

COMMUNITY CHOICE ELECTRICITY PROGRAMS

A SURVEY OF MASSACHUSETTS MUNICIPALITIES

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Authors

Report prepared by a team of researchers from the University of Massachusetts Amherst.

Lead Author: Marta Vicarelli, Assistant Professor, Department of Economics and School of Public Policy -
Contact: Dr. Marta Vicarelli <mvicarelli@econs.umass.edu>

Research team:

- Ajay Dawani, Department of Economics '22
- Emily Laus, Department of Physics '23
- Nihal Warawdekar, Department of Economics '20, and Department of Resource Economics '23

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OUTLINE

EXECUTIVE SUMMARY page 5

1. INTRODUCTION 8

 1.1 Renewable Energy Portfolio Standards (RPS) 10

 1.2 Key steps toward the creation of a municipal CCE program 12

2. METHODOLOGY 14

 2.1 Massachusetts CCE contracts database 14

 2.2 Municipal survey database 15

3. RESULTS 18

 3.1 Goals motivating the creation of CCE programs 18

 • Most important goals, by municipal characteristics 20

 • Evolution of municipal goals since the beginning of CCE programs 25

 3.2 Challenges experienced by municipalities 27

 3.3 Benefits reported by municipalities, overview 30

4. CONTRACT CHARACTERISTICS and RENEWABLE ENERGY LEVELS 34

 4.1 Packages available to residents 34

 4.2 Renewable energy levels in CCE contracts 35

5. SAVINGS 39

6. CONCLUSION 43

APPENDIX 44

EXECUTIVE SUMMARY

This study by a team of researchers from the University of Massachusetts Amherst focuses on **opportunities and challenges associated with the implementation of Community Choice Energy (CCE)¹ aggregation programs** across Massachusetts municipalities.

Qualitative and quantitative data for this project was collected between 2019 and 2022. Our **methodology** includes: (i) **interviews and focus groups of municipal officials** in Massachusetts municipalities that have adopted a CCE program; (ii) a **survey of municipal officials** in Massachusetts municipalities that have adopted a CCE program; and (iii) the creation of an extensive **dataset of market data** (e.g., prices, contract duration, amount of renewable energy offered) collected from the Massachusetts government website, municipal websites, and websites of energy consulting companies. Follow up interviews will take place in 2023.

We examine the goals that motivated municipalities to acquire CCE programs, the self-reported challenges associated with their implementation, and the benefits obtained. We also explore the extent to which CCE programs may support federal and state climate goals by increasing renewable energy demand, thus contributing to **climate mitigation** (i.e., ability to reduce CO₂ emissions), and facilitating the **green energy transition**.

To our knowledge, this is the first study assessing in detail the performance of a CCE program in the United States by both analyzing market data as well as the self-reported experience of municipalities. The key results are the following:

Goals

- Based on our survey of municipal officials, the most frequently reported primary goal (i.e., most important goal) motivating the implementation of CCE programs include: “reduced rates” (56% of responses), “higher renewable energy levels” (27%), and “price stability” (16%).
- Cities and municipalities in urban areas are more likely to indicate “higher renewable energy levels” as their primary goal, compared to towns and municipalities in rural areas.
- 81% of municipalities that joined national or international municipal coalitions to support climate action reported “higher renewable energy levels” as their primary goal toward the adoption of the CCE program. These municipalities perceive the CCE as an instrument to achieve their climate goals.

¹ CCE programs (sometimes referred to as municipal aggregation programs) allow local governments to aggregate the electricity loads of residents, businesses, and municipal facilities to procure their supply of electricity (including renewable energy) in the competitive market. Potential benefits of CCE programs include savings for consumers (i.e., lower prices), price stability, increased renewable energy consumption, reduced greenhouse gas emissions, and incentives to boost innovation and local economic development related to renewable energy technologies.

- We asked municipal officials if their goals have been evolving over time. Our results indicate a growing interest toward future investments in renewable energy.

Challenges

- Based on our online survey results, the most frequently reported implementation challenge is “delays associated with approval from the Department of Public Utilities (DPU)” (26%). Some municipalities had to wait more than one year for the DPU approval.
- Smaller municipalities (i.e., towns), particularly in rural areas, are more likely to have experienced difficulties associated with information acquisition toward the creation of CCE programs, and in particular “understanding/interpreting state regulations associated with the CCE” (43%).
- Administrative costs (after the creation of the CCE) and staffing capacity do not seem to be a constraint for municipalities. In fact, during interviews and focus groups, municipalities stated not having experienced any implementation obstacle related to administrative costs and staffing capacity.

Benefits

CCE programs in Massachusetts provide numerous benefits including reduced rates, higher renewable energy levels, price stability and customer ownership and protection.

- Survey results indicate that about 80% of municipalities achieved **savings** by developing a CCE program. (This survey outcome matches the results of our market analysis, performed using publicly-available contract data from all municipalities in Massachusetts).
- Moreover, municipalities systematically reported obtaining **additional benefits** beyond their primary goal. For instance, among municipalities with “higher renewable energy levels” as their primary goal, the top three benefits reported include: “higher renewable energy levels” (83%), “reduced rates” (78%) and “price stability” (65%).
- Municipalities with “higher renewable energy levels” as their primary goal most frequently indicated “leadership in the municipality” and “attitude of residents toward sustainability” as the key drivers toward the success of their CCE program. In comparison, municipalities with “reduced rates” as their primary goal most frequently indicated “choice of energy consultant” as the key factor contributing to their successful CCE programs.

Renewable energy levels

CCE programs in Massachusetts have been contributing to increasing renewable energy demand, thus enhancing the local production of renewable energy and local economic development:

- 60% of standard CCE packages (also referred to as basic packages or default packages) in our database have a percentage of renewable energy certificates higher than the Massachusetts renewable energy requirement. These additional certificates can be either Renewable Energy Portfolio Standards (RPS) Class 1, or National Renewable Energy Certificates (RECs), or both².

² Definitions are provided in the report.

- 30% of standard CCE packages not only exceed the Massachusetts renewable energy requirement but also contain 100% of renewable energy certificates.

Savings calculations

We compared standard CCE package prices with monthly residential utility basic service rates for all municipalities with a CCE program as of July, 2021. Prices were compared from the beginning of the most recent CCE contract until October 2021.

- Our analysis indicates that 79% of municipalities achieved **savings** compared to utility's monthly basic service rates, with an **average amount of savings** corresponding to 0.88 cents per kWh (about 93 USD per household, per year). The savings for these municipalities amount to about **\$70,000,000 per year in total**.
- 35% of municipalities achieved savings above 1 cents per kWh (about 106 USD per household, per year) and the maximum amount of savings corresponded to 2.55 cents per kWh (about 271 USD per household, per year).
- 89% of municipalities with a “green” standard CCE package (i.e., with a percentage of renewable energy certificates higher than the MA requirement)³ achieved an average amount of savings corresponding to 0.84 cents per kWh. The savings for these municipalities amount to about **\$33,500,000 per year in total**.

These results suggest that CCE programs contribute to both sustainability (by allowing higher renewable energy levels) and equity (by reducing costs).

With solar and wind energy prices declining rapidly, and fossil fuel prices becoming more and more volatile, CCE programs are emerging as promising cost-effective instruments to support the transition to sustainable energy and climate mitigation efforts.

Last but not least, CCE programs contribute to the expansion of local renewable energy markets and local economic development.

³ These additional certificates can be either RPS Class 1 or National RECs or both.

COMMUNITY CHOICE ELECTRICITY PROGRAMS

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1. INTRODUCTION

A team of researchers from the University of Massachusetts Amherst has developed a large dataset on Community Choice Electricity Aggregation (CCE) programs in Massachusetts by collecting data from state and municipal government websites, and by conducting interviews, focus groups and an online survey.

Community Choice Energy aggregation (CCE) programs are energy procurement programs adopted by 157 of the 351 municipalities across Massachusetts, as of November 2021, when the data was collected (Figure 1)⁴. Massachusetts is one of only eight states across the country to have enacted CCE legislation (*Electric Industry Restructuring Act, 1997*)⁵. CCE programs allow local governments to aggregate the electricity loads of residents, businesses, and municipal facilities to procure their energy supply at competitive market prices. Potential benefits of CCE programs include savings for consumers (i.e., lower prices) and incentives to boost innovation and local economic development related to renewable energy technologies. Moreover, CCEs may generate positive environmental externalities; by choosing their electricity supplier, municipalities may, for instance, increase the proportion of renewable energies in their energy mix and contribute to climate change mitigation.

The purpose of this study is to learn more about **opportunities and challenges associated with the implementation of CCE programs** across Massachusetts municipalities, including: the goals that motivated municipalities to acquire CCE programs, the self-reported challenges associated with their implementation, and the benefits obtained. We also explore the extent to which CCE programs may support federal and state climate goals by increasing renewable energy demand, thus contributing to **climate mitigation** (i.e., ability to reduce CO₂ emissions), and facilitating the **green energy transition**.

⁴ At the time of the publication of this report, the Department of Public Utilities has approved 176 community choice aggregation programs, 19 more than the number of municipalities included in our 2021 database.

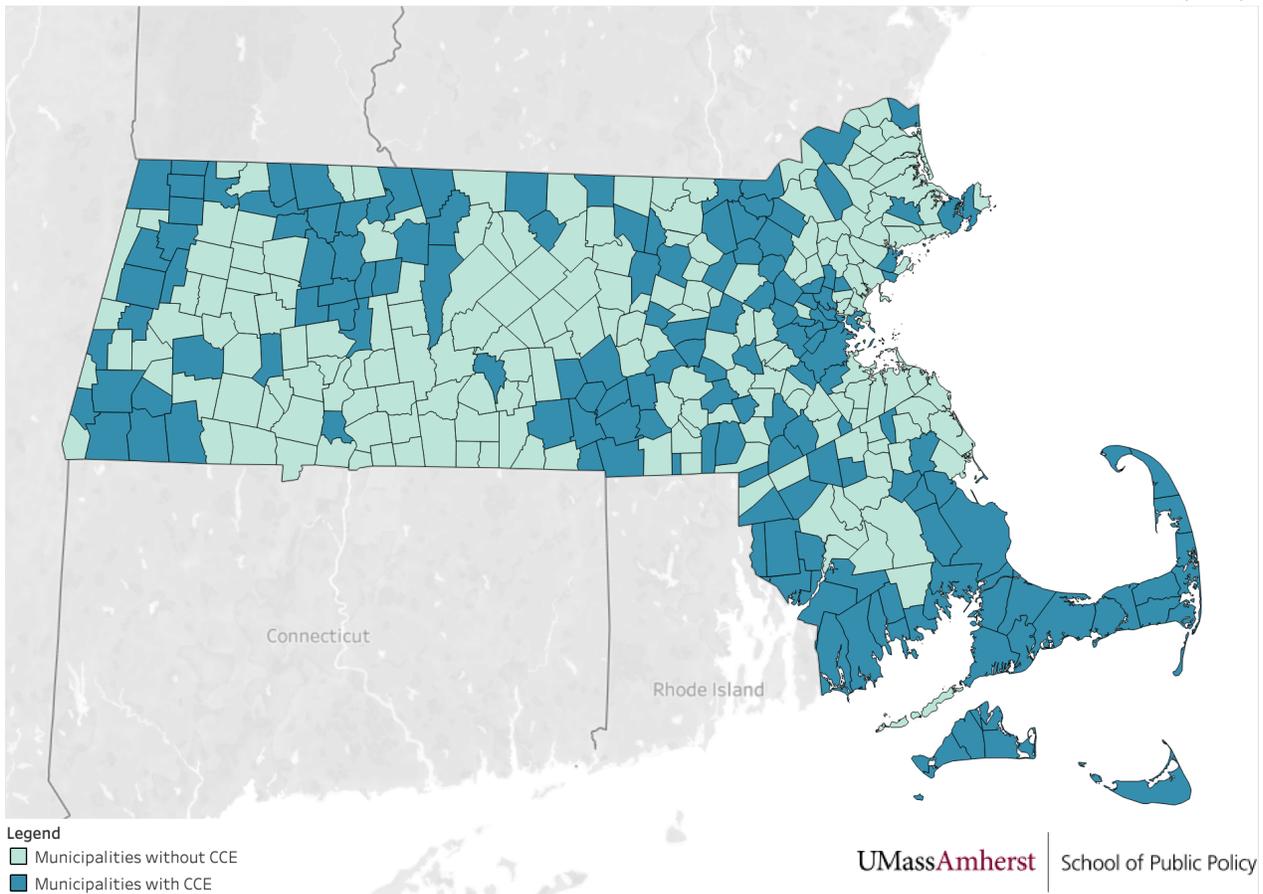
⁵ The *Electric Industry Restructuring Act* (1997) is accessible from the Massachusetts Government Website: <https://www.mass.gov/doc/mm3pdf/download>

Qualitative and quantitative data for this project was collected between 2019 and 2022. Our **methodology** includes: (i) **interviews and focus groups of municipal officials** in Massachusetts municipalities that have adopted a CCE program; (ii) a **survey of municipal officials** in Massachusetts municipalities that have adopted a CCE program; and (iii) the creation of an extensive **dataset of market data** (e.g., prices, contract duration, amount of renewable energy offered) collected from the Massachusetts government website, municipal websites, and websites of energy consulting companies. Follow up interviews will take place in 2023.

The remainder of the introduction will provide some background by describing Massachusetts Renewable Energy Portfolio Standards (RPS) and by outlining the protocol that municipalities need to follow to set up a CCE program.

Figure 1. Massachusetts municipalities with community choice electricity (CCE) programs
(As of November 19, 2021)

(n=351)



Data source: Massachusetts government website and websites of Massachusetts municipalities (as of Nov 19, 2021)

1.1 RENEWABLE ENERGY PORTFOLIO STANDARDS (RPS)

Massachusetts' Renewable Energy Portfolio Standard (RPS) was one of the first programs in the nation that required a certain percentage of the state's electricity to come from renewable energy⁶. Retail electricity suppliers (both regulated distribution utilities and competitive suppliers) must obtain a percentage of the electricity they serve to their customers from qualifying renewable energy facilities. There are two types of RPS: Class I & Class II⁷ (Box 1). Broadly speaking, Class I requirements provide financial incentives for newer renewable energy facilities (established after 1997). Class I requirements increase every year in an effort to achieve Massachusetts climate goals.

Class I and Class II requirements are a subset of the overall **Massachusetts Requirement**. The MA Requirement for renewable energy from the New England region includes multiple standards associated with multiple state initiatives. The MA requirement equals the sum of the Clean Energy Standard (inclusive of RPS Class I), the Clean Energy Standard for existing resources (CES-E), and RPS Class II. The Class I requirement in 2021 was 18% and it increases by 2% annually. The MA requirement was 49.1% in 2021, when our database was completed.

When a municipality develops their CCE programs, they may decide to offer energy packages with an amount of New England renewable energy that exceeds the MA requirement. In particular, they may select a higher amount of RPS Class I. The amount of renewable energy offered in MA CCE programs is examined in "[Section 4, Savings](#)".

⁶ More information about RPS is available from the Massachusetts Government website: <https://www.mass.gov/renewable-energy-portfolio-standard>

⁷ For details, see Massachusetts Government website: <https://www.mass.gov/service-details/2022-rps-class-i-ii-rulemaking>

BOX 1: Renewable Energy Portfolio Standards (RPS) Class 1 and Class 2

The RPS began with a compliance obligation of one percent in 2003, and increased by one-half percent annually until it reached four percent in 2009. In 2009, as a part of the Green Communities Act of 2008, the RPS Class I annual obligation was set to increase by 1% annually (subsequently increased to 2%) and a new RPS Class II was created for existing renewable energy facilities. Each Class has different annual compliance requirements as well as different eligibility criteria for qualifying facilities.

Suppliers meet their annual **RPS obligations** by acquiring a sufficient quantity of RPS-qualified **renewable energy certificates (RECs)** that are created, traded, and tracked at the New England Power Pool (NEPOOL) Generation Information System (GIS).

One **REC** is created each time a qualified facility generates 1 megawatt hour (MWh) of electricity. In order for retail electricity suppliers to meet their annual compliance obligations established by the RPS, they must purchase a number of RECs equal to the percentage for that particular compliance year. For example, in 2020 all Suppliers will be required to purchase an amount of RECs equal to 15% of the total electricity they serve in Massachusetts.

RPS Class I requirement - These requirements increase by 2% percent annually. It is met through electricity production from qualified new renewable energy facilities. New renewable energy facilities are those that began commercial operation after 1997, generate electricity using any of the following technologies, and meet all other program eligibility criteria:

- Solar photovoltaic, solar thermal electric, wind energy, small hydropower, landfill methane and anaerobic digester gas, marine or hydrokinetic energy, geothermal energy, eligible biomass fuel

RPS Class II requirements - Similar to RPS Class I, this class pertains to generation units that use eligible renewable resources, but have an operation date prior to January 1, 1998. Therefore, RPS Class II provides financial incentives for the continued operation of qualified pre-1998 renewable generation units. Eligible facilities generate Class II RECs and the annual percentage requirement varies from year to year per a formula in regulation.

Sources:

Government of Massachusetts (accessed on February 1, 2023) <https://www.mass.gov/service-details/program-summaries>.

Class I and Class II Rulemaking (accessed on February 1, 2023) <https://www.mass.gov/service-details/2022-rps-class-i-ii-rulemaking>

1.2 KEY STEPS TOWARD THE CREATION OF A MUNICIPAL CCE PROGRAM

The Massachusetts Government website outlines four steps toward the creation of a municipal aggregation (BOX 2).

BOX 2: How does a municipality create a municipal aggregation?

1. Vote within the municipality to initiate the municipal aggregation program.
2. Prepare a municipal aggregation plan in consultation with the Department of Energy Resources (DOER), often in partnership with a consultant.
3. Allow an opportunity for citizen review of the municipal aggregation plan.
4. Submit a municipal aggregation plan to the DPU for review and approval.

Source: Government of Massachusetts (accessed on February 1, 2023) <https://www.mass.gov/info-details/municipal-aggregation>

Our interviews and focus groups confirm that the creation of municipal CCE programs are usually prompted by extensive internal consultation (e.g., town meetings, council meetings) often supported by research efforts by groups of local residents or by municipal committees (e.g., energy committee, sustainability committee).

After achieving consensus at the municipal level, municipalities start preparing their aggregation plan in consultation with the Department of Energy Resources (DOER).

At this stage, municipalities usually identify a brokerage company (i.e., energy consulting firm) to assist them. The energy consultant often supports the design and preparation of the application for CCE to the State Department of Public Utilities (DPU). Their key role is to help the municipality select a suitable contract (e.g., price and amount of renewable energy supplied) and support the development and implementation of the municipal CCE program (once it is approved by the Department of Public Utilities).

Municipalities interested in a CCE program usually create a request for proposals (i.e., RFP) to identify a suitable brokerage company. In some cases, the RFP is created for a group of municipalities through planning agencies, which decreases transaction costs and appears to be an efficient strategy (especially for smaller municipalities). In other cases, the brokerage company chosen to assist in the development of the CCE program is contacted directly, without RFP, because of existing personal or professional connections with municipal officials or members of municipal committees. In yet other cases, the brokerage company is recommended by a nearby (often adjacent) municipality that has already successfully started their CCE program.

After review and approval of the aggregation plan by the DPU, municipalities are allowed to start implementing the CCE with the support of their energy consultant. This includes extensive learning programs to help residents familiarize with the CCE framework and to inform them about their ability to opt out, if they wish to do so. After the initial notification, residents are automatically enrolled. If they wish, they can opt-out at no cost. They can also opt-back-in at no cost, at any time.

The remainder of the report is organized as follows: Section 2 outlines the methodology used; Section 3 presents the results of the municipal survey, describing self-reported goals, challenges, and benefits of municipal CCE programs; Section 4 provides an outlook of existing contract characteristics with a particular focus on renewable energy levels offered; and Section 5 describes the savings achieved in relation to renewable energy levels.

2. METHODOLOGY

Qualitative and quantitative data for this project was collected between 2019 and 2022. We complemented extensive market dataset with qualitative interview data and survey data, targeting municipal officials.

CCE market data and contract database - This database, generated by collecting data from the Massachusetts government website, municipal websites, and websites of energy consulting companies, includes detailed information about all 157 CCE contracts developed in Massachusetts, as of November 2021 (e.g., prices, duration, amount of renewable energy supplied).

Interviews and focus groups of municipal officials - This qualitative data was collected during phone/zoom interviews and focus groups with more than 50 Massachusetts municipal officials, between 2019 and 2022. We interviewed municipalities with CCE programs as well as municipalities that suspended CCE programs or with CCE programs under development. Our goal was to learn from the experience of municipal officials. This data collection effort led to the design of an online survey targeting Massachusetts municipalities. Follow up interviews will take place in 2023.

Online municipal survey database - This survey, implemented in 2021 and addressed to Massachusetts municipal officials (e.g., mayors, town managers, sustainability managers, select-board members, members of energy committees), gathers information about CCE implementation goals, challenges, and benefits. The design of the survey was supported by the feedback received from municipal officials during phone/zoom interviews and focus groups.

These aforementioned datasets are described in more detail below.

2.1 MASSACHUSETTS CCE CONTRACTS DATABASE

In a given municipality, the CCE contract may include different options, or packages, that differ for their renewable energy content and price. Consumers are automatically enrolled in the standard package (which is almost always cheaper than the price they would pay to local utilities without the CCE program), but they may opt for a different package. For instance, they may “opt-down” if they wish to pay a lower price (usually associated with a lower amount of renewable energy). In other cases, they may “opt-up” to a package with a larger amount of renewable energy.

In order to better understand the characteristics of CCE contracts in Massachusetts municipalities, we collected the following data for each municipality with a CCE program:

- Number of packages associated with each municipal contract
- Price paid for electricity for each package
- Brokerage company supporting the implementation of the CCE program
- Duration of contracts

- Amount of local renewable energy (i.e., Class 1 RPS) and amount of national renewable energy certificates (i.e., National RECs) for each package

With the data collected, we compared standard CCE package prices with monthly residential utility basic service rates for all municipalities with a CCE program. Prices were compared from the beginning of the most recent CCE contract until October 2021.

Data sources include: the Massachusetts government website⁸, the websites of individual municipalities within Massachusetts, and the websites of brokerage/energy consulting companies.

2.2 MUNICIPAL SURVEY DATABASE

Between March 2019 and January 2021, we conducted more than 50 focus groups and interviews with Massachusetts municipal officials to better understand the motivations behind the adoption of CCE programs and the logistical aspects of their implementation. Results from the focus groups and interviews informed the design of an online survey targeting municipal officials and implemented between January and February 2021. The responses provide a comprehensive outlook on CCE programs in Massachusetts municipalities, with a focus on 4 areas:

1. Original implementation goals and evolution of those goals post-implementation
2. Challenges experienced during the implementation
3. Benefits obtained post-implementation
4. Reasons for success (as perceived by municipal officials)

The online survey was sent via email to all 157 Massachusetts municipalities that had a CCE program as of January 2021. Emails were addressed to mayors, town managers, energy managers, sustainability managers (when applicable), chairs of energy committees and sustainability committees (when applicable), and members of select boards (when applicable). We received answers from 69 municipalities. In addition, 42 municipalities answered a subset of the survey questions during phone/zoom interviews between 2019 and 2021⁹. In 2021 we consolidated all municipal responses in one dataset. After eliminating duplicates, we generated a database of 97 municipalities (from now on referred to as “UMass School of Public Policy Municipal Survey 2021”). Follow up interviews are planned for 2023.

⁸ Massachusetts government website: <https://www.mass.gov/info-details/municipal-aggregation>

⁹ 24 of these interviews were completed in 2019. Interviews were performed by Prof. Vicarelli; SPP students David Wasielewski and Cobi Frongillo; and research assistants Thomas Roberts, Max Ball, Kiyoshi Dee, and Chris Small. The qualitative data from these interviews were analyzed and discussed in a paper developed by SPP students as part of the Spring 2019 SPP Workshop Program, under the supervision of Prof. Vicarelli: *Wasielewski, D., Frongillo, C. and Liu, J., “Community Choice Aggregation Programs in Massachusetts: Challenges, Opportunities, and Sustainable Development Solutions,”* (May 9, 2019) (unpublished).

This report contains a collection of anonymous direct quotes from comments and reflections shared by the survey respondents. These anonymous contributions are a way to make their voices heard beyond statistical calculation. We are very grateful for the time respondents took to answer our questions and for their thoughtful and heartfelt contributions.

Table 1 presents key socio-economic and demographic characteristics of the 97 municipalities in the UMass School of Public Policy Municipal Survey 2021 compared to the 351 Massachusetts municipalities.

Our sample of 97 municipalities includes municipalities associated with Cape Light Compact. Cape Light Compact is an energy services organization operated by the 21 towns on Cape Cod and Martha's Vineyard and Dukes County. The Compact's mission is to serve its 200,000 customers through the delivery of energy efficiency programs, consumer advocacy and renewable electricity supply¹⁰.

¹⁰ More information about Cape Light and its history can be found here: <https://www.capelightcompact.org/about-us/>

Table 1. Characteristics of Municipalities in our sample compared with Massachusetts municipalities						
	Massachusetts		MA municipalities with CCE		Survey Sample (municipalities with CCE)	
	Count	% of Total	Count	% of Total	Count	% of Total
Total number of municipalities*	351	-	157	45%	97	62%**
Cities	39	11%	24	15%	17	18%
Towns	312	89%	133	85%	80	83%
LEVEL of RURALITY ***						
Not rural	191	54%	86	55%	55	57%
Rural level 1	104	30%	37	24%	26	27%
Rural level 2	56	16%	34	22%	16	16%
DEMOGRAPHIC CHARACTERISTICS (2019 Census) ****						
Average per capita income in 2019 (inflation adjusted)	\$45,940		\$45,354		\$48,141	
Average per capita income in 2020 dollars	\$46,507		\$45,914		\$48,735	
Average municipal population size	19,637		23,572		21,096	
Average percentage of 25+ with bachelor's degree	25%		25%		26%	
Average percentage of 25+ with only a graduate degree	20%		20%		23%	

Notes: * The following website provides a list of cities and towns of the Commonwealth of Massachusetts with the dates of when they were settled, when incorporated as a town and, if applicable, when incorporated as a city, as well as the county in which they are located. <https://www.sec.state.ma.us/cis/cisctlist/ctlistalph.htm> (accessed on August 15, 2022)

** This value corresponds to 62% of municipalities with a CCE.

*** The MA State Office of Rural Health defines "levels of rurality" at this website: <https://www.mass.gov/doc/rural-definition-detail-0/download> (accessed on August 15, 2022) — Rural towns are also classified into two categories of rurality. Towns classified as rural level one meet fewer rural criteria than towns considered rural at level two. Towns in level two are less densely populated and more remote and isolated from urban core areas. Towns in level one and level two are both rural. Towns not in level one or two are considered urban.

**** 2019 Census data: <https://data.census.gov/>

3. RESULTS

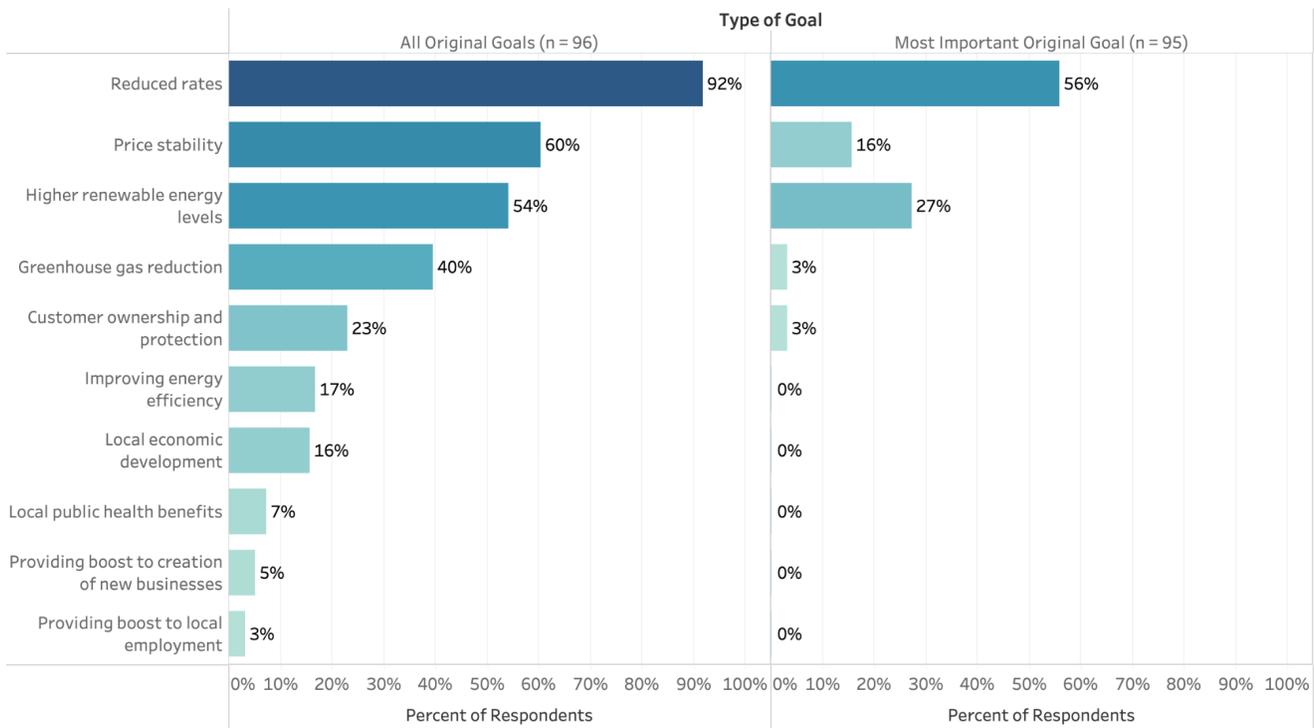
3.1 GOALS MOTIVATING THE CREATION OF CCE PROGRAMS

Municipalities may adopt a CCE program for a variety of reasons. We asked municipalities what the **original goals** were that motivated the creation of their CCE program (Figure 2).

“Reduced rates” is indicated as one of the original goals by more than 90% of respondents (Figure 2 and Figure 3), followed by “price stability” (60% of respondents) (Figure 2 and Figure 4) and “higher renewable energy levels” (54% of respondents) (Figure 2 and Figure 5). “Greenhouse gas reduction” and “customer ownership and protection” are also frequently reported original goals.

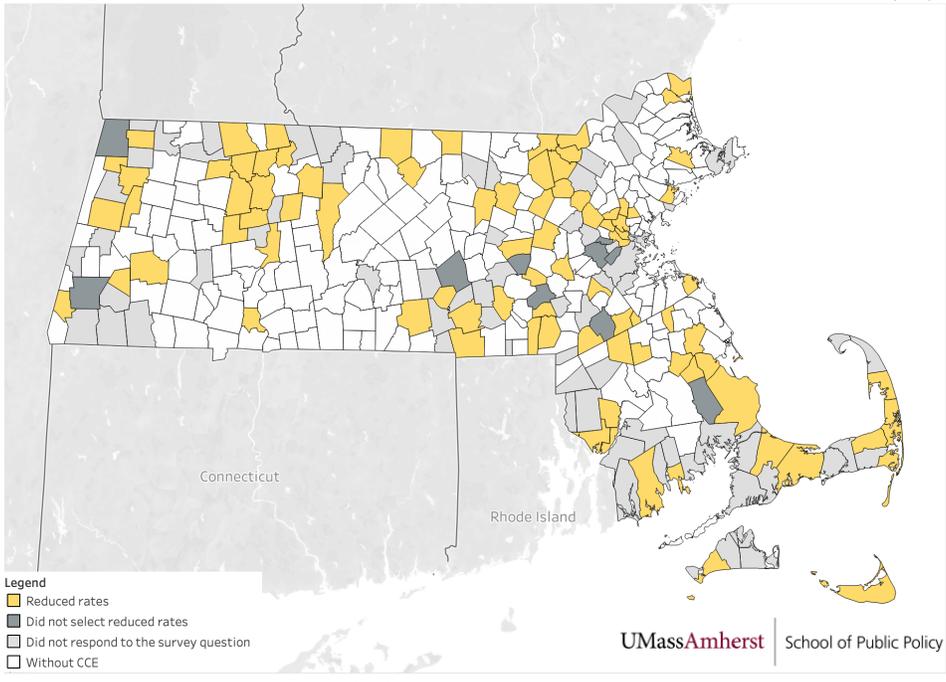
According to interviews and focus groups, among the goals motivating the adoption of a CCE program there usually is a primary goal that is prioritized in designing the contract, in collaboration with the brokerage company. In our survey, when asked what their **most important goal** was, municipalities most frequently answered “reduced rates” (56%), “higher renewable energy levels” (27%), and “price stability” (16%) (Figure 2).

Figure 2. Original goals motivating the development of Community Choice Electricity (CCE) programs



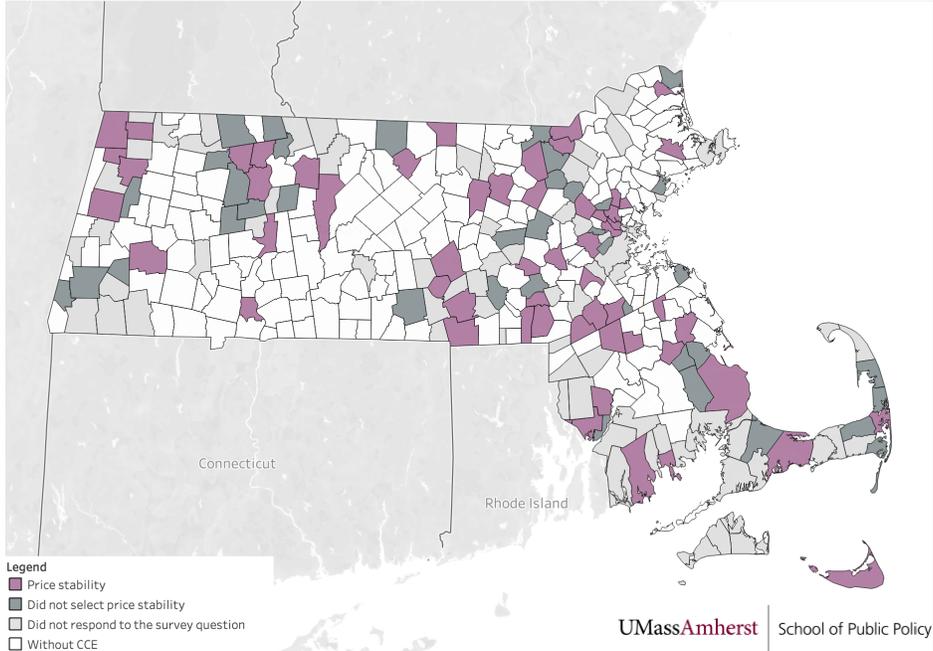
Data source: UMass School of Public Policy municipal survey (2021)
 Five municipalities indicated more than one most important goal.

Figure 3. Municipalities that indicated reduced rates as one of the goals motivating the adoption of CCE programs (n=96)



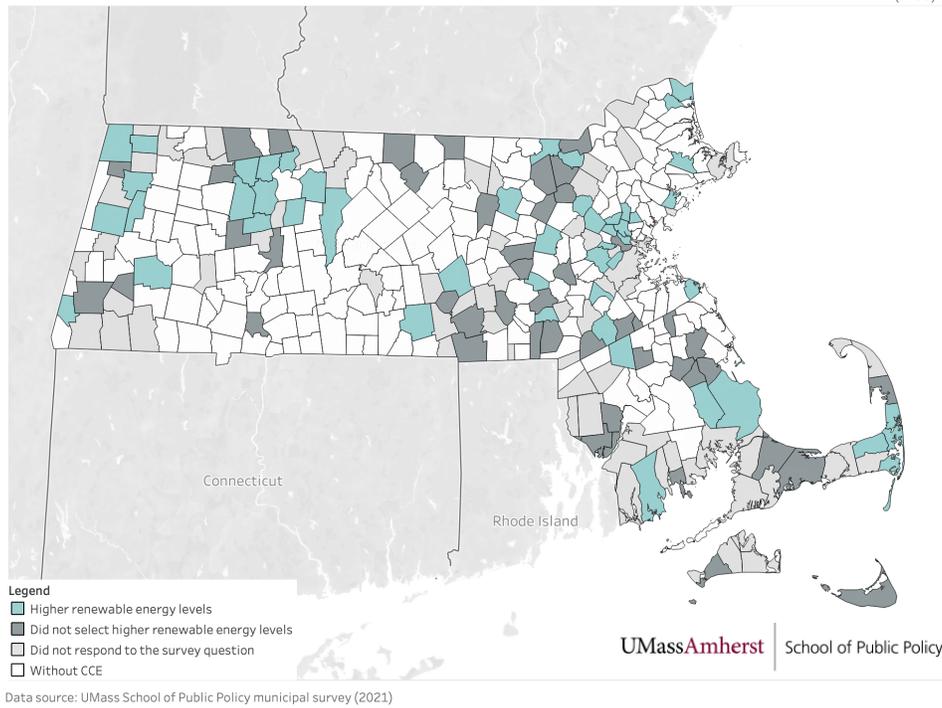
Data source: UMass School of Public Policy municipal survey (2021)

Figure 4. Massachusetts municipalities that indicated price stability as one of the goals motivating the adoption of CCE programs (n=96)



Data source: UMass School of Public Policy municipal survey (2021)

Figure 5. Municipalities that indicated higher renewable energy levels as one of the goals motivating the adoption of CCE programs (n=96)



“Our primary goal is saving residents and businesses money on their electrical supply.” — Director of Community Development

“Our goal is 100% sustainable energy and the lowest possible cost.” — Municipal Official

“Our long term goal is the local economic development of blue and green industry while supporting environmental conservation and fighting pollution. We want to keep attracting seasonal residents and recreational boating and they look for a pristine Cape environment.” — Municipal Official

Most important goals motivating the creation of municipal CCE programs, by municipal characteristics

We examined the most important (i.e., primary) goals reported by municipalities (Figure 2) in relation to several municipal characteristics, including level of rurality, governance structure, and whether municipalities are part of international coalitions for climate action.

- When we consider only **cities**¹¹, “higher renewable energy levels” emerges as the primary goal for the majority of respondents (53%) (Figure 6). This suggests that size of the municipality, staffing capacity, and governance structure may be factors affecting the renewable energy level chosen for the CCE contracts. We investigated this further in subsequent analyses, described below.
- We examined primary goals based on **level of rurality**¹² and found that urban municipalities are more likely to indicate “higher renewable energy levels” as their primary goal compared to rural municipalities (Figure 7).
- The **municipal governance structure** seems to be related to the municipality’s primary goal too. Municipalities with a mayor and council appear more likely to select “higher renewable energy levels” as their primary goal than municipalities whose governance structure corresponds to “open town meeting” or “representative town meeting” (Figure 8). Municipalities with a mayor and council often have larger populations and they may have more staff able to support the development of sustainable policies and programs (including broader grant-writing capacity to finance new projects).
- 68 out of 97 municipalities in our survey belong to the **Green Communities program**, a state initiative aimed at enhancing energy efficiency. A key motivation behind energy efficiency programs may be cost reduction. Indeed, 65% of these municipalities selected “reduced rates” as their most important goal. Only 19% indicated “higher renewable energy levels” and 15% indicated “price stability” (Figure 9).
- Climate goals and renewable energy goals are emerging as priorities in several MA municipalities. 16 out of 97 municipalities reported having joined **national or international municipal coalitions to support climate action**, including: the U.S. Compact of Mayors¹³, Climate Mayors, United Cities and Local

¹¹ Source: <https://www.mass.gov/lists/massachusetts-city-and-town-websites> - The following website provides a list of cities and towns of the Commonwealth of Massachusetts with the dates of when they were settled, when incorporated as a town and, if applicable, when incorporated as a city, as well as the county in which they are located. <https://www.sec.state.ma.us/cis/cisctlist/ctlistalph.htm> (accessed on January 22, 2023)

¹² The MA State Office of Rural Health defines “levels of rurality” at this website: <https://www.mass.gov/doc/rural-definition-detail-0/download> (accessed on August 15, 2022) — Rural towns are also classified into two categories of rurality. Towns classified as rural level one meet fewer rural criteria than towns considered rural at level two. Towns in level two are less densely populated and more remote and isolated from urban core areas. Towns in level one and level two are both rural. Towns not in level one or two are considered urban.

¹³ “The Compact of Mayors is an ambitious agreement by mayors and other city officials to publicly commit to deep GHG emissions reductions -- making existing mitigation and adaptation targets and plans public and report on their progress annually -- using a newly-standardized measurement system that is compatible with international practices.” The Compact of Mayors is endorsed by UN-Habitat, UN Secretary General’s Special Envoy for Cities and Climate Change, UN Secretary General’s Climate Change Support Team. “447 cities, representing 390,761,581 people worldwide and 5.39% of the total global population, have committed to the Compact of Mayors”. Source: <https://www.uclg.org/en/node/23789> (accessed on August 15, 2022)

Governments (UCLG)¹⁴, ICLEI Local Governments for Sustainability¹⁵, the Global Covenant of Mayors for Climate & Energy¹⁶, and the C40 Cities Climate Leadership Group¹⁷. Some municipalities participated as non-state actors at the Paris Agreement. (Figure 9)

- ▶ 81% of municipalities that joined **national or international municipal coalitions to support climate action** reported “higher renewable energy level” as their primary goal toward the adoption of the CCE program (Figure 9). These municipalities seem to see the CCE as an instrument to achieve their climate goals. This confirms the great potential of CCE programs to contribute to the sustainable energy transition and more broadly to global climate mitigation efforts.
- We compared primary goals between municipalities with different **political preferences** at the 2016 and at the 2020 presidential election (Figure 10 and Appendix Figure 1). Municipalities that supported the Democratic candidate in either election were more likely to embrace higher renewable energy levels as their primary goal.
 - ▶ Among municipalities where the majority of voters supported the Democratic candidate, 32% indicated “higher renewable energy levels” as their primary goal. In comparison, this goal was selected by only 6% of municipalities where the majority of voters supported the Republican candidate.
 - ▶ Among municipalities where the majority of voters supported the Democratic candidate, 50% indicated “reduced rates” as their primary goal. In comparison, this goal was selected by more than 80% of municipalities where the majority of voters supported the Republican candidate.

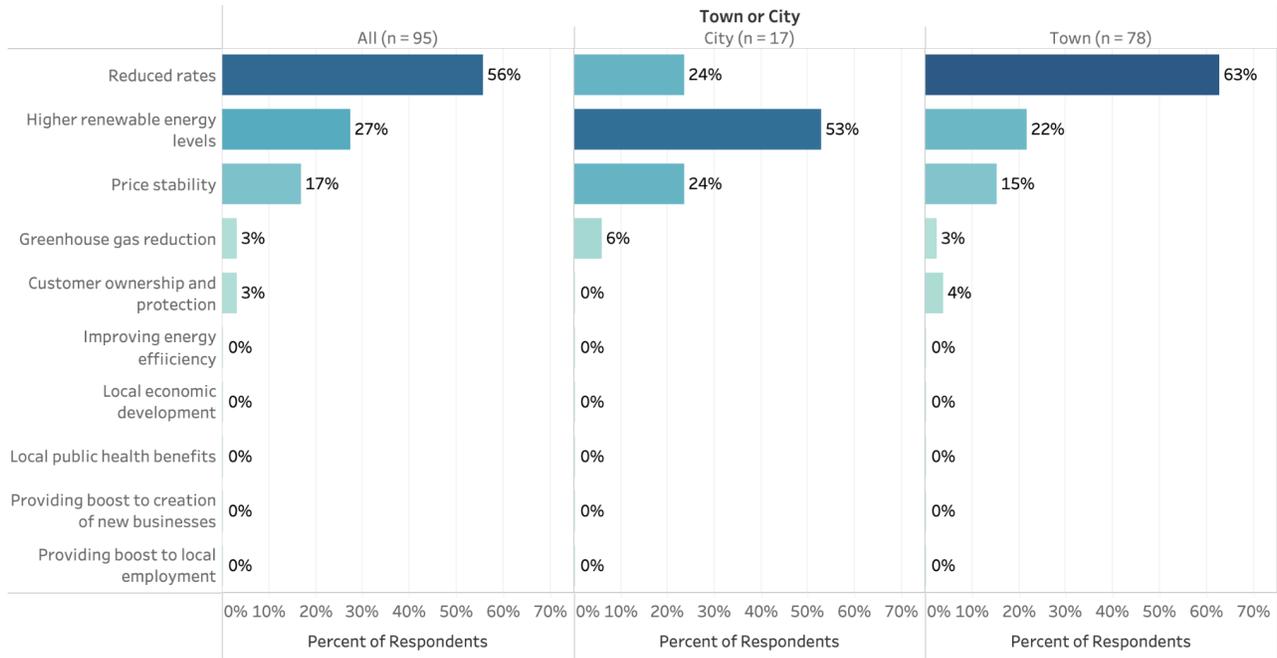
¹⁴ Based on their website: “UCLG, is the largest global network of cities and local, regional, and metropolitan governments and their associations. [...] UCLG is committed to representing, defending, and amplifying the voices of local and regional governments to leave no-one and no place behind.” Source: <https://www.uclg.org/en/organisation/about> (accessed on August 15, 2022)

¹⁵ Based on their website “ICLEI – Local Governments for Sustainability is a global network of more than 2500 local and regional governments committed to sustainable urban development. Active in 125+ countries, we influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development.” Source: https://iclei.org/our_approach/ (accessed on August 15, 2022)

¹⁶ The Global Covenant of Mayors for Climate and Energy. “GCoM is the largest global alliance for city climate leadership, built upon the commitment of over 11,500 cities and local governments. These cities hail from 6 continents and 142 countries. In total, they represent more than 1 billion people.” <https://www.globalcovenantofmayors.org> (accessed on August 15, 2022)

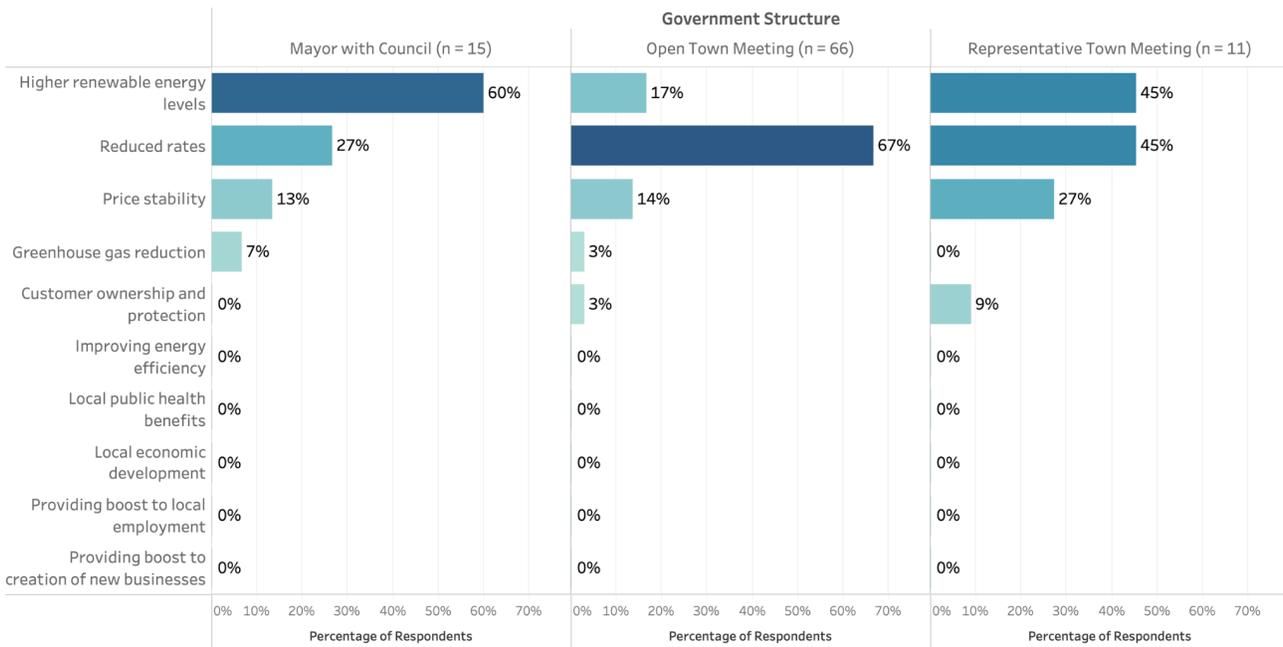
¹⁷ The C40 Cities is a global network of mayors taking urgent action to confront the climate crisis.” The organization includes “96 member cities that represent 20% of the global economy” Source: <https://www.c40.org> (accessed on August 15, 2022)

Figure 6. Massachusetts municipalities with Community Choice Electricity (CCE) programs: most important goal motivating the adoption of the program, by city/town status



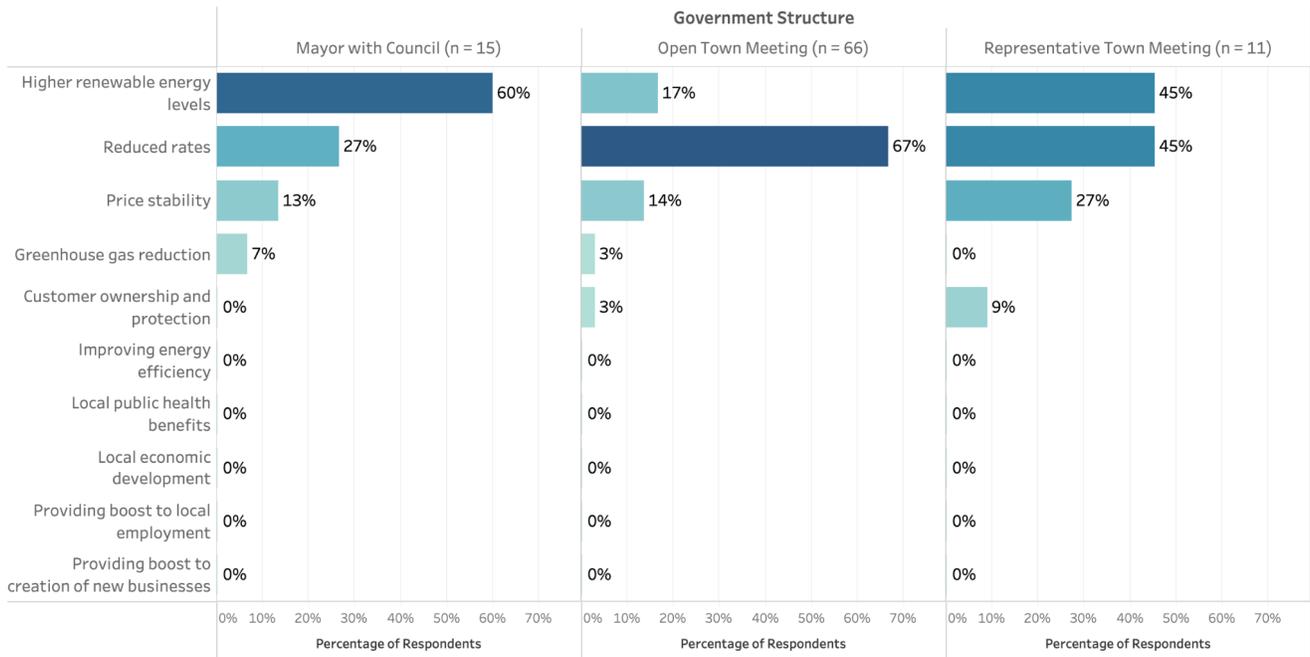
Data source: UMass School of Public Policy municipal survey (2021)
Five municipalities indicated more than one most important goal

Figure 8. Massachusetts municipalities with Community Choice Electricity (CCE) programs: most important goal motivating the adoption of the program, by government structure



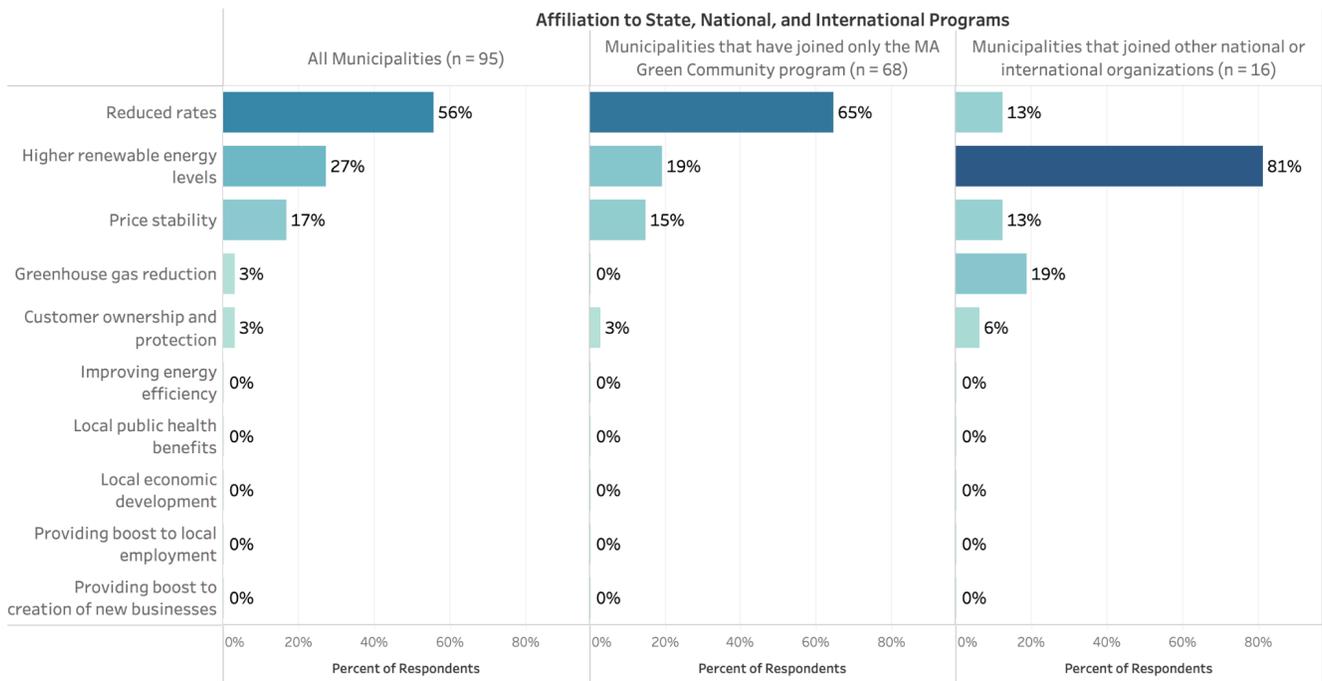
Data source: UMass School of Public Policy municipal survey (2021)
Five municipalities indicated more than one most important goal.

Figure 8. Massachusetts municipalities with Community Choice Electricity (CCE) programs: most important goal motivating the adoption of the program, by government structure



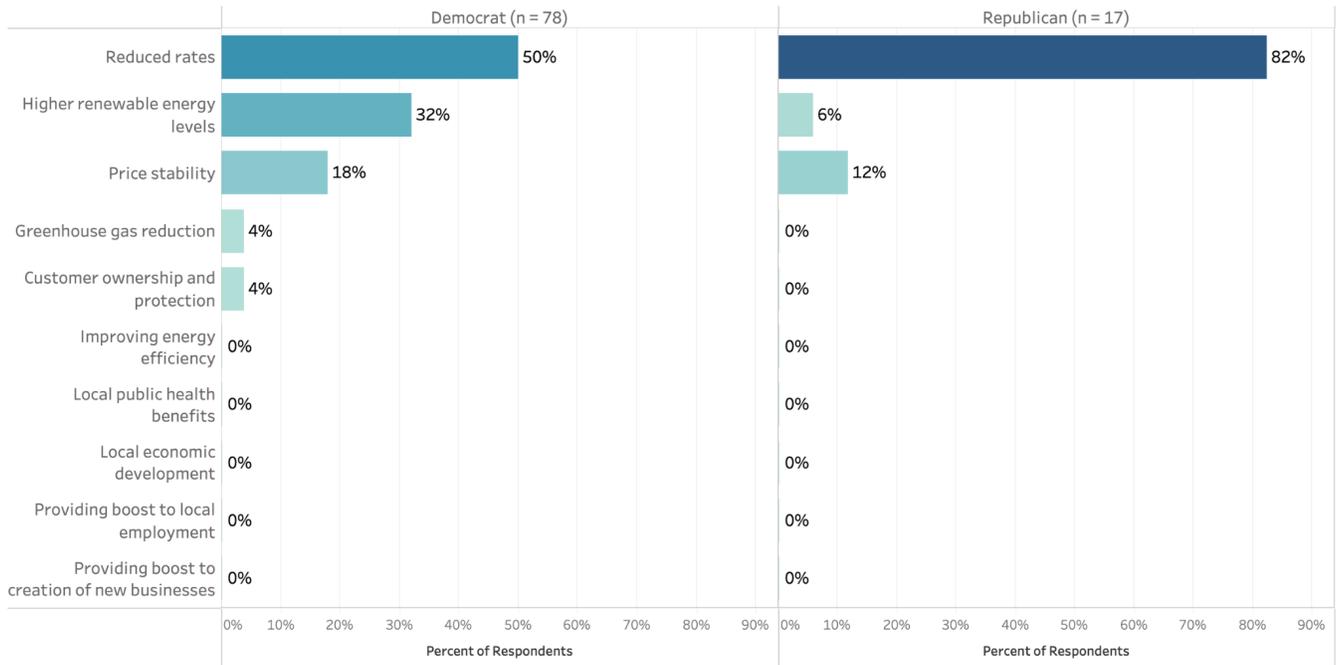
Data source: UMass School of Public Policy municipal survey (2021)
Five municipalities indicated more than one most important goal.

Figure 9. Massachusetts municipalities with Community Choice Electricity (CCE) programs: most important goal motivating the adoption of the program, by affiliation to other programs and organizations



Data source: UMass School of Public Policy municipal survey (2021)
Five municipalities indicated more than one most important goal.

Figure 10. Massachusetts municipalities with Community Choice Electricity (CCE) programs: most important goal motivating the adoption of the program, by political preferences at the 2016 presidential election



Data source: UMass School of Public Policy municipal survey (2021)
 Five municipalities indicated more than one most important goal.

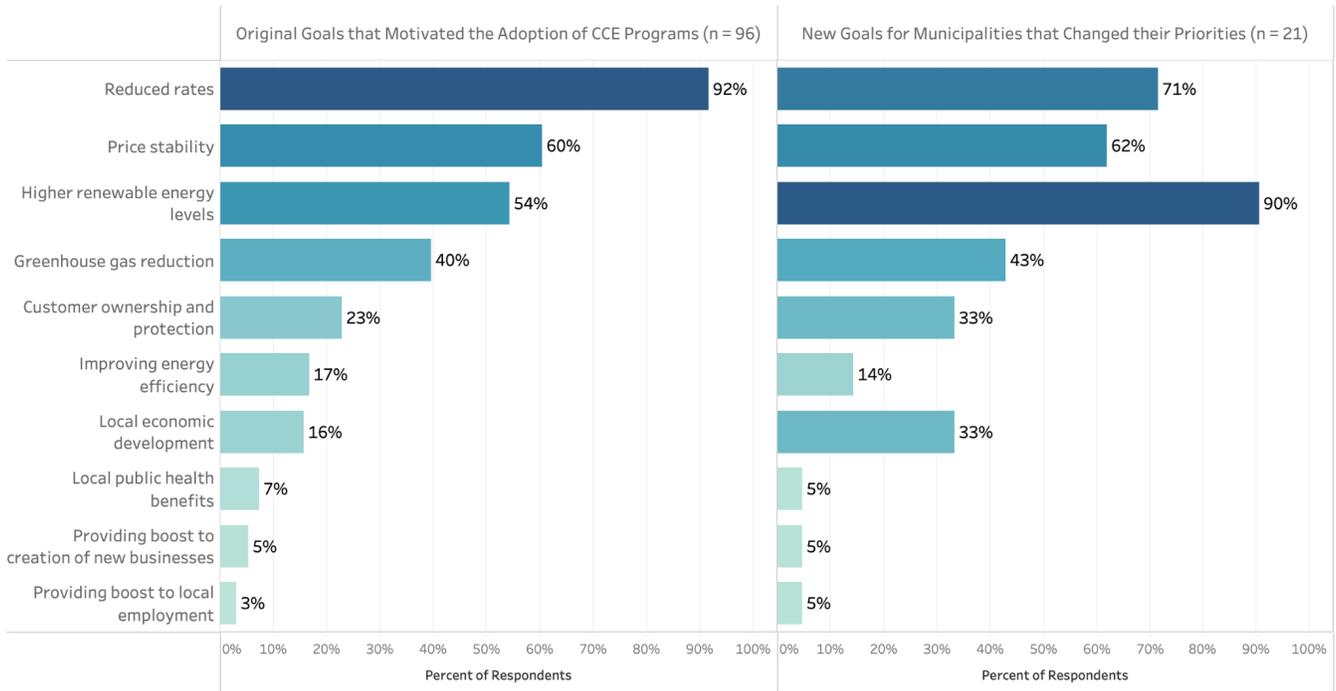
Evolution of municipal goals since the beginning of CCE programs

We asked municipal officials if their goals had evolved over time. Our results suggest a growing interest toward investments in renewable energy.

Figure 11 shows that “higher renewable energy levels” has emerged as a priority in 90% of the 21 municipalities that reported having new goals. Of these municipalities, 7 originally indicated that “higher renewable energy levels” was their most important goal motivating the adoption of the CCE; however, in subsequent CCE contracts they decided to increase renewable energy levels even more. The remaining 12 municipalities originally indicated “reduced rates” as their most important goal; however, in subsequent CCE contracts they decided to prioritize “higher renewable energy levels” instead of “reduced rates” (Appendix Figure 2).

Other respondents indicated growing interest in renewable energy among their residents, but expressed concern that energy contracts might become too expensive with higher renewable energy levels. We examine the relationship between renewable energy levels and savings in [Section 5](#).

Figure 11. Evolution of municipal goals for Community Choice Electricity (CCE) programs



Data source: UMass School of Public Policy municipal survey (2021)
 Since the beginning of the MA CCE program, 20 municipalities have changed their priorities in relation to the goals to be achieved by their CCE program.

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“The request for more renewables comes from the public.” — Municipal Official

“Our municipality wants to improve CCA with more renewables but we are not sure this is within price range of the town.” — Member of Select Board

“We now seek to provide the lowest carbon footprint for our electricity supply while maintaining prices no higher than we could get through Eversource Basic Service.” — Municipal Energy Task Force

“We have always offered 100% green electricity, and in the recent few years we are striving to add as much Class I REC's while being mindful of costs. We have also had a 100% Class I option for those interested for the past 3 years.” — Municipal Official

“Our residents want more renewables. We want (to) offer different products within our CCA. Everyone now who is enrolled has 45% voluntary REC. We would like people to have the option to opt-up to 100% renewable with Class I REC and also to have a downgraded option.” — Chair of Municipal Energy Commission

3.2 CHALLENGES EXPERIENCED BY MUNICIPALITIES

Based on our online survey results, the most frequently reported implementation challenge is “delays associated with approval from the Department of Public Utilities” (26%) (Figure 12) . Several municipalities reported a waiting time longer than one year and up to two years. These delays are in part associated with the COVID-19 pandemic.

Additional frequently reported implementation challenges are related to communication with residents and background research efforts to get the project started (Figure 12). They include:

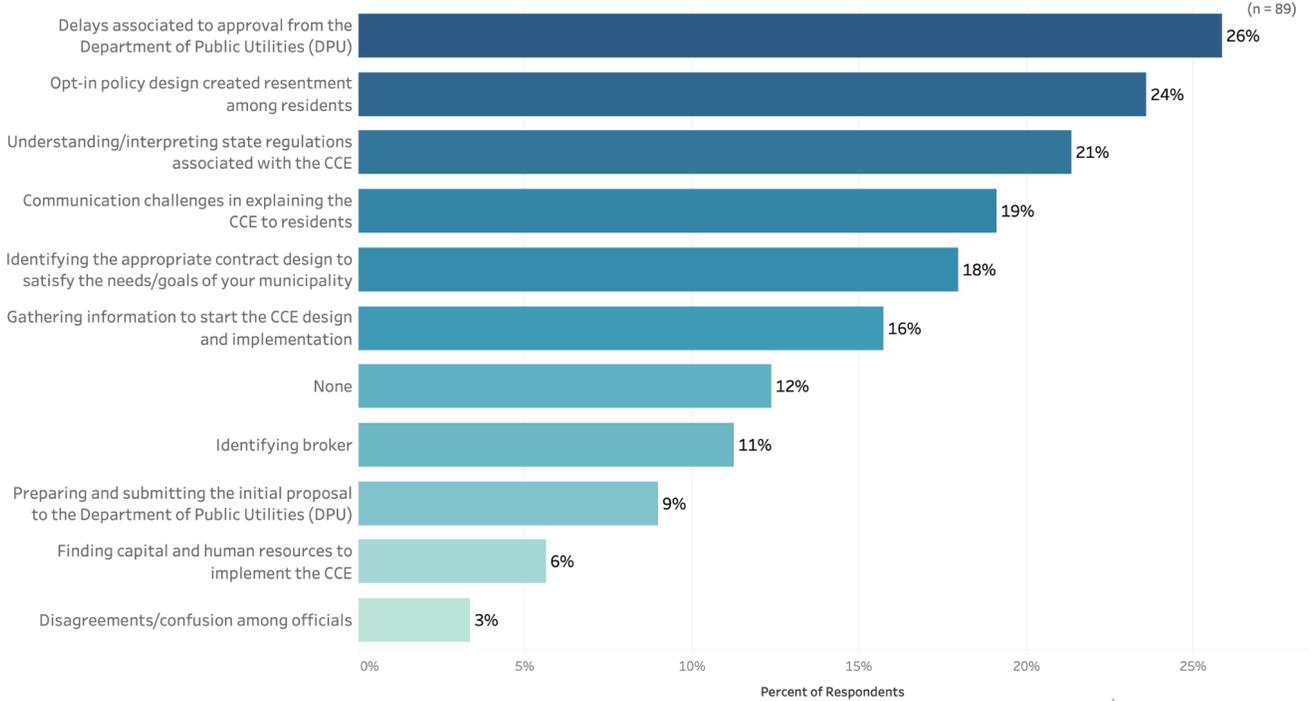
- The default “opt-in policy design of CCE program created resentment among residents” (24%)
- “Understanding/interpreting state regulations associated with CCE” (21%), which is related to “gathering information to start CCE design and implementation” (16%)

Administrative costs (after the creation of the CCE) and staffing capacity do not seem to be a constraint for municipalities. In fact, during interviews and focus groups, municipalities stated not having experienced any implementation obstacle related to administrative costs and staffing capacity.

We compared challenges experienced between cities and towns, between rural and urban municipalities, and across municipalities with different government structures (Figures 13, 14 and 15).

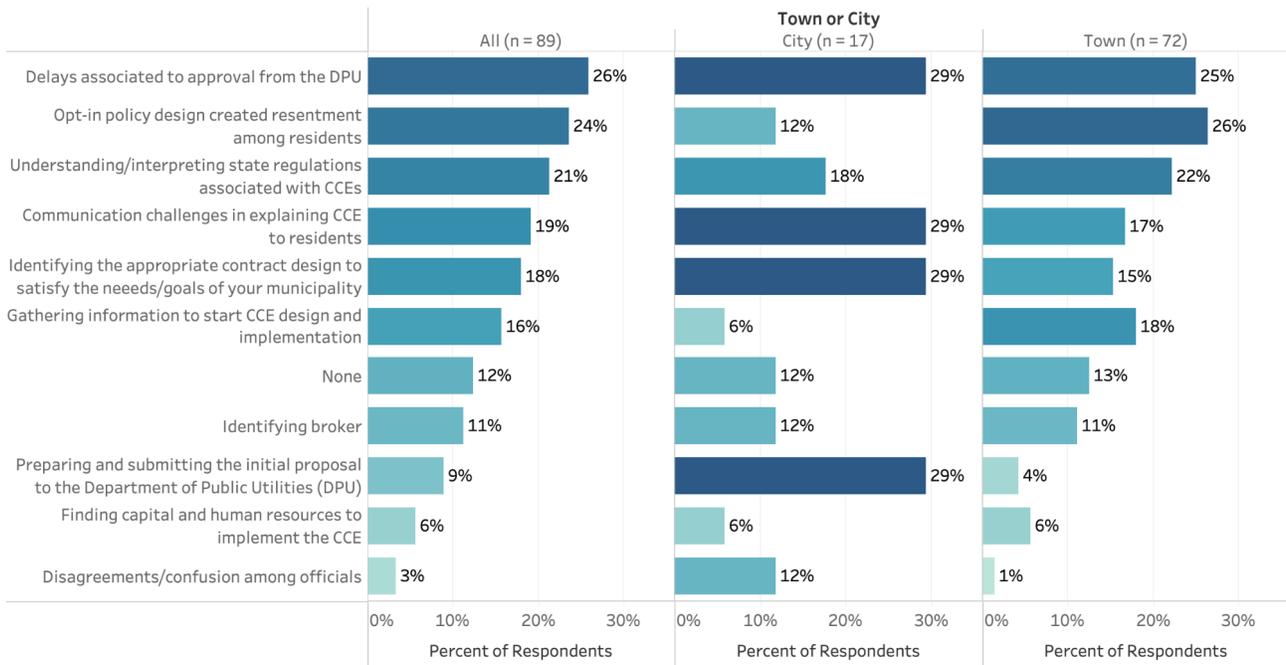
- Results suggest that smaller municipalities, particularly in rural areas, are more likely to have experienced difficulties associated with information acquisition toward the creation of CCE programs. Research and knowledge acquisition can be more challenging in small municipalities with limited staffing capacity.
 - ▶ 18% of towns (vs. 6% of cities) reported facing challenges in gathering information to start the CCE design and implementation (Figure 13).
 - ▶ 43% of “rural level 2” municipalities indicated experiencing difficulties interpreting State regulations associated with CCE programs, compared to 16% of municipalities in urban settings (Figure 14).
- Cities and urban municipalities seem more likely to have experienced challenges in communicating the CCE program to residents (29% and 25%, respectively) compared to towns (17%) and rural municipalities (7% for rural level 2 municipalities). In tight-knit communities communications with residents may be more effective.
- The default opt-in policy design of the CCE program was more likely to generate resentment among residents of towns (26%) compared to cities (12%). The negative response is tangible in rural areas (36%).

Figure 12: Most challenging aspects of Community Choice Electricity (CCE) program implementation reported by municipalities (n = 89)



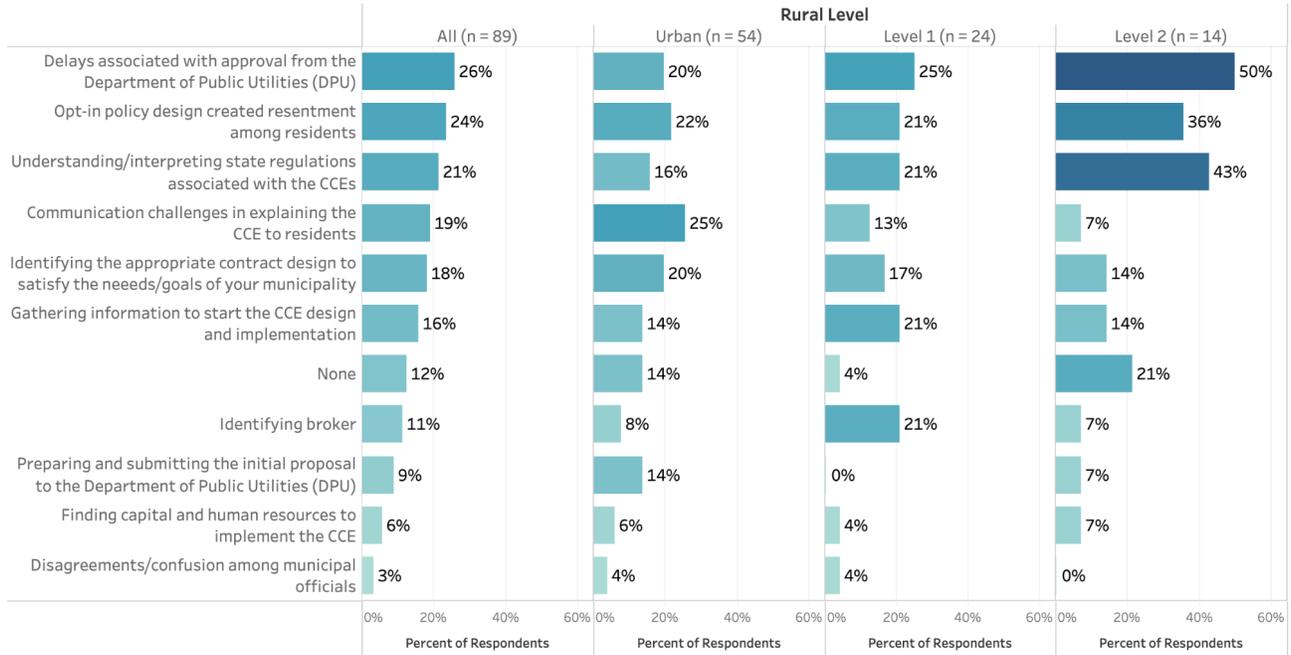
Data source: UMass School of Public Policy municipal survey (2021)

Figure 13. Most challenging aspects of Community Choice Electricity (CCE) program implementation reported by municipalities, by town/city status



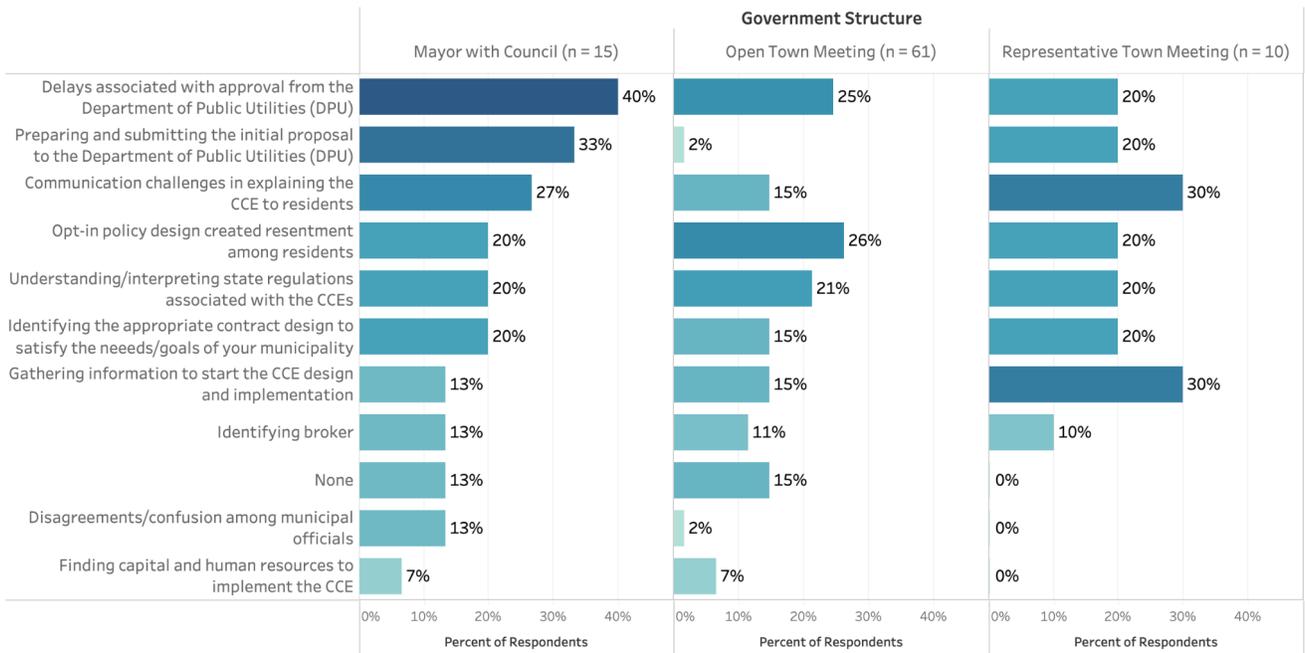
Data source: UMass School of Public Policy municipal survey (2021)

Figure 14. Most challenging aspects of Community Choice Electricity (CCE) program implementation reported by municipalities, by level of rurality



Data source: UMass School of Public Policy municipal survey (2021)

Figure 15. Most challenging aspects of Community Choice Electricity (CCE) program implementation reported by municipalities, by government structure



Data source: UMass School of Public Policy municipal survey (2021)

“We did not experience any challenges associated with the implementation of the CCE. The only minor obstacle were door-to-door sales that tried to boycott or create public opinion distrust for the CCE.” — Town Manager

“Challenges included public outreach and getting City Council to understand benefits of CCE.” — Energy and Environment Commission

“The biggest obstacle were the misunderstandings among community members about the program.” — Municipal Official

“Communicating intent of program to customers was challenging: lots of conversations/confusion/clarifying necessary.” — Municipal Official

“Communicating the challenges and benefits of CCA programs to residents (was the biggest challenge).” — Energy Officer

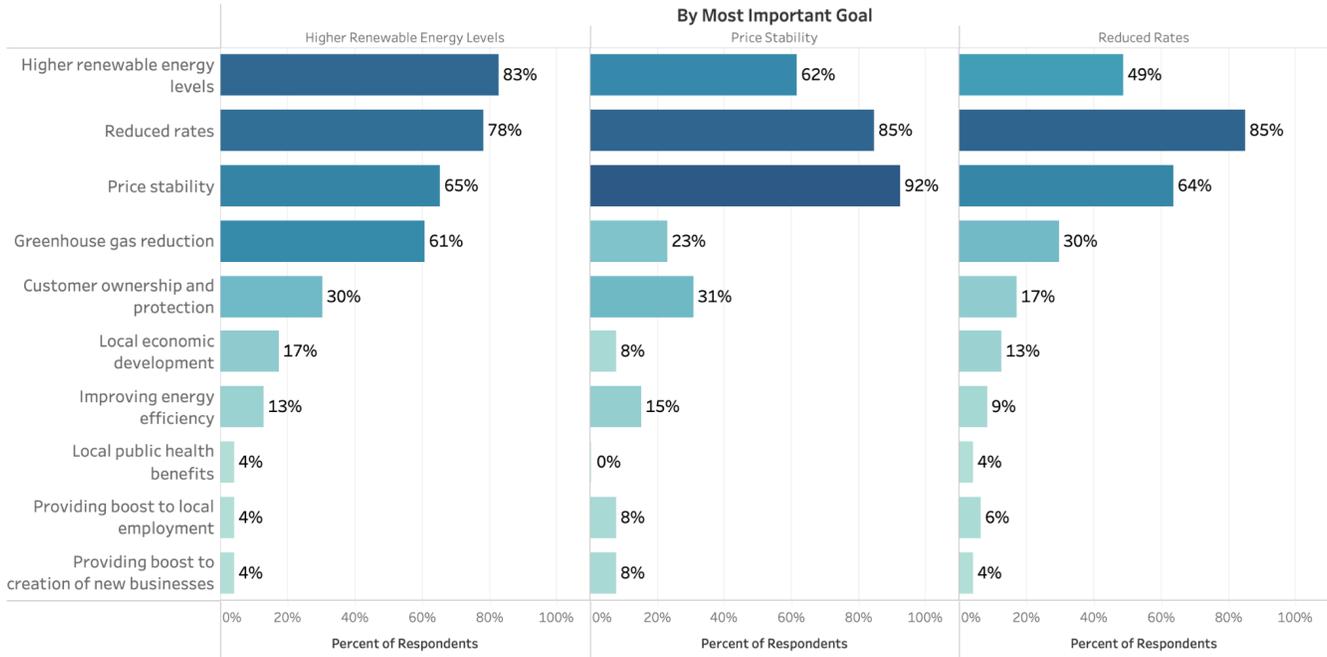
3.3 BENEFITS REPORTED BY MUNICIPALITIES, OVERVIEW

Survey results indicate that about 80% of Massachusetts municipalities in our sample achieved savings by developing a CCE program. Moreover, municipalities systematically reported obtaining additional benefits beyond their primary goal.

Figure 16 presents the benefits generated by the CCE program (as reported by municipalities) by comparing municipalities that had three different primary goals in developing their CCE programs, namely: higher renewable energy levels, price stability, and reduced rates.

- Among municipalities with “higher renewable energy levels” as their primary goal, the top three benefits reported include: “higher renewable energy levels” (83%), “reduced rates” (78%) and “price stability” (65%). It is a promising outcome that even when the primary goal is “higher renewable energy levels” almost 80% of municipalities were able to achieve savings (i.e., reduced rates).
- Among municipalities with “price stability” as their primary goal, 92% reported achieving this goal. Moreover, 85% reported achieving reduced rates and 62% reported benefitting from higher renewable energy levels too.
- Among municipalities with “reduced rates” as their primary goal, 85% reported obtaining reduced rates, hence savings. Additional benefits for them included price stability (64%) and higher renewable energy levels (49%).

Figure 16. Benefits achieved with Community Choice Electricity (CCE) programs as reported by municipalities, by most important goal motivating the adoption of the CCE



Data source: UMass School of Public Policy municipal survey (2021)

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We investigated the possible reasons/mechanisms behind the successful outcomes of their CCE program (Figure 17 and 18).

- Among municipalities with “higher renewable energy levels” as their primary goal, the most frequently reported reason for success is “leadership in the municipality” (42%), followed by “attitude of residents toward sustainability” (23%) (Figure 17).
- Among municipalities with “reduced rates” as their primary goal, the most frequently reported reason for success is “choice of energy consultant” (31%), followed by “leadership in the municipality” (25%) and competence of municipal staff and volunteers” (17%) (Figure 17).

Governance structure seems to be related to different CCE goals and different reasons for success:

- Leadership with an electoral mandate appear more likely to support “higher renewable energy levels” as their primary goal. Municipalities with a mayor and council appear more likely to select “higher renewable energy levels” as their primary goal (See [Section 3.1 Goals motivating the creation of the CCE programs](#)). In these municipalities, the most frequently reported driving force behind the success of CCE programs is “leadership in the municipality” (36%) and “competence of municipal staff and volunteers” (29%) (Figure 18).

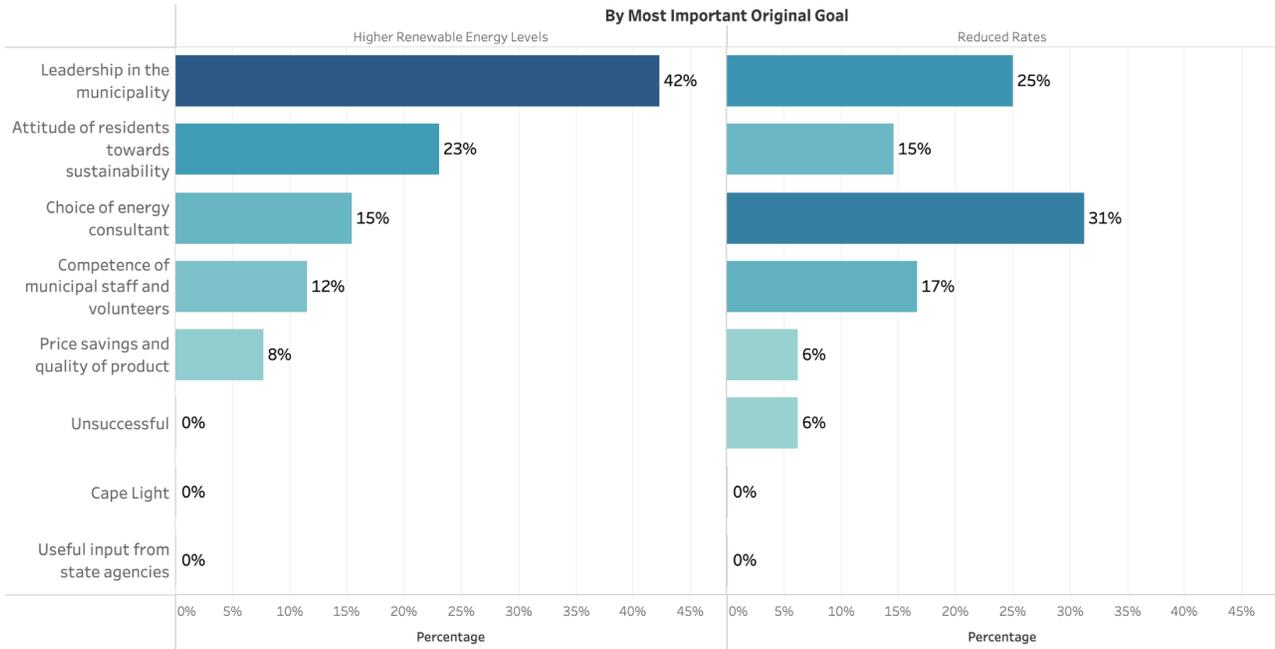
- In comparison, in municipalities with a different governance structure, the most frequently reported reason for success is “choice of energy consultant” (29%) followed by “leadership in the municipality” (26%) (Figure 18).

“The CCE has been very helpful in helping people save money. Our CCE has also helped prevent the residents from seeing any fluctuations in the market. It has been very good in terms of educating the public and providing different types of renewable energy.” — Municipal Energy Commission

“Commercial and industrial entities have joined CCE (even if it does not seem economically interesting compared to utilities) because they trust the management and they are ready to pay [a] small premium for price stability and transparency. They know the person they need to call if there is a problem is right in town hall. [...] Town manager reached out to a few large Commercial and industrial consumers explaining that maybe the prices were not advantageous for them. But they replied that they were happy to stay in the CCE. These customers are buying more than energy, they are buying insurance. They are aware that the contract is transparent and that it is easily managed by interacting with City Hall.” — Town Manager

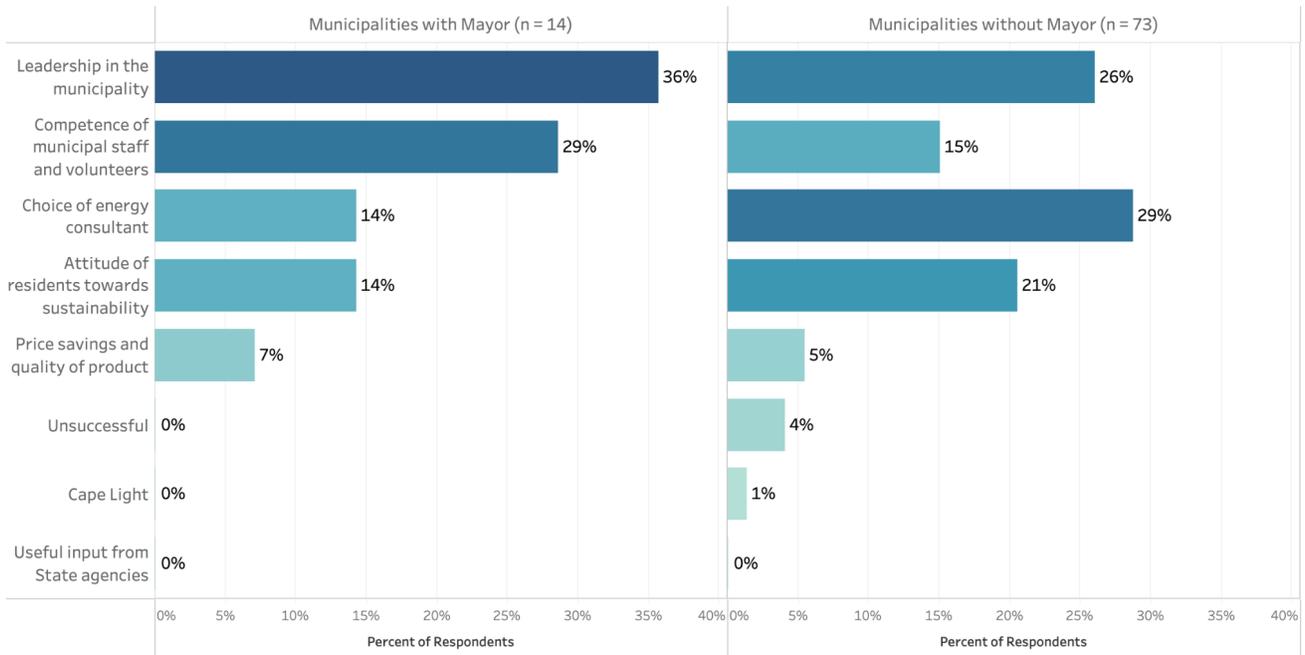
“We were able to boost residential solar through (CCE) adder funds. This source of financing is also supporting our Energy staff.” — Energy Coordinator

Figure 17. Most important reasons for success of Community Choice Electricity (CCE) programs as reported by municipalities, by most important goal motivating adoption of the CCE



Data source: UMass School of Public Policy municipal survey (2021)

Figure 18. Most important reasons for success of Community Choice Electricity (CCE) programs as reported by municipalities, by government structure



Data source: UMass School of Public Policy municipal survey (2021)

4. CONTRACT CHARACTERISTICS AND RENEWABLE ENERGY LEVELS

This section presents the results obtained analyzing publicly available data from all CCE contracts active in November 2021. We have collected and aggregated this data from the Massachusetts government website, municipal websites, and websites of energy consulting companies. First, we summarize the different types of CCE contracts and packages available to residents, then we examine the amount of renewable energy purchased. In the next section we will analyze the relationship between the amount of renewable energy purchased and the savings obtained.

This section refers to Massachusetts Renewable Portfolio Standards (RPS) (e.g., Class I and Class II) and Massachusetts Requirement, which are described in [Section 1 Introduction](#).

4.1 PACKAGES AVAILABLE TO RESIDENTS

Municipalities with CCE programs may offer a variety of packages to their residents:

Standard package (also referred to as basic package or default package) - Usually cheaper than the cost of energy supplied by utility companies, the standard package contains at least the amount of renewable energy required by the State of Massachusetts. In 2021 the Massachusetts Requirement corresponded to 49.1% (which includes Class I, Class II, and Clean Existing Generation (CES-E), with 18% RPS Class I). Residents are automatically enrolled in this package when their Municipality implements the CCE.

Opt-down package - In an effort to promote higher renewable energy usage, several municipalities adopt standard packages with an amount of renewable higher than the state requirement. Some of these municipalities, besides the standard package, offer a cheaper package containing the minimum amount of renewable energy required by the State of Massachusetts. Residents interested in minimizing costs are able to “opt-down” and select this package. Of the 157 municipalities in our database 21% have an opt-down package.

Opt-up packages(s) - Besides the standard package, some municipalities offer one or more additional packages with an amount of renewable energy that is higher than the state requirements. These packages are generally more expensive than the utility price. Residents have the choice to select these packages when they join the CCE. If they do not “opt-up” and select these packages, they are automatically enrolled in the standard package. Of the 157 municipalities in our database 73% offer at least an opt-up package. 48% of the municipalities offer at least 2 opt-up packages, and the second opt-up package almost always includes 100% RPS Class I.

4.2 RENEWABLE ENERGY LEVELS

There are different ways to exceed the MA renewable energy requirements in CCE packages. Some municipalities buy national Renewable Energy Certificates (RECs), while others buy additional RPS Class I¹⁸.

- **RPS Class I certificates** are associated with New England renewable energy facilities established after 1997. Choosing to buy additional RPS Class I certificates ensures that more renewable energy is produced in New England above and beyond what the MA RPS requires, thus contributing to the creation of new renewable energy facilities.
- **National Renewable Energy Certificates (RECs)** are associated with facilities all over the U.S. (i.e., not necessarily in New England), independently from the year in which the facilities were established.

Choosing to buy RPS Class I certificates contributes to accelerating the energy transition toward renewable energy, enhancing the local economic development of the green energy market, and fulfilling state and federal climate goals.

Indeed, based on our interviews and survey results, municipalities that indicated as a goal of their CCE program “boosting local economic development” always offer standard CCE packages with additional Class I certificates, beyond the MA requirement.

Standard packages in our 2021 database have the following renewable energy content (Table 2 and Figure 16):

- 48% of standard CCE packages in MA offer RPS Class I content that exceeds the MA requirement (i.e., 18% in 2021).
- No standard CCE package offers 100% RPS Class 1.
- 60% of standard CCE packages are “green”, that is they have a percentage of renewable energy certificates higher than the MA requirement. These additional certificates can be either RPS Class 1 or National RECs or both.
- 30% of standard CCE packages not only exceed the MA requirement but they contain 100% of renewable energy certificates. These certificates can be either RPS Class 1 or National RECs or both.

When we consider opt-up packages, besides the standard package, the amount of renewable energy offered is even larger.

- 92% CCE programs have at least one package (i.e., standard package or opt-up packages) that exceeds MA requirements.

¹⁸ Massachusetts Renewable Portfolio Standards (RPS) (e.g., Class I and Class II) and Massachusetts Requirement are described in the Introduction.

- 80% of CCE programs have at least one package (i.e., standard package or opt-up packages) that offers 100% renewable energy (as national RECs, or RPS Class 1, or a combination of the two types of certificates).
- Overall 61% of CCE programs offer at least one package with 100% RPS Class 1.

Table 2. Renewable energy levels in MA CCE standard packages (as of November 2021)				
	Municipalities	% of Total	Municipalities that achieved savings	%
Municipalities with CCE Program	157	-	122	79%
Standard contract characteristics				
Offers percentage of RPS Class 1 higher than MA requirement (18%)	74	48% (*)	64	86%
Offers National RECs (besides satisfying MA requirement)	47	30%	46	98%
Standard contract is “green” (**)	94	60%	84	89%
Standard contract contains 100% renewable energy (***)	47	30%	46	98%
Standard contract contains 100% Class 1 RPS	0		-	

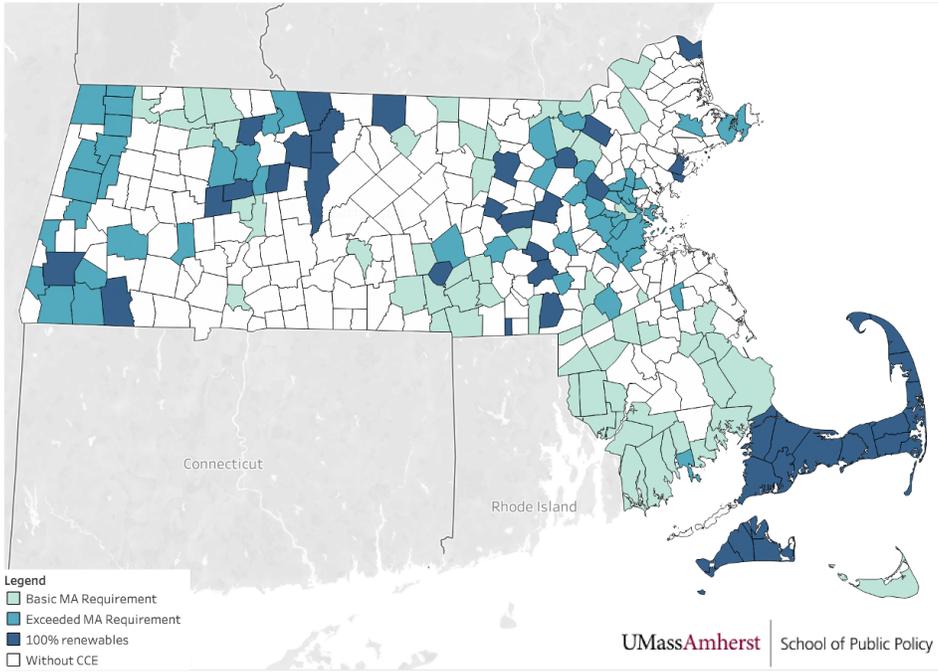
Note: Standard contracts are also referred to as “default package” or “basic package”.

(*) In this column, percentages are calculated in relation to the total number of municipalities (157) for which we have complete data.

(**) We define “green” standard contracts those contracts that have a percentage of renewable energy certificates higher than the MA requirement. These certificates can be either RPS Class 1 or National RECs or both.

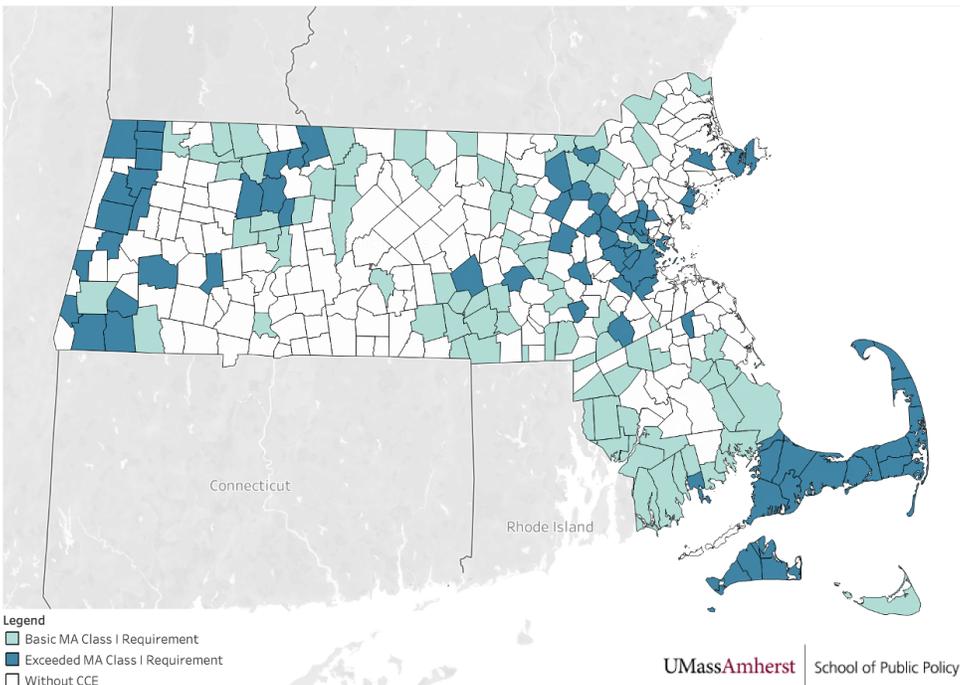
(***) The contracts contain 100% of renewable energy certificates. These certificates can be either RPS Class 1 or National RECs or both.

Figure 16. Massachusetts municipalities with Community Choice Electricity (CCE): renewable energy content in CCE default package (n=157)



Data source: Massachusetts government website and websites of Massachusetts municipalities (as of Nov 19, 2021)

Figure 17. Massachusetts municipalities with Community Choice Electricity (CCE): MA Class I renewable energy content in CCE default package (n=157)



Data source: Massachusetts government website and websites of Massachusetts municipalities (as of Nov 19, 2021)

Figure 18. Maximum amount of renewable energy content offered by municipal CCE programs (in the default package or in the opt-up packages) (n=157)

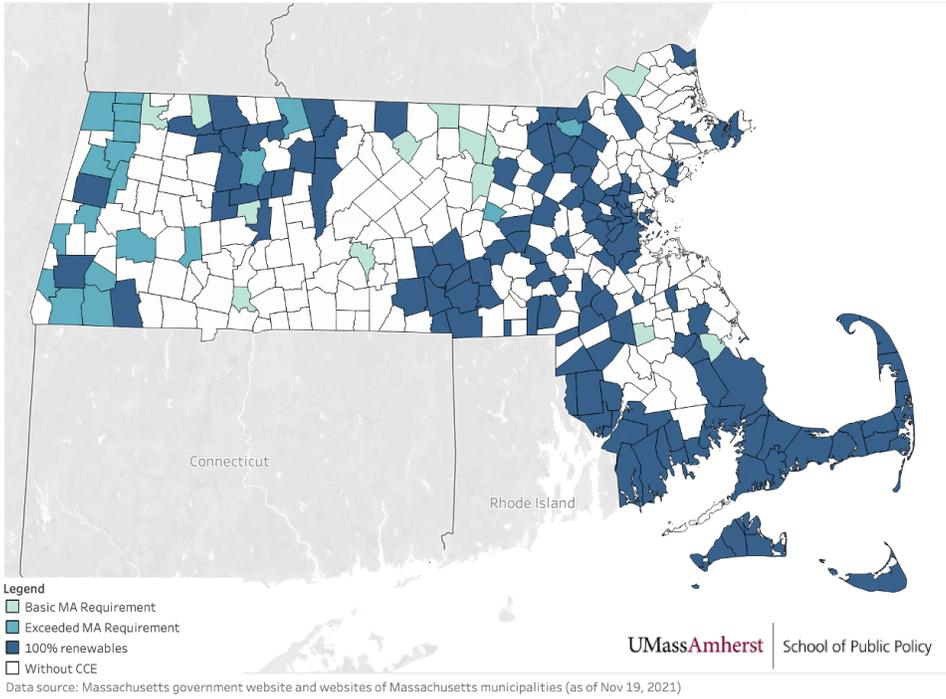
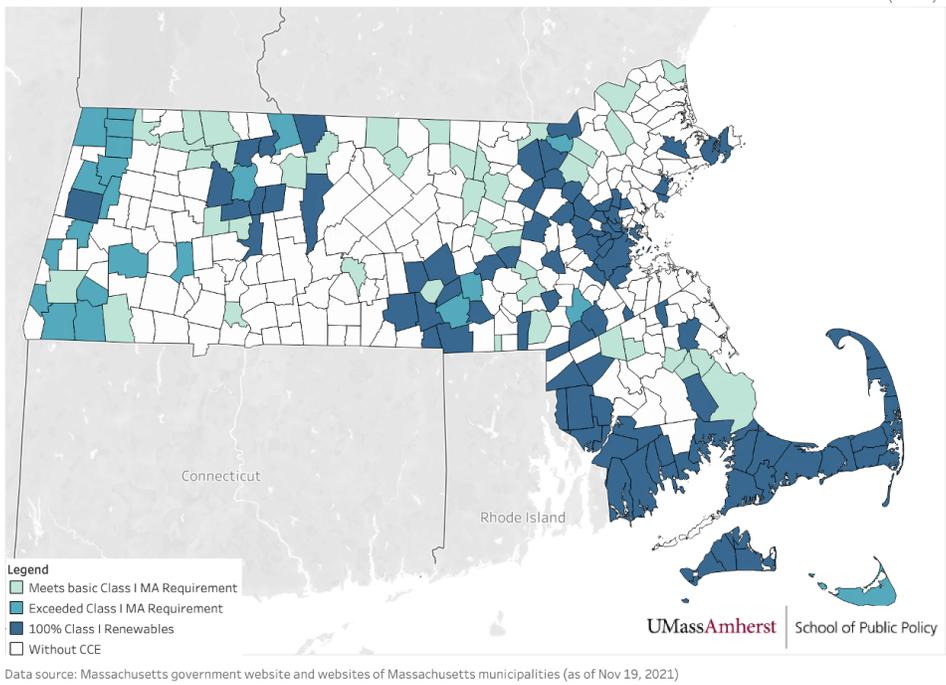


Figure 19. Maximum amount of Class I renewable energy content offered by municipal CCE programs (in the default package or in the opt-up packages) (n=157)



5. SAVINGS

We compared CCE standard package prices (i.e., default or basic package prices) with *monthly residential utility basic service rates*¹⁹ for all municipalities with a CCE program in November 2021²⁰. Prices were compared from the beginning of the most recent CCE contract until October 2021.

Our analysis indicates that **79% of municipalities achieved savings compared to utility's monthly basic service rates** (Table 3), with an **average amount of savings** corresponding to 0.88 cents per kWh (about 93 USD per household, per year²¹). The savings for these municipalities amount to about **70,000,000 USD per year in total**.

- The corresponding amount of savings in a municipality with about 20,000 residents²² is 601,836 USD/year.
- 35% of municipalities achieved savings above 1 cents per kWh (about 106 USD per household, per year)
- the maximum amount of savings corresponded to 2.55 cents per kWh (about 271 USD per household, per year).

The majority of municipalities with contracts exceeding MA renewable energy level requirements achieved savings (Tables 2, and 4).

- 89% of municipalities with a “green” standard CCE package (i.e., with a percentage of renewable energy certificates higher than the MA requirement)²³ achieved an average amount of savings corresponding to 0.84 cents per kWh. The savings for these municipalities amount to about 33,580,000 USD per year in total.
- 86% of municipalities with standard CCE packages offering RPS Class I content that exceeds the MA requirement (i.e., 18% in 2021) achieved an average amount of savings corresponding to 0.77 cents per kWh. The savings for these municipalities amount to about 25,112,000 USD per year in total (Table 4).

¹⁹ From the Massachusetts Government website (accessed on May 23, 2021): <https://www.mass.gov/info-details/basic-service-information-and-rates#basic-service-pricing->

²⁰ Of the original 182 municipalities in our dataset, we did not include 20 municipalities for which data was not publicly available (contracts not active yet). Because of partially missing data we were able to perform savings calculations only for 157 municipalities.

²¹ The average electricity consumption per household in the U.S. is 10,632 kilowatthours. Source: <https://www.eia.gov/tools/faqs/faq.php?id=97&t=3>

²² The average population size in Massachusetts municipalities is about 19,637 (with average household size equal to 3.1), which corresponds to about 6,335 households. (U.S. Census 2019).

²³ These additional certificates can be either RPS Class 1 or National RECs or both.

- 98% of municipalities with standard CCE packages that not only exceed the MA requirement, but also that contain 100% of renewable energy certificates²⁴ achieved an average amount of savings corresponding to 0.91 cents per kWh. The savings for these municipalities amount to about 17,584,000 USD per year in total (Table 5).

Figures 20 and 21 show, for each municipality, the relationship between savings achieved with the CCE program and corresponding level of renewable energy (in their standard package).

Table 3. Key Outcomes of Savings Analysis (as of November 2021)		
	Value	Units
Percentage of municipalities that achieved savings thanks to the CCE program compared to utility's monthly basic service rates	79%	
Average savings per kilowatthour	0.0088	USD/kWh
Total Population in municipalities that achieved savings	2,358,647	people
Estimated total number of households in municipalities that achieved savings	760,853.87	households
Estimated average yearly savings per household	93.48	USD/year
Total estimated yearly savings	71,123,904.93	USD/year

²⁴ These certificates can be either RPS Class 1 or National RECs or both.

Table 4. MA municipalities with a CCE standard package offering RPS Class 1 renewable energy levels above MA requirement - Key Outcomes of Savings Analysis (as of November 2021)			
		Value	Units
A	Total number of municipalities	157	
B	Municipalities that offer RPS Class 1 renewable energy levels above MA requirement	48%	
C	Percentage of B that achieved savings thanks to the CCE program, compared to utility's monthly basic service rates (*)	86%	
D	Average savings per kilowatthour	0.0077	USD/kWh
E	Total Population in municipalities that achieved savings	948,079.00	people
F	Estimated total number of households in municipalities that achieved savings (**)	305,831.94	households
G	Estimated average yearly savings per household (***)	82.11	USD/year
H	Total estimated yearly savings (for municipalities in group C)	25,111,754.41	USD/year

(*) This corresponds to 41% of total municipalities (157)

(**) Massachusetts average household size is 3.1

(***) The average electricity consumption per household in the U.S. is 10,632 kilowatthours. Source: <https://www.eia.gov/tools/faqs/faq.php?id=97&t=3>

(****) For all households in municipalities in group C, which have RPS Class 1 renewable energy levels above MA requirement and achieved savings.

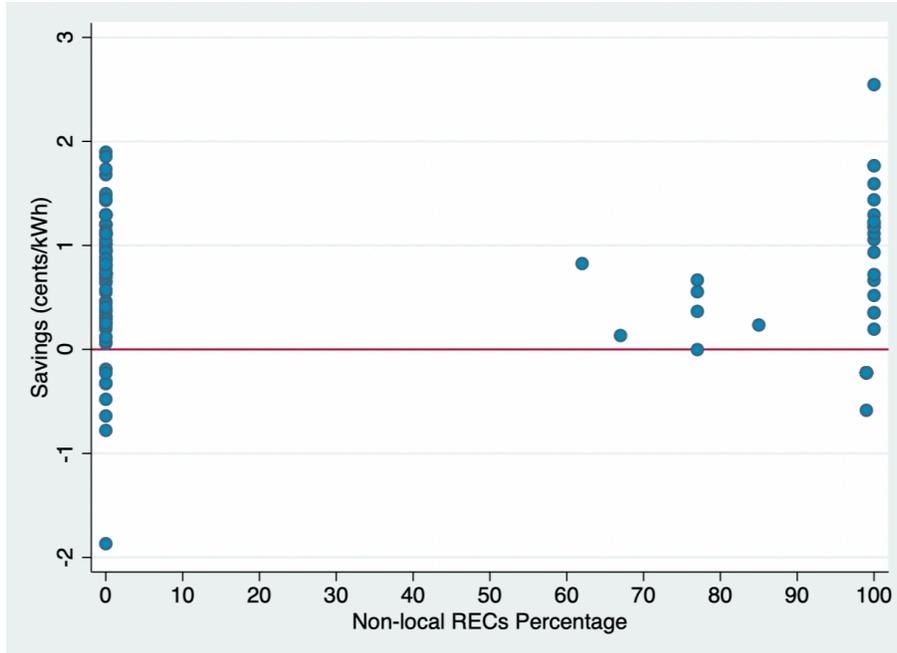


Fig 20. Scatterplot showing, for each municipality, the relationship between savings achieved with the CCE program and corresponding level of renewable energy from National RECs (standard CCE package).

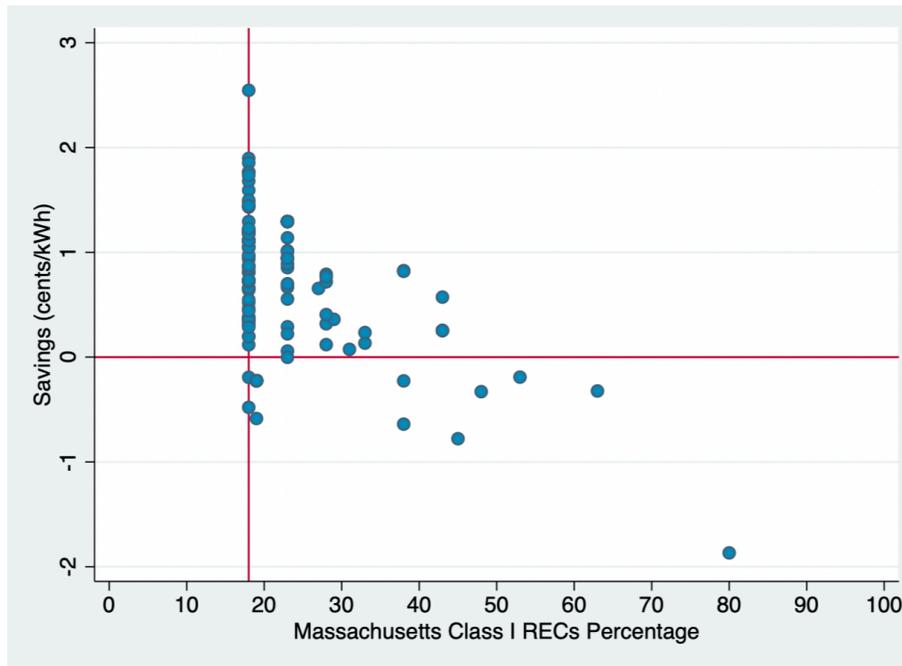


Fig 21. Scatterplot showing, for each municipality, the relationship between savings achieved with the CCE program and corresponding level of renewable energy from Massachusetts RPS Class I (standard CCE package).

6. CONCLUSION

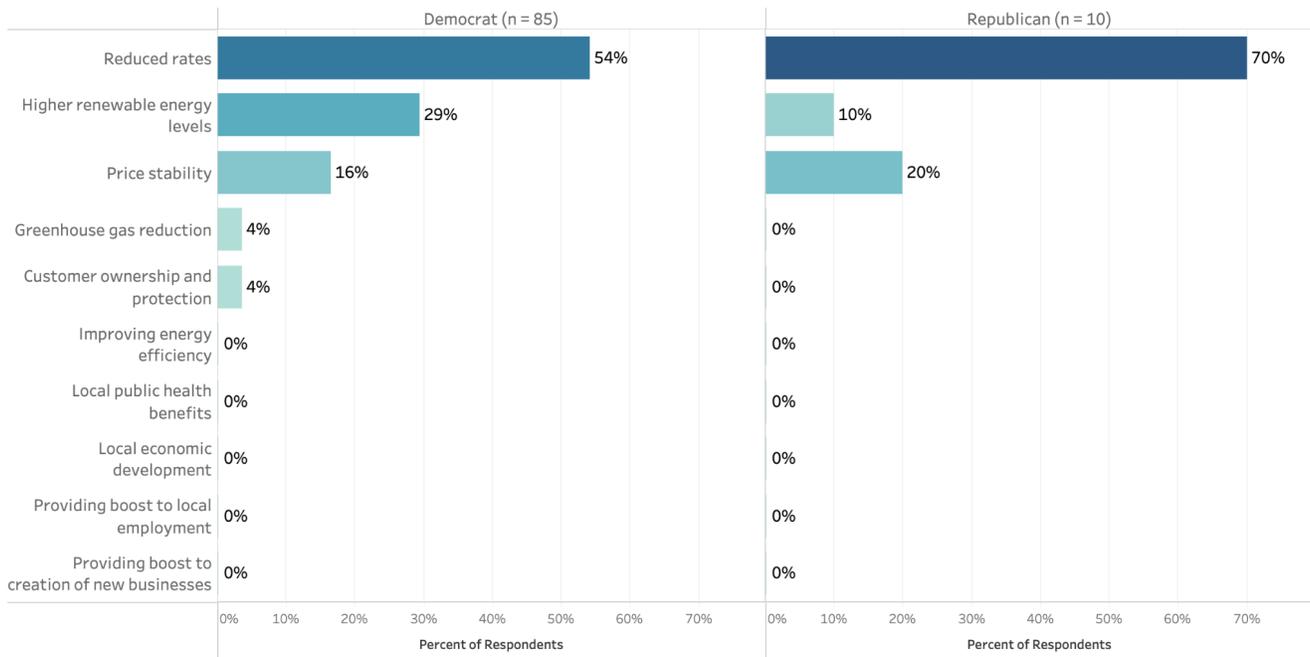
These results suggest that CCE programs contribute to both sustainability (by allowing higher renewable energy levels) and equity (by reducing costs). Our findings show that a fair and equitable access to energy is not compromised by the transition to sustainable/renewable energy, which is urgently needed to mitigate climate change

With solar and wind energy prices declining rapidly, and fossil fuel prices becoming more and more volatile (with exceptionally high prices during winter 2022-23), CCE programs are emerging as promising cost effective instruments to support the transition to sustainable energy and climate mitigation efforts.

Last but not least, CCE programs contribute to the expansion of local renewable energy markets and local economic development.

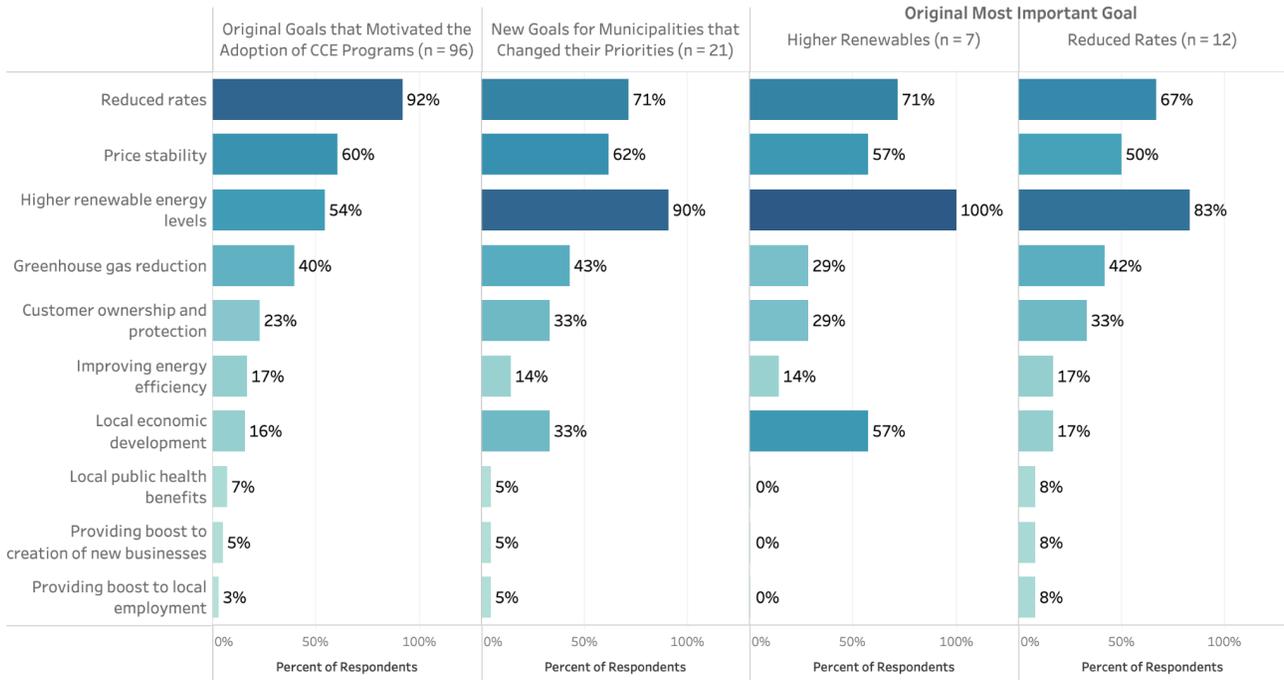
APPENDIX

Appendix Figure 1. Massachusetts municipalities with Community Choice Electricity (CCE) programs: most important goal motivating the adoption of the program, by political preferences at the 2020 presidential election



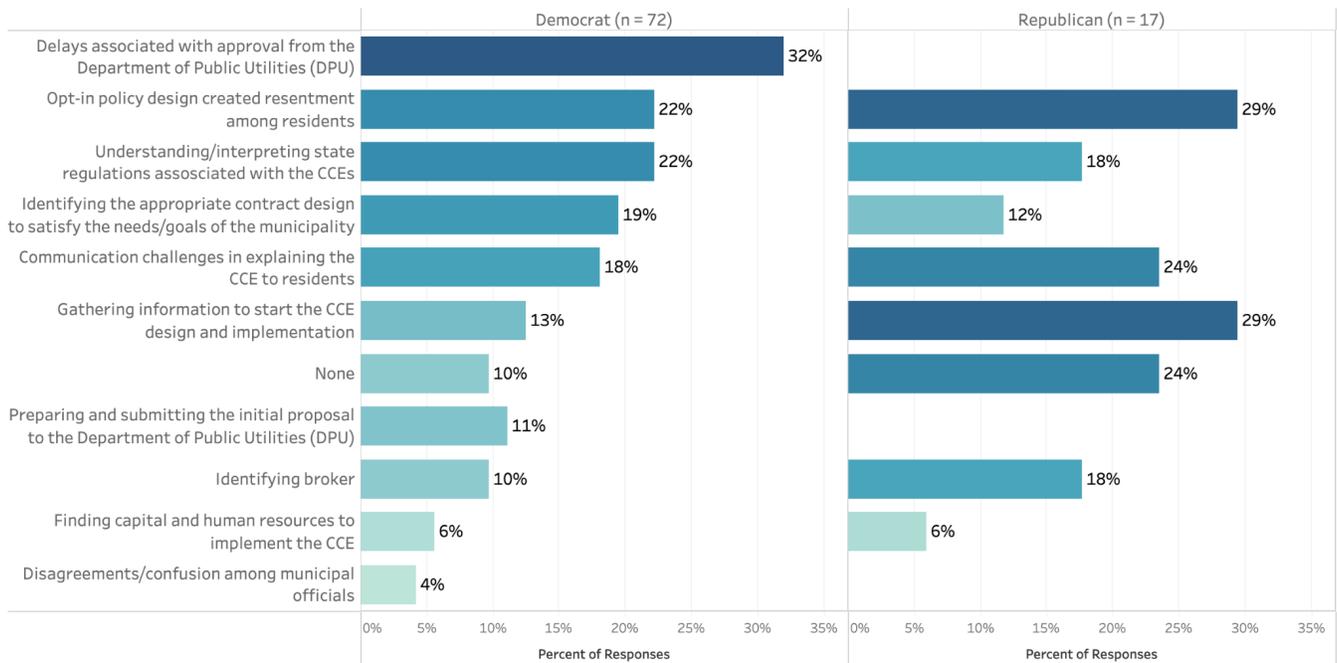
Data source: UMass School of Public Policy municipal survey (2021)
 Five municipalities indicated more than one most important goal

Appendix Figure 2. Evolution of municipal goals for Community Choice Electricity (CCE) programs



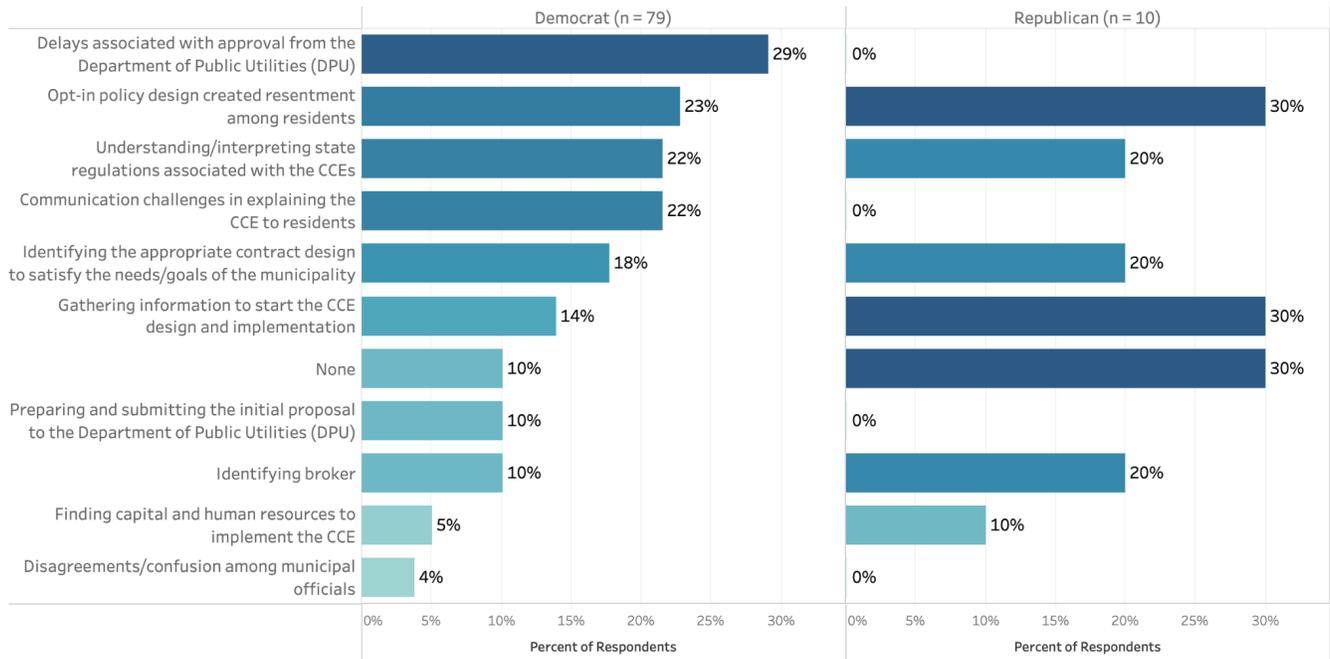
Data source: UMass School of Public Policy municipal survey (2021)
 Since the beginning of the MA CCE program, 20 municipalities have changed their priorities in relation to the goals to be achieved by their CCE program.

Appendix Figure 3a. Most challenging aspects of Community Choice Electricity (CCE) program implementation reported by municipalities, by political preferences at the 2016 presidential election



Data source: UMass School of Public Policy municipal survey (2021)

Appendix Figure 3b: Most challenging aspects of Community Choice Electricity (CCE) program implementation reported by municipalities, by political preferences at the 2020 presidential election



Data source: UMass School of Public Policy municipal survey (2021)

Table 5. MA municipalities with a CCE standard package offering National Renewable Energy Certificates (RECs) besides the MA requirement - Key Outcomes of Savings Analysis (as of November 2021)

		Value	Units
A	Total number of municipalities	157	
B	Municipalities that offer National Renewable Energy certificates besides the MA requirement	29%	
C	Percentage of B that achieved savings thanks to the CCE program, compared to utility's monthly basic service rates (*)	98%	
D	Average savings per kilowatthour	0.0091	USD/kWh
E	Total Population in municipalities that achieved savings	560,629	people
F	Estimated total number of households in municipalities that achieved savings (**)	180,848.06	households
G	Estimated average yearly savings per household (***)	97.23	USD/year
H	Total estimated yearly savings (for municipalities in group C)	17,583,868.20	USD/year

(*) This corresponds to 29% of total municipalities (157)

(**) Massachusetts average household size is 3.1

(***) The average electricity consumption per household in the U.S. is 10,632 kilowatthours. Source: <https://www.eia.gov/tools/faqs/faq.php?id=97&t=3>

(****) For all households in municipalities in group C, which have RPS Class 1 renewable energy levels above MA requirement and achieved savings.