



2019

BOISE'S ENERGY FUTURE

A community-wide energy plan.

Prepared by:



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I. EXECUTIVE SUMMARY

Building off numerous sustainability initiatives and public policies geared toward making Boise the most livable city in the country, Boise's Energy Future is a community-wide plan for using energy wisely and actively managing where the energy comes from to navigate toward increased use of clean, renewable resources. Focused primarily on electricity and natural gas use, the plan was initiated amid vocal concern by residents and local organizations about the environmental and economic health consequences from inaction in the local energy arena. The planning process included meetings with technical experts, stakeholders, and residents through public forums, surveys, and open houses to craft the contents of the plan. Based on this input, the vision for Boise's Energy Future is as follows:

In 2035, Boise's community energy will be generated from clean sources that deliver reliable and affordable energy that benefits our local economy, while enhancing our community's resilience to climate change.

The planning process produced two goals for achieving this vision:

ELECTRICITY GOAL: 100% OF THE ELECTRICITY USED BY THE CITY OF BOISE'S RESIDENTS AND BUSINESSES WILL BE CLEAN BY 2035 WHILE PRIORITIZING AFFORDABILITY AND ACCESS FOR ALL.

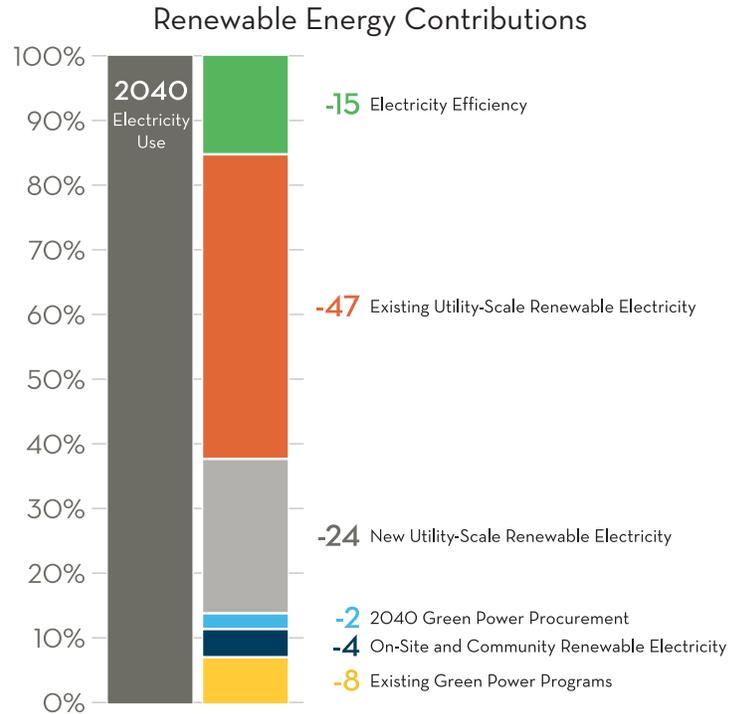
THERMAL ENERGY GOAL: MAKE MEASURABLE PROGRESS ON NATURAL GAS EFFICIENCY AND GEOTHERMAL EXPANSION AND IDENTIFY A QUANTIFIABLE GOAL BY 2025.

The results of the planning process include a list of 6 actionable electricity strategies with practical targets that demonstrate a cost-effective path to 100% clean electricity. For perspective, Boise residents currently spend approximately \$245 million dollars per year on energy in their homes, businesses, institutions, and industrial processes, approximately 75% of which is spent on electricity and 25% on natural gas.

While there is good traction in the community with supportive public policies, educational resources, voluntary programs and relatable examples of homes and businesses successfully installing clean energy and energy efficient equipment and appliances, much more is needed to achieve the community energy vision and goals. In fact, under a business as usual scenario, energy costs are expected to increase to \$580M in 2040. On the other hand, the combined financial performance of the strategies in this plan is estimated to have a positive net present value to the community of \$210M.

The six strategies and their relative contribution to the 100% clean electricity goal are shown below. Boise's Energy Future presents such a strong economic case in large part due to Idaho Power's existing renewable energy mix and energy efficiency offerings that can be leveraged and expanded to achieve 100% renewable electricity cost-effectively. It will take working together to support Idaho Power being able to take credit for all its clean or renewable energy generation and to collaborate and advocate for state-level policies in support of Idaho Power incorporating more utility-scale renewable energy generation in the future.

While Idaho Power is key to achieving Boise's 100% Clean Electricity goal, the entire community has a role to play and benefits to gain in successfully achieving plan goals. The City is committed to leading by example and achieving 100% clean electricity in all its facilities on a fast-tracked timeline to share lessons learned and stimulate investments across the community. The City encourages other institutions and primary employers to follow-suit. Residents are encouraged to get involved, remain informed, and consider opportunities for cost-effective improvements to their homes and businesses.



The technical details of this plan currently reflect an implementation timeline for the electricity goals and opportunities of 2040.

The Boise's Energy Future plan is intended to provide an initial framework for the community's transition to clean energy. It is acknowledged that specific aspects of many of the identified opportunities will need to be developed in more detail during the implementation phase.

Boise's Energy Future identifies and publicly communicates a goal that 100% of the electricity used by Boise residents and businesses will be **clean** by 2035. However, for the technical components of this report, it is important to differentiate between those existing energy sources that are **clean** and existing and new energy sources that are **renewable**. The plan considers existing large scale hydro-electric facilities to be **clean**. The plan considers the following new and existing energy sources that are generally non-reliant on fossil or carbon-based fuels to be **renewable**: solar, wind, geothermal and new small scale hydro-electric facilities. This list is not exhaustive and other renewable energy technologies or practices may be considered on a case by case basis. In the future, this interpretation could be modified based on advances in energy technology, regulatory changes or other relevant reasons.

Considering the disruptive changes that are occurring currently with renewable energy technology, energy policy and other issues related to the Boise's Energy Future plan, it is also important that the plan be considered as a living document. It is possible that opportunities or actions could be adjusted based on implementation progress, technological advances or regulatory changes. The project team proposes to annually track progress towards the goal and implementation activities, to prepare a progress report every two years (starting in 2020) and to update the plan every five years during the implementation timeframe.

This plan shows that the vision and goals of Boise's Energy Future are attainable by working together and will help the community prosper for many years to come on its journey to becoming the most livable city in the country.

The technical details of this plan currently reflect an implementation timeline for the electricity goals and opportunities of 2040. These details will be adjusted and corrected with future plan updates to match the final goal timeline of 2035.

II. ENERGY USE AND SOURCES TODAY

Boise's Energy Future focuses on Boise's community energy use, which refers to all the energy used to power Boise, heat and cool homes, and allow Boise's businesses and institutions to operate and grow. More specifically, Boise's community energy sources include electricity, natural gas, and geothermal energy.

Figure 1 displays the energy breakout for the baseline year (2015) in millions of British Thermal Units (MMBtu). Forty-eight percent of the community's energy use was derived from electricity used for lighting, cooling, powering appliances, and many other purposes. Fifty percent of the community's energy was derived from natural gas in 2015. Natural gas is piped to homes and businesses and used for heating, hot water heating, and other uses like gas appliances or fireplaces. Intermountain Gas is Boise's primary natural gas utility provider. Two percent of the community's energy was derived from geothermal heat provided by four geothermal systems.

The City of Boise operates the largest direct-use geothermal system in the country. Geothermal is an energy source that comes from heat stored inside the earth's core. Energy is provided to residential and business customers in the form of hot water pumped directly from the ground. It is used primarily for heating buildings in areas close to Downtown Boise and is considered a renewable energy source.

Community Energy Sources 2015
16 Million MMBtu

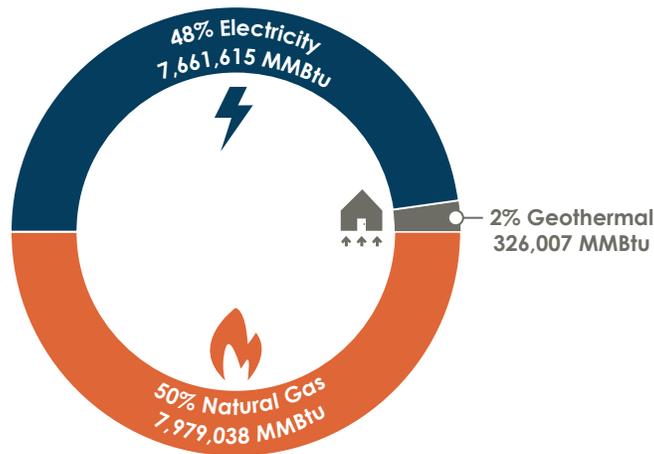


FIGURE 1. 2015 COMMUNITY ENERGY BASELINE

It is important to understand the context of the community energy use identified in the Boise's Energy Future plan in relation to the City's Greenhouse Gas (GHG) Emissions Inventory. In the City's 2015 GHG Inventory (Figure 2), community energy usage accounts for approximately 2/3rds (65%) of GHG emissions. Considering the significant contributions of community energy usage to the City's GHG emissions, the goals and opportunities identified in the Boise's Energy Future plan have the potential to result in significant emissions reductions. For this reason, the City has decided to focus this plan with community energy. However, it is important to note that the City is also actively engaged with other plans and initiatives to reduce emissions from other components of the City's GHG emissions inventory. These initiatives include considerations for alternative transportation in the city's Transportation Action Plan and initiatives to expand the use of electric vehicle within city government and throughout the community. In the future, the City will consider developing a similar planning document to potentially identify opportunities and goals for clean energy in the transportation sector.

Community Greenhouse Gas (GHG) Emissions Inventory (2015)

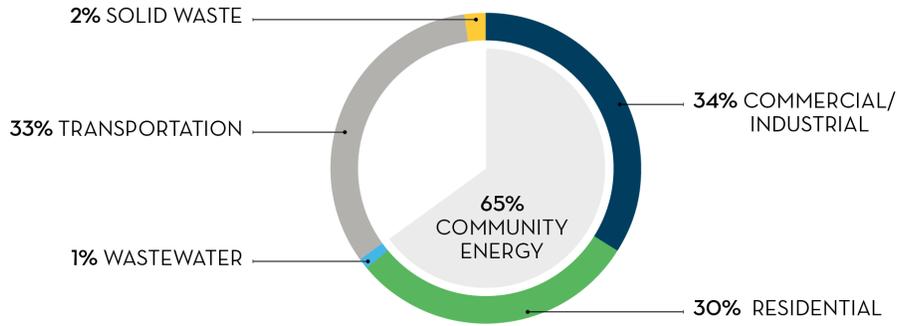


FIGURE 2. 2015 COMMUNITY GREENHOUSE GAS (GHG) EMISSIONS INVENTORY

In 2015, the community spent an estimated \$245 million on electricity and natural gas (Figure 3). Due to the cost difference between these two energy sources, the community spends more on electricity than natural gas even though it uses roughly equal amounts of both sources. The residential, commercial, industrial, and institutional (CII) breakout is shown for both energy sources (Figure 3).

2015 Estimated Community Cost \$245 Million Dollars

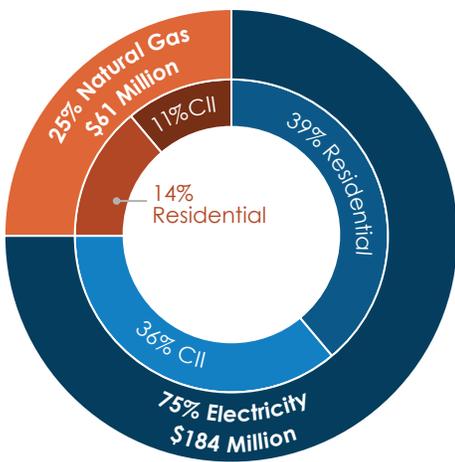


FIGURE 3. 2015 COMMUNITY ENERGY COST BASELINE

Baseline Community Energy Use Forecast

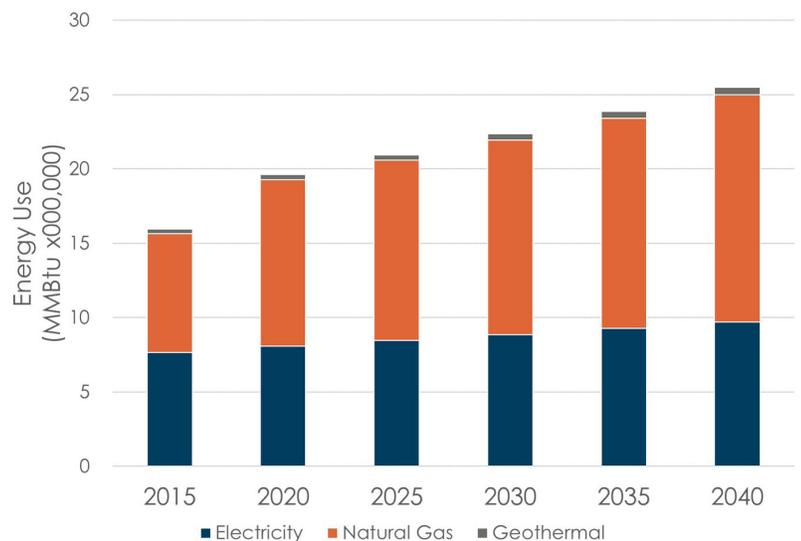


FIGURE 4. BASELINE COMMUNITY ENERGY USE FORECAST

Using utility growth expectations from Idaho Power (Idaho Power, 2017a, p. 72), Intermountain Gas (Intermountain Gas Company, 2017), the City's geothermal utility, and cost predictions from Idaho Power (Idaho Power, 2017b, p. 32) and the U.S. Energy Information Administration (U.S. Energy Information Administration, 2018), energy use and cost forecasts were created to show the community's expected energy expenses through 2040 (Figure 4 and Figure 5). These forecasts show the expected results of no further action to curb energy use or make changes to the energy supply and are intended to show a business-as-usual forecast. Under this scenario, costs are expected to more than double between 2015 and 2040 due to increased energy use and utility costs.

Baseline Community Energy Cost Forecast

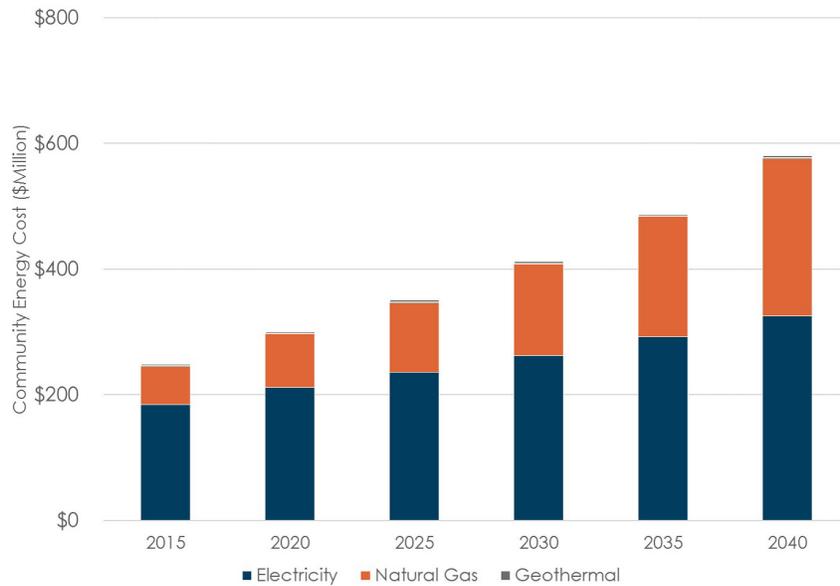
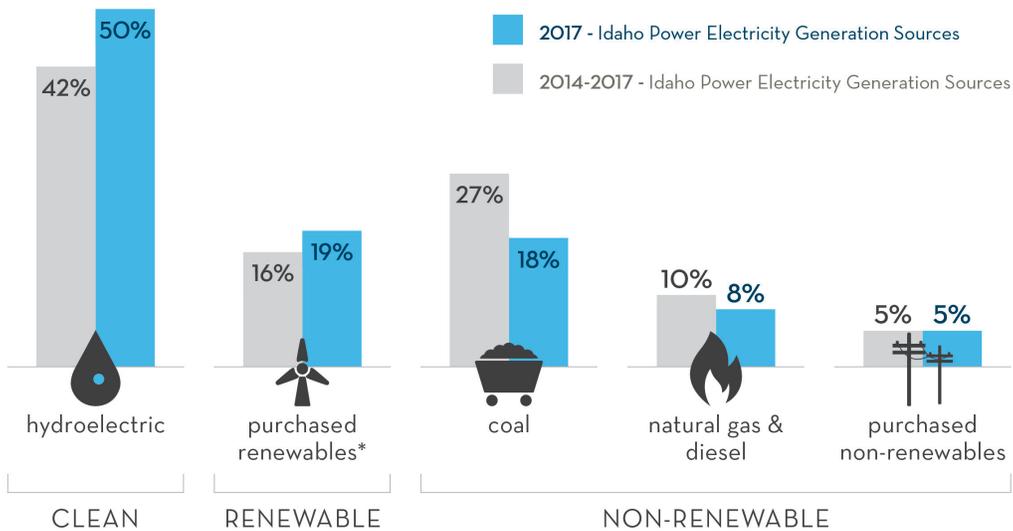


FIGURE 5. BASELINE COMMUNITY ENERGY COST FORECAST

Since geothermal energy use is such a small portion of Boise's overall energy use, it is difficult to distinguish compared to electricity and natural gas. The City's geothermal utility expects to continue to expand its service as water rights become available. By 2040 under this business-as-usual scenario, geothermal energy use is expected to account for 2% of the community's overall energy use and 0.6% of its energy cost.

Idaho Power 4-Year Average Resource Mix



**Idaho Power sells the Renewable Energy Credits (REC) it receives in association with this energy; and therefore cannot claim that electricity produced from these sources is delivered to retail customers.*

FIGURE 6. IDAHO POWER 4-YEAR AVERAGE RESOURCE MIX

Another important aspect of the baseline that informs planning is to understand the electricity resource mix delivered from Idaho Power. Figure 6 presents a 4-year average of Idaho Power's resource mix from 2014 through 2017. Over this period, the single largest source of Boise's electricity generation came from hydroelectric dams (42%). In 2017, due to a high water year, hydroelectricity provided almost 50% of the utility's resource mix (Idaho Power, 2018a).

As a result, Idaho Power was ranked as the 47th-lowest carbon dioxide emitter per megawatt hour produced among the nation's 100 largest electricity producers (M.J. Bradley & Associates, 2017). However, due to the variable nature of hydroelectricity, which relies on annual precipitation, a 4-year average resource mix is used as a baseline for all analyses associated with this planning effort.

The community looks forward to working with Idaho Power to continue incorporating more renewable electricity into the utility's resource mix.

III. BOISE'S ENERGY FUTURE

In an effort to continue to make Boise the most livable city in the country, the community is interested in defining its energy future. The City has heard from residents, businesses, and organizations that are interested in seeing the community transition to clean energy sources. However, this transition is not just to address environmental concerns but also because renewable energy has strong economic, resiliency, and energy security benefits.

Boise has established two community-wide goals: one for electricity and a second for thermal energy, which includes natural gas and geothermal energy use. Both goals are designed to illustrate a transition to renewable energy sources over time. From the beginning, the planning team set out to establish practical goals that it believes the community and its partners can achieve.

In 2035, Boise's community energy will be generated from clean sources that deliver reliable and affordable energy that benefits our local economy, while enhancing our community's resilience to climate change.

For electricity, the plan identifies a community-wide goal that 100% of the electricity used by the City of Boise's residents and businesses will be clean by 2035 while prioritizing affordability and access for all. The opportunities that support this goal include improved electricity efficiency as well as integrating additional distributed and utility-scale renewable energy onto the electrical grid. Boise considers the existing large-scale hydropower a contributing clean energy source to meet the goal along with green power purchases and on-site renewable investments made by homes and businesses. The U.S. Environmental Protection Agency (EPA) also recognizes large-scale hydropower as a clean energy source (U.S. Environmental Protection Agency, 2018). However, in an effort to move to more beneficial renewable energy sources, this plan does not support additional large-scale hydroelectric facilities beyond what already exist.

ELECTRICITY GOAL: 100% OF THE ELECTRICITY USED BY THE CITY OF BOISE'S RESIDENTS AND BUSINESSES WILL BE RENEWABLE BY 2035 WHILE PRIORITIZING AFFORDABILITY AND ACCESS FOR ALL.

THERMAL ENERGY GOAL: MAKE MEASURABLE PROGRESS ON NATURAL GAS EFFICIENCY AND GEOTHERMAL ADOPTION AND IDENTIFY A QUANTIFIABLE GOAL BY 2025.

For thermal energy, the plan identifies a community wide goal to make measurable progress on renewable thermal energy, including natural gas efficiency, geothermal growth, and alternatives to conventional natural gas. Many communities are considering options to transition toward 100% clean thermal energy. However, Boise will monitor its progress before committing to a quantitative goal or timeline and will consider identifying a thermal energy goal by 2025. Although Idaho Power uses natural gas for electricity generation, this end use is not considered under the thermal energy goal. Electricity generation falls under the electricity goal and is discussed in the electricity roadmap.

Throughout the process, community input was obtained to develop a vision and to identify priorities for the plan, which are incorporated into the vision statement above. The community priorities include clean energy, a plan that maintains the current reliability of our energy system, an energy transition that is affordable with access for all and improves community resilience from the impacts of climate change. Other priorities are also included in the vision, goals, and opportunities including economic development, resiliency and security, and local investment.

Clean energy opportunities help to increase economic development by attracting businesses seeking locations that can provide renewable energy. Also, increasing energy production locally benefits Boise's economy by keeping energy dollars closer to the community. Energy efficiency and clean energy initiatives can create local jobs as contractors and technicians are needed for local installation and maintenance. Reliable energy is important to daily activities. The ability to diversify energy sources means that, in the long run, the community will be able to count on the energy supply and better handle any disruptions. This includes energy security, which means less reliance on fuel sources that are vulnerable to international instability and economic volatility related to price, supply, and demand.

Boise's Energy Future identifies and publicly communicates a goal that 100% of the electricity used by Boise residents and businesses will be **clean** by 2035. However, for the technical components of this report, it is important to differentiate between those existing energy sources that are **clean** and existing and new energy sources that are **renewable**. The plan considers existing large scale hydro-electric facilities to be **clean**. The plan considers the following new and existing energy sources that are generally non-reliant on fossil or carbon-

based fuels to be **renewable**: solar, wind, geothermal and new small scale hydro-electric facilities. This list is not exhaustive and other renewable energy technologies or practices may be considered on a case by case basis. In the future, this interpretation could be modified based on advances in energy technology, regulatory changes or other relevant reasons.

The technical details of this plan currently reflect an implementation timeline for the electricity goals and opportunities of 2040. These details will be adjusted and corrected with future plan updates to match the final goal timeline of 2035.

A. PLANNING PROCESS

The planning process for Boise's Energy Future began in late 2017 with an internal planning team composed of City of Boise staff and the consultants selected to support the planning process, Brendle Group and Ide Energy. During the planning process, the City of Boise hosted one internal planning workshop and three stakeholder workshops to draft renewable energy goals for the community and identify potential opportunities and targets to support these goals. Stakeholders included representatives from the local utilities, environmental organizations, significant energy users (business and institutions) and other subject matter experts.

The early focus of the internal workshop and first stakeholder workshop was on Boise's energy baseline. This included understanding Boise's current energy use and energy sources. Since the community had not participated in a planning effort like this before, it was important to benchmark Boise against other communities to understand what goals would be practical for Boise's energy future. Boise has a unique opportunity because of Idaho Power's resource mix that is dominated by hydroelectricity and the community's geothermal resource in that it can more practically transition to renewable energy because it has a smaller percent of non-renewable energy sources to begin with.

Building off the 2015 baseline, the internal team worked with stakeholders to draft a renewable energy vision for Boise as well as unique renewable energy goals, opportunities, and targets. This included benchmarking with other communities to get a sense for the commitment's communities are making and actions they are taking. The aim of these discussions was to draft pragmatic goals and opportunities unique to Boise that the community can support.

The planning team shared the goals and opportunities that were drafted during the workshop process with the public through four open houses in early December 2018 hosted by City staff. Attendees provided feedback at the in-person open houses through an interactive process and were provided an opportunity to take a brief exit survey as well. The planning team also worked with the Boise State University – Idaho Policy Institute (IPI) and Energy Policy Institute (EPI) to develop and implement a statistically valid survey of City residents to obtain input. A detailed summary of these activities is included in Section B "Public Outreach" of the report.

1. ELECTRICITY ROADMAP

The electricity roadmap outlines the opportunities identified and finalized during the planning process. They focus on both electricity efficiency and renewable electricity. In the near-term, the focus is on existing programs that include existing energy efficiency offerings, taking credit for renewable electricity that is already included in Idaho Power's resource mix, and green power programs. Over the mid and long term, the community would like to see increased investment in on-site, community, and utility- scale renewable energy generation.

The planning team identified three scenarios to help inform development of the renewable electricity goal: Business as Usual, Boise's Best, and Accelerated.

The Business as Usual scenario included Boise's current actions or the result of taking no action. More specifically, no additional electricity savings were expected that were not already part of Idaho Power's electricity sales forecast. With respect to renewable electricity, this scenario assumed that the same amount of homes and businesses would invest in on-site solar or green power annually and that Idaho Power would keep its existing plan to invest in natural gas generation as coal plants are retired and additional generation is necessary.

The planning team also evaluated a scenario that would get the community to 100% renewable electricity five years ahead of the original 2040 target. This scenario was called the Accelerated scenario and since the goal was moved up, the individual opportunity targets required earlier adoption of renewable electricity at larger rates.

The scenario with the chosen targets is called Boise's Best in this plan. The combined results of Boise's Best opportunities are included in Figure 7 and they demonstrate a cost-effective path to 100% renewable electricity by 2040.

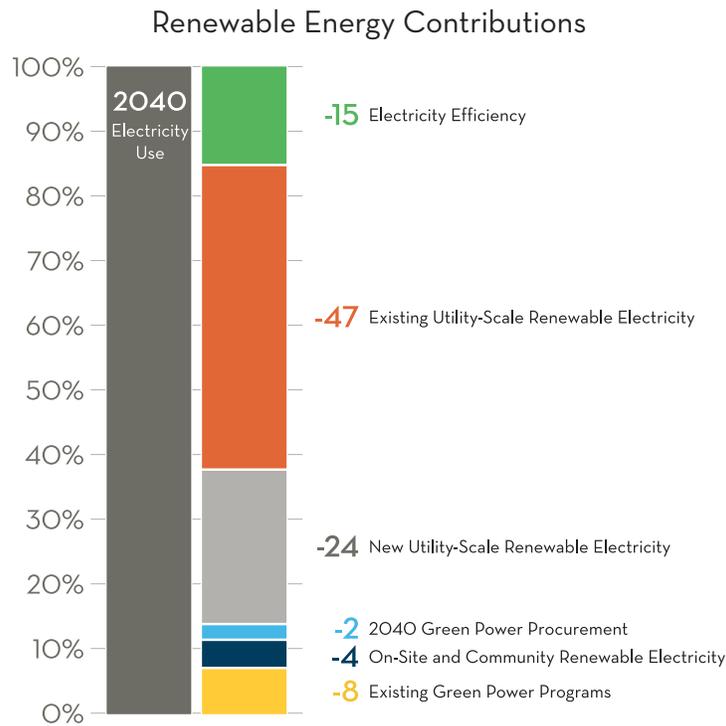


FIGURE 7. RENEWABLE ENERGY CONTRIBUTIONS FROM BOISE'S BEST OPPORTUNITIES THAT LEAD TO 100% RENEWABLE ELECTRICITY IN 2040

The renewable energy contribution presented in Figure 7 is the amount of energy that is either saved (i.e., electricity efficiency) or transitioned to renewable energy sources (i.e., solar generation) expressed as a percentage of energy use in 2040. With these percentages, it is important to note their inherent interconnection. Since all the opportunities are analyzed together, the assumptions and progress of each opportunity influences the results of the others. For instance, electricity efficiency reductions reduce the community's overall energy load thus reducing the need for renewable energy generation during the planning period.

One takeaway is the significance of the electric utilities' role in meeting the community's goal. Combined, over 70% of the community's progress toward 100% renewable electricity is attributable to the electricity grid from existing and future renewable energy opportunities. Later in this section, these opportunities are outlined with additional detail relative to the target that has been set, the actions that the implementation team will undertake, and the financial expectations over the planning timeline.

The process of crafting goals and opportunities for Boise's Energy Future focused on establishing practical outcomes. Therefore, a financial evaluation was conducted for each scenario and opportunity to assess general feasibility. The financial evaluation provides a planning-level estimate that includes the potential costs and savings to residents and businesses throughout the community. The evaluation also quantifies the economic benefit to the community of reducing carbon emissions, defined as "Community Cost of Carbon".

At this time, the evaluation does not include capital costs or savings of Idaho Power beyond those included in annual rate adjustments or from inflation. The evaluation also does not include other costs or savings from tangential benefits to the local economy from local energy production, renewable energy jobs or improvements to the resilience of the energy system. The financial results for the Boise's Best scenario are included in Table 1.

Electricity Roadmap (through 2040)

(In millions of dollars)

Opportunity Title*	Contribution to Goal	Cumulative Capital and Operational Cost	Cumulative Operational Savings	Net Present Value	Cumulative Risk or Benefit	Total Value with Risks and Benefits
E1. Electricity Efficiency	15%	\$140M	\$690M	\$350M	\$50M	\$400M
E2. Existing Utility-scale Renewable Electricity	47%	\$50M	-	(\$30M)	\$150M	\$120M
E3. New Utility-scale Renewable Electricity	24%	**	**	**	\$130M	\$130M
E4. Green Power Procurement	2%	**	**	**	\$10M	\$10M
E5. On-site and Community Renewable Electricity	4%	\$290M	\$210M	(\$80M)	\$20M	(\$60M)
E6. Existing Green Power Programs	8%	\$40M	-	(\$30M)	\$40M	\$10M
Total	100%	\$520M	\$900M	\$210M	\$400M	\$610M

* See the description of each opportunity for additional detail about cost, savings and implementation assumptions.

** Opportunities E3 and E4 are assumed to be cost neutral and do not have operational costs or savings associated with them. Please see the opportunity description for a discussion of this assumption.

TABLE 1. ELECTRICITY ROADMAP SUMMARY (BOISE'S BEST SCENARIO)

The first column of Table 1 shows each opportunity's estimated contribution to the 100% renewable electricity goal. The cumulative capital and operational costs column in Table 1 estimates the expected investment that the community will need to make to achieve each opportunity's associated target. These costs are cumulative investments that must be made to fund or participate in a program or capital and operational costs for new energy efficiency or renewable electricity generation equipment. Cumulative operational savings are also estimated for each opportunity. These estimates reflect the cost savings from reduced energy bills by residents, businesses, and city buildings through 2040. The results from both the cumulative costs and cumulative savings summary columns are increased using a 3% escalation rate to convert current dollars into future costs. An analysis of how changes to the escalation and discount rates impact the financial results is included later in the plan.

The fourth column of the Table 1 calculates the net present value by combining each opportunity's cumulative costs and savings and applying a discount rate to account for future uncertainty and risk. An opportunity with a positive net present value is directly profitable and will positively impact the community. An opportunity with a negative net present value costs the community and will require support without the expectation of positive financial return during the planning period. The net present value for each opportunity focuses only on direct cost and savings to residents, businesses, and city buildings.

Overall the plan has a positive net present value with the help of the assumed savings from E1, electricity efficiency. Electricity efficiency over time saves customers on their annual bills and reduces the need for investing in electricity generation going forward. Three of the other opportunities, E2, E5 and E6, have negative net present values because they require annual payments and do not lead to direct savings to residents and businesses. E5 includes

investments in on-site and community solar installations, which have extended payback periods and, therefore, lead to a negative net present value over the planning timeline. This plan assumes that over the implementation timeline, utility-scale renewables will become cost neutral with future utility-scale natural gas electricity generation. This is the reason that the cost and savings results for E3 and E4 are not quantified at this time.

The cumulative risk or benefit to the community estimates the community's cost of carbon. The community's cost of carbon is based on the EPA's analysis (U.S. Environmental Protection Agency, 2018) of the social cost of carbon. This cost accounts for the benefit to the community from reducing its carbon emissions by reducing energy use or increasing alternative energy generation equipment.

Conversely, not pursuing these opportunities will be a risk to the community through increased health care costs, negative impacts to the agricultural industry, and greater prevalence of natural disasters.

The last column of Table 1 includes a second net present value calculation that combines the net present value of each opportunity with the cumulative risk or benefit estimate. A positive net present value will ultimately benefit the community after accounting for the benefit from reduced carbon emissions. Table 2 includes the financial results for the three scenarios that were evaluated during the planning process. The Business as Usual scenario, as the name suggests, does not make very much progress on achieving 100% renewable electricity. The small move it does make is due to on-site renewable installations by homes and businesses. Therefore, there is less capital and operational cost but also less benefit to the community.

In contrast, the Accelerated scenario does reach 100% renewable electricity by 2035. This scenario requires additional investment and increased participation by homes, businesses, and Idaho Power sooner. The Accelerated scenario also has a larger total value due to the benefit that reducing carbon emissions has on the community. The one important caveat to this scenario is that it, like Boise's Best, assumes that cost neutral utility-scale renewable electricity will be available for the entire community. However, to achieve 100% renewable electricity by 2035, community-wide renewable electricity would need to be available five years sooner.

Electricity Roadmap Scenarios (through 2040)

(In millions of dollars)

Scenario Title	Contribution to Goal	Cumulative Capital and Operational Cost	Cumulative Operational Savings	Net Present Value	Cumulative Risk or Benefit	Total Value with Risks and Benefits
Business as Usual	44%	\$140M	\$90M	(\$40M)	\$30M	(\$10M)
Boise's Best	100% by 2040	\$520M	\$900M	\$210M	\$400M	\$610M
Accelerated	100% by 2035	\$590M	\$950M	\$200M	\$440M	\$640M

TABLE 2. SUMMARY OF ELECTRICITY ROADMAP SCENARIOS

One additional aspect of the financial analysis was a sensitivity analysis of the assumptions that were made for the escalation and discount rates. Figure 8 shows the variability of the present value results from changing the assumed discount rate and escalation rates without the community cost of carbon included. In Table 2, the assumed discount and escalation rates were set at 3%, represented by the yellow line in Figure 8. These values were chosen to align with other City planning efforts and financial analyses.

For this demonstration, the escalation rate varies between 2.8% on the low end based on the most recent 12-month consumer price index increase from September 2018 (U.S. Department of Labor, 2018) and 5% on the high end. Similarly, the discount rate varies between a high discount rate of 5%, which applies the largest discount on future cost savings, and a low discount rate of 2.5%, which applies the smallest discount on future cost savings. The result is that although the escalation and discount rates do have an impact on the results of the financial analysis, the preferred roadmap has a positive net present value in each case.

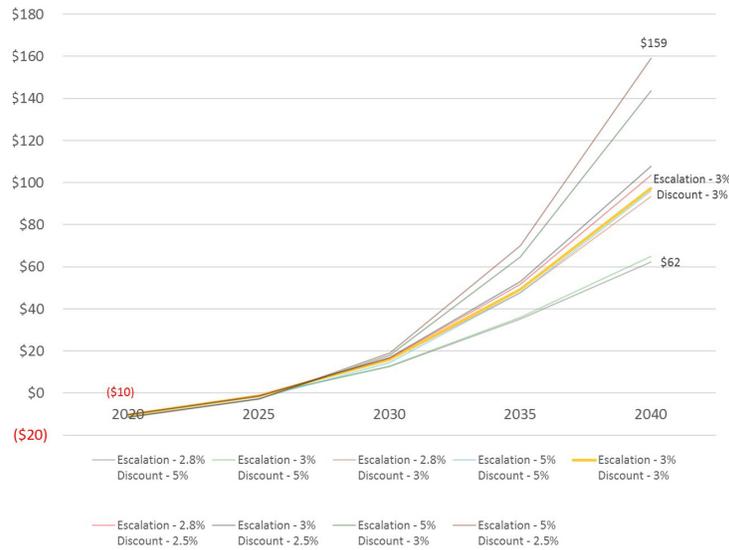


FIGURE 8. BOISE'S BEST SCENARIO: NET PRESENT VALUE SENSITIVITY ANALYSIS WITHOUT THE COMMUNITY COST OF CARBON

The next section of the plan dives into each opportunity's specifics, including a detailed description of the opportunity to understand Boise's unique approach. The Boise's Best implementation target identified for each opportunity is the implementation target that the community would like to achieve by 2040.

Recommended actions for the implementation team are also included to provide areas for immediate focus after the plan is adopted. In addition, to help put the financial results in perspective for residents and businesses, the monthly cost or savings of each opportunity is calculated. This was done by averaging sector results into per unit values (residential and CII) based on the number of accounts that are included in each sector.

A. ELECTRICITY EFFICIENCY (E1)

Energy efficiency is an important piece of the community's renewable energy goal because it reduces the need for energy generation and is typically the lowest cost electricity resource available. It also has the support of Boise's residents: 37% of Boise residents said that they would be very interested in participating in an incentive program for energy reductions in their home or business (National Research Center Inc., 2016, p. 38). Fortunately, Idaho Power has demand-side management (DSM) programs that encourage energy efficiency practices and upgrades in both homes and businesses. Specific programs and options are included on the utility's website.

In 2017, Idaho Power's first-year electricity savings from energy efficiency across its service area were 1.2% in the residential sector and 1.1% in the CII sector (Idaho Power, 2018c, p. 11). However, even with this annual savings, the utility still expects annual electricity load growth of 1.2% in the residential sector and 0.7% in the CII sector (Idaho Power, 2017a, p. 72) through 2036 territory-wide. These load growth expectations could increase further as residents and businesses adopt electric vehicles. Without additional efficiency savings, the community's electricity use is expected to continue to grow.

To combat this growth expectation, Boise has set a target to grow participation in Idaho Power's energy efficiency programs and services to match the utility's annual load growth estimates. The community plans to ramp up participation over time and level off Boise's electricity use beginning in 2030.

It is acknowledged that achieving the identified level of electricity efficiency program participation by customers will be challenging and represents a best in class effort when compared to other utility efficiency programs nation-wide.

However, the City believes that it is well positioned to communicate the need to establish energy efficiency as a core value of our residents and businesses.

Additionally, the City proposes to learn from other communities who have developed active community energy planning partnerships with their electric utility providers. Examples indicate that these types of programs have demonstrated a high effectiveness to increase customer participation in utility efficiency programs. The City may also be able to utilize alternate methods of customer interaction to increase customer participation and raise awareness throughout the community for the importance of energy efficiency and energy use reduction.

Comments from stakeholders about the potential to either achieve or exceed the energy efficiency targets are acknowledged. The City commits to closely monitor performance in this opportunity and adjust performance targets during future plan updates as necessary. The City also acknowledges the potential for impact to the financial evaluation and economic performance of the plan, however it is important to note that there are still significant customer savings that could be realized even with lower achievement in this opportunity.

BOISE'S BEST: Increase participation in electricity efficiency programs and match annual load growth estimates by 2030.

Continue Participation in Idaho Power's Energy Efficiency Advisory Group

As a first action, City staff members plan to continue to participate in Idaho Power's Energy Efficiency Advisory Group (EEAG). Currently, the Environmental Manager of Public Works, is a member of the group. This group allows the City to share the community's feedback and ideas on Idaho Power's energy efficiency and demand response programs. The City hopes to leverage its participation in this group to increase participation by homes and businesses. Working closely with Idaho Power on energy efficiency will also support implementing this plan by ensuring alignment with outreach and community engagement.

RECOMMENDED ACTIONS:

- Continue participation in Idaho Power's EEAG

Maximize Community Participation in Existing Programs

The implementation team will pursue an initiative to increase awareness and participation in Idaho Power's existing efficiency offerings. In 2017, \$13 million collected under the DSM rider used to fund energy efficiency programs was unused and refunded to customers (Idaho Public Utilities Commission, 2017). The project team plans to coordinate with Idaho Power and other stakeholders with the goal of increasing program participation and fully utilizing available rider funds.

In addition to the utility's incentive programs, Idaho Power also offers time-of-day pricing for residential and large CII customers. Although this program does not necessarily reduce energy use, it offers cost savings to customers that are able to shift their daily electricity use to off-peak hours. In addition to cost savings to the customer, time of use rates help to lower Idaho Power's peak demand, which allows the utility to reduce or delay future generation investments.

Specific steps to maximize program participation could include developing a customized residential and commercial awareness campaign designed by stakeholders and tailored to customer needs. Leveraging existing engagement resources, networks, and the recent community survey to understand why Boise's residents and businesses are or are not participating could help to support campaign development. A barrier that has been identified in other communities is skepticism of energy cost savings (Cody, 2011). This barrier could be addressed by incorporating case studies or demonstrations into outreach materials.

RECOMMENDED ACTIONS:

- Work with the utility to identify which programs could be the most impactful in the community but are currently underutilized, including opportunities for enhanced data sharing that improves program participation.
- Evaluate community feedback to identify what barriers residents face when making energy efficiency improvements or applying for incentives.

Develop Specific Programs to be Promoted by the City of Boise

The City of Boise is actively involved in engaging its citizens and may be able to support Idaho Power's existing program outreach efforts with the goal to increase program participation. Developing Boise-specific education and outreach materials would allow the implementation team to put into practice what it learns from the actions above and feedback from this planning effort.

Given the City's unique ability to interact with our citizens, developing outreach materials and programs that begin to address efficiency for both electricity and thermal energy holistically for residents and businesses will also be considered.

RECOMMENDED ACTIONS:

- Develop and distribute Boise-specific outreach materials with case studies to encourage residents to participate in Idaho Power's efficiency offerings.

Work with the Utility to Implement New Pilot Programs

Boise will take advantage of any new pilot programs that Idaho Power offers. Becoming involved during the development process will allow the community to take advantage of additional electricity savings and provide input to ensure maximum benefit to Boise's residents as well as Idaho Power's larger customer base. For example, Idaho Power recently rolled out a Residential New Construction Pilot Program in which builders can earn a cash incentive to build energy efficient homes. Other examples of programs could include on-bill financing to increase energy efficiency participation and developing a program to engage vulnerable communities.

RECOMMENDED ACTIONS:

- Volunteer the community as a pilot community for upcoming efficiency or DSM offerings with an emphasis on programs that benefit vulnerable communities.

Consider Voluntary Benchmarking for Commercial Buildings

One tactic to urge businesses to invest in energy efficiency projects is to encourage or require buildings to benchmark energy use data using EPA's Portfolio Manager Tool. Boise would have the opportunity to make benchmarking voluntary or required based on building size. Benchmarking benefits building owners by allowing them to understand better how their building is performing versus similar buildings in Boise.

High performing buildings can use their status for marketing. If building owners are encouraged to share their results, benchmarking can also have an added advantage for the community by allowing the community to get a better sense of how energy is used in the built environment. A popular campaign around energy benchmarking is to create competitions to see which buildings can reduce their energy use the most over a defined time.

RECOMMENDED ACTIONS:

- Start a benchmarking pilot in the Central Addition LIV District, Boise's first eco-district.
- Consider voluntary benchmarking for commercial buildings community-wide. Identify best practices from other City's benchmarking programs.

Grow Participation in the City's Green Building Construction Code

Voluntary measures, such as the community's Green Building Construction Code, encourage businesses and residents to achieve greater efficiency gains in new construction projects. The code is now standard for all city-owned construction projects but voluntary for other developers. Projects that meet the standards receive expedited permit processing and assistance throughout the development process. Upon completion, a plaque commemorating the building's designation as a "Boise Green Building" project is installed on its exterior. New construction built to beyond standard energy code has advantages that builders and developers can market, including reduced operational costs and better indoor environmental quality for owners and occupants.

RECOMMENDED ACTIONS:

- Distribute outreach material with case studies to builders and developers to encourage them to participate in the Green Building Construction Code.
- Identify barriers builders face to following the Green Building Construction Code.

E1. COST-BENEFIT ANALYSIS

Electricity Efficiency

Energy efficiency is an important piece of the community's renewable energy goal because it reduces the need for electricity generation and is typically the lowest cost electricity resource available. In this plan, the estimated savings from electricity efficiency savings offset the cost of renewable electricity generation. This allows the plan to have an overall positive net present value.

What level of community investment is required?

The cumulative cost of this opportunity over the next twenty-one years is expected to be **\$140 MILLION**. Residents, businesses, and City buildings will be expected to make this investment by making upgrades to their homes or facilities.

- The cost for this opportunity is based on a unit cost from a Lawrence Berkeley study that found the lifetime cost of energy efficiency is \$0.037/kWh in Idaho (Hoffman, et al., 2015, p. 18). This lifetime cost covers both the cost to the customer and the entity operating the program. However, because the community already has access to Idaho Power efficiency programs, only the cost to the customer is used to estimate the cost of this opportunity, which is assumed to be \$0.019/kWh saved.
- The actual investment made by homes and businesses will vary based on the type of efficiency improvement.

What are the expected community benefits?

This investment in electricity efficiency is expected to save the community **\$690 MILLION** over the twenty-one-year implementation timeline. Cost savings were estimated based on annual electricity savings from the opportunity's target and residential and commercial industrial institutional electricity rates.

- NET PRESENT VALUE: **\$350 MILLION**
- CUMULATIVE RISK OR BENEFIT: **\$50 MILLION**
- TOTAL VALUE WITH RISKS AND BENEFITS: **\$400 MILLION**

What are the financial impacts to individual homes and businesses?

This opportunity is expected to **save residents \$5 per household monthly and businesses \$24 monthly** after the initial investment is made.

Contribution to 100% goal: 15%

RECOMMENDED ACTIONS:

- Continue participation in Idaho Power's EEAG
- Work with the utility to identify which programs could be the most impactful in the community but are current underutilized, including opportunities for enhanced data sharing that improves program participation.
- Evaluate community feedback to identify what barriers residents face when making energy efficiency improvements or applying for incentives.
- Develop and distribute Boise-specific outreach materials with case studies to encourage residents to participate in Idaho Power's efficiency offerings.
- Volunteer the community as a pilot community for upcoming efficiency or DSM offerings
- Start a benchmarking pilot in the Central Addition LIV District, Boise's first eco-district.
- Consider voluntary benchmarking for commercial buildings community-wide. Identify best practices from other City's benchmarking programs
- Distribute outreach material with case studies to builders and developers to encourage them to participate in the Green Building Construction Code.
- Identify barriers builders face to following the Green Building Construction Code.

B. EXISTING UTILITY-SCALE RENEWABLE ELECTRICITY (E2)

In 2017, almost 50% of Idaho Power's electricity delivered to customers came from hydroelectric generation. Over the last 4 years, this percentage has held strong at an average of 42% as shown in Figure 6. In 2017, Idaho Power acquired 19% of its generated electricity from renewable energy sources besides hydroelectricity, such as solar, geothermal, biomass, and wind. However, under Idaho Power's Renewable Energy Credit Management Plan, the utility is required by the Public Utilities Commission (PUC) to sell its share of the renewable energy credits (RECs) associated with the non-hydroelectric renewable energy to help reduce rates. RECs are the non-tangible property rights to the clean energy attributes of electricity generated by renewable sources. One megawatt hour of renewable energy is equal to one REC.

Due to this PUC requirement, Idaho Power is not allowed to claim its share of this portion of renewable energy as delivered renewable electricity. However, the tradeoff is that the sale of the RECs reduces rates for customers. Although this is a benefit to Idaho Power's customers, retaining these RECs could have a greater economic impact by attracting more energy conscious businesses that would appreciate Idaho Power's large renewable energy portfolio.

By collaborating with Idaho Power, the PUC, and supportive businesses and organizations, Boise could help the utility and the state attract new business if Idaho Power could market its use and delivery of renewable electricity. By recognizing and promoting the utility's success in renewable energy, the state could increase economic development by attracting more companies that want to use renewable energy. Recognizing the utility's use of renewable energy could also help incentivize the utility to continue to invest in renewable energy. Further, the parties' collaboration could lead to more in-state development of renewable energy, including optimizing and maximizing power from existing hydroelectric facilities. In-state renewable energy generation helps the economy of Idaho. Renewable energy generation creates more than three times as many jobs as fossil fuel generation for the same amount of energy according to a 2009 Union of Concerned Scientists report (Union of Concerned Scientists, 2009). The state could also lead the nation by creating policies that specifically recognize existing large-scale hydroelectricity as renewable energy.

BOISE'S BEST: Help Idaho Power retain all RECs associated with its current resource mix by 2030.

The community will support Idaho Power by working together to further policy that would allow the utility to take credit for all the renewable energy in its resource mix and allow it to further stand out as a low-carbon electric utility.

RECOMMENDED ACTIONS:

- Identify a group of stakeholders, including Idaho Power, and convene a working group to discuss the best format and method to bring this opportunity to the PUC.

E2. COST-BENEFIT ANALYSIS

Existing Utility-Scale Renewable Electricity

Idaho Power is not currently allowed to claim its share of Renewable Energy Credits (RECs) associated with the non-hydroelectric renewable energy that it delivers to its customers.

Although this is a benefit to Idaho Power's customers, retaining these RECs could have a greater economic impact by attracting more energy conscious businesses that would appreciate Idaho Power's large renewable energy portfolio.

What level of community investment is required?

The cumulative cost of this opportunity over the next twenty-one years is expected to be **\$50 MILLION**. This investment is expected to be spread across all Idaho Power customers.

- The cost includes the expense that Idaho Power would need to recover to retain all RECs.
- Since Idaho Power does not currently have control of all the RECs associated with existing renewable generation, this would need to be a consideration of the implementation team and stakeholders.
- The estimated cost of these RECs is \$0.0067 per kWh (Idaho Power, 2018b).

What are the expected community benefits?

There are **no assumed direct cost savings** associated with this opportunity. However, it is a low-cost local investment that could help grow economic development, significantly increase the amount of renewable energy delivered to customers, and further Idaho Power's reputation as a low-carbon utility.

- NET PRESENT VALUE: **(\$30 MILLION)**
- CUMULATIVE RISK OR BENEFIT: **\$150 MILLION**
- TOTAL VALUE WITH RISKS AND BENEFITS: **\$120 MILLION**

What are the financial impacts to individual homes and businesses?

This opportunity is expected to cost residents on average **66¢ per household monthly and \$8 monthly per business**.

Contribution to 100% goal: 47%

RECOMMENDED ACTIONS:

- Identify a group of stakeholders, including Idaho Power, and convene a working group to discuss the best format and method to bring this opportunity to the PUC.

C. NEW UTILITY-SCALE RENEWABLE ELECTRICITY (E3)

This opportunity has the largest future impact on the community achieving its renewable electricity goal. Under the community's definition of renewable energy, which includes hydroelectricity, Idaho Power currently provides Boise with 42% renewable electricity, on average. If Idaho Power can retain the RECs associated with its purchased renewables, this percentage is estimated to increase to 60% on average.

This opportunity focuses on adding additional utility-scale renewables with the goal to increase Idaho Power's overall percentage of renewable electricity generation to 90% by 2040. This percentage goal was selected to account for the fossil fuel generation that Idaho Power currently has in its fuel supply and does not plan to replace. It also allows room to account for the uncertainty of renewable generation, which is not considered dispatchable. This plan does not support additional investment in fossil fuel generation but acknowledges that green power purchases, opportunity E6, may be needed to achieve net 100% renewable electricity.

The opportunity to achieve this goal is enhanced by Idaho Power's need for additional generation to replace its coal-fired power plants and the variable nature of hydroelectricity, which relies on annual precipitation and river flows. The community would like to see further investment in renewable generation, including large-scale solar, wind, geothermal, or other technologies. This plan also supports investigating additional hydroelectric capacity at existing sites but does not support additional large-scale hydroelectric facilities beyond what is already installed.

In Idaho Power's 2017 Integrated Resource Plan (IRP), the current preferred portfolio includes investment in fossil fuel generation resources beginning in 2031 after the Boardman-to-Hemingway transmission line comes online in 2026. As an alternative, the community will encourage Idaho Power to invest instead in renewable electricity generation in the future, retire the remaining coal-fired power plants, and use the transmission line and energy imbalance market to help attain the 90% resource mix target. This target will help to position the community and state as a home for renewable energy, encourage economic development by energy conscious companies, and invest in local and innovative renewable energy generation.

When considering increases in utility scale renewable electricity generation, the City acknowledges that the reliability of these additional resources is intrinsic to Boise's Energy Future demonstrated with the inclusion of reliability as a priority in the plan's vision. A specific analysis of the reliability of the electricity system was not completed as part of this analysis, however it is acknowledged that modeling and analysis for reliability is critical to decisions made concerning future generation resources as part of Idaho Power's IRP process. It is also important to note that the electricity goals identified in Boise's Energy Future are achieved through a combination of the identified opportunities and are not reliant on utility scale electricity generation that is 100% renewable.

While not specifically analyzed, Boise's Energy Future also acknowledges the potential need for energy storage technologies to support and supplement the increased renewable electricity generation recommended with this opportunity.

The capital, operation and maintenance costs associated with utility scale solar are projected to be lower when compared to fossil fuel generation during the implementation timeframe. However, the financial analysis utilized the conservative assumption that these costs are equal. Projected savings could be utilized to integrate energy storage or other improvements to address the dispatchability of the renewables. Implementation actions are identified to support additional consideration and analysis for this issue.

Idaho Power has acknowledged that the energy landscape is changing and that it is interested in continuing to provide low-cost reliable electricity. On behalf of Boise's Energy Future, City representatives will continue to actively participate in the IRP process to stay informed and advocate for cost-effective renewable energy investment.

BOISE'S BEST: Work with Idaho Power to add an additional 30% of renewable electricity generation by 2040 to supplement existing renewable electricity generation and reach a combined 90% renewable electricity generation mix by 2040 while ensuring system reliability.

Encourage Retirement of Idaho Power's Coal Resources

Idaho Power is working with its partners to retire a portion of its coal-fired assets beginning in 2020 with the

Boardman coal plant, both North Valmy units by 2025, and two of the four Jim Bridger units by 2032 (Idaho Power, 2017a, p. 136). This plan supports these retirements and encourages the utility to move away from coal generation completely. The implementation team plans to publicize the results of these retirements and continue to participate in the utility's IRP process to vocally support exiting from the remaining two units at the Jim Bridger facility.

RECOMMENDED ACTIONS:

- Publicize the retirement of Idaho Power's coal generation assets.
- Support initiatives to retire additional fossil fuel generation when feasible and cost effective.

Continue Participation in the Integrated Resources Plan Process

The community understands that the IRP process is the best way to engage with Idaho Power and the PUC on future generation decisions. Boise is currently represented on the Integrated Resource Plan Advisory Council (IRPAC) by City staff. The City plans to continue to participate in the IRPAC to advocate for new utility- scale renewable electricity generation.

Boise would like to see scenario analyses that incorporate additional indirect benefits that favor renewable generation, such as energy independence, job creation, and community resiliency into the IRP's modeling process. Additionally, the City should encourage Idaho Power to look to other utilities to determine best practice on how to incorporate additional renewable electricity into its system. This may include energy storage or real-time energy markets.

RECOMMENDED ACTIONS:

- On the IRPAC, advocate for a more robust set of factors for measuring the benefit to customers of local renewable electricity investments.
- Work with Idaho Power to follow and implement innovations in integrating intermittent renewables through energy storage or other technologies.
- Follow the price of solar, wind, geothermal, hydroelectric optimization, and energy storage (including pumped hydroelectric storage) in comparison to natural gas generation.
- Explore the potential for the energy imbalance market to make renewable energy more cost effective and feasible without the need for storage technology.
- Support the optimization of existing hydroelectric resources.
- Encourage participation by other communities in Idaho Power's service area.

E3. COST-BENEFIT ANALYSIS

New Utility-Scale Renewable Electricity

The community plans to encourage Idaho Power to invest in renewable electricity generation in the future in place of its current strategy to invest in fossil fuel generation beginning in 2031. This opportunity has the largest future impact on the community achieving its renewable electricity goal. This opportunity will also help to position the community and state as a home for renewable energy, encourage economic development by energy conscious companies, and invest in local and innovative renewable energy generation.

What level of community investment is required?

This plan assumes that there is **no incremental cost** for installing and integrating renewable energy generation into Idaho Power's fuel mix by 2040 given the uncertainty of the future price of renewable energy and new opportunities to increase its dispatchability.

- Currently, there are examples of renewable energy offerings that have no incremental costs and some that have some incremental costs to participants.
- Idaho Power's existing programs and Rocky Mountain Power's Schedule 34 are both examples of renewable energy programs that have some incremental cost to participants.
- Xcel Energy's Renewable*Connect program is expected to have zero incremental cost to its long-term participants.
- Additionally, based on NREL's 2017 ATB Cost and Performance Summary, the levelized cost of utility-scale solar installations is forecasted to be less than the levelized cost of combined cycle natural gas generation in 2030 (National Renewable Energy Laboratory, 2017a). However, this does not account for the difference in dispatchability.

What are the expected community benefits?

There are **no assumed direct cost savings** associated with this opportunity. However, there is an opportunity for further economic development and long-term cost savings. This opportunity does have a positive total value from its carbon reduction benefits.

- Cumulative Risk or Benefit: **\$130 MILLION**
- Total Value with Risks and Benefits: **\$130 MILLION**

What are the financial impacts to individual homes and businesses?

This opportunity does not assume any incremental cost. Therefore, there should not be any additional investment required from individual homes and businesses.

Contribution to 100% goal: 24% Recommended Actions

- Publicize the retirement of Idaho Power's coal generation assets.
- Support initiatives to retire additional fossil fuel generation when feasible and cost effective.
- On the IRPAC, advocate for a more robust set of factors for measuring the benefit to customers of local renewable electricity investments.
- Work with Idaho Power to follow and implement innovations in integrating intermittent renewables through energy storage or other technologies.
- Follow the price of solar, wind, geothermal, hydroelectric optimization, and energy storage (including pumped hydroelectric storage) in comparison to natural gas generation.
- Explore the potential for the energy imbalance market to make renewable energy more cost effective and feasible without the need for storage technology.
- Support the optimization of existing hydroelectric resources.
- Encourage participation by other communities in Idaho Power's service area.

D. GREEN POWER PROCUREMENT (E4)

In addition to Idaho Power's current green power offerings, the Green Power Program and the Large Renewable Energy Purchase Option, the community has two more innovative options: power purchase agreements (PPAs) and a green power rate also known as a green tariff. Both solutions are a scalable way to rapidly procure large quantities of bundled renewable energy and replace fossil fuel generation. They differ in the local electric utility's role and participation.

PPAs require a procurement team to purchase bundled renewable electricity from renewable energy projects through a financial contract. If the electrons are directly provided to the user, it is considered a physical PPA whereas if they are provided to the grid in a separate state or region, it is considered a virtual PPA. The RECs associated with the bundled purchase are used to offset the non-renewable portion of the retail power purchased from the electric utility. Recently PPAs and virtual PPAs have been a popular option for corporations to achieve renewable energy goals.

However, the market is slowly moving toward utility-provided green power rates.

A green power rate is an agreement between users and their local utility in which the utility provides users with renewable electricity at a contracted unit cost over time. This arrangement has the advantage of leveraging the utility's resources to procure and manage renewable electricity integration instead of the user. The financial advantage is that the user has the potential to save money from fixed-cost contracts over time instead of being subject to unknown future electricity rate increases.

The City of Boise is interested in discussing options to work with Idaho Power to develop a green power rate for its municipal electricity usage. This rate would help support Boise's renewable electricity goal included in the Boise's Best target. After the City pilots this green power rate, the City envisions a rate that could also be used by other customers in the community. A community green power rate would provide an alternative to other Electricity Opportunities.

BOISE'S BEST: The electricity that powers the City of Boise's facilities and operations will be 100% renewable by 2030. The City could consider using a green power rate to achieve all or a portion of this goal.

Identify Examples of Best in Class Green Power Rate Programs

As noted in the previous opportunity, Rocky Mountain Power and Xcel Energy have both begun to offer green power rates to their customers. Rocky Mountain Power with Schedule 34 and Xcel Energy with its Renewable*Connect program. Both offer locally sourced renewable electricity and allow users an alternative to on-site installations or REC subscription programs. As the City works with Idaho Power to develop a green power rate for its municipal operations, the implementation team will document best practices and track other community's progress.

RECOMMENDED ACTIONS:

- Work with Idaho Power to pilot a green power rate for municipal facilities and operations.
- Monitor similar green rate initiatives and document the best practices of other successful green power rates regionally and nationally.

Increase Knowledge on Green Power Purchase Options

As the City and Idaho Power investigate and develop a green power rate for municipal operations, the implementation team will plan to keep the community informed. Important information will include pricing, how the electricity is being generated, benefits, and what to consider before participating. This will allow residents and businesses to learn more about their options and create demand to expand the offering past municipal operations. Informing businesses located outside of Boise that value renewable electricity can also be a great opportunity for economic development.

RECOMMENDED ACTIONS:

- Develop informational material informing residents and businesses about innovative green power options, such as PPAs and green power rates.
- Keep the community informed on the development of a green power rate between the City of Boise and Idaho Power.

E4. COST BENEFIT ANALYSIS

Green Power Procurement

The City of Boise is interested in discussing options to work with Idaho Power to develop a green power rate to achieve all or a portion of its 100% renewable by 2030 goal. After the City pilots this green power rate, the City envisions a rate that could also be used by other businesses in the community.

What level of community investment is required?

This plan assumes that by the time of implementation there will be **no incremental cost** for installing and integrating renewable energy generation into Idaho Power's fuel mix as part of the City's Green Rate. This aligns with the assumptions and examples provided in the previous opportunity, E3.

What are the expected community benefits?

There are no assumed direct cost savings associated with this opportunity. However, a City-lead green power rate will help to establish a new green power option that could be rolled out to the community. This opportunity also leads to carbon reduction benefits to the community.

- Cumulative Risk or Benefit: **\$10 MILLION**
- Total Value with Risks and Benefits: **\$10 MILLION**

What are the financial impacts to individual homes and businesses?

This opportunity does not assume any incremental cost and focuses on municipal operations. Therefore, there should not be any additional investment required from individual homes and businesses.

Contribution to 100% goal: 2%

RECOMMENDED ACTIONS:

- Work with Idaho Power to pilot a green power rate for municipal facilities and operations.
- Monitor similar green rate initiatives and document the best practices of other successful green power rates regionally and nationally.
- Develop informational material informing residents and businesses about innovative green power options, such as PPAs and green power rates.
- Keep the community informed on the development of a green power rate between the City of Boise and Idaho Power.

E. ON-SITE AND COMMUNITY RENEWABLE ELECTRICITY (E5)

Boise would like to increase access to and availability of locally-generated renewable energy to meet community interest and demand and to diversify the generation portfolio. On-site solar has traditionally been a way for individuals and businesses to demonstrate their commitment to renewable energy and energy diversification. At the end of 2017, Boise had an estimated 3.5MW of net-metered solar installed across residential and CII customers (Baird, 2017) and residential solar building permits increased by 47% in 2018. Additionally, in 2018 Boise was recognized as a SolSmart Gold community for its efforts to encourage solar installations by reducing soft costs, such as extra fees associated with permitting, inspection, zoning, etc. To achieve this designation, the community accomplished the following:

- Created an online permitting checklist to increase transparency for community members and solar installers
- Reviewed local zoning codes and identified restrictions that intentionally or unintentionally prohibit solar photovoltaic (PV) development
- Allowed solar by-right accessory use in all zones (so solar installations do not require special permits or hearings)
- Cross-trained both inspection and permitting staff on solar PV
- Provided a streamlined permitting pathway for small PV systems
- Created a streamlined process to approve certain solar permit applications over the counter (SolSmart, 2018)

Based on this commitment to on-site renewable energy, the community has a target to install an average of 3.5MW of additional solar capacity each year beginning in 2019 □ 1.5MW in the residential sector and 2MW in the CII sector. This target reflects some uncertainty associated with the new net metering rates that will be created by Idaho Power. It is not yet clear how these rates may affect the financial value of owning on-site solar. However, an evaluation of net metering costs and benefits is currently being completed by Idaho Power to determine the impacts that net metering customers have on the grid. Nevertheless, attendees and stakeholders voiced support for increasing on-site solar installations for homes and businesses as part of the planning process.

BOISE'S BEST: Install 3.5MW of rooftop solar each year beginning in 2019.

Community solar complements on-site solar by allowing residents to invest in local renewable energy sources without having to locate them on their property. One important difference between community solar and on-site solar is that community solar arrays are larger installations to which many customers subscribe (own shares). These subscribers can benefit from the economy of scale, ideal siting, flexibility to move without losing ownership, and long-term fixed prices. Idaho Power has already planned its first 500-kW community solar installation in Boise, however the project has

been postponed. Boise would like to target to install a similar-sized installation every 5 years, leading to 2MW of total capacity by 2040.

BOISE'S BEST: Install a 500-kW community solar array every 5 years.

Conduct Outreach through Public Engagement and Educational Materials

The City has implemented initiatives to make developers and builders aware of the solar permitting process as part of its work under SolSmart. With the rollout of Idaho Power's net metering rate schedule, it will be important to keep the public informed on how the rates will impact current and future solar owners. Similarly, the implementation team would like to keep the community informed about current and future community solar installations. This is another example of an educational campaign that the implementation team will undertake to ensure higher participation in renewable energy options.

RECOMMENDED ACTIONS:

- Develop or share informational material for residents and businesses to help them understand Idaho Power's new rate schedule, when developed.
- Publish information about on-site renewable installations around the community. Use these examples to encourage residents and businesses to consider their renewable energy options.

Promote Energy Storage and Reduce Barriers to Adoption

On-site energy storage is beneficial for any non-dispatchable renewable energy installation. Energy storage allows the owner/operator to store excess energy generated on-site and use it later. This allows on-site renewables to become a more consistent source of electricity that is not pushed back to the grid. This benefits all entities from single family houses to community solar and utility-scale installations. For large entities, energy storage also can become an alternative to gas or diesel generators for backup power when the grid is down. A few common examples of energy storage include battery storage, compressed air, and pumped hydroelectric storage.

The implementation team will work to promote energy storage installations as they become more cost effective. This could include similar actions to what was done with SolSmart with on-site solar or the guidelines adopted by New York City for battery storage to reduce barriers to energy storage installations. These actions will focus on reducing soft costs by streamlining permitting, educating staff, and making sure that building codes and processes align with the community's goals.

RECOMMENDED ACTIONS:

Build off the success of the SolSmart program to identify and eliminate additional barriers to on-site energy storage adoption. Create a permitting and interconnection process guide to encourage residents and businesses to become early adopters of energy storage technology.

Community Solar Considerations

Below are a few considerations that the implementation team will examine as it works to promote future community solar installations.

- Include access for vulnerable communities. Homeownership is less common among vulnerable communities; therefore, community solar is an ideal way for them to take advantage of the benefits of community solar. The largest barrier may be determining how the community can financially support residents who have little disposable income or are a higher credit risk.
- Future installations will need to be cost competitive with current utility rates so that subscribers can see the benefit of price stability early on and have a short payback period.
- Siting community solar near transmission and distribution infrastructure is key to providing grid stability and a value for Idaho Power.

RECOMMENDED ACTIONS:

- Work with Idaho Power to develop viable community solar projects that are cost competitive with on-site installations.
- Begin discussing how to structure future community solar installations to benefit vulnerable communities that may not have access to renewable energy otherwise.

E5. COST-BENEFIT ANALYSIS

On-site and Community Renewable Electricity

The community would like to increase access to and availability of locally-generated renewable energy to meet community interest and demand and to diversify the generation portfolio. This includes on-site generation as well as community solar.

What level of community investment is required?

The cumulative cost of this opportunity over the next twenty-one years is expected to be **\$290 MILLION**. Residents, businesses, and City buildings will be expected to make this investment by either installing solar arrays on-site or investing in community solar.

- The current and future costs for on-site residential and commercial solar installations are based on the 2017 Annual Technology Baseline Cost and Performance Summary (National Renewable Energy Laboratory, 2017a). These costs include initial capital costs and annual operational costs through 2040. The costs do not include tax incentives.
- The one-time subscription cost for Idaho Power's first community solar array is \$562. The array is estimated to generate 997,000 kWh per year and provide 638 kWh of renewable electricity to each subscription (Idaho Power, 2018e).

What are the expected community benefits?

This investment in on-site and community renewable electricity is expected to save the community **\$210 MILLION** over the twenty-one-year implementation timeline. The net present value for this opportunity is negative due to the extended payback of both options. However, investments in electricity efficiency will reduce the size requirement for installations or community solar subscriptions.

- Cost savings for on-site solar do not include net metering rate adjustments but instead quantify the value to the customer.
- Cost savings for community solar are based on Idaho Power's current solar energy credit, which begins at \$0.036/kWh and will increase over time with rates.
- Net Present Value: **(\$80 MILLION)**
- Cumulative Risk or Benefit: **\$20 MILLION**
- Total Value with Risks and Benefits: **(\$60 MILLION)**

What are the financial impacts to individual homes and businesses?

The cost of on-site residential solar in 2019 is approximately \$3,700 per kW installed with additional costs of \$21 per year in maintenance and the average residential installation in Boise is 6kW. The cost of on-site CII solar in 2019 is approximately \$2,200 per kW installed with additional costs of \$16 per year in maintenance and the average CII installation in Boise is 29kW. Without tax incentives and based on these cost assumptions residential solar is expected to have a 21-year payback and CII is expected to have an 18-year payback.

Contribution to 100% goal: 4%

RECOMMENDED ACTIONS:

- Develop or share informational material for residents and businesses to help them understand Idaho Power's new rate schedule, when developed.
- Publish information about on-site renewable installations around the community. Use these examples to encourage residents and businesses to consider their renewable energy options.
- Build off the success of the SolSmart program to identify and eliminate additional barriers to on-site energy storage adoption.
- Create a permitting and interconnection process guide to encourage residents and businesses to become early adopters of energy storage technology.
- Work with Idaho Power to develop viable community solar projects that are cost competitive with on-site installations.
- Begin discussing how to structure future community solar installations to benefit vulnerable communities that may not have access to renewable energy otherwise.

F. EXISTING GREEN POWER PROGRAMS (E6)

Idaho Power offers two programs to its customers that allow them to purchase renewable energy through carbon offsets. These include the Green Power Program and the Large Renewable Energy Purchase Option (learn more here). The Green Power Program allows all Idaho Power customers to purchase RECs from projects around the northwest. The RECs are retired on behalf of the customer and the electricity is provided to the northwest electric grid. The Large Renewable Energy Purchase Option is a limited program that requires a minimum purchase of 750 megawatt-hours (MWh) and allows participants to purchase RECs to offset their non-renewable energy. The RECs for this program come from local renewable energy projects that generate electricity for Idaho Power's grid. The generation from these projects is categorized as "Purchased Renewables" in Idaho Power's resource mix (Figure 6). Under its REC Management Plan, Idaho Power must currently sell these RECs. However, Boise is interested in partnering with the utility to allow Idaho Power to keep these RECs such that Idaho Power's resource mix is more compelling to businesses that are interested in purchasing renewable electricity.

Currently, there are a total of 534,528 customers served by Idaho Power (Idaho Power, 2017a, p. 22) and an estimated 2,300 are Green Power Program subscribers (Idaho Power, 2018b). This equates to an estimated 0.4% participation rate statewide. A recent National Renewable Energy Laboratory study found that best-in-class customer participation for green power programs ranges from 5.43% to 19.44% (National Renewable Energy Laboratory, 2017b).

Boise has identified a target to increase participation to 10% by 2040. This target is supported by the idea that increased participation from citizens signals a desire to consume renewable electricity provided by Idaho Power. Although green power purchases are not always a preferred strategy, green power purchases may be necessary to achieve the community's 100% renewable electricity goal. In this circumstance the implementation team will encourage Idaho Power to evolve its Green Power Program's focus to be on local renewable energy that benefits the community, environmentally and economically.

The development of additional Green Power Procurement options (E4) from Idaho Power, could provide a future alternative to the Green Power Program for residents and businesses to purchase renewable electricity. The City will evaluate the need for changes to this opportunity to future plan updates.

BOISE'S BEST: Achieve 10% participation in the Green Power Program by 2040.

Promote the Green Power Program with Workshops and Educational Materials

Green power is a readily available renewable energy purchase option that shows support for future renewable generation investment. To increase participation in the Green Power Program, homes and businesses need to know that it is available and how it will benefit them and the Boise community. The implementation team will use the City's existing communication networks and engagement strategies (such as events and workshops) to encourage and recognize participation by homes and businesses. Northwest utilities Portland General Electric and Pacific Power are two of the utilities with best-in-class customer participation in green power programs referenced above (National Renewable Energy Laboratory, 2017b). The Implementation team should reach out to these utilities to gather best practice on how to encourage more participation.

RECOMMENDED ACTIONS:

- Use the City's existing communication networks and engagement strategies to tell residents and businesses about the current green power offerings and how they support the community's electricity goal.
- Increase participation in Idaho Power's green power offerings by gathering best practice and incorporating it into information materials and campaigns.

Explore New Sources of Renewable Electricity Based on Changing Resource Mix

This plan addresses changes to the current electrical grid, which in the future could change Idaho Power's green power offerings. One specific change is that after Idaho Power can retain the RECs associated with more renewable energy projects, the RECs will no longer be available for purchase under the Large Renewable Energy Purchase Option. This is covered in the description of Opportunity E2. As Idaho Power's green power offerings change, the implementation team will continue to encourage the utility to invest in local renewable projects and promote the new programs. With this change, Idaho Power could shift its green power offerings to a green power rate as described in Opportunity E4.

RECOMMENDED ACTIONS:

- Align informational material around the new offerings as green power purchase options change.
- Use any additional benefits or impacts that new programs may bring (i.e., local generation) to encourage further participation.

E6. COST-BENEFIT ANALYSIS

Existing Green Power Programs

Idaho Power offers two programs to its customers that allow them to purchase renewable energy through carbon offsets. These include the Green Power Program and the Large Renewable Energy Purchase Option. Although green power purchases are not always a preferred strategy, they may be necessary to achieve the community's 100% renewable electricity goal.

What level of community investment is required?

The cumulative cost of this opportunity over the next twenty-one years is expected to be **\$40 MILLION**. Residents, businesses, and City buildings will be expected to make this investment by subscribing to the green power programs on an annual basis. The cost of this program is based on the current cost premium of \$1/100 kWh block or \$0.01/kWh for Idaho Power's Green Power Program (Idaho Power, 2018d).

What are the expected community benefits?

There is **no direct financial benefit** for participating in the current Green Power or Large Renewable Purchase Option programs. However, participation is an action that residents and businesses can take to show their support and continued interest in renewable electricity.

- Net Present Value: **(\$30 MILLION)**
- Cumulative Risk or Benefit: **\$40 MILLION**
- Total Value with Risks and Benefits: **\$10 MILLION**

What are the financial impacts to individual homes and businesses?

This opportunity is expected to cost participating residents \$6 per household monthly and businesses \$69 monthly.

Contribution to 100% goal: 8%

RECOMMENDED ACTIONS:

- Use the City's existing communication networks and engagement strategies to tell residents and businesses about the current green power offerings and how they support the community's electricity goal.
- Increase participation in Idaho Power's green power offerings by gathering best practice and incorporating it into information materials and campaigns.
- Align informational material around the new offerings as green power purchase options change.
- Use any additional benefits or impacts that new programs may bring (i.e., local generation) to encourage further participation.

2. THERMAL ENERGY ROADMAP

Thermal energy refers to end uses that require heat, such as space heating, water heating, and cooking for homes and businesses as well as process loads for industrial facilities. For Boise, thermal energy sources include natural gas, provided by Intermountain Gas, and geothermal use, which is provided by four districts: The City of Boise's geothermal utility, the Boise Warm Springs Water District, Veterans Affairs Hospital, and the Idaho State Capital. Although Idaho Power uses natural gas for electricity generation, this end use is not considered under the thermal energy roadmap. Like the electricity roadmap, the thermal energy roadmap relies on efficiency programs and existing renewable sources near term and investigates more innovative options over the long term.

When compared to electricity, readily available options for significant transition to renewable energy for the thermal sector remain limited. Consequently, the thermal energy goals identified in Boise's Energy Future were written to focus on qualitative actions versus the more quantitative approach identified for electricity. Many other communities are exploring transition in the thermal energy sector. Boise will have the opportunity to identify best practices to learn what is practical and cost-effective. During the next two years, a detailed outline to support the identification of future quantitative goals for thermal energy and natural gas reduction will be developed. This outline will add additional implementation details to the four opportunities that have been currently identified and potentially identify new opportunities that support thermal energy efficiency and clean thermal energy.

A financial analysis was not completed for the opportunities in this roadmap because the community does not have a defined thermal energy goal. Even though a financial analysis was not completed, this roadmap does include four opportunities that the community can pursue and actions that the implementation team plans to take in the near term.

A. NATURAL GAS EFFICIENCY (T1)

Like electricity, natural gas efficiency plays an important role in a renewable energy future. Increasing efficiency in existing buildings, new construction, and industrial applications reduces the need for renewable energy sources and leads to lower costs and better comfort for homes and businesses. Intermountain Gas just began its residential efficiency program and specifics can be found on its website. Since the program is brand new, annual savings results are not yet available, but best-in-class natural gas efficiency programs save between 0.5% and 1.6% of retail sales annually (Nadel, 2017). Additionally, even though the program just started, natural gas efficiency projects may still be taking place. Envelope and heating, ventilation, and air conditioning (HVAC) projects often have both electricity and thermal energy savings.

Like electricity efficiency, the community's goal is to limit natural gas use growth by offsetting any growth with efficiency gains. In Intermountain Gas' most recent IRP, it estimated a load growth forecast of 1.8% in the residential sector and 1.3% in the CII sector (Intermountain Gas Company, 2017, p. 18). Therefore, to achieve this target, the community will need to exceed the results from best-in-class utility programs.

Similar to electricity, comments from stakeholders about the potential to either achieve or exceed the energy efficiency targets are acknowledged. The City commits to closely monitor performance in this opportunity and adjust performance targets during future plan updates as necessary.

BOISE'S BEST: Increase participation in natural gas efficiency programs and match annual load growth estimates with savings by 2030.

Connect Efforts on Maximizing Electricity Efficiency with Natural Gas Efficiency

The actions that have been identified for the electricity efficiency opportunity will also be used to encourage natural gas efficiency. This includes maximizing participation, working with Intermountain Gas on community engagement and piloting new programs, creating a benchmarking program, and growing participation in the City's Green Building Construction Code. However, it is important that participation is tracked separately to ensure that customers are taking advantage of available resources.

Given the City's unique ability to interact with our citizens, community engagement, outreach materials and programs that begin to address efficiency for both electricity and thermal energy holistically for residents and businesses will also be considered.

RECOMMENDED ACTIONS:

- Work with Intermountain Gas to identify which programs could be the most impactful in the community but are currently underutilized, including opportunities for enhanced data sharing that improves program participation.
- Evaluate community feedback to identify what barriers residents face when making energy efficiency improvements or applying for incentives.
- Develop and distribute Boise-specific community engagement and outreach material with case studies to encourage residents to participate in Intermountain Gas efficiency offerings.
- Volunteer the community as a pilot community for upcoming efficiency offerings, with an emphasis on programs that benefit vulnerable communities.
- Start a benchmarking pilot in the Central Addition LIV District, Boise's first eco- district.
- Consider voluntary benchmarking for commercial buildings community-wide. Identify best practices from other City's benchmarking programs.
- Distribute outreach materials with case studies to builders and developers to encourage them to participate in the Green Building Construction Code.
- Identify what barriers builders and developers face to following the Green Buildings Construction Code.

Specific Considerations for Natural Gas Efficiency

One difference between electricity and natural gas efficiency is that the typical natural gas equipment includes the more expensive pieces of equipment located in homes and businesses. This includes space heating and water heating equipment.

Additionally, the low cost of natural gas means that efficiency upgrades take longer to pay back. The implementation team will incorporate these considerations into its work to maximize participation in natural gas efficiency.

RECOMMENDED ACTIONS:

- Encourage contractors to let residents, businesses know about incentives that may be available in the process of selecting new natural gas equipment.
- Develop education materials on the non-financial benefits of higher efficiency natural gas equipment, such as improved indoor air quality and comfort.

B. GEOTHERMAL (T2)

Boise's geothermal resource is unique and already serves a portion of the community's buildings with renewable energy for space heating, water heating, and sidewalk snow melt. The City utility plans to further expand the existing infrastructure and the amount of geothermal water that it can deliver into the future. Expanding the geothermal district opens the door to incorporating additional buildings as well as the potential for new and innovative renewable and waste heat resources. To ensure the geothermal resource remains renewable, the City must continue to monitor the capacity and replenishment of the aquifer that provides the geothermal resource. If the aquifer remains at acceptable levels, the City plans to continue to apply for water rights and expand the geothermal system by 10 to 15 million gallons per year. Currently, there is good potential to add additional customers to the existing piping.

For the purpose of this analysis, the cost of geothermal energy from the City utility is estimated to be at \$0.86 per therm compared to the current average unit cost of natural gas at \$0.71 per therm. However, the price of natural gas is expected to fluctuate much more than the cost of geothermal energy over time. It should also be noted that some highly efficient buildings that use geothermal currently have the potential to see a cost savings as compared to natural gas.

BOISE'S BEST: The City of Boise will add an additional 10 to 15 million gallons (approx. 40,000-60,000 therms) of geothermal capacity on an annual basis.

Develop Informational Materials for the Land Development and Building Industry

The City has observed that out-of-town developers and contractors are not as familiar with the community's geothermal system and the various benefits that it offers to occupants of buildings served by geothermal hot water. To ensure that contractors are familiar with this renewable resource, the implementation team will conduct an

education campaign so that all contractors working with the City's Building Department are aware of geothermal energy and the successes that other buildings have had.

RECOMMENDED ACTIONS:

- Develop education materials and distribute them to builders through the City's Planning and Development Services Department.

Conduct a Geothermal Cost of Service Study

The City's geothermal resource is a special asset and it is important to understand the unique conditions surround the generation and use of this energy source. The geothermal system provides additional value to residents beyond traditional utilities and the current methods of determining costs for service and connections may need to be updated. Any study should evaluate new options for service and connections that ensure the financial success of the geothermal resource and where possible support the expansion of the system. In addition to a cost of service study, additional analysis to prioritize areas for system expansion should be considered and to determine the feasibility of integrating new technologies, such as solar thermal, sewer heat recovery, combined heat and power, and industrial waste heat recovery (from data centers) into the heating loop.

RECOMMENDED ACTIONS:

- Complete a Geothermal Cost of Service Study for the City utility.
- Consider a Geothermal Demand-side Management Program

Efficiency is an important low-cost method for expanding the geothermal utility and incorporating more buildings without increasing supply. As with electricity and natural gas, a DSM program that offers incentives for using less energy will help to encourage customers to value efficiency. Focusing on end use and distribution system efficiency will allow more customers to be served.

RECOMMENDED ACTIONS:

- Consider development of a Geothermal DSM program for the community around best practices and lessons learned from Idaho Power and Intermountain Gas.

C. RENEWABLE NATURAL GAS (T3)

Renewable natural gas (RNG), or biogas, is an energy source derived from breaking down organic material. It is an alternative to traditional natural gas extraction and can be produced at pipeline-quality standards for distribution to homes and businesses. Biogas sources include waste from dairies, landfills, and wastewater treatment plants. A recent biogas analysis found that Ada and surrounding counties had good methane generation potential (American Biogas Council, 2016). This is an important option for the community since traditional natural gas is not renewable, and to become a 100% renewable energy community, Boise will need to find alternatives to traditional natural gas. Due to the uncertainty of this technology, the community has not set a quantitative target for its use. Instead, it has decided to track the feasibility and cost effectiveness of this technology and identify a working group that includes Intermountain Gas to explore its potential going forward.

BOISE'S BEST: Track the feasibility of incorporating RNG into the community's natural gas mix over the planning period.

RECOMMENDED ACTIONS:

- Evaluate opportunities to partner with Intermountain Gas to capture and use methane at the City's water renewal facilities.
- Track Intermountain Gas' IRP process to identify additional RNG opportunities.

D. RENEWABLE ENERGY SOURCING (T4)

For the community to move toward addressing all its energy use with renewable energy, it is important to identify how all the previous opportunities can be used to address non-renewable thermal energy use. Transitioning thermal energy to renewable sources is often considered the last step of a complete renewable energy transition for the built environment. The exact path is uncertain and will most likely depend on the future mixture of efficiency, renewable electricity, geothermal, and/or RNG.

The easiest transition may come from RNG or geothermal since those technologies will make use of infrastructure and appliances that are already in place and familiar to the community. However, if renewable natural gas is deemed infeasible or geothermal resources are not practical, the community may consider changing to renewable electricity for these thermal energy needs. This will require meeting the renewable electricity target as well as investing in new electrical infrastructure and appliances.

BOISE'S BEST: Transition thermal energy loads to renewable energy, where practical, over the planning period.

Transition to Clean Energy Buildings

As a first step, the implementation team plans to work with a selection of buildings to demonstrate and pilot the process of transitioning existing buildings to 100% renewable energy. These buildings will be selected from the inventory of buildings that currently rely exclusively on the geothermal system for thermal energy. The implementation team will work with these building owners to transition any non-renewable energy uses to renewable energy through energy efficiency measures, distributed renewable energy installations, or green power purchases. Additional demonstration buildings may be explored to showcase other technologies, such as low-temperature heat pumps and solar thermal heating. These buildings could be used to inform developers and train contractors on alternative technologies.

RECOMMENDED ACTIONS:

Begin a dialog with building owners of the 45 identified buildings that rely on the geothermal system for thermal energy. Discuss their interest in becoming 100% renewable energy and how the renewable electricity options included in this plan can help.

Establish and Grow Renewable Energy Districts

Building on the clean energy buildings program, the next step is to establish and grow renewable energy districts. These districts will be comprised of neighboring buildings that use renewable energy for both electrical and thermal loads. District-scale demonstrations could showcase how a neighborhood can incorporate community solar and demand response measures. This action should also align with the effort to create energy benchmarking in Opportunity E1. Buildings that participate in renewable energy districts should also be encouraged to disclose their energy use and track progress in energy use reduction over time.

RECOMMENDED ACTIONS:

Identify new construction or major renovation projects in the community that could serve as demonstration buildings or districts for 100% renewable energy.

3. MUNICIPAL ELECTRICITY GOAL

To support the goals and opportunities of Boise's Energy Future, the City desires to demonstrate leadership in energy efficiency and clean energy at City owned and operated facilities.

In 2018, the City of Boise established a renewable electricity goal for City facilities and operations.

BOISE'S BEST: The electricity that powers the City of Boise's own facilities and operations will be 100% clean by the year 2030.

A detailed plan will need to be developed to support implementation of the goal by City Departments. The plan will account for existing initiatives within the City for efficiency and renewable electricity and where appropriate, incorporate the opportunities identified for the community in this plan.

RECOMMENDED ACTIONS:

- Develop a detailed implementation plan that supports achievement of the City's goal for clean electricity

B. PUBLIC OUTREACH PROCESS

Sharing information and obtaining public input is necessary to support the development of the Boise's Energy Future project and associated planning process. Details for various outreach activities are listed below.

1. WEBSITE

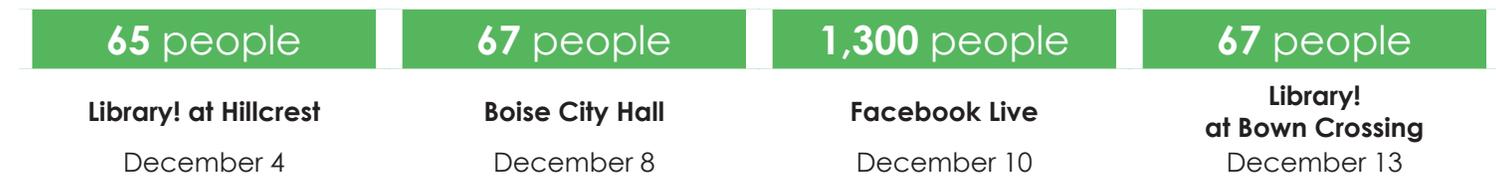
A website with background information on the Boise's Energy Future project was launched in September 2018. During the period from November 1, 2018 – December 31, 2018, the website received 1,312 views with an average time spent on the site of approximately four minutes.

2. E-MAIL

A project specific e-mail address (energyfuture@cityofboise.org) was launched in September to field specific inquiries about the project and to provide project updates. To date, approximately 13 specific inquiries have been received and responded to. Additionally, approximately 150 individuals requested to be included in an e-mail distribution list for project updates.

3. OPEN HOUSES

Four open houses were hosted for the project, three in person and one broadcast with Facebook Live, detailed below:



Format

During each open house, poster presentation stations were developed to share information about the project. Project staff was available at each presentation station to provide additional questions. For the Facebook Live Open House, poster presentations were converted to presentation slides for viewing by participants.

Attendance feedback

Attendees were able to provide informal feedback on the project at the poster presentation stations. First, attendees were able to select three words or phrases that were to identify their priorities for the plan. Attendee selections are summarized in the following graph:

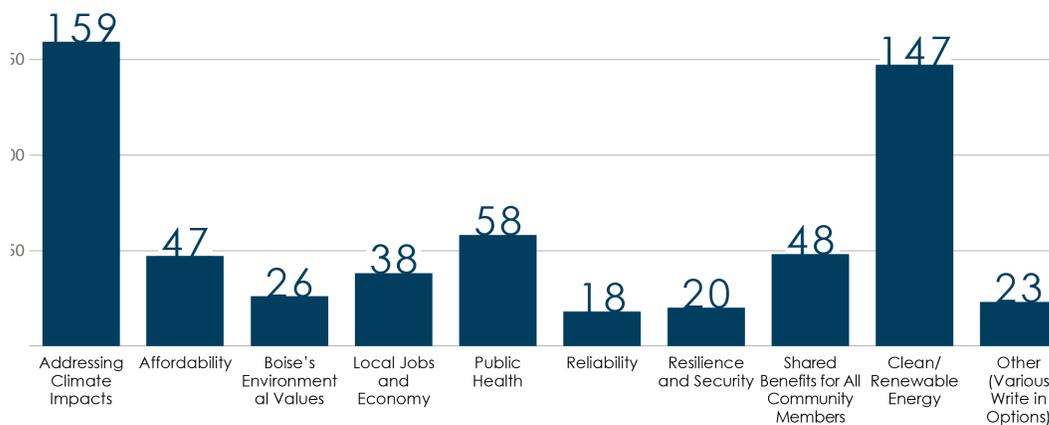


FIGURE 9. BOISE'S ENERGY FUTURE PRIORITIES – ATTENDEE VOTES

Attendees were also able to select their preferences for opportunities associated with the draft goals for electricity and natural gas/geothermal. Attendee selections are summarized in the following graph:

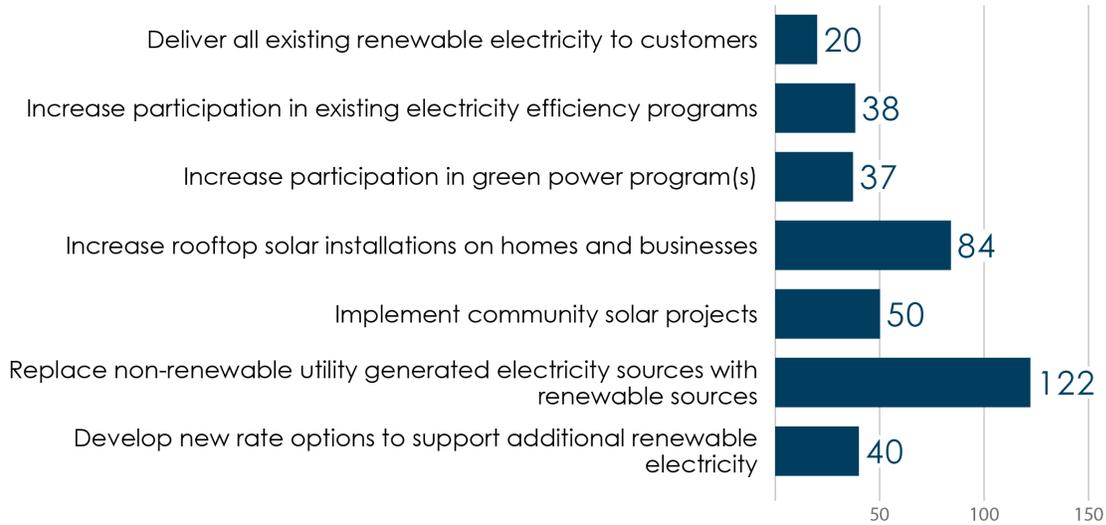


FIGURE 10. ELECTRICITY OPPORTUNITIES – ATTENDEE VOTES

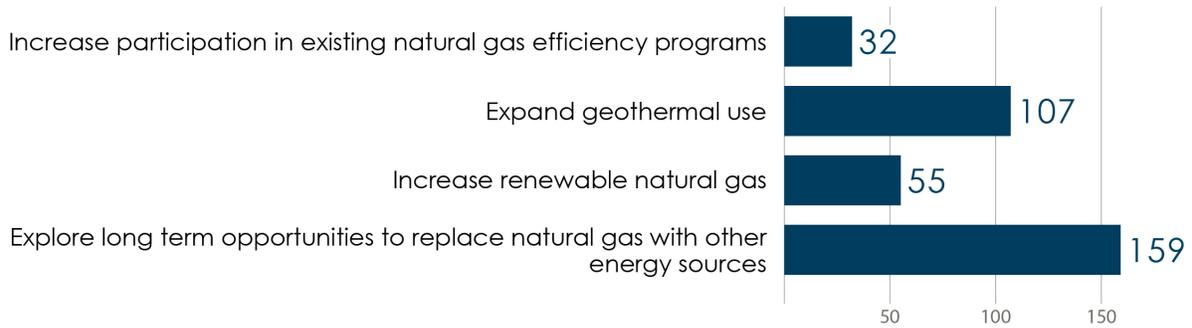


FIGURE 11. NATURAL GAS/GEOHERMAL OPPORTUNITIES – ATTENDEE VOTES

Attendees were also able to provide formal feedback by completing an exit survey following their attendance at the open house. Completed survey responses will be included in the final report.

4. MEDIA OUTREACH

To provide project information and promote the open houses, the City used radio, newspaper, social media and customer newsletters as shown.

SEPTEMBER 13

PRESS RELEASE - *Boise Announces 100 Percent Clean Electricity Municipal Goal by 2030 - Community-wide Goal in Development*

SEPTEMBER 14

IN THE KNOW - E-newsletter - *Mayor Bieter Outlines Major Initiatives in State of the City Address*

Subscribers: 4,900

SEPTEMBER 19

BOISE STATE PUBLIC RADIO - *Boise City Aims At 100 Percent Renewable By 2030 For Municipal Operations*

FACEBOOK - The electricity that powers the City of Boise's own facilities and operations will be 100% renewable by the year 2030

Reach: 12,300 Likes: 300
Shares: 54

INSTAGRAM - The electricity that powers the City of Boise's own facilities and operations will be 100% renewable by the year 2030

Impressions: 7,500
Likes: 600

OCTOBER 3

BOISE WEEKLY - *City of Boise Pledges to Meet Ambitious Clean-Energy Goals by 2030*

NOVEMBER 8

FACEBOOK - Video - What is energy?

Reach: 7,800
Views: 3,800

TWITTER - What is energy?

Impressions: 3,400

YOUTUBE - What is energy?

Impressions: 84

NOVEMBER 15

FACEBOOK - Video - Where does energy come from?

Reach: 7,800 Views: 3,800

NOVEMBER 16

TWITTER - Where does energy come from?

Impressions: 2,900

NOVEMBER 18

YOUTUBE - Where does energy come from?

Impressions: 63

NOVEMBER 27

INSTAGRAM - Do you know where Boise's energy comes from?

Impressions: 8,400 Likes: 840

INSTAGRAM STORY - Do you know where Boise's energy comes from?

Impressions: 6,000
(within a 24-hour timeframe)

NOVEMBER 28

BOISE WEEKLY - *City Open Houses Will Gauge Public Response to Clean Energy Plan*

YOUTUBE - Is it important to plan for our energy future?

Impressions: 57

NOVEMBER 29

IDAHO PRESS - Boise eyes energy goal: Entire city powered by renewable energy by 2040

IN THE KNOW, E-newsletter - *Help Plan Boise's Energy Future*

Subscribers: 5,300

FACEBOOK - Video, Facebook Live Open House

Reach: 1,800 Views: 650

TWITTER - What would you like to know about energy?

Impressions: 2,800

YOUTUBE - What would you like to know about energy?

Impressions: 61

DECEMBER 1

FACEBOOK EVENT - Renewable Energy Open Houses

Reach: 8,600
Responses: 2,600

DECEMBER 6

BOISE WEEKLY - City of Boise Moves Toward 100 Percent Clean Energy

IN THE KNOW, E-newsletter - *Get Involved – Renewable Energy Open Houses*

Subscribers: 5,300

DECEMBER 10

FACEBOOK - What would you like to know about energy?

Reach: 4,500 Views: 1,300
Comments/questions: 22

TWITTER - Promoting Facebook Live Chat

Impressions: 4,200

JANUARY 19

IDAHO MATTERS PROGRAM - January 19, 2019
Community Leaders Discuss Future of Energy In Boise, *Steve Burgos from City of Boise and Idaho Power's Adam Richins*

FEBRUARY/MARCH ISSUE

UTILITY BILLING CUSTOMER NEWSLETTER – February/March, 2019
Charting The Course for Boise's Energy

5. BSU ENERGY FUTURE SURVEY TECHNICAL REPORT

BOISE'S ENERGY FUTURE SURVEY Technical Report

This report was prepared by the Idaho Policy Institute and Energy Policy Institute at Boise State University and commissioned by the City of Boise.



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INTRODUCTION

Many cities across the United States are establishing community-wide goals for a transition to clean and renewable energy sources. In line with a rising tendency toward planning and strategic engagement around transitioning to more sustainable operations, Boise initiated a planning process in 2017, entitled Boise's Energy Future.

The intention of Boise's Energy Future is to develop a plan that will provide a roadmap on how the City of Boise moves towards renewable energy, increased efficiency or other savings, local resilience, and energy security. The planning process includes engaging key stakeholders, such as local utilities, major employers, environmental organizations and the general public. As part of the broader community engagement effort, the City of Boise contracted with the Idaho Policy Institute and Energy Policy Institute at Boise State University to develop, implement and analyze a community survey to gain a better understanding of community members' views on topics the plan will address.

SURVEY METHODOLOGY

Idaho Policy Institute and Energy Policy Institute collaborated with City of Boise to design a survey instrument suitable for measuring community members' attitudes and experiences regarding home energy use, energy generation and climate change. Qualtrics, a web-based online survey software, was used to distribute the survey instrument, which was administered from January 5-21, 2019. The survey was distributed to a sample drawn from a list of 72,433 residential utility account customers. Contact information was provided by the City of Boise. A total of 19,145 invitations were sent out to utility account holders, among which 9,143 were sent through email and 10,002 by postcard. Email and postcard recipients were selected in a manner that prioritized representative distribution across Boise's 10 zip codes. Respondent confidentiality was ensured by managing and reporting data in a manner that maintained the anonymity of the respondents.

The survey received 2,129 total valid responses, among which 1,774 were from email (19.4% response rate) and 335 from postcard (3.5% response rate). The total response rate was 11.1%, although each question varied on number of respondents. This qualified the results with a 95% confidence level with a 2.1% margin of error.

LIMITATIONS

This study is not without limitations, which fall into two categories: respondents and survey design/distribution. The respondents tended to be slightly older, wealthier and more educated than the general City of Boise population. Figure 1 compares survey respondent household income to actual household incomes in Boise, in which the median household income of Boise residents is \$54,547². This is likely because the vast majority of the utility account holders, the population that fed into the respondent pool, were property owners who are more likely to be older and have higher incomes than property renters. The higher response rate of emailed residents (relative to those who received a card through the postal service) may reflect an implicit bias toward technologically savvy respondents.

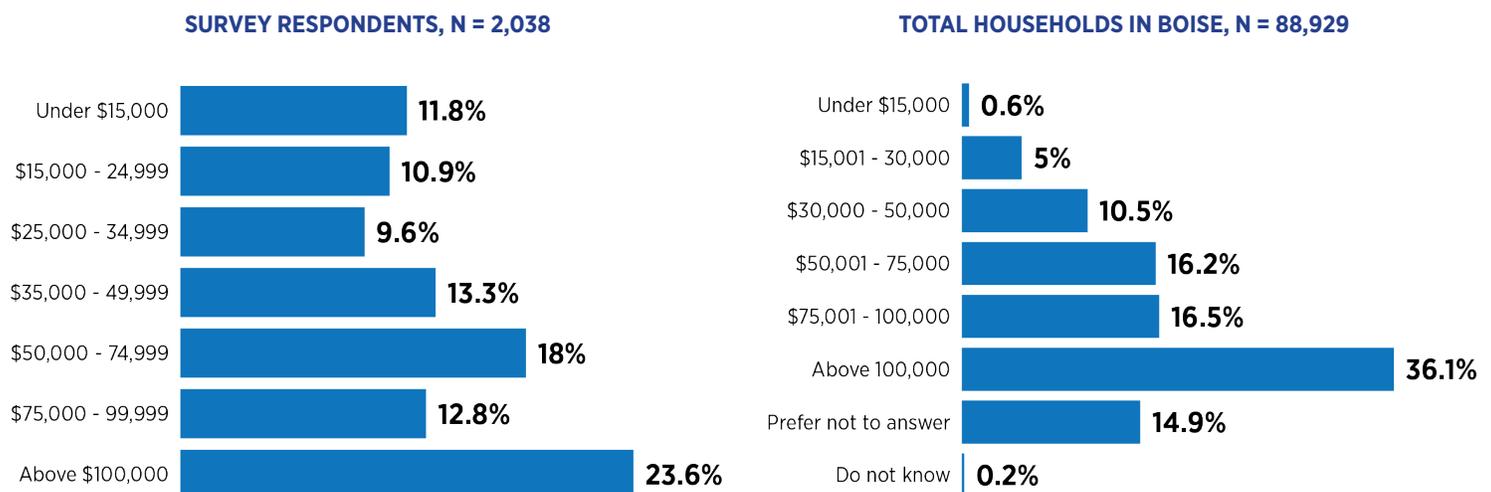


Figure 1: Household income of survey respondents versus actual household income

The research was conceptualized, developed and implemented in conjunction with the City’s needs. The timing of the survey distribution closely followed open house events associated with the planning process. This may have had some bearing on the response rate or the responses.

Finally, the survey was not a purely open-ended and academic study, in line with the City’s scope of needs. Thus, this study had limits on the types and coverage of questions and answers. Definitions could have increased internal validity and response options could be expanded and vary across sectors, technologies, practices, etc.

RESULTS

The results indicate strong and consistent agreement with the City of Boise’s goals to reduce energy use and to transition to clean/renewable energy (57.5%), as well as concern about the impact of climate change (57.1%). As Figure 2 shows, the direction of the public sector effort in these areas aligns with respondent interests. Among those who oppose the City’s goals or who do not agree with climate concerns, there are slightly more respondents who are unconcerned with the impact of climate change on Boise (16.2%) relative to those who disagree with the City’s goals (10.3%). Additionally, the results show strong agreement with the city’s energy goals and climate concerns across all demographic groups.

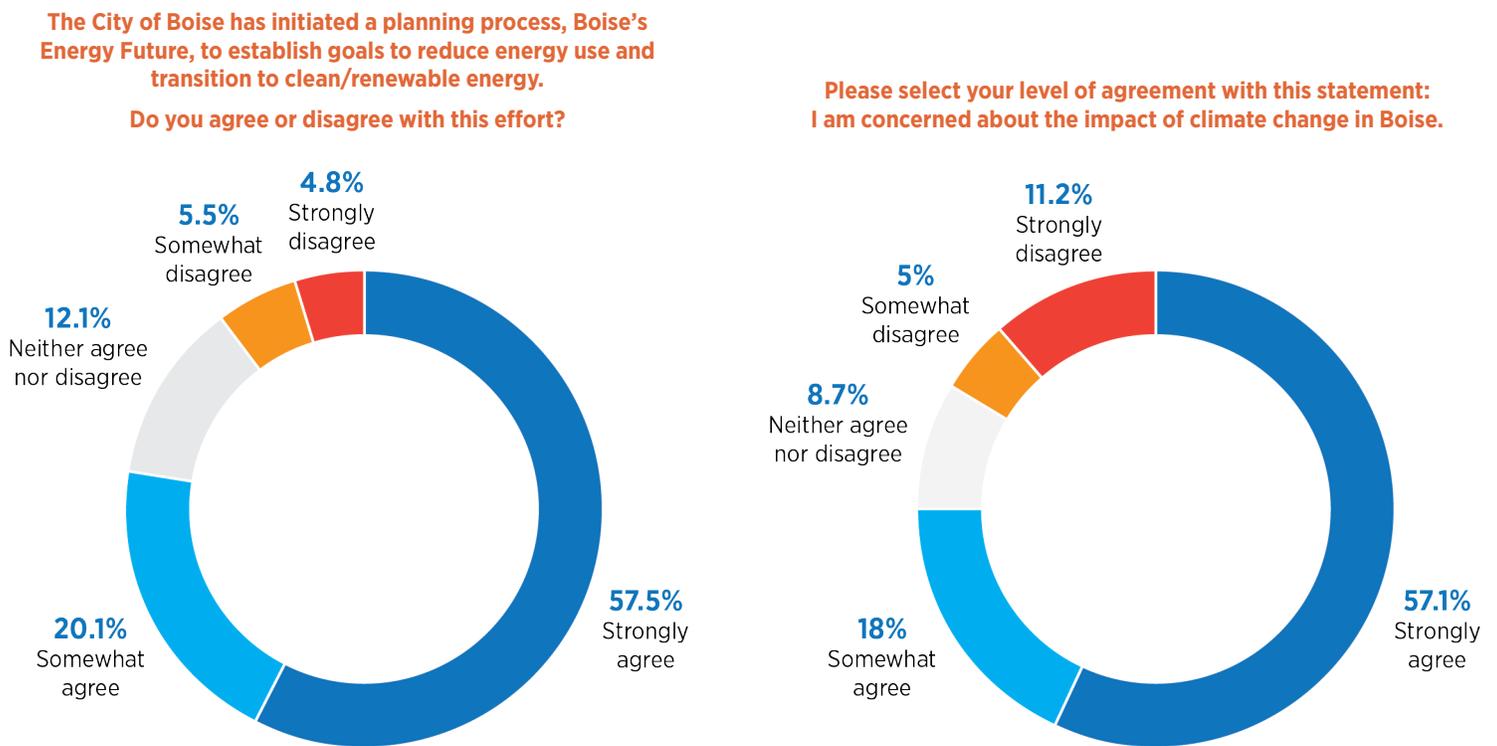


Figure 2: Survey respondents’ agreement with Boise’s Energy Future and climate change

When presented with a choice of multiple priorities, there is dual interest among respondents in clean/renewable energy (60.9%) and affordability (58.8%) as top-ranked priorities in an energy future, as shown in Figure 3. Boise residents prioritize clean/renewable energy sources, but are equally concerned with potential costs associated with a new energy future. The results show that Boise residents are also concerned with a range of other priorities, but to a lesser degree. Roughly half of residents prioritize addressing climate/environmental impacts and just over one-third of residents are concerned with the reliability of energy systems. About a quarter of residents prioritize local jobs and economy, shared benefits for all community members and public health. Only 14.3% of residents chose resilience and security as a top priority.

**As the City of Boise plan a new energy future, which priorities should be considered?
Please choose your top 3.**

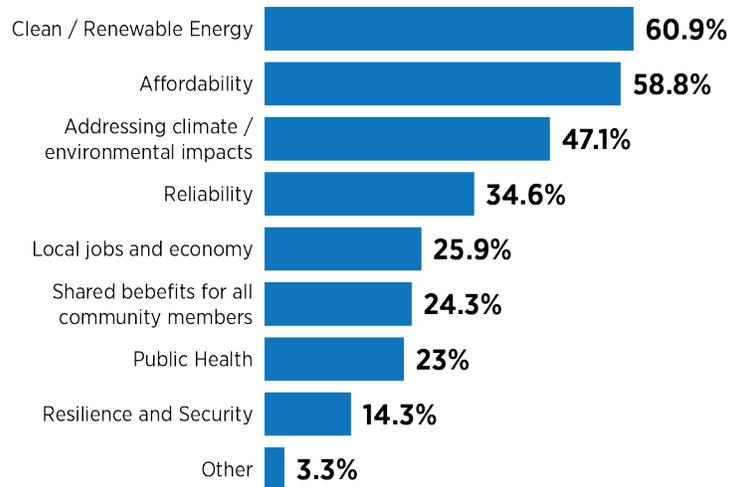


Figure 3: Survey respondents' top energy priorities

The top four fuel choices for Boise's Energy Future are all renewable, as demonstrated in Figure 4. These results indicate that respondents' preferred energy sources align with Boise's clean/renewable energy goals. When asked to choose the top three fuel choices from among seven options, solar energy is favored as a top energy choice by a large majority of residents (82.1%), and is popular across demographic groups. Geothermal is also chosen by 64.2% of residents as a highly preferred option, possibly due to Boise's tradition of geothermal heating in many historic downtown buildings. Wind and hydropower are among the top choices for roughly half of respondents and just over one-third favored natural gas. Only about 5% of residents prioritized oil and coal energy sources.

Which of the following sources of energy would you want to represent the future of energy in Boise? Please choose your top 3.

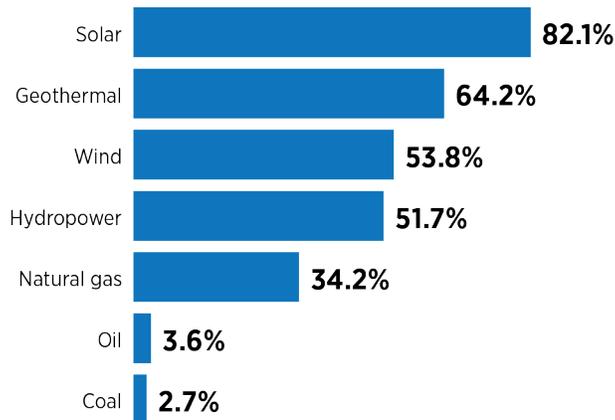


Figure 4: Survey respondents' preferred energy sources

The cost preferences for acceptable, new energy scenarios are mixed. The majority of respondents would accept energy goals that reduce monthly utility costs (71.9%) or result in no change to energy costs (54.7%). A majority of respondents (62.4%) would also accept an initial increase in utilities costs with the potential for long-term savings. A smaller number of respondents (14.4%) would accept energy solutions with no long-term savings. With the survey, respondents could select all of the cost alternatives that were acceptable to them and many respondents chose multiple or all of the four possible scenarios. In fact, 228 respondents chose all four options and 676 respondents chose at least three scenarios. Respondents that selected all four options tended to be younger, wealthier, highly educated and live downtown (83702) and in the foothills (83712). The respondents selecting all four may be indicating their preference for renewable energy outweighs their concern for any associated costs.

Participation in efficiency/clean energy programs and home energy improvements appear to have potential for further development. A slight majority of respondents (52.4%) reported participation in energy efficiency programs offered by utility companies, but almost a third do not participate to date and 16.5% are unsure. Very few respondents reported installing solar panels (8.1%) or wind power devices (0.3%) in their home. Solar panels were reported to be too expensive for a majority (57.3%) of respondents and nearly half were not aware of wind power options. Most respondents indicated installing energy efficient appliances (90.8%) and LED light bulbs (97.4%). 62.2% of respondents reported installing additional insulation. 440 respondents indicated other energy efficiency home improvements. The most common response was upgraded windows or doors (44.8%), which could also be classified as insulation. About 10% of respondents reported changing everyday behaviors to reduce energy use. Other open-ended responses included measures such as energy efficient appliances, electric care, solar devices and landscaping.

DEMOGRAPHIC ANALYSIS

The results show strong support for the City of Boise’s energy goals and concern for climate change across demographic groups. This finding indicates broad agreement with the city’s transition to clean/renewable energy sources. However, there is notably more support for clean/renewable energy and varying energy priorities among certain groups. For instance, the installation of energy efficiency upgrades is more prevalent among some demographic groups.

AGE

Respondents of all ages agree with Boise’s Energy Future initiatives and share concern for climate change. In terms of energy priorities, respondents that prioritize climate issues, equity and clean/renewable energy are younger on average, whereas respondents that prioritize resilience and local jobs and economy tend to be older. Prioritizing natural gas is more prevalent among older respondents. When asked about utility cost, younger respondents are more supportive of the new energy plan regardless of impacts on monthly utility costs. Older respondents are less likely to agree that changes in utility costs are acceptable. A greater proportion of young people chose each of the four potential cost scenarios. The starkest difference by age is that older respondents are more likely to have installed all types of energy efficiency upgrades than younger residents.

ZIP CODE

A majority of respondents in all zip codes show support for Boise’s Energy Future initiatives, as well as concern about climate change. However, support is stronger downtown (83702) and in the foothills (83712) for both the City of Boise’s energy goals and concern for climate change. Similarly, respondents that prioritize climate/environmental impacts and clean/renewable energy are also more likely to live downtown (83702) and in the foothills (83712), whereas respondents that prioritize the local economy and affordability are more likely to live in west Boise (83713 and 83709) and in the Boise bench area (83704). These differences extend to preferred energy sources, as respondents that prioritize solar, wind and geothermal are more likely to live downtown (83702). Notably, there is high support for hydropower in the 83716 zip code, which includes Lucky Peak Dam. Respondents downtown (83702) and in the foothills (83712) seem less concerned about increased utility costs and are more likely to have installed solar panels than respondents in other areas. Residents in the Boise bench area (83705) are less likely to have installed energy efficient appliances.

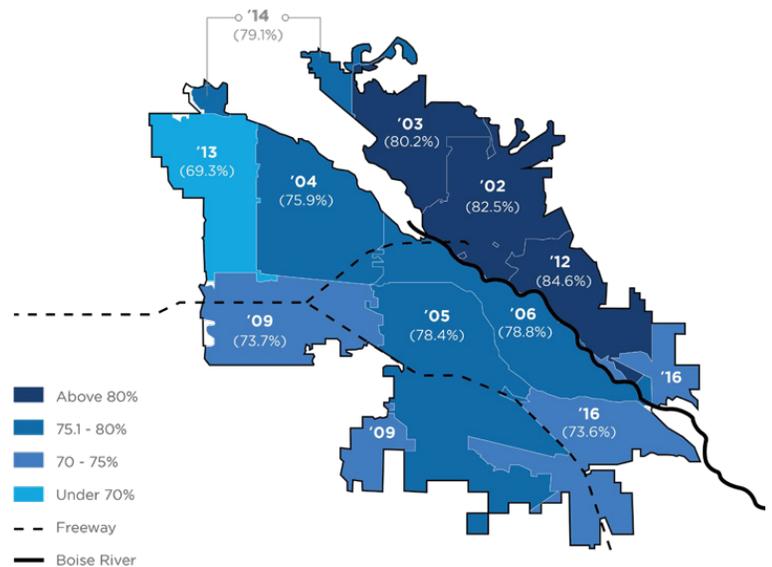


Figure 5: Boise’s Energy Future - % respondents agree by zip code

YEARS IN BOISE

There are some differences based on how long a respondent has lived in Boise. Respondents that prioritize resilience, climate impacts and clean/renewable energy tend to have lived in Boise for fewer years, whereas those who prioritize equity and affordability tend to have lived in Boise longer. Respondents that have lived in Boise fewer years tend to also be less concerned about increased utility costs. Respondents that have lived in Boise longer were more likely to have installed energy efficient appliances and additional insulation.

GENDER

On average, women and men have somewhat different views of Boise's Energy Future. Although a majority of both women and men agree with clean/renewable energy solutions, women are more likely to agree. Women are somewhat more likely to favor options that will reduce utility costs or result in long-term savings. Although men and women both prioritize affordability, men tend to prioritize the local economy, reliability and resilience at higher rates, whereas women prioritize equity, climate concerns, clean/renewable energy and public health. Respondents that prioritize solar and wind are more likely to be women. Respondents that prioritize natural gas, oil, coal and hydropower are more likely to be men.

EDUCATION

There are a few associations that are evident in the study, based on respondent education level. Respondents with more education tend to agree with climate issues at higher rates but are less concerned about cost and affordability. When asked about utility costs, respondents with at least a four-year degree are less concerned with increased costs. There is strong support for geothermal among college educated residents and a trend in support of natural gas for those without college degrees.

DISCUSSION AND FUTURE RESEARCH

Looking across the findings, an opportunity exists for future research and to implement near-term and longer-term policies to support City of Boise's vision for a clean and renewable energy future.

The mixed results on cost preferences for acceptable, new energy scenarios could be better understood with additional research. Respondents valued affordability while showing mixed preferences for different utility cost scenarios. Specific cost scenarios or exact dollar amounts may have impacted responses. In addition, the relationship between clean/renewable energy goals and affordability is nuanced and complex. These results illuminate a need to better understand residents' preferences by taking into consideration a more complete scope of options and tradeoffs including specific economic, social and environmental factors.

It would also be worthwhile to explore more fully why some residents are not participating in home improvement efforts, and if various age groups respond differently to attainment options. Information sharing appears to be an important area for continued effort, such as with energy audits or peer benchmarking to advance home energy improvements. Future research would benefit from surveys or focus groups that present more nuanced options of energy efficient upgrades. This would ensure a better understanding of the barriers to installing energy efficient upgrades and could be used to direct policy or programmatic changes.

Future research should also try to correct for the limitations encountered by this study. This study drew its respondents from city utility account holder information provided by the City of Boise Public Works Department. A more representative survey could draw respondents from more inclusive sources. Other sources of respondent contact information may lead to a more representative sample that does not disproportionately capture the views of affluent residents. However, gaining access to such contact information can be cost-prohibitive.

It is noteworthy that the response rate for postcard invitations was significantly lower than email invitations. This suggests that the benefits of mailing survey invitations and inclusion might not outweigh the costs of producing and distributing the postcards. The additional steps required to complete a survey from a postcard invitation are the likely reason for the low response rate. Future research should consider the ease of accessing online surveys and use electronic distribution when possible.

CONCLUSION

This study is a critical step in determining the compatibility of the City with respect to Boise's Energy Future and the priorities of Boise residents. The research demonstrates a high affinity with Boise's Energy Future on behalf of the respondents. The top-ranked and nearly equal interests in clean/renewable and affordable energy highlight a balance that the City of Boise should strive to maintain in its planning efforts. Although the results show strong support for the City's energy initiatives, this study points to areas for future research to develop more nuanced insight on Boise residents' views on energy use and energy efficiency upgrades. As Boise's Energy Future efforts move forward, the City of Boise has an opportunity to continue engaging stakeholders in evaluating tradeoffs, monitoring and reviewing the plan's progress. Doing so will ensure that the City of Boise continues to deepen its understanding of the perceptions and priorities of its residents.

ENDNOTES

¹Bouton, S., Newsome, D., and Woetzel, J. (2015). Building the Cities of the Future with Green Districts, McKinsey & Company, <https://www.mckinsey.com/business-functions/sustainability/our-insights/building-the-cities-of-the-future-with-green-districts>.

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²U.S. Census – 2017 American Community Survey. The Census data includes additional income categories.

C. COMMUNITY ROLES

A successful renewable energy plan requires prompt action so that the community can achieve the ambitious but practical goals it has set for itself. City staff has already committed to leading the implementation of the programs and initiatives necessary to support these goals. However, the city cannot do it alone. Residents, businesses, and local technical experts all have a role in making this planning process a success and transitioning the community to renewable energy goals. After this plan is completed the implementation path will be created. City Staff will lead this next phase and will recruit members of the community to assist and build momentum.

1. HOMES & BUSINESSES

The role of households and businesses after the adoption of this plan is to act on energy improvements and, when possible, invest in renewable energy sources. The bullets below layout steps that homes and businesses can take to first reduce energy use and then invest in renewable energy options.

- Conduct an energy audit of your home or business.
- Businesses, benchmark your organization's annual energy use to comparable buildings using ENERGY STAR Portfolio Manager. This will help to identify your opportunity for energy reduction and cost savings.
- Investigate Idaho Power and Intermountain Gas' efficiency programs and identify which energy efficiency upgrades may make sense for you. This may include adding insulation, upgrading HVAC equipment, or installing LED lighting.
- Consider installing rooftop or on-site solar on your home or building.
- If purchasing your own solar array does not make sense, consider community solar or green power purchases.

2. TECHNICAL STAKEHOLDERS

During implementation, technical stakeholders will play a key role in the implementation teams. City staff will lead these teams, but others will be asked to support and collaborate on how the actions identified in this plan are carried out. Below is a list of roles the community will look to stakeholders to complete.

- Partner with the City to implement programs and actions
- Use your organization to promote the goals and opportunities of Boise's Energy Future and encourage other community members to take part.
- Provide advisory technical or regulatory input to teams supporting the implementation of goals and opportunities.
- Incorporate the goals and opportunities of Boise's Energy Future into your organization or personal life.

D. OTHER INITIATIVES

1. ELECTRIC VEHICLES

Electric vehicles (EVs) are increasingly popular and, according to some projections are anticipated to increase significantly in the coming years. As EVs become more prevalent in the local vehicle mix, it is important to understand how this change will impact electric power generation and demand. This change will come with costs, including potential pressure on the electric grid and significant investments in infrastructure. Considerable planning is required for an efficient transition. Boise is working on an Electric Vehicle Readiness Guide, which will help the community prepare for and adjust to the significant changes that are anticipated.

In our municipal operations, Boise has begun our investment in the transition to electric transportation. Five EVs and two plug-in hybrid electric vehicles have been added to the city's fleet and six public charging locations established. Additional EVs and charging locations are being considered. However, costs are significant, and an organized path forward is necessary. The readiness guide will help organize the development of an EV plan that will lay out the direction for effective integration of EVs into municipal operations and the community. Best practices and experiences from other cities further along in their EV planning and the considerations needed to successfully incorporate EVs into the local vehicle mix will be discussed.

Additionally, City staff is coordinating with Idaho Power and other stakeholders to better understand opportunities to support and plan for EV implementation in the community.

2. CARBON OFFSET

While Boise's Energy Future is focused on reducing the use and transitioning our community energy to renewable sources, it is important to mention other local efforts to mitigate carbon. One effort of note is the recently developed Treasure Valley City Forest Credits Program, which followed the completion of the Treasure Valley Forest Carbon Assessment. The Forest Credits Program proposes to generate registered carbon credits from various tree planting efforts throughout the Treasure Valley. Credits could be purchased by businesses or other entities seeking to offset their carbon emissions.

IV. IMPLEMENTATION TRACKING AND PLAN UPDATES

Considering the disruptive changes that are occurring currently with renewable energy technology, energy policy and other issues related to the Boise's Energy Future plan, it is important that the plan be considered as a living document. It is possible that opportunities or actions could be adjusted based on implementation progress, technological advances or regulatory changes. The project team proposes to annually track progress towards the goal and implementation activities, to prepare a progress report every two years (starting in 2020) and to update the plan every five years during the implementation timeframe.

RECOMMENDED ACTIONS:

- Develop reporting templates and tools to track progress of implementation activities.
- Develop a schedule to complete periodic updates to the planning document.

V. GLOSSARY OF TERMS AND ACRONYMS

Affordable – An option that is cost effective and any necessary expense falls within the realm of the community's budget.

BTU – British Thermal Unit

CII – Commercial, Industrial and Institutional

Clean energy – Existing large scale hydro-electric facilities. In the future, this interpretation could be modified based on advances in energy technology, regulatory changes or other relevant reasons.

Climate change – Major, long-lasting changes to climate over time.

Community energy – All the energy used to power Boise, heat and cool homes, and allow Boise's businesses and institutions to operate and grow. Specifically, this includes electricity, natural gas, and geothermal energy.

Community solar – A medium-sized solar array (e.g. 500 kW) that can provide electricity for a small group of homes or businesses. Members of the community can subscribe to community solar to offset a portion of or all their electricity bill.

Demand-side management (DSM) – Actions that a utility undertakes to reduce the overall demand for electricity within its system. This may include incentivizing energy efficiency and shifting industrial loads outside of peak times. DSM increases the reliability of the grid during periods when generation requirements are at their highest and decreases the need for the utility to invest in additional generation while still allowing the community to grow.

EEAG – Energy Efficiency Advisory Committee

Economic development – Improvements to a community that lead to investments from inside and outside the community that increase the community's wealth and standard of living.

Energy efficiency – Technologies, strategies, or equipment upgrades that allow a home or building to use less energy. These improvements generally increase the effectiveness of a process or piece of equipment or reduce the amount of time that a process or piece of equipment is powered.

Energy storage – Equipment or processes that allow energy acquired at a point in time to be used later. Examples may include battery storage, compressed air, or pumped hydroelectric storage.

EV – Electric Vehicle

Geothermal energy – An energy source that comes from heat stored inside the earth's core and is considered renewable. Energy is provided to residential and business customers in the form of hot water pumped directly from the ground. It is used primarily for heating buildings.

Green power rate – An alternative to traditional electricity rates in which a utility provides interested parties with renewable energy at a contracted unit cost over time.

Integrated Resource Plan (IRP) – The required planning process that utilities undergo to estimate their future loads and determine what sources will be used to meet those loads.

IRPAC – Integrated Resource Plan Advisory Council

kW – Kilowatt

kWh – Kilowatt hour

Local economy – A community's interconnected financial network.

Local investment – Purchases made by the community where funds are utilized to support local energy generation, energy efficiency or similar activities as opposed to purchases that support energy fuels that are generated outside of the community.

MMBtu – Million British Thermal Units

MWh – Megawatt hour

Net metering – The practice of generating electricity at a location and sending any surplus electricity out to the electrical grid or drawing from the electrical grid, if needed. This allows homes and businesses to balance the electricity that is generated at their location with purchases from the grid when they are not generating electricity.

On-bill financing – A financing mechanism that allows customers to invest in energy efficiency or renewable energy upgrades to their home or building and pay for the investments over time as part of their monthly utility bills.

On-site renewable electricity – Individual renewable energy installations, such as a rooftop solar array, that allow a home or building to generate renewable energy to serve their location.

Power purchase agreement (PPA) – A financial agreement where the customer invests in a renewable energy project in exchange for a portion of the renewable energy credits (RECs) generated. The seller builds or installs the renewable energy generation project and the buyer pays for the energy that is generated on a per unit basis with the cost of the seller's investment factored in.

Physical PPA – A PPA where the renewable energy purchased is physically delivered to the customer.

Virtual PPA – A PPA where the renewable energy is not physically delivered to the consumer and may not even be generated in the same region. The customer gets the RECs and the actual energy is sold to the grid and cannot be considered renewable by any other entity.

PUC – Public Utilities Commission

PV – Photovoltaic

Reliability – Consistent provision of energy to an entire service area at any given point in time. Reliability is a concern when a utility does not have the necessary amount of generation capacity to fulfill its customer's demands or aging infrastructure. A lack of reliability can lead to brown or black outs.

Renewable energy – Energy generated from fuel sources that naturally regenerate over a short period of time. Examples of these fuel sources include sunlight, wind, moving water, biomass, and geothermal. New and existing energy sources that are generally non-reliant on fossil or carbon-based fuels including solar, wind, geothermal and new small scale hydro-electric facilities. This list is not exhaustive and other renewable energy technologies or practices may be considered on a case by case basis. In the future, this interpretation could be modified based on advances in energy technology, regulatory changes or other relevant reasons.

Renewable energy credits or certifications (RECs) – Non-tangible property rights of electricity generated by renewable sources – the clean energy attributes, where 1 megawatt-hour of electricity is equal to 1 REC.

Renewable natural gas (RNG) – An alternative to conventional natural gas that comes from sources such as wastewater treatment and agricultural or municipal waste streams. The gas that is generated from these processes can be upgraded for use in conventional natural gas equipment. These sources are considered renewable because the process of burning renewable natural gas is carbon neutral.

Resilience – The ability to prepare and plan for, absorb, respond to, recover from, and more successfully adapt to adverse events (The National Academies, 2012).

Thermal energy – Energy that is used to heat, such as space heating, water heating, and cooking for homes and businesses as well as process loads for industrial facilities. Natural gas and geothermal energy use generally fall into this category.

Time-of-day pricing – Structured utility rates that change throughout the day based on the community's demand for electricity. Generally, electricity costs more when more customers are using electricity and less when less customers are using electricity. Homes and businesses that can make changes to when they use electricity can reduce their monthly utility bill through time-of-day pricing and electric utilities can smooth their demand profile, which allows them to delay or forgo investing in additional generation.

Utility-scale renewable electricity – Very large renewable electricity installations (e.g. greater than 1 MW) that are implemented by the utility and fed directly into the utility's electric grid. These installation projects do not require a utility customer to opt-in to receive electricity from these sources.

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APPENDIX A: ADDITIONAL FINANCIAL ANALYSIS DETAILS

Electricity Roadmap (through 2040) (In millions of dollars)

Opportunity Title*	Contribution to Goal	Cumulative Capital and Operational Cost	Cumulative Operational Savings	Net Present Value	Cumulative Risk or Benefit	Total Value with Risks and Benefits
E1. Electricity Efficiency	15%	\$140M	\$690M	\$350M	\$40M	\$390M
E2. Existing Utility-scale Renewable Electricity	46%	\$50M	-	(\$30M)	\$150M	\$120M
E3. New Utility-scale Renewable Electricity	23%	*	*	*	\$180M	\$180M
E4. Green Power Procurement	2%	*	*	*	\$10M	\$10M
E5. On-site and Community Renewable Electricity	5%	\$350M	\$260M	(\$90M)	\$20M	(\$70M)
E6. Existing Green Power Programs	8%	\$50M	-	(\$30M)	\$40M	\$10M
Total	100%	\$590M	\$950M	\$200M	\$440M	\$640M

TABLE 3. ELECTRICITY ROADMAP ACCELERATED CUMULATIVE RESULTS THROUGH 2040

Electricity Roadmap (through 2040) (In millions of dollars)

Opportunity Title*	Contribution to Goal	Cumulative Capital and Operational Cost	Cumulative Operational Savings	Net Present Value	Cumulative Risk or Benefit	Total Value with Risks and Benefits
E1. Electricity Efficiency	-	-	-	-	-	-
E2. Existing Utility-scale Renewable Electricity	40%	-	-	-	-	-
E3. New Utility-scale Renewable Electricity	-	-	-	-	-	-
E4. Green Power Procurement	2%	*	*	-	\$20M	\$20M
E5. On-site and Community Renewable Electricity	5%	\$350M	\$260M	(\$40M)	\$10M	(\$30M)
E6. Existing Green Power Programs	-	*	-	*	*	*
Total	44%	\$140M	\$90M	(\$40M)	\$30M	(\$10M)

*The results for E6 fall below the rounding threshold for the overall scenario therefore its results are no included.

TABLE 4. ELECTRICITY ROADMAP BUSINESS AS USUAL CUMULATIVE RESULTS

APPENDIX B: STAKEHOLDER GROUP INFORMATION

TO: File
FROM: Steven Hubble, Project Manager
DATE: 3/26/2019
RE: Boise's Energy Future – Expert Stakeholder Group Summary

BACKGROUND

Sharing information and obtaining input is necessary to support the development of the Boise's Energy Future project and associated planning process. The project team established a group of expert stakeholders to provide initial and ongoing technical input during the project.

EXPERT STAKEHOLDER GROUP MEMBERS

The expert stakeholder group consists of the following members representing utility companies, significant energy users, environmental interests and other energy experts.

MEMBER	ORGANIZATION
Adam Richins	Idaho Power
Ben Otto	Idaho Conservation League
Billie Jo McWinn	Idaho Power
Brad Ware	Intermountain Gas
Brandy Wilson	Simplot
Bryan Wewers	Idaho Power
Casey Mattoon	Sierra Club
Cheryl Imlach	Intermountain Gas
Crystal Rain	Conservation Voters of Idaho
Demi Fisher	Micron
Elizabeth Cooper	University of Idaho-Integrated Design Lab
Jason Blais	City of Boise – Building Official
Kevin Tolman	Simplot
Lauren McLean	Boise City Council
Leif Elgethun	Idaho Clean Energy Association
Mark Chiles	Intermountain Gas
Michael Hagood	Idaho National Laboratory
Nic Miller	City of Boise – Economic Development
Selena O'Neal	Ada County
Stacey Donahue	Idaho Public Utilities Commission Staff
Suzy Arnette	Boise State University
Theresa Drake	Idaho Power
Zack Waterman	Sierra Club

GROUP MEETINGS

The stakeholder group has met twice and is scheduled to meet for a third time on February 20, 2019.

March 1, 2018 - Meeting #1

The project team provided background information and information on data collection to the group. The group provided input on the draft vision and priorities for the project.

July 13, 2018 – Meeting #2

The project team presented a first draft of the goals and objectives to the group. The group provided input on the draft goals and objectives and identified preliminary opportunities for implementation partnerships.

February 20, 2019 – Meeting #3

The project team will present a summary of recent public outreach efforts and share the draft of the planning document for input. The group will have an opportunity to review the draft plan.

MEETING SUMMARIES

Introductory Workshop

March 1, 2018

2:00 p.m. – 4:00 p.m.

Greenbelt Room, City Hall 1 – Third Floor

ATTENDEES

MEMBER	ORGANIZATION
Adam Richins	Idaho Power
Bryan Wewers	Idaho Power
Theresa Drake	Idaho Power
Ben Otto	Idaho Conservation League
Kevin Tolman	Simplot
Elizabeth Cooper	University of Idaho - Integrated Design Lab
Crystal Rain	Conservation Voters of Idaho
Stacey Donahue	Idaho Public Utilities Commission
Demi Fisher	Micron
Brad Ware	Intermountain Gas
Cheryl Imlach	Intermountain Gas
Jason Blais	City of Boise - Planning and Development Svcs.
Selena O'Neal	Ada County
Casey Mattoon	Sierra Club

PROJECT AND CONSULTANT TEAM

MEMBER	ORGANIZATION
Steve Burgos	City of Boise - Public Works
Haley Falconer	City of Boise - Public Works
Steve Hubble	City of Boise - Public Works
Jami Goldman	City of Boise - Public Works
Beth Baird	City of Boise - Public Works
Amy Parrish	City of Boise - Public Works
Colin Hickman	City of Boise - Community Engagement
Judy Dorsey	Brendle Group
Zach Taylor	Brendle Group
Britt Ide	Ide Energy & Strategy

AGENDA

2:00 p.m. – 2:20 p.m.	Welcome and Introductions
2:20 p.m. – 2:50 p.m.	Project Overview/Energy Background Purpose: Introduce the group to the project scope, overview of work, and energy baseline.
2:50 p.m. – 3:20 p.m.	Vision for Boise's Energy Future Purpose: Review examples and get input on a vision statement for Boise's Energy Future.
3:20 p.m. – 3:50 p.m.	Participant Feedback Purpose: Identify stakeholder's energy goals and areas for collaboration.
3:50 p.m. – 4:00 p.m.	Wrap up and Next Steps

PRESENTATION SLIDES (Attached)

DISCUSSION SUMMARY

WELCOME AND INTRODUCTIONS (SLIDES 3-15) – STEVE BURGOS

PROVIDE BACKGROUND ON "BOISE'S ENERGY FUTURE" PROJECT AND CITY ACTIONS TO DATE

CITY ACTIONS (SLIDE 4)

Mayor signed the U.S. Mayors Climate Protection Agreement in 2006 and 2014; agreement identified action steps for cities

City action with municipal operations (i.e. electric vehicles into fleet, establishment of LIV District in the Central Addition, first net zero energy commercial building at Twenty Mile South Farm).

BOISE CLIMATE ADAPTATION ASSESSMENT (SLIDE 5)

Completed by University of Idaho

Localized analysis of potential impacts on Boise from climate change including heat stress days, air quality, and water-related issues

CURRENT ENERGY SUPPLY (SLIDE 6)

Our utilities provide cost-effective and reliable energy

Idaho Power has invested in Demand Side Management(DSM) and energy efficiency programs and Intermountain Gas is implementing a new DSM program; City participation at a water renewal facility resulted in a 14% energy use reduction

Idaho Power's Energy Sources

2016 data is shown in figure; preliminary data for 2017 indicates that the generation mix was approximately 70% carbon free

OUR ENERGY FUTURE (SLIDE 7)

As we consider "Boise's Energy Future" it is important to understand the potential impacts the local economy, opportunities for improving the resiliency and reliability of the energy system and contributions to economic development. This discussion provides context for the public that is beyond the typical messaging about climate change and renewable energy.

RENEWABLE ENERGY COST DECLINES (SLIDE 8)

Global costs of generating energy from renewable technologies continue to decline (*see graphic – does not include storage costs which can support integration of renewable energy applications)

CORPORATE INTEREST IN RENEWABLE ENERGY (SLIDES 9-10)

Many larger corporations are interested in renewable energy, and not just the usual suspects, because it can support energy cost stability

From a City economic development perspective, renewable energy sources are becoming more important in business growth and attraction to Boise

ENERGY SECURITY AND THE LOCAL ECONOMY (SLIDES 11-12)

Graphic provides an example of investment that City residents and businesses make in fossil fuels annually (*costs approximate - includes transportation fuels) and how those funds could be used locally to support renewable energy

EMERGING TECHNOLOGIES (SLIDES 13-15)

Vehicle-to-grid (V2G) – transfer of energy between electric vehicle batteries and grid based at times of varying demand

Energy Storage - storage supports integration of renewable energy to the grid

Zero Net Energy Buildings – example at City Twenty Mile South Farm

PROJECT OVERVIEW (SLIDES 16-20) – STEVE HUBBLE

Discuss project background including scope, tasks and schedule

PROJECT BACKGROUND (SLIDE 17)

Cities in U.S. and worldwide are participating in various climate and energy planning activities

The City initiated a planning process ("Boise's Energy Future") to evaluate opportunities for improving energy efficiency, increasing renewable energy and supporting the local economy with local energy production. Brendle Group and Ide Energy & Strategy were hired to lead this planning effort. The consulting team has background with similar projects supporting both communities and investor owned utilities in energy planning efforts.

PROJECT ELEMENTS (SLIDE 18)

Development of an achievable community-wide plan and vision for "Boise's Energy Future"

Consideration/establishment of goal(s) and identification of programs and initiatives to implement goals

A timeline and a framework for measuring progress

Community/stakeholder input during the planning process

PROJECT TASKS (SLIDE 19)

Data collection and Baseline

Identify sources and usage of energy in the community

- The project includes the city's residential, commercial, industrial, and institutional sectors
- Sources of energy include electricity, natural gas, and geothermal

Group Discussion: “Community Energy”

- Includes buildings, facilities, and all other ancillary uses throughout the City of Boise (not just City government)
- Does not include transportation system energy at this time

Goals, Programs, and Initiatives

- Goals are achievable and practical
- Planning process supports goal setting instead of the opposite
- Goals are community wide but may include additional actions for City government (municipal) operations to lead by example
- Programs and initiatives will be implemented to support achieving the goals

Regulatory and Technical Analysis

- Ensure that goals, programs and initiatives are possible from a technical and regulatory context
- Determine economic impacts of goals, programs and initiatives

Planning

- The project will include a detailed internal planning document and a public facing plan
- The documents will include identified goals, programs, initiatives, implementation timeframes and metrics to assess progress

PROJECT SCHEDULE (SLIDE 20)

Project commenced in Fall, 2017. Tentative completion date is late summer 2018.

ENERGY BACKGROUND (SLIDES 21-24) – JUDY DORSEY PRESENT CURRENT BASELINE ENERGY DATA

COMMUNITY ENERGY SOURCES (SLIDE 22)

Data provided by City of Boise; includes actual data from utilities for 2015 (baseline year)

- Electricity usage split is 44% residential and 56% Commercial, Industrial, and Institutional (CII)
- Natural Gas split is 53% residential and 47% CII

Idaho Power Generation Mix

- Electricity supply data for 2016 (Idaho Power IRP)
- Renewable sources include hydroelectric power and portions of “purchased power”

COST SUMMARY (SLIDE 23)

Community electricity costs are based off DOE database unit costs and natural gas costs are based on DOE's Cities LEAP (2015 Baseline)

- Can utilities or stakeholders provide additional information?

Cost forecast

- Reflects a business-as-usual forecast with escalation
- Cost escalation is a national forecast based on EIA's Annual Energy Outlook 2017
- Electricity growth based on Idaho Power's 2017 IRP
- 1.2% for the residential sector; 0.7 % for the CII sector
- Natural Gas growth based on Intermountain Gas' 2017 IRP
- 1.8% for the residential sector; 1.3 % for the CII sector
- The planning process will complete additional financial analysis to identify cost impacts of goals, programs and initiatives

RENEWABLE ENERGY (SLIDE 24)

Defines renewable energy; important to note that energy efficiency and renewable energy are complimentary in planning process

Group Feedback: Consider metrics that look at bills and not just rates

- Information on energy use and cost is always helpful for the community
- Stakeholders are working hard to measure Energy Use Intensity in their buildings to help inform the energy efficiency discussion in Boise

VISION FOR BOISE'S ENERGY FUTURE (SLIDES 23-32) – HALEY FALCONER OBTAIN INPUT ON A VISION STATEMENT FOR BOISE'S ENERGY FUTURE

VISION BACKGROUND (SLIDE 26)

Boise's current vision is to be the most livable city in the country.

What are the parts and pieces that are most important about energy that need to be included in the vision statement?

The vision is the ideal and is for our entire community, not just City government.

Today's goal is to inform the planning team outcome on elements of the vision statement that are important to this group.

EXAMPLES (SLIDES 27- 30)

Department of Energy Guidance - [Link](#)

Arlington, VA - [link](#)

- Example of a narrative vision without a specific timeline or specific strategies that will be involved

Minneapolis, MN - [link](#)

- Six priorities that create the vision and it includes language from a utility perspective
- Utility partnership important in this vision; the city cannot do this on its own
- Demand response and efficiency is downplayed

Group discussion: Importance of energy efficiency for Boise Plan

Efficiency can be challenging and it may not have the appeal that renewables do

Efficiency is a clean resource and can be little or no cost and can happen soon where renewable energy may be more long term

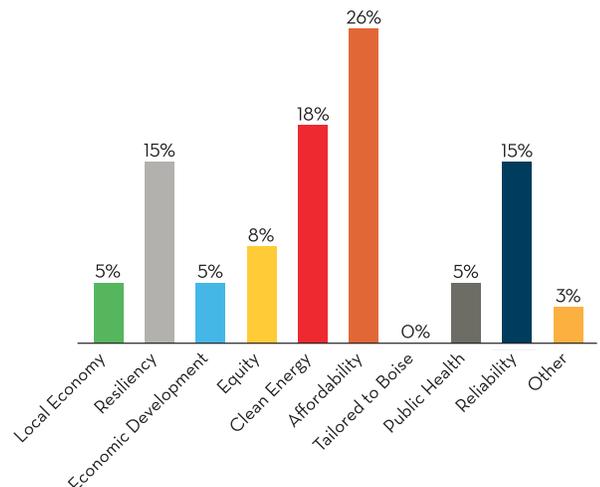
Fayetteville, AR - [link](#)

- Broad vision with 8 areas of focus

RESULTS OF KEYPAD POLLING (SLIDE 32)

Group Discussion: What other priorities have not been mentioned?

- Education, Air Quality and Regional leadership/innovation
- The group discussed concerns about potential State legislation that would impact the ability for cities and counties to enact enhanced code requirements for buildings. This could impact the ability to pass future upgrades to energy codes.



PARTICIPANT FEEDBACK – BRITT IDE

OBTAIN FEEDBACK FROM MEETING ATTENDEES

Group Discussion: What are your organizations' energy priorities or priorities for this planning process?

- **Affordable reliable power and resiliency are important**
- **Site-by-site energy savings - driven by customers and investors**
- **Some organizations had corporate goals with either a focus on carbon footprint or consideration of renewable energy opportunities**
- **Utilities' priorities include providing customer incentives for energy efficiency**
- **Cost is a driver in making decisions but there is a difference between cost and cost-effectiveness**
- **Keeping up with the energy code**
- **Benchmarking building stock**
- **Energy education/awareness**
- **Energy efficiency research and optimizing performance**
- **Keeping Idaho as a great place to live**
- **Cost and reliability is common ground**
- **Moving to a clean energy system will empower and educate citizens and companies**
- **Organizational goals to decarbonize by 2050 (2030 for electricity sector), reduce transportation fuels by 50% compared to 2005, and overall a focus on public education and public involvement in the energy conversation**

WRAP UP AND NEXT STEPS – STEVE HUBBLE IDENTIFY NEXT STEPS

This is a new planning project for the City and we are being deliberate in formulating our next steps.

All the stakeholders agreed that they would like to stay up-to-date on the project. The group may reconvene once additional progress is made on the project.

Group discussion: Who is not at the table?

- **Small business representatives**
- **Homeowners or associations**
- **Community Action Partnerships (Weatherization Organization)**
- **Renewable Energy Industry Rep (i.e. solar installer, project developer)**
- **State Chamber of Commerce**
- **Idaho Office of Minerals and Energy**

STAKEHOLDER WORKSHOP II

July 13, 2018

9:00 a.m. – 11:30 a.m.

Greenbelt Room, City Hall 1 – Third Floor

ATTENDEES

MEMBER	ORGANIZATION
Bryan Wewers	Idaho Power
Theresa Drake	Idaho Power
Elizabeth Cooper	University of Idaho-Integrated Design Lab
Crystal Rain	Conservation Voters of Idaho
Stacey Donahue	Idaho Public Utilities Commission Staff
Brad Ware	Intermountain Gas
Mark Chiles	Intermountain Gas
Jason Blais	City of Boise – Planning and Development Services
Selena O’Neal	Ada County
Lauren McLean	Boise City Council President
Casey Mattoon	Sierra Club
Emily Her	Sierra Club
Michael Hagood	Idaho National Laboratory
Leif Elgethun	Idaho Clean Energy Association
Steve Burgos	City of Boise – Public Works
Haley Falconer	City of Boise – Public Works
Steve Hubble	City of Boise – Public Works
Abigail Germaine	City of Boise – Legal
Jami Goldman	City of Boise – Public Works
Colin Hickman	City of Boise – Community Engagement
Amy Parrish	City of Boise – Public Works
Judy Dorsey	Brendle Group
Zach Taylor	Brendle Group

AGENDA

9:00 a.m. – 9:20 a.m.	Welcome and Stakeholder Updates Purpose: Reintroductions and relevant updates from stakeholders.
9:20 a.m. – 9:35 a.m.	Project & Energy Background Purpose: Review project objectives and where we are in the process.
9:35 a.m. – 9:50 a.m.	Goal Background Purpose: Review goals by other communities and introduce Boise's draft goals.
9:50 a.m. – 10:15 a.m.	Electricity Objectives Purpose: Introduce preliminary results for a range of targets that could contribute to 100% Renewable Electricity.
10:15 a.m. – 10:35 a.m.	Prioritization and Refinement of Electricity Objectives Purpose: Facilitated discussion prioritizing and refining targets.
10:35 a.m. – 10:55 a.m.	Natural Gas Objectives Purpose: Introduce preliminary results for a range of targets that could contribute to renewable natural gas.
10:55 a.m. -11:10 a.m.	Prioritization and Refinement of Natural Gas Objectives Purpose: Facilitated discussion prioritizing and refining targets.
11:10 a.m. – 11:30 a.m.	Participant Feedback and Next Steps Purpose: Explore areas for collaboration. Identify synergies and stakeholder roles for prioritized objectives. Discuss project timeline and next steps.

PRESENTATION SLIDES (Attached)

DISCUSSION SUMMARY

WELCOME AND STAKEHOLDER UPDATES (STEVE HUBBLE – SLIDES 3-5)

Council President is very appreciative of staff and stakeholder effort on the project

- Supportive of the project direction; City Council and Mayor are also supportive of the project
- Stressed the importance of understanding that the project is not only beneficial to the environment but is beneficial to Boise's citizens and economy

City Staff are also excited about the process and appreciative of support from City Council

University of Idaho - Integrated Design Lab shared an update that they are working to create a baseline for the LIV District by collecting energy data from occupants

The Planning and Development Service department shared that it continues to inform the public about the changes to city building codes that will take place and awareness of the green building code

There is a nationwide push for 100% clean energy by 2050 that is being supported by the Conservation Voters of Idaho

The Idaho National Laboratory continues to work with the Department of Energy on building and transportation related research

Idaho Clean Energy Coalition's mission is to educate and advocate for clean energy in our State

The Idaho Public Utilities Commission (PUC) shared that Idaho Power's Integrated Resource Plan (IRP) process will start back up soon and Intermountain gas will be conducting an efficiency evaluation soon

Idaho Power will also be conducting on-site generation research as part of the recent net metering case

Sierra Club has received its 77th city (Concord, NH) to commit to 100% renewable energy and Denver, CO is expected to announce soon

Intermountain Gas appreciates support from Idaho Power as a resource for efficiency program development

PROJECT & ENERGY BACKGROUND (HALEY FALCONER & JUDY DORSEY – SLIDES 6-12)

A lot of other cities are looking at goals and strategies around 100% RE The focus of this planning effort is energy but the city acknowledges that transportation, water, and waste are also important and are/will be addressed with other initiatives

The city is not simply looking at renewable energy for environmental reasons but there are strong economic considerations; local economy is an important aspect of the planning process

The scope of this work is to create an actionable and achievable plan for Boise's energy future

The intent of this meeting is to discuss draft goals and objectives with the stakeholder group

We have a draft quantified electricity goal with associated objectives; measuring progress is also important

Overview of Work

- Baseline data - Electricity, natural gas, and geothermal annual use
- Goals, programs, and initiatives will align with the regulatory and technical requirements
- The project will deliver a plan document that outlines goals and how we plan to achieve them

Boise is a unique community and these unique aspects are incorporated into the content of today's workshop

Boise's energy use

- The energy baseline was previously presented in the last workshop
- An updated resource mix for Idaho Power is included and provides a 4- year average of the resource mix based on the feedback from stakeholders
- We have heard feedback from Idaho Power that they expect that the portion attributed to Purchased renewables should be larger than the 4- year average considering increased purchases in recent years
- It is a significant accomplishment that already an average of 42% of Boise electricity is hydroelectric and an average of 16% comes from purchased renewable power
- Due to a good water year, the percentage of electricity that came from hydropower in 2017 was higher than the four-year average
- The team has decided to use an average percentage for hydropower to acknowledge that it is a fluctuating resource that may change over time
- The project team would like to incorporate any additional local utility data that is available to further refine the assumptions and results based on the most recent locally available data
- The cost forecast has been created for both electricity and natural gas with available data which includes IRP reporting and the U.S. Energy Information Administration (EIA) nationwide cost forecast
- There was general discussion on the electricity and natural gas cost forecasts and that in particular the natural gas forecast may be high; Intermountain Gas offered to help refine with a localized forecast
- For example, Intermountain Gas has seen an 8% decrease in rates compared to EIA's estimated 2.4% annual growth.

GOAL BACKGROUND (STEVE HUBBLE – SLIDES 13-20)

The slides in this section are intended to show examples of different energy and greenhouse gas (GHG) emission goals throughout the country

Fort Collins and Salt Lake City were chosen as examples of communities the consultant team has worked with and are regional benchmarks

The other three communities (Arlington, Fayetteville, and Minneapolis) were chosen based on the vision exercise from the last workshop

Fort Collins' goals are focused on GHG reductions, but energy is embedded within these larger goals

Salt Lake City has a mixed approach by including both renewable electricity and GHG emissions goals

Fayetteville, AR; Arlington, VA; and Minneapolis, MN established specific energy efficiency goals for the building sector as well as their energy supply; inclusion of nuclear energy in Minneapolis resource mix was discussed

Some cities established goals then decided on how they will be achieved; our process is the opposite

Question about the inclusion of Transportation in Boise's goals

- Transportation becomes a bigger target as energy becomes less carbon- intensive
- Boise will start by setting electric and natural gas goals during this planning effort and move to transportation fuels in the future
- The city is intentionally taking a bottom-up approach, starting with energy; a full climate action plan for the City is not being developed at this time but may be in the future

ELECTRICITY OBJECTIVES (JUDY DORSEY & ZACH TAYLOR – SLIDES 21-31)

The process of deciding on objectives is very much iterative and the planning team values the stakeholder's opinions

Each objective has a numerical target associated with it

The contribution that each objective could make towards reaching the goal is also included on each slide

Several of the objectives leverage existing programs and actions

Some objectives require upfront capital costs but have annual cost savings and others are subscription offerings which will need to be renewed each year and are currently a cost premium

Some objectives have additional community co-benefits including economic health and resilience

Electric – Summary Chart

- This chart visually displays how much each objective could contribute to the goal
- There are three scenarios for each objective: Business as Usual, Boise's Best and Best in Class
- Boise's Best represents the draft target for each objective and the Business as Usual and Best in Class scenarios bracket the target
- It is important to note that all objectives are not set at the best in class target
- Also, important to note is that the draft plan does not suggest that Idaho Power generate all of their electricity from renewable sources

Question about how resiliency will be included

- Resiliency will be considered as applicable in describing each objective and the overall goal/scenario in the energy plan document

Question about if the Water Renewal Facilities works into this plan

- This plan is being completed at the community wide scale; separate water renewal planning process in progress with some energy evaluation
- After this, the team will evaluate more specific opportunities

Idaho Power Mix

- The group discussed that currently Idaho Power is not able to keep the RECs from purchased renewable power and the savings from selling these RECs go back to customers
- The Large Renewable Energy Purchase program is also interrelated to this objective's draft target

- Question about which IOU achieved 76% renewable electricity?
- Project team will clarify/identify utilities with high amounts of renewable electricity

Energy Efficiency

- Boise's best target matches the best in class benchmark
- The forecast does include assumptions around electric vehicles
- Some stakeholders voiced the opinion that this is achievable
- Efficiency can help to reduce the need for additional generation Green Power Program
- Council President became aware of the Green Power program and plans to sign up
- How does the Green Power Program differ from Green Power Rate?
 - The Green Power Rate would be a new collaboration with Idaho Power that would require regulatory approval; it is also referred to as a green tariff
 - Green Power Rate includes procuring new renewable electricity from new projects
 - The Green Power Program is already available and makes use of existing renewable electricity projects; Idaho Power clarified that this program is available to all customers, not just residential
 - The Green Power Program has a cost premium

New Renewables

- The target for rooftop solar assumes the current growth rate based on historical installs
- The target for community solar could be a utility offering and assumes a different structure than originally proposed by Idaho Power

New utility-scale renewables

- This objective suggests that Idaho Power consider renewables in future plans for new or replacement generation resources

Innovative Options

- Both options include investment in new renewable energy projects so they are different than investing in renewable energy credits (RECs)
- Corporations have historically used Virtual PPA's to fulfill renewable energy goals; this allows investment in renewable energy projects in areas where renewable energy is not available or onsite renewables are not feasible
- Green Power Rate (Green Tariff) programs are in various stages of development; project team will attempt to identify relevant examples from other areas of the U.S.

PRIORITIZATION AND REFINEMENT OF ELECTRICITY OBJECTIVES (JUDY DORSEY – SLIDES 32-39)

The results from the keypad polling exercise can be found in the attached PowerPoint

Idaho Power Resource's Mix

- Concerns around the impact on underserved communities and that it could be too expensive

100% Renewable Electricity Goal

- Thoughts on why this goal may not be ambitious enough?
 - Want Boise's objectives to lead towards statewide renewable energy growth not just for Boise
 - There is flexibility and the community can do it sooner than 2040
- Not Feasible or too soon?
 - The targets need to be more achievable
 - There are factors that are not under Boise's control
 - Concern around the growth of electric vehicles and electrification

NATURAL GAS OBJECTIVES (JUDY DORSEY – SLIDES 40-46)

Geothermal

- Boise's best is tied to the planned expansion of the geothermal system by the City utility

Natural Gas Efficiency

- Boise's best is also based on offsetting growth Renewable Natural Gas
- Boise's best is based on the reported availability of biogas resources
- Includes methane from mainly animal waste but landfill, wastewater, and other industrial operations could also be included

Energy Sourcing

- This objective creates a connection to the 100% renewable electricity goal
- Some functions and equipment can use both electricity or natural gas and this target would allow these operations to switch to electricity, assuming it is supported by achieving 100% renewable electricity goals

PRIORITIZATION AND REFINEMENT OF NATURAL GAS OBJECTIVES (JUDY DORSEY – SLIDES 47-52)

Results from the keypad polling exercise are included in the slide deck The discussion also included the following:

- Natural gas is not renewable but it is considered a “clean fuel” by some or at least “cleaner fuel” compared to coal
- There is a move away from flexible definitions of what can be considered renewable by Oregon and Washington in their RPS
- They are instead moving towards a carbon-focused approach
- Renewable does not necessarily mean not impactful. There is a tendency to get tunnel vision and not look holistically

FINANCIAL DISCUSSION (JUDY DORSEY – SLIDE 52)

The financial picture has evolved with the goals and objectives and will continue to evolve as target levels are adjusted and additional analysis is conducted

Energy efficiency investment could drive cost savings for renewable investment

Question from the group who will pay for these programs?

- Homeowners, city buildings, and businesses during retrofits and other decision-points over next 20 years
- This market is driven by consumer decisions
- Program funding could also be considered by the City or others to support initiatives

Who is paying for the renewables?

- Homeowners and businesses may decide to put solar on their roofs
- The assumption is that renewables will not remain higher than conventional generation sources over time or can be bundled with efficiency for no net increase in utility costs
- Investments could provide economic stimulus attracting and supporting business

Concern around equity

- Discussion of impact to low-income customers if rates were to increase
- More detailed utility data could allow for more targeted design of programs and initiatives to address this

PARTICIPANT FEEDBACK AND NEXT STEPS (JUDY DORSEY & COLIN HICKMAN – SLIDES 53-60)

The group ran out of time to identify specific roles for each stakeholder but the group was asked to look at the roles and objectives and identify how their organization can fit into the process

Community Engagement

- There is a role for the public to play in this planning process
- Telling the energy story is not an easy thing to do
- It will be an ongoing process
- Three phase process being considered Large business engagement
- Micron and Simplot attended the first stakeholder meeting but were unable to attend today
- Still want to involve the chamber of commerce and local businesses

Next Steps

- Share presentation materials and meeting notes with the group
- Take stakeholder input and consider for a final draft
- Build an action plan for each objective
- Stakeholder group next steps are TBD; but plans will be made to share the draft plan and to keep the group involved in the process

STAKEHOLDER WORKSHOP III

February 20, 2019

3:00 P.M. – 5:00 P.M.

Greenbelt/River Room, City Hall 1 – Third Floor

ATTENDEES

MEMBER	ORGANIZATION
Bryan Wewers	Idaho Power
Theresa Drake	Idaho Power
Elizabeth Cooper	University of Idaho-Integrated Design Lab
Crystal Rain	Conservation Voters of Idaho
Stacey Donahue	Idaho Public Utilities Commission Staff
Brad Ware	Intermountain Gas
Mark Chiles	Intermountain Gas
Jason Blais	City of Boise – Planning and Development Services
Selena O’Neal	Ada County
Lauren McLean	Boise City Council President
Casey Mattoon	Sierra Club
Emily Her	Sierra Club
Michael Hagood	Idaho National Laboratory
Leif Elgethun	Idaho Clean Energy Association
Steve Burgos	City of Boise – Public Works
Haley Falconer	City of Boise – Public Works
Steve Hubble	City of Boise – Public Works
Abigail Germaine	City of Boise – Legal
Jami Goldman	City of Boise – Public Works
Colin Hickman	City of Boise – Community Engagement
Amy Parrish	City of Boise – Public Works
Judy Dorsey	Brendle Group
Zach Taylor	Brendle Group

AGENDA

3:00 p.m. – 3:10 p.m.	Welcome and Introductions Purpose: Reintroductions and relevant updates from stakeholders.
3:10 p.m. – 3:20 p.m.	Public Outreach Update Purpose: Review public outreach activities and results of open houses.
3:20 p.m. – 3:40 p.m.	Citizen Survey Update Purpose: Review the results of the citizen survey.
3:40 p.m. – 4:20 p.m.	Review Draft Planning Document Purpose: Review key elements of the draft planning document and obtain feedback from the group.
4:20 p.m. – 4:40 p.m.	Discuss Planning Document Feedback and Next Steps Purpose: Discuss process for providing feedback on the document and next steps.
4:40 p.m. – 5:00 p.m.	Discussion/Questions Purpose: Allow additional an opportunity for questions and discussion.

PRESENTATION SLIDES (Attached)

DISCUSSION SUMMARY

WELCOME AND INTRODUCTION

Attendees introduced themselves

Council President welcomed the group and appreciated the support and participation of the stakeholder group

PUBLIC OUTREACH AND OPEN HOUSE SUMMARY (COLIN HICKMAN)

Background information was shared on the City's efforts to provide background information on the project including the sharing of some You Tube videos that were produced

The format and the attendance at the open houses was reviewed including sharing the presentation materials that were displayed during the open houses

Feedback received from open house attendees on plan priorities and goals and opportunities was shared with the group

CITIZEN SURVEY (VANESSA FRY)

Idaho Policy Institute (IPI) and Energy Policy Institute staff shared the survey methodology and reviewed demographics of the respondents

- The group discussed particulars of the demographics include the age and income level of the respondents
- IPI noted that renters and multifamily residents are under-represented in the survey, this is likely due to survey pool of utility billing customers

IPI shared the top priorities of the survey respondents

- The group debated the top two priorities of clean and renewable energy and affordability
- The group agreed that this issue is variable by situation and that affordability is likely more challenging for thermal goals than for electricity

IPI presented the information on the response to the "willingness to pay question"

- The group discussed this and it was noted that this may be an area where additional specificity and data collection could support enhanced information

A group member asked about the statistical significance of the survey results when compared to the total number of households in Boise

- IPI commented that they are comfortable that the survey results are representative within a small margin of error

Once the survey deliverables have been reviewed by City staff, the results will be shared with the group

REVIEW DRAFT PLANNING DOCUMENT (STEVE HUBBLE)

An outline of the report was presented including elements of the plan that are being finalized and not currently included.

Following earlier discussions, it was suggested that group members review the vision statement. The current statement only includes the initial priorities of the stakeholder group and the project team. Priorities from the open houses and the survey were also shared and these will need to be incorporated also.

The draft goals were reviewed:

- The electricity goal was the same as the group reviewed in July
- The natural gas and geothermal goal has been renamed as the “Thermal Energy” goal and has been modified to add that a numeric goal would be identified by 2025.
- Group discussion included:
 - Consideration for interim goals
 - Concerns about reliability and resiliency; many members expressed the importance of these items. The project team will evaluate this and requests comments from the group for how the plan can better support or address this issue.
 - Electricity storage for renewables; is the plan lacking discussion on this topic.

The differences between the roadmaps for electricity and thermal energy were discussed and the path to 100% for the electricity goal was reviewed in detail using the waterfall chart on Slide 15.

- Group members discussed the feasibility of the electricity efficiency goals
 - What is the impact of City support for program implementation?
 - What are different ways that other utilities are increasing participation?
 - The consulting team agreed that our goals are aggressive
 - Goals for efficiency could be modified based on stakeholder feedback or based on future performance with future plan updates
- Group members discussed how the retiring of renewable energy credits might be received by the Idaho Public Utilities Commission
 - Is this system wide or just for Boise?
 - Could franchise fees support this additional cost
- Group members discussed the utility scale renewables including the need for storage and the impacts of the Boardman to Hemingway transmission project
- The project team clarified what resources are included in the existing renewables category and what data was used to project system growth

The financial analysis was reviewed including:

- Financial model structure
- General inputs
 - The project team will share a document that identifies the model inputs for review by the group
- The three scenarios: Business as Usual, Boise’s Best (2040) and Accelerated and that all three options were analyzed
- The output for the Boise’s Best scenario was reviewed in detail
- The group discussed the assumptions around Opportunities E3 and E4.

- Summary output for all three scenarios was discussed
 - The Group discussed level of confidence in the numbers:
 - This is a high-level, community wide analysis.
 - Are there benefits in showing a range of performance? The team attempted to address this with analysis concerning options for different discount rates in the report

The project team provided examples of how adjustments have been made in the plan based on stakeholder feedback

- The group discussed electric vehicles:
 - Do growth rates match expected growth in this area?
 - Potential impacts on overall emissions reduction
 - The project team appreciates any feedback or additional input for the plan on this topic.

FEEDBACK AND NEXT STEPS (GROUP)

The project team requested that any comments on the plan be submitted to Steve Hubble by Friday, March 1st.

- The group shared concerns about the timeline.
- A group member mentioned the desire to have a more detailed discussion with the group about their comments.
 - The project team offered to meet with group members individually prior to making comments.
 - The project team will consider another optional meeting in March following initial receipt of comments
- All existing and new comments will be compiled and included in the report as an Appendix

The project team will review comments and consider updates to the plan during the first half of March

Review with the City Council is anticipated in April

DISCUSSION (GROUP)

Group discussion continued about the merits of additional meetings and discussion prior to City Council consideration of the plan

- Some members expressed comfort with the vision oriented nature of the current document, and understood that there may be a need to move forward with the understanding that additional details will be identified during implementation or with future plan updates

The group discussed technological needs to support plan implementation and agreed that it this time it may be difficult or impossible to confirm that there is technological feasibility to achieve certain parts of the goals

- Future plan updates can be utilized to address technological changes or the plan could be adjusted if necessary based on progress (or lack of) in this area

APPENDIX C: STAKEHOLDER COMMENT RESPONSE

TO: Boise's Energy Future – Stakeholder Group
FROM: Project Team
DATE: 3/26/2019
RE: Boise's Energy Future – Response to Draft Plan Comments

Following the group meeting on February 20, 2019, comments on the final draft of the Boise's Energy Future plan were submitted by the following stakeholders:

Ada County Staff
Boise State University – Energy Policy Institute
Conservation Voters of Idaho
Idaho Conservation League
Idaho Power
Idaho Public Utilities Commission Staff
Intermountain Gas
Sierra Club – Idaho Chapter

A compilation of comments, summarized by topic, with the associated response from the project team is included below.

DEFINITIONS, VISION, PLAN CONTEXT

COMMENT SUMMARY:

- Consider adding a glossary of terms; ensure consistency of use with terms
- Include local economic development and addressing impacts to vulnerable communities in the plan vision
- Clarify the extent of this plan
- Define clean/renewable energy

COMMENT RESPONSE:

- A glossary of terms is currently being developed and is planned to be included in the draft prior to consideration by city council.
- Local economy is included as a priority in the plan vision. (See pages 10-11); Electricity and natural gas efficiency opportunities (E1 and T1) specifically encourage the development of new programs that support vulnerable communities. (See pages 21 and 41)
- Narrative added to explain scope of plan (i.e. community energy), relate community energy to greenhouse gas emissions and reference that other emissions sources will be addressed with separate initiatives. (See page 5)
- Narrative added to better define clean/renewable energy. (See page 11)

PROGRESS ASSESSMENTS/INTERIM GOAL

COMMENT SUMMARY:

- Progress evaluation should be added to the plan
- Commit to update the plan every 4-5 years
- Identify interim milestones

COMMENT RESPONSE:

- The plan proposes to track progress annually, to prepare a progress report every two years (starting in 2020) and to prepare an update every five years. (See pages 5 and 66)
- The plan does not identify interim goals/milestones for the community, however the project team will consider their addition in future progress reports or plan updates as implementation activities are defined in more detail.

GOALS AND TIMELINE

COMMENT SUMMARY:

- Support for the identified electricity and thermal goals
- Recommend more specific thermal goals
- Support for the accelerated timeline (2035)
- Lack of support for the accelerated timeline (2035)
- Lack of support for the goals and plan without additional study and analysis

COMMENT RESPONSE:

Given the varying opinions of stakeholders and the concerns from the project team/consultant about practical achievability of the accelerated timeline, the electricity and thermal goals remain as drafted.

ELECTRICITY ROADMAP (RELIABILITY, RENEWABLES INTEGRATION, EFFICIENCY, GREEN POWER)

COMMENT SUMMARY:

- Reliability is critical to energy systems
- Identify how the plan addresses system reliability
- Identify how the plan addresses resources to support intermittent generation from renewables (i.e. energy storage)
- Electricity efficiency opportunities are not realistic or cost effective
- Support for electricity efficiency opportunities; these are achievable
- Expand efficiency goals to focus on energy conservation and consider combined community engagement programs for electricity and thermal
- Support for the combined strategies that achieve the goals
- Prioritize Green Power Procurement (E4) opportunities instead of Green Power Program opportunities (E6)

COMMENT RESPONSE:

- The project team acknowledges that reliability is an intrinsic element to meeting the goals and opportunities identified in the plan. Reliability is included as a priority in the plans' vision and additional clarifying text was added to opportunity E3. (See pages 26 and 27)
- Additional narrative was added to the plan to note that a specific analysis for system reliability was not completed as part of the plan and to acknowledge that utility reliability analyses are critical to support consideration of future renewable energy resources. (See page 26)
- The plan includes narrative that notes the ability for enhanced transmission capacity with the Boardman to Hemingway (B2H) project to support renewable electricity generation.
- Additional narrative was added to the plan to note that a specific analysis of the need for additional resources (i.e. energy storage) was not completed as part of this study, however opportunity E3 contains implementation actions that support future analysis. (See pages 26-29)
- Given the varying opinions of stakeholders and technical input from the project consultant about the electricity efficiency goals, the targets within that opportunity have not been changed. However, the project team acknowledges that achieving the identified target will be challenging and has added narrative to the plan to address these comments. The city commits to monitor this opportunity closely and make adjustments to the implementation targets with progress reports or future plan updates. (See page 19)
- Narrative was added to opportunities E1 and T1 to identify opportunities for combined community engagement programs to address both electricity and natural gas efficiency. (See pages 21 and 41)
- Narrative is included in opportunities E4 and E6 to note that new Green Power Procurement options, if developed, could replace participation efforts in the existing Green Power Program. (See pages 30 and 37)

THERMAL ROADMAP (RELIABILITY, EFFICIENCY, RENEWABLE NATURAL GAS)

COMMENTS SUMMARY:

- Reliability is critical to energy systems
- Expand efficiency goals to focus on energy conservation and consider combined community engagement programs for electricity and thermal
- Potential opportunities for renewable natural gas at city water renewal facilities
- Comment response:
- The project team acknowledges that reliability is an intrinsic element to meeting the goals and opportunities identified in the plan. Reliability is included as a priority in the vision statement. (See page 10)
- Narrative was added to opportunities E1 and T1 to identify opportunities for combined community engagement programs to address both electricity and natural gas efficiency. (See pages 21 and 41)
- The project team appreciates the comments and interest in identifying opportunities for renewable natural gas at city water renewal facilities. (See pages 43-44)

OTHER

COMMENT SUMMARY:

- Provide additional explanation of what is or is not included in the cost, cost savings and benefits in the financial analysis
- Engage other municipalities in implementation planning

COMMENT RESPONSE:

- Additional narrative and footnotes have been added to provide a more detailed explanation of the financial analysis. (See pages 13-18)
- Opportunity E3 suggests that other municipalities consider involvement in the Integrated Resource Plan process.



2019

BOISE'S ENERGY FUTURE