



Denver's 100% Renewable Electricity Action Plan

August 2020



DENVER
CLIMATE ACTION,
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LETTER FROM THE MAYOR

In 2018, Denver set a goal to achieve 100% renewable electricity community-wide by 2030. The city is proud to release its 100% Renewable Electricity Action Plan (the 100RE Plan) to meet that challenge. The 100RE Plan focuses on the impact Denver makes towards decarbonizing the entire electric system. Denver will prioritize investments in local renewable energy sources, while ensuring affordability and reliability for customers. Achieving 100% renewable electricity will instigate fundamental shifts in traditional grid operations and management. We are well positioned to work with our utility, Xcel Energy, to enable the energy transition.

Denver is confronted with an equally enormous challenge and opportunity. The challenge is to decarbonize the centuries old industries and infrastructure that are the backbone of our economy. The opportunity is to replace those systems with economically, socially, and environmentally sustainable alternatives to create a community in which all Denverites have the opportunity to live, work, and thrive. These issues are compounded by the hardships imposed on Denver's residents, businesses, and municipal operations by the COVID-19 pandemic.

COVID-19 is exposing discrepancies in our society associated with marginalization and discrimination, economic inequality, overcrowded housing, environmental risks, and limited availability of healthcare. Additionally, protests triggered by the killing of George Floyd have highlighted the racial injustice inherent in our health, education, employment, and criminal justice systems.

Denver is leading the nation in addressing both climate change and structural inequity because we recognize that the transition to a decarbonized economy must be accompanied by societal changes to repair centuries of systemic racism. This moment in history will be regarded as the turning point towards an equitable society that finally acknowledges the direct connection between environmental quality and public health.

The 100RE Plan identifies a set of strategies and opportunities to mitigate the effects of and adapt to a rapidly changing climate. Investments in Denver's clean energy economy will strengthen our community and solve multiple problems while reducing our carbon footprint. The Renewable Denver Initiative—which will deploy community solar gardens on Denver's municipal facilities, provide utility bill savings to income-limited households, and expand public access to electric vehicle charging—is just one example of Denver's investments in the transition to a carbon-free and sustainable economy.

Denver is working hard to ensure a swift economic recovery that produces resilient, sustainable infrastructure and advances equity across our community. The recommendations in this report will directly contribute to the recovery effort. Together, we can achieve an equitable decarbonization of Colorado's industries and correct our racial and environmental injustices.

Respectfully,



Michael B. Hancock
Mayor



Denver's 100% Renewable Electricity Action Plan

100RE Plan

August 2020



EXECUTIVE SUMMARY

In Denver's 80x50 Climate Action Plan, the city pledged to achieve 100% renewable electricity community-wide by 2030. Denver recognizes that aggressive and decisive action is needed to achieve this goal. At the same time, Denver must ensure equitable access to the benefits of climate action.

Denver's 100% Renewable Electricity Action Plan (100RE Plan) was developed over a concurrent time period as Denver's Climate Action Task Force (referred to as the Task Force). The Task Force was comprised of 26 members of the community from diverse backgrounds. They developed a set of recommendations to strengthen Denver's work to address climate change equitably. Denver staff from the Office of Climate Action, Sustainability, and Resiliency (CASR) were available as a resource and to provide technical expertise to the Task Force members, including regarding electricity supply.

The collaborative approach and communication between CASR, the 100RE Plan team, and the Task Force enabled the City to establish a clear vision and target for its electricity supply. Specifically,

Denver's renewable vision is to enable a rapid and equitable transition to a 100% renewable electric system in Colorado.

By 2030, 100% of Denver's community-wide electricity use will contribute to this vision.

The above vision and 2030 goal for Denver's electricity use to "contribute to" a 100% renewable electric system is unique compared to goals to be "powered by" 100% renewable electricity. This is in part due to the recognition that Denver is a part of a larger electric system operated by Xcel Energy in Colorado. **Denver physically cannot be powered by 100% renewable electricity until the entire system is powered by 100% renewable electricity.** Therefore, Denver is focusing on strategies that equitably transition the entire system as quickly as possible.

Renewable Energy Credits, or "RECs", measure renewable energy production and are "retired" to meet renewable energy goals. Each REC represents one MWh of renewable electricity. RECs were created as a regulatory method for utilities, including Xcel Energy, to meet statutorily defined requirements such as those established by Colorado's Renewable Energy Standard. RECs retired by the utility benefit all customers by contributing to system-wide decarbonization.

Xcel Energy customers contribute to system-wide decarbonization in a number of ways:

1. **Paying utility bills:** As Xcel Energy ratepayers, all customers invest in and enable most of the renewable electricity in Colorado's electric system.
2. **Expanding distributed solar:** Customers can create RECs with on-site solar arrays or subscriptions to community solar gardens that are transferred to Xcel Energy and used to clean the electric system.
3. **Subscribing to utility-scale RE programs:** Customers can subscribe to utility-scale wind and solar projects through the Windsource and Renewable*Connect programs. The renewable resources supported by these programs are located in Colorado and serve Xcel Energy's customers.

Denver's objective is to enable as much new renewable electricity as possible and for the associated RECs from that power to be retired into the system. Whether RECs are retired by the utility on behalf of all customers or by individual customers within the system, there is the same net effect on the total renewable content of the overall system. When RECs are sold to third-parties outside of the system it directly detracts from the renewable electricity content of the delivered grid mix and undermines Denver's ability to reach its goals.

Denver will realize its vision to enable a rapid and equitable transition to a 100% renewable electric system by prioritizing investments in local renewable energy sources.

Denver is embracing strategies that: 1) influence utility electric resource planning to increase the amount of renewable electricity in the system; 2) expand the deployment of distributed solar; and 3) increase subscriptions to renewable electricity options. The City will retain ownership of RECs to the greatest extent possible but will support strategies in which additive RECs are generated, transferred to, and retired by Xcel Energy towards system-wide decarbonization.

Denver's focus on "contributions to" achieving a 100% renewable electric system in Colorado means that purchases of stand-alone or unbundled RECs are not a suitable option for Denver to achieve its renewable electricity goals.¹ Options to expand distributed solar—such as on-site solar and community solar gardens through which Denverites receive an incentive payment from Xcel Energy for the RECs they create—can make resources available for the City to invest in additional, local renewable electricity capacity.

If Denver sought to purchase enough stand-alone RECs to match 100% of community-wide electricity use, which reached 6.7 million MWh in 2019, it would be prohibitively expensive and would not advance the City's equity objectives. For example, Denver could ask taxpayers to fund REC purchases through a renewable electricity option—Xcel Energy's Windsource program offers bundled RECs at a cost of \$15/MWh—to "clean" the 70% of the community's power supply expected to be provided from non-renewable resources in 2020. This would cost taxpayers \$70.3 million in the first year.

To continue to claim that Denver is powered by 100% renewable electricity, stand-alone REC purchase costs would continue to be borne by Denver's taxpayers year-after-year until Xcel Energy

reaches its publicly stated and statutorily mandated requirement that 100% of the electricity delivered to retail customers be carbon-free by 2050. Although Denver would need to purchase fewer RECs over time as the electric grid incorporates more renewable and carbon-free resources, the cumulative cost of those purchases would be expected to reach over \$571 million by 2030 and \$932 million by 2050.

Denver's Climate Action Task Force explicitly recommends against such purchases as an option for the City to achieve its clean electricity goals.²

"If hundreds of millions of dollars of taxpayer money becomes available to support Denver's electricity decarbonization, those resources should be spent by investing locally in carbon-free energy infrastructure that enable co-benefits such as workforce development, utility bill savings, and more resilient public facilities."
- Denver Climate Action Task Force

Decarbonization of Colorado's electric system will require active participation in Colorado Public Utility Commission (PUC) proceedings and close collaboration between Denver and Xcel Energy. Xcel Energy is required by §40-2-125.5, C.R.S. to file a plan with the PUC to reduce carbon dioxide emissions associated with retail electricity sales by 80% from 2005 levels by 2030. Denver's involvement in the development of this plan and cooperation with Xcel Energy can help to meet and exceed the 80% carbon dioxide reduction target.

Denver's Climate Action Task Force also recommended expanding the scope of the community-wide target to include both renewable and carbon-free electricity options. The City will continue to prioritize, advocate for, subscribe to, and deploy technically proven and economically viable renewable electricity options in pursuit of its 100RE objectives as described in this plan. The City

¹ Stand-alone or unbundled RECs are often sourced from renewable energy generators located anywhere in the nation and are separate from electricity service.

² "Denver Climate Action 2020 Recommendations Report." www.denvergov.org/climatestakeholder

will consider and evaluate the potential of contributions of non-renewable carbon-free technologies as they are introduced through relevant proceedings at the Colorado PUC.³

Denver's Electricity Landscape and Strategies to Reach 100% Renewable Electricity by 2030

Denver as an electricity consumer is nested within Xcel Energy and the Colorado electric system. As such, Denver physically cannot be powered by 100% renewable electricity until the entire system is powered by 100% renewable electricity. The City is prioritizing strategies to accelerate that transition.

Xcel Energy was the first investor owned utility in the country to announce a voluntary target to deliver 100% carbon-free electricity by 2050 and to produce 80% less carbon on their electric system by 2030 than a 2005 baseline. However, there is still a gap that Denver must close between Xcel Energy's carbon reduction trajectory and the City's community-wide renewable electricity goal.

Denver's renewable electricity contribution metrics adopt a holistic view of the electric system and Denver's place in it. They include:

- **System Renewables:** The RECs inherent in the electricity Xcel Energy delivers to all retail customers that are not created by, subscribed to, or sold to other customers.
- **Distributed Solar:** The RECs created by Denver customers with on-site solar arrays or subscriptions to community solar gardens that are transferred to Xcel Energy and may be retired towards system decarbonization.
- **Utility-Scale RE Subscriptions:** The RECs retired due to participation in Xcel Energy's Renewable*Connect and Windsource programs by Denver customers.

Denver's approach to tracking renewable electricity contributions measures progress towards system

wide decarbonization. It ensures that local investments in rooftop solar and community solar gardens are not inadvertently discounted and discouraged. This focus could make resources available for the City to invest in additional renewable electricity capacity to the benefit of both the community and the utility.

System Renewables are expected to account for the majority of Denver's attainment in 2030. As part of Xcel Energy's carbon reduction commitments, the utility currently projects it will retire RECs for approximately 60% renewable energy by 2030. Increasing system renewables is critical for the City and requires close collaboration with Xcel Energy and active participation in regulatory proceedings.

Denver has significant untapped distributed energy potential. The City can expand distributed energy resources by strengthening building codes, supporting CSG and rooftop solar programs, and advocating for the expansion of distributed energy resources through PUC proceedings. Approximately 1,150 MW of distributed solar is needed to reach a 30% contribution to Denver's goal—equivalent to using about 9% of roof space in Denver for solar.

The deployment, integration, and management of distributed energy resources is essential to support increases in electric loads due to the electrification of buildings and transportation systems. The City will pursue strategies and work collaboratively with Xcel Energy to increase energy efficiency programs and use building and transportation loads as grid assets to reduce the amount of grid infrastructure needed to achieve full electrification.

Subscriptions to utility-scale renewable electricity options are necessary to fill any gap below Denver's target of 100% renewable electricity by 2030. Community engagement and education are expected to drive participation in such programs.

³ Denver agrees with the exclusion of fossil and nuclear fuels and their derivatives from consideration as eligible energy resources as per C.R.S. §40-2-124 (1)(a).

Centering Climate Action and Denver's Electricity Goals in Equity

Equity and community impact are foundational criteria for Denver's evaluation of climate action strategies. Fundamentally, the objective of Denver's climate work is to enable an environment in which Denverites can live, work, and thrive for generations. All Denverites have the right to participate in and benefit from the energy transition.

The commitment to equity is a centerpiece of the Task Force's recommendations.

"The pursuit of equity happens in several ways. Government has historically excluded people of color from decision making processes, so it is critical that processes to make decisions about policies and programs are inclusive and fair. In addition, the benefits or burdens of policies, programs or investments have not always been fair or shared equitably across our City. Looking closely at those impacts and making future corrections is critical. Finally, equity is also about understanding historical patterns of discriminatory action and intentionally correcting for those injustices today."

- Denver Climate Action Task Force Report

The City agrees with the Task Force that we can reduce greenhouse gas emissions AND advance equity and racial justice. Denver's clean energy investments can and should strengthen the community.

The economic downturn and pending recovery due to the COVID-19 pandemic is already proven to disproportionately impact people of color. We have an opportunity to build Denver back better, interlacing the recovery across our current economic, racial justice, and climate crises.

The 100RE Plan identifies a set of strategies and opportunities to strengthen our community and solve multiple problems while reducing our carbon footprint.



Photographs taken at the Denver Climate Strike on September 20, 2019



Denver's Renewable Vision

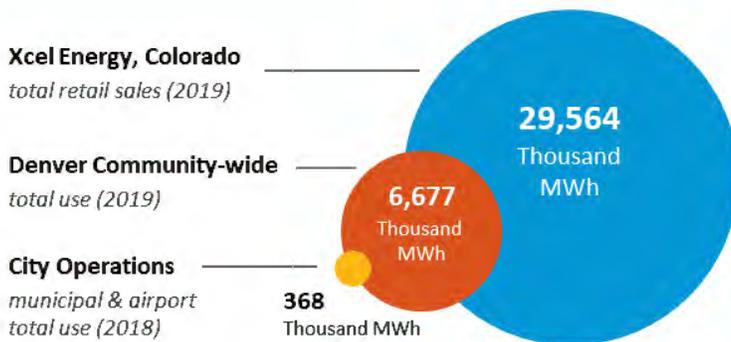
Enable a rapid and equitable transition to a 100% renewable electric system in Colorado.

By 2030, 100% of Denver's community-wide electricity use will contribute to this vision.

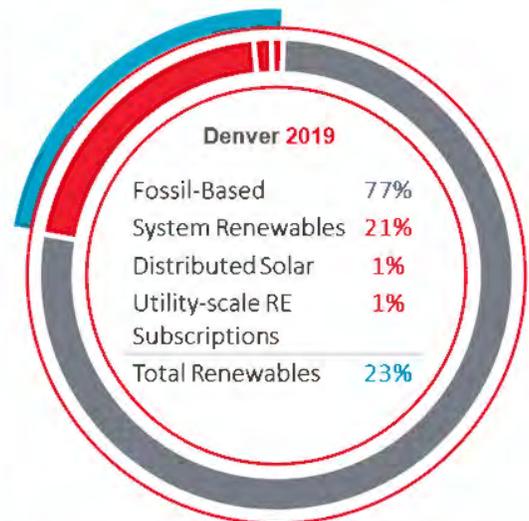
In 2018, Denver made the pledge to achieve 100 percent renewable electricity community-wide by 2030.

The Office of Climate Action, Sustainability, and Resiliency was directed to develop a plan to achieve that transition.

Success for Denver's community-wide renewable electricity goal is based on its contributions towards decarbonizing Colorado's entire electric system.



Denver is the largest city served by Xcel Energy, representing approximately 25 percent of its total retail sales in Colorado. The City's choices meaningfully influence the resource makeup and functionality of a 100% renewable electric grid.



Denver's Contributions to a Clean Electric Grid

Less than 23% of Denver's community-wide electricity use came from renewable sources on the utility grid or was produced by distributed solar in 2019.

Denver must influence the energy mix of the utility grid and increase local deployments of distributed energy resources, such as rooftop solar, as much and as quickly as possible.

Xcel Energy delivered 99% of Denver's community-wide electricity use in 2019.

This reliance requires Denver to collaborate with Xcel Energy and participate in regulatory proceedings to influence the City's energy portfolio and decrease the carbon intensity of its electricity supply.

More than 98% of Denver's community-wide rooftop solar potential is untapped.

Investing locally in distributed energy infrastructures will enable co-benefits such as workforce development, utility bill savings, more resilient public facilities, and cleaner buildings and transportation.

Strategies to Achieve 100% Renewable Electricity

- 01 **Decrease the carbon intensity of the utility grid mix**
- 02 **Expand distributed energy resources**
- 03 **Lead with municipal infrastructure**
- 04 **Educate and engage the community**
- 05 **Invest in energy workforce development**

Within each strategy, Denver will prioritize opportunities that maximize climate impact and equity, that the City can control or exert meaningful influence over, and where it can overcome challenges to implementation.

Equity

All Denverites have the right to participate in and benefit from the clean energy transition.

Community Impact

Denver's climate action investments should provide co-benefits for the community.

Climate Impact

Prioritize strategies that result in the largest reduction in greenhouse gas emissions.

Control vs Influence

Differentiate between actions Denver can take directly and actions of others Denver can influence.

Feasibility

Identify solutions to economic, technical, social, and regulatory barriers.

Denver's actions should enable systemic shifts in status quo operations for City government and electric grid operations. They should produce co-benefits such as workforce development, utility bill savings, and more resilient public facilities.

Systemic Change

Shift the status quo



Sustainable Infrastructure

Lead with municipal space

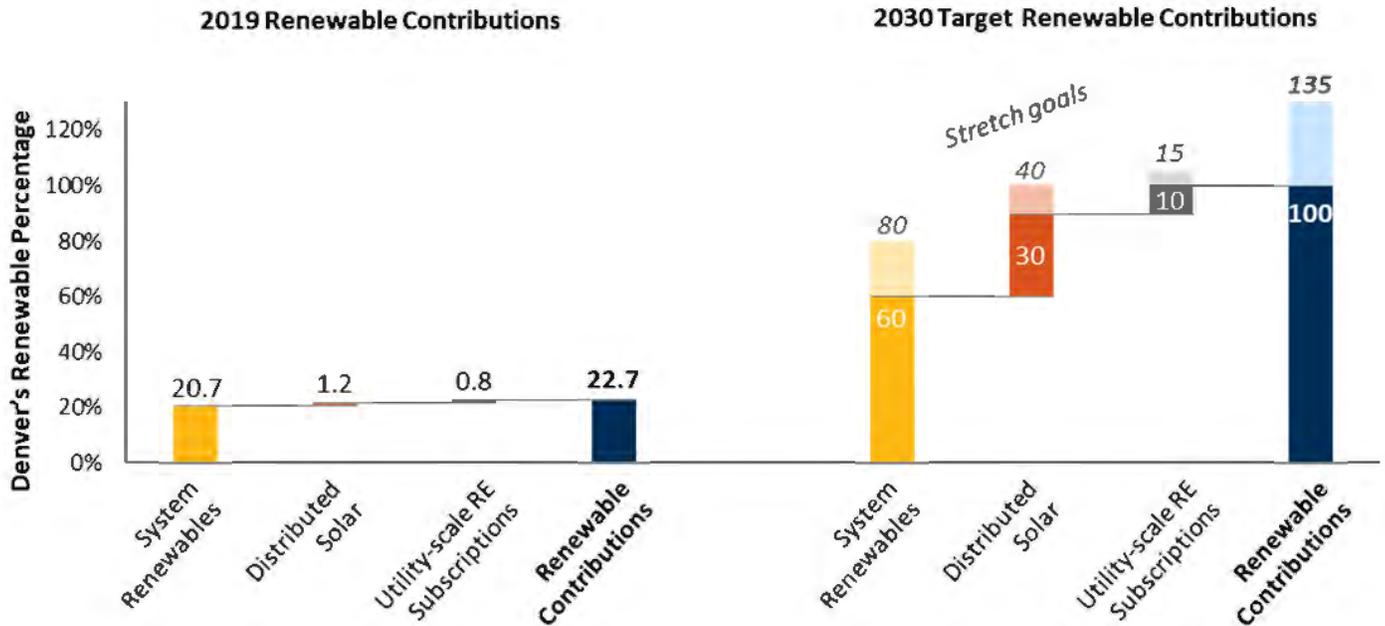


Community Empowerment

Strengthen the community



Renewable Electricity Targets and Stretch Goals



Influencing the transition to a 100% renewable electric system will require strong leadership, robust partnerships, and coordination with concurrent climate efforts.

The following three metrics will track Denver's influence towards a 100% renewable electric system:

System Renewables: *Renewable electricity delivered by Xcel Energy to all customers with deductions for REC sales, Renewable Connect, Windsource, and retail distributed solar.*

System renewables account for nearly all of Denver's renewable electricity and are expected to account for the majority of Denver's 2030 target. Increasing system renewables in the City's energy portfolio requires collaboration with Xcel Energy and active participation in state regulatory proceedings.

Distributed Solar: *Distributed solar generation enabled by Denverites through on-site solar and subscriptions to community solar gardens as part of Xcel Energy's Solar*Rewards programs.*

Denver has significant untapped distributed energy potential. The City can expand distributed energy resources by strengthening building codes, hosting community solar gardens, supporting community organizations, and influencing regulatory proceedings to incentivize investments in distributed resources.

Subscriptions to Utility-scale Renewables: *Electricity purchases by utility customers in the City and County of Denver as part of Xcel Energy's Renewable Connect and Windsource programs.*

Subscriptions to utility-scale renewable electricity options may be necessary to fill any gap below Denver's target of 100% renewable electricity by 2030. Community engagement and education is expected to be the primary driver to encourage residential and commercial entities to subscribe.

Public Survey Responses – Support for the Energy Transition

88% of survey respondents agree that, “Denver should transition to 100% renewable electricity for all municipal buildings, private buildings, and homes by 2030.”

87% of survey respondents agree that, “Denver should invest in solar power and battery storage systems that enable areas of the electric grid to function independently and remain powered during emergencies.”

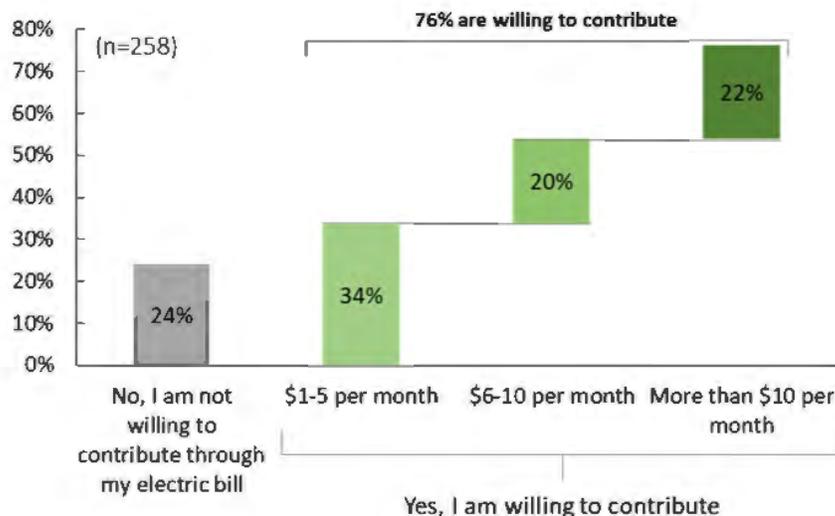
92% of survey respondents agree that, “Denver should install solar panels on municipal facilities and prioritize purchasing renewable electricity from projects located in Colorado rather than purchasing Renewable Energy Credits that fund power projects in other states.”

Denverites are willing to make voluntary contributions to climate action efforts

76% of respondents are willing to contribute to climate action efforts through a voluntary contribution on their electricity bill.

This includes,

- local workforce development programs,
- renewable energy projects,
- efficient buildings, and
- clean transportation.



Community Considerations and Priorities

Main challenge to powering your home with 100% RE,

“The up-front costs are prohibitive.”

Critical attribute for a renewable electricity program,

“I want my electricity to come from a local source.”

Top priority for the transition to 100% renewable electricity,

“The transition to 100% RE should occur as rapidly as possible.”

Survey detail provided in Appendix A

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DEVELOPING THE PLAN

Denver is committed to developing and implementing strategies to equitably achieve Denver's carbon emissions reduction targets as described in the 80x50 Climate Action Plan.⁴ The plan built on a history of climate action in Denver that began in 2007 when Denver released its first Climate Action Plan and became one of the first large U.S. cities to recognize the potential threats and broad-reaching impacts of climate change.

Denver's renewable electricity supply is critical to achieving Denver's decarbonization objectives. It is foundational to the shifts described in the 80x50 Plan to use electric vehicles and electrify buildings in the coming decades.

The 100RE Plan is led by the Office of Climate Action, Sustainability, and Resiliency (CASR). The 100RE Plan relies on staff directed research and analysis, an inclusive and robust stakeholder process, community feedback, and close collaboration with parallel climate planning efforts in Denver.

Denver's Climate Action Task Force

Denver's Climate Action Task Force (referred to as the Task Force) developed recommendations to strengthen Denver's work to address climate change equitably in the following critical areas:

- | | |
|-------------------------------|------------------------------|
| 1. Buildings | 4. Industrial Energy Use |
| 2. Transportation | 5. Consumption Emissions |
| 3. 100% Renewable Electricity | 6. Resiliency and Adaptation |

The Task Force was comprised of 26 members of the community from diverse backgrounds including technical expertise in engineering or climate and energy solutions, affiliation with industry associations or the electric utility, representation from local high school and college students, leadership from non-profit environmental justice and community-organizations, and non-technical members of the general public.

The Task Force process kicked off in January and met on a near-weekly basis through June of 2020. CASR staff provided technical expertise to the Task Force

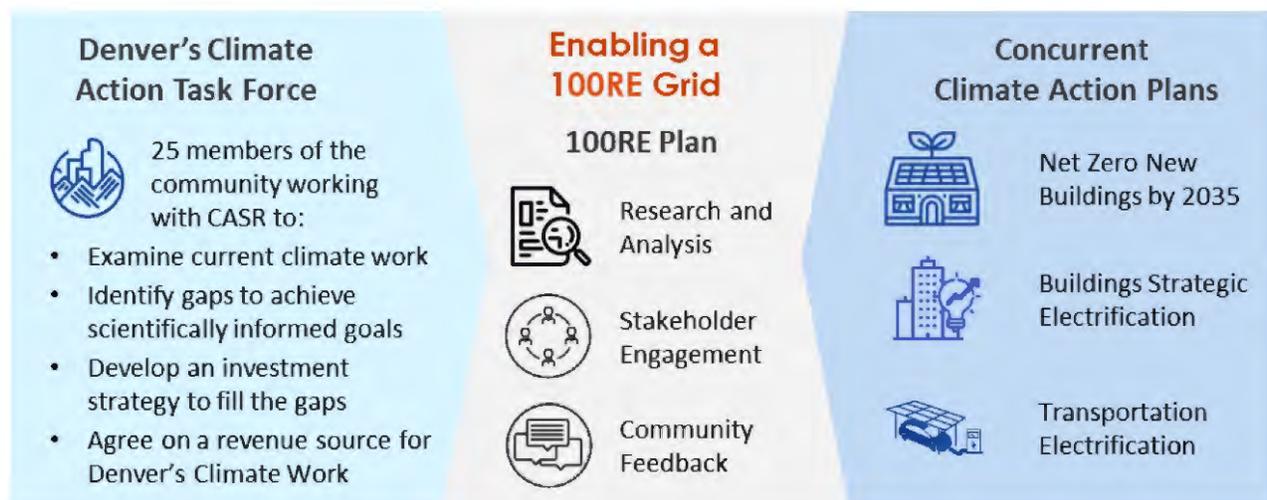


Figure 1. Relationship of Denver's 100RE Plan to concurrent climate planning efforts

⁴ "Denver: 80x50 Climate Action Plan." Denver Department of Public Health and Environment. July 2018.

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members as it pertains to Denver's 100% Renewable Electricity target.

The Task Force's charge is higher-level than the 100RE Plan. The responsibilities of the two efforts can be differentiated by who is answering the following questions:

Task Force

1. What is the overarching goal?
2. How quickly does Denver need to achieve the goal to align with the climate science?
3. What principles must be adhered to, to achieve the goal equitably?
4. What resources can be made available to support the actions to achieve the goal?

100RE Plan

1. What are the strategies and tactics Denver can use to achieve the goal?
2. What existing programs can be modified or leveraged to achieve the goal?
3. How will the City measure and ensure the effectiveness and equitability of its strategies and tactics?
4. How will City agencies collaborate more effectively with each other and community-partners to achieve the goal?

Denver's overarching goal and the underlying strategies to enable a rapid and equitable transition to a 100% renewable electric system in Colorado were developed with input from and are supported by Denver's Climate Task Force. Denver's Climate Task Force delivered their full set of recommendations to the City in June 2020.⁵

Relation to Concurrent Climate Action Plans

The City is pursuing aggressive decarbonization objectives that are likely to increase electric load in buildings and transportation. In addition to the



Figure 2. Images from Denver's Climate Action Task Force Process

100RE Plan, Denver is developing three concurrent Climate Action Plans:

1. Net Zero New Buildings by 2035
2. Strategic Electrification of Buildings
3. Transportation Electrification

The City is currently defining net zero buildings as being: 1) highly energy efficient; 2) all electric; 3) powered by renewable electricity; and 4) providers of demand flexibility for the grid. The ability for buildings and transportation loads to provide demand flexibility for the grid creates a paradigm shift in traditional electric system operations and management. Customer-owned distributed energy resources, with appropriate integration technologies and price signals, could provide considerable value to and may be necessary for a 100% renewable electric grid to operate reliably.

The City is engaged at the Colorado Public Utilities Commission (PUC) and with Xcel Energy to better understand how building and transportation loads can be functionalized into grid assets. There is currently a disconnect between customer compensation for grid services versus utility compensation for capital investments. The PUC acknowledges this challenge in decision C19-0957 that, "Non-wires alternatives may reduce the utility's

⁵ "Denver Climate Action 2020 Recommendations Report." www.denvergov.org/climatestakeholder

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opportunity to earn a rate of return and potentially may lead to lost revenue.” Customers should be appropriately compensated when providing utility access to their distributed energy resources. The City will continue its participation in relevant PUC proceedings such as 19M-0670E related to distribution system planning and 19M-0661EG related to performance-based metrics to advocate for the alignment of utility incentives with the stated public benefit goals of C.R.S §40-3-117. Regulatory shifts may encourage innovation and enable a more integrated electric system with distributed energy resources, highly efficient all-electric buildings, and electric vehicles.

Electrification of the transportation system will require not just charging infrastructure in residential and commercial spaces, but also may require increased electricity supply. SB19-077 authorized a process at the Colorado PUC whereby a public utility may undertake implementation of an electric motor

vehicle infrastructure program in their service territory.⁶

Xcel Energy filed its first transportation electrification plan in May of 2020 in proceeding 20A-0204E. The plan calls investments and programmatic support for transportation electrification in Colorado across a three-year timeframe. The proposed plan includes initial considerations for data sharing and EV charging control system requirements that will enable customer participation in demand management programs to support electric system operations. As the EV charging industry matures, this provides a valuable opportunity for utilities and other stakeholders to influence how technology vendors develop a suite of standardized and effective demand management capabilities.

Collaboration and frequent communication between CASR's project teams will provide the greatest chances of success for buildings and transportation

Concurrent planning efforts for energy efficiency, building electrification, and transportation electrification complement the City's renewable electricity goal.

Energy Efficiency



Energy Efficiency is the first strategic priority in Denver's Municipal Facilities Strategic Energy Plan. By 2025, Denver expects to save approximately 12.6 GWh (11%) of municipal electricity use through energy efficiency.

Energy efficiency:

- is strategically important to the feasibility and economics of Denver's renewable electricity efforts;
- allows for "right-sized" renewable energy additions, both for distributed and utility scale efforts; and
- is an important means to reduce overall costs for energy, through the absolute reduction of energy consumption.

The Net Zero New Buildings and the Buildings Strategic Electrification plans discuss the importance of energy efficiency and building electrification.

Transportation Electrification



Denver prioritizes biking, walking and public transit, and values innovative approaches to transportation and mobility. Mobility options other than driving are growing, while electric vehicles are accelerating the market share at a rapid pace.

EVs are the only commercially available vehicle that gets cleaner over time as our grid decarbonizes.

Increased mobility options and electric vehicles present the best opportunity to decrease harmful air pollution and avoid non-compliance with health-based air quality standards.

The Transportation Electrification plan discusses the role of electric vehicles and the City's strategy to decarbonize transportation across the community.

⁶ SB19-077, Electric Motor Vehicle Public Utility Services.

electrification to enable system-level benefits. Denver leaders will acknowledge and address potential equity impacts to low-income communities including economic barriers to electrification in Colorado. Incentives and targeted programs may be necessary to support low-income communities as electric appliances and vehicles move down the cost curve to reach price parity with fossil-based alternatives. Legislative and regulatory actions will be particularly important to address the risks of burdening a subset of the Denver community or customer base with a disproportionate share of maintaining and paying for existing fossil-based infrastructure.

Consideration of Renewable and Carbon-Free Options for Denver's Electricity Objectives

Denver's Climate Action Task Force recommended expanding the scope of the community-wide target to include both renewable and carbon-free electricity options. They argue that it will increase the likelihood of success for Denver while meeting the intent of the goal from a climate mitigation perspective. For now, Denver will continue to prioritize, advocate for, subscribe to, and deploy technically proven and economically viable renewable electricity options in pursuit of its 100RE objectives as originally stated in the 80x50 Climate Action Plan and described in this plan. Costs for renewable electricity technologies and battery storage continue to drop and present cost-effective solutions for electricity decarbonization with yet untapped potential for both utility-scale and distributed deployments.

As was originally stated in the 80x50 Climate Action Plan, the City remains open to considering and evaluating the potential of contributions of non-renewable carbon-free technologies that demonstrate the ability to provide reliable and affordable electricity for Denver and the Colorado

electric grid. Denver agrees with the exclusion of fossil and nuclear fuels and their derivatives from consideration as eligible energy resources in meeting Colorado's clean electricity objectives.⁷

The City expects that non-renewable carbon-free options will be introduced through relevant proceedings at the Colorado PUC. Such proceedings will allow for analysis and comparisons of carbon-free electricity options by Denver, the PUC Commissioners and Staff, Xcel Energy, and other organizations. Denver may update or expand its 100RE objective to include alternative carbon-free resources if it is determined to be in the interest of the City's facilities, residents, and businesses.

100RE Plan Stakeholder Engagement Process and Community Feedback

An inclusive and robust stakeholder process is a key component of the 100RE Plan. Public involvement is a critical part of Denver's Climate Action strategy and the foundation upon which the 100RE Plan rests. The public and interested stakeholders will continue to be engaged as the implementation process moves forward.

The 100RE Plan is supported by an Advisory Committee (AC) that includes representatives from the Colorado Energy Office, Denver Public Schools, the Denver International Airport, energy and environmental non-profit organizations, the Colorado Solar and Storage Association, and Xcel Energy. The Advisory Committee met regularly over the development of the plan from December 2019 through the summer of 2020.

The AC provided valuable inputs to the process and development of the 100RE Plan. The AC weighed in on the potential strategies and tactics that emerged and were prioritized throughout the process. They helped to identify existing programs and partner organizations that could be leveraged to advance

⁷ Definitions of "Carbon Free Energy" or "Clean Energy Resources" often include both emissions free and carbon neutral energy sources. Nuclear, though not renewable, is considered a carbon-free energy source in some areas.

Colorado C.R.S. §40-2-124 (1)(a) specifically excludes fossil and nuclear fuels and their derivatives from consideration as eligible energy resources in meeting Colorado's clean electricity objectives.

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Denver's clean electricity objectives. The AC also helped to identify and suggest solutions to the potential pitfalls that could negatively impact each strategy.

Denver staff participated in several public events and conference presentations, listed in Table 1, to discuss and encourage feedback on the City's clean electricity efforts. Unfortunately, the COVID-19 crisis resulted in the cancellation of several conferences and public engagement events. The City pivoted to virtual opportunities where possible, including a public survey (results shown in Appendix A).

Presenting Denver's clean electricity perspectives and strategies to peer cities, utilities, solar developers, members of the community, and other relevant stakeholders has proven to be highly informative. CASR staff have established valuable

relationships with experts from other cities and organizations that provide useful perspectives and alternative experiences that inform new or help to refine Denver's clean electricity strategies and implementation tactics. Denver staff will continue to pursue opportunities to participate in and speak at clean energy conferences.

Denver has established and continues to strengthen its public engagement strategy and framework for establishing partnerships with community-organizations. The City will continue to use a variety of outreach channels including email; websites; social media; virtual and in-person meetings/events; newsletters; media outreach; and outreach through informational sessions such as open houses, town halls, lunch and learns, and other events.

Table 1. Denver staff conference presentations and public engagement events

Conference Presentations	Public Engagement Events
<ul style="list-style-type: none">• July 2019 – Clean Cities Renewable Power Procurement Conference (Municipal Perspective on Clean Electricity Priorities)• September 2019 – EUCL Utility Green Tariffs Conference (Municipal Perspective on the Role of Green Tariffs in Achieving RE targets)• November 2019 – Colorado Solar and Storage Association Annual Conference (Community Solar: Enabling a Consumer Revolution)• February 2020 – Solar Power Mountain West Conference (Community Solar: Big Changes in Colorado)	<ul style="list-style-type: none">• December 2019 – Denver Sustainability Summit (RE100 Plan survey distribution and info table)• February 2020 - Environment Colorado with Metro State University (Panel discussing international climate agreements and municipal climate action)• March 2020 – Save Green Be Green event hosted by the Denver Office of Strategic Partnerships and the Environmental Protection Agency (Presentation titled Empowering the Community through Clean Energy Investments)• March 2020 – Colorado Renewable Energy Society (Enabling a More Sustainable and Resilient Denver)



Photograph from the Denver Climate Strike on September 20, 2019

DENVER'S ELECTRICITY LANDSCAPE

In 2018, Denver pledged to achieve 100% renewable electricity community-wide by 2030, which was met with widespread public support.⁸ Achieving this ambitious objective will require a variety of partnerships including with Denver's electricity service provider, community-organizations, members of the public, and interdepartmental coordination across City agencies.

Denver's community-wide electricity consumption represents almost 25% of Xcel Energy's total retail sales in Colorado (Figure 3). Denver's choices meaningfully influence the resource makeup and functionality of a 100% renewable electric grid. A comparison of Xcel Energy's power supply vs Denver's renewable contributions is shown in Figure 4.

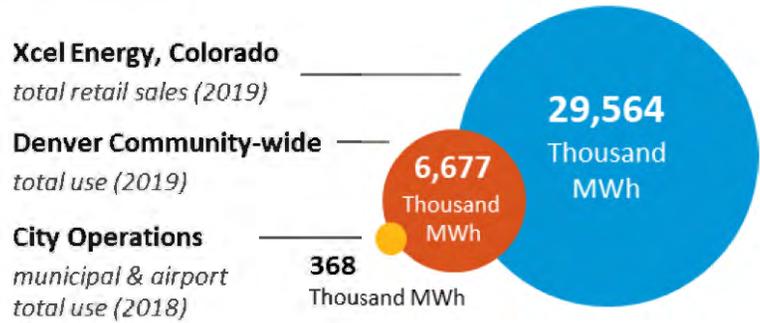


Figure 3. Electricity relationship between Denver and Xcel Energy

The renewable content of Xcel Energy's physical generation mix was reported as 30% carbon-free in 2019.

However, Denver's renewable contributions were less than 23% in 2019.

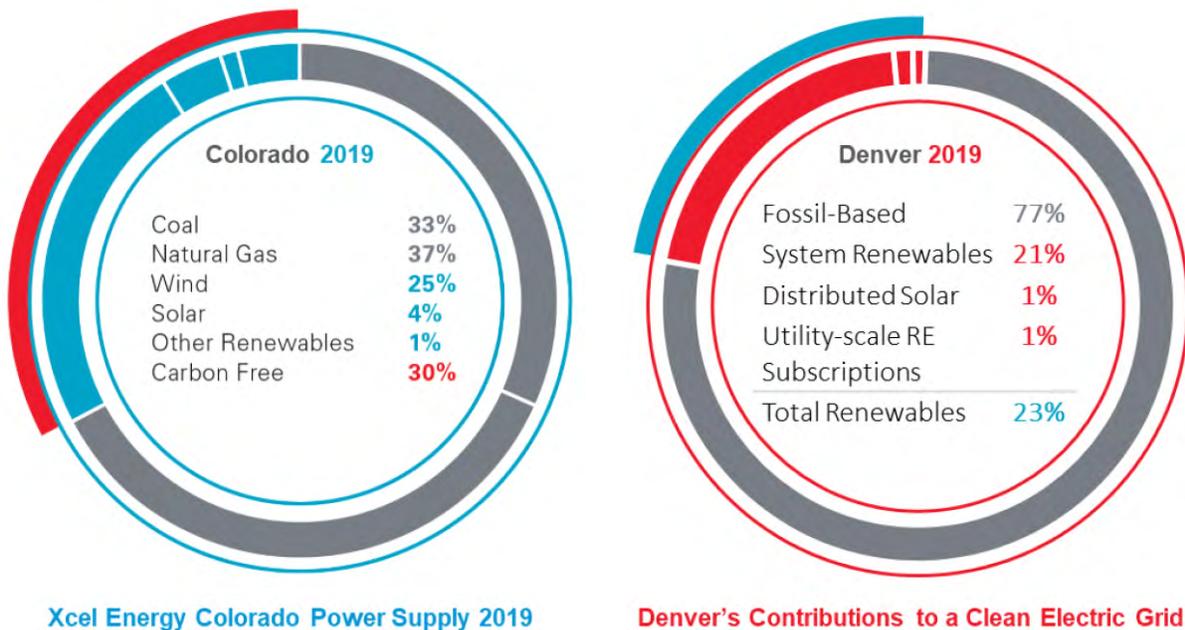


Figure 4. Comparison of Xcel Energy's physical portfolio of power generation in Colorado vs Denver's metrics to track its renewable electricity supply and its contributions to a 100% renewable electric system

Electricity fuel mix on Xcel Energy's system in 2019. www.xcelenergy.com/energy_portfolio/electricity/power_generation

⁸ "Denver: 80x50 Climate Action Plan." Denver Department of Public Health and Environment. July 2018.

It may seem counterintuitive that Denver's renewable contributions would be less than the physical renewable electricity in Colorado's power supply. This is because some of the renewable energy attributes, measured by Renewable Energy Credits or "RECs", of the renewable power in Colorado's system are sold to third parties before it is delivered to customers. Xcel Energy customers outside of and within Denver are also responsible for creating RECs through distributed solar programs such as Solar*Rewards and community solar gardens that help to clean Colorado's power supply. Lastly, customers can purchase RECs from utility-scale electricity assets through Xcel Energy's Windsource and Renewable*Connect programs and should be credited for doing so.

Denver's renewable electricity metrics adopt a holistic view of the electric system and Denver's place in it. They include:

1. **System Renewables:** *The remaining RECs in Xcel Energy's delivered grid mix that are not created by, subscribed to, or sold to other customers.*
2. **Distributed Solar:** *The RECs transferred to Xcel Energy by Denver customers with on-site solar arrays or subscriptions to community solar gardens.*
3. **Utility-Scale RE Subscriptions:** *The RECs retired due to participation in Xcel Energy's Renewable*Connect and Windsource programs by Denver customers.*

Xcel Energy delivered 99% of Denver's community-wide electricity use in 2019. Fortunately, Xcel Energy is a national leader in the clean energy transition among investor owned utilities (IOUs). Xcel Energy was the first IOU in the country to announce a voluntary target to deliver 100% carbon-free electricity by 2050 and to produce 80% less carbon on their system by 2030 than a 2005 baseline.⁹

⁹ "Building a Carbon-Free Future." Xcel Energy. www.xcelenergy.com/environment/carbon_reduction_plan

Denver is embracing REC creation and utility REC retirement in its energy goals.

Renewable Energy Credits, or RECs, measure renewable energy produced. RECs were created as a regulatory method for utilities, including Xcel Energy, to meet statutorily defined renewable electricity requirements such as those established by Colorado's Renewable Energy Standard. RECs retired by the utility benefit all customers by contributing to system-wide decarbonization.

Regulated markets were established to coordinate the sale, transfer, and retirement of RECs between utilities in pursuit of their renewable electricity requirements. Utility programs and voluntary REC markets emerged to meet the demand of customers interested in retaining or procuring RECs to meet their own clean energy objectives.

Many municipalities have negotiated REC purchases with renewable electricity producers to "clean" the power supply of their communities. This sends a signal to utilities that customers desire more clean energy, however, does not always create additional renewable electricity on the local electric grid.

If Denver were to rely solely on stand-alone REC purchases, the cumulative cost of "cleaning" Denver's power use is estimated to reach \$571 million by 2030 and \$932 million by 2050, with potentially minimal system-level carbon impact depending on the type of REC purchased.

Denver's renewable electricity approach therefore strives to encourage the most rapid decarbonization of Colorado's electric system. The City is embracing and encouraging strategies in which its facilities and the community create additive RECs, including those in which RECs are transferred to and retired by the utility towards system-wide decarbonization.

Denver's approach adopts a holistic view of the electric system and Denver's place in it. It places investments in local clean energy infrastructures and community co-benefits at the forefront of Denver's energy transition.

See Appendix B for more information on Denver's approach to renewable electricity accounting.

Denver's 100% Renewable Electricity Action Plan

The City has some confidence in the rate at which renewable electricity will be added to grid thanks to 2019 legislation and Xcel Energy's commitment to its Certified Renewable Percentage (CRP) approach. Xcel Energy will incrementally increase the amount of RECs retired on behalf of Colorado customers each year.^{10,11} As shown in Figure 5, the CRP establishes targets of nearly 50% by 2025 and more than 60% by 2030. However, there is still a gap that Denver must close between Xcel Energy's renewable electricity trajectory and the City's goal.

There is a reasonable expectation that renewable energy will be the lowest cost means for Xcel Energy to achieve its 80% carbon-free target by 2030. Denver anticipates the utility will be able to acquire additional renewable resources and retire the corresponding RECs prior to 2030, thereby helping Denver meet its goals.

Xcel Energy is regulated by the PUC, which is charged with protecting the public interest and ensuring that electricity service is safe, reliable, and

cost-effective. The PUC also provides oversight of electricity rates, approves utility capital investment plans, and determines what customer choice renewable electricity program options are available at both the utility and distributed scales.

Enabling a rapid and equitable transition to a 100% renewable electric system in Colorado requires Denver to actively engage with Xcel Energy, other stakeholder groups, and in regulatory proceedings to influence the City's energy portfolio and options.

The subsequent sections describe several possible pathways to achieving the 100% renewable electricity goal and the metrics Denver will use to track progress. The City is focused on encouraging the most rapid decarbonization of Colorado's electric system possible, while placing investments in local clean energy infrastructure and community co-benefits at the forefront of its energy transition.

Appendix B provides more information on Denver's approach to renewable electricity accounting.

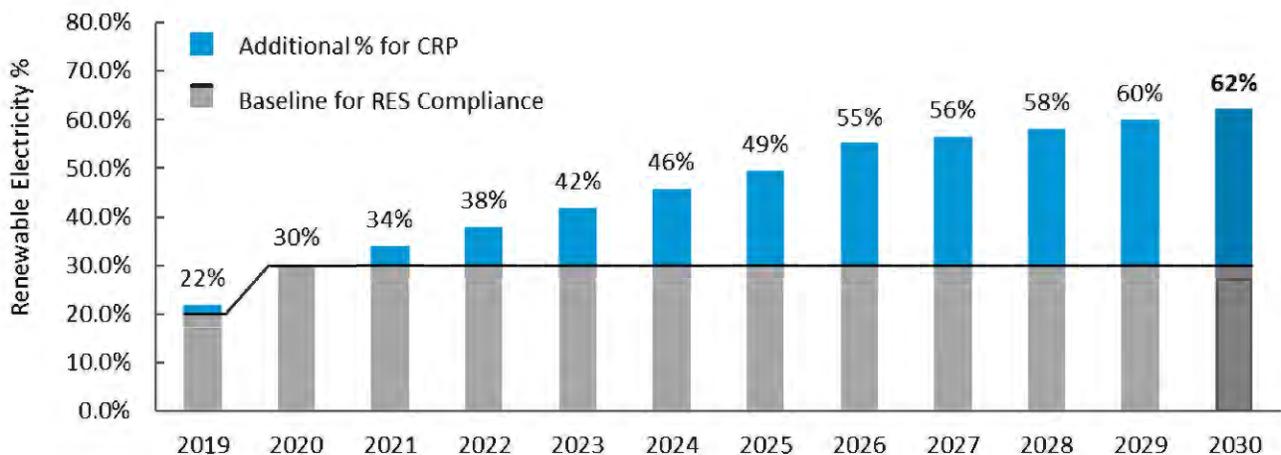


Figure 5. Xcel Energy Colorado - Certified Renewable Percentage outlook

(Source: Adapted from Xcel Energy, Certified Renewable Percentage Filing G_764613, proceeding 19AL-0268E)

¹⁰ Senate Bill 19-236 added Colorado Revised Statute §40-2-125.5 requiring Xcel Energy to file a "Clean Energy Plan" with the PUC by March 31, 2021. The plan will reduce carbon dioxide emissions associated with retail electricity sales by 80% from 2005 levels by 2030, and provide customers with energy generated from 100% clean energy resources by 2050.

¹¹ Xcel Energy Certified Renewable Percentage is described in filing number G_764613, proceeding 19AL-0268E. Colorado Public Utilities Commission.

PATHWAYS TO 100% RENEWABLE ELECTRICITY

The collaborative approach and communication between the 100RE Plan team and the Task Force enabled the City to establish a clear vision and target for its electricity supply. Specifically,

Denver's renewable vision is to enable a rapid and equitable transition to a 100% renewable electric system in Colorado.

By 2030, 100% of Denver's community-wide electricity use will contribute to this vision.

The above vision and 2030 goal for Denver's electricity use to "contribute to" a 100% renewable electric system is distinct from goals to be "powered by" 100% renewable electricity.

Denver's approach adopts a holistic view of the electric system and Denver's place in it. It places investments in local clean energy infrastructure and community co-benefits at the forefront of Denver's energy transition.

Denver as an electricity consumer is nested within Xcel Energy and the broader Colorado electric

system. Success in achieving Denver's renewable electricity target, particularly through the subscription to and deployment of additive renewable electricity capacity has a net beneficial effect on Xcel Energy's system-wide decarbonization objectives when accompanied with REC retirement.

Denver's renewable electricity contribution metrics include: 1) System Renewables; 2) Distributed Solar; and 3) Utility-Scale RE Subscriptions. The 2019 actual and 2030 target renewable percentages are compared in Figure 6.

Five high-level strategies emerged from the 100RE Plan process that were vetted concurrently by the 100RE Plan Advisory Committee and Denver's Climate Task Force. The City will prioritize implementation tactics for the strategies that maximize climate impact, that the City can control or exert meaningful influence over, and where the City can overcome challenges to implementation.

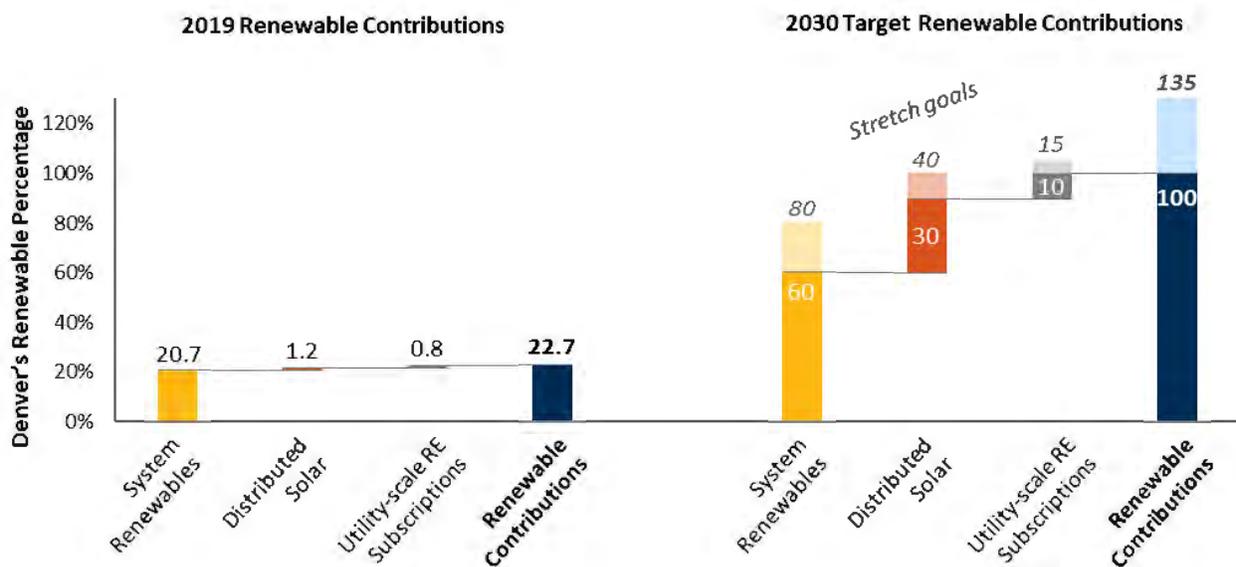


Figure 6. Achieving 100% Renewable Electricity in Denver: 2030 Targets and Stretch Goals

Denver's five strategies individually and collectively impact or support the City's renewable electricity goals:

1. Decrease the carbon-intensity of the utility grid-mix
2. Expand distributed energy resources
3. Lead with municipal infrastructure
4. Educate and engage the community
5. Invest in energy workforce development

The five strategies are enduring concepts that can last through Denver's attainment of the City's clean electricity goals and beyond. Within each strategy, Denver will prioritize opportunities that maximize climate impact and equity, that the City can control or exert meaningful influence over, and where it can overcome challenges to implementation.

The strategies and implementation tactics must align with three climate intervention priorities:

1) Systemic Change; 2) Sustainable Infrastructure; and 3) Community Empowerment. This means that Denver's actions should enable systemic shifts in status quo operations for City government and electric grid operations. They should also produce co-benefits such as workforce development, utility bill savings, and more resilient public facilities.

Systemic changes can create simplicity in the transition. General members of the community will not need to concern themselves with researching and becoming experts in renewable electricity systems. When Denver is successful, buildings will be built better and its utility will provide renewable energy in the same reliable and affordable manner to which customers are accustomed.

Denver has significant distributed energy potential. According to data from Google Project Sunroof, 72% of buildings in Denver are solar-viable and could produce 3.4 million MWh of electricity annually. For comparison, the Denver community used 6.7 million MWh of electricity in 2019. Approximately 1,150 MW of distributed energy resources are needed to reach a 30% contribution to Denver's renewable electricity goal. This can be accomplished if

By 2030, 100% of Denver's community-wide electricity use will contribute to a clean energy grid.

The following metrics track Denver's progress:

System Renewables

20.7% (2019) → 60-80% by 2030

System renewables account for nearly all of Denver's renewable electricity and are expected to continue to account for the majority of Denver's 100RE attainment in 2030. As part of Xcel Energy's carbon reduction commitments, the utility currently projects it will retire RECs for approximately 60% renewable energy by 2030. Meeting this target is critical to Denver's objectives. Exceeding this target will require Denver to work closely with Xcel Energy and to take an active role in regulatory proceedings.

Denver is pursuing a 60-80% contribution from system renewables by 2030.

Distributed Solar

1.2% (2019) → 30-40% by 2030

Denver has significant untapped distributed energy potential. Actions to expand distributed energy resources include incorporating renewable electricity requirements into Denver's building codes, supporting CSG and rooftop solar programs, and advocating for the expansion of distributed energy resources through PUC proceedings.

Denver is pursuing a 30-40% contribution from distributed solar by 2030.

Utility-Scale RE Subscriptions

0.8% (2019) → 10-15% by 2030

Utility-scale renewable electricity subscriptions by Denverites to options such as Windsource and Renewable Connect are necessary to fill any gap that system renewables and distributed solar leave below Denver's target of 100% renewable electricity by 2030. Community engagement and education is expected to be the primary driver to encourage residential and commercial customers to participate.

Denver is pursuing a 10-15% contribution from utility-scale RE subscriptions by 2030.

Denver's 100% Renewable Electricity Action Plan

approximately 9% of total roof space in Denver is used for solar and can be supplemented by deploying solar over parking lots and at local vacant land parcels within and adjacent to Denver.

The expansion of distributed energy resources can be supported by Denver taking advantage of the opportunity to invest locally in sustainable infrastructure. The City owns over 150 buildings and parking lots that can host distributed energy resources. The first iteration of the Renewable Denver Initiative seeks to host 15MW of CSGs on municipal property. Power from the CSGs would be enough to meet approximately 10% of Denver's municipal electricity requirements (facilities overseen by the Energy Office) and power for nearly 1000 homes. If successful, Denver intends to engage members of the community with suitable sites to replicate and expand the program.

The deployment, integration, and management of distributed energy resources is essential to supporting a 100% renewable electric system. As the City pursues the electrification of buildings and expands its electric vehicle infrastructure it must ensure that such systems can support demand flexibility and enhance the functionality of the electric system. The City will need to pursue strategies and work collaboratively with Xcel Energy to better understand how distributed energy resources can reduce the amount of additional grid infrastructure needed to achieve full electrification.¹²

Subscriptions to utility-scale renewable electricity options such as Windsource and Renewable*Connect are necessary to fill any gap that system renewables and distributed energy resources leave below Denver's target of 100% renewable electricity by 2030. Community engagement and education is expected to be the

primary driver to encourage residential and commercial entities to subscribe.

The subsequent sections discuss Denver's strategies and the implementation tactics and prioritization of resources needed to achieve 100% renewable electricity (summarized in Figure 7 and Table 2). The City's efforts will evolve based on need and impact over the next decade.

Denver's climate action efforts strive to replace our dated and polluting systems with an economically, socially, and environmentally sustainable community in which all Denverites have the opportunity to live, work, and thrive for generations.

Importantly, equity and community impact are foundational criteria for Denver's evaluation of climate action strategies. Equity considerations are embedded throughout each of the five strategies and their associated implementation tactics.

Appendix C discusses Denver's efforts to establish an equity framework for energy transition. The City recognizes that a robust equity framework requires an ongoing and inclusive process to determine how climate action programs are designed and how success is measured in pursuit of the City's goals.

¹² The strategies and implementation tactics to increase energy efficiency and electrify buildings and transportation are discussed in Denver's other climate action plans.

Strategies to Achieve 100% Renewable Electricity

- 01 Decrease the carbon intensity of the utility grid mix
- 02 Expand distributed energy resources
- 03 Lead with municipal infrastructure
- 04 Educate and engage the community
- 05 Invest in energy workforce development

Denver's actions should enable systemic shifts in status quo operations for City government and electric grid operations. They should produce co-benefits such as workforce development, utility bill savings, and more resilient public facilities.

The strategies and implementation tactics must align with three climate intervention priorities:

Systemic Change

Shift the status quo



Sustainable Infrastructure

Lead with municipal space



Community Empowerment

Strengthen the community



Within each strategy, Denver will prioritize opportunities that maximize climate impact and equity, that the City can control or exert meaningful influence over, and where it can overcome challenges to implementation.

Equity

All Denverites have the right to participate in and benefit from the clean energy transition.

Community Impact

Denver's climate action investments should provide co-benefits for the community.

Climate Impact

Prioritize strategies that result in the largest reduction in greenhouse gas emissions.

Control vs Influence

Differentiate between actions Denver can take directly and actions of others Denver can influence.

Feasibility

Identify solutions to economic, technical, social, and regulatory barriers.

Figure 7. Strategies and Considerations for Achieving 100% Renewable Electricity in Denver

Table 2. Strategies and Tactics to Achieve 100% Renewable Electricity in Denver

1. Decrease the carbon-intensity of the utility grid-mix	
Near Term (by 2022)	Longer Term (by 2030)
<ul style="list-style-type: none"> a. Actively participate in state legislative affairs and Public Utility Commission proceedings. b. Strengthen City-utility partnership to accelerate the transition to a renewable electric grid. c. Add CASR staff capacity to support energy policy. 	<ul style="list-style-type: none"> a. Continue participation in state legislative affairs and Public Utility Commission proceedings. b. Influence Xcel Energy’s electric resource planning PUC proceedings to exceed an 80% reduction in carbon emissions by 2030.
2. Expand distributed energy resources in Denver	
Near Term (by 2022)	Longer Term (by 2030)
<ul style="list-style-type: none"> a. Fund community solar (and rooftop solar) programs. b. Increase funding for community-based energy organizations and nonprofits with established energy efficiency and renewable energy programs. c. Expedite and minimize permitting and inspection costs. d. Expand rebates and incentives beyond utility programs. e. Revise zoning requirements if needed to support CSGs. f. Advocated for the expansion of distributed resources. 	<ul style="list-style-type: none"> a. Adopt the latest model International Energy Conservation Code (IECC) with strengthening amendments to advance Denver towards Net Zero Carbon New Buildings. b. Strengthen building codes for energy intensive loads to include grid controllable attributes to remove barriers to participation in utility DSM programs. c. Implement an R-PACE program in Colorado with strong consumer protections.
3. Lead with Municipal Infrastructure	
Near Term (by 2022)	Longer Term (by 2030)
<ul style="list-style-type: none"> a. Host community solar gardens at municipal properties through the Renewable Denver Initiative. b. Prioritize additive renewable capacity above purchasing RECs from existing resources or resources in other service territories. 	<ul style="list-style-type: none"> a. Build new municipal facilities to be Net Zero Carbon. b. Power facilities with renewable electricity and retrofit them to be all electric and support grid flexibility. c. Deploy battery storage at municipally-hosted community solar gardens to enable community-scale microgrids with resiliency capabilities.
4. Educate and engage the community	
Near Term (by 2022)	Longer Term (by 2030)
<ul style="list-style-type: none"> a. Ensure that Denver's climate solutions maximize co-benefits for the community. b. Work with Denver Public Schools (K-12) on energy education and curriculum. c. Conduct a city-wide solar assessment and develop targeted programs for viable sites to go solar. 	<ul style="list-style-type: none"> a. Remove barriers to participation in RE, EE, DSM, and EV programs and ensure that community members are aware of those opportunities and their benefits. b. Enable systemic changes that create ample opportunity for members of the community to benefit from and participate in the energy transition.
5. Invest in energy workforce development programs	
Near Term (by 2022)	Longer Term (by 2030)
<ul style="list-style-type: none"> a. Support and expand programs for energy infrastructure training and job placement. b. Partner with local educational institutions on student exposure to energy employment pathways. c. Add CASR staff capacity to support energy employment and workforce development programs. 	<ul style="list-style-type: none"> a. Establish employment pipelines between local educational institutions and energy companies. b. Enable systemic changes that ensure job training and energy workforce opportunities are readily available to members of the community and do not exclude previously incarcerated individuals.

Denver's 100% Renewable Electricity Action Plan

Strategy 1: Decrease the carbon-intensity of the utility grid-mix

Priority Actions

1. Strengthen City-utility partnership to accelerate the transition to a renewable electric grid.
2. Actively participate in regulatory proceedings pertaining to renewable electricity and energy efficiency.
3. Influence Xcel Energy's electric resource planning PUC proceedings to exceed an 80% reduction in carbon emissions by 2030.

Description

Denver's renewable contributions are highly dependent on the percentage of system renewables available to the community through the utility grid mix. Active participation in PUC proceedings and close collaboration between Denver and Xcel Energy are helping to advance Denver's and Xcel Energy's mutual decarbonization objectives.

The Denver/Xcel Energy, Energy Future Collaboration (EFC) Memorandum of Understanding provides a strategy for cooperation and achievement of a shared vision. This collaborative effort focuses on innovation, clean energy, economic development opportunities, customer choice programs, and technology.

Denver and Xcel Energy have outlined short-term and longer-term goals, organized by six technical working groups as follows:

1. Renewable Electricity, Policy, and Regulatory
2. Strategic Building Electrification
3. Resilience and Reliability
4. Municipal Operations
5. Streetlights
6. Electric Vehicles

Each working group has distinct objectives and have selected relevant near-term implementation projects. The leaders of each working group meet monthly as a "Core Team". The Core Team supports the technical working groups and encourage

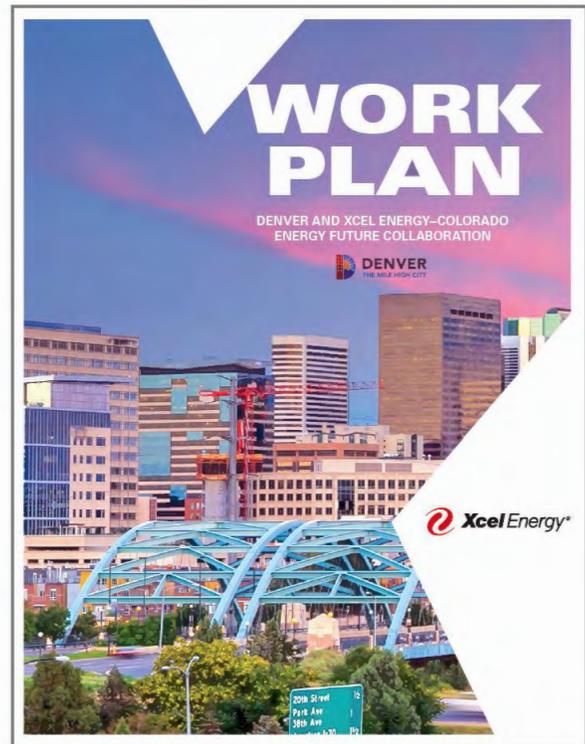


Figure 8. Denver and Xcel Energy – Colorado Energy Future Collaboration 2020 Work Plan

knowledge sharing and collaboration between groups. The Core Team also provides a quarterly briefing to Denver and Xcel Energy executive leadership. These briefings promote transparency and ensure consistent communication throughout the hierarchies of Denver and Xcel Energy.

Denver's 100% Renewable Electricity Action Plan

The Renewable Electricity, Policy, and Regulatory (REPR) working group is most relevant to this action plan. REPR has two defined objectives:

1. Enable Denver to achieve its 80x50 Climate Action Plan goal that 100% of electricity use community-wide contributes to a carbon-free electric grid by 2030.
2. Act as a knowledge resource and lead, organize, or support policy and regulatory activities for the EFC Partnership.

Denver increased its presence and advocacy at the PUC in 2019. A dedicated member of the CASR staff tracks and selects proceedings in which to intervene or provide comments in. The City discusses PUC activities regularly with representation from the Mayor's Office, CASR, the City Attorney's Office, and leadership from other interested and affected City agencies.

The proceedings Denver participates in generally focus on issues pertaining to customer rates, resource planning, regulatory rules, and renewable electricity and energy efficiency program options.

Denver's advocacy has helped to influence positive outcomes for the City and its residents that prioritize local investments, promote community resilience, and accelerate the decarbonization of Xcel Energy's Colorado grid, while doing so equitably and affordably. For example, Denver worked with Xcel Energy and other stakeholders through the course of PUC proceeding 19AL-0268E to define how the CRP approach could be implemented in Colorado. The resulting approach enables customers to more confidently incorporate system renewables in their clean electricity strategies.

Active participation in State Regulatory Proceedings and City-utility collaboration must continue for Denver to achieve its renewable electricity targets. This includes using the upcoming Clean Energy Plan filing to review the costs and emissions of existing generation resources and define a cost effective and equitable path to retire and replace polluting generation sources.

Existing Program and Partner Opportunities

There are several organizations that are actively involved in Colorado regulatory proceedings including, but not limited to: Colorado Energy Office, Colorado Solar and Storage Association, Office of Consumer Council, Public Utilities Commission Staff, Public Service Company of Colorado (Xcel Energy), GRID Alternatives, EarthJustice, Sierra Club, Vote Solar, Western Resource Advocates, and other Colorado Municipalities.

The City and County of Denver is also active in local, regional, and national clean energy organizations that work together to promulgate best practices, share resources, and coordinate strategies. These groups include the Denver Regional Council of Governments, the Urban Sustainability Directors Network, and the American Cities Climate Challenge. Denver is always looking for new partnerships with non-profits, industry associations, local governments, and community groups to help amplify its climate and community impact work.

Addressing and Avoiding Pitfalls

The RE100 AC cited the following as the most common pitfalls:

1. Competition from fossil fuels and incumbent infrastructure
2. Regulations inhibit or limit the strategy
3. Public awareness and information barriers

The AC emphasizes the importance of establishing a collaborative relationship with Xcel Energy. Denver should work to build public awareness and support from educational institutions, non-profit groups, community organizations, state agencies, and other trusted experts and community leaders.

Resource Outlook

CASR is fortunate that the value of PUC involvement and participating in the Energy Future Collaboration is recognized and encouraged by Denver's City leadership. Regular meetings and information sharing between CASR, the Mayor's Office, and other City agencies have proven effective.

Denver's 100% Renewable Electricity Action Plan

Strategy 2: Expand distributed energy resources

Priority Actions

1. Fund community solar (and rooftop solar) programs.
2. Expand rebates and incentives beyond utility programs.
3. Increase resources for community-based energy organizations and nonprofits with established energy efficiency and renewable energy programs.
4. Adopt building codes to advance Denver towards Net Zero Carbon construction.

Description

Distributed solar energy accounted for only 1.2% the Denver community's electricity use in 2019. According to data from Google Project Sunroof (Figure 9), 72% of buildings in Denver are solar-viable and could produce 3.4 million MWh of electricity annually. The Denver community used 6.7 million MWh of electricity in 2019.

There are a variety of steps that Denver could take to better realize the City's distributed solar potential. The City could provide cash incentives for homeowners and businesses that deploy rooftop solar. The City could also work to expand existing programs that benefit low-income residents in Denver such as the Colorado Energy Office Weatherization Assistance Program. It is critical that Denver advocate at the PUC for appropriate incentives to expand distributed energy resources in a way that effectively utilizes existing rooftops and other City infrastructure while also providing clean grid benefits.

One of the most impactful actions the City can take is to adopt building codes that advance Denver towards Net Zero Carbon construction. The City is working on a concurrent implementation plan to achieve Net Zero Carbon New Buildings by 2035. The pathway to Net Zero inherently includes renewable electricity and grid integration requirements that could be incorporated into Denver's building codes.

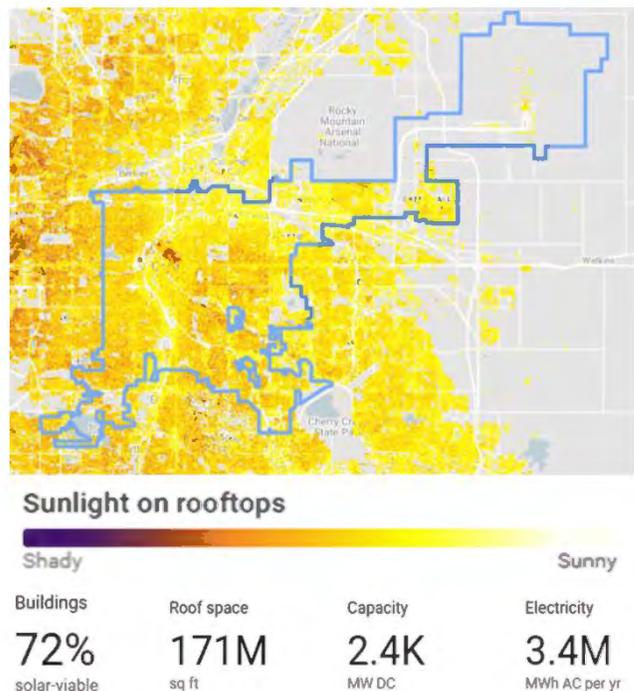


Figure 9. Estimated rooftop solar potential of Denver
(Source: Google Project Sunroof)

Existing Program and Partner Opportunities

The City is working closely with stakeholders in commercial and residential building construction and community groups to ensure that the progression of Denver's building code is logical, attainable, and affordable.

Denver's 100% Renewable Electricity Action Plan

Denver's voluntary Green Code provides minimum requirements for the siting, design, construction, and plans for operation of high-performance green buildings.¹³ Transitioning the voluntary Green Code to base code and providing strengthening updates to each iteration of the Green Code will help Denver achieve its Net Zero Carbon Net Construction goal.

Denver's Green Buildings Ordinance took effect in November of 2018.¹⁴ It applies to new buildings, roof permits for existing buildings, and additions, if any of which are 25,000 square feet or larger. The ordinance requires qualifying buildings to include a cool roof and other options including on-site solar panels or the purchase of off-site solar energy.

The City estimates that there is over 800 million ft² of roof space on existing buildings in Denver. The 171 million ft² of solar viable roof space identified by Google Project Sunroof is slightly more than 20% of the total roof area in Denver. Denver estimates that its building stock is growing at a rate of 1.5% each year. This could result in an additional 142 million ft² of roof space from new construction by 2030. Denverites could produce nearly 4.5 million MWh annually by 2030, or 67% of the electricity used by the Denver community in 2019 through a 20% utilization of total roof space.¹⁵ These estimates do not consider the resource potential of solar canopies over parking lots and local vacant land parcels within and adjacent to Denver.

Achieving a 30-40% contribution from distributed solar to Denver's renewable electricity goal by 2030 will require multi-faceted strategies and partnerships to be successful. Denver can engage with a variety of organizations including nonprofit energy organizations (such as Energy Outreach Colorado and GRID Alternatives), Xcel Energy, the Colorado Solar and Storage Association (COSSA), the Colorado Clean Energy Fund, the Colorado Energy

Office (CEO), and more. These organizations have existing programs that offer cost-effective energy efficiency, weatherization, and solar energy services that Denver can support.

Denver anticipates that customer-owned distributed energy resources, with appropriate integration technologies and price signals will provide considerable value to and may even be necessary for Colorado to achieve a 100% renewable electric grid.

Addressing and Avoiding Pitfalls

The RE100 AC cited the following as the most common pitfalls:

1. Up-front cost barriers
2. Lack of customer incentives/value of distributed energy resources
3. Regulations inhibit or limit the strategy
4. Public awareness and information barriers

The AC suggests that Denver should focus on bringing stakeholders together early and leveraging those partners to maximize the effectiveness of community engagement and incentive programs. Denver should strengthen its relationship with Xcel Energy and take an active role at the PUC to ensure that there are clear and supported rules for the expansion of distributed energy resources.

Resource Outlook

Providing funding, rebates, or cash incentives to support distributed energy resources may be cost-prohibitive in the near term. However, CASR can focus on lower-cost, and potentially higher impact, strategies including education, updating building codes, hosting distributed energy resources at municipal facilities, and advocating for the expansion of distributed energy resources at the PUC.

¹³ Denver Green Code. 2019. www.denvergov.org/content/dam/denvergov/Portals/696/documents/Denver_Building_Code/2019-code-update/2019_Denver_Green_Code.pdf

¹⁴ Denver's Green Buildings Ordinance. [www.denvergov.org/content/denvergov/en/denver-](http://www.denvergov.org/content/denvergov/en/denver-development-services/commercial-projects/green-roof-initiative.html)

[development-services/commercial-projects/green-roof-initiative.html](http://www.denvergov.org/content/denvergov/en/denver-development-services/commercial-projects/green-roof-initiative.html)

¹⁵ Assumes 20% solar utilization of approximately 942 million ft² of total roof space at 15 Watt/ft² and an 18% solar capacity factor.

Strategy 3: Lead with municipal infrastructure

Priority Actions

1. Incentivize or require training and hiring of individuals with barriers to employment.
2. Implement a policy for all new City facilities to achieve Net Zero Carbon.
3. Prioritize additive renewable capacity above purchasing stand-alone RECs.
4. Host Community Solar Gardens at municipal properties and provide a portion of power to save low-income residents on bills.
5. Invest in existing City facility retrofits to be all electric, support grid flexibility, and powered by renewable electricity.

Description

The City made the commitment to lead by example to achieve 100% renewable electricity for municipal buildings by 2025. City and County of Denver facilities, including Denver International Airport use 368 GWh of electricity annually out of 6,852 GWh of electricity used community-wide (5.4%).¹⁶ A subset of 256 municipal buildings overseen by the Denver Energy Office use 112 GWh of electricity per year, representing \$9.5 million in electricity costs across more than 10 million ft² of building space. Achieving the 100% renewable electricity goal for these buildings would reduce Denver's annual carbon footprint by 62,000 MTCO₂e, approximately equivalent to the carbon emitted from 13,400 passenger vehicles per year.

The scale of annual electricity consumption and cost to the City creates a valuable opportunity for Denver to invest locally to reduce energy use and optimize its renewable energy supply. Denver participated in Xcel Energy's Partners in Energy Program to develop the City's strategic energy plan.¹⁶ The Plan identifies three focus areas and eight strategies to achieve 100% renewable electricity for Denver municipal facilities by 2025 (Figure 10).



Energy efficiency strategies are expected to deliver 12.6 GWh of electricity savings (11% of baseline electricity use) and will result in over \$1 million per year of electricity savings.¹⁷ The City and County of Denver and the Denver International Airport are currently undergoing investment grade audits through energy performance contracting. The cost savings of energy efficiency upgrades will play an important role in offsetting the cost of retrofitting buildings to use electricity only.

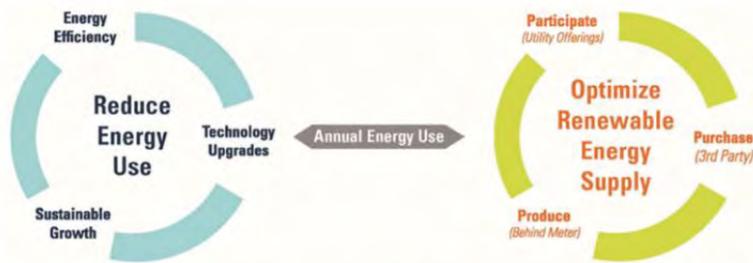
To achieve net zero carbon in new buildings, the City and County of Denver will apply new construction best practices, monitor progress, and use effective project management. Denver Executive Order No. 123 (XO123), issued in March 2013 requires all new City buildings and major renovations will be certified to the applicable LEED Gold Certification, with the goal of achieving LEED Platinum where economically feasible. This is a valuable foundation and as this guiding policy is updated it will reflect the City's more ambitious goals.

The City will prioritize equity and empowerment through its investments in energy retrofits for existing municipal facilities and net zero carbon new

¹⁶ "Strategic Energy Plan for City and County of Denver Municipal Facilities 100% Renewable Electricity Goal." Denver Energy Office. Revised May 28, 2019.

¹⁷ *ibid*, page 3.

Denver's 100% Renewable Electricity Action Plan



1. Energy Efficiency for Existing Buildings

- a. ELEVATE Bond Renovations
- b. Energy Performance Contract
- c. Energy management program

2. New Construction

- a. Advance towards net zero municipal facilities

3. Renewable Energy Coordination

- a. Xcel Energy Certified Renewable Percentage
- b. Rooftop Solar through Net Metering and Power Purchase Agreements
- c. Xcel Energy Renewable*Connect
- d. Purchase Windsource or RECs (as back-up plan)

Figure 10. Focus areas and strategies to achieve 100% renewable electricity for Denver municipal facilities by 2025

(Source: Strategic energy plan for Denver municipal facilities 2019)

construction. This includes incentivizing or requiring participation by Minority- and Women-owned businesses (M/WBE) in Denver's energy projects and training community members to participate in the construction of energy projects.

Denver's renewable electricity procurement strategy prioritizes additive and local sources of renewable electricity capacity above purchasing stand-alone RECs. It is insufficient for the City and County of Denver to achieve its renewable electricity goals by simply buying out-of-state RECs. Denver's actions must enable the physical operation of a 100% renewable electric grid in Colorado.

Denver's energy investments should be visible to the community and provide opportunities for education, engagement, and participation by all. Denver is piloting an effort to host community-solar gardens on municipal property that support these objectives. In addition to providing renewable power for City facilities, a portion of solar generation will be made

available to help low-income residents save on bills. This effort is discussed in the Renewable Denver Initiative section.

Existing Program and Partner Opportunities

The City is well positioned as a partner in driving the energy transition for Xcel Energy and Colorado. The City has objectives to pursue the strategic electrification of buildings, to promote and support electrification of the transportation sector, and to invest in distributed energy resources closer to where the electricity is being used.

Distributed energy resources, municipal buildings, and electric vehicle fleet loads can be functionalized into grid assets and provide Xcel Energy with opportunities to learn how to manage a more diverse, and distributed grid, with dispatchable and flexible demand.

Addressing and Avoiding Pitfalls

The RE100 AC cited the following as the most common pitfalls:

1. Up-front cost barriers
2. Regulations inhibit or limit the strategies
3. Technology complexities

The AC suggests that Denver should prioritize equity in municipal energy projects including establishing goals for local hires and training individuals with barriers to employment in projects. Beneficial electrification and Net Zero Carbon new construction policies should be enacted as soon as possible to complement ongoing energy efficiency and building retrofit efforts.

Resource Outlook

In some instances, funding may be available for capital projects from the City budget. Although some funding will be available through the City's capital budget, Denver will need policy updates and innovative financing to fully implement new energy projects.

Strategy 4: Educate and engage the community

Priority Actions

1. Ensure that climate solutions address issues identified by the impacted communities through consistent and meaningful engagement.
2. Collaborate with Denver Public Schools to embed clean energy education in the curriculum.
3. Implement a marketing and communication plan to increase support for and participation in clean energy programs.

Description

Equity and community impact are foundational criteria for Denver's evaluation of climate action strategies. Fundamentally, the objective of Denver's climate work is to enable an environment in which Denverites can live, work, and thrive for generations.

Success will require CASR to establish strong community partnerships and to engage the members of our community where they are. CASR must earn the trust of our residents, local businesses, and community leaders. Denver's programs and investments should create opportunities for Denverites to become advocates for, participants in, and beneficiaries of Denver's transition to a carbon-free economy.

While climate change is an imminent threat to all Denver residents and business, many face more immediate threats including hunger, homelessness, and safety. Climate change solutions must provide co-benefits to improve these conditions and explicitly not make any of them worse.

Extreme heat events will become increasingly common as the climate warms, which exploits vulnerabilities in our communities. Figure 11 visualizes this intersection by comparing how Denver's communities with a high Heat Vulnerability are also rated poorly on Denver's Opportunity Index.



Denver can target areas throughout the city for energy investments where residents' opportunities to enhance their quality of life are less prevalent than others. Targeted investment can empower Denver's communities with more sustainable living environments, relief from the financial burden of proportionally higher utility bills, and access to employment opportunities.

Existing Program and Partner Opportunities

Effective community engagement and empowerment requires holistic, collaborative and mutually beneficial relationships throughout Denver. CASR is working with Denver Public Schools, the Denver Housing Authority, and the Sustainable Neighborhoods Program to engage our students and residents. CASR is exploring ways to more directly engage with students and to expose them to career opportunities and a broader understanding of sustainability and environmental responsibility in a carbon-free economy.

Partnerships with trusted and established community organizations are essential to Denver's success. CASR has begun working with several local organizations including Energy Outreach Colorado,

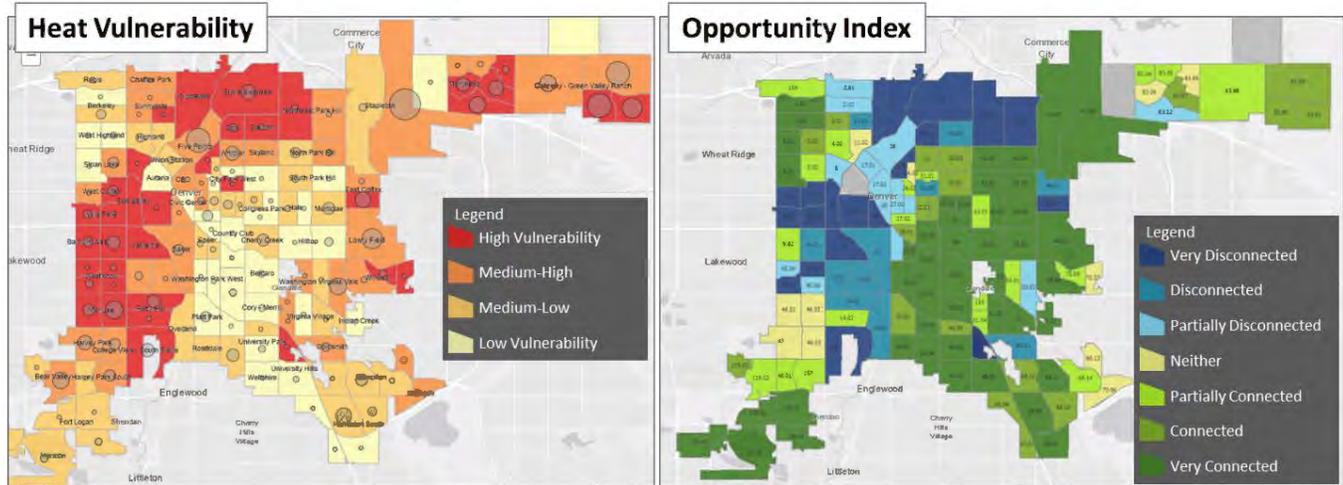


Figure 11. Alignment of heat vulnerability and lack of opportunity in Denver

Heat Vulnerability, measured by the Department of Public Health & Environment, is a composite measure of the built environment, demographics, and human health in census tracts across Denver.

The Denver Opportunity Index, measured by the Department of Public Safety, is a composite measure informed by median household income, education levels social and health factors as compared to city averages, and prevalence of crime in each area.

Solar Energy International, the Youth Sustainability Board, and Solar United Neighbors. Collaboration with these and other groups, as well as participation in existing community engagement events such as neighborhood meetings and community festivals, will provide opportunities to educate larger audiences and to empower groups to amplify Denver’s message.

Denver can continue to strengthen its relationship with Xcel Energy to raise awareness of and encourage participation in utility renewable energy and energy efficiency programs. Joint marketing can help to increase the 2.0% of community-wide electricity associated with distributed solar and utility-scale RE subscriptions.

Addressing and Avoiding Pitfalls

The RE100 AC cited the following as the most common pitfalls:

1. Public awareness and information barriers
2. Lack of customer incentives/value of distributed energy resources

The AC suggests that Denver should employ a persistent, compassionate, and informed communication effort. Denver must adopt a multi-

solution mentality that focuses on attaining multiple community benefits. Denver should regularly take the pulse of the community using public surveys, such as that described in Appendix A, and by working directly with local partners.

Denver should engage with local organizations, business groups, and community leaders early in the design process for new programs to ensure they will achieve their desired objectives. City Council’s engagement and participation may help to reach as many socioeconomically and geographically diverse members of the community as possible.

Resource Outlook

Geographically targeted investments for planned energy infrastructure and close collaboration with City Council and local energy organizations should allow for CASR to stretch the impact of limited resources. In the future, additional resources could be prioritized for curriculum development and more intensive public-marketing campaigns.

Strategy 5: Invest in energy workforce development

Priority Actions

1. Prioritize programs and resources towards individuals with barriers to employment.
2. Partner with K-12 schools, universities, and vocational programs to support clean energy employment pathways.
3. Provide funding to existing community-led non-profit organizations to expand Denver's clean energy workforce.
4. Where possible, include workforce development as an evaluation criteria for City contracts for energy investments.

Description

Workforce development programs should be implemented with an equity lens. These programs should prioritize job skills, transition training, apprenticeships and other opportunities that engage, recruit, and retain individuals with barriers to employment. Priority should be given to programs that both reduce greenhouse gases and promote economic, social, and environmental benefits.

City directed investments in new energy infrastructure can be used to empower members of the Denver community with access to workforce development and employment opportunities. The City will prioritize workforce development opportunities that pay people to do the work necessary for Denver's energy transition.

Denver included community engagement and empowerment objectives, including workforce development considerations in its Request for Proposal (RFP) No. 29151Q, Solar Photovoltaic Electric Systems Developer issued for implementation of the Renewable Denver Initiative. The City included the following requirements that accounted for 10% of the RFP's technical evaluation criteria:

1. Demonstrate how your proposal will provide benefits to the community, particularly



students, low-income, and environmental justice participants.

2. Demonstrate how your proposal provides opportunities for City residents to gain technical skills and qualifications that are transferable for the clean energy workforce.

Including such considerations is a productive start to leveraging City contracts to provide opportunities for Denver residents of all backgrounds to meaningfully participate in the clean energy transition. Denver will continue to participate in national organizations such as the Urban Sustainability Director's Network to learn about best practices from other communities that have used City contracts to advance their clean energy and community empowerment objectives.

Denver will strengthen its coordination with industry associations, community groups, and educational institutional institutions to establish clean energy employment pathways and expand Denver's energy workforce.

Existing Program and Partner Opportunities

Denver should prioritize supporting existing energy workforce development programs before creating new job training programs. There are several existing programs that have had success around the nation, including Colorado, in a variety of capacities,

from renewable deployment and transportation decarbonization to weatherization and “green” workforce development.

Several programs that the City could consider supporting include GRID Alternatives' Colorado Installation Basics Training Program for Solar and Solar Futures Program for High School. The CEO provides technical expertise and workforce training programs in weatherization and energy efficiency. Solar Energy International (SEI) offers solar training and certification programs both online and in-person and has established a High School Technical Training and Careers Pathways Program at Paonia and Delta High Schools that could be replicated in Denver (Figure 12).

The school-based programs in Paonia and Delta have been highly successful, but require commitments from teachers, the school district, local energy companies, non-profits, and other supporting institutions. Denver can act a facilitator and technical resource for stakeholders to help establish a similarly impactful program. As resources allow, Denver will consider establishing grant opportunities or making other supporting investments in energy workforce development programs.

Figure 12. With SEI's help, high school students in Delta County install solar photovoltaic systems on their schools as part of SEI's High School Technical Training and Careers Pathway Program in 2018.

The students learned about every step of the installation process from excavation and pouring concrete to setting the railing and wiring the solar panels.



Addressing and Avoiding Pitfalls

The RE100 AC cited the following as the most common pitfalls:

1. Lack of experienced professionals
2. Limited availability of infrastructure and facilities
3. Public awareness and information barriers
4. Up-front cost barriers
5. Lack of green jobs available after training.

The AC recommends that the City focus resources on creating jobs and paying people to do the work necessary for Denver's energy transition and supporting existing energy workforce development organizations. The City should consider establishing official workforce development policies in energy procurements, such as those of HUD Section 3.

Resource Outlook

In the near term, Denver will need to focus on creating local employment opportunities through investments in clean energy infrastructure. As Denver advances its RE procurements, it can prioritize working with developers with strong workforce development programs and local hiring practices. If resources become available in the future, Denver can pursue partnerships with local schools and companies to support employment pipelines and job training programs.

THE RENEWABLE DENVER INITIATIVE

Denver has been awarded \$1,000,000 from the Colorado Department of Local Affairs (DOLA) 2020 Renewable Energy Challenge grant program to support the city's Renewable Denver Initiative (the Initiative) to host community-solar gardens on municipal property.

About the Initiative

The Initiative is an innovative approach to host community-solar gardens on municipal property. This strategy will accelerate Denver towards 100% renewable electricity while empowering the community. Financing renewable energy projects is a major challenge for municipalities. There are always competing budget priorities and, as long as there are up-front costs, renewable procurements often move slowly or not at all. The Initiative creates a replicable framework for Denver to deploy solar at no up-front cost while achieving multiple objectives (Figure 13).

The Initiative advances Denver's strategies to achieve 100% renewable electricity.

- Denver leads with municipal infrastructure to host CSGs and expand distributed energy.
- The Initiative is replicable for Denver and other Colorado communities and will help to decrease the carbon-intensity of the grid.
- Distributed CSGs provide potential locations to deploy battery storage to support grid functionality and community resiliency.
- Denver can target deployments at sites in climate vulnerable communities. In doing so, Denver has the opportunity to educate and engage community members.

The Initiative operates under the assumption that municipalities do not have to and should not spend taxpayer dollars on preliminary engineering and

designs for renewable energy project. Community solar developers finance site acquisition, engineering, design, permitting, interconnection, operations and maintenance, and asset management up-front and recuperate their investment through power purchase agreements.

The Initiative creates efficiencies in the community solar deployment process by making municipal space available to host a portfolio of projects for free. Because of the financial security inherent in Denver's participation an institutional investor will finance a portfolio of CSGs for a solar developer to deploy as part of the Initiative, eliminating up-front costs to the City.

Community-sited CSGs create an opportunity to educate and engage with local residents and sends a clear message to the community that Denver is advancing its renewable electricity objectives. Additionally, a portion of the power from the CSGs will be made available to low-income customers.

Empowering the Community

Low-income access to renewable electricity has proven to be difficult. Companies offering community solar subscriptions require minimum credit scores that are prohibitive for many households that have historically had limited access to credit. That means a customer must pay for a rooftop solar system out-of-pocket, which is not affordable for many residents. Additionally, many low- and moderate-income residents do not own their homes or move frequently and are not suitable candidates for rooftop solar. The PUC created a dedicated carve-out for 100% low-income CSGs, but by October 2019 more than 40% of competitively awarded low-income CSG capacity selected in 2018 had been cancelled.¹⁸

¹⁸ Filing G_762024 in proceeding 19R-0608E.

RENEWABLE DENVER

Goal: Accelerate Denver towards 100% renewable electricity while empowering the community and enhancing intracity collaboration.

1. Host Community-Solar Gardens on municipal property
2. Co-locate solar-canopy CSGs with community accessible EV charging
3. Power City facilities through the CSGs and make excess power generation available to enable low-income utility bill savings
4. Share the Renewable Denver Initiative framework for other Colorado and U.S. communities to use to deploy solar at no up-front cost

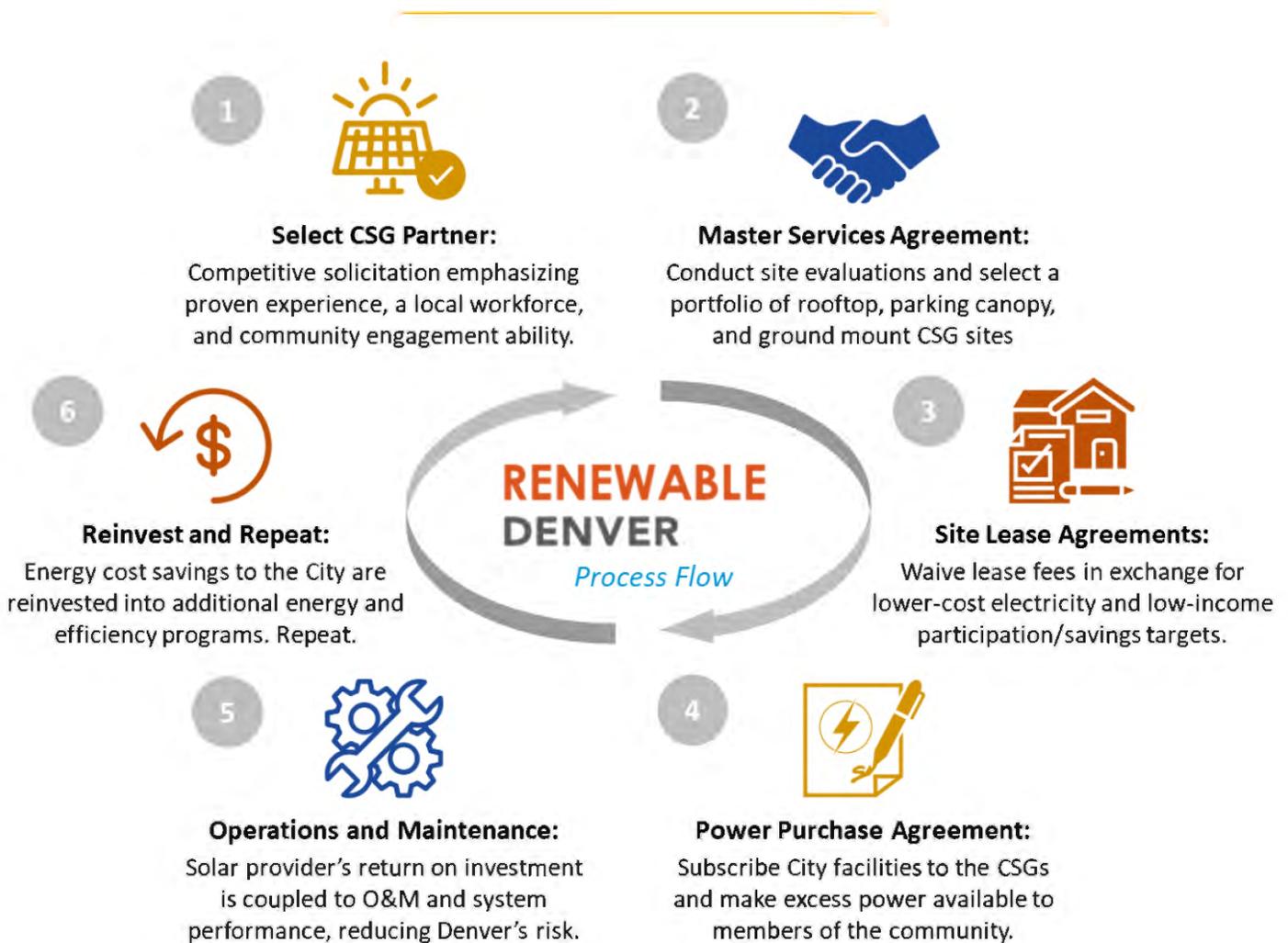


Figure 13. Renewable Denver Initiative purpose and process flow

Denver's 100% Renewable Electricity Action Plan

One of the reasons is due to the difficulties in financing a low-income dedicated project. Compounding that challenge is the difficulty finding a suitable site. Land costs are high and low-income gardens need, but struggle to compete for, a limited supply of suitable grid interconnection points. The Initiative is designed to address this by leasing space on city-owned properties to solar developers for free, in exchange for requirements to hit targets for participation and bill savings for subscriptions to the CSGs by low- and moderate-income residents.

The City will partner with trusted non-profit community organizations, such as Energy Outreach Colorado, due to the history of predatory behavior visited upon these communities in the past. Leveraging relationships with community organizations that provide energy efficiency and weatherization services enables Denver to connect residents with myriad options to address energy insecurity. Denver can provide oversight, host information sessions, and encourage members of the community to participate in and benefit from the City's clean energy investments and hosted CSG portfolio.

Initiative Partners

A variety of partners are needed for the Initiative to be successful due to its broad nature and multi-functional objectives. CASR staff have worked with dozens of individuals across several organizations, both internal to the City and externally.

The Initiative is managed by CASR staff with support from the Energy Office, Denver International Airport, Denver Housing Authority, the Department of Transportation and Infrastructure, the Department of Parks and Recreation, the Department of Public Health and Environment, the City Attorney's Office, the Department of Finance, and others.

The Initiative is one of six projects in Denver and Xcel Energy's, Energy Future Collaboration 2020 Work Plan. The Colorado Solar and Storage Association and its members provided valuable feedback over several months during the



Example solar canopy at Denver International Airport

development of the initiative to ensure the technical and economic feasibility of the roll-out for the Initiative's first iteration. Denver has also begun partnerships with local non-profits and community-organizations. The framework and structure of these partnerships continues to improve so that the City can best engage and enroll the community.

Desired Outcomes and Replicability

Denver has signed a Master Services Agreement with a solar developer that will allow for up to 15MW of municipally hosted CSGs. Power from the CSGs would be enough to meet approximately 10% of Denver's municipal electricity requirements (facilities overseen by the Energy Office) and power for nearly 1000 homes.

Denver's energy investments provide valuable opportunities to facilitate the participation of individuals with barriers to employment in the new energy economy. Implementing purchasing policies, such as a greater emphasis on community engagement and equitable subscriber participation in criteria for selecting CSG projects, helps to advance these objectives.

The Initiative is designed to leverage economies of scale, allow for project optimization, and mitigate risk to municipalities. If successful, Denver intends to pursue subsequent iterations of the Initiative.

STAYING ON TRACK: NEXT STEPS

The 100RE Plan is only the beginning. Its creation has been an opportunity for the Mayor's Office to think critically and holistically about Denver's 100% renewable electricity target and to engage with the community and start conversations about what a clean energy future could look like.

CASR will continue to involve other City agencies and external partners to advance the strategies and tactics to achieve 100% renewable electricity in Denver. One aspect of CASR's role is to help instigate and create systemic shifts in status quo operations of Denver's City government. Systemic shifts are necessary to accelerate and create simplicity in the transition. When Denver is successful, investments in clean energy sources, better buildings, and carbon-free transportation will not require additional thought, cost, or effort. Such investments will advance naturally because they are cost-effective, simple to implement, and broadly supported by the City's staff and the broader Denver community.

Looking to the Future

Moving from a 23% baseline to 100% renewable electricity community-wide by 2030 will require strong leadership, robust partnerships, and coordination with concurrent climate action efforts. Because of Denver's emphasis on shifting towards electricity-powered homes, business, and vehicles the amount of renewable electricity needed to meet 100% of the City's needs is uncertain. This emphasis signals the need for investments in energy efficiency and flexible capacity. Renewable electricity must be

provided from both the utility grid and distributed throughout the community.

Tracking progress, and keeping the public informed of that progress, is critical to managing Denver's renewable electricity efforts. Denver has access to annual data reports from Xcel Energy that can be used to calculate Denver's renewable contributions each year. The data provides visibility to and allows Denver to measure the renewable contributions from the percentage of system renewables available to Denver and the amount of distributed solar & utility-scale RE subscriptions across the community.

It is essential that as the City moves forward to implement this plan that it prioritizes the goals of equity, community impact, and climate impact. The City must also be able to control or exert meaningful influence over the strategy and overcome any challenges to implementation. Climate change is an all-encompassing issue that broadly affects public health, the economy, and the ability to live and thrive in the Denver community. The 100% renewable electricity goal is one part of what must be a holistic approach to economy-wide decarbonization.

Although the exact path ahead is uncertain, balance between Denver's five renewable electricity strategies, transparency, and engagement with the public and community-organizations will create the best chance to achieve an environment in which Denverites can live, work, and thrive for generations.



CALL TO ACTION

The City and County of Denver needs the continued partnership of the members of our community to successfully implement this plan. Please join us by participating in this process, and help Denver achieve a clean energy future.

Visit Our Website

Follow Denver's Climate Action progress at denvergov.org/climate. This website is the primary source for updates, events, and opportunities related to Denver's climate action, sustainability, and resiliency strategy. Community members will also be able to submit requests to partner with the City to advance our climate action objectives.

Share Your Comments

Connect with us on Twitter and Instagram @denverCASR, and at www.facebook.com/DenverCASR. You can also contact CASR at sustainability@denvergov.org.

We appreciate your continued feedback, contributions, and feedback!

Start a Conversation

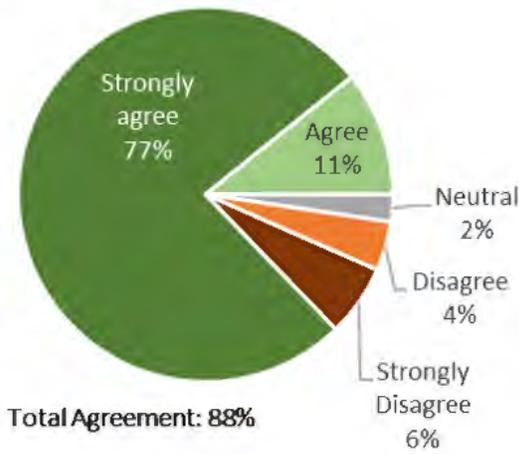
Be informed, keep an open mind, ask questions, and remember that anyone can be an advocate. Talk to your family, friends, colleagues, and neighbors about reducing your carbon footprint and creating a more sustainable Denver. The 100RE Plan will have the greatest impact by reaching as many Denverites as possible.

APPENDIX A: PUBLIC SURVEY RESULTS

The City and County of Denver released a survey as part of the 100RE Plan public input process. The survey was open from April 10th through May 4th, 2020. The survey was promoted via the CASR email newsletter and social media accounts. A link to the survey was also included in a public-engagement website for Denver's Climate Action Task Force. In total, 259 respondents engaged with the survey.

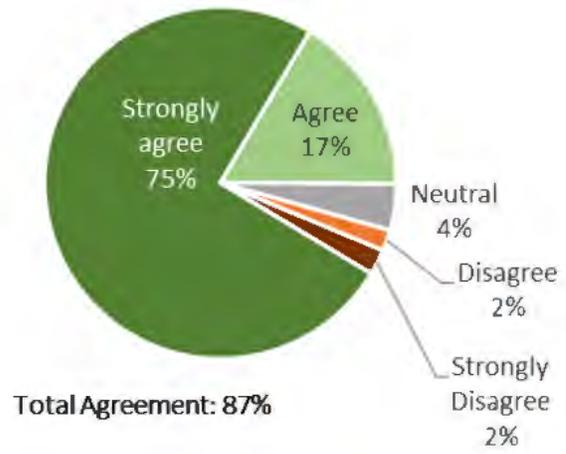
Survey Section 1: Clean Electricity Statements

1. Please indicate your level of agreement with the statement:
 "Denver should transition to 100% renewable electricity for all municipal buildings, private buildings, and homes by 2030."



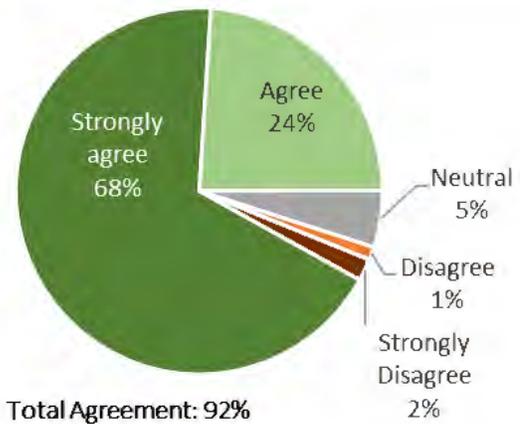
(n=259)

2. Please indicate your level of agreement with the statement:
 "Denver should invest in solar power and battery storage systems that enable areas of the electric grid to function independently and remain powered during emergencies."



(n=259)

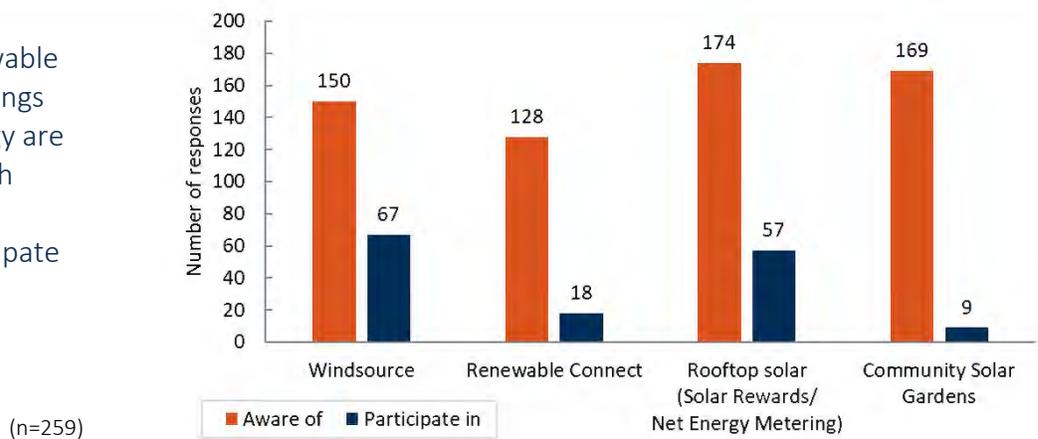
3. Please indicate your level of agreement with the statement:
 "Denver should install solar panels on municipal facilities and prioritize purchasing renewable electricity from projects located in Colorado rather than purchasing Renewable Energy Credits that fund power projects in other states."



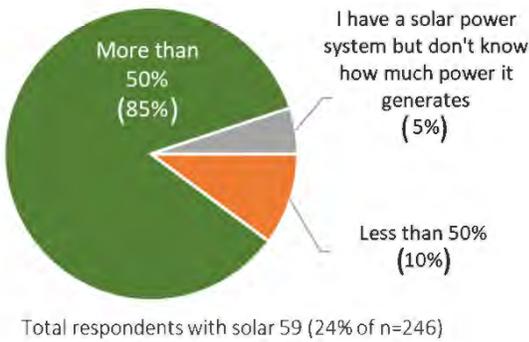
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Section 2: Your electric bill

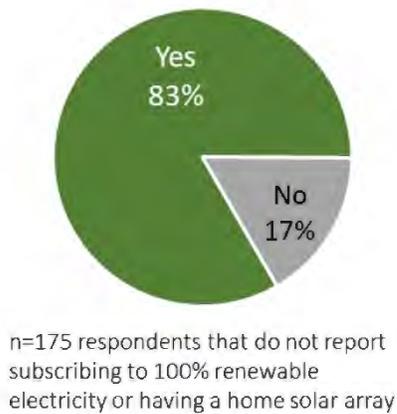
4. Which of the following renewable electricity offerings from Xcel Energy are you familiar with and/or do you currently participate in?



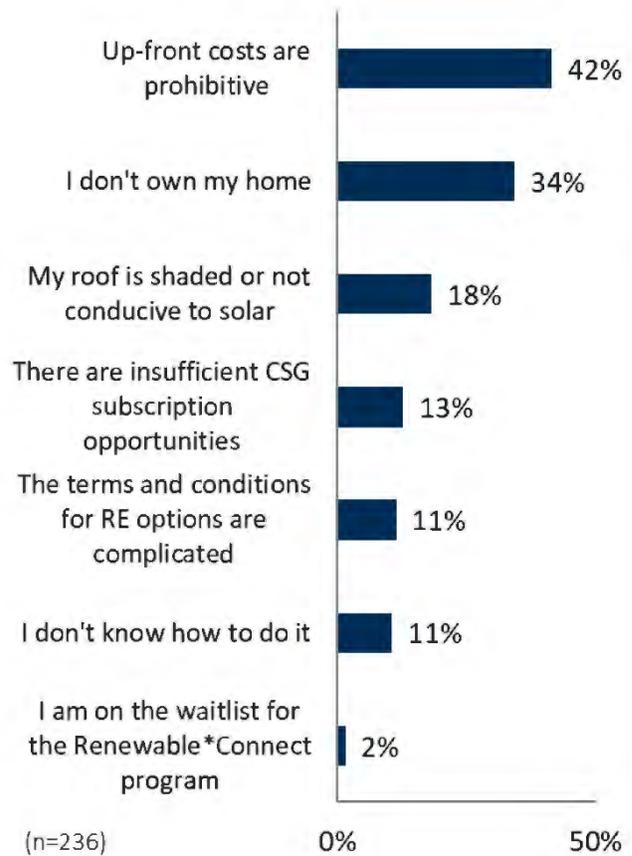
5. If your home has an on-site solar power system, how much of your annual electricity use is generated by this system?



6. Are you interested in subscribing to 100% renewable electricity or installing a solar array to power your home?

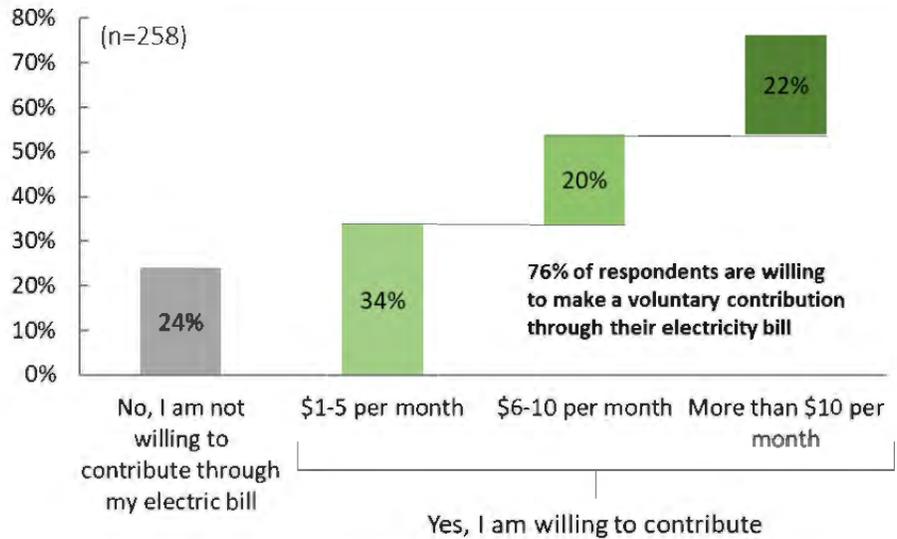


7. What are the main challenges to powering your home with 100% renewable electricity? (select all that apply)



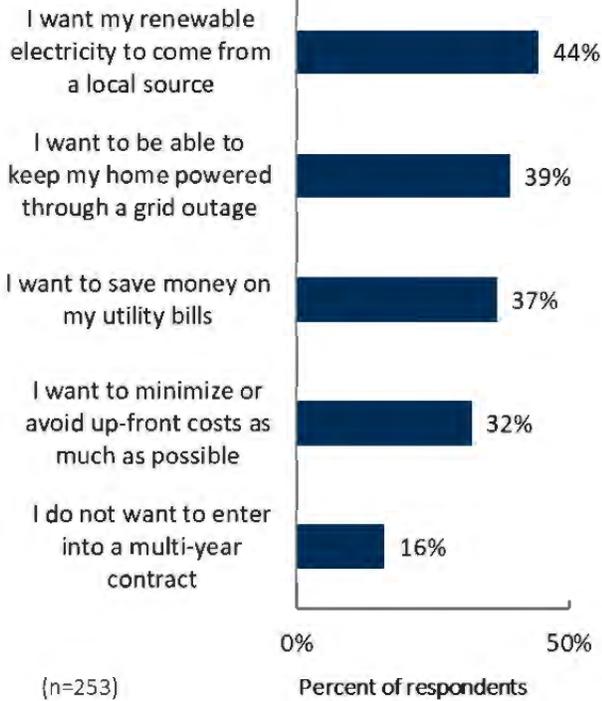
8. Would you be willing to contribute to the City's climate action efforts through a voluntary additional charge on your electricity bill?

(Local workforce development programs, renewable energy projects, efficient buildings, and clean transportation are examples of Denver's climate action efforts.)

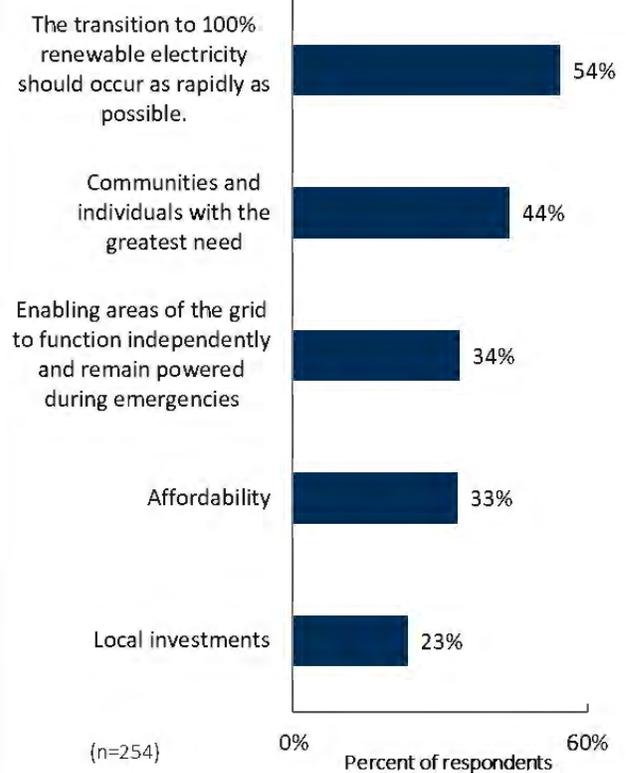


Section 3: Renewable Energy Priorities

9. What attributes are most important to you for a renewable electricity program? (select up to two)

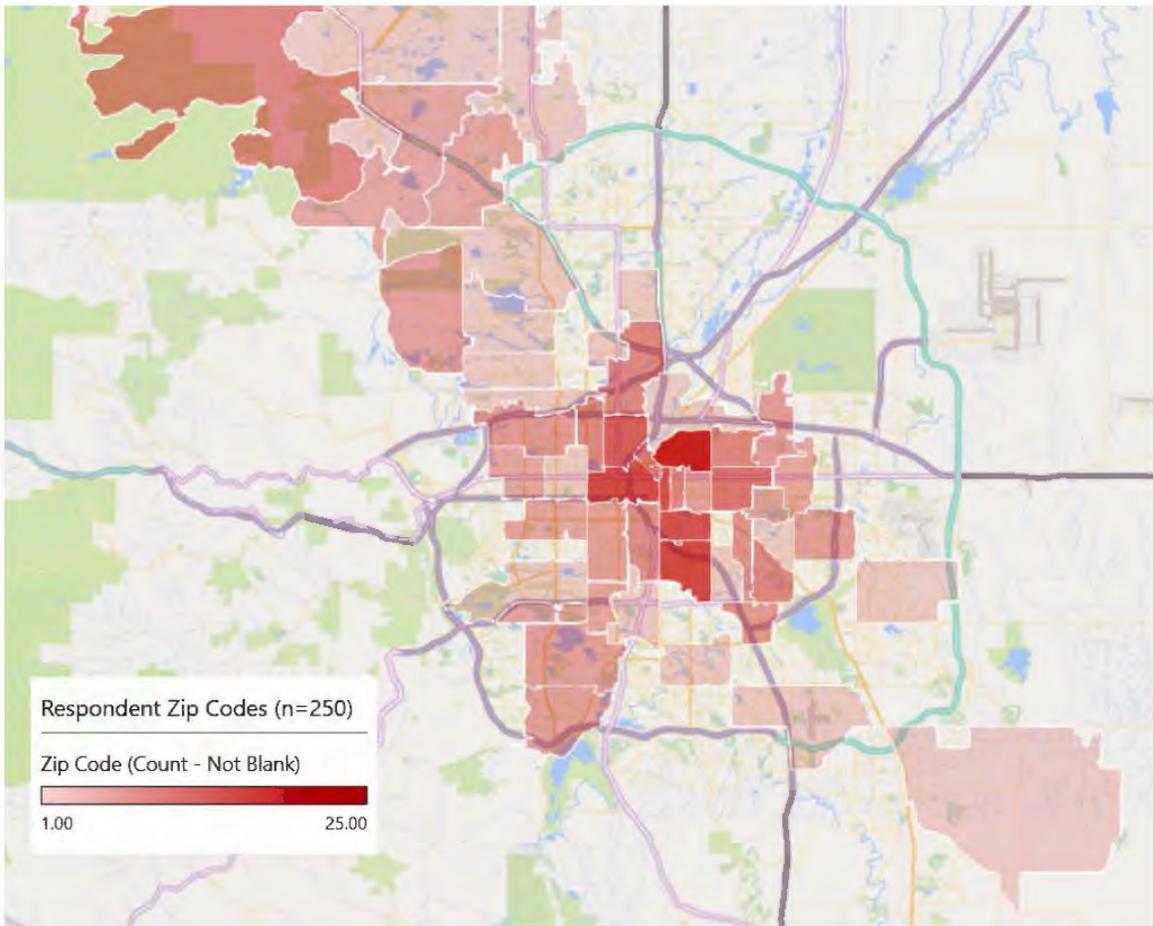


10. What should be prioritized in Denver's transition to 100% renewable electricity? (select up to two)



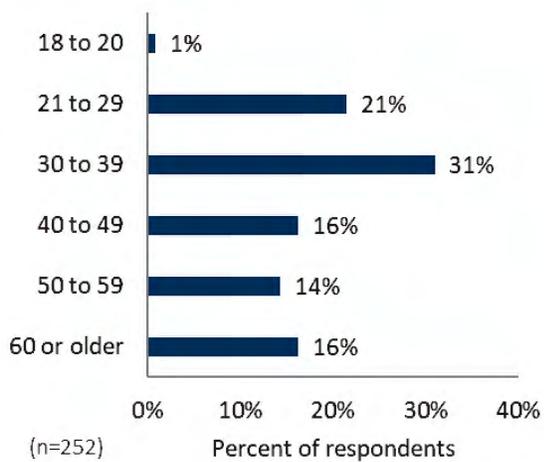
Survey Demographics

11. What is your 5-digit ZIP code?

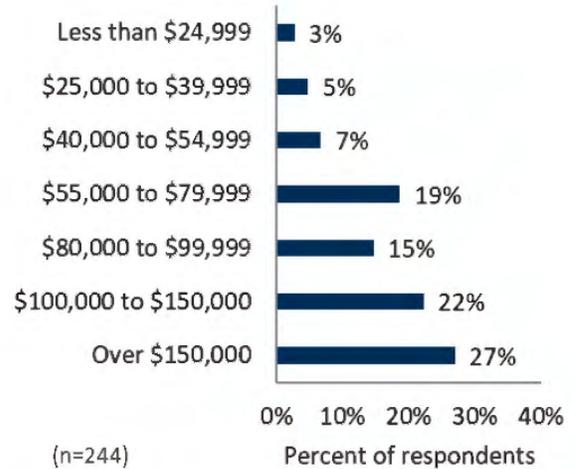


*Not shown = 80829 (Colorado Springs, 1); 80442 (Fraser, 1); 80538 (Loveland, 1); 80524 (Fort Collins, 1)

12. What is your age range?



13. What is your annual household income?



APPENDIX B: RENEWABLE ELECTRICITY TRACKING AND REPORTING

The City and County of Denver will adhere to following the core design principals that its renewable electricity tracking strategy should:

1. Reflect desired outcomes
2. Be clearly defined
3. Be quantifiable through reasonably available data
4. Be easily interpreted
5. Be easily verified

The following section provides a technical discussion of the City and County of Denver's renewable electricity accounting and reporting strategy. It describes the specific data elements and data sources that will be released in an annual report to track progress towards Denver's community-wide 100% RE target

What are RECs?

Renewable Energy Credits, or RECs, measure renewable energy produced and are used to meet renewable energy goals. RECs are retired by utilities, including Xcel Energy, to meet statutorily defined renewable electricity requirements such as those established by Colorado's Renewable Energy Standard. RECs retired by the utility benefit all customers by contributing to system-wide decarbonization.

Xcel Energy offers two renewable electricity programs through which customers can subscribe to renewable electricity resources and have RECs retired on their behalf, allowing those customers to claim they are being "powered by" renewable electricity. However, when Xcel provides a financial incentive for rooftop solar and Community Solar Gardens, Xcel may retain the REC or retire it on behalf of all customers. Denver tracks RECs that are supported through investments and subscriptions by Denver residents and businesses. In contrast, a variety of national REC purchasing options are also available, but do not directly affect the physical energy generation of the local grid. Whether the RECs created on an electric grid are retired by the utility on behalf of all customers or by individual customers within the system, there is the same net effect on the renewable content of the system.

Are all RECs created equal?

No. Electricity customers interested in purchasing RECs to offset the carbon-intensity of their electricity supply typically consider the following REC attributes in their purchasing decision: 1) Vintage (i.e., the year in which the REC was generated); 2) Location (i.e., the state or utility service territory in which the REC was generated), and 3) Generation source (i.e., solar, wind, or other renewable resource).

The aforementioned REC attributes can have meaningful differences in terms of carbon intensity or desired impact. For example, the USGBC LEED 4.1 standard defines several tiers of RECs that can be used for compliance, with Tier 1 RECs receiving the highest scoring consideration:¹⁹

¹⁹ LEED V4.1. <https://www.usgbc.org/leed/v41#bdc>

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- Tier 1: On-site renewable energy generation
- Tier 2: Off-site renewable energy produced by a generation asset(s) built within the last 5 years, or contracted to be operational within one year of building occupancy, and generated by either: an asset(s) in the project's grid subregion; or an asset(s) in a grid subregion with higher GHG emissions rates.
- Tier 3: Off-site renewable energy that is produced by a generation asset(s) built within the last 5 years or contracted to be operational within one year of building occupancy
- Tier 4: Off-site renewable energy that is Green-e Energy certified or equivalent
- Tier 5: Off-site renewable energy that is produced by a generation asset(s) that meet Green-e's certification criteria (or equivalent) for eligible renewables, has a mechanism to prevent double counting in place, and is third-party certified to an ecolabel standard.

Defining the City and County of Denver's desired outcome

The City's desired outcome is to decarbonize the entire electric system in Colorado. Success for Denver's renewable electricity goal is therefore based on the Denver community's contributions towards decarbonizing the entire electric system. Denver's Climate Action Task Force explicitly recommends against stand-alone REC purchases as an appropriate option for the City to achieve its electricity supply decarbonization goals. Denver's resources should be spent by investing locally in carbon-free energy infrastructure that enable co-benefits such as workforce development, utility bill savings, and more resilient public facilities.

Comparing Denver's renewable electricity procurement options

Denver's renewable electricity procurement strategy prioritizes additive (i.e., new) and local sources of renewable electricity capacity above purchasing RECs from existing resources or resources in other service territories. The following table compares the different renewable electricity program options available to the City and County of Denver's facilities and its residents and businesses:

Renewable Electricity Program Option	Renewable Electricity Location	REC Vintage	REC Treatment
Additive Renewable Electricity Options			
Net Energy Metering (on-site solar)	On-site at customer facility.	Current year	REC retained by customer who can retire it if they choose to.
Solar*Rewards (on-site solar)	On-site at customer facility.	Current year	Xcel Energy purchases the REC with an incentive payment and can retire the REC on behalf of customers.
Community Solar Garden	Xcel Energy's Colorado service territory. CSGs can be hosted at a customer facility and shared with others (i.e., Renewable Denver Initiative).	Current year	Xcel Energy purchases the REC with an incentive payment and can retire the REC to meet CO statutory targets. There is currently no option for a subscriber to retain CSG RECs.
Renewable*Connect	New solar in Xcel Energy's Colorado service territory.	Current year	Retired by Xcel Energy on behalf of the subscribing customer.
Non-additive Renewable Electricity Options (i.e., RECs purchased from existing resources)			
Windsorce	Existing wind in Xcel Energy's Colorado service territory.	First-In-First-Out accounting (i.e., up to 5 years old).	Retired by Xcel Energy on behalf of the subscribing customer.
National Stand-Alone RECs	RECs are sold separately from a utility customers electricity.	Price dependent Older = cheaper	Retired by REC brokerage on behalf of customer.

Prioritizing “additive” RECs that contribute to a carbon-free electric system in Colorado

“Additive” renewable electricity, as the name implies, is a source of additional or new renewable electricity to the system. Customer participation in an additive program is necessary for the renewable resource to be constructed. “Non-additive” renewable electricity options involve buying RECs from existing renewable electricity resources. Buying non-additive RECs transfers the renewable attributes of that resource from one owner to another, without increasing the physical renewable electricity content of the grid mix. The majority of RECs available for purchase come from excess generation in previous years. For example, Xcel Energy maintains a “REC bank” and carried forward more than 24 million RECs from 2014-2018, compared to generating less than 10 million new RECs in 2019.²⁰ So, customers should be mindful regarding their REC procurement strategies and support additional renewable electricity on their local electric grid to the greatest extent possible.

If Denver sought to purchase enough stand-alone RECs to match 100% of community-wide electricity use, which reached 6.7 million MWh in 2019 (1 MWh = 1 REC), it would be prohibitively expensive and would not advance the City’s equity objectives. Xcel Energy’s Certifiably Renewable Percentage is projected to be 30% in 2020. Denver could ask taxpayers to fund REC purchases through a renewable electricity option—Xcel Energy’s Windsource program offers bundled RECs at a cost of \$15/MWh—to “clean” the remaining 70% of the community’s power supply. This would cost taxpayers \$70.3 million in the first year.

To continue to claim that Denver is powered by 100% renewable electricity, REC purchase costs would continue to be borne by Denver’s taxpayers year-after-year until Xcel Energy reaches its publicly stated and statutorily mandated requirement that 100% of the electricity delivered to retail customers be carbon-free by 2050.

Although Denver would need to purchase fewer RECs over time as the electric grid incorporates more renewable and carbon-free resources, the cumulative cost of those purchases would be expected to reach over \$571 million by 2030 and \$932 million by 2050. Figure 14 shows how the annual cost to taxpayers for REC purchases would decrease over time and Figure 15 shows the cumulative effect of those recurring costs.

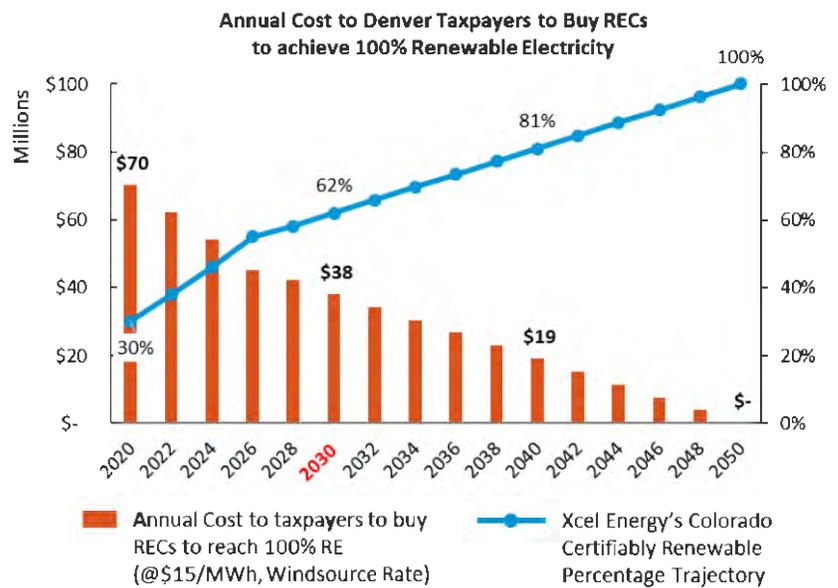


Figure 14. Annual Cost to Denver Taxpayers to Buy RECs to achieve 100% Renewable Electricity (@\$15/MWh)

Note: As Xcel Energy’s CRP in Colorado increases, the amount of REC purchases required decreases. Extended on a linear projection from 2030 to 2050.

²⁰ “Attachment C, Xcel Energy 2019 RES Compliance Report.” Proceeding no. 16A-0139E. Page 40.

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It should be said that REC procurements can send a powerful signal from a customer to their electrical utility. In some cases, a customer or community may have limited resources or physical capacity to procure, finance, or host a renewable electricity resource. A REC procurement strategy may be the best available option for that customer. Electric ratepayers should be aware that buying RECs may not actually increase the renewable content of the grid mix if the RECs are from a non-current year vintage or a non-additive resource.

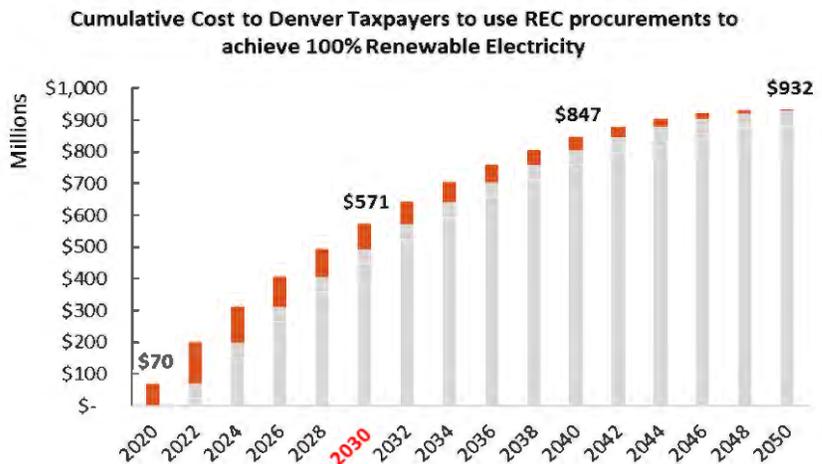


Figure 15. Cumulative Cost to Denver Taxpayers to use REC procurements to achieve 100% Renewable Electricity (@\$15/MWh)

Note: 2030 shown in red to represent Denver's 100RE community-wide

The City's objective is to decarbonize the entire electric system in Colorado and enable the physical operation of a 100% renewable electric grid. If hundreds of millions of dollars of taxpayer money becomes available to support Denver's electricity decarbonization, those resources will be spent in line with Denver's Climate Task Force recommendations to invest in local clean energy infrastructure that maximize community co-benefits.

Denver is embracing and encouraging strategies in which the City's facilities and community participation in renewable electricity programs create additive RECs. The City will retain ownership of RECs to the greatest extent possible and will support strategies in which additive RECs are generated, transferred to, and retired by the utility towards system-wide decarbonization. A Denver electricity customer's actions to host a rooftop solar array or subscribe to a CSG enables additive renewable electricity capacity that "contributes to" the decarbonization of the entire electric system, which is what ultimately matters. Denver will advocate for more utility-scale carbon-free electric resources to be brought online in Colorado and will work in collaboration with Xcel Energy to ensure that the new systems maintain affordability and reliability.

The influence of utility-directed REC sales on Denver's clean electricity targets

REC sales directly detract from the renewable electricity content of the delivered grid mix and undermine the City and County of Denver's ability to reach its electricity decarbonization goals. A portion of REC sales in Colorado provide funding for additional renewable energy programs that are made available to Xcel Energy customers. However, the value of REC sales to fund additive renewables in Colorado must be balanced with a necessary phase out of the practice to avoid double counting RECs and to ensure that Denver can reach its goals.

As seen in Figure 16 total community-wide electricity use has stayed relatively constant over the past four years. However, Denver's renewable contributions peaked in 2016 at 25.7% before declining to 18.7% by 2018. This can seem counterintuitive considering that the renewable content of Xcel Energy's physical generation mix has continued to increase and was reported as 30% carbon-free in 2019.²¹ Figure 17 demonstrates how REC sales

²¹ Xcel Energy includes solar, wind, and hydropower resources in its carbon-free electricity summation for Colorado. "Power Generation: The Origin of Your Electricity." Xcel Energy. www.xcelenergy.com/energy_portfolio/electricity/

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have detracted significantly from the percentage of system renewables in the grid mix. Nearly 40% of RECs acquired by Xcel Energy in 2018 and 28% of those acquired in 2019 were sold.

The City has some confidence in the rate at which renewable electricity will be added to grid thanks to 2019 legislation and Xcel Energy's commitment to its Certified Renewable Percentage (CRP) approach, in which Xcel Energy will increase the amount of RECs retired on behalf of Colorado customers each year.^{22,23} The CRP establishes targets of nearly 50% by 2025 and more than 60% by 2030.

Additionally, Denver anticipates that when Xcel Energy's Clean Energy Plan is submitted to the PUC (no later than March 31, 2021) and subsequently approved, all RECs used to comply with the requirements of the Clean Energy Plan will need to be retired in the year they're generated.²⁴

Balancing proceeds from REC sales to fund additive renewables in Colorado with a phase out of the practice is necessary to enable a rapid and equitable transition to a 100% renewable electric system in Colorado. It requires Denver to actively engage with Xcel Energy, other stakeholder groups, and in regulatory proceedings.

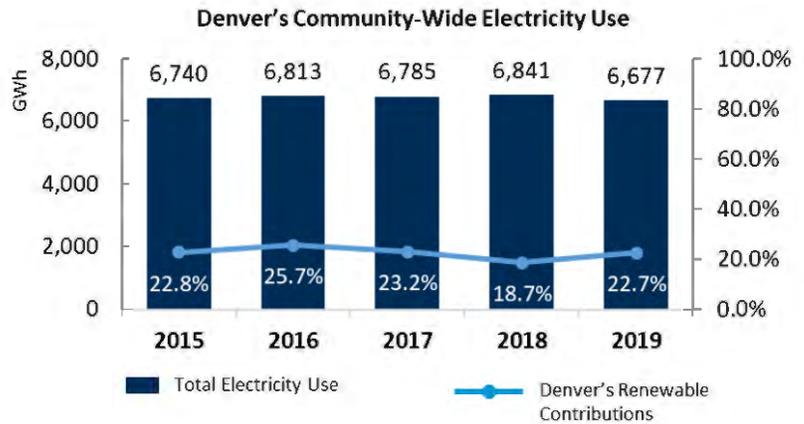


Figure 16. Denver's Community-Wide Electricity Use
(Data from Xcel Energy RES Plan Compliance and Community Energy Reports)

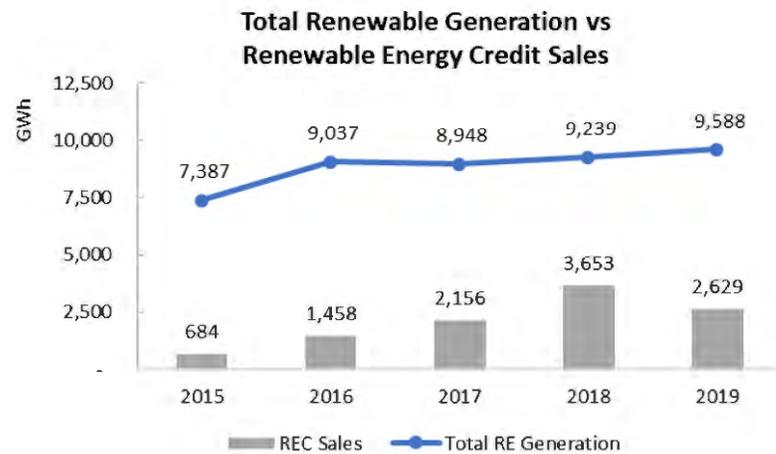


Figure 17. Total Renewable Generation vs REC Sales
(Data from Xcel Energy RES Plan Compliance Reports)

²² Senate Bill 19-236 added Colorado Revised Statute §40-2-125.5 requiring Xcel Energy to file a "Clean Energy Plan" with the PUC by March 31, 2021. The plan will reduce carbon dioxide emissions associated with retail electricity sales by 80% from 2005 levels by 2030, and provide customers with energy generated from 100% clean energy resources by 2050.

²³ Xcel Energy Certified Renewable Percentage is described in filing number G_764613, proceeding 19AL-0268E. Colorado Public Utilities Commission.

²⁴ § 40-2-125.5 C.R.S., "(3)(a)(III) The qualifying retail utility shall retire renewable energy credits established under section 40-2-124(1)(d), in the year generated, by any eligible energy resources used to comply with the requirements of this section."

Denver's 100% Renewable Electricity Action Plan

Defining Denver's Renewable Electricity Contribution Categories

Denver's approach to tracking renewable electricity contributions strives to encourage the most rapid decarbonization of Colorado's electric system. It is designed to adopt a holistic view of the electric system and Denver's place in it. Denver's renewable contributions are tracked and organized in three categories. The percentages from each category are added together to determine Denver's contributions for a given year.

Category	Formula Components	2019 Calculation	
System Renewables		20.7%	"System Renewables"
The RECs inherent in the electricity Xcel Energy's delivers to all retail customers that are not created by, subscribed to, or sold to other customers. ²⁵	Total Retail RECs obtained in Xcel Energy's CO system after transfers	9,588,148	Total RECs
	<i>minus</i> (REC Sales to 3 rd Parties)	(2,629,408)	REC Sales
	<i>minus</i> (RECs retired for Windsource and Renewable*Connect)	(209,499)	Windsource
	<i>minus</i> (RECs obtained from Retail DG Solar)	(97,894)	Renewable*Connect
	<i>divided by</i> Xcel Energy Total Retail Sales including distributed solar	(539,011)	Retail DG Solar
<i>equals</i> the percentage of "System Renewables" in the electric grid that Denver can count	6,112,336	Remaining RE in the grid mix (RECs)	
		29,594,304	Xcel Energy Total Retail Sales including DG solar (MWh)
Distributed Solar		1.2%	"Distributed solar"
The RECs created by Denver customers with on-site solar or subscriptions to community solar gardens that are transferred to Xcel Energy and can be used for system decarbonization. ²⁶	Total electricity generated or subscribed to by Denverites as part of Xcel Energy's Solar*Rewards and Community Solar Garden programs (i.e., Denver's contributions to Retail DG Solar)	66,819	On-site Solar (Solar*Rewards)
	<i>divided by</i> Denver's Community-Wide Electricity Use	13,435	Community Solar Gardens
	<i>equals</i> Denver's distributed solar energy as a percentage of community-wide electricity use	82,254	Distributed Solar (RECs)
		6,676,539	Denver's total electricity use (MWh)
Utility-Scale RE Subscriptions		0.8%	"Utility-Scale RE Subscriptions"
The RECs retired due to participation in Xcel Energy's Renewable*Connect and Windsource programs by Denver customers. ²⁶	Total subscriptions to Xcel Energy's utility-scale renewable electricity programs including Windsource and Renewable*Connect.	51,251	Windsource
	<i>divided by</i> Denver's Community-Wide Electricity Use	n/a	Renewable*Connect
	<i>equals</i> Denver's utility-scale RE subscriptions as a percentage of community-wide electricity use	51,251	Utility-Scale RE subscriptions (RECs)
	6,676,539	Denver's total electricity use (MWh)	
Denver's Renewable Contributions (2019)		22.7%	

²⁵ The data needed to calculate System Renewables includes Xcel Energy's annual renewable energy generation, REC retirements, and annual REC sales. Xcel Energy publishes this data in Attachments B and C of the annual RES Compliance filing to the PUC. "Annual Compliance Reports." Xcel Energy www.xcelenergy.com/company/rates_and_regulations/filings/renewable_energy_plans_and_reports

²⁶ The data needed to calculate Denver's community-wide Distributed Solar & Utility-Scale RE Subscriptions comes from Xcel Energy's renewable electricity customer choice programs. "Community Energy Reports." Xcel Energy. www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

Does Denver's approach lead to the double counting of RECs?

No. The City's renewable electricity target is nested within that of Xcel Energy and the broader Colorado electric system. Denver is counting the RECs created by Denverites and transferred to Xcel Energy to decarbonize the entire system. Success in achieving Denver's renewable electricity target, particularly through the subscription to and deployment of additive renewable electricity capacity will have a net beneficial effect on Xcel Energy's system-wide decarbonization objectives. If Denver hosts a CSG on a building and the RECs are transferred to and retired by Xcel Energy, the carbon intensity of the system will decrease.

Denver's approach allows the City to mitigate financial barriers to customer-sited solar deployment and a potential disincentive for customers to subscribe to CSGs. Due to current regulations and electric rate structures, local solar deployments can face economic challenges without receiving an additional incentive to sell the RECs to Xcel Energy. Focusing on Denver's contributions to the decarbonization of the entire electric system could make resources available for the City to invest in additional renewable electricity capacity to the benefit of both the community and the utility.

Using consistent and readily available data sources

The data needed to calculate system renewables includes Xcel Energy's annual renewable energy generation, renewable energy credit (REC) retirements, and annual REC sales. Xcel Energy publishes this data in an annual RES Compliance Report filing to the PUC. In support of its Certified Renewable Percentage (CRP) program, Xcel Energy will also publish relevant data elements as described in filing number G_764613, proceeding 19AL-0268E.

- Attachments B and C of Xcel Energy's annual RES compliance report:
www.xcelenergy.com/company/rates_and_regulations/filings/renewable_energy_plans_and_reports

The data needed to calculate Denver's community-wide distributed solar & utility-scale RE subscriptions is published in an annual community energy report. The report includes information on community-wide electricity use and participation in Xcel Energy's renewable electricity customer choice programs.

- Xcel Energy's annual community energy reports:
www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

Intuitive public dissemination of information

Denver has a social commitment and responsibility to achieve its clean electricity targets in a way that promotes equity, empowerment, and economic development for the community. The City is committed to working with Xcel Energy, solar developers, community-organizations, students, members of the public, and all interested stakeholders to advance Denver's clean electricity objectives.

Denver's annual renewable percentage will be communicated to the public in a transparent and consistent manner. Information dissemination strategies may include but are not limited to a dedicated space for climate goal tracking on the Office of Climate Action, Sustainability, and Resiliency website, an annual public announcement, and a publicly facing information sheet such as that on the following page.

TRACKING DENVER'S CONTRIBUTIONS TOWARDS A 100% RENEWABLE ELECTRIC SYSTEM IN COLORADO



By 2030, 100% of Denver's community-wide electricity use will contribute to a clean energy system.

The following metrics track the Renewable Energy Credits, or "RECs", created by Denverites and transferred to and retired by Xcel Energy to achieve a 100% renewable electric grid (1 REC = 1 MWh).

1. "System Renewables"

2019 Contribution	2030 Target
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System RECs not created by, subscribed to, or sold to other customers as a percentage of Denver's electricity:	20.7%	60-80%
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1,382,044 RECs in the Xcel Energy system due to Denver ratepayers contributions through their utility bills that are not created by, subscribed to, or sold to other customers.

Basis for "System Renewables" ¹	2019 (MWh)
Retail RECs obtained after transfers	9,588,148
<i>Deductions for contributions from other customers</i>	
REC Sales to 3 rd Parties	(2,629,408)
RECs retired for utility-scale RE subscriptions	(307,393)
RECs obtained from retail distributed solar	(539,011)

6,112,336 MWh out of 29,564,304 MWh (Xcel Energy's total retail sales w/distributed solar in 2019)
As Xcel Energy ratepayers, this ratio applies to Denver's community-wide electricity use.

2. "Distributed Solar"

Distributed solar REC transfers to Xcel Energy as a percentage of Denver's electricity use:	1.2%	30-40%
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82,254 RECs created by Denver customers with on-site solar arrays or subscriptions to community solar gardens that are transferred to Xcel Energy to decarbonize the electric grid.

Basis for "Distributed Solar" ²	2019 (MWh)
RECs created from on-site solar (Solar*Rewards)	66,819
Community solar gardens	13,435

82,254 MWh out of 6,676,539 MWh (Denver's community-wide electricity use in 2019)

3. "Utility-Scale RE Subscriptions"

RECs retired due Denver customer participation in utility-scale RE programs as a percentage of Denver's electricity use:	0.8%	10-15%
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51,251 RECs retired due to participation in Xcel Energy's Renewable Connect and Windsource programs by Denverites.

Basis for "Utility-Scale RE Subscriptions" ²	2019 (MWh)
Windsource	51,251
Renewable Connect	n/a

51,251 MWh out of 6,676,539 MWh (Denver's community-wide electricity use in 2019)

1,515,549 RECs created by Denverites and transferred to Xcel Energy to decarbonize the electric system in Colorado. Compared to 6,676,539 MWh of community-wide electricity use in 2019.

Denver's Contributions to a Clean Grid (2019) 22.7%

¹ System data available from Attachments B and C of Xcel Energy's annual RES compliance filings www.xcelenergy.com/company/rates_and_regulations/filings/renewable_energy_plans_and_reports

² Data available from Xcel Energy's annual Community Energy Reports. www.xcelenergy.com/working_with_us/municipalities/community_energy_reports

APPENDIX C: ESTABLISHING AN EQUITY FRAMEWORK FOR ENERGY TRANSITION

Equity and community impact are foundational criteria for Denver's evaluation of climate action strategies. Denver's climate action efforts strive to replace our dated and polluting systems with an economically, socially, and environmentally sustainable community in which all Denverites have the opportunity to live, work, and thrive.

Denver's Climate Task Force established equity as a centerpiece of their recommendations to the City.²⁷

"The pursuit of equity happens in several ways. Government has historically excluded people of color from decision making processes, so it is critical that processes to make decisions about policies and programs are inclusive and fair. In addition, the benefits or burdens of policies, programs or investments have not always been fair or shared equitably across our City. Looking closely at those impacts and making future corrections is critical. Finally, equity is also about understanding historical patterns of discriminatory action and intentionally correcting for those injustices today."

The City and the authors of the 100% Renewable Electricity Action Plan agree with the Task Force that we can reduce greenhouse gas emissions AND advance equity and racial justice. Denver's clean energy investments can and should strengthen the community.

Denver's Office of Climate Action, Sustainability, and Resiliency (CASR) recognizes that a robust equity framework goes beyond the initial set of recommendations from the Task Force. It will require an ongoing and inclusive process to determine how climate action programs are designed and how success is measured in pursuit of the City's goals.

The Urban Sustainability Directors Network (USDN) defines four types of equity for sustainability planning, decision-making, and program and policy design. These four aspects of equity are often overlapping, but the different points of intersection between energy supply transformation and equity outlined in the framework will necessarily emphasize different types of equity. The USDN definitions are:²⁸

1. **Procedural (Inclusion):** inclusive, accessible, authentic engagement and representation in the process to develop or implement programs or policies.
2. **Distributional (Access):** programs and policies result in fair distributions of benefits and burdens across all segments of a community, prioritizing those with highest need.
3. **Structural:** decision-makers institutionalize accountability; decisions are made with a recognition of the historical, cultural, and institutional dynamics and structures that have routinely advantaged privileged groups in society and resulted in chronic, cumulative disadvantage for subordinated groups.
4. **Transgenerational:** decisions consider generational impacts and don't result in unfair burdens on future generations.

²⁷ "Denver Climate Action 2020 Recommendations Report." www.denvergov.org/climatestakeholder

²⁸ Angela Park. "Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs." USDN, September 2014.

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A 2018 report by Meister Consulting Group, developed in partnership with the innovation Network for Communities, the Carbon Neutral Cities Alliance, and the Urban Sustainability Directors Network identifies a set of topics and questions that can help cities think through ways to embed equity into their energy transition (Figure 18).²⁹

CASR will need to ask the following questions and more as Denver considers establishing new programs, forming community and organizational partnerships, or investing in new energy infrastructure. Input from members of the Denver community is needed to shape many of the answers.

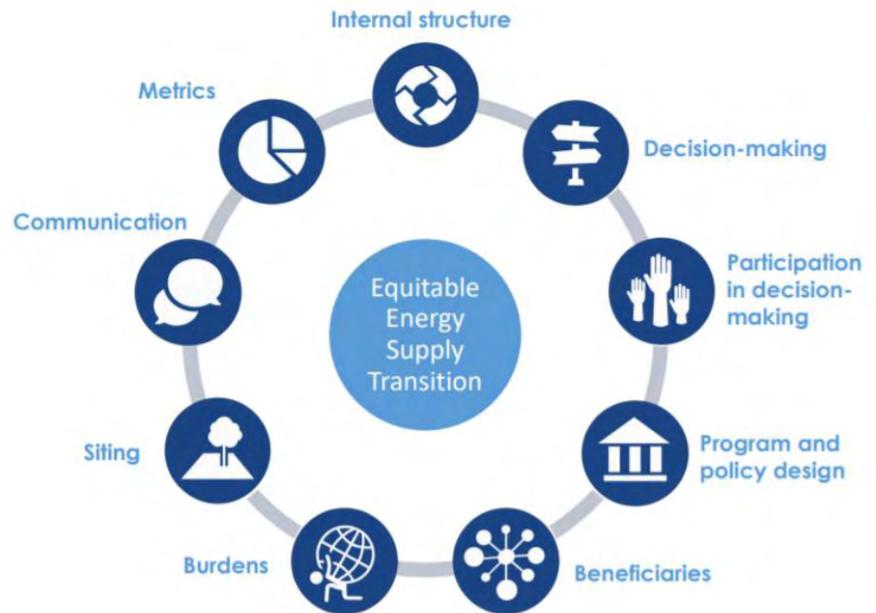


Figure 18. Key attributes to question when establishing a framework for equitable energy supply transformation.

- **Internal Structure:** How is equity defined within the city and department?
- **Decision-making:** How does the city prioritize and make decisions about its energy policy and planning?
- **Participation in decision-making:** Who can participate in decision-making processes?
- **Program and policy design:** How are clean energy programs and policies designed and who has access to participate?
- **Beneficiaries:** Who gets the benefits and are they distributed equitably?
- **Burdens:** Who bears the costs of energy generation and are they distributed equitably?
- **Siting:** Where are renewables or other generation sources or systems sited?
- **Communication:** How are energy transformation priorities communicated?
- **Metrics:** What data or analysis is used to measure success?

CASR anticipates a layered framework in which certain principles will apply holistically to all its activities. Additionally, individual programs and energy investments should follow an equity framework to establish project specific metrics and inputs to advance mutually agreed upon goals for the City and affected community.

CASR is also looking to other cities and states for ideas examples of successful frameworks. For example, the Portland Clean Energy Fund is a municipal grant program that was established by a citizen ballot measure (the Portland Clean Energy Initiative) which passed in November 2018 with 65% support from Portland voters.³⁰ It will distribute \$54-71 million every year in clean energy funding for renewable energy, energy efficiency, job training,

²⁹ "Framework for an equitable energy supply transformation." Meister Consultants Group. 2018.

³⁰ "Portland Clean Energy Fund." <https://portlandcleanenergyfund.org/about>

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green infrastructure, and future innovation for all Portlanders, prioritizing low-income residents and people of color.

The Portland Clean Energy Fund has a fundamental commitment to Portlanders who are most impacted by climate change but have been excluded from the emerging low-carbon economy: low-income people and people of color. At least 50% of grant-funded energy efficiency/renewable energy projects “should specifically benefit low-income residents and communities of color;” and at least 20% of all grants “shall be awarded to nonprofit organizations with a mission and track record of programs that benefit economically disadvantaged community members.”

The Portland Clean Energy Fund established a Portland Clean Energy Community Benefits Fund Committee (Committee) made up of experts and community members to make funding recommendations to the Mayor and City Council; and evaluate the effectiveness of the Fund in achieving the goals of this Measure. Section 7.5(f) of the initiative instructs the Committee to,

“Adopt a workforce and contractor equity plan to ensure that the work funded by the Committee is being performed by historically disadvantaged groups, including measurable and ambitious goals for the training and hiring of historically disadvantaged groups, including women, people of color, people with disabilities, and the chronically underemployed and measurable goals for contracting with businesses owned or operated by such groups. In developing the plan and goals, the Committee shall consult with workforce and contractor equity stakeholders as well as incorporate appropriate best practices from City procurements. Progress in meeting these goals shall be prominently displayed on the Committee’s homepage and, if goals are not being met, shall be the Committee’s top priority to address.”³¹

Commitments to benefit Denverites who are most impacted by climate change, processes to include community members in programmatic recommendations, and transparency are valuable components of an equity framework. The specific program areas within CASR dedicated to achieving Denver’s clean electricity objectives will adopt strategies in the near-term to advance equity in its activities, while CASR and Denver pursue the development of a city-wide equity framework for energy transition. This includes:

1. Asking and answering the questions related to the equity topic areas identified in Figure 18 for programmatic, strategic, and investment decisions within the team’s control.
2. Including equity, environmental justice, workforce development, and community impact considerations as meaningful evaluation criteria in CASR led contracting and business opportunities.
3. Establishing and striving to exceed minimum thresholds for low- and moderate-income household participation in and bill savings due to subscriptions to Denver hosted community solar gardens.
4. Coordinating with environmental justice groups, non-profit organizations, and other regional governments on regulatory filings at the Public Utilities Commission to advocate that utility incentives and program designs are structured equitably and are accessible to historically disadvantaged groups.
5. Working with the community to establish a set of equity-focused renewable electricity metrics, as well as tracking and providing regular updates on the progression of those metrics.

CASR is committed to advancing the systemic changes necessary to equitably decarbonize Denver.

³¹ Portland Clean Energy Community Benefits Initiative 2018. Section 7.5(f). <https://static1.squarespace.com/static/5b847fe4f8370ad8f30a8cac/t/5ba29cbb8985834b3fc96aec/1537383612767/Portland+Clean++Energy+Community+Benefits+Initiative+2018++%2818-02-20%29+.pdf>

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100RE Plan Advisory Committee

The 100RE Plan Advisory Committee (AC) provided valuable inputs that helped shape the priorities documented in this plan. While the AC supports Denver's vision to enable a rapid and equitable transition to a 100% renewable electric system in Colorado, participation on the AC does not indicate endorsement of all positions in the plan.

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