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DEVELOPING, ADOPTING, AND EXECUTING 100% NET-RENEWABLE
ELECTRICITY RESOLUTIONS AT THE LOCAL LEVEL

by

Emily E. Skill

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Environment and Society

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2019

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ABSTRACT

Developing, Adopting, and Executing 100%
Net-Renewable Electricity Resolutions
at the Local Level

by

Emily E. Skill, Master of Science

Utah State University, 2019

Major Professor: Dr. Roslynn Brain McCann
Department: Environment and Society

In the absence of national leadership on climate policy, municipalities are adopting resolutions to reduce their carbon footprint and transition to clean energy. However, what leads to successful adoption of these resolutions and how to effectively implement climate goals at the community level needs further exploration. Using a qualitative, exploratory case study approach, this thesis examines the resolutions adopted in Salt Lake City, Park City, and Moab, Utah to transition to 100% renewable electricity by 2032. An in-depth document analysis and semi-structured interviews with government officials, city staff, and community members involved with the resolution process were conducted. Time series and thematic analyses were used to determine causal events and identify fundamental themes within the data. Each city's plan for resolution execution was compared to the approaches and techniques outlined in the community-based social marketing framework and the theory of diffusion of innovations. Identifying similarities

and differences across the communities' plans and these frameworks helped determine key components in implementation strategies. Our findings deliver a transferable five-step framework to assist other cities in adopting similar resolutions and strategies to engage community members with practices that will help cities achieve these ambitious resolutions.

(185 pages)

PUBLIC ABSTRACT

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Net-Renewable Electricity Resolutions

at the Local Level

Emily E. Skill

In the absence of national leadership on climate policy, municipalities are adopting resolutions to reduce their carbon footprint and transition to clean energy. However, what leads to successful adoption of these resolutions and how to effectively implement climate goals at the community level needs further exploration. To investigate these questions, this thesis examines the resolutions adopted in Salt Lake City, Park City, and Moab, Utah to transition to 100% renewable electricity by 2032. Data was collected through documents, such as city reports and newspapers, and interviews with government officials, city staff, and community members involved with the resolution process. A time series analysis and thematic analysis were used to determine casual events and identify fundamental themes within the data. Each city's plan for resolution execution was compared to the approaches and techniques outlined in the community-based social marketing framework and the theory of diffusion of innovations. These findings deliver a transferable five-step framework to assist other cities in adopting similar resolutions and strategies to engage community members with practices that will help cities achieve these ambitious resolutions.

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CHAPTER I

INTRODUCTION

Climate Change and Fossil Fuels

At the 2015 G20 Leaders' Summit in Antalya, Turkey, representatives of 19 countries¹ and the European Union collectively stated that “climate change is one of the greatest challenges of our time” (G20 Leaders, 2015b, p. 6). Climate change threatens many aspects of society, including public health, food security, national security, and economic stability (Brown et al., 2015; Stern, 2008; United States Department of Defense, 2015). There is a 97% consensus in the scientific literature that climate change is happening and anthropogenic (Cook et al., 2013), with the combustion of fossil fuels for energy as the main contributor (Melillo, Richmond, & Yohe, 2014; U.S. EPA, 2015). When fossil fuels are burned, greenhouse gases are emitted into our atmosphere, trapping the Earth's radiation and causing the planet to warm. A low emissions scenario, where emissions are cut substantially (scenario B1), estimates a 3°F to 5°F rise in temperature by the end of the century (Melillo et al., 2014). A high emissions scenario, with continued increases in emissions (scenario A2), predicts that by the end of the century the planet will warm 5°F to 10°F (Melillo et al., 2014). Combustion of these fuel sources also releases many pollutants that are harmful to human health, such as sulfur dioxide, nitrous oxides, mercury, and lead into the atmosphere. The release of carbon dioxide and methane indirectly harm human health through the adverse effects of climate change. In a

¹ Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, and the United States (G20 Leaders, 2015a).

similar light as the G20 Leaders' summit, the Fourth National Climate Assessment explains the threats that climate change poses to human health and well-being (U.S. Global Change Research Program, 2018). Extreme heat, water contamination, spread of disease, decreased air quality, increased frequency and intensity of storms, and declined crop yields are just a few of the health concerns that result from climate change (Henson, 2014; U.S. Global Change Research Program, 2018).

In addition to health threats, climate change puts national security at risk. In 2015, the United States Department of Defense (DoD) released a report stating that climate change “increases the risk of instability and conflict overseas, and has implications for DoD on operations, personnel, installations, and the stability, development, and human security of other nations” (United States Department of Defense, 2015, p. 3). Four impacts of climate change were outlined in the report as climate-related security risks: 1) persistent and reoccurring flooding, drought, and higher temperatures, 2) More frequent and/or extreme weather events 3) Sea level rise and temperature changes and 4) Decreases in Arctic ice cover (United States Department of Defense, 2015).

Furthermore, fossil fuels do not provide an indefinite fuel source, especially when the increase of energy demand and consumption is considered. The depletion of these finite fuel sources leaves us with unanswered questions about the affordability and accessibility of energy in the future. A prediction of fossil fuel depletion estimates that coal will be the only fossil fuel remaining after 2042 until it reaches depletion in 2112 (Shafiee & Topal, 2009). The development and improvement of hydraulic fracturing technologies for natural gas and oil have led to disputes about such predictions (Brecha, 2013). Due to the difficulty in predicting fossil fuel depletion, estimates vary. However,

many scientists argue that fossil fuel resource depletion is in proximity (Brecha, 2013; Henson, 2014; Shafiee & Topal, 2009; Singh & Singh, 2012). Thus, continuing to invest in finite and harmful resources is inherently unsustainable. Knowing that our main energy sources are both finite and a major contributor of greenhouse gases, our cities and nation should be motivated to diversify our energy sources. Proactively transitioning our energy infrastructure to renewables is necessary for avoiding the issues associated with energy scarcity (Shafiee & Topal, 2009) and reducing the impacts of climate change (Bruckner et al., 2014).

However, the United States, and nearly every other country in the world right now, remains heavily dependent on fossil fuel energy sources. In 2016, 65% of electricity generation in the U.S. was from fossil fuel use, 20% from nuclear, and 15% from renewable energy sources, which includes hydropower that accounts for 6.4% with wind, biomass, solar, and geothermal together comprising 8.6%) (U.S. Energy Information Administration, 2016). The United States makes up 4% of the world population but contributes 17% of the world's CO₂ emissions (Union of Concerned Scientists, 2011), and the U.S. contribution to cumulative global emissions throughout the last century is even greater (Melillo et al., 2014). Furthermore, these values do not account for the U.S.'s consumption-based emissions, which are emissions associated with the production of goods in other countries that the United States imports and consumes. In the U.S., electricity production is the largest contributor to greenhouse gas emissions, making up 29% of the country's carbon footprint (U.S. EPA, 2015). Large reductions in heat-trapping emissions is necessary for mitigating climate change (Melillo et al., 2014). Thus, it is critical that the U.S. begins transitioning to clean, renewable sources of electricity.

Energy Generation by Source Trends

Despite our continued dependence on fossil fuels, technological breakthroughs in hydraulic fracturing as well as advances in solar and wind technology have reduced the costs of energy from these sources, which has contributed to making coal less competitive. The transition in the United States' energy generation from coal to natural gas has contributed to a 53% decline in coal from 2006 to 2016 and a 33% increase in natural gas (U.S. Department of Energy, 2017). Energy generation from renewables has also grown substantially. From 2006 to 2016, solar energy generation in the U.S. increased by 5000%, 508,000 MWh to 28,000,000 MWh (U.S. Department of Energy, 2017). It is important to note that solar energy generation is currently a small fraction, 0.9%, of the US electrical production (U.S. Energy Information Administration, 2017). Renewable energy growth is also apparent through the increase in renewable energy employment. From 2015 to 2016, employment in solar energy grew by 25% and wind energy employment increased by 32% (U.S. Department of Energy, 2017).

The following graphs depict the electricity source changes in the United States' electricity generation from 2000 to 2016. Figure 1 shows a decline in coal powered electricity generation, dropping from 49.6% in 2008 to 30.4% in 2016. While there has been an increase in electricity generated from natural gas, 18.8% in 2005 to 33.8% in 2016, electricity generation from renewable energy sources grew by 70% in the same time period, increasing from 8.7% in 2005 to 14.8% by 2016.

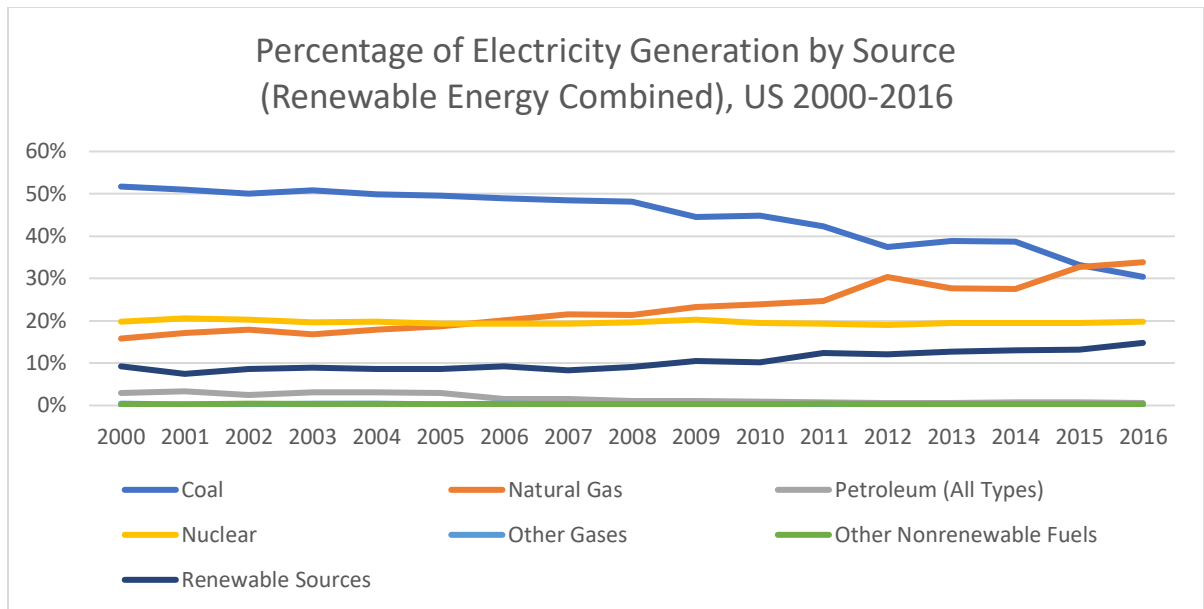


Figure 1. Percentage of the United States' electricity generation by source. Renewable energy sources are grouped together, consisting of wind, biomass, geothermal, hydropower, and solar (U.S Energy Information Administration, 2017).

Figure 2 shows how electricity generation in the U.S. from renewable energy alone has changed in the last few years. In 2005, hydropower was the main source of renewable energy, making up 75% of total renewable energy generation. By 2016, hydropower was responsible for only 43% of renewable energy generation, due to the substantial expansion of wind power generation. Note that energy from hydropower did not decrease, but rather remained mostly stagnant while other renewable sources increased significantly in energy generation. For example, wind energy generated 17,885,000 MWh in 2005, or 5% of total renewable energy generation. However, by 2016, wind energy produced 226,300,000 MWh, making up 37.6% of the renewable energy sector. Solar energy generation has changed drastically in the last few years, contributing 0.9% to total renewable energy generation in 2012 and 6.07% in 2016.

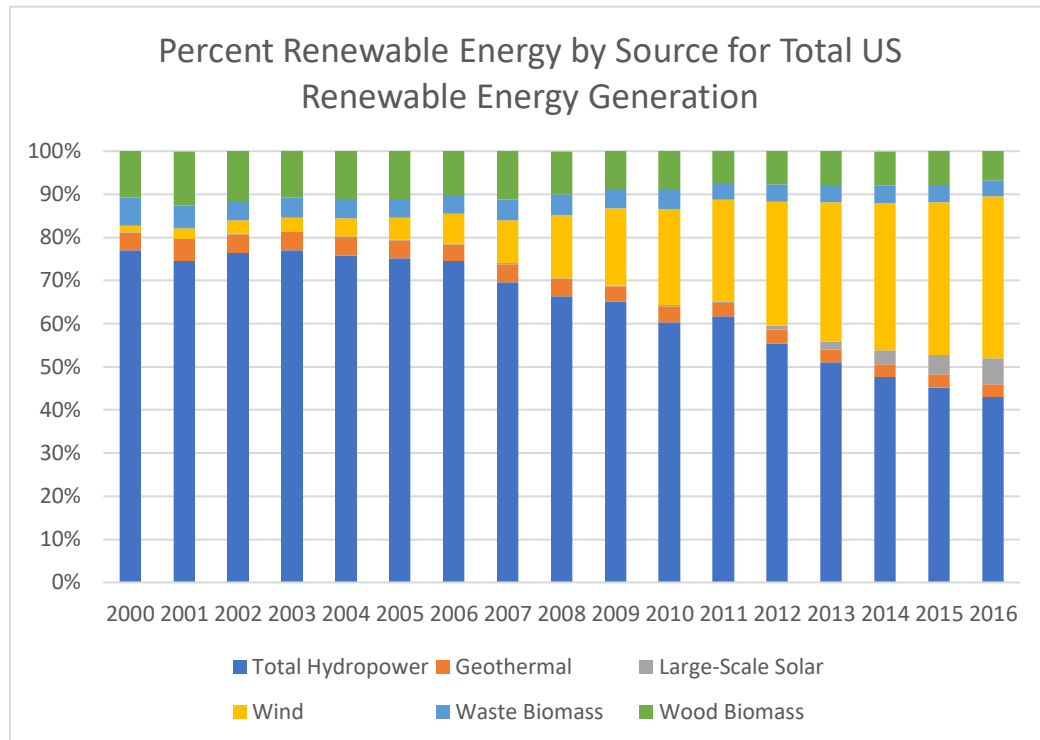


Figure 2. Renewable energy source contribution to total renewable energy generation from 2000 to 2016 (U.S Energy Information Administration, 2017).

The dropping prices for solar and wind energy contribute to the increase in renewable energy generation. Since 2010, the cost of solar has dropped by 73% now making it cost-competitive with fossil fuels and other energy sources (IRENA, 2018). Wind energy has also decreased in cost. The cost of onshore wind has reduced by 25% since 2010 (IRENA, 2018). Figure 3 depicts these changes in renewable energy prices since 2010 and also displays the cost range for fossil fuels. The International Renewable Energy Agency predicts that by 2020, electricity from all renewable power generation technologies that are in current commercial use will be consistently cheaper than fossil fuels (IRENA, 2018). These decreasing trends in renewable energy costs will be important for a successful transition to a renewable energy future.

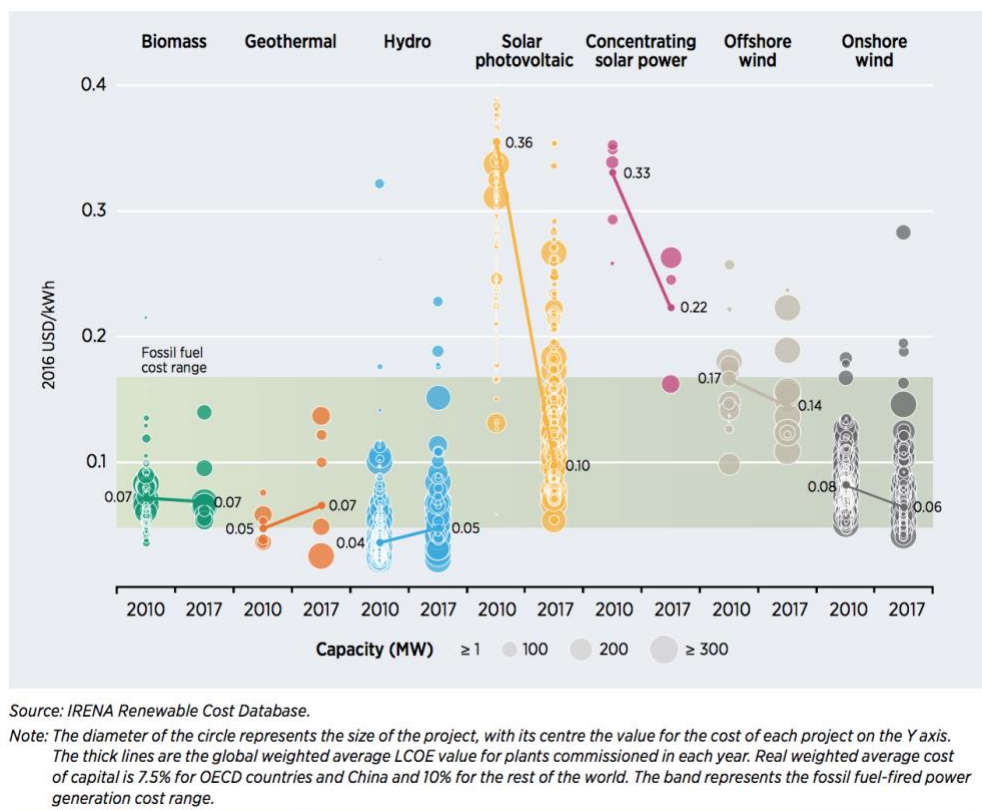


Figure 3. Global levelized cost of electricity from utility-scale renewable power generation technologies, 2010-2017 (IRENA, 2018).

The growth in renewable energy, the prospect of new job creation, and the substantial cost reduction in renewables have contributed to the opportunity for a national transition to renewable energy. A shift in U.S. energy sources has already begun, but that momentum must be supported with political action to secure a future fueled by renewables.

Climate Policy and Government Action

The absence of national leadership on climate policy has created a void that many municipalities are addressing at a local level (Martinez, Defrancia, & Schroder, 2018). Local government climate action followed after the United States failed to ratify the Kyoto Protocol, an international agreement mandating cuts on greenhouse gas emissions, during the George W. Bush administration (Engel, 2005). The lack of federal action led local and state governments to develop their own programs and policies to reduce greenhouse gas emissions, such as California's emissions standards for passenger vehicles (Engel, 2005). While regional scale efforts do not yield reduction in carbon emissions equivalent to what could have resulted had these policies been implemented nationwide, these localized initiatives have contributed to building momentum on climate action. Today, municipalities across the country are adopting resolutions and implementing plans to uphold the goals of the Paris Climate Accords, such as the commitment cities can make through the Climate Mayors organization (Climate Mayors, 2017). Mayors from more than 400 cities across the United States, representing 69 million Americans, have joined the Mayors National Climate Action Agenda to demonstrate leadership on climate action and build support for effective federal policies on climate change (Climate Mayors, 2017). Mayors across the nation are also signing onto the Sierra Club's campaign "Ready for 100," in which mayors commit to powering their cities with 100% clean, renewable energy. By the end of 2018, more than 100 cities within the U.S. committed to transitioning to 100% renewable electricity (Sierra Club, 2019). On a broader scale, more than 10 counties, Washington, D.C., and the states of Hawaii, California, and New Mexico have also committed to 100% renewable electricity

(Sierra Club, 2019). Moreover, six cities (Aspen, CO; Burlington, VT; Greensburg, KS; Kodiak Island, AK; Rock Port, MO; Georgetown, TX) have already achieved these goals and are currently powered by 100% renewable electricity (Sierra Club, 2019). Despite limited federal action, these cities see transitioning to renewable energy as essential for building and maintaining healthy and resilient communities, reducing carbon emissions, strengthening the economy, and improving the lives of citizens (Sierra Club, 2017).

Local government action on climate change benefits climate policy and can have impacts far beyond the locality. Climate policy at the local level allows for experimentation of a variety of programs and regulatory actions (Lutsey & Sperling, 2008). The ability of local-level governments to experiment with these policies helps test the public and political responses to these innovative actions (Lutsey & Sperling, 2008). The variety of local government efforts on climate policy can help identify the most effective policies and programs, which may benefit future federal climate policy adoption (Lutsey & Sperling, 2008). Furthermore, numerous studies point to the influence local government policies have on state and federal policy (Engel, 2005; Lutsey & Sperling, 2008; Tang, Brody, Quinn, Chang, & Wei, 2010). As more local governments adopt climate policies, a domino effect can occur as other locales sign on to similar policies (Engel, 2005). The increase of local action on climate change has helped form regional efforts and partnerships, such as the Western Governors' Association and the Western Climate Initiative, to combat climate change (Engel, 2005; Lutsey & Sperling, 2008). As climate action expands to the regional level, it helps create a social norm to address climate change, which encourages nearby communities to act (Engel, 2005). The formation of regional efforts capitalizes on the opportunity for shared environmental

resources and economies, allowing the region to address climate change in a cost-effective manner while simultaneously displaying the importance of climate action (Engel, 2005). Regional partnerships can also reduce “shuffling” behavior, where companies sell low-carbon products to jurisdictions with strict carbon regulations and high-carbon products to jurisdictions with minimal carbon regulations (Lutsey & Sperling, 2008).

Localized climate action allows policy to be specifically tailored to and more responsive to the concerns and preferences of the community members (Lutsey & Sperling, 2008). Policy implementation at a small scale allows the community to provide input, utilizing local expertise and experience (Lutsey & Sperling, 2008). Lutsey and Sperling found that local level engagement is critical to long-term progress (2008). Local level engagement fosters a commitment that is rooted in the individuals, allowing for the necessary economic and societal transformations to reduce greenhouse gas emissions to take place (Lutsey & Sperling, 2008). For example, Portland, Oregon’s success in reducing greenhouse gas emissions has been attributed to its ability to engage and incentivize individuals throughout the community to make more environmentally-conscious decisions, such as energy efficient retrofits and upgrades. (Rutland & Aylett, 2008).

Much of the current research on local climate action focuses on studying the types of policies cities are adopting and analyzing climate plan quality. However, there is a need for research analyzing the effectiveness of policy implementation and how to better engage community members in the development and implementation stages of climate action (Bulkeley, 2010; Lutsey & Sperling, 2008; Rutland & Aylett, 2008). A major issue

with climate policy is the gap that exists between rhetoric and action (Bulkeley, 2010). Identifying strategies and techniques to close this gap are essential for ensuring effective climate policy.

Thesis Purpose

To mitigate the threat of climate change, it is essential that municipalities reduce reliance on fossil fuels and transition to renewables. While many cities have signed onto resolutions for climate action and a transition to renewable energy, effective implementation processes and the achievement of GHG reduction goals have been difficult (Bulkeley, 2010; Lutsey & Sperling, 2008). To mitigate greenhouse gas emissions, it is necessary that these local governments understand how to succeed in their climate action efforts. Thus, what leads to successful adoption of these resolutions and how to effectively implement climate policy and engage communities needs further exploration. This thesis will contribute to the limited research on effective renewable energy resolution adoption and implementation in the U.S. We analyzed three municipalities in Utah that have adopted 100% renewable energy resolutions and developed a framework that outlines critical steps for successful adoption and implementation of these resolutions. Additionally, this thesis identifies strategies and techniques that motivate the public to engage in sustainable behaviors so that these Utah communities, and others, can successfully achieve their renewable electricity goals.

Research Questions

Overall Research Question:

How do local governments build political support for their communities to adopt and implement 100% renewable energy resolutions?

Research Question 1:

How were the City Councils of SLC, Moab, and Park City successful in passing their resolutions to implement 100% renewable energy?

1. What were the attitudes of community members toward the resolutions?
2. What were the attitudes of the council members toward the resolutions?
3. Did attitude changes take place? How was that achieved?
4. What were obstacles for the resolutions?
 - a. Were the obstacles resolved? If so, how? If not, why?

Research Question 2:

How do the cities plan to motivate households and businesses to engage in sustainable practices in line with the resolutions?

1. What inspires the public to make these behavior changes? What can the city do to ease the transition?
2. How does the city engage households and businesses in the cost-effective ways?
3. Who are the “respected champions” helping enact change within the community?

Study Area

This thesis scope includes Salt Lake City, Park City, and Moab, the first cities in Utah to adopt resolutions to transition to 100% renewable electricity. All three of these cities have partnered with Rocky Mountain Power, which will deliver 100% renewable electricity to the cities to help them achieve their goals (Egelhoff, 2017; Rocky Mountain Power, 2018; Rocky Mountain Power & Salt Lake City Corporation Department of Sustainability, 2017). For each study area, we describe the motivations to develop the resolution and the goals included within the resolution. Each of these cities possess different economic characteristics, showing the ability of economically diverse cities in the United States to adopt similarly ambitious renewable energy goals. The economic characteristics of these communities are compared in Table 1, in addition to the population size and political affiliation. Note that the political affiliation within the table is at the county level, providing only an approximation of the political atmosphere in each of the study areas. According to the United States Census Bureau, Park City is a much wealthier and more educated community than both Salt Lake City and Moab (2016). Moab is an important case study as it is not an affluent community and the cost of transitioning to renewable energy is more of a concern. In terms of city size, both Moab and Park City are small communities, while Salt Lake City is a relatively large metropolis. Regarding political affiliation data, the three counties these cities share a similar political atmosphere. While more citizens within these counties are registered for the Republican Party rather than the Democratic Party, Salt Lake City, Park City, and Moab are all perceived as liberal in Utah (Bernick, 2009). Note that nearly half of registered voters in all three counties are unaffiliated.

Table 1. Demographic Data for Study Area (United States Census Bureau, 2016; Utah Lieutenant Governor’s Office, 2016)

<i>City</i>	Population	Median Household Income	Annual per capita income	Median Gross Rent	Median House Value	Bachelor’s Degree or Higher	Registered Democrat (County)	Registered Republican (County)	Registered Unaffiliated (County)
<i>Salt Lake City</i>	193,744	\$47,243	\$29,972	\$818	\$237,700	43.0%	15.8%	37.0%	45.3%
<i>Park City</i>	8,299	\$105,102	\$64,552	\$1,223	\$868,100	59.8%	19.3%	32.3%	46.1%
<i>Moab</i>	5,242	\$40,497	\$19,906	\$793	\$218,500	23.3%	15.9%	30.8%	51.1%

Data from the Yale Climate Opinion Maps are portrayed in Table 2 to show the opinions around climate policy within each of the study areas. Table 2 displays the average adult opinions within the county of each study area for support on three different types of climate policies: regulation of CO₂, funding research on renewable sources, and requiring utilities to produce 20% of electricity from renewable sources. When the values for these three counties are compared to the average support from adults on these policies across the nation and in Utah, we see that the counties’ values are more similar to the national values than those for the State of Utah. The percentage of adults across the counties who support these policies are similar to each other and the national average, differing by only one or two percent. When compared to the state of Utah average, the percentage of adults who support these policies is higher within the counties of the study sites.

Table 2. Percentage of Adults Who Support Climate Policies in Study Area (Howe, Mildenberger, Marlon, & Leiserowitz, 2015)

<i>County (City)</i>	Regulate CO ₂ as a pollutant	Fund Research in Renewable Energy Sources	Require Utilities to Produce 20% of Electricity from Renewables
<i>Salt Lake (Salt Lake City)</i>	74%	83%	64%
<i>Summit (Park City)</i>	73%	83%	65%
<i>Grand (Moab)</i>	74%	84%	66%
<i>State of Utah Average</i>	67%	80%	57%
<i>United States Average</i>	74%	82%	65%

Salt Lake City

Salt Lake City, located in Salt Lake County, is the capital of Utah and the largest city in the state. Salt Lake City is notorious for its poor air quality and is ranked in the top ten U.S. cities with the worst air pollution (American Lung Association, 2017). The poor air quality is exacerbated during the winter months when dense cold air is trapped below warm air in an inversion. The mountains surrounding Salt Lake City, specifically the Wasatch Front, trap the cold air and the accumulating pollution in the valley, resulting in dangerously poor air quality (Salt Lake City, 2017)

In attempt to improve air quality, the city has created numerous goals and made many accomplishments toward cleaner air. Some of these accomplishments include installing EV charging stations, adopting an idle free ordinance, developing solar energy, such as the 3,000 solar panel array to help power the Public Works Building, implementing a residential solar installation program, adopting zoning changes to develop more walkable and bike-able streets, increasing the number of bike lanes, and

building net-zero buildings (Salt Lake City Sustainability Department, 2017). However, the most ambitious goal yet to improve the city's air quality was made in July 2016 when the city council and mayor signed a joint resolution to commit to 100% renewable electricity (Salt Lake City Mayor's Office, 2016). The resolution outlined two major goals with a handful of sub-goals: 1a) transition to 50% renewable electricity within municipal operations by 2020; 1b) transition to 100% renewable electricity city-wide by 2032; 1c) publish progress reports on the renewable goal at least every year; 2a) reduce carbon emissions by at least 50% by 2030; 2b) reduce carbon emissions by 80% by 2040 (in relation to the 2009 emissions baseline); 2c) publish progress reports every three years on the carbon emission reduction goal (Salt Lake City Council, 2016).

Within the resolution, Salt Lake City describes its motivations for passing this ambitious resolution. The city believes its responsibility to its citizens includes promoting public health and safety through access to clean air, water, and a livable environment (Salt Lake City Council, 2016). The city identifies fossil fuel energy resources as a threat to the well-being of its citizens and its economy and connected the use of fossil fuels to climate change (Salt Lake City Council, 2016). The resolution also states that impacts of climate change have already started to affect Salt Lake City, as average local temperatures have increased, changes in the water system have become apparent, and weather events have threatened the economy and quality of life (Salt Lake City Council, 2016). More than 50% of Salt Lake City's carbon emissions come from electricity generation (Salt Lake City Council, 2016). Therefore, Salt Lake City's resolution was created to reduce its carbon footprint and prioritize climate change mitigation (Salt Lake City Council, 2016). A transition to a low carbon community will improve air quality,

public health, national security, energy security, and increase the number of local green jobs while also reducing reliance on finite energy resources (Salt Lake City Council, 2016). After adopting the resolution, Salt Lake City and Rocky Mountain Power signed a Joint Clean Energy Cooperation Statement in August of 2016, in which the company collaborates with the city to develop the energy systems necessary to help achieve the city's renewable electricity goals (Rocky Mountain Power & Salt Lake City Corporation Department of Sustainability, 2017).

Park City

Park City, a small winter resort town known for its ski slopes and host site to the 2002 Winter Olympics, is tucked away in the Wasatch Range within Summit County and just east of Salt Lake City. On March 24, 2016, the Park City Council unanimously passed a resolution to become carbon net-zero and transition to 100% renewable electricity by 2032. The resolution outlines goals for Park City's government agency to become carbon net-zero by 2022 and to be carbon net-zero community-wide by 2032 (Park City Council, 2016). Park City was the first city in Utah to strive for these goals. Salt Lake City was working to adopt similar renewable goals at the same time and adopted a resolution a few months after Park City. Additionally, Summit County adopted its resolution in October of 2017 to also transition to 100% renewable electricity by 2032, making this county the first county in Utah, and one of four counties in the entire United States, to adopt a resolution to achieve this ambitious goal (Sierra Club, 2019; Summit County Council, 2017).

As a ski resort town, Park City is directly affected by the ramifications of climate change as its economic success is dependent on winters that bring cold weather and snow to the region. Thus, this resolution was created to protect its valuable assets and engage in climate change mitigation. Park City's resolution directly states the threats that climate change imposes on its community and states that grassroots change and local governments have the ability to reduce the impacts of climate change (Park City Council, 2016). However, the Park City government acknowledges that they cannot solve climate change alone and therefore hope that many other communities will join them (Park City Council, 2016). On October 16, 2017, Park City passed an additional resolution requiring all new or renovated buildings and facilities funded by Park City to adopt net-zero performance requirements to help achieve the goal for municipal operations to be powered by 100% renewable energy by 2022 (Peterson, 2017). This resolution is the first net-zero resolution adopted in North America, exemplifying Park City's leadership in climate action (Hartman, 2017).

Prior to the adoption of Park City's 100% renewable energy resolution, the city had made other efforts to reduce its environmental impact. These include installing solar arrays on public buildings, transitioning its bus fleet to run on biodiesel, passing an anti-idling ordinance, enacting a car share program, expanding its recycling program, calculating the city's carbon footprint on a regular basis, and creating a roadmap for carbon emission reduction. Park City has also created local environmental groups to educate the public on reducing their environmental impact and conserving wildlife. Additional environmental initiatives are listed on Park City's website and within its

carbon footprint reports.

Moab

Renowned for its outdoor recreation and tourism, people from all over the world come to Moab to visit Arches and Canyonlands National Parks and partake in adventure sports. This southeastern Utah tourist city is situated near the Utah-Colorado border in Grand County. While there is a growing interest in Moab tourism, pollution from nearby coal plants is blown into Moab's parks creating a hazy view over Moab's scenic landscapes and threatening the tourism industry (Herndon, 2016). In 2016, the U.S. EPA ordered Rocky Mountain Power to install additional pollution controls at the Hunter and Huntington coal-fired power plants in Emery County to help reduce haze-forming pollutants (Herndon, 2016). These changes may cause an increase in energy costs, yet many of Moab's elected officials were in favor of the stricter regulation (Herndon, 2016). Additionally, on February 14, 2017, Moab's city council unanimously adopted a resolution to transition to 100% renewable electricity by 2032, which will also work to reduce the threat of pollution on its tourism industry (Moab City Council, 2017). Moab's renewable energy resolution was driven by the community's desire to protect the natural environment and develop a sustainable future (Stevens, 2017), but its efforts were initiated and championed by Moab's city council. Moab's resolution was inspired by the resolutions that were recently adopted by Salt Lake City and Park City (Stevens, 2017). The resolution outlines a handful of objectives under two broad goals for greenhouse gas emission reduction and a transition to renewable electricity. For a greenhouse gas reduction goal, Moab has committed to reducing 80% of greenhouse gas emissions by

2040 and a reduction of 50% by 2032 relative to 2018 emissions (Moab City Council, 2017). Additionally, greenhouse gas emissions inventories will be released every three years starting in 2018 (Moab City Council, 2017). For the renewable electricity transition goal, Moab will transition to 100% renewable electricity community-wide by 2032 (Moab City Council, 2017). Additionally, Moab will transition to 100% renewable electricity for municipal operations by 2027 and 50% renewable electricity for municipal operations by 2024 (Moab City Council, 2017). Starting in 2018, reports on the electricity transition will be published at least every other year (Moab City Council, 2017).

Moab's reasoning for this ambitious transition to renewable electricity is outlined in the resolution. Reasons include the responsibility of the city to provide a clean and livable environment for its citizens, acknowledgment that energy sources affect the health, safety and economic well-being of the community, and the fact that climate change is a result of human activity that, in addition to global impacts, also threatens Moab (Moab City Council, 2017). Furthermore, Moab's resolution states that a transition to a low-carbon future will help mitigate these climatic impacts while also improving air quality, public health, increasing national and energy security, and providing local jobs (Moab City Council, 2017). As a world-renowned tourist destination, Moab recognizes its ability to influence the dialogue on climate change (Moab City Council, 2017). Moab's city officials view local governments as being in a great position to quickly and efficiently address climate change impacts (Moab City Council, 2017). Emissions from electricity generation are a major contributor to greenhouse gas emissions in Moab, thus a transition to renewable electricity can significantly cut their carbon footprint (Moab City Council, 2017).

Since adopting the resolution, Moab has already started to take action in developing a Sustainability Director position and appointing Rosemarie Russo, former sustainability program coordinator for Fort Collins, Colorado (Sullivan, 2017). The Moab City Council also approved a memorandum of understanding with Rocky Mountain Power, and Moab became the first city to join Rocky Mountain Power's new wattsmart Communities Program in October 2017 (Egelhoff, 2017). Through this new program, Rocky Mountain Power will help Moab develop efficiency goals and build a community energy plan (Egelhoff, 2017). With a new partnership and sustainability director, Moab is already taking strides to reach the goals in their resolution.

Theory

Five theories are applied in this research to inform and strengthen key findings on development, adoption, and implementation of renewable electricity resolutions. Social-ecological system transformations, community coalition building, and grassroots innovations were applied in this research to inform phases within transformations and strengthen the findings of how support for renewable electricity resolutions was built in these communities. This thesis also applied diffusion of innovations theory and community-based social marketing to understand how certain strategies for community engagement that emerged in the data are successful in increasing participation in environmental behaviors that help the cities achieve their 100% renewable electricity goals. This thesis will not test these theories, but instead will use them to explain why themes in the qualitative data may be key in the resolution adoption and implementation

process. These theories and their relevance to this research are more thoroughly described in Chapter II and Chapter III of this thesis.

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CHAPTER II

BUILDING LOCAL SUPPORT TO DEVELOP AND ADOPT 100% NET-RENEWABLE ELECTRICITY RESOLUTIONS

Introduction

In 2017, the United States withdrew from the Paris Climate Accords, an agreement ratified by 185 countries to make ambitious efforts to address climate change and keep the global temperature rise below 2 degrees Celsius (UNFCCC, 2019). The United States' absence of federal leadership on climate policy has spurred a sense of urgency and responsibility to act among local governments. While local and regional scale efforts to address climate change yield smaller reductions in carbon emissions than policies implemented at the federal level would, these localized initiatives have generated momentum for climate action throughout the nation. Across the country, cities, counties, and states are adopting resolutions and developing plans to tackle climate change. For example, the Mayors National Climate Action Agenda has over 400 cities across the United States, representing 69 million Americans, pledged to greenhouse gas reduction goals (Climate Mayors, 2017). Additionally, the Sierra Club's campaign "Ready for 100" has encouraged more than 100 cities to commit to powering their communities with 100% clean, renewable electricity (Sierra Club, 2019). This campaign has also led to larger scale entities including more than 10 counties, Washington, DC., and the states of Hawaii, California, and New Mexico to commit to 100% renewable electricity (Sierra Club, 2019). Moreover, six cities have already achieved these goals and are currently powered by 100% renewable electricity: Aspen, CO; Burlington, VT; Greensburg, KS; Kodiak Island, AK; Rock Port, MO; Georgetown, TX (Sierra Club, 2019). These regional

governments see a transition to renewables as an essential component for building and maintaining healthy and resilient communities while addressing the threat of climate change.

Climate action at the local level offers many benefits to climate policy and can create an influence that spans beyond city limits. Local level action on climate change offers experimentation of climate policy (Lutsey & Sperling, 2008). With hundreds of cities pledging to reducing greenhouse gas emissions and committing to 100% renewable electricity, effective policies and programs for achieving these efforts can be identified. Additionally, research suggests that local government policies can have an influence on state and federal policy (Engel, 2005; Lutsey & Sperling, 2008; Tang, Brody, Quinn, Chang, & Wei, 2010). Local governments have also been found to inspire neighboring communities to adopt similar efforts, creating a ripple effect across regions (Engel, 2005). As more cities strive to act on climate change, regional efforts and partnerships can form, such as the Western Climate Initiative (Engel, 2005; Lutsey & Sperling, 2008). When climate action initiatives reach a regional level, it can form social norms to act on climate change, encouraging other communities in the area to join climate action efforts (Engel, 2005). Regional partnerships also create opportunities for communities to share resources, helping the region address climate change in a cost-effective manner (Engel, 2005). A unique advantage of local level climate action is the ability to incorporate local expertise, experience, and preferences to tailor climate policies and programs to the needs of the community (Lutsey & Sperling, 2008). Engaging individuals across a community fosters commitment on a personal level, which is necessary for long-term progress and achievement toward goals such as greenhouse gas reduction (Lutsey & Sperling, 2008).

Portland, Oregon's success in carbon reduction, for example, has been accredited to the city's ability to engage its community in environmental conversations and behaviors, such as making energy efficient upgrades (Lutsey & Sperling, 2008).

Most of the research around local climate action has been focused on evaluating the types of policies cities are implementing to reduce greenhouse gas emissions and assessing the quality of climate action plans. In addition to this type of research, it is also necessary to research how cities go about adopting ambitious plans and efforts to address climate change, such as the goals to power cities with 100% renewable electricity. Understanding how cities are successful in adopting these ambitious goals could help other cities establish similar plans and further grow the momentum for local government action on climate change.

Study Area

In 2016, the city councils of both Salt Lake City and Park City adopted resolutions to power their communities with 100% renewable electricity by 2032². Soon after, in 2017, Moab's city council adopted a similar goal. These were the first three cities in Utah to adopt resolutions to transition their cities to 100% renewable electricity. When this research project began in 2017, a total of 46 U.S. cities had committed to 100% renewable electricity goals (Moodie, 2017). These three Utah cities were selected due to the state of Utah's religious and conservative population, serving as unique case studies and models for other cities. Also, given limited time and a small travel budget for the

² In 2018, Park City moved its goal to be net-zero with 100% renewable electricity to 2030 (Murray, 2018), and, in 2019, Salt Lake City also moved its 100% renewable electricity goal to 2030 (Winslow, 2019).

project, cities within the same state were the most feasible for this study. While all of these cities are located in Utah, they vary greatly by population size and also possess different economic characteristics, which help make these findings more transferable to economically diverse cities and cities ranging in size.

Salt Lake City

Salt Lake City is the capital of Utah and the largest city in the state with a population of 193,744 (United States Census Bureau, 2016). The city council and mayor signed a joint resolution in July of 2016 that outlined two major goals. The first goal is to transition to 100% renewable electricity city-wide (across municipal operations and the community) by 2032 and power municipal operations with at least 50% renewable electricity by 2020 (Salt Lake City Mayor's Office, 2016). The second goal is to reduce greenhouse gas emissions by 80% (in relation to the 2009 emissions baseline) by 2040 and by at least 50% by 2030 (Salt Lake City Council, 2016). The resolution states that these goals will help Salt Lake City become a low carbon community, which will improve air quality, public health, national security, energy security, and increase the number of local green jobs while also lessening dependence on finite energy resources (Salt Lake City Council, 2016).

Park City

Just east of Salt Lake City, Park City, known for its ski resorts and host site to the 2002 Winter Olympics, can be found in the Wasatch Range located in Summit County. Park City is an affluent resort town with a population of approximately 8,300 (United

States Census Bureau, 2016). In March of 2016, the Park City City Council unanimously adopted a resolution to become carbon net-zero and transition to 100% renewable electricity by 2032. Park City set a sub-goal of becoming carbon net-zero across governmental operations by 2022 on the way to reaching its main goals of net-zero carbon across the entire community by 2032 (Park City Council, 2016). In the resolution, Park City directly states how climate change is a threat to the community and why this local effort to reduce carbon is an important step in climate change mitigation (Park City Council, 2016). However, the resolution acknowledges that climate change cannot be solved by Park City alone and encourages other communities to join them in reaching these goals (Park City Council, 2016). Summit County followed these efforts, and in October of 2017 adopted a resolution to transition to 100% renewable electricity by 2032 (Summit County Council, 2017). This effort made Summit County the first county in Utah, and one of four counties in the entire United States at the time, to adopt an ambitious renewable electricity resolution (Sierra Club, 2019).

Moab

Moab, surrounded by Arches and Canyonlands National Parks as well as Bears Ears National Monument and Dead Horse Point State Park, is internationally known for its tourism and adventure sports. Prior to becoming a tourist hub, this southeastern Utah city, located near the Utah-Colorado border in Grand County, was a mining town for uranium. Today, the city's economy is based on tourism and its population is approximately 5,250 (United States Census Bureau, 2016). In February of 2017, Moab's City Council unanimously adopted a resolution with two major goals that resemble those

of Salt Lake City: 1) transition to 100% renewable electricity across the community by 2032, while meeting 100% renewable across municipal operations by 2027, and a sub-goal of 50% renewable across municipal operations by 2024; and 2) reduce greenhouse gas emissions by 50% by 2032 and 80% by 2040 (relative to 2018 emissions) (Moab City Council, 2017). In the resolution, Moab's City Council also describes how a transition to a low-carbon future not only addresses climatic impacts, but can also improve local issues such as air quality, public health, and employment (Moab City Council, 2017). As a world-renowned tourist destination, Moab's City Council believes it has the ability to influence the dialogue on climate change and the council is hopeful that this resolution can initiate that conversation (Moab City Council, 2017).

Theories Relevant to Understanding Renewable Electricity Resolutions

There are many theories rooted in sociology, psychology and sustainability science that relate to our research, but the research team selected three theories we determined offered the most pertinent and useful information to assist with interpreting our research findings. Social-ecological system transformations, community coalition building, and grassroots innovations were particularly applicable to our study and provided insightful and useful knowledge that helped explain many of our findings. We cross-compared the fundamental elements of these theories with the data that emerged from the interviews in this research to inform and organize our findings of how support for renewable electricity resolutions was developed in these communities. This paper will not test these theories, but instead will use them to explain why themes that emerged in

the qualitative data may be key in the resolution adoption process.

Social-Ecological System Transformations

The first theory we cross-compared to our case study findings is a framework that outlines four stages of a social-ecological system transformation. This framework was selected because it clearly delineated phases that exist within a system transformation, which helped us better understand and organize the stages for resolution development and adoption that emerged during our cross-case analysis.

A social- ecological system is a system that consists of both ecological and social elements (Moore et al., 2014). Elements in an ecological system are (1) natural capital, which includes ecosystem processes, functions, and species configurations, and (2) ecosystem services that are generated by natural capital (Moore et al., 2014). The elements in a social system are (1) norms, values, and beliefs, (2) rules and practices, such as laws, procedures, and customs, and (3) distribution of power, authority, and resources (Moore et al., 2014). A deliberate transformation describes a form of change that alters existing elements within a system in fundamental ways and its occurrence was actively navigated, rather than unintended (Moore et al., 2014). In the context of this paper, a deliberate social ecological transformation is the transition from fossil fuel sources of energy to renewable sources.

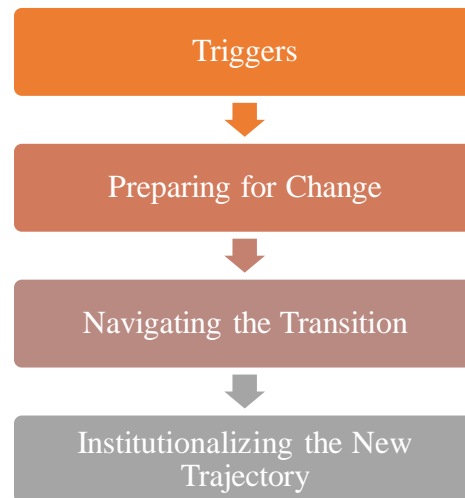


Figure 4. Framework for social-ecological system transformations (Moore et al., 2014)

While this research omits local ecological system components, this framework is still useful for characterizing energy transitions.

The four major stages of a deliberate social-ecologic transformation include: triggers, preparing for change, navigating the transformation, and institutionalizing the new trajectory. This chapter will focus on the first two stages. Triggers are characterized by major social or ecological disruptions that create windows of opportunity. The second stage, preparing for change, consists of three substages: (1) sensemaking, identifying problems within the current structure, (2) envisioning, developing the new visions and ideas, and (3) gathering momentum, self-organizing around new ideas and mobilizing support. The third stage, navigating the transition, includes choosing the innovation with which to invest, understanding previous approaches to inform current tactics, and scaling up the innovation. The final stage, institutionalizing the new trajectory, focuses on stabilizing the new system as it works through unanticipated challenges and tailoring approaches to be applied in other contexts as it is scaled up. The ‘triggers’ and ‘preparing for change’ stages offer insight into the resolution development and adoption process, whereas the final two stages are more fitting once a resolution has been adopted and the city is adapting to that change. Because the transition from fossil fuel sources of energy to renewable sources is a deliberate transformation, identifying how the first two phases may apply to this case study research could strengthen the findings and assist in creating a transferable framework specific to the adoption of 100% renewable electricity resolutions.

While this framework provides a systematic outline of how a transformation occurs and strengthens our understanding of that process in our research, it lacks some of

the in-depth strategies for how to build and maintain collective community interest and support for a transformation. Community coalition building theory addresses that concern.

Community Coalition Building

A community coalition is a group of people, representing diverse sectors of a community, who come together to address and solve community issues (Wolff, 2001b). There are eight criteria that a community coalition meets: (1) the coalition consists of community members, (2) its main focus is on local issues, not national, (3) it addresses community needs, building on community assets, (4) it uses collaboration to resolve community problems, (5) it is community-wide, with representatives from multiple sectors of the community, (6) it works on multiple issues, (7) it is at least citizen influenced if not citizen-driven, and (8) it is a long term, not ad-hoc group (Wolff, 2001b). Through the use of community coalitions, communities have been able to mobilize resources to successfully solve the problems they are facing, impacting programs, practices, and policies in a broad range of issues (Wolff, 2001b).

There have been many motivations to create community coalitions, but these can be consolidated into:

1. Expanding interventions to the whole community. Efforts are more successful when they have community-reinforcement.
2. Devolution. Abdication of federal responsibility has created great pressures on communities, creating an opportunity for communities to use local resources to address the issues the federal government did not.

3. Doing more with less. Coalitions develop as creative solutions to government funding cuts.
4. Limitations to the health and human service system. Dysfunction in formal systems lead to coalitions that foster interagency and cross-sector approaches, increasing coordination to create more competent systems.
5. Civic Engagement. As civic engagement declines and constituents become alienated, coalitions are developed to help reengage the community with local issues (Wolff, 2001b).

For community coalition success, nine key factors have been identified (Wolff, 2001a). When these nine factors are accounted for in the development of a coalition, community coalitions have the potential to be powerful forces for creating change in a community (Wolff, 2001a).

1. **Coalition readiness:** The community must be ready to take on tasks. A community with a high state of readiness has motivation for a coalition, previous history of community-level collaborations, and quality leaders (see “Leadership”).
2. **Intentionality:** A key to success is the early development of a common shared vision and mission. Goals must be concrete, attainable, and measurable.

Community-coalitions are successful when there is community ownership, thus, community members should be engaged from the beginning to maintain the bottom- up approach. A visioning process can help develop a shared goal or mission. Members must have hope and faith in themselves to enhance their sense of efficacy.

3. **Structure and organizational capacity:** The structure of the coalition should reflect the common organizational capacity of any successful organization: staff, capacity for decision-making, communication, adequate resources, and leadership. Unstaffed coalitions have been found to produce fewer results than staffed coalitions. Staff often increases the coalition's ability to address numerous issues, keep members engaged, and complete necessary tasks. To build trust and ownership, members should understand the coalition's actions. Developing newsletters and organizing effective meetings can enhance communication and can also provide opportunities for networking.
4. **Taking action:** Members stay engaged when the coalition is achieving concrete outcomes. Thus, the goal to create community change must remain in the forefront to be successful. Publicizing actions through annual reports and media that summarize successes are crucial for enhancing the motivation to change. Building partnerships between coalitions and state legislatures can translate into concrete actions, such as new programs or funding.
5. **Membership:** A successful coalition is inclusive and diverse, engaging individuals from all across the community. There are six key reasons why people participate, which informs how to encourage participation: recognition, role, respect, reward, results, and relationships. A supportive culture gives members a feeling of comfort and ownership.
6. **Leadership:** Successful coalitions are based on leadership that follows four main principles: the leaders inspire commitment and action; they lead as peer problem solvers; they build broad-based involvement; and they sustain hope and

participation. Collaborative leaders share power instead of creating a hierarchy, they look at the big picture, and they use facilitation to inform decisions.

Character traits include trustworthiness, patience, energy, hope, and foster personal relationships. The leaders also delegate responsibility, expanding leadership among its participants.

7. **Dollars and resources:** Coalitions must assess their financial needs by determining what is necessary for reaching their goals. When requesting funds, funders are often more willing to provide financial support to coalitions that are working to address an issue related to the funder's agenda. Coalitions must balance their own integrity with the needs of funders when raising money.
8. **Relationships:** Facilitating and building relationships among members fosters problem-solving and improves the quality of life within the community. Leaders must model conflict management and create an environment where conflict can emerge and be handled productively. Relationships build a sense of community, connection, hope, and celebration, all critical to coalition success.
9. **Technical assistance:** Coalitions often need additional information or support to be successful. Support can be provided through peer learning and collaboration with others. Additionally, professionals from a variety of backgrounds and written materials and resources developed by other coalitions can provide support.

Developing and adopting a renewable electricity resolution requires building community support, which can be understood as building a coalition. Identifying if the nine factors for community coalition building also emerged in our case study research could explain why certain strategies were effective at gaining community support.

Furthermore, if our findings for developing community support align with community coalition building and its strategies for success, this theory can help make our findings more transferable and assist other cities in gathering community support to adopt 100% renewable electricity resolutions. Aligning the characteristics of successful community coalitions to this case study research strengthens and informs effective approaches to build local support.

Community coalition building provides useful factors for developing community support, an essential component to our research, but we determined that understanding local community support could also be strengthened by understanding locally grown efforts within the context of our research. Thus, we also incorporated grassroots innovations theory to further explore bottom-up environmental solutions.

Grassroots Innovations

Grassroots innovations theory describes how networks of activists and organizations can create bottom-up solutions for sustainable development (Seyfang & Smith, 2007). Grassroots innovations can provide sustainability solutions where top-down approaches struggle (Seyfang & Smith, 2007). Top-down approaches are often inflexible and thus unable to meet unique needs of a community, whereas bottom-up approaches utilize contextualized knowledge to offer tailored solutions (Seyfang & Smith, 2007). Grassroots activists have localized experience and knowledge, which inform strategies that work well in their communities and what individuals in the community value (Seyfang & Smith, 2007). These activists are thus able to communicate sustainability issues in a manner that is more meaningful and personally relevant to

community members, allowing for a unique ability to engage the community and encourage behavior change (Seyfang & Smith, 2007).

Grassroots innovations are often faced with challenges such as steady sources of funding and reliable volunteers, the ability to have a large influence, and risk-aversion among policy-makers (Seyfang & Smith, 2007). Risk-aversion among policy makers is due to the culture of policy and funding constraints, thus circumstances that create risks, such as innovations, tend to be avoided (Seyfang & Smith, 2007). Innovations create risks because they are experiments that provide knowledge through both successes and failures. Therefore, successful grassroots innovations need to obtain resources and supportive factors from the initial creation of the innovation to alleviate these challenges (Seyfang & Smith, 2007). Additionally, connecting with groups regionally and nationally can help innovations be reproduced elsewhere, increasing the influence of the innovation (Seyfang & Smith, 2007).

Grassroots innovation theory is a useful theory to include in our research because it explains the benefits of bottom-up approaches, for example, a community led 100% renewable electricity resolution, but also cautions the practitioner on challenges that can develop from such an endeavor. Grassroots innovation theory aligns with previous literature on the effectiveness of localized approaches and conveys why these strategies can be more successful. Grassroots innovation suggests key strategies for success that can be compared to our case studies. Additionally, we can identify if the challenges our cases face align with any of the potential challenges this theory describes and use this theory's suggestions to help develop proactive tactics. Awareness of the difficulties of grassroots

movements can prepare cities for possible barriers that can arise while working to develop and adopt 100% renewable electricity resolutions.

A combination of social-ecological system transformations, community coalition building, and grassroots innovation theories help create a more holistic understanding of our data that covers many different facets of our research. These three theories explain fundamental phases of a transformation, offer key strategies to successful coalition building, and suggest why and how grassroots led movements can be more effective and influential. Incorporating these theories as a cross-comparison with our qualitative research themes can provide insight regarding how certain approaches were successful and led to the adoption of renewable electricity resolutions across all three case studies.

Methods

We used a qualitative, exploratory, multiple-case study design to investigate our research question, ‘how were Salt Lake City, Moab, and Park City successful in adopting their resolutions for 100% renewable electricity?’ A multiple-case study is a research design that provides a detailed account and analysis of the characteristics and processes present in more than one case (Johnson & Christensen, 2017). In this thesis, a case refers to a city that has adopted a resolution to transition to 100% renewable electricity. We studied three cases, Park City, Moab, and Salt Lake City. A case study approach was used because it allows for investigation in a real-life context and the ability to utilize multiple sources of data collection (Yin, 1994). A major advantage of a case study approach is the ability to develop converging lines of inquiry through multiple data sources (Yin, 1994). We triangulated data from interviews and documents to corroborate

facts to enhance the validity and accuracy of commonalities in how these resolutions were adopted in each city within the study areas (Golafshani, 2003; Yin, 1994). We studied multiple cases to compare similarities and differences across the cities (Johnson & Christensen, 2017), which provided greater insight into the process of renewable electricity resolution adoption. A distinct advantage to a multiple-case study approach, as opposed to a single-case study, is the opportunity to develop more robust and compelling findings (Yin, 1994). Because the purpose of this thesis is to develop a framework for successful adoption of renewable energy resolutions, a multiple-case study approach offered a major benefit with the increased likelihood that our findings are transferable to other sites (Johnson & Christensen, 2017).

Data Collection

We used a variety of data sources to understand how Salt Lake City, Park City, and Moab were successful in adopting a resolution to transition to 100% renewable electricity. For each study area, we collected videos and audio tapes from city council meetings, a variety of documents including city council agendas and meeting minutes, city reports, newspaper articles, information from other media sources, and we conducted semi-structured interviews with individuals involved in the resolution process. We collected and examined documents, in addition to interviews, to alleviate the bias that inherently exists within interviews, increasing the validity of this study (Yin, 1994).

In addition to documents and interviews, we obtained data from local government websites, websites from the environmental organizations the cities are partnered with (Climate Reality Project and Sierra Club), and general internet searches using key words

and phrases, such as “renewable energy resolution”, “100% renewable energy”, “adopt renewable energy”, “transition to renewable energy”, “clean energy”, and “carbon neutral,” which were combined with the specific city’s name. We collected newspaper clippings from newspaper database searches and general web searches to help build the timeline for resolution adoption within each of these cases.

Interviews were an essential component of the data collection process for our case studies because they provided detailed information about the resolution development process, explanations of the motives for the resolution, insight into the attitudes of the community around the resolution, and access to other important sources of data to help us further understand how the resolution was successfully adopted (Yin, 1994). We conducted a total of 13 interviews, interviewing a representative from Rocky Mountain Power, an individual who works for the Sierra Club, five individuals from Moab, four individuals from Park City, and two from Salt Lake City. Because the study areas have utility partnerships with Rocky Mountain Power to help them achieve their resolutions, interviewing a utility representative helped provide insight into the role Rocky Mountain Power is playing in this process. Qualitative researchers have found that there is no direct relationship between the number of interviewees and the quality of a study (Hatch, 2002). Rather, it is suggested to interview as many participants needed until the necessary information is obtained and saturation has been reached (Hatch, 2002). If the number of interviews is small, it is important to utilize multiple data sources to increase the validity, reliability, and diverse construction of reality (Golafshani, 2003; Hatch, 2002). Due to a limited number of individuals being directly involved with drafting and enacting the resolutions in each city, we combined the 13 interviews with other data sources in an

effort to achieve valid and reliable answers to the research questions. As our results section indicates, opposition was not a major issue in any of these cases; all city councils unanimously voted in favor of the resolutions. Thus, we did not attempt to interview individuals who may have been in opposition to the resolution. Due to time constraints, we narrowed our focus and only interviewed individuals who were immersed and engaged in the resolution process to gather accurate and detailed information about the resolution process in these three cases. To identify the individuals heavily involved with the renewable energy resolutions in their communities, we read through newspaper articles, city council meeting minutes, and material on the cities' webpages. For our interviews, we targeted sustainability directors, mayors, and city council members who were a part of the resolution development and adoption process, as well as additional individuals holding key roles in the process, such as the community member who initiated the conversation for a renewable electricity resolution in one of our study areas. We discovered this active and engaged community member through a snowball sampling technique, a technique where other important individuals are discovered through conversations with interviewees (Weiss, 1994).

We requested interviews with potential participants via email. If there was no response two weeks after the email was sent, we made follow up phone calls. Nine of the 13 interviews took place in-person and in locations that were convenient, comfortable, and private for the participants. Participants who agreed to interviews but could not be interviewed in-person were interviewed over the phone and via video call, except for the Rocky Mountain Power representative who responded to the interview questions via email. The semi-structured interviews for the participants from the cities consisted of

approximately 10 open-ended questions that inquired about the process of resolution development and adoption as well as plans to reach their goals. The latter part of the interview questions concerns strategies and implementation, which is addressed in Chapter III of this thesis. We modified the interview guide specific to the cities for the interview with the Sierra Club representative to gather information specific to how the Sierra Club assists cities with developing and adopting renewable electricity resolutions. The semi-structured interview for the representative from Rocky Mountain Power consisted of eight open-ended questions that explored the partnership between Rocky Mountain Power and each city. See Appendix A, B, and C for the specific interview questions that were asked of the cities, Sierra Club, and Rocky Mountain Power. The interview duration ranged from 30 to 90 minutes. We conducted interviews in October and November of 2018.

Analysis

Before we analyzed the data, we completed verbatim transcriptions of the interviews. A within-case analysis, where each case is examined separately, was the first step in analyzing the data for each study site (Johnson & Christensen, 2017). We studied the data within each city using a time series analysis. The purpose of this analysis was to trace events over time to determine if there were events that multiple interviewees identified as critical to resolution development and/or adoption in their community; events such as these may suggest key components to the successful adoption of the resolution (Yin, 1994). We also used a thematic analysis to identify, analyze, and report patterns and themes within the data (Braun & Clarke, 2006). We first identified themes

using an inductive approach, in which themes were strongly emphasized in the data (Braun & Clarke, 2006). We used this data-driven approach as a preliminary step to code data without trying to fit the data into a preexisting coding frame or the researcher's preconceptions (Braun & Clarke, 2006). Once we analyzed the data for each study area, a cross-case analysis was conducted to compare each city's approach and identify similarities and differences (Johnson & Christensen, 2017). Identification of similar themes and patterns across the three cases suggested steps that may be key in successfully adopting these resolutions. Lastly, we compared the findings from our cross-case thematic analysis with the three theories we described earlier in a deductive manner to determine if our findings could be informed by or supported through these theories. Our findings that aligned with these theories could indicate strategies applicable at a broader scale, supporting cities outside of our study area working to adopt renewable electricity resolutions. The combination of our time-series analysis, thematic analysis, and theory comparison helped us build a transferable "how to" framework to assist analogous cities working to adopt a similar resolution.

Results and Discussion

Five stages emerged from our analysis that may be critical steps to the successful adoption of 100% renewable electricity resolutions in our case studies. These include: (1) Using trigger events for inspiration, (2) Envisioning change, (3) Identifying challenges and potential solutions, (4) Building support, and (5) Taking it to a vote. These five stages are related to the first two phases in the social-ecological transformation framework created by Moore et al. (2014) (triggers and preparing for change) and are

supported by similarities found in community coalition building and grassroots innovation theory. Many themes that emerged from our analysis align with the nine factors for success listed in community coalition building. Application of grassroots innovations identified additional key elements for resolution adoption detected throughout our cases studies, including benefits of localized action and challenges that grassroots movements experience.

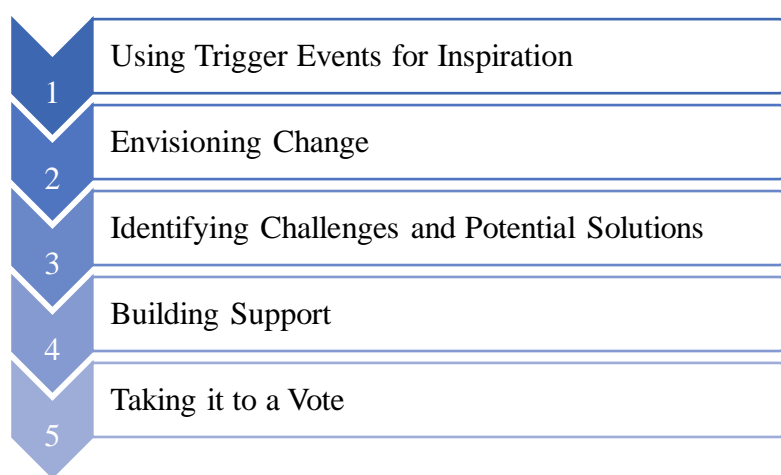


Figure 5. Five step framework for the adoption of 100% renewable electricity resolutions

Step 1: Using Trigger Events for Inspiration

As Moore et al., (2014) described, transformations, such as from fossil fuels to renewable sources of electricity, often begin with feelings of alarm or crisis that create a window of opportunity. Concern for planetary health, potential economic impacts that climate change could have on a city, health issues that are caused or exacerbated by the use of fossil fuels, and the lack of federal action in the United States to address climate change were identified in each case as motivators for developing ambitious goals for

renewable electricity. As explained in community coalition building, abdication of federal government can lead to the building of local, community coalitions to address the issues the federal government did not (Wolff, 2001b), which was identified as a motivation for the renewable goals in these case studies. In Park City, a community whose economy is driven by a healthy snow pack, climate change is observable, “It’s really front and center that climate change is impacting Park City” (Participant 7). In Salt Lake City, air quality and water supply are concerns associated with the use of fossil fuels and climate change, driving the city’s renewable resolution. Additionally, state, national, and international movements that encourage action, such as the 2015 Paris Climate Accords and other cities in the United States making ambitious climate goals inspired Park City, Salt Lake City, and Moab to adopt these resolutions in their own communities. For example, a major impetus that led to Moab’s renewable electricity resolution was the adoption of such resolutions in Park City and Salt Lake City, as Participant 2 describes,

“I think it happened with visiting with folks from Park City and realizing that they, as well as Salt Lake City, had adopted these high-level goals. And that was really inspiring to me to hear about them, and other cities, taking aggressive steps to work on climate change themselves, and just realizing that there was this whole municipal level movement out there to step in where national governments are perhaps failing.”

This participant further expresses,

“I have deep concern about climate change and the implication for our species and civilizations...And so, the opportunity to take action, to influence action at a

level that was bigger than I can do in my professional capacity, was inspiring to me.”

The withdrawal from the Paris Climate Accords during the Trump administration in June 2017 drove an increase in local climate action across the United States.

Participant 12, a practitioner in climate action, describes this phenomenon, “I think a major turning point has been the withdrawal from the Paris Climate Accords, which has spurred a lot of municipal leadership on climate.” Park City, Moab, and Salt Lake City responded to the withdrawal with disappointment but also perseverance to achieve their already established renewable goals. A Park City paper quoting Mayor Jack Thomas in response to the withdrawal reads,

“It doesn’t change our goal. If anything, it activates us a little more. I think there’s a groundswell of support for the Paris accord and making change. This does not diminish our passion or work we have to do in this community. We’ll continue” (Hamburger, 2017).

Furthermore, the release of the 2018 IPCC report generated a greater sense of urgency to act on climate in Park City. Distressing messages about the planet, such as the effect of warmer temperatures on Utah’s snow pack, motivated Park City elected officials to move their goal to achieve net-zero carbon and 100% renewable electricity community-wide from 2032 to 2030 in November of 2018.

While our participants perceive climate change and its impacts on their cities alarming, the community’s concerns, reinforced by a need to act in absence of federal efforts on climate, engendered an opportunity to establish ambitious renewable electricity resolutions. Trigger moments that instill a strong desire to act were discovered as the first

critical step in the successful adoption of renewable electricity resolutions in our cases. This finding aligns with the social-ecological system transformation framework where identifying a trigger event is the first major step in a transformation.

Step 2: Envisioning Change

In each of the cases, identifying champions and defining the goals within the resolution became major drivers in the development of the resolutions.

Identifying Champions

In the interviews, participants were asked to describe individuals who were champions for the renewable

electricity resolutions in their communities and the specific qualities these individuals possess. Many of the responses were similar and are displayed in Figure 6. The larger a word appears in Figure 6, the more often it was stated in the participants' responses. In Park City, Salt Lake City, and Moab, the champions in their communities were individuals who are passionate about climate change issues and building a sustainable and healthy community. These individuals are dedicated, persistent, reliable, hardworking, and visionaries who are forward thinkers imagining the next 10 years, not thinking in two-year budget cycles. Champions inspire others, are hopeful, lead by example, and are generous, giving much of their time to the cause. They are



Figure 6. Qualities possessed by champions. The larger the word, the more frequently repeated in the interviews.

collaborative, engaged citizens, and build partnerships across the town. These individuals are informed about renewables and climate change, but are constructive, pragmatic, professional, and humble as they educate others. The leadership characteristics described in community coalition theory align very closely to the qualities the participants used to define champions in each of the case studies; both the theory and our participants describe leaders as individuals who are visionary, foster relationships, are collaborative and inclusive, can inspire others, and are hopeful and energetic (Wolff, 2001a).

Defining Goals: A Shared Vision

Participant responses merged into four components in defining the goals within the resolution: (1) a shared vision, (2) a concrete and clear concept, (3) a timeframe, and (4) awareness of factors necessary for achievability. The three case studies used localized issues, such as air quality and snow pack concerns, creating a tailored approach to address issues of clean energy in their communities (Seyfang & Smith, 2007). The goals within the resolutions were drafted to fit the unique needs of the community, establishing a shared vision, which strengthens opportunities for community engagement and goal success, as also described in community coalition building (Wolff, 2001a). Many participants stated the importance of engaging community members from the beginning of the resolution development process to help maintain a bottom-up approach that encourages participation and generates feelings of inclusivity and ownership, echoing community coalition building and grassroots innovation theory (Seyfang & Smith, 2007; Wolff, 2001a). Participant 3 describes this importance of a community-led and shared vision,

“We didn't want to just be working on something because we knew about it from Park City and Salt Lake City, we wanted to make sure it was something that the community here wanted. So, we started engaging with more groups and individuals here.”

While the goals may be adjusted when the resolution is distributed to city council and receives feedback during public hearings, starting with goals that are developed by the citizens and align with the culture of the community could reduce the changes that are made in the later stages of this process.

Defining Goals: A Concrete and Clear Concept

After these cities established a shared vision, they created concrete and clear goals to include in their resolutions. Participant 8 explains this notion,

“Adopting an 80 percent reduction from 2009 figures by 2020 is over the head of way too many people. It's not immediately understandable. If you can say like ‘net zero energy’ or ‘net zero carbon’ or ‘100 percent renewable,’ everybody understands that goal, and it’s ambitious... And I think if you end up setting goals that are really ambiguous or just not quite so absolute, you lose people... You would never want that because you need all. I mean this is a collaborative effort; we need everybody on board.”

Participants from our research explained that concrete and clear goals avoid confusion, allowing more people in the community to understand the goal. Community coalition building also states the importance of clear goals and how these understandable goals can help foster ownership and trust with community members (Wolff, 2001a). And,

a better understanding of the goals allows individuals to more easily decide if this is an idea they support. Creating clear and concrete goals aligns with the community coalition building theory, which states that identifying concrete, measurable, and attainable goals is a component for successful coalition building (Wolff, 2001a).

Defining Goals: A Timeframe

When discussing the development of the resolutions, we asked participants to explain how the timeframes for their goals were selected. Many participants mentioned the challenge of developing goals that were both feasible and progressive. To set ambitious but achievable timeframes, participants stated that it was helpful to consider current utility contracts, the city's carbon footprint, and what timeframes other cities are choosing. For Park City, Salt Lake City, and Moab, the expiration dates of their utility contracts were approaching, which was a major factor in setting the goal timeframes and starting a new dialogue with their utilities. Rather than renewing the same contract, as cities often do, Park City, Salt Lake City, and Moab worked with Rocky Mountain Power to explore different options. In addition to establishing a 100% renewable electricity goal, these cities also established goals to reduce their carbon emissions. A carbon assessment identifies the quantity of greenhouse gas emissions that are emitted by each sector (transportation, electricity, etc.). A carbon baseline was thus critical for understanding how to achieve carbon reduction in our case studies. While Moab did not have a carbon database, the city still established greenhouse gas reduction goals. To obtain these goals, Moab's resolution required that the city conduct and publish regular greenhouse gas inventories, establishing a carbon baseline to help the city understand how to make the

necessary carbon reductions to achieve its goal. Additionally, learning how and why analogous communities have set their goals provided good insight as to what may be a good timeframe. Participant 9 also mentioned that it is helpful to align goals with other events, such as a community's foundational event, or goals that the city is already working toward, as it helps build momentum and support. Park City, for example, aligned its net-zero carbon and 100% renewable electricity resolution with the prospect of being a 2030 Olympic Games host and providing the first net-zero carbon Olympics.

Defining Goals: Awareness of Factors Necessary for Achievability

Lastly, participants highlighted the importance of proactively assessing additional components and resources that are necessary to achieve their goals. Identifying the adequate resources to accomplish goals is one of the nine factors associated with success according to community coalition building and is also a key component for successful grassroots innovations (Seyfang & Smith, 2007; Wolff, 2001a). For Moab, this was developing a carbon inventory and making a sustainability staff hire. Community coalition building claims that staffed coalitions have the potential to produce more results than unstaffed coalitions (Wolff, 2001a, p. 178), and, in our research, multiple stakeholders indicated that having a sustainability director was a key component to successfully achieving ambitious renewable goals. Participants stated that acquiring a sustainability director makes the goal more practical and less aspirational because it prioritizes the goal, allocates long-term resources to the goal, and identifies staff specifically responsible for implementing a plan to accomplish the goal. Prior to the adoption of the resolution, Moab did not have any sustainability staff. To achieve the

goals in the resolution, however, it was critical that budget allocations were made and staff were hired to follow through with the city's commitment. Participant 10 alludes to challenges unprepared communities may face in achieving goals,

“I think if other cities don't have a sustainability department or division or they haven't done as much deep dive into their carbon footprint as a city and how to make changes in the future, then this might be a jarring resolution.”

Our research found that detecting the community's specific needs and including those as part of the resolution established more attainable and tailored goals, which helped these three cities avoid pushback in passing the resolutions.

To summarize, interviews revealed that effectively envisioning change involves identifying champions who are perceived by the staff and community as passionate, inspiring, and determined, defining a shared, concrete goal within a set timeframe, and being aware of the factors and resources that are necessary to achieve the goal.

Step 3: Identifying Challenges and Potential Solutions

The third step in adopting a renewable electricity resolution is to proactively identify foreseeable challenges and generate potential solutions. Following the social-ecological transformations framework, the second phase 'preparing for change' involves a sub-phase of sensemaking, in which current structures that are problematic for the deliberate change are identified (Moore et al., 2014). In our results, Step 3 incorporates this sub-phase to help cities proactively identify challenges to resolution adoption. Awareness of difficulties and starting conversations early on to address these issues may not only make the resolution easier to adopt, but it could also make the goals more

attainable. A benefit of a grassroots approach, explained in grassroots theory and previous research, is the access to localized knowledge and an understanding of the community's unique needs and concerns (Seyfang & Smith, 2007; Lutsey & Sperling, 2008; Rutland & Aylett, 2008). Cities working to adopt renewable electricity resolutions face different challenges, and thus understanding the specific issues of a community and tailoring the resolution to address those matters is likely to increase the success of the resolution (Seyfang & Smith, 2007; Lutsey & Sperling, 2008; Rutland & Aylett, 2008). The challenges that the participants in our case studies perceived as the most difficult part of the resolution process and were frequently mentioned during interviews include: (1) utility contracts, (2) limited resources and economic concerns, (3) no or outdated carbon footprint analyses, (4) prioritization of community needs, (5) outdated state building codes, (6) absence of education, and (7) lack of wide spread support. Figure 7 summarizes these seven challenges and the solutions that will be discussed next.

STEP 3: IDENTIFYING CHALLENGES AND POTENTIAL SOLUTIONS	
Challenges	Solutions
❑ Long-term utility contracts	✓ Utility negotiations
❑ Limited resources/economic concerns	✓ Internal and external partnerships
❑ No carbon database	✓ Budget allocations and staff hires
❑ Prioritization	✓ Identify overlapping goals
❑ Outdated building codes	✓ Set LEED or net-zero building ordinances
❑ Communication and education	✓ Identify effective local outlets
❑ Lacking support	✓ See Step 4 for strategies

Figure 7. Summary of challenges and solutions our cases experienced and executed. Step 3 explains the importance of proactively identifying challenges and potential solutions to achieving the resolution. This image shows the challenges and corresponding strategies that our study areas are implementing.

Challenge 1: Utility Contracts

During the interviewing process, many participants explained that utility contracts can be a major challenge to the establishment of 100% renewable electricity goals. To overcome this challenge, many participants claimed that proactively working with city staff and elected officials to address utility contract challenges can make a 100% renewable electricity resolution more achievable. The utility model upon which a city relies (investor owned utilities, municipal utilities, or utility cooperatives) will result in utility model-specific obstacles to the resolution, but also opportunities to achieve 100% renewable electricity. Salt Lake City, Moab, and Park City are all served by Rocky Mountain Power, an investor owned utility. The cities had flexibility in how to proceed with electricity procurement because each of the cities' contracts with the utility were expiring.

Rocky Mountain Power is a division under PacifiCorp that serves Utah, Idaho, and Wyoming. PacifiCorp's energy resource mix in 2015 was approximately 77% fossil fuels (62% coal and 15% natural gas) and 14% renewable sources (7% wind, 5% hydro, 1% combination of solar, geothermal, and biomass). Given the prevalence of fossil fuel sources in Rocky Mountain Power's resource mix, re-signing current contracts would not help Salt Lake City, Park City, or Moab reach their 100% renewable electricity goals. Participant 10 explains that to achieve Salt Lake City's renewable goal, a new strategy was necessary,

“[T]he way most municipal power purchase agreements with power providers happen all over the country, and historically the way it always happened with Salt Lake City, [is] that there's little to no changes to the contract after 25 years, you

just sign it again....[W]e're not going to sign that same power purchase agreement because it's not going to allow us to fulfill our goals. We're figuring out other pathways to get there.”

While the cities could separate from Rocky Mountain Power and establish their own municipal utility, as done in Boulder, CO, doing so can be costly. Rather, the cities chose to work with Rocky Mountain Power, forming a unique partnership that would allow the cities to achieve their goals for 100% renewable electricity,

“Rocky Mountain Power [came] to the table with a different willingness to help [Salt Lake City] explore real paths to achieving carbon neutrality and [the city’s] other environmental goals” (Participant 10).

Participant 13 explained that Rocky Mountain Power

“[I]s interested in helping communities and individual customers meet their renewable energy goals. Being responsive to customer needs is a longstanding company value, and in our experience, a good business strategy.”

Rocky Mountain Power was willing to engage in discussions with these cities to develop alternative contracts. While this resulted in a positive outcome for these Utah cities, such an approach may not be as successful for other municipalities. The following paragraphs provide a brief overview of what these new contracts look like for these cities.

Park City and Salt Lake City signed Joint Clean Energy Cooperation Statements with Rocky Mountain Power, establishing a commitment to work together in good faith to identify solutions to accomplish the cities’ goals. A key component to establishing the unique cooperation statement was the partnership between Park City and Salt Lake City. Because Park City does not make up a significant portion of Rocky Mountain Power’s

customer base, partnering with Salt Lake City gave the entities more weight during negotiations with Rocky Mountain Power. Participant 7 describes the partnership between Salt Lake City and Park City as they worked to develop new pathways with Rocky Mountain Power,

“Salt Lake being a big city has a lot of leverage and a lot of credibility....As a smaller entity, with probably more of an accepting public, we were able to maybe be a little more nimble and aggressive. But as a larger entity, [Salt Lake City was] able to push harder with Rocky Mountain Power. So, helping each other, we were able to move this along.”

The cities will work with the utility to develop a variety of technologies and projects that will assist the cities in reaching their goals. For example, Rocky Mountain Power will develop new, locally-sited renewable energy installations that provide the amount of power to reach each city's electricity demand. The costs for these installations will not be imposed on other Rocky Mountain Power customers, and thus these cities were willing to pay higher, but reasonable, according to city officials, upfront costs to the utility for such endeavors. The contracts have an initial five-year commitment, after which progress toward the goals will be assessed. Once the contracts are reviewed, they may be extended with or without amendments. Participant 10 describes the uniqueness of such an arrangement with a utility, “[T]he franchise agreement that we ended up with is the most progressive franchise agreement in the country right now....It's like the most unsung amazing environmental piece of work I think in the whole state.”

Moab's partnership with Rocky Mountain Power is slightly different. As a smaller community with an energy demand under five megawatts and fewer financial resources,

Rocky Mountain Power developed a different approach to assist Moab with its energy goals. The utility selected Moab as its first wattsmart Community. The wattsmart Community program is a framework that Rocky Mountain Power has designed to empower communities to set and achieve a new energy vision for their city, focusing on energy efficiency, renewable energy, electric vehicles and a progressive grid. Moab and Rocky Mountain Power signed a Memorandum of Understanding where Moab agreed to participate in the wattsmart Community program, which is of no cost to the city and offers Moab many benefits to help the city reach its goal. Through the program, Rocky Mountain Power will help Moab create a community energy plan, detailing specific, community-driven strategies to help Moab achieve its goals. Rocky Mountain Power will also help Moab improve energy efficiency and generate renewable energy. This partnership helps Rocky Mountain further develop its wattsmart Communities program, allowing the company to assist other communities in its service area that have similar energy goals.

Park City, Salt Lake City, Moab, and Summit County's negotiations and partnerships with Rocky Mountain Power to achieve their 100% renewable electricity goals led to the development and adoption of HB411, the Community Renewable Energy Act, during the 2019 Utah Legislative Session. This bill allows communities that complete an application and adopt formal renewable electricity resolutions before December 31, 2019, to acquire new, incremental renewable energy resources that are developed by Rocky Mountain Power to help the city achieve its renewable electricity goal. Essentially, this bill simplifies the negotiation process that Park City, Salt Lake City, and Moab engaged in with Rocky Mountain Power, and through this increased

convenience, other communities in Utah can more easily pursue similar renewable electricity goals. Utah makes up 44% of PacifiCorp's energy sales. Thus, if many Utah cities request renewable electricity, these local efforts could lead to a transformation of renewable sources in PacifiCorp's energy mix. A challenge grassroots movements face is the ability to have a large-scale influence (Seyfang & Smith, 2007), but the potential to affect change in Rocky Mountain Power's energy portfolio could generate an extensive impact. Additionally, this unique legislation and partnership with the utility could inform how other states and utilities can work together to help cities achieve 100% renewable electricity goals.

Early conversations between the cities and Rocky Mountain Power developed important partnerships and strategies to make the notion of 100% renewable electricity a reality. From our research, we suggest connecting with utilities at the beginning of the city's discussion on renewable electricity and forming regional partnerships to generate leverage in negotiations. Doing so could produce feasible solutions with the utility and show city officials that 100% renewable electricity is achievable.

Challenge 2: Limited Resources

The second challenge to adopting a 100% renewable electricity resolution concerns limited resources. The challenge of acquiring the necessary financial resources for local action was addressed in both community coalition theory and grassroots innovations (Seyfang & Smith, 2007; Wolff, 2001a). For Moab, limited city resources and the prevalence of poverty in the community made affordability of a 100% renewable

electricity resolution a major concern. Participant 1 describes the challenge of low-income issues in Moab,

“[W]e have 48 percent of our kids on free and reduced lunch, which basically means half of our community is living in poverty. And so, it might not seem like a lot to say, ‘Oh, why don't you buy an LED bulb.’ But if an LED bulb is eight dollars and the other one is three, they're never going to buy it if they're that close to the poverty line....[I spend] a large part of my time thinking about how we can finance it. Because I think people are really willing...people have really good intentions here. But again, if they're choosing between buying the kids sneakers or LEDs, I think they're going to go with sneakers.”

For Moab, a solution to these financial challenges was to form partnerships.

Partnerships with other cities can provide insight into best practices and offer solutions to problems that these cities may have already experienced. By not repeating work that has already been done, resources like time, staff, and money, can be saved for other matters.

When Moab became interested in a renewable electricity resolution, the city council members reached out to Park City and Salt Lake City for advice on how to achieve an ambitious goal given a small city budget and no sustainability staff. Participant 3 describes this interaction,

“[W]e started having initial conversations with [Park City and Salt Lake City] mostly on the phone about how other communities can do this, but also if this is a reality for Moab because our budget wasn't as big. We don't know that we can take something like this on without staff that's really dedicated to put more hours into it.”

Park City and Salt Lake City helped Moab make decisions about how to move forward given their limited resources. Additionally, forming partnerships with companies and organizations can offer grant opportunities that can fund projects in line with the resolution. The Blue-Sky Program, Subscriber Solar, the wattsmart Community program, and a grant to install EV charging stations has made Rocky Mountain Power an invaluable partner for Moab. Additionally, the Utah Governor's Office of Energy Development offers the Commercial Property Assessed Clean Energy Financing (C-PACE) program. C-PACE is a low-cost, long-term financing option for commercial buildings that makes energy efficiency, renewable energy, and water conservation projects more affordable. The importance of C-PACE has been stressed throughout the case study sites as a cost-effective and affordable program that aligns with the cities' renewable electricity goals. Moab received the Solar Energy Innovation Network grant from the National Renewable Energy Laboratory (NREL) in 2017 to assist the community with solar development through data-based decision making. Identifying partnerships that can provide expertise or grant funding opportunities can show city officials and the community that reaching 100% renewable electricity goals can be done affordably and with limited resources.

Challenge 3: No or Outdated Carbon Footprint Analyses

In addition to their goals for 100% renewable electricity, these cities also had goals to reduce their greenhouse gas emissions. Our research found that it is critical that a city has an up to date greenhouse gas inventory. Not having a carbon emissions inventory, or having an outdated inventory, can cause challenges. A well-established

baseline identifies where emissions are coming from so that strategies to reduce the emissions can be developed. During the interviews, many participants stated the importance of establishing a greenhouse gas emission baseline. Participant 11 describes this importance,

“You want to set a science-based goal 80 percent reduction [in greenhouse gas emissions], well what's your baseline? Unfortunately, in a lot of cases the answer is, I'm not sure. As part of continuing to build towards the end resolution and outcome, you need to have that, I would think, defined prior to the actual resolution being adopted so you know what you're reducing....Once you've got it, and you've got the pie chart where emissions come from and you see, let's say it is electricity, then the how [to reduce the emissions] comes into play.”

Prior to the adoption of the resolution, Moab did not have a greenhouse gas inventory or a staff member to conduct one. As mentioned earlier, hiring a sustainability staff member for Moab was a crucial component to the resolution. Budget allocations to make the sustainability hire was key to developing a carbon baseline for Moab. Given Moab's limited financial resources, the city utilized the EPA's Energy Star Portfolio Manager at no cost to manage and track energy consumption and greenhouse gas emissions in city buildings. Our research suggests that allocating an individual to conduct a greenhouse gas emissions inventory is essential to understanding what is necessary to achieve the goals in the resolution. From our case studies, we identified conversations with city staff to either make a sustainability hire or assign a facility staff member to track and manage greenhouse gas emissions as an important component to developing practical, science-based strategies for goal achievement.

Challenge 4: Prioritization of Community Needs

A fourth challenge identified in our research was the prioritization of multiple community needs. Communities often have a myriad of issues they are actively working to solve or mitigate, and adding an additional ambitious goal, such as 100% renewable electricity, can cause challenges. Participant 7 communicates this difficulty, “[T]he challenge for all of us is how does it fit in our priority matrix? We've got a lot of urgent things we need to get done in the town. And how much does this fit, how much does it detract from our other goals, and where does it fit in with urgency?” Furthermore, a few participants indicated that when renewable energy resolutions were not framed effectively, some members of the community saw the goal as an irresponsible use of the city’s resources, or as a distraction from more pressing issues. Participant 7 describes community concerns around prioritization, “There was an occasional complaint that it would cost more, it shouldn't be a priority, that there are more important, more urgent items.”

To address prioritization issues, Park City developed a priority matrix to identify critical priorities in their community. Park City has defined critical priorities as issues that if not corrected, could have significant negative impacts on the community and thus, addressing critical priorities is of the highest level of importance. City council ultimately determines which issues are identified as critical priorities; however, this decision is heavily informed by constituents and the city staff. When an issue is classified as a critical priority, staff must come to city council monthly with progress updates and strategies to address the critical priority. Park City currently has three critical priorities: housing, transportation, and energy. While there are many things that need to be done in a

city, prioritizing city goals, as Park City has done, can identify the problems that are most immediate and relevant to the community. Throughout the interviews, many individuals also stressed the importance of maintaining focus on the goal. Prioritizing the goal, as Park City has done, established and continues to help maintain focus on the goal as distractions and other community issues arise.

Our research also suggests that identifying ways in which programs can be developed so that they are able to address multiple priorities simultaneously, is a way to strategically use city resources. Park City recognizes that its energy critical priority, as described above, is overarching and also addresses its housing and transportation issues. Offering electric buses, free to the public, has addressed public transportation issues, and also helps Park City toward its greenhouse gas reduction goal. Additionally, Moab's affordable housing efforts align with the renewable electricity goal, as one of the goals listed in the Affordable Housing Action Plan is to promote energy efficient housing that minimizes environmental impact. Upgrading home energy efficiency and constructing energy efficient buildings will reduce the costs of utilities for the owner, making it more affordable, and, energy conservation practices and energy efficient upgrades are critical components to achieve renewable goals. To address prioritization issues, our data suggests aligning the 100% renewable electricity resolution with other community efforts and showing why these energy goals are also a priority for the community.

Challenge 5: Outdated State Building Codes

A fifth challenge that emerged from our research is outdated building codes for the state of Utah. In Utah, energy codes for new construction are adopted at the state

level. Outdated state building codes result in structures that consume significantly more energy than necessary, as modern, energy efficient technologies are not required in the building's design. During a Park City city council meeting in 2015 that discussed the city's energy critical priority, the policy advisor explained, "that the State Building Code was set in 2006, and that was a drawback with becoming energy efficient. It could be done, but not as easily as it could if the code was updated." Interviews and data across all three study sites reveal the challenge outdated building codes create with reaching energy goals. For Park City, a solution to this challenge was the adoption of a resolution to implement net zero-energy performance requirements on all new and renovated buildings constructed with municipal funds. Similarly, Salt Lake City required all new or renovated municipality-owned buildings to be constructed to the Leadership in Energy and Environmental Design (LEED) Gold criteria. Moab promoted programs that incentivized energy efficiency and encouraged the state legislature to update the state's building codes.

During the 2019 Utah Legislative session, HB218 Construction Code Modifications was adopted. This bill updates the state's building codes and will help improve the energy efficiency of buildings in Utah. For cities in Utah, this will remove a major challenge to 100% renewable electricity resolutions. Cities that are still working under outdated building codes could adopt an ambitious resolution like Park City, incentivize energy efficiency upgrades, or work at the state level to update building codes.

Challenge 6: Absence of Education

The sixth and seventh challenges identified throughout our research were the absence of education and lack of wide-spread support for the resolution. These ideas are also discussed in Step 4: Building Support for 100% renewable electricity resolutions.

The absence of education appeared as a challenge in two ways. First, an absence of education can create uncertainties about how a 100% renewable resolution affects community members, including city staff, financially. When information is not communicated, participants shared that some community members construed false outcomes of the resolutions. In Moab, this absence of information resulted in some negative attitudes toward the resolution, lessening support for its adoption. Participant 3 describes confusion from community members regarding the resolution, “there were some people who would ask questions like, ‘are you going to force me to put solar panels on my home?’” While most people in Moab were supportive of the resolution, those who were hesitant appeared to lack information on the details of the resolution. These individuals often thought that the resolution would impose a higher cost to them. Second, the absence of education is a challenge because 100% renewable electricity resolutions require looking at costs with a long-term horizon. Without a clear understanding of how certain investments associated with these goals will benefit a community, it can be difficult to gain support for the resolution given higher upfront costs. Participant 1 describes the need to educate staff to think more long-term,

“People [have to] start to think about lifecycle costs of things rather than [how] a lot of city staff think, [which is] a two-year, or a one-year budget cycle. And so, it's sort of re-educating people about that.”

Thus, a potential solution to the absence of education is to proactively educate and effectively communicate with the city about what these goals mean for them on a personal level and how the goals benefit the city.

Challenge 7: Lacking Wide Spread Support

The lack of widespread internal support was a challenge that both Park City and Moab mentioned. In both cases, the cities encountered difficulties when trying to engage city staff and departments on sustainability issues. Participant 7 describes this challenge,

“[F]or me, the biggest resistance was internally that the staff didn't want to set goals that they didn't feel like they had the support or the resources to achieve.

And so, it took a little while to convince everybody internally that one, we could be aggressive, and two, that they would have ongoing support to accomplish what they needed to.”

Participant 3 echoes a similar response about the need to gain support,

“[S]ome of this struggle, I think, is just to make sure that [there was] support from all the different departments that [were necessary] to constantly integrate what needs to be done, certainly on the city's side to meet our part of the goal.”

To increase goal success, these case studies suggest that ambitious energy resolutions require a holistic approach where all facets of the community, especially city staff, are educated about, involved in, and working toward the common goal, as mentioned in Step 2. Our data indicates that unaligned efforts will make it difficult to adopt and implement the goals of the resolution. Participant 1 describes discrepancies that challenged the goals in the resolution,

“I had a conversation about Lime, the alternative transportation-- those scooters. So that company comes in, it's no cost to the city. So, I was like well here's a great thing, it's no cost. We'll get some people out of cars. And [name removed for confidentiality] goes, ‘Oh, I don't want scooters. It's just clutter all over the city.’”

During the interview, Participant 1 expressed other examples of mismatched efforts, similar to the example above, that create difficulties for achieving the goals of the resolution. A strategy Park City mentioned to engage staff in the resolution and acquire their support, was to build trust among departments by empowering them to set their own goals in line with the resolution. Additional tactics to gain support for the resolution will be described in Step 4.

The seven challenges identified across our case studies were: (1) utility contracts, (2) limited resources and economic concerns, (3) no or outdated carbon footprint analyses, (4) prioritization of community needs, (5) outdated state building codes, (6) absence of education, and (7) lack of wide spread support. These instances, although specific to these cases, we hope will help other cities identify challenges they may experience, as well as potential solutions, as they work to adopt 100% renewable electricity resolutions.

Step 4: Building Support

The fourth step, and one that participants emphasized as critical, to adopting 100% renewable electricity resolutions is to build support among the community and within the city council. This step is guided by the sub-phase ‘gathering momentum’ in the ‘preparing for change’ phase of social-ecological system transformations, which explains

mobilizing resources to build support for the transformation (Moore et al., 2014). We will first outline tactics to gather community support identified from the interviews and then explain a few additional strategies mentioned to gain support among the city council.

Our research found three main approaches to gathering support within a community, (1) effective communication, (2) opportunities for engagement, education, and feedback, and (3) building partnerships.

Communicate Effectively

To communicate effectively, our research found that messages should be framed in a way that utilizes localized knowledge, connects with the culture of the community, and aligns with community's values. Our findings indicate that renewable resolutions were more positively perceived by the community when messages were framed in a way that showed the benefits the resolutions could offer the community. In Moab, Park City, and Salt Lake City, clean air, water security, a healthy snow pack for winter sports, a strong local economy, preserving natural beauty, and caring for future generations were some of the values these communities held. Many participants believe that connecting these localized values and expressing the benefits of renewable electricity resolutions helped make the resolutions more widely accepted and supported in their cities. This hypothesis aligns with grassroots innovation theory, which describes successful approaches as those that use localized knowledge to address the specific needs of the community (Seyfang & Smith, 2007). Participant 7 explains how presenting the benefits of the resolution helped gain its support,

“I think at the end of the day when we were able to show that it was not going to have a negative economic impact on the town, most of our community is concerned about climate change, and they are generally supportive. So really a lot of times it was sort of lining out the map and showing that small immediate investments very quickly payback over the long term.”

Many participants stated that economic conversations and discussing the cost-benefits of a renewable resolution was critical for gaining support with community members who were more skeptical of the resolution. The importance of addressing the financial benefits of a renewable resolution to gain community support was mentioned across all of the cases. Participant 10 describes the importance of engaging in economic conversations, “I think that the approach needs to not be one of environmental sustainability but an economic conversation with the community about livability for residents, affordability for households, and the future of energy production.” Furthermore, Participant 11 addresses the importance of framing messages to align with the audience,

“In my view, words matter but what matters more is the messenger and the message around that. And then also the recipient matters, you can't convince, you can't force people. But through skilled messaging, and through correct framing of the climate issue, this isn't exclusively an issue for environmentalists to care about. This isn't an issue that then leads to regulation being imposed. You can now frame climate and climate action in ways that talk about market-based solutions, lowest cost form of energy, being cognizant of the costs imposed by pollution on us, and reacting in ways that create a clean, locally developed pathway.”

Participant 11 mentioned that the messenger matters, which aligns with research that states that messages are more likely to be accepted by a group when they are communicated by a trusted and credible individual of that group who also shares a similar worldview to the audience than if the message had come from an outside source with differing worldviews (Hoffman, 2012; Kahan, 2010). Referring back to Step 2, these cities identified the champions and leaders across multiple sectors of their cities and worked with those individuals to communicate within their own groups about the resolution to help gain diverse support for the resolutions. Participant 3 describes how helpful it was to have representatives from Park City and Salt Lake City speak to Moab's city council about the resolutions in their community,

“I felt like in many ways the most powerful tool was having [sustainability managers from Park City and Salt Lake City] come because even though they were outsiders, some of us think that the male energy some people can relate to it better....it takes a lot of the emotion out of it, just hard numbers. And, I feel sometimes like people who are skeptical can relate better.”

For skeptics in Moab, education on the topic of the resolution was better received when the audience could relate to the individuals sharing the information.

Other comments from interviews, in addition to the one that was mentioned, suggest that gender could play a role in identifying effective messengers for energy conversations in Utah communities. During our research, three interviewees mentioned the role of gender in this line of work without being prompted by gender-related interview questions. Their comments suggest that men who communicated about sustainability and renewable energy were taken more seriously than women who

communicated on the same topic, especially when the audience was primarily men or skeptics of the resolutions. Describing challenges with achieving goals in the resolution, Participant 1 said,

“And there's gender issues too....As a woman, asking fleet guys or street guys to do something in a very, what I consider, traditional culture here in Utah, I don't think they're used to women in leadership positions as much and so it's an added twist.”

Participant 8 described a situation where she felt undermined for her work because her male co-worker was not present to help explain the community's renewable goals,

“[I]t was actually infuriating...it was just this older guy and it really felt like, ‘Oh, you silly girl there's no way we're ever going to do this.’ And I never experienced that. But I remember that pretty clearly. It was very demeaning.”

These comments suggest that gender may have an effect on the way messages around sustainability and energy are perceived in a community. In these Utah cases, male messengers were observed by females to be more successful at communicating energy related topics to the public. More research could be done to determine if this pattern exists outside of Utah, which, in 2018, was ranked as the second most sexist state in the U.S. (Alberty, 2018).

Refocusing on effective messages, Participant 5 felt that communication efforts could have been improved to increase knowledge of the resolution and better engage individuals in the community who exist outside of the sustainability network. This participant felt that only an exclusive part of the community had been reached about the resolution, and most other community members had been left in the dark. Thus,

Participant 5 suggests that when cities work to gain support on this topic, they should ensure that support is being gathered holistically and is representative of the diverse groups within the community. This suggestion is supported with community coalition building, stating that diverse and inclusive membership from across a community is a key factor of successful coalitions (Wolff, 2001a). Participant 6 states an additional communication problem that arose in one of the case studies,

“There’s all these cool things that I know about because I met with [the sustainability manager] for like an hour a month ago. But if I hadn’t done that, [I wouldn’t know of these sustainability efforts], so there’s a communication [issue]. We need to get [these sustainability efforts] out because [the sustainability department is] doing so many good things.”

Summarizing successes and regularly communicating with community members was also listed as a factor necessary for success in community coalition building because it encourages engagement and builds motivation (Wolff, 2001a).

In addition to effective messages and messengers, we found that communicating also includes using the local information outlets that the community commonly uses. Our case studies used local newspapers, popular radio shows, city council meetings, social media, and forms of personal contact such as email, phone calls, face-to-face conversations, and texting to communicate with citizens about these renewable electricity resolutions. As knowledge of the resolution developed, many interviewees indicated that it was also important that community members share their support for the resolution by writing letters to the editor of the local paper or op-eds, emailing city council members,

sharing their positive attitude toward the resolution on social media platforms, and encouraging other supporters to do the same.

Create Opportunities for Engagement, Education, and Feedback

The second major component of building community support that emerged in our data is to provide engagement, education, and feedback opportunities. The findings explained in this section closely align with community coalition building and grassroots theory. As addressed in Step 3, educating the community about the resolution is critical to gaining success and generating positive attitudes around the resolution. The Sierra Club and Climate Reality Project helped Moab and Park City educate the community and disseminate information about the renewable electricity resolutions. Additionally, Moab utilized its partnership with Park City and Salt Lake City to help educate its own community about the possibility of bringing a renewable electricity resolution to their city. The city brought a representative from Park City and Salt Lake City to a Moab city council meeting to present on the purpose for renewable electricity resolutions and the benefits that accompanied the effort, such as the cost savings and price predictability that renewables offer. This public opportunity to learn about renewable electricity resolutions was helpful for Moab to gain community and council support.

Providing opportunities for the community to engage with the development of the resolution and voice concerns increased community empowerment and enhanced the resolution as it was fitted to meet specific community needs. City council public hearings on the resolution were identified in our research as a common approach to allow for inclusive feedback opportunities. In Park City, the city staff originally presented the

energy goals with a timeframe to achieve 100% renewable electricity by 2050, and the community was not pleased. At the public hearing, many community members spoke out and requested that the city take a more aggressive approach. One of the citizens who was in favor of a shorter timeframe said, “if we continue at the rate we're going, there will be no snow by 2050. We need to aim high....We have a young, passionate community who will make this work.” As a result of the many concerns voiced by the public, the city staff redeveloped the goals and soon after, the city ended up with the ambitious goal to achieve net-zero carbon and 100% renewable electricity by 2030. Allowing the community to be heard and their suggestions to be incorporated into the goal created a sense of ownership, increasing dedication and commitment toward reaching the goal (Seyfang & Smith, 2007; Wolff, 2001a). Offering opportunities for the community to voice concerns was important to designing goals in all three cases that are reflective of community culture and values.

Build Partnerships

Building partnerships was a major theme that emerged in our data. In Step 3, we described how our case studies developed partnerships to solve the challenge of having limited resources. In this section, we mention the importance of partnerships again, but in the context of how partnerships helped these cities gather community support. In our research, we found the development of partnerships with businesses and organizations inside and outside of the community helpful for building community support. Well-known and respected businesses and organizations that spoke out in favor of the resolution were an important factor. Each of the cities partnered with specific businesses

in their community to address any concerns that entity had, gain their support, and work with that entity to spread information about the resolution within various networks. In Park City, for example, the ski resorts, hotels, and the town's business alliance were important to have on board with the resolution to show that the resolution was favored by the business community. In Moab, over 20 businesses wrote a letter to the council in favor of the resolution, which was important for displaying the pronounced support the resolution had in the community. Externally, the cities partnered with a variety of organizations such as the Sierra Club, the Climate Reality Project, Utah Clean Energy, Rocky Mountain Power, and Recycle Utah, to name a few. Participant 12, a Sierra Club representative explains how they work with communities to gather support on renewable electricity resolutions,

“[The] biggest job that we have as an organization is in public awareness education because people have lives and they don't spend their time thinking about where their energy comes from....[B]ringing these concepts to the public so they can digest them and realize how kind of tailor-made they are for community engagement is an important step....[W]e can then provide [the public] resources and examples from across the country, so that they can see how it would be applicable for their community.”

Throughout all three case studies, we found that external partnerships can help inform strategies and provide technical support to achieve the goals, work on changes with state legislation, provide grant opportunities, and assist with communication and public engagement. The importance of these external partnerships was also identified in both grassroots innovations and community coalition building, supporting our findings.

Community coalition building states that partnerships offer collaboration and peer learning and offer assistance through funding opportunities (Wolff, 2001a), as Utah Clean Energy and Rocky Mountain Power have for our case studies. And, grassroots innovation claims that developing regional and national partnerships, such as the partnerships with the Sierra Club and Climate Reality Project, can help increase the influence of the innovation (Seyfang & Smith, 2007). These internal and external partnerships increased the awareness and need for renewable electricity goals in our case studies and helped the cities identify feasible ways to achieve their goals, all of which were important for gathering community support around the resolutions.

In addition to the strategies to gather support within a community, our research identified specific steps to gain city council's support on the resolution. Park City, Moab, and Salt Lake City were fortunate to already have elected officials who were concerned about climate change and willing to take action. Thus, gaining the elected officials support on the resolution was easier for these cities than it likely may be for other communities whose council members are not as concerned about climate change. Because Moab's resolution was initially motivated by the city council, and Salt Lake City's resolution was primarily driven by the city staff and city council, our findings for gaining council's support are reflective of what was identified in the case study of Park City. Park City's efforts began with a single concerned citizen who garnered community support for a renewable electricity resolution and then took his idea to the Park City council. Through this successful experience, three key actions emerged to gain council's support: (1) meet with a council member one on one, (2) show community benefits, and (3) demonstrate that there is community support.

Meet One on One with a City Council Member

Our Park City case study identified that meeting one on one with a council member created an opportunity for the council member to express chief concerns and provide other feedback on the renewable electricity goal and resolution idea. After the feedback was gained, the resolution idea for Park City was reworked to address the council member's concerns. A couple of Park City participants stated that it was important to follow-up with the council member to present the revised idea that incorporated the council member's feedback. While the community member who was interested in this resolution idea met and worked primarily with only one member of city council, a participant mentioned that it could be helpful to also consult with the other members of the council to gather all of the concerns the council may have. Multiple interviewees stated that it is key to establish a partnership with the council members. Attending city council meetings and arranging a time to discuss concerns on the resolution were identified as effective ways to build that partnership. Park City offers "coffee with a council," which provides an opportunity for community members to meet and discuss matters with the council in a relaxed setting.

Show Community Benefits

We found that when meeting with the council, it was important to show how this resolution benefits the community and will have a long-lasting positive impact on its community members. Grassroots innovation warns of policy makers' risk-aversion (Seyfang & Smith, 2007); thus, showing how a resolution for renewable energy benefits a community is necessary for reducing any perceived risk among the city council. Because

Park City's economy is tied to the success of the ski industry, talking about climate change and how Park City could be a leader on climate action was appealing to the culture of the community. This step to gain council's support connects with effective communication and framing of messages mentioned earlier to address community values and benefits. In Salt Lake City, addressing air quality and health concerns was a major reason to support clean, renewable energy efforts. For many cities, a relatable incentive will likely be the long-term economic benefits that renewable energy and energy efficiency can offer after initial investments in infrastructure and technologies.

Demonstrate Community Support

Lastly, to gain council support, our data indicates that it is essential that community support for a renewable electricity resolution is demonstrated. Across all the study areas, visual community support on an issue was identified as a major factor of success. Because the city council is representative of the community, our participants indicated that it's necessary to portray that the constituents want this change. Participant 3 explains the importance of community support, stating

“It's really important if we're going to do something like this, and these are going to be community goals, that they be community driven.”

In our research, support from community members and businesses was demonstrated to the city councils through written letters or emails to council, the presence of a large group of supporters at city council meetings, speaking at public hearings in favor of the resolution, writing letters to the editor or op-eds, and displaying support through other

effective information outlets that were described earlier. Participant 7 describes the importance community support has on the city council's attitude toward the resolution,

“Once the public support swelled on this, council, you know it's not like council was opposed to it, I think they felt like it was controversial and maybe not a priority in the community. And I think they were pleasantly surprised by the activism that this was very important to our community. So, they were very proud to take action by the time they sort of heard from the public.”

As shown in the case of Park City, gaining council's support is easier when the elected officials are already supportive of climate action. Throughout our research, electing officials or already having elected officials who are supportive of climate was found to be fundamental for success. Several participants stated that communities interested in adopting renewable electricity resolutions must support and elect candidates for local office who are advocates for climate action and supportive of renewable energy and other environmental sustainability endeavors.

Major takeaways from Step 4 include gathering support within a community through (1) effective communication, (2) opportunities for engagement, education, and feedback, and (3) building partnerships, and acquiring council's support by (1) meeting with a council member one on one, (2) showing community benefits, and (3) demonstrating that there is community support.

Step 5: Taking it to a Vote

The final step to adopt 100% renewable electricity resolutions identified in our research is to take the resolution to a city council vote. Our findings indicate that there

are five factors that should be considered as the resolutions are brought to council: (1) confidence that council is in support, (2) promoting the council meeting, (3) gathering attendance for the council meeting, (4) speaking up in support at the meeting, and (5) sharing the good news.

First and foremost, a council member drafts the resolution and establishes the resolution as an agenda item for the council meeting. Before a vote was scheduled, however, it was critical to know where each council member stood on the topic. Recalling Step 4, engaging in person with the council members established an understanding of their attitudes on the topic, and also provided an opportunity to gain support. If the majority of council members are not yet in favor of the resolution, our findings suggests that more time should be spent on Step 4 before the council votes on the resolution.

In our research, many participants stressed the importance of promoting and advertising the city council meeting once the vote on the resolution was scheduled. Our case studies used effective communication outlets to increase awareness of the meeting, such as local newspapers, radio stations, social media, phone, email, and face-to-face interactions. Key individuals in these communities also helped spread the message and gather attendance from diverse community groups.

Vast attendance at the meeting was fundamental for illustrating community support for the resolution. The observable community support grabbed the attention of Park City's city council as Participant 6 describes,

“I've been to zero city council meetings probably prior to [setting these climate goals]. So, I didn't go [to council meetings]. Young people don't go. No one goes,

right? So, all of a sudden [the council chamber is] filled with like 25 people and the [city council] is like, ‘Oh this is serious.’”

As mentioned, our findings suggest that visible community support is important for successful adoption of the resolutions. Participant 7 echoes Participant 6 here, but from a different viewpoint to explain the significance of community support at the Park City council meeting,

“I told them [the individuals pushing for the resolution], you need to start showing up at every city council meeting. You need to bring your friends. You need to create momentum. And, you need to demand that the council take greater action. And for six months they did exactly that. They showed up at meetings. It was mostly a millennial group, but they showed up with their young children. They showed up with their friends. They brought in their parents. And they all continue to say that ‘This is our future. We’re very concerned about it. And we want you to take action.’ And by the end of it they had unanimous support from the council.”

In addition to attendance, our research found that it was essential that resolution supporters spoke up at the public hearings before the vote took place and explained why the adoption of the resolution was important to them and fundamental for the community.

Lastly, after the adoption of the resolution, our findings revealed that it is necessary to share the good news. Moab, Park City, and Salt Lake City used their partnerships with the Sierra Club and Climate Reality Project to spread news of their resolutions across the country. Many participants discussed the importance of inspiring other communities to establish similar goals to create large-scale change. One of the challenges noted in grassroots innovation theory is the difficulty for small, local efforts to

have extensive influence (Seyfang & Smith, 2007). Telling an exciting story of this ambitious effort can motivate other cities, creating a ripple effect that allows local level efforts to build effective change nation-wide.

Reiterating the findings of Step 5, our interviews revealed that taking a renewable electricity resolution to a vote includes: (1) confidence that council is in support, (2) promoting the council meeting, (3) gathering attendance for the council meeting, (4) speaking up in support at the meeting, and (5) sharing the good news.

Limitations and Implications for Further Research

This exploratory research identifies how communities can strategize to develop and adopt 100% renewable electricity resolutions within local governments. While the framework produced in this research has been designed to be transferable to other cities, its potential for success is limited by its scope. Additional research is necessary to determine if the framework and strategies identified in this research are also applicable in other locales, especially cities where supportive climate action attitudes are not as prevalent. The cases in this study may be thought of as the progressive cities of Utah because our participants stated that there was already a collective sense of urgency to act on climate change before the resolutions were developed. The history of environmental efforts and motives to address climate likely aided the successful adoption of these resolutions across the cases. Cities that do not have a history of environmental action or a pre-existing collective desire to act on climate change may experience additional barriers that were not experienced in these cases, and thus were not included in our framework. Examining communities that did not have a history of environmental actions or an

established sense of urgency to act on climate change could indicate additional strategies for developing the desire for a renewable electricity goal. Furthermore, due to time constraints, this research only examined cities that successfully adopted 100% renewable electricity resolutions. Examining cities that failed to adopt these resolutions or were required to modify the resolutions to a less ambitious goal, such as a 50% renewable electricity goal instead, could provide beneficial information to this field, such as barriers these cases experienced that prevented resolution adopted that other cities should prepare for when considering a 100% resolution. Additionally, a research study that tests this framework with cities interested in adopting similar resolutions would provide valuable data about the strengths and weaknesses of this framework, determine its overall usefulness, and suggest changes to strengthen the framework's utility. Future research could also entail a quantitative analysis on the community-level presence or absence of the various attributes detailed in this analysis (e.g., professional sustainability staff employed by the city, internal and external partnerships established, community meetings and messages developed to share information about the resolutions, etc.) in conjunction with 100% renewable energy resolutions passed or not passed. With further research on this topic, it is likely that additional strategies for success will emerge. The addition of strategies and techniques to this initial framework will strengthen its functionality and thus, better assist other cities in adopting 100% renewable electricity resolutions. Finally, this research only explores ways in which renewable electricity resolutions can be adopted. To reduce GHG emissions, these communities must follow through and achieve the goals established in the resolutions.

Conclusion

As described throughout the results, our findings support previous literature and theory on localized community action and engagement strategies. Our research, however, applies a focused lens to offer insight into how resolutions for renewable electricity can be adopted by other cities. Local government climate action is important for the reduction of greenhouse gas emissions. Adopting 100% renewable electricity resolutions is a major step a city can take to reduce its carbon footprint (Sierra Club, 2017). Understanding how a community can successfully adopt aggressive goals is thus critical for greenhouse gas reduction. Climate efforts by local governments can be undermined, as the greenhouse gas emissions from a single municipality are miniscule when compared to global emissions. Conversely, local governments can have a ripple effect with the potential to generate substantial change. The negotiations Park City, Moab, and Salt Lake City had with their utility – to establish an agreement that the utility develops new renewable electricity generation to the capacity necessary to power that city – is unprecedented and creates a new path that other cities and utilities could follow. Furthermore, the regional partnerships formed by these three cities, Summit County, and Rocky Mountain Power led to the adoption of state legislation that encourages other Utah municipalities to adopt 100% renewable electricity resolutions through an application process that results in a partnership with Rocky Mountain Power to reach their goals. Because these resolutions require that new renewable electricity is generated by Rocky Mountain Power, these cities have the ability to transform Rocky Mountain Power's grid to one that requires more generation from renewable sources. Again, with 44% of PacifiCorp's customers coming from Utah, a change in Rocky Mountain Power's energy mix could affect change

in power generation across multiple states as PacifiCorp adapts its power supply. Local action and the creation of regional efforts have the potential to alter the supply of utilities to renewable sources, thus it is crucial to provide local government with the tools they need to adopt renewable electricity resolutions.

This research provides a five-step framework to help communities across the country adopt 100% renewable electricity resolution: (1) Using trigger events for inspiration, (2) Envisioning change, (3) Identifying challenges and potential solutions, (4) Building support, and (5) Taking it to a vote. In each of these steps, we provide examples, strategies, and connect our findings to theory and previous research. Our framework was designed to be transferable and assist communities across the nation that are working to adopt ambitious renewable goals. Local governments have the ability to create effective change, but because climate change is a global, collective action issue, community level action must be scaled up. Thus, local governments must continue to inspire and support each other as they work to adopt these ambitious energy goals. This need and the emphasis to inspire other communities is well explained by Participant 7,

“What Park City does is a drop in the bucket. I am the first to acknowledge that. But if we can create waves in other communities and demonstrate that it's replicable and scalable and practical...we can have a real impact that way.”

These findings were organized as a tool to assist communities interested in developing and adopting renewable electricity resolutions. This research also describes challenges that our case studies faced when developing these resolutions and offers a variety of solutions and approaches these communities used to overcome those

difficulties. We hope this framework assists cities in adopting 100% renewable electricity resolutions, furthering a national transition to cleaner and renewable electricity.

Recommendations for Practice

Results from this study suggest five-steps to adopt 100% renewable electricity resolutions:

1. Using trigger events for inspiration
 - Concern for planetary health, potential economic impacts that climate change could have on a city, health issues that are caused or exacerbated by the use of fossil fuels
 - Lack of federal action
 - State, national, and international movements that encourage action
2. Envisioning change
 - Identify champions who are passionate, inspiring, respected and determined
 - Define a shared and concrete goal with a timeframe and list factors necessary for achieving the goal
3. Identifying challenges and potential solutions
 - Proactively identify foreseeable challenges and generate potential solutions.
 - Address these issues early on to make the resolution easier to adopt and also more attainable.
4. Building support

- Gather support within a community through (1) effective communication, (2) opportunities for engagement, education, and feedback, and (3) building partnerships
- Acquire council's support by (1) meeting with a council member one on one, (2) showing community benefits, and (3) demonstrating that there is community support

5. Taking it to a vote

- Consider these five factors as the resolutions are brought to council: (1) confidence that council is in support, (2) promoting the council meeting, (3) gathering attendance for the council meeting, (4) speaking up in support at the meeting, and (5) sharing the good news to inspire other communities

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CHAPTER III

COMMUNITY ENGAGEMENT STRATEGIES FOR ACHIEVING 100% NET-RENEWABLE ELECTRICITY GOALS

Introduction

An absence of federal action on climate change has led to an increase in local and regional efforts to reduce greenhouse gas emissions (Engel, 2005; Lutsey & Sperling, 2008; Martinez, Defrancia, & Schroder, 2018; Rutland & Aylett, 2008). More than 100 municipalities in the United States have committed to powering their cities with 100% renewable electricity through the Sierra Club's 'Ready for 100' campaign (Sierra Club, 2019). Thus far, six cities have achieved this goal and are currently powered by 100% renewable electricity (Sierra Club, 2019). Geographically spreading across the United States, Kodiak Island, AK, Aspen, CO, Georgetown, TX, Greensburg, KS, Rock Port, MO, and Burlington, VT were motivated to run their cities on 100% renewable electricity for diverse reasons, including greenhouse gas reduction and climate change concerns, economic benefits, price stability, energy independence, and energy reliability (Martinez et al., 2018). These cities have forged the path showing that powering communities with 100% net-renewable electricity is not only doable, but also economical in many cases. Brief summaries of these six successful cities' efforts are provided in Appendix D.

Municipal level action does not directly yield the major greenhouse gas reductions that a national government policy could. Local government efforts, however, should not be disregarded. While it may seem that the 100% net-renewable electricity efforts these six small, local governments made have only a marginal impact on the global issue of climate change, local action has the potential to generate large-scale

change, as local policies have been shown to influence state and federal policies (Engel, 2005; Lutsey & Sperling, 2008; Tang, Brody, Quinn, Chang, & Wei, 2010). Furthermore, local action could inspire neighboring communities to adopt similar policies, creating the momentum to expand and form regional action on climate change (Engel, 2005; Sovacool & Brown, 2009). The variety of local government approaches to power communities with renewable electricity and address greenhouse gas reduction allows for experimentation of practices and tests political responses to policies, which could help identify the most effective programs for future climate change mitigation (Engel, 2005; Lutsey & Sperling, 2008). Local government action on climate change also allows for policies and programs to be tailored specifically to the needs of the community (Lutsey & Sperling, 2008; Rutland & Aylett, 2008; Seyfang & Smith, 2007; Sovacool & Brown, 2009). Localized knowledge and community input could develop more attractive and effective solutions to local issues, as community engagement helps cultivate commitment and accountability to the matter at hand (Lutsey & Sperling, 2008; Rutland & Aylett, 2008; Seyfang & Smith, 2007; Sovacool & Brown, 2009).

While there are benefits to working at a local level, it is important to note that local government action and grassroots movements are not a panacea to solving the problem of global climate change. As mentioned, climate change is a global issue and local climate action alone does not generate the necessary reductions in greenhouse gas emissions to resolve climate change; local action must be scaled up to have a major impact (Engel, 2005; Lutsey & Sperling, 2008; Sovacool & Brown, 2009). Additionally, in the context of implementing resolutions for 100% renewable electricity, communities face challenges such as the complex energy regulatory structure and the lack of direct

control over their electricity supply, gaining political and community support, external political pressures, and limited funding or financial support, which create barriers to the upfront costs of renewable energy installations and energy efficiency upgrades to infrastructure (Martinez et al., 2018).

With 100+ U.S. cities committed to renewable electricity resolutions, these cities are serving as critical role models in their efforts to combat climate change. Yet, a major issue with policy, and one that is often mentioned in climate policy, is the gap that exists between rhetoric and action (Bulkeley, 2010). Identifying strategies and techniques to resolve barriers is essential for closing this gap and ensuring effective policies that mitigate climate change. Community engagement has been identified as a fundamental component for successful achievement of climate policy and greenhouse gas reduction goals (Lutsey & Sperling, 2008; Martinez et al., 2018; Rutland & Aylett, 2008). While there is much research that explores the engineering technicalities of achieving renewable electricity goals, more research is needed to understand how community engagement can alleviate challenges and strengthen the momentum toward goal achievement.

Through three case studies, this chapter will explore how Salt Lake City, Park City, and Moab are engaging their residents to assist with the achievement of 100% renewable electricity goals. Although community members are often absent in electricity procurement because it is handled by city officials, obtaining renewable electricity from a utility is only one piece of the puzzle. Energy conservation and energy efficiency are critical components to reducing greenhouse gas emissions and supplying 100% renewable electricity to the community (Martinez et al., 2018); thus, inefficient practices that waste energy must be addressed, which requires community participation

(Smaliukienė & Monni, 2019). This chapter will present three major challenges our study areas are facing, identified through a thematic analysis of semi-structured interviews and document collection, as they work to engage the public with the goals of their resolutions, as well as describe the approaches these cities are implementing to overcome these barriers.

Study Area

In 2016 and 2017 Salt Lake City, Park City, and Moab, became the first cities in Utah to adopt resolutions to transition to 100% renewable electricity. Each of the city councils adopted the resolutions unanimously and began collaborative negotiations with their utility, Rocky Mountain Power, to procure renewable electricity (Egelhoff, 2017; Rocky Mountain Power, 2018; Rocky Mountain Power & Salt Lake City Corporation Department of Sustainability, 2017). The negotiations with Rocky Mountain Power led to the adoption of state legislation, HB 411, in early 2019. The bill streamlines the process for Utah cities with 100% renewable electricity resolutions to be part of an agreement with Rocky Mountain Power that results in new renewable energy development that powers these communities (State of Utah, 2019). The utility agreement is one of many steps Salt Lake City, Park City, and Moab are taking to achieve their renewable electricity resolutions. These cities are also executing a variety of community engagement tactics to help reach their energy goals, which will be explored in this chapter.

While Utah has untapped solar, wind, and geothermal energy potential that could generate large quantities of electricity, in 2017, 70% of Utah's electricity was generated by coal (U.S. Energy Information Administration, 2019). Utah's traditional fossil fuel

culture with coal as the dominating electricity source alongside its majority religious and conservative population made these three cities interesting case studies for understanding how the cities are engaging their communities with renewable electricity and greenhouse gas reduction goals. Additionally, due to limited time and funding, these cities were selected due to their proximity to the researchers, making the project feasible.

Salt Lake City

With a population of 193,744, Salt Lake City, the capital of Utah, is the largest city in the State (United States Census Bureau, 2016). Salt Lake City is notorious for its poor air quality but has been attempting to improve air quality for decades. Sustainability staff and city council identified air quality concerns as a major motivator for the development and adoption of Salt Lake City's 100% renewable electricity resolution, which was adopted in July of 2016 (Salt Lake City Mayor's Office, 2016). The resolution consists of two major goals: transitioning to 100% renewable electricity community-wide by 2032³ and reducing carbon emissions by 80% by 2040 (in relation to the 2009 emissions baseline). The resolution also calls for benchmark goals, such as transitioning to 50% renewable electricity within municipal operations by 2020 and reducing carbon emissions by at least 50% by 2030 (Salt Lake City Council, 2016). Salt Lake City's resolution states the severity of climate change impacts on Salt Lake City in justifying its responsibility to transition to a low carbon community. After the adoption of the resolution, the city created its Climate Positive 2040 plan which outlines its pathway to achieve these goals.

³ In 2019, Salt Lake City adjusted its goal to achieve 100% renewable electricity by 2030 (Winslow, 2019).

Park City

Park City, located east of Salt Lake City in Summit County, is an affluent ski town in the Wasatch Range and former host site to the 2002 Winter Olympics. The population of Park City is approximately 8,300 (United States Census Bureau, 2016). The Park City City Council adopted a resolution in March of 2016 to become net-zero carbon and power the entire community with 100% renewable electricity by 2032⁴ and that municipal operations will be net-zero and powered with 100% renewable electricity by 2022 (Park City Council, 2016). With an economy driven by a healthy snow pack, Park City recognizes the threat that climate change brings to their community and states that this resolution is an important step for carbon reduction. Recognizing they cannot solve climate change alone, Park City encourages other communities to join them in this ambitious effort. In October of 2017, Summit County followed Park City's lead and also adopted a resolution to transition to 100% renewable electricity by 2032, which made Summit County the first county in Utah, and one of four counties across the United States, to adopt a 100% renewable electricity goal (Sierra Club, 2019; Summit County Council, 2017).

Moab

Moab, located in southeastern Utah near the Utah-Colorado border, is an international hot spot for adventure sports and is well-known for tourism. The population of this tourism-driven community is 5,250 (United States Census Bureau, 2016). Inspired by the renewable electricity resolutions adopted in Park City and Salt Lake City, Moab's

⁴ In 2018, Park City moved its goal to be net-zero carbon with 100% renewable electricity to 2030 (Murray, 2018).

City Council aspired to set their own goal to act on climate change. The council's environmental concerns and desire to set renewable electricity goals were supported by the community, which led to the adoption of Moab's renewable electricity resolution in February of 2017. The resolution committed the city to achieve two major goals: 1) reduce 50% of greenhouse gas emissions by 2032 and 80% by 2040 relative to 2018 emissions, and 2) transition to 100% renewable electricity within municipal operations by 2027 and community-wide by 2032 (Moab City Council, 2017). Moab's resolution further states that transitioning to a low-carbon community will help address climate change as well as bring local benefits such as improved air quality, public health, energy security, and local jobs (Moab City Council, 2017). As a world-renowned tourist destination, Moab's city officials believe the city can influence the dialogue on climate change and that this resolution is an effective way to begin that conversation (Moab City Council, 2017).

Community Engagement

To achieve community-wide renewable electricity goals, individual lifestyle choices are key components, as behaviors that support responsible energy consumption can speed up the transition to renewables (Smaliukienė & Monni, 2019). To understand strategies for how practices such as energy conservation are adopted within these communities, this research explores diffusion of innovations theory and community-based social marketing. Comparing our data with these theories can help us understand how certain strategies for community engagement that emerged in the data could be successful in increasing participation in environmental behaviors in our case studies.

Furthermore, these theories could indicate additional tactics that could strengthen the approaches each city is implementing. The purpose of this research is not to test these theories, however, if community engagement tactics not stated in these theories repeatedly emerge in our data, our research could suggest limitations to these theories or propose the addition of community engagement approaches to these theories.

Diffusion of Innovations

To understand how practices such as energy conservation, energy efficiency, and renewable energy installation are adopted by individuals in our study area, we applied Rogers' diffusion of innovations theory, which explains how ideas are spread throughout a community (1995). Diffusion of innovations is a well-established theory used across many disciplines to explain innovation adoption (Pannell, Marshall, Barr, & Curtis, 2006). This theory describes the willingness to adopt an innovation and depicts the process through waves of adoption across five groups (Rogers, 1995). The first group to adopt an idea is the innovators. This group is seen as the risk takers, able to cope with the uncertainty of a new idea (Rogers, 1995). The innovators are followed by the early adopters, which is one of the most important groups for determining the success of an innovation. Early adopters are role-models and leaders, as they are well-respected individuals in a community (Rogers, 1995). The acceptance of an innovation by early adopters inspires the next group, the early majority, to also adopt the innovation (Rogers, 1995). The adoption of an innovation by the early majority helps the innovation reach its tipping point, which occurs between 10-20% of acceptance (Rogers, 1995). From there, the innovation is accepted by the late majority, and lastly the laggards (Rogers, 1995).

Furthermore, this theory suggests five characteristics for successful innovation diffusion: observability, relative advantage, compatibility, trialability, and complexity (Rogers, 1995).

This research does not test diffusion of innovations, but rather uses it as a theoretical background to support the methodology and strengthen the findings. As these communities work toward 100% renewable electricity, it will be important that the cities engage the community in this process. Spreading sustainable behaviors and practices throughout a community can be strengthened with the understanding of diffusion of innovations. Identifying the role models in the community and strategizing to target these early adopters with new sustainable behaviors will be crucial in the spread of these practices and achieving the community's resolution. Additionally, designing a community engagement plan that meets the five characteristics of innovation diffusion will also help increase the success of the community's sustainability practices. While diffusion of innovations helps us understand the spread of ideas in a community and offers tactics to speed up the adoption of an innovation, we compared a framework specific to bringing about sustainability-related behavior change in a community, called community-based social marketing.

Community-Based Social Marketing

Community-based social marketing (CBSM) is a framework that has been used to bring about sustainability-focused behavior change through a combination of psychology and social marketing knowledge (McKenzie-Mohr, 2011). This framework is a proven approach in delivering environmental programs and its strategies have been in thousands

of programs around the world (McKenzie-Mohr, 2011). McKenzie-Mohr's CBSM framework has been quoted as, "Probably the most adopted approach to using social marketing tools for sustainable energy use" (Smaliukienė & Monni, 2019, p. 21), making it a great resource to compare our research.

Community-based social marketing consists of five steps: selecting the behavior to promote; identifying barriers and benefits associated with the behavior; developing strategies; piloting the selected strategy; and evaluating the program after implementation (McKenzie-Mohr, 2011). Identification of barriers and benefits is an integral part for success. Increasing the perceived benefits and decreasing the barriers to the desired behavior while also decreasing the perceived benefits and increasing the barriers to the undesired behavior is crucial for making the desired behavior the attractive choice. Additionally, this framework addresses the power of commitments, social norms, prompts, incentives, and effective communication to assist individuals in adopting a new behavior. Rather than just trying to persuade people to adopt a behavior, this framework identifies what individuals need and value to ease the transition to a new behavior. Community-based social marketing's strategies and steps were used to help inform and strengthen our findings.

A combination of diffusion of innovations and CBSM could help us better understand the community engagement strategies that emerged in our data. These theories explain how ideas are adopted across a community and how certain tactics can ease and quicken the adoption of a practice or behavior. Cross-comparing the major components of these theories with the community engagement strategies that emerged in our data could provide insight as to why these strategies are likely to be successful and

assist with the achievement of the cities' renewable goals. Furthermore, these theories may highlight approaches within our cases that could be strengthened with the addition of the tactics outlined in these theories.

Methods

To investigate our research question, 'how do the cities plan to motivate households and businesses to engage in sustainable practices in line with the resolutions?' we used a qualitative, exploratory multiple-case study design. In the context of our research, a case refers to a city that has adopted a resolution to transition to 100% renewable electricity. Our research explores three cases: Salt Lake City, Park City and Moab, Utah. We selected the multiple-case study design because it allows us to investigate these three cases in a real-life context with the ability to collect data from multiple sources (Yin, 1994). Collecting data from diverse sources creates the opportunity to triangulate the data, validating facts and building the most accurate depiction of how our cases are implementing 100% renewable electricity resolutions (Golafshani, 2003; Yin, 1994). We studied multiple cases so that we could compare similarities and differences across the cities, building a greater understanding of the different strategies these cases are using to engage the public in practices that help achieve their renewable electricity resolutions. Studying multiple cases can also be advantageous because it creates the opportunity to develop stronger and more compelling findings than a single-case study approach (Yin, 1994). Thus, conducting a multiple-case study to understand how the cities plan to motivate households and businesses to engage in sustainable practices in line with their resolutions could increase the likelihood that the

findings from our research are transferable to other cities (Johnson & Christensen, 2017).

Data Collection

To understand how Salt Lake City, Park City, and Moab are motivating households and businesses to engage in sustainable practices that will likely help achieve their resolution goals, we used a variety of data sources. For each case, we conducted semi-structured interviews with individuals involved in the resolution process, collected videos and audio tapes from city council meetings, and gathered an assortment of documents including city council agendas and meeting minutes, city reports, newspaper articles, and data from other media sources. These other media sources included information from local government websites, articles mentioning the cities found on websites from organizations the cities are partnered with (Climate Reality Project and Sierra Club), and general internet searches of the cities' names combined with the following key words and phrases: "renewable energy resolution," "100% renewable energy," "adopt renewable energy," "transition to renewable energy," "clean energy," and "carbon neutral." To increase the validity of our research, we collected this information in combination with interviews to corroborate facts and alleviate the bias that is intrinsic to interviews (Yin, 1994).

Interviews were essential to our research because they provided in-depth information on the different programs and strategies that are being used to engage the public with the goals of the resolutions, including programs that have not yet been launched. We conducted 13 interviews, which included a representative from Rocky Mountain Power, an individual who works for the Sierra Club, five participants from

Moab, four from Park City, and two from Salt Lake City. We chose to interview an individual from Rocky Mountain Power to better understand the partnership between the utility and our cases studies. No direct relationship has been found between the number of interviewees and the quality of research (Hatch, 2002). Rather, research suggests to conduct the number of interviews needed to reach saturation in answering the research questions (Hatch, 2002). Studies with fewer interviews should use multiple sources of data to strengthen findings (Hatch, 2002), which we have done with our combination of interviews and document collection. Participants from our study areas included city council members, mayors, sustainability staff, and involved community members. To identify the individuals who were key in the resolution development process, we read through newspapers, city council meeting minutes, the local government webpage, and used a snowball sampling technique. Due to time constraints and that these resolutions were adopted unanimously and were perceived positively in the community, we only interviewed individuals who were directly involved with the resolution development and/or the approach to reach the goals of the resolution so that we could collect the most accurate data. Because there are few individuals directly involved with the implementation of the plans and strategies to achieve the goals in the resolution, we used additional data sources, such as the city's sustainability reports and plans, to develop more robust and reliable findings (Golafshani, 2003).

We informed potential participants about our study and asked via email if they were available for an interview. If there was no response two weeks after the email was sent, we contacted potential interviewees via phone. Nine of the 13 semi-structured interviews were conducted in-person in private locations that were both convenient and

comfortable for participants. Over the phone or via video call, we interviewed interested participants who were unable to be interviewed in-person, with the exception of the Rocky Mountain Power representative who provided responses via email. We asked the participants representing the study areas 10 open-ended questions about the city's strategies and engagement plans to reach the goals of the resolution and the process of resolution development and adoption, which is addressed in Chapter 2. We modified the cities' interview guide for the interview with the individual who works for the Sierra Club so that we could ask questions that were directly related to how the Sierra Club assists cities with their renewable electricity resolutions. Our interview guide for Rocky Mountain Power consisted of eight open-ended questions that asked about the partnership between Rocky Mountain Power and the study areas. All three interview guides can be found in Appendix A, B, and C. We conducted interviews in October and November of 2018. Interview duration ranged from 30 to 90 minutes.

Analysis

We conducted a within-case analysis, where we examined each case separately, to first interpret findings across the study sites individually (Johnson & Christensen, 2017). In this first stage of our analysis, we used an inductive thematic analysis to identify reoccurring, data-driven themes and patterns throughout the data in each site (Braun & Clarke, 2006). After we completed a within-case analysis, we used a cross-case analysis to identify similarities and differences in the themes and patterns that emerged across the cases (Johnson & Christensen, 2017). Upon completing the cross-case analysis, we applied a deductive approach to compare the themes identified in our thematic analysis to

the techniques outlined in community-based social marketing framework and the theory of diffusion of innovations. Both provide concepts and tips that could assist in the successful adoption of a practice throughout a community. Thus, comparing the cities' approaches for community engagement and resolution implementation with theory helped detect gaps and key components to the cities' strategies. Identifying if cities have used the proven techniques from these theories could help explain why a strategy is effective, or the addition of these concepts could strengthen and improve a city's approach. This multiple analysis approach to compare the cases with the frameworks helped pinpoint approaches that could lead to successful community engagement with sustainable practices, a finding that could assist other cities as they work to achieve the goals of their renewable electricity resolutions.

Results

In our analysis, we identified three overarching challenges that our study areas are facing as they work to engage the community and meet the goals of the resolution. To address these challenges, we found that these cities are employing a variety of strategies. While certain strategies emerged more commonly as approaches to address one of these three challenges, many of the strategies could be applied to any of the challenges. The three major challenges that emerged in our data are: (1) motivating action and maintaining focus on the resolution's goals; (2) increasing community participation in sustainable behavior; and (3) reducing costs for the city and the community. Figure 8 displays these three challenges as well as the strategies our study areas are using to address those challenges.

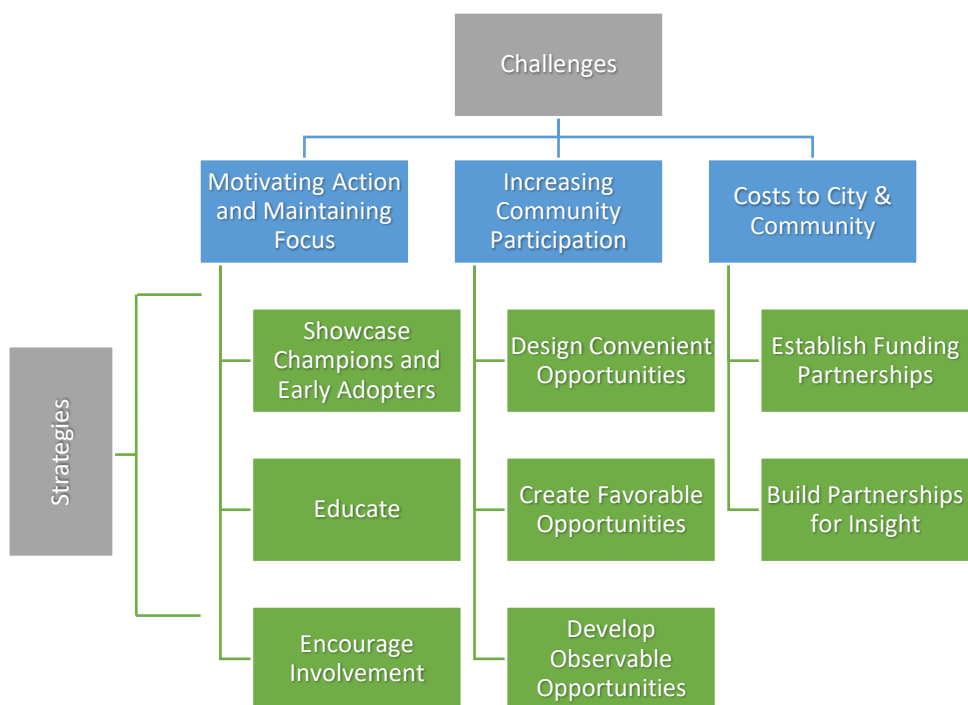


Figure 8. Challenges and strategies: Engaging the community with renewable electricity resolutions

Challenge 1: Motivating Action and Maintaining Focus

Across all three cases, interviewees indicated that a challenge to achieving the 100% renewable electricity resolutions was motivating action across the community to engage in practices that will help meet the resolutions' goals and staying focused as other issues emerge in the community. When asked about the challenges of implementing the resolution, Participant 11 stated that "there's no question that economics and technology are there. The missing piece is political will and social support of delivering and doing it now." Generating and maintaining support and interest with the goals of the resolutions is a challenge that all of the study areas expressed. One study area stated that it has experienced difficulties in motivating action among the city staff, in addition to

community members. Participant 7 also stated that keeping the public engaged with the resolution is a challenge,

“Park City is full of wonderful distractions. We have great powder days. We have incredible summer single track riding, golf....great arts and culture – all these things going on. People move here to enjoy that high quality of life and that competes with activism because there's just a lot of good things you can do. So, it's a matter of I think making it feel like fun and progress. Nobody really likes to move at government speed. So, we need to keep this moving on in a way that keeps people engaged.”

Our data found that continuing the momentum for a resolution can be difficult with the abundance of issues or events that arise in a community. Many participants mentioned that it has been challenging to keep attention on the resolution. When prompted to answer what one of the biggest challenges was to reach the resolution goals, Participant 9 stated, “Focus....it's really easy to chase shiny objects or the next thing or the new thing without following through on everything it takes to get from a to z. So, there's a discipline aspect to that.” Similarly, Participant 7 stated,

“And the challenge for all of us is how does it fit in our priority matrix. We've got a lot of urgent things we need to get done in town. And how much does this fit, how much does it detract from our other goals, and where does it fit in with urgency? For me this is one of those overarching issues, we're working really hard on transit issues, social equity issues, and such. And I just believe that as important as all those are, and how they might be closer to home, that the reality

is if climate change goes as badly as it could, some of that stuff might not matter in the scheme of things.”

Participant 4 also expressed the importance of prioritizing the resolution and maintaining focus amidst the many matters that may ensue,

“We’ve got a housing crisis and infrastructural crisis....there are still some things that are immediate that need to be resolved so you've got to keep it in front of people. In other words, you’ve got to keep your eye on the ball. You can't just put it on the shelf...Other issues are going to come into play that are going to distract that. So, you've got to prioritize.”

As these participants described, distractions from the resolution have made it difficult to maintain public interest and the city’s focus on the resolution. To build public interest that motivates action aligning with the resolution and instills focus on the goals, these cities are using three strategies to address this challenge: (1) showcasing champions and early adopters, (2) educating the community, and (3) encouraging involvement.

Strategy: Showcase Champions and Early Adopters

In this thesis, the term champion is used to describe well-respected leaders in a community who are adopting sustainable practices and inspiring other individuals or entities to do the same. Our findings identified two types of champions who have been identified as key for community engagement in sustainable practices. The first are those within city government, such as elected officials and city staff, who are leading by example and are often identified as the faces of their city’s sustainability movement. The second are businesses, organizations, or even individuals in a community who are role-

models for participation in sustainability-related opportunities. In the diffusion of innovations theory, these champions would be recognized as the early-adopters, who are among the first in the community to accept a sustainability practice and lead the way for others to follow (Rogers, 1995).

Elected Officials and City Staff as Climate Champions

Within our case studies, many of the interviewees and other data sources described supportive elected officials and sustainability staff members as key individuals for setting the tone for sustainability and engaging the public with environmental behaviors. To address the challenge of lacking public motivation and focus, these champions have helped bring the importance of the resolutions to the forefront in these case studies, reactivating public interest and bringing attention back to goals of the resolution. For example, a post from Mayor Biskupski's Blog in November of 2016, following the adoption of the city's renewable electricity resolution, reads "We need to put strong action behind our pledges to clear our air and address the threat of climate change." Moreover, a newspaper article from April 2017 quotes Mayor Biskupski explaining Salt Lake City's commitment to lead on climate change, "Investing in renewable energy, clean transportation systems, and sustainable food programs not only reduces carbon pollution, it also builds an identity for our city and hope for the future." Leading by example, Salt Lake City has built multiple net-zero buildings, a public safety building and two fire stations. Salt Lake City's public safety building was the first in the nation to have a net zero energy impact. Salt Lake City's action on climate change,

however, is not a new endeavor. Participant 11 describes the consistent efforts to address climate change led by a lineage of mayors in Salt Lake City,

“Salt Lake City has a long history of acknowledging climate change and attempting to create policies that address it, going all the way back to 2000 with [former Mayor] Rocky Anderson at that time and then carry through the eight years of Mayor Becker's administration and now certainly with Mayor Biskupski. Across all three mayors there has been a willingness to discuss climate change publicly to embed certain policies within city operations and within community goals that reflect the need to act on that. And so just kind of from a social willingness perspective, an elected official willingness perspective, we have a lineage of mayors that have all wanted to act on climate.”

A consistency of climate action from Salt Lake City's mayors has helped to develop the city's taste for climate action. As the city works to achieve its 100% renewable resolution, it will be important to maintain the mayor's support so that attention can continue to be brought to this issue.

Similarly, in Moab, Participant 1 describes support from the former and current mayor on sustainability efforts, “The former mayor, Mayor Dave, he's a pastor, and he was the mayor, and he was very well respected. And so that was a boost for sustainability. The new mayor is absolutely supportive.” Building on this, Participant 1 describes the support of the city council for the city's energy goals, “They're all supportive...one of the city council women owns [a local bicycle shop], so she's absolutely an advocate for alternative transportation.” Participant 4 reiterates that Moab has had a supportive council on these efforts and adds the importance of leading by

example, “We've always had good supportive councils, which was really important. And, a good administration that was willing to see it. My philosophy has always been you lead by example....I think that's the critical component.”

Data sources from Park City echo these findings and also explain that support from mayors, city councils, and staff is key. Participant 7 illustrates the idea of leading by example and continuing to encourage the city's energy efforts,

“It had been a goal of mine since I'd been in office. I actually took my business net zero back in I think 2007 or 2008. I am a majority owner and operate a hotel in Park City or did until recently. And so, it's been something that I've felt strongly about. When I got on council it was a goal of mine, although I have to admit it seemed like a long shot.”

In all three cases, each city has had key elected officials leading by example, inspiring community members, and enacting fundamental changes within the municipal government to ensure the community reaches its goals. Many of the participants expressed the critical importance of having strong support from the mayor, city council, and city staff to drive efforts for energy efficiency and renewable energy in their cities. These champions have been described as individuals who are able to motivate change in the community and bring attention to the urgency and importance of climate change, thus making these individuals critical for helping maintain the city's focus and public interest on the renewable electricity resolutions.

Early Adopters of Sustainable Practices

In addition to strong and supportive leaders within the city government, early adopters in the community, such as businesses and organizations that are modeling efficiency and renewable energy development, have been critical for motivating action among the community as they inspire others to follow the practices they are demonstrating. As more businesses, organizations, and individuals follow the example these early adopters are setting, social norms supporting engagement in these practices can arise in the community, leading to the adoption of these practices by additional community members. Furthermore, a variety of early adopters engaging in environmental behaviors have started to infiltrate multiple sectors of the community and increase inclusion in these behaviors and practices. Participant 3 describes the importance that these early adopters had in gaining the support necessary to establish an energy goal and inspire other community members to make their own commitments,

“I mean certainly integral to all of this, and what was helpful in the beginning too, was just some of the businesses who've already made personal commitments. And then were willing to be examples or put themselves out there. So, there've definitely been a number of bike shops over time. Some food places. Some lodging places that have put up [solar] panels....I think they definitely are an important part of that circle of people too because I think especially depending on the community you're working with they want to know, well how's this going to work? And you know how expensive is this going to be? And you know, I can't afford this. Sometimes [these business champions] are really helpful.”

In Park City, early adopters that have been critical for promoting environmental practices within the business community are the resorts. Participant 9 explains how Vail Resorts in Park City is leading the way,

“They have a commitment; I think it’s called their Epic Promise Commitment. It’s zero waste, zero impact to their land, and I think zero carbon by a pretty aggressive date. And they own two resorts, and the amount of economic influence they have in town is massive.”

As a tourist town, gaining support within the lodging businesses has been crucial for engaging tourists in sustainable practices. Many of the Moab participants mentioned the challenge of engaging tourists with energy efficient and water conscious behaviors. A couple of the participants are hopeful that the Green to Gold Business program, an effort launched by the Moab Sustainability Department to help businesses reduce resource use and save money, will help lodging facilities engage their guests with the energy goals and the sustainability-oriented culture growing in Moab. As Participant 3 explains,

“I’m hoping that the Green to Gold program does that by giving businesses, many of which will be tourist oriented, this sort of more tangible way to engage with sustainability and measure it. And then [those businesses] can advertise that they’re a member of this program.”

There are already a few businesses in Moab that generate solar energy and are champions in the community inspiring change for other businesses, but a few businesses in particular have gained attention in the local media. Back in 2004, a popular Moab radio station, KZMU, powered its facility with 100% wind power through the Blue Sky program offered by Rocky Mountain Power. In 2008, a grant from Rocky Mountain

Power helped KZMU install a solar array that allowed it to locally power its station with 100% solar. In 2017, a few other businesses joined the radio station's efforts. One of those business is the Red Rock Bakery, which installed enough solar panels to offset its energy needs, making it the first bakery in Utah to be powered with 100% solar. Soon after in 2018, the Adventure Inn became the next business to be powered completely by solar and became the first Green to Gold partner. Participant 3 lists other early adopter businesses in the community and states their importance,

“When I think of [businesses] that stand out there's...Western Spirit Cycling and they've done a lot [of sustainability practices]. The owner...of Moab Cyclery; they for a long time have been calculating their carbon footprint and doing some solar. Red Rock Bakery has solar panels up now and the Adventure Inn Moab on the south end of town....those are some of the ones that stick out...they're an important part of the community.”

In addition to businesses, there are also local organizations that many participants have identified as champions in their communities. Some of these local organizations include, Summit Community Power Works, the Park City Foundation, Future Park City Ladies, the Dark Skies efforts through Arches and Canyonlands National Parks, the League of Women Voters in Moab, local radio stations (KZMU in Moab and KPCW in Park City), Canyon Country Rising Tide, Utah State University- Moab, and the University of Utah. Across all three cities, there were a large number of local organizations assisting the cities with efforts toward the energy goals. The role of these organizations has mostly focused around information sharing about energy efficient

practices and environmental concerns, which brings attention to the goals of the resolutions and motivates environmental behaviors.

Identifying champions and early adopters who are leading the way with practices that align with the renewable electricity resolutions helps motivate action across the community and keep attention on the resolution and its goal. Leading by example, these champions and early adopters can inspire community members to adopt sustainable practices, helping to overcome the challenge of motivating action and maintaining focus. As more individuals and businesses follow the behaviors of these champions and develop solar on their rooftop or spread the word of efficiency practices, the goals of the resolution will become more attainable.

Strategy: Educate

A second strategy participants emphasized to address the challenge of motivating action and maintaining focus is educating the community members and the staff about the resolution and its importance. In our case studies, educational opportunities have provided businesses and individuals with knowledge regarding how they can assist the city in a transition to 100% renewable electricity. All three of the case study cities have a variety of different education tactics to inform the public. Some of these education forms are passive, such as sharing ways to reduce energy usage on the city websites, writing blog posts, and utilizing social media to share messages across the city. A local radio station in Park City, KPCW, for example, hosts an hour-long show every Tuesday to educate listeners on the importance of environmental conservation and stewardship called “This Green Earth.” Other education forms are more interactive, such as Salt Lake City’s

Climate Leaders program. This program engages municipal employees and develops professional skills and a knowledge base to create strategic and effective actions that address climate change across all city departments. Programs similar to this can be essential for maintaining the resolution as a priority within the city as staff learn about the importance of the resolution and need to act on climate change. Participant 11 describes how this program educates city staff and develops influential climate leaders,

“[Salt Lake Climate Leaders is] an internal curriculum, a nine-part series that we hosted for city staff that was around holistically evaluating climate change science, the local science and risks, and the opportunities to reduce emissions. And then also, a leadership component around communications and people being influential within Salt Lake City corporations.”

In Park City, the Sustainability Department is planning to bring back a program that was called “My Sustainable Year.” This program provided tips every week of different sustainable behaviors individuals could engage in. Using a similar framework, Participant 8 explains how the department will also add face-to-face engagement to increase the program’s success,

“And then of course there’ll be tips, but there will be community events because face-to-face sorts of things and kind of forming that community is what people really want these days. There’s enough information out there that you’d get through like newsletters and all of that. But I don’t think that that’s what people need, they need to be around other people that are doing these things and have in-depth discussions to learn and internalize how to do things more in line with what the planet can handle. So, with the engagement series we’ll do a couple of fun

events each month around the topic. But then also at least one deep dive event and then have lots of PSAs on the local radio station and discussions on the radio because that's a valuable community asset-- to have a radio station that everybody listens to.”

Educating the public on the actions they can take to reduce energy usage, for example, is a major component to empowering and motivating individuals to make their own lifestyle changes while also informing the community of the importance of sustainable practices and the city’s energy goals. Learning about the purpose for the resolution and other environmental issues could also help bring focus back to the resolution and prioritize its goals.

Strategy: Encourage Involvement

A third strategy to alleviate the challenge of motivating action and maintaining focus is encouraging involvement in activities that align with the resolution and create a sense of inclusion. These opportunities could motivate and inspire businesses and individuals to adopt behaviors that will help each city achieve its renewable electricity resolution.

To motivate individuals to follow through with self-selected behavior changes, these cities have designed a variety of programs that inspire continued involvement and commitments to sustainable practices. These findings align with community-based social marketing, which uses commitments as a tool to build internal and external expectations that drive engagement in sustainable behavior. Both Park City and Moab have developed community challenges to encourage citizens to establish commitments to sustainable

behaviors. These challenges engage citizens in a fun way that supports friendly competition across the community. Moab's recent community challenges included a 'Bike to Work' challenge and a 'Clean the Air' challenge. These challenges last for a month or two and then new challenges are generated. Park City's challenges are run through Summit Community Power Works (SCPW), a non-profit that Park City partnered with and helps fund. The SCPW challenges program offers six categories of actions that the public can choose from and within each category there are many specific actions citizens can select. The variety of specific behaviors listed on the challenge website also increases awareness of the many changes individuals can make in their lives to be more sustainable. Participant 8 describes details of how SCPW challenges work,

“There's 70 different actions that everyday people can take, and they range from easy to challenging. It quantifies all the analytics, like how much money you're going to save, how much energy, what it's going to cost. And then you can earn points, so we can build the challenge aspect into it.”

In addition to creating challenges to foster commitments to sustainability, approaches that build involvement and contribution to the cities' plans have been identified as techniques to motivate and empower community members as well as maintain focus on the city's resolution. Park City's Sustainability Department is encouraging other city departments to design their own plans to achieve the city's energy goals. Participant 8 describes how building trust and fostering creativity can empower individuals,

“There has been a lot of internal negotiating that we've had to do and trust building with other teams...so we've taken a different strategy...taking the

approach of engaging [the Water Department] and asking them how they're going to figure it out. First of course, there was some resistance. But then...there's a lot of creativity that is within that team that hadn't been tapped. So once there were some constraints set and the ball was in their court to figure it out, people started actually getting kind of into it...got really excited and now they're really proud that they're going to have a net zero water treatment plant in the future. And so that's one of my favorite things about my job, converting the contrarians to being supporters when it comes to sustainability efforts. And they can see that the financial benefits are going to be so much better. But then also, we've been really kind of praising and kind of elevating those people as the heroes...If there is some freedom and creativity...then it starts to make it more of their own.”

To increase community involvement with their energy goals and plans, Moab brought key individuals from many different sectors across the community to help develop the city’s community energy plan. Inclusion of the community into the process creates a sense of ownership, which can help with goal achievement (Wolff, 2001). Participant 1 explains how this community engagement session functioned,

“We had three charrettes...The whole idea is you bring all these community members and stakeholders together and they have to commit to you know we had three, four-hour meetings. And you really try to get a comprehensive group of people choir, non-choir, business, religious organizations, educational folks...What sectors would make the most sense for our community...And so, what we came up with was we're going to focus on hotels, restaurant sector, residential remodels and new, and then a large-scale solar. And then within those

sectors we have targets about how we outreach and timelines of when all that's going to happen.”

Creating opportunities for the community to engage in sustainable behaviors through community challenges or inclusion in the planning process creates ownership, commitment, and encourages the individual to stick to those self-selected behavior changes and continue to help the city reach its energy goals. Thus, these opportunities for empowerment can help motivate the public to engage in sustainable behaviors and keep the resolution as a priority as public interest for the resolution rises.

To alleviate the difficulties of motivating sustainable actions among the community and maintaining focus on the resolution, our study areas are showcasing champions and early adopters to model sustainable practices and inspire individuals to engage in similar behaviors, educating the public about what they can do to contribute to the resolution and understand the resolution's importance, and encouraging involvement with the city's goals through inclusion and commitments. Each of these strategies highlights ways in which individuals and businesses can contribute to the resolution, while also bringing knowledge of and attention to the resolution so that focus on its goals is maintained.

Challenge 2: Increasing Community Participation

Engaging the public in energy efficiency and conservation practices is essential for helping the cities achieve their goals for 100% renewable electricity. Minutes from a Park City City Council meeting on September 22, 2016 stated, “that from January-March, Park City residents used more power than all commercial businesses in town;

consequently, the focus should be on the residents' energy consumption in order to reach Council's goals." All of the study areas indicated that engaging residents in sustainable behaviors that align with the renewable electricity resolutions are critical, however, increasing community participation and engagement in these sustainable behaviors has been challenging. Participant 8 describes the importance of increasing awareness and engagement within the community,

"We've been doing a lot of community engagement to get people on board...But during the next year, what I've been working on is planning an entire year of engagement and awareness campaigns and really starting the conversation around climate change. But bring it down to more concrete touch points in life."

Because community engagement is fundamental to achieving the goals in the resolution, the cities are working to identify the best ways to gain public interest in a variety of programs and sustainability practices. A challenge regarding community engagement mentioned by some of the participants is the difficulty in creating voluntary behavior change when there are some major barriers to sustainability embedded in the lifestyles of the community, or Americans in general. Participant 8 reflects on this concern,

"I'm not sure that we'll really be able to move out of a voluntary basis, but we have to be creative about kind of the carrots and sticks...we're going to have to be more aggressive with our community members and figure out how we can help them to reduce their energy consumption too."

The participant further explains,

"It's looking at the residential emissions. That's the thing that really keeps me up at night...I've heard, anecdotally speaking, of people that have heated driveways

and leave them on all year and...a lot of those are electric. At the end of the day it doesn't matter if it's renewable electricity, it's waste. I mean we don't need to produce that much just to heat sidewalks or driveways in the summertime, that's just ridiculous.”

In describing the efforts one businesses owner made to place solar panels on his roof, Participant 8 recalls the conversation with this businesses owner and the difficulty he experienced in trying to get others onboard, “And he did solar panels...and tried to engage other businesses. And he's like, ‘it's a heavy lift’. Like everybody says they want to do it but when push comes to shove, they're busy.” Similarly, after discussing concerns of excessive home size and inefficient vehicle usage, Participant 4 said, “We've got to change society. We've got this consumption mentality...it's not sustainable.”

Establishing environmental behaviors across a community has been a major challenge our study areas have expressed, but these cities are persevering. To address this challenge, our data found that these cities are designing opportunities that are convenient, favorable, and observable to engage the public in environmental behaviors. The strategy of incentivizing sustainable behavior, as described in community-based social marketing (McKenzie-Mohr, 2011), is discussed twice in the section because it is a component that emerged in our data for developing both convenient and favorable opportunities – the two solutions identified for this challenge.

Strategy: Design Convenient Opportunities

From our data, we have found that convenient opportunities have helped engage the community with sustainable practices. Convenience is a strategy explained in

community-based social marketing to encourage engagement in sustainable behaviors (McKenzie-Mohr, 2011). In general, these cities are simplifying the processes for engaging in sustainable choices, such as solar installations, and increasing accessibility to information about energy efficient appliances. Participant 10 stated that, “[Salt Lake City] waived permit fees for solar installation last year as a city for all of our residents...there’s so many different ways to go about making renewable energy more integrated and convenient for residents.” Furthermore, Participant 9 explains the importance of simplifying engagement opportunities, “It's how do you introduce them to the solution, make the solution as accessible and as simple as possible, and make sure that it's normalized across a community that people understand that is the community ethos or ethic.” Reducing complexity, as Participant 9 describes, is an important characteristic of what makes a program or action convenient, and is explained in diffusion of innovations as a characteristic for successful innovation diffusion (Rogers, 1995). Additionally, Participant 9 explains the importance of portraying these sustainability practices as social norms, connecting back to the strategy of showcasing early adopters described in Challenge 1 and community-based social marketing (McKenzie-Mohr, 2011).

The SCPW challenge, mentioned in the strategy to encourage involvement described in Challenge 1, also informs the availability of incentives from choosing energy efficient appliances. Incentives are a strategy discussed in community-based social marketing that can be used to enhance an individual’s motivations to engage in sustainable behaviors. Participant 8 explains that in addition to listing actions that community members can commit to,

“we've collected all of the incentives that are available like through tax breaks or state programs or anything into one site so people can just go out there and be like oh I can get this incentive, and this incentive...[getting] all the information that's available into one spot I think is, or I hope, will help people make more energy-wise decisions.”

Conveniently displaying these incentives will make the motivations for energy-wise decisions apparent and easy to engage in. Participant 8's explanation of this program is also an example of how Park City is increasing accessibility of information and reducing complexity to make it more convenient for community members to engage in sustainable behaviors. Participant 9 echoes this idea, stating that conveniently providing information to businesses and individuals will help support energy efficient behaviors,

“The more you can do it for them, lay it out - Here's a great vendor. Here's how you get quotes. This is what it should cost - Then they'll execute on it because then it's kind of greased...If you're just like, ‘you should do the right thing,’ people get confused because they have to do all this research, then make the best decision, and then hope their best decision isn't wrong, and then talk to a contractor and hopefully not get ripped off. The longer they see the process, the less likely they are to do it. So, if you shorten it, make it easy, and make it palatable, and make it easy for them to justify to their bosses or board or investors, the better it goes.”

Our data indicates that these cities are reducing the complexity of adopting sustainable habits and making the information accessible and straightforward to better engage

members of the public, which aligns with strategies described in community-based social marketing and diffusion of innovations (McKenzie-Mohr, 2011; Rogers, 1995).

Strategy: Create Favorable Opportunities

In addition to making environmental behaviors more convenient, data across all three cities revealed the importance of portraying these behaviors in a favorable manner. Community-based social marketing suggests the use of barrier-benefit analyses to generate a favorable perception of a sustainable action (McKenzie-Mohr, 2011). A barrier-benefit analysis identifies the barriers and the benefits of a behavior so that the barriers can be reduced and benefits increased, making the sustainable behavior more favorable (McKenzie-Mohr, 2011). Through our research, we found that favorability occurs when engagement in these behaviors aligns with community values and addresses the local relevancy of the behavior. Additionally, providing advantages or incentives from participating in these practices created favorability. And, designing programs that created excitement and the desire to engage in these environmental behaviors generated favorability as well.

Aligning the sustainable practices with values was a key strategy identified in our case studies to appeal to the public. One of the five characteristics for successful innovation diffusion is compatibility, which aligns an individual's values with the innovation (Rogers, 1995). Effective messaging is a tool in community-based social marketing that helps portray innovations as more compatible with community members (McKenzie-Mohr, 2011). As DOI and CSBM emphasize, using effective message framing is critical for connecting with community values. In our case studies, renewable

electricity resolutions were identified as relevant to and aligning with the values of environmental quality, public health, and economics. In Park City a major concern is maintaining a healthy snow pack for an economically productive ski season. And, in Salt Lake City, reducing air pollution to improve public health is an issue the citizens care about deeply. A post on the Salt Lake City Mayor's Blog in April of 2017 addressed how a transition to 100% renewable electricity would help meet the values and concerns of the community,

“I strongly believe that transitioning to 100% clean and renewable energy — like wind, solar and electrified transportation — will protect our kids and families from pollution, create new jobs and local economic opportunities, and ensure that all people have access to affordable energy solutions.”

Many participants described the benefits of explaining energy efficiency through economic savings. Participant 11 stated, “connecting back to their values of maybe economics and showing how a transition like this is actually more feasible for them and it makes more sense financially might be a better strategy and approach.” Following this approach, Participant 10 describes an economic tactic to reach audiences about energy efforts,

“I think that the approach needs to not be one of environmental sustainability but an economic conversation with the community about livability for residents, affordability for households, and the future of energy production...we need to have a conversation at a basic level with residents about what the future holds. And it's not just about the environment. It's about your livability and affordability

as a family, as a household, and what we pay for our power, and the jobs that produced that power needs to be forward thinking and not stuck in the past.”

Similarly, Participant 3 explains how discussing the economics can help build support for development of renewables,

“a lot of people might not relate so much to the environmental or health benefits or climate change, but the bottom line of the economics was very relatable. You know this has the potential to create the possibility for more energy that doesn't depend on coal which is so up and down, and renewables tend to be less susceptible to the boom-bust cycle. And certainly, if you can build some capacity closer it increases your security as a community. And you have less reliance on the outside and I think that, especially in rural places, is something people could appreciate.”

The price instability of fossil fuels as compared to the stability of renewables was mentioned by several participants as a benefit that renewables offer. By connecting environmental behaviors to the values and concerns of the community, engagement in these behaviors became favorable as individuals saw that such practices help fulfill a value they hold.

In addition to value alignment, displaying incentives, as described earlier, and other advantages, such as economic benefits, helped specific actions become more favorable (McKenzie-Mohr, 2011). All three cities are actively working to establish financial incentives to support efficient energy-usage and alternative transportation. Participant 8 explains the importance of offering incentives to promote environmental behaviors,

“the benefit needs to be there. We're not going to just come talk about like ‘you need to save energy,’ we need to show [the public] incentive programs. And there are a lot of those, and just kind of connect them with the right information of how they can save energy.”

Salt Lake City provides incentives to residents with EVs, offers a 50% discount on its public transit Hive pass, which includes buses, streetcars, and city trains, and the city has waived permit fees for solar installations. Participant 11 elaborates on some of the incentive opportunities that Salt Lake City offers,

“We have other programming around transportation: The Hive pass which is a discounted \$42 a month public transportation pass; We built out electric vehicle charging infrastructure publicly that supports people who buy EVs and kind of incentivizes EVs; We've got a green vehicle parking program where if you own a plug-in vehicle it's free to park at city meters.”

Park City is developing a program to incentivize developers and construction workers to build more efficient buildings. And, Moab's Green to Gold business program offers resource reduction strategies and highlights the financial gains that result from adopting sustainable practices. Explaining the cost benefits of different practices can also increase engagement in sustainable behaviors, as Participant 11 describes,

“the cost benefit is easier to sell. And the affordability becomes pretty apparent depending on what you're doing, the payback is super short with gross savings over time there. So, it's more a matter of just messaging and reflecting upon that spend a little extra for this lightbulb and you're going to save a lot of money.”

This participant further explains a pilot program to engage citizens in these sorts of behaviors that can save money,

“The city council and the mayor just funded a neighborhood efficiency pilot effort where we are now engaging with small businesses and households in certain neighborhoods on the west side of Salt Lake City. That's where we're starting. And in that engagement is around things like LED light bulbs and conservation measures with your thermostat and other things.”

Similarly, Participant 9 provides an example of the multiple benefits certain sustainable actions can offer that may not at first be apparent,

“It's kind of a features versus benefits conversation and first is explaining how much something costs, and it's also explaining how much you save with that outcome. But also understanding those other intangibles that make something a pain, like if an LED light bulb replaces, let's say 15 incandescent bulbs, it's saying there's 15 fewer trips up the ladder. If you're a property management group, that's less time your maintenance team spends on that. If you're a resort, that's less time your maintenance team spends on that. They have limited resources; they are operating towards a profit. The more you show them that it's less operations and maintenance, whatever else it is, that's where their eyes light up.”

Generating excitement on the topic is an additional way these cities are creating favorability with energy-related actions. Participant 4 stated that to build community engagement, “You've got to create excitement. You've got to create enough drive.” This was echoed when Participant 7 stated that, “it's a matter of, I think, making it feel like fun and progress. Nobody really likes to move at government speed. So, we need to keep this

moving on in a way that keeps people engaged.” An example of how Park City is keeping people engaged in an exciting way is through a program that offers Energy Detective Kits to the public. These kits can be checked out for use at the city library to help homeowners identify where energy is being wasted. Participant 8 explains the functionality and enjoyment that comes along with these energy kits,

“Trying to make home weatherization fun...[the Energy Detective Kits] contain a thermal camera so people can actually see where their leaks are. And, they're just fun. Kids love playing with those things. [The kits also contain] a kilowatt smart meter to talk about vampire power, a fridge and freezer thermometer, toilet dye tablets to talk about water leakage, and we're creating materials, like little worksheets, to go with it.”

Through creative and fun programing, the cities are hoping to increase favorability of sustainability practices and behaviors and cultivate community involvement. Participant 7 hopes that offering engaging opportunities will uphold community activism on energy-related topics,

“Our main focus until now has been on the utility, and to be honest that is not something that the public can participate in much because it's negotiations with a large entity. But as we get to these more, I will call them more grass roots tangible, visible, participatory activities, my goal for 2019 is to start to roll those out, get the public excited, and am hoping that keeps that group really activated.”

Strategy: Develop Observable Opportunities

The final strategy revealed in our analysis to establish engaging opportunities for sustainable behaviors was to increase the observability of these practices. Observability was a strategy that emerged in our data and is one of the five characteristics for successful innovation diffusion explained in DOI (Rogers, 1995). Increasing observability includes advertising and communicating about various energy-related opportunities, as well as physically observable changes that depict sustainability efforts. For example, Park City's electric bus fleet, elective vehicle charging stations, bike and scooter-share alternative transportation options, and development of net-zero buildings with attractive signage are a few examples of physical changes in a city that display sustainability efforts. Participant 6 explains the importance of these visual reminders of sustainability, "the electric buses are like the most important thing because they're visual.... You can't see solar panels you can't see wind if they're down in southern Utah or Vernal or wherever we're going to put them." This participant addresses a fundamental point, energy-related efforts are not always visual, which is also noted in community-based social marketing (McKenzie-Mohr, 2011). When these sustainable actions aren't visual, several participants mentioned the importance of identifying ways to make these efforts observable. Participant 4 describes this importance,

"It can't just be this abstract thing. It's got to [have] some tangibility to it. People see the solar array on top of the roof of this building... You walk into city hall and there's a visual display of how much energy we're producing and what the offset is. What the benefit to the environment is. You know, you can see it... There's got to be there's got to be some tangibility to it."

When sustainability efforts are not observable, using visible outreach tools has been important for communicating sustainable actions that businesses and individuals are making or opportunities those entities can join. For example, participants of the Green to Gold business program are not immediately visual, thus Participant 1 indicated that, “the tourism board is actually working with [Moab’s Sustainability Department] to highlight the hotels and restaurants that have joined Green to Gold.” Additionally, using effective communication tools such as social media, newspapers, radio stations, and the city government website can make sustainability efforts more apparent.

The importance of observability connects back to the strategy of showcasing champions and early adopters described under Challenge 1: Motivating Action and Maintaining Focus. As more individuals and businesses commit to these sustainable practices, and the more visual these efforts are, social norms around sustainability are generated in the community. This encourages others to adopt similar sustainability practices. Evidence that others are engaging in these behaviors makes those behaviors appear more achievable and favorable to others.

Designing programs that are convenient, favorable, observable, and include incentives helped our case studies create more attractive programs that encourage community engagement with sustainable practices. Our data suggests that developing engagement strategies that reflect these three components could help cities increase participation in these sustainable behaviors and achieve efforts toward 100% renewable electricity.

Challenge 3: Costs to City and Community

The third challenge identified in our research was the upfront costs of renewable energy installations and energy efficiency upgrades for community members. Participant 11 explains why upfront costs can create a barrier to energy efficient purchases,

“...it's more a matter of just messaging and reflecting upon that spend a little extra for this lightbulb and you're going to save a lot of money...Delivering upon that is extraordinarily challenging. If people made the best financial decisions for themselves in the energy realm our jobs would be a lot easier or even go away just because if we were constructing things, purchasing the right appliances, doing all that, they all make sense financially. It's thinking lifecycle not just merely upfront cost.”

Additionally, participants from Moab stated that upfront costs of renewable energy installations and efficiency upgrades as well as sustainable programming opportunities, was a major challenge for the city due to its limited budget and small sustainability staff. Participant 3 alludes to some of the financial issues within the community of Moab, “many people struggle financially. So part of [the challenge] too is figuring out what options are there that [community members] can afford.” To further explain financial concerns in Moab, Participant 1 stated that nearly 50% of the kids are on reduced lunch, indicating that half of the community is living in poverty. With many families already having difficulties making ends meet, Participant 1 explained that these families will not choose to purchase LED bulbs for eight dollars when there is an incandescent bulb available for three dollars. Participant 1 also mentions that the budget for sustainability programing in Moab is very small, which makes it difficult to design programs that can

engage community members and offer incentives for sustainable practices. Participant 1 said, “I spend a large part of my time thinking about how we can finance [sustainability initiatives].” While our data indicated that Moab experienced more financial issues than Salt Lake City and Park City, all three study areas are working to identify ways to reduce costs to the city and its community.

To address the challenge of cost, our analysis revealed that each of these cities are developing partnerships to lower upfront costs of energy efficiency upgrades, renewable energy installations, and sustainable programing. Two types of partnerships were identified, (1) partnerships that provide funding to assist energy-related programming and installations, and (2) partnerships that offer insight and strategies to support various efforts to achieve the goals of renewable energy resolutions.

Strategy: Establish Funding Partnerships

Partnerships that offer grants and programs to reduce the cost of energy efficiency upgrades and renewable energy installments have been critical for engaging businesses and households across our study areas. Rocky Mountain Power offers a variety of grants and opportunities for community engagement through their Subscriber Solar, Blue Sky, and wattsmart programs. Rocky Mountain Power’s Subscriber Solar offers its customers the opportunity to subscribe to 200kwh blocks of electricity that come from a 20MW solar array in Millard County, Utah, to offset all or some of the electricity usage on customers’ energy bills. Similarly, the Blue Sky program is an opportunity for customers to purchase 100 kwh blocks of renewable solar and wind energy to offset electricity usage on their energy bill. In an equivalent amount to the Blue Sky block purchases,

Rocky Mountain Power buys renewable energy certificates. These programs are strongly promoted throughout all of our study sites. Enrolling in these programs lessens the amount of electricity from fossil fuels that community members are using. Renewable energy subscriber programs are particularly helpful for individuals who are unable to pay the upfront costs of rooftop solar and for individuals who are interested in purchasing renewable energy but reside in apartments and thus cannot develop solar on their own roofs.

For Moab, the wattsmart Community Program is a key component to achieving the city's renewable electricity goals. The wattsmart Community Program is a framework that Rocky Mountain Power has designed to empower communities in setting and achieving a new energy vision for their city. This program is a partnership between the utility and the city and focuses on energy efficiency, renewable energy, electric vehicles, and a progressive grid. The program engages multiple stakeholders across the community to work with Rocky Mountain Power to develop a vision and localized plan for the city's energy goals. A local Moab newspaper article from October of 2017 describes how this partnership will function,

“The wattsmart Communities Program centers on increasing energy efficiency at the community-scale level. Rocky Mountain Power will provide expert support to help the city create an energy plan with the input of residents and business owners. As part of this plan, Moab City will build upon the leadership Moab businesses and organizations have shown by participating in the renewable energy programs that Rocky Mountain Power currently offers: Solar Subscriber and the Blue Sky Program.”

In addition to a community program, Rocky Mountain Power also provides a wattsmart Business Program, which offers experience and financial incentives to assist businesses in energy efficient upgrades. In Moab, this program was specifically helpful to businesses interested in LED lighting retrofits.

Furthermore, Moab received a \$50,000 grant from Rocky Mountain Power to install electric vehicle (EV) charging stations. As Moab develops this infrastructure, it will increase convenience and thus, support community members who own EVs or others who are considering purchasing one. Moab also received a grant from the National Renewable Energy Laboratory (NREL) to assist with the development of renewables from data-based decision making. This grant will be used to develop small, local solar projects in Moab to increase energy independence and provide clean electricity to the community. Grant opportunities from partners like Rocky Mountain Power and NREL, help provide the funds necessary to develop projects and opportunities for citizens to engage in behaviors that support the city's energy goals.

The Utah Governor's Office of Energy Development provides a low-cost, long-term financing option for energy efficiency, renewable energy, and water conservation projects on commercial businesses through its Commercial Property Assessed Clean Energy (C-PACE) financing program. All three cities promote this program in their communities to assist and encourage owners of commercial property to make these energy improvements. Participant 11 describes the usefulness of this program for helping commercial property owners cover large upfront retrofit costs,

“Let's say you get an audit and it says you need to spend \$800,000 to retrofit this property but then it will deliver \$125,000 savings per year and those will be

sustained for 15 years. A big impediment is that \$800,000 price tag, right?

Commercial PACE Financing is designed to figure that out. Where you can go and get financing for your property to do big things-- millions of dollars of efficiency for upfront new construction or retrofit and have the repayment of that be over 10, 15, 20 years in ways that your reduced utility costs and savings there can exceed your debt loan repayment month to month. And all of a sudden, you've done a million dollars in energy efficiency, nothing out of pocket, and you are now netting a net positive financial savings every single month. So that's a very functional program that just came into being this year for [Salt Lake City].”

These are only a few of examples of the many different funding and programing opportunities that partnerships can offer. For cities with small budgets, such as Moab, these partnerships have been key to providing the resources necessary to develop opportunities for the community to engage in smart and clean energy usage.

Strategy: Build Partnerships for Insight

In each of the case studies, establishing partnerships with a variety of organizations and other communities was key to gaining insight and strategies to develop programs that assist community engagement and sustainability programing. For Moab, a community with only one sustainability staff member, building these types of partnerships can be incredibly important for saving resources. All three cities partnered with global and national organizations, such as the Carbon Neutral Cities Alliance, Urban Sustainability Directors Network, Sierra Club, and Climate Reality Project. Regional partnerships were formed through the Western Adaptation Alliance and neighboring

Colorado ski towns. And, the cities established partnerships among each other and with state and local organizations such as the Utah Climate Action Network, Utah League of Cities and Towns, Recycle Utah, Utah Clean Energy, and the Utah Clean Cities Coalition. These partnerships offer a wide variety of knowledge and tools that our case study cities are incorporating into their plans to achieve their renewable electricity goals. Participant 11 describes the benefit of partnerships with state and local organizations,

“I think that we're really fortunate in Utah to have a network of nonprofits that are informed of energy policy and legislation, and the regulatory realm with the public service commission, and Utah Clean Energy has been intervening in very formal energy dockets for a long time. And just having the support network of nonprofits and individuals within those nonprofits that can help envision what are local pathways. That's a huge value to [Salt Lake City]...One of the things that I'd advise cities on is if you do have individual organizations doing that work in your state, connect with them early...they can help inform what it looks like functionally for you to make the transition...In the absence of that it becomes a lot harder. You've got to do a lot more homework.”

Participant 7 echoes the assistance Utah Clean Energy provides to cities and explains how the partnership can make programs more affordable,

“Utah Clean Energy has been very helpful in cooperative buys on electric bikes and cooperative buys on solar so everybody can get a bulk reduction on solar panels. And, they've also offered good technical support dealing with the legislature, the state legislature.”

Participant 8 further explains how Utah Clean Energy will help cities boost their EV programs, “We're really strong proponents of electric vehicles and we'll be working with Utah Clean Energy to do some campaigns to let people know that we want them to buy electric vehicles and we're setting up the charging infrastructure.”

Park City and Summit County created their own non-profit, Summit Community Power Works, whose mission is to “inspire efficient energy use through practical and innovative programs to improve economic vitality and the environment.” This non-profit was established to increase community engagement without having to do so through a government body, and Participant 9 describes that reasoning,

“Nonprofit relationships are an effective third party. So if you need conversations that aren't coming from the government, they're a really good resource to first tone check what you're sharing to see how they respond and how they think their stakeholders would respond, and then they can also come up with innovative programs or approaches to solving certain things. So, kind of the soft power approach.”

The partnerships between Moab, Park City, and Colorado ski towns are helpful because they offer opportunities to share successful strategies for tourist towns and provide some friendly competition that pushes innovation, as Participant 7 describes,

“We've worked with a number of the Colorado ski towns. In particular, we have some friendly competition with Aspen that's also working on many of these same goals. And I know their Mayor well, and you know we're always challenging each other to try whatever innovative thing the other one is doing.”

Additionally, the working relationships between Park City, Moab, and Salt Lake City have been critical as these three cities move toward similar energy goals and work together with their utility, Rocky Mountain Power, to provide renewable electricity sources. As these cities worked together, they formed a regional partnership that helped leverage their negotiations with Rocky Mountain Power, making an agreement with the utility for 100% renewable electricity a reality. Participant 2, describes the importance of working with Salt Lake City, a large Rocky Mountain Power customer, to build more weight in request for 100% renewable electricity,

“one of the reasons that I wanted to do the resolution soon was so that we could participate with [Park City and Salt Lake City] because it seems like having, especially Salt Lake City which is such a large customer for Rocky Mountain Power, we could scoot in on their coattails more easily than we could negotiate that on our own.”

In addition to the utility specific benefits of these regional partnerships, Participant 3 describes the general importance of establishing supportive partnerships with Park City, Salt Lake City, and other organizations,

“I mean the thing that really worked, that I think made it possible [and] would be important for our communities to know is to have a support circle of people to help you. So if by any chance a community has the opportunity to learn from [some place] like Park City or Salt Lake City or just the sustainability directors who have been doing this longer and understand the national trends,...or Climate Reality Project, or you know someone [from the Sierra Club] who really has

studied renewables. I think having a partnership of a group of people...who's going to support you [helps].”

Participant 11 expands on what local networks can offer, and discusses the importance of the Urban Sustainability Directors Network (USDN) for learning best practices,

“Locally here with cities but then even more importantly nationally where we're plugged in through something called Urban Sustainability Directors Network. And through that we have direct access to staff, every major city in North America, everyone. And you look at the landscape of who is doing electrified transportation the best. Who is electrifying energy usage around buildings the best? Who's delivering in the renewable realm? How are they doing it?...The willingness of cities, and city staff, and local government to share across the country is really high because of what we're all collectively trying to ultimately do for climate change. And so, it's all hard but through networks like that it's achievable.”

Lastly, these partnerships are important because they not only provide information and resources to cities, but they inspire collective action on climate change. A Salt Lake City Blog post from August of 2017 quoted Vicki Bennett, the Salt Lake City Sustainability Director,

“While we can all have carbon reduction goals, and even meet them, it won't be enough unless we use our collective influence on other cities, and the regions around us, to step up and take similar action. That is why networks such as the Carbon Neutral Cities Alliance are so important.”

Building financial partnerships and partnerships that offer insight are important because they can reduce costs of energy efficiency upgrades, renewable energy installation, and sustainable programming. Partnerships also provide knowledge, insight, and inspiration, all of which are helpful for reaching ambitious renewable electricity goals. Through the development of partnerships, these cities have obtained resources to assist in engaging the community to achieve goals for 100% renewable electricity.

Discussion

The challenges and strategies our study areas encountered as they work to engage the public align with several aspects of the diffusion of innovations theory (DOI) and the community-based social marketing framework (CBSM).

The Strategy: Showcasing Champions and Early Adopters that these communities are using to address Challenge 1: Motivating Action and Maintaining Focus follows the DOI social diffusion curve. Early adopters are key to spreading a new behavior in a community; they are described in DOI as individuals who are role-models, leaders, well-respected, and trusted in the community. Thus, identifying elected officials and businesses who are champions in the community and can model sustainable practices, such as Salt Lake City's Mayor Jackie Biskupski, Vail Resorts, Moab's Red Rock Bakery, and Moab's radio station KZMU, is a strategic component to gain acceptance of sustainable practices across the community.

Five characteristics for successful innovation diffusion are described in DOI: observability, relative advantage, compatibility, trialability, and complexity (Rogers, 1995). The strategies to educate and encourage involvement described under Challenge 1,

as well as the strategies listed under Challenge 2, incorporate the DOI characteristics of observability, relative advantage, compatibility, and complexity into the design of these approaches.

Many strategies to foster sustainable behaviors are provided in CBSM, most of which were identified in the data. Challenge 2: Increasing Community Participation, is the main focus for many strategies described in CBSM. To address Challenge 2, approaches that can reduce the barriers to community participation are necessary, which is similar to CBSM's barrier-benefit analysis. The CBSM barrier-benefit analysis is an exercise to identify the barriers and benefits of engaging in a specific sustainable behavior. The purpose of detecting these barriers and benefits is to illuminate approaches that could reduce those barriers and increase the benefits of engaging in that behavior, making it easier to gain community participation. Stemming from research in psychology, sociology, and conservation behavior, along with thousands of case study trials, McKenzie-Mohr (2011) finds that strictly information-based programs have little effect on changing behavior. While the findings explained in Challenge 1 in the strategies to educate and encourage involvement in sustainable behaviors mention a few information-based programs, there are many programs that foster involvement, which were also addressed throughout those sections. Of the strategies described in CBSM, the following were most noticeable in the cities' engagement plans: commitments, convenience, effective message framing, and incentives.

One of the main CBSM techniques is commitments. Commitments have been found to be effective tools for increasing behavior change because of self-perception theory, where agreeing to small tasks alters the way individuals perceive themselves and

can alter their attitudes on a topic, and strong internal pressures to behave consistently (McKenzie-Mohr, 2011). To increase the success of commitments, CBSM states that written commitments, especially those that are made publicly and have witnesses, are often more effective than verbal commitments. The SCPW Challenge that Park City has created, for example, allows a commitment for energy efficiency to be both written (as the commitments are submitted and viewable online) and public (as they are shared with the network of individuals also participating in the challenge). Commitments are not effective when individuals are pressured to commit, as voluntary commitment leads to more success (McKenzie-Mohr, 2011). Our findings echoed a similar notion: self-selected commitments empower individuals and create a sense of efficacy with regard to the city's energy goals.

Increasing convenience and reducing complexity, as explained in the strategies under Challenge 2, aligns with strategies explained in DOI and CBSM. The importance of reducing the barriers to the practices you want individuals to engage with is discussed in CBSM. As explained in the results, behaviors that are easy, enjoyable, and limit financial and time resources, are perceived as convenient and are more successful. Furthermore, reducing complexity can make a behavior more convenient, better understood, and easier to follow.

Just as it is important to reduce the barriers to the desired behavior, CBSM suggests increasing the benefits of engaging in this positive behavior. This tactic aligns with the cities' efforts to make the given behavior more favorable. Establishing a connection between the behavior and personal or community values and offering incentives are two ways to increase the perceived favorability of a behavior.

Communicating and framing effective messages that align with values are strategies from CBSM, which are similar to the compatibility component of DOI. Each of the cities worked to identify ways to frame messages and programs so that they would be compatible with the values of the audience. Additionally, CBSM and DOI discuss the importance of offering incentives, increasing the perceived benefits, and displaying the relative advantage of engaging in that behavior. These strategies, explained in Challenge 2, are effective because they provide motivations to behave in a certain way. To create effective incentives, the incentives should be presented at the same time an individual engages with the behavior, should match the purpose of the behavior, and should be visible to increase the public's awareness of the existence of this benefit, all of which were incorporated in these cities' engagement plans.

The third component addressed in Challenge 2, creating observability, is one of the engagement strategies explained in DOI. When behaviors are visible it strengthens the likelihood that more individuals will adopt the behavior, which may also foster a social norm.

A major component of CBSM concerns social norms; the most influential of all marketing tools in the framework. In this research social norms were identified throughout multiple strategies, but most especially in the strategies to showcase champions and early adopters and develop observable opportunities. Early adopters and champions help create social norms as they model sustainable behaviors and practices, which can increase the observability of those practices and encourage others to engage in similar behaviors. Observable opportunities can generate social norms in a similar manner, as actions become more visible, they can appear more common and socially

acceptable and become a social norm. Social norms have the ability to influence behaviors when executed well. Although people think they act independently of others, our actions are strongly influenced by social norms. Continuing to incorporate social norms into the communities' strategies will help further display these environmental behaviors as common across the community and could persuade others to engage in these tasks. This could be accomplished by continuing to showcase city staff, council members, and businesses modeling desired sustainable behaviors and recruiting additional community leaders to do the same.

While the cities implemented many of the strategies in CBSM and DOI, the cities' engagement plans could be strengthened with the inclusion of a few additional tactics suggested within these models. In DOI, trialability, which is the ability to sample a practice before having to commit resources and time, was not identified as a major theme in our data. There may be community programs the cities are implementing that do allow for trialability, but trialability did not emerge as a noticeable theme. Thus, supplementing current engagement strategies with an ability to try out a community sustainability program or an energy conservation practice may help gather community engagement if citizens are aware that there is no immediate resource investment required to engage in that program or practice. This idea of trialability, however, becomes more difficult when considering energy efficiency upgrades and renewable energy installations and the upfront costs of these investments.

A strategy discussed in CBSM that did not emerge as a prominent theme in our data was the use of prompts. The purpose of prompts is to remind individuals to participate in certain sustainability behaviors. As individuals work to break unsustainable

habits, such as leaving the lights on when leaving a room, prompts can remind individuals of the practice they want to engage in. Prompts can also remind individuals of a new sustainable habit they are trying to form, such as bringing reusable bags to the grocery store. To help individuals and businesses cease unsustainable habits and build more sustainable ones, prompts can be an effective tool for developing those new behaviors. Effective prompts should be placed in a space that is immediate to the targeted behavior (McKenzie-Mohr, 2011). Prompts should also encourage engagement in a positive behavior, rather than discourage negative behaviors, such as, ‘please put your waste in the trash,’ rather than, ‘don’t litter’ (McKenzie-Mohr, 2011). An example of a common and effective prompt is a recycling container lid that identifies which items are recyclable and can be placed in the bin (McKenzie-Mohr, 2011). In the context of this research, helpful prompts would focus on energy conservation tips, as energy efficiency upgrades and renewable energy installation are one-time purchases, not habitual behaviors. For example, helpful prompts could include light switch stickers reminding people to turn the lights off when leaving a room, or desktop stickers reminding to shut down a computer at the end of the work day.

An additional suggestion from CBSM to strengthen engagement strategies, that did not emerge as a major theme in our data, is to reduce the benefits associated with behaviors that are not in line with renewable electricity resolutions and also increase the barriers to those behaviors. Making the unsustainable behaviors inconvenient and unfavorable will help drive community members away from these behaviors and towards the favorable and convenient sustainable behaviors instead. A carbon tax is a great example of a way to increase the barriers to fossil fuel consumption, however, other ideas

could include higher prices for parking permits to disincentivize driving or an adjusted rate payer structure that would discourage wasteful energy usage.

Both CBSM and DOI provide resources and tools to support adoption of environmental behaviors. However, in the context of engaging the community in practices that support 100% renewable electricity goals, establishing partnerships and networks, a prominent theme that emerged in our data, was not strongly referenced in DOI or CBSM. Conducting a literature review and establishing relationships with knowledgeable individuals in the field is briefly mentioned in CBSM, but the importance of establishing partnerships is not reflected. As explained in the results, partnerships can provide knowledge, insight, and support, but also offer funding. Although this theme is not discussed as a major strategy in CBSM or DOI, in our study areas, partnerships were critical in developing and implementing a variety of programs and practices to engage citizens in behaviors that support the achievement of the 100% renewable electricity goals. The addition of building informative and financially supportive partnerships could be a useful tool to include in CBSM and DOI.

Recommendations for practice

Our findings identified three main approaches to engage community members with 100% renewable electricity goals:

1. Showcase champions, educate, and involve the community to motivate action and maintain focus

- Champions and early-adopters, those that model efficiency and renewable energy development, are able to inspire others to follow the practices they are demonstrating
 - Provide opportunities to educate businesses and individuals on how they can assist the city in a transition to 100% renewable electricity
 - Design a variety of programs that inspire involvement and commitments to sustainable practices, such as community challenges, delegating plans to achieve goals, and incorporating the community in a goal making or visioning process
2. Develop convenient, favorable, and observable opportunities to increase community engagement
- Create convenient opportunities by simplifying the process and increasing accessibility to encourage engagement in sustainable choices
 - Align actions with community values, address local relevancy, provide advantages or incentives, and design programs that generate excitement to create favorable opportunities
 - Increase observability of sustainable behaviors through visible actions and physical objects that depict sustainability efforts, or with messaging that brings attention to non-observable sustainability opportunities or achievements.
3. Build partnerships to leverage resources
- Establish partnerships with those offering grants and programs reducing the cost of energy efficiency upgrades and renewable energy installments

- Develop partnerships with a variety of organizations and other communities to gain insight and strategies to assist with effective program design and community engagement

Limitations and implications for further research

While the challenges and strategies provided in this research could be transferable to other cities, these scenarios are specific to our case studies. Additional research is necessary to determine if the strategies identified in this research are applicable in other locales. With further research on this topic, it is likely that additional strategies will emerge. The addition of strategies and techniques to this framework will better assist other cities in achieving 100% renewable electricity resolutions.

Furthermore, this research studied communities that are actively working to achieve 100% renewable electricity goals. Although these were common themes identified across all three sites, because these cities have not yet achieved their goals, we cannot say that these particular strategies have led to successful achievement of 100% renewable electricity resolutions within these cases. Thus, research is needed that identifies common themes and strategies in the six cities that have already achieved their resolutions. Such research could be compared with the findings in this study as well as with other theories and frameworks for community engagement and environmental behavior change to further develop practices that lead to successful implementation of the resolutions.

Conclusion

Attaining the ambitious goals established in these resolutions is critical for climate action and transforming our power supply to clean energy. To achieve 100% renewable electricity, electricity conservation is a key component. Working with households and businesses in the community to adopt energy efficient practices is necessary for these cities to achieve their renewable energy goals. Community engagement has been identified as a crucial component for successful achievement of a variety of policies and programs. This research identifies strategies and tactics being used by communities working toward 100% renewable electricity resolutions. Comparing these with theory and frameworks for community engagement strengthens the strategies and suggests additional tactics to gain success in reaching goals of 100% renewable electricity. This research contributes to the field of environmental behavior change by providing new information of how to promote environmental behaviors to achieve community-driven, and ambitious goals of 100% renewable electricity. The strategies identified in these case studies could inform effective and transferable practices other communities may use to achieve 100% renewable electricity goals. The collective action of local governments working toward 100% renewable electricity has the power to bring about major carbon reductions, but to do so these entities must first achieve those goals, and we hope this research can assist with that process.

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CHAPTER IV

CONCLUSION

Synthesis of research findings

Our research team used an exploratory, qualitative, multiple-case study design to examine the development, adoption, and execution of renewable electricity resolutions in Park City, Moab, and Salt Lake City, Utah. Data collected consisted of a variety of documents, such as city reports, city council meetings minutes, and newspaper articles, and 13 semi-structured interviews with key individuals from these cities, the Sierra Club, and Rocky Mountain Power. Through time series and thematic analyses, we identified common approaches and strategies used in these cities to build community engagement and environmental behaviors that support the adoption and implementation of renewable electricity resolutions.

During the data analysis, a five-step framework to adopt 100% renewable electricity resolutions emerged. Across the three study areas, common occurrences and approaches to adopt the resolutions revealed the following five steps: (1) Using trigger events for inspiration, (2) Envisioning change, (3) Identifying challenges and potential solutions, (4) Building support, and (5) Taking it to a vote. Adopting a renewable electricity resolution in a community requires local support, and grassroots innovation theory and community coalition building theory suggested many ways in which successful local support can be developed. Within each step of the five-step framework, the cities used a variety of different tactics, which aligned with many of the approaches recommended in the theories for building local support. Because these cities were successful in gaining support, and the approaches for doing so align with these theories,

this research could be used to demonstrate the proficiency of the techniques provided in these theories. Additionally, these theories strengthen the approaches explained to adopt a renewable electricity resolution because they inform the reasoning for how and why certain approaches are successful at building local support.

Our study areas faced three main challenges as they worked to engage the public with the goals of their resolutions: (1) motivating action and maintaining focus on the resolution's goals; (2) increasing community participation in sustainable behavior; and (3) reducing costs for the city and the community. To address these concerns our data found that these cities are (1) showcasing champions, educating, and involving the community (2) developing convenient, favorable, and observable opportunities for engagement, and (3) building partnerships to leverage resources. Within each of these approaches are tactics that align very closely with the diffusion of innovations theory and the community-based social marketing framework. Overlapping strategies between the cities' approaches and these theories include incorporation of early adopters, commitments, relative advantage and incentives, complexity and convenience, compatibility, social norms, effective message framing, and observability. The similarities between DOI, CBSM, and these cities' tactics can suggest why certain approaches have been, or will be, successful for engaging the public with sustainable practices. The strategies employed by the cities could also be strengthened with further incorporation of these theories, as a few tactics mentioned in these theories were not as prevalent in our findings. We suggest that the addition of trialability, the use of prompts, and increasing the barriers to unsustainable behaviors while also decreasing the benefits

of unsustainable behaviors can supplement current approaches for community engagement.

Our findings suggest a key approach that is not prominent in community-based social marketing but could provide an added benefit to fostering sustainable behavior. In the context of engaging the community in practices that support 100% renewable electricity goals, establishing partnerships and networks was a key theme that emerged in our data. As explained in the results, partnerships can provide knowledge, insight, and support, but also offer funding opportunities to support programs that can assist the cities in achieving 100% renewable electricity goals. Thus, the addition of building informative and financially supportive partnerships could be a useful tool to include in the community-based social marketing framework.

Our findings align closely with previous research and theories for successful tactics to engage a community; however, our research tailors these approaches to the specific context of engaging a community to adopt and implement 100% renewable electricity resolutions. Understanding how previous research and theory apply to this particular area of interest, can enhance current approaches to achieve 100% renewable electricity, promoting the transition to clean energy generation.

Recommendations for future study

The five-step “how to” framework generated by this study is the first framework that we know of to offer a step-by-step approach to assist local governments in adopting 100% renewable electricity resolutions. While the framework produced in this research was designed with the intent to be transferable to other cities, its potential for success is

limited by its scope. All three case studies from this research are located in Utah, therefore additional research is needed to determine if the framework and strategies identified in this research are also applicable in other locales. With further research on this topic, it is likely that additional strategies for success will emerge. The addition of strategies and techniques to this initial framework will strengthen its functionality and thus, better assist other cities in adopting 100% renewable electricity resolutions. Furthermore, this research studied communities that are actively working to achieve 100% renewable electricity goals to suggest strategies for community engagement that assists the cities in reaching these goals. While the strategies were common across all three cases, because these cities have not yet achieved their goals, we cannot say that these particular strategies have led to successful achievement of 100% renewable electricity resolutions. Thus, research that identifies common themes and strategies in the six cities that have already achieved their resolutions could better inform best practices for community engagement that lead to successful implementation of the resolutions.

Our research is a good starting point for identifying a framework for successful adoption and implementation of renewable electricity resolutions within local governments. However, there is more work that can be done to improve the utility of the framework and better assist communities striving toward 100% renewable electricity. Thus, we recommend the following for further research on this topic:

- The resolution development and adoption process should be studied across more of the 100+ other cities that have committed to 100% renewable electricity to create a more transferable framework for resolution adoption

- The thesis only studies cities that have successfully adopted resolutions. Studying cities that attempted but failed to adopt 100% renewable electricity goals would provide valuable information to this field of study, such as barriers to successful resolution adoption
- The 5-step adoption framework should be tested in communities that are working to adopt a resolution to determine the framework's practicality and identify its strengths and weaknesses
- Case studies of the six cities that have achieved their 100% resolutions should be analyzed to see if their successes can inform best practices for community engagement with 100% renewable electricity goals
- This thesis only looked at the application of community-based social marketing and diffusion of innovations in its analysis of community engagement tactics, exploration of other sociology, psychology, and other conservation behavior theories could suggest additional key components for community engagement with these goals
- The design of this study is focused on community engagement, but a study that also incorporates the economic and technological feasibility of developing and achieving renewable electricity resolutions would likely be valuable to cities as well.

Recommendations for practice

Results from this study suggest five-steps to adopt 100% renewable electricity resolutions:

1. Using trigger events for inspiration

- Concern for planetary health, potential economic impacts that climate change could have on a city, health issues that are caused or exacerbated by the use of fossil fuels
- Lack of federal action
- State, national, and international movements that encourage action

2. Envisioning change

- Identify champions who are passionate, inspiring, respected, and determined
- Define a shared and concrete goal with a timeframe and list factors necessary for achieving the goal

3. Identifying challenges and potential solutions

- Proactively identify foreseeable challenges and generate potential solutions.
- Address these issues early on to make the resolution easier to adopt and also more attainable.

4. Building support

- Gather support within a community through (1) effective communication, (2) opportunities for engagement, education, and feedback, and (3) building partnerships
- Acquire council's support by (1) meeting with a council member one on one, (2) showing community benefits, and (3) demonstrating that there is community support

5. Taking it to a vote

- Consider these five factors as the resolutions are brought to council: (1) confidence that council is in support, (2) promoting the council meeting, (3) gathering attendance for the council meeting, (4) speaking up in support at the meeting, and (5) sharing the good news to inspire other communities

Our findings also identified three main approaches the case study cities were using to engage community members with 100% renewable electricity goals:

1. Showcase champions, educate, and involve the community to motivate action and maintain focus
 - Champions and early-adopters, those that model efficiency and renewable energy development, are able to inspire others to follow the practices they are demonstrating
 - Provide opportunities to educate businesses and individuals on how they can assist the city in a transition to 100% renewable electricity
 - Design a variety of programs that inspire involvement and commitments to sustainable practices, such as community challenges, delegating plans to achieve goals, and incorporating the community in a goal making or visioning process
2. Develop convenient, favorable, and observable opportunities to increase community engagement

- Create convenient opportunities by simplifying the process and increasing accessibility to encourage engagement in sustainable choices
 - Align actions with community values, address local relevancy, provide advantages or incentives, and design programs that generate excitement to create favorable opportunities
 - Increase observability of sustainable behaviors through visible actions and physical objects that depict sustainability efforts, or with messaging that brings attention to non-observable sustainability opportunities or achievements.
3. Build partnerships to leverage resources
- Establish partnerships with those offering grants and programs reducing the cost of energy efficiency upgrades and renewable energy installments
 - Develop partnerships with a variety of organizations and other communities to gain insight and strategies to assist with effective program design and community engagement

Summary

With electricity production as one of the nation's largest contributors to greenhouse gas emissions, a transition to renewable electricity is essential for reducing our country's carbon footprint. Many cities across the country are setting goals to transition to renewable electricity, however, what leads to successful adoption of these goals and how these goals can be accomplished needs to be researched further. Effective efforts in climate action have been attributed to community engagement and tailoring

programs and policies to meet the specific needs of a community (Lutsey & Sperling, 2008; Rutland & Aylett, 2008). To understand how cities successfully adopt and engage the community in the implementation of these ambitious resolutions, this thesis used a qualitative, multiple-case study approach to explore the efforts made in Salt Lake City, Park City, and Moab, the first three cities in Utah to adopt 100% renewable electricity resolutions.

Supplemented by previous research and theory, our findings generated a “how-to” framework that outlines techniques to build local support to develop and adopt renewable electricity resolutions, and our findings provide three approaches to engage the community with renewable electricity resolutions that can assist the city in achieving its goal. The findings from this research are intended to equip cities across the country with an effective approach for setting and achieving renewable electricity goals. To mitigate climate change, we must shrink the gap that Harriet Bulkeley described between rhetoric and action in climate policy (2010). By providing a framework for municipalities that could lead to successful development, adoption, and implementation of 100% renewable electricity resolutions, this research helps reduce that gap.

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APPENDICIES

APPENDIX A

CITIES: SEMI-STRUCTURED INTERVIEW GUIDE

1. How long have you worked in government?
2. Where did the idea for this resolution begin?
 - a. Who created the idea for this resolution?
 - b. Was the resolution inspired by nearby communities striving for a similar goal?
 - i. How was that idea brought up to your community?
3. What were the attitudes and perceptions of community and council members around the resolution and its goals?
 - a. Did attitude changes have to take place?
 - i. How was that achieved?
 - b. If positive attitudes already existed, what created that positivity within the public and/or council members around this resolution?
4. What was the most difficult part of resolution creation/adoption/implementation process?
5. Were there any groups/community members opposing the adoption of the resolution?
 - a. Was there any opposition to the use of the term and acknowledgement of “climate change” in the document?
 - i. If so, how was this handled?
 - b. How were these obstacles resolved?
6. How were the goals outlined in the resolution chosen and agreed upon?
7. How does your community plan to reach the goals outlined in the resolution?
 - a. Was there a plan of action prior to adopting the resolution, or did this form later?
 - i. (Such as Salt Lake City’s Climate Positive Plan)
 - b. What resources are being used to reach the resolution goals?
 - i. Were there any partnerships that helped make this resolution more feasible?

- c. What are some of the major challenges your community must overcome to successfully follow through with the resolution?
- 8. How does your community plan to motivate households and businesses to engage in sustainability practices that are in line with the resolution?
 - a. How does your city plan to do this in a cost-effective manner?
 - i. What partnerships have been formed to help the city enact this?
- 9. Who do you believe are the “respected champions” helping enact change within the community?
 - a. Why are these individuals so respected, allowing them to serve as change agents in the community?
- 10. What advice would you give municipalities interested in adopting and implementing a similar resolution?

APPENDIX B

ROCKY MOUNTAIN POWER: SEMI-STRUCTURED INTERVIEW GUIDE

1. Was RMP interested in helping these cities achieve their renewable energy resolutions? Why?
2. How did RMP react to the proposal?
 - a. Was there resistance? If so, what issues had to be resolved to obtain RMP's support?
3. Do you see any differences in how Moab, Park City, and Salt Lake City are planning to adopt their 100% renewable energy resolutions?
 - a. If so, please describe.
4. What is RMP's role in working with each of the cities on their 100% renewable energy plans?
5. What changes/adaptations did RMP have to undertake in order to accommodate these cities' resolutions?
6. Do you see RMP adjusting to a portfolio that is sourced mainly by renewables, including to provide baseload, by 2032, as a direct result of these resolutions?
7. How might RMP accommodate future cities within their service area looking to enact similar resolutions?
8. What lessons did RMP learn from their engagement in these first three cities and their renewable energy efforts?

APPENDIX C

SIERRA CLUB: SEMI-STRUCTURED INTERVIEW GUIDE

1. How long have you worked for the Sierra Club?
 - a. How long have you been working on the Beyond Coal Campaign?
 - i. What does that job entail?
2. How have the 100% renewable energy resolutions adopted in Park City, Moab, and SLC inspired nearby communities?
 - a. How is the idea to strive for similar renewable energy goals brought up in these other communities?
 - i. What have been the attitudes of the community, city staff, and council members around these ideas?
 1. Do attitude changes need to take place?
 - a. How is that achieved?
 2. If positive attitudes already existed, what creates that positivity within the public and/or council members?
3. In general, what have you noticed are the attitudes of community, city staff, and council members in nearby communities around the goals that PC, SLC, and Moab have in place?
4. From your involvement with the Sierra Club, what is the most difficult part of engaging and empowering citizens to push for renewable energy goals/resolutions?
 - a. What do you think is the most difficult part with the adoption and implementation process of such resolutions?
5. When you are working on outreach, do any groups/community members oppose these types of renewable energy goals?
 - a. Have you noticed opposition to the use of the term and acknowledgement of “climate change” in public documents?
 - b. How do you mitigate this type of opposition?
6. How does the Sierra Club assist these communities in reaching their renewable energy goals?

- a. What resources does the Sierra Club offer these communities?
7. What are some of the major challenges you foresee that communities must overcome to successfully follow through with their renewable energy goals?
8. How does the Sierra Club motivate households and businesses to engage in sustainability practices that are in line with renewable energy goals?
 - a. How do you help the community do so cost-effectively?
9. Who do you believe are the “respected champions” helping enact change within these communities?
 - a. Why are these individuals so respected, allowing them to serve as change agents in the community?
10. What advice would you give municipalities interested in adopting and implementing a similar resolution?

APPENDIX D

SUMMARY OF SIX CITIES POWERED BY 100% RENEWABLE ELECTRICITY

ASPEN, COLORADO

In 2005, Aspen, Colorado adopted The Canary Initiative, a resolution to reduce greenhouse gas emissions and actively address climate change through various actions, including energy efficiency upgrades and obtaining renewable electricity (City of Aspen, 2005). The resolution's name was rooted in the notion that Aspen's alpine location can more easily detect the impacts of climate change, as a canary's death indicates danger in a coal mine (City of Aspen, 2005). In 2007, the city adopted the Canary Action Plan to acquire renewable electricity targets and reduction in greenhouse gas emission (City of Aspen, 2007). In 2014, Aspen had acquired 75% of its electricity from renewables but encountered barriers to renewable electricity development that would impede its success (NREL, 2015). Thus, the city partnered with the National Renewable Energy Laboratory (NREL) to obtain additional assistance to meet the goal (NREL, 2015). In 2015, the city attained its ambitious goal and, as of September 2015, the city's electricity is sourced with 46% hydroelectric, 53% wind, and 1% landfill gas (City of Aspen, 2018).

BURLINGTON, VERMONT

In 2012, Burlington, Vermont set a goal to achieve 100% renewable electricity (City of Burlington, 2013). The city's energy is supplied by its municipal utility, Burlington Electric Department (BED). Prior to the establishment of this goal, the City of Burlington had a long history of climate action and BED was already working to acquire electricity from renewable sources (City of Burlington, 2013). In 2014, the purchase of a

7.4 MW hydroelectric dam on the Winooski River led the city to achieve its goal of 100% renewable electricity (City of Burlington, 2013). A combination of renewable electricity projects, renewable energy credits, and implementation of energy efficiency practices, allowed Burlington to achieve its goal for 100% renewables, which is sourced mainly by biomass, hydroelectric, wind, and some solar (Burlington Electric Department, 2018b). The city is currently working to become a net-zero energy city by 2030 and is making strides to reduce greenhouse gas emissions through numerous efforts (Burlington Electric Department, 2018a). As the largest city in Vermont, Burlington's efforts have influenced the state's electricity supply; the state of Vermont now has a goal to obtain 90% of its electricity from renewable sources by 2050 (Richardson, 2014).

GEORGETOWN, TEXAS

In 2015, Georgetown, Texas committed to 100% renewable electricity largely due to the independence and price stability that renewable sources offer (Martinez et al., 2018). The city of Georgetown receives its electricity through its own municipal-utility, which is one of the largest municipally-owned utilities in the country (City of Georgetown Texas, 2015). Through a 150 MW solar power agreement and a 144 MW wind power agreement signed in 2015 (City of Georgetown Texas, 2015), Georgetown, a politically conservative community, achieved its goal of 100% renewable in 2017 (Martinez et al., 2018). The Mayor of Georgetown, who identifies as a republican, believes that powering Georgetown with 100% renewables was the best financial decision the city could make because it creates price stability for the next 25 to 30 years (Rainey, 2017). The case of Georgetown demonstrates how renewables can transcend

political party lines and provide cities with economical energy solutions.

GREENSBURG, KANSAS

The City of Greensburg, Kansas was struck by an EF-5 tornado in May 2007, which reached windspeeds up to 200mph and destroyed 90% of its structures (Pless & Billman, 2010). During the conversations to rebuild the city, the city decided to rebuild the town to meet Leadership in Energy and Environmental Design (LEED) standards for its buildings and power its city with the wind that destroyed it (Pless & Billman, 2010). In 2008, these energy goals were detailed in the Greensburg Sustainable Comprehensive Plan (Myers et al., 2008). By 2013, the city had constructed a 12.5 MW wind farm to provide net-100% electricity to their community (Martinez et al., 2018). Other cities recovering after a disaster can find inspiration in Greensburg's story and rebuild their communities following Greensburg's energy-efficient and sustainable model.

KODIAK ISLAND, ALASKA

Kodiak Island, Alaska, a remote community that is not connected to the continental power grid, values self-sufficiency (Gerdes, 2015). The city wanted to decrease reliance on fossil fuels to reduce volatility of electricity rates and to lower emissions. As a result, it set a target to achieve clean energy by 2020 (Gerdes, 2015). The city's electrical utility, Kodiak Electric, explored wind development as an alternative to burning diesel for electricity (Gerdes, 2015). In 2009, the first wind project was developed and consisted of three wind turbines (Gerdes, 2015). Soon after, a second wind project, a hydroelectric facility, and a battery storage system were developed (Gerdes,

2015). By the end of 2014, 99.7% of the city was powered with clean energy, using diesel generators as a backup, and its clean energy goal was achieved with many years to spare (Gerdes, 2015). The transition to clean energy reduced the city's annual fuel costs by \$4.5 million, exemplifying clean, renewable energy as an affordable and reliable source of electricity (Gerdes, 2015).

ROCK PORT, MISSOURI

Rock Port, Missouri, a town of only 1,300 people, was the first town in the United States to be powered by 100% net-renewable electricity (Morris, 2008). Rock Port achieved this goal in 2008 through the development of four, 1.25 MW wind turbines that generated enough electricity to power the entire community (City of Rock Port, 2008; Hedlund, 2008). The community is still connected to the grid, thus on days when the wind is not blowing, the community takes from the power grid (Morris, 2008); however, on most days, the community generates more electricity than needed and contributes its wind generated electricity to the power grid (Hedlund, 2008). The city uses approximately 13 million kwh each year and the wind farm will produce 16 million kwh a year, allowing the excess to generate revenue as it is purchased by the Missouri Joint Municipal Utilities (City of Rock Port, 2008). The city developed renewables as an approach to stabilize electricity prices (Hedlund, 2008). The current wind farm will allow electricity prices to remain constant for the next 25 years (Hedlund, 2008).

APPENDIX D: REFERENCES

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