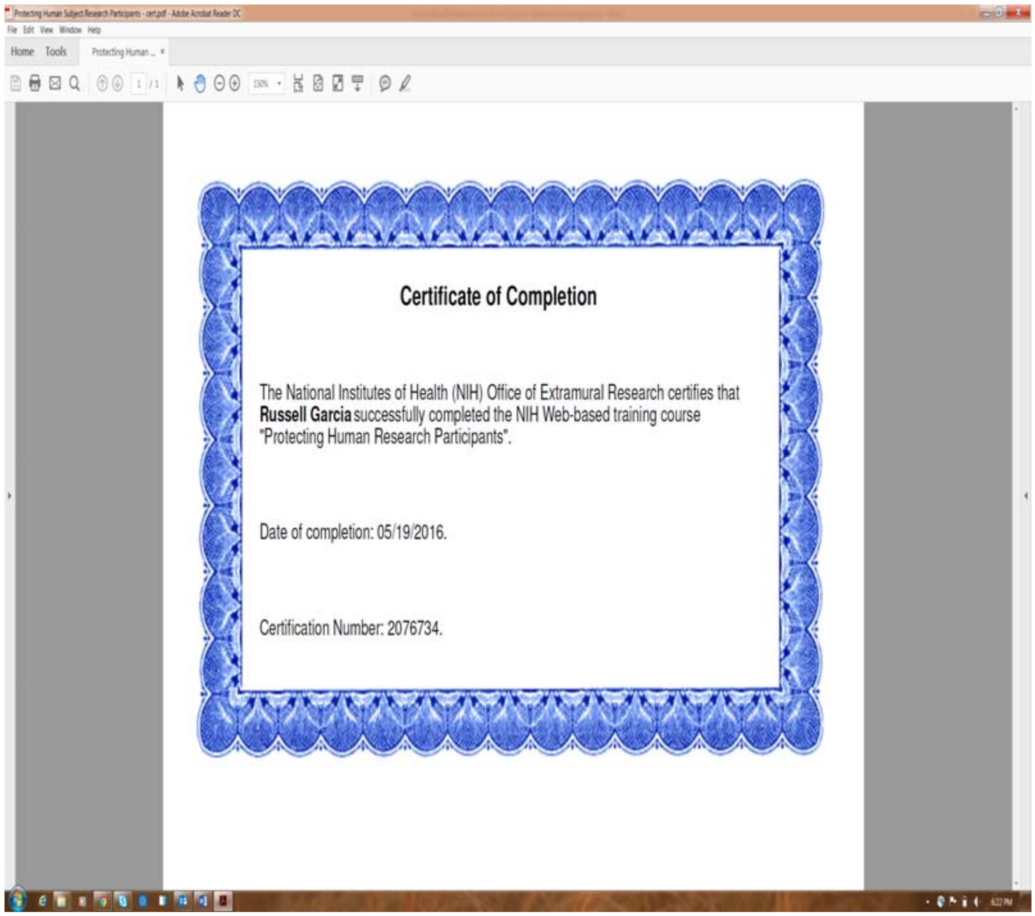
13 Mandatory energy audits with public disclosure.

14 Mandatory retrofits to bring buildings to a minimum level of efficiency.

15 Ratepayer incentives the pay that full public value of efficiency to the building owner.

APPENDIX O

National Institutes of Health (NIH) Clearance



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Russell Garcia** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 05/19/2016.

Certification Number: 2076734.