# The Energy Systems Transformation Project:

# City Energy Supply Strategy Profiles

December, 2015

Table of Contents



*A Note On The Profiles:*

*The attached profiles are part of the materials for the Energy Systems Transformation Framework. They describe the energy supply context and strategies for the five cities participating in this USDN-funded project: Boulder, Boston, Minneapolis, Portland and San Francisco.*

*The Framework describes three core energy system change solutions:*

- *Reducing energy demand*
- *De-carbonizing energy supply*
- *Increasing energy resilience*

*These profile materials are primarily focused on the electricity supply de-carbonization strategies in each city, so are not representative of their full range of energy systems change work. It is expected that they will be updated to be more complete over time.*

## City of Boulder Energy Supply Strategy Profile

### Summary

Boulder began researching power supply options in 2005 as part of the development of its climate action plan. The climate action plan was designed to implement the City's GHG reduction targets, including a 24% reduction by 2012. The initial climate action plan (2006), and the 2010-2011 update, included more typical energy supply strategies (more solar; some REC purchasing; some wind), but did not envision an aggressive strategy for supply de-carbonization. The research made clear that it would be almost impossible to achieve the city's decarbonization goals without an energy supplier willing to partner with the city to achieve those goals.

In 2010, the City's franchise with its electricity utility, (Xcel), expired and after extensive negotiations, the city decided not to renew the franchise. Instead, Boulder voters approved a "utility occupation tax" to replace the franchise fee. The City continued to negotiate with Excel over options for increasing renewable supplies, but was unable to reach agreement. As a result, in November of 2011, voters passed a measure to fund an analysis of the feasibility of establishing a municipal utility. The ballot measure also established City Charter requirements that any municipalization strategy would have to meet, including:

- The rates required to sustain the utility would not exceed the rates Xcel charged at the time of acquisition.
- The rates would be sufficient to pay operating and debt payments of the utility, plus funds equal to 25% of debt payments.
- The utility would have power reliability equal to Xcel's.
- The utility would have a plan to reduce GHG emissions, reduce pollutants, and increase renewable energy.

In 2012 and 2013, the City conducted numerous detailed technical and financial analyses to determine the feasibility of establishing a municipal utility that met the Charter requirements. As a result of these analyses, in 2013 voters approved a ballot measure authorizing bond issuance for the purchase of Xcel assets. In May of 2014 the City Council formed a utility in the Charter. A detailed business plan and management transition plan was developed and approved by the City Council in August of 2014. In the plan, the City determined that it would be possible to launch a municipal utility and achieve a 51% de-carbonization rate within the first year of operation without any increase in rates.

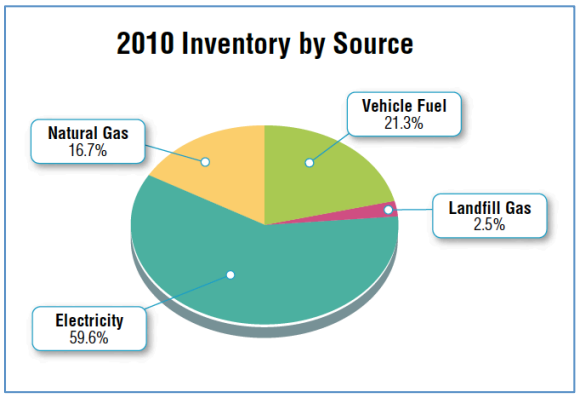
Since the decision to move ahead on municipalization, there have been multiple legal maneuvers – suits and counter-suits. The City is currently submitting a proposal to the Colorado Public Utility Commission requesting permission to transfer the Xcel assets to the City. Once the City has a ruling on that petition, it will then file condemnation proceedings on the Xcel assets needed to operate the municipal utility. The condemnation process will establish the value of the assets that Boulder needs to compensate Xcel for.

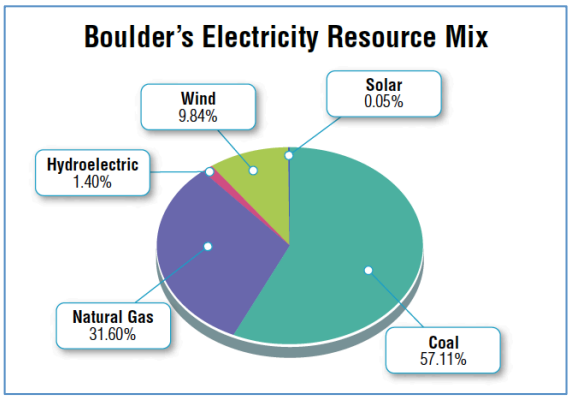
The current timeline is for the City to "go live" on the new municipal utility in January of 2018.

## The Boulder Energy Supply Context

| Context | Description |
|---|---|
| *Demographics* | • Population = 103,000<br>• Land size = 77.5 square miles |
| *Utility Regulation* | • Colorado is a regulated utility market. Consumers are not allowed to select their power supplier at the retail level, and Community Choice Aggregation is not allowed. |
| *Energy Cost* | • Electricity prices are in the middle range – averaging about 11.7¢ per kwh for residential service. |
| *Energy Supply and Demand* | • The City consumes 1,664 GWh of electricity annually<br>• Boulder is served by Xcel, and investor-owned utility. Xcel provides both electricity and natural gas to the City. |
| *Renewable Power Incentives* | • Colorado has a state Renewable Portfolio Standard that requires IOUs to generate 30% of their electricity from renewable sources by 2020.<br>• Net metering is allowed.<br>• Community Solar Gardening (virtual net metering) allowed up to 2 MW. |

The graphics below show Boulder's emissions profile and their electricity supply mix.




## Establishing the Aspiration and Vision for a Clean Energy System

The initial vision for a clean energy system was established in the 2006 Climate Action Plan and its 2010-2011 update:

> *"The vision of the Climate Action Plan is to guide Boulder towards a sustainable energy future that dramatically reduces greenhouse gas emissions from current levels, while meeting the needs of present and future generations. A sustainable energy future is a critical component of the Boulder Valley Comprehensive Plan, which is a tool designed to protect the natural environment of the Boulder Valley while fostering a livable, vibrant and sustainable community. A sustainable energy future is achievable through the widespread adoption of the overarching strategies presented in the Climate Action Plan, which are to increase energy efficiency, switch to renewable energy and vehicle fuels, and reduce vehicle miles traveled." (City of Boulder Climate Action Plan, 2006)*

*"While the first two strategy areas focus on changes to energy demand, Ramp Up Renewables looks at the energy supply. Just over 57 percent of Boulder's electricity is currently sourced from coal and another 32 percent comes from natural gas. Reducing carbon emissions requires shifting this generation portfolio from fossil fuels toward lower carbon fuels and renewable resources and increasing the rooftop solar and on-site wind and geothermal heating to diversify the sources of our power." (Climate Action Plan Update, 2010-2011)*

The detailed vision for "Boulder's Energy Future" was established in 2011 with the City Council approval of language articulating the purpose, framework, goals and objectives for Boulder's Energy Future. The Energy Future project became a separate planning initiative with its own web site – a process that in essence created a parallel track to the overall Climate Action Plan, but focused specifically on energy supply issues. The key elements of the Boulder Energy Future vision are summarized below.

The Goal

"*The ultimate purpose of this effort is to ensure that residents, businesses and institutions have access to reliable energy that is increasingly clean and remains competitively priced*."

Strategic Framework – Energy Localization

1. ***Democratize Energy Decision Making****: customers should have more direct control and involvement in decisions about their energy, including opportunities to invest in their long-term energy needs and to have a say in energy investments made on their behalf.*

2. ***Decentralize Energy Generation and Management****: energy should be generated locally or within the region to the maximum extent feasible, reducing reliance on external fuel sources; customers should be able to manage and reduce their energy use as directly and effectively as possible; and energy service companies should be empowered to compete and innovate within a diverse and robust local energy economy.*

3. ***Decarbonize the Energy Supply****: renewable and clean fuel sources should be maximized as much as possible, as quickly as possible, minimizing both short- and long-term environmental impacts and maximizing energy independence over time.*

Goals and Objectives

The goals and objectives are summarized below. The detail is in the source document.

1. **Ensure a stable, safe and reliable energy supply**.
    - System redundancy, supply quality and load management
    - Fuel source stability
    - System reliability
2. **Ensure competitive rates, balancing short-term and long-term**

**interests**.
    - Rate competitiveness
    - Rate transparency and predictability8
    - Technology investment and managing price volatility.
3. **Significantly reduce carbon emissions and pollutants**.
    - Reduction of GHG emissions
    - Reduction of toxic pollutants
4. **Provide energy customers with a greater stay about their energy supply**.
    - Democratizing local decision-making
    - Democratizing local ownership
5. **Promote local economic vitality**.
    - Support for local business innovation
    - Economic competitiveness
6. **Promote social and environmental justice**.
    - Energy equity
    - Impacts to vulnerable populations
    - Energy literacy

A Vision for the "Utility of the Future"

The Boulder Energy Future materials also developed a vision specific to the design of the municipal utility. The need for this new business model is established in the following statement:

> *"At the core of these analyses is a vision of " the electric utility of the future" that is bold and exciting. No matter which energy path the city chooses to take, it strives to be a leader in reducing the impact its electric use has on climate change and in providing local energy services that meet the unique needs and community values of Boulder. For traditional electric utilities, "managing energy" is their core competence. Xcel has repeatedly said it is limited in its ability to shift from its current trajectory. The question Boulder faces is whether it wishes to be beholden to this antiquated business model for the next 20 years, while also recognizing community concerns that change represents risk." (2.26.13 City Council materials)*

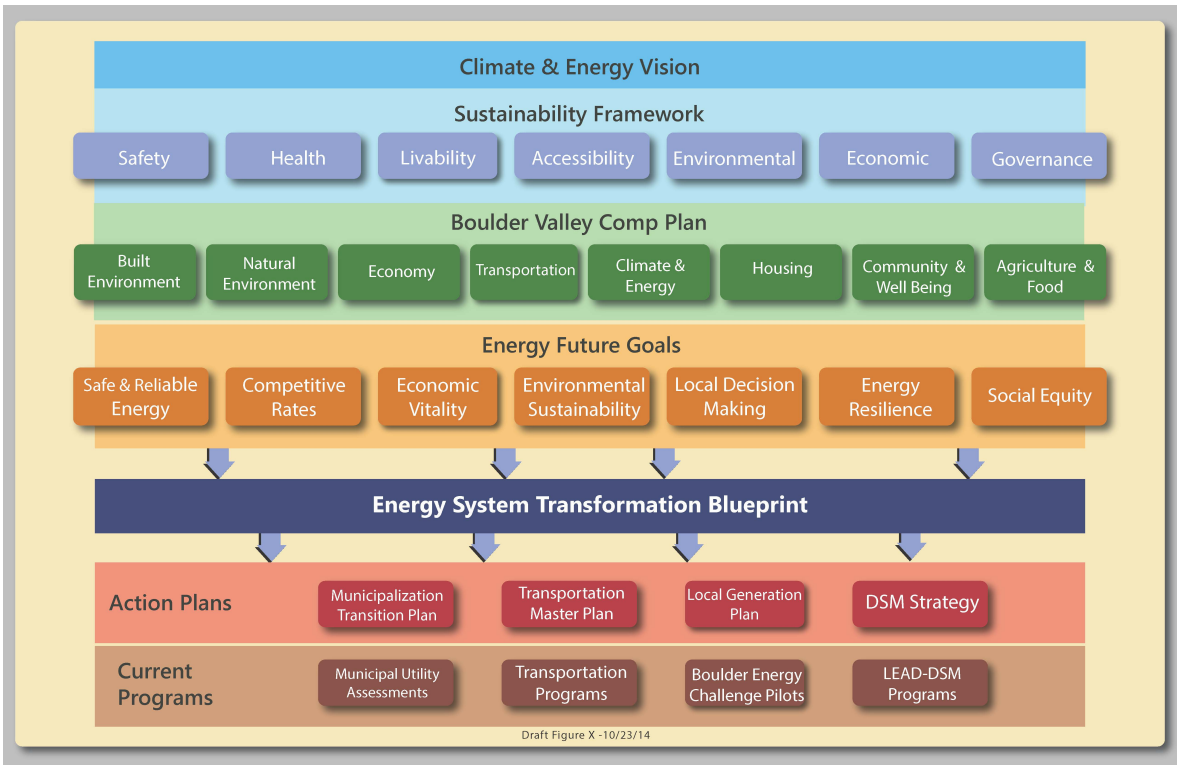
Key design features for the new utility include the following:

- **Customer-focused.** Flexible, customer-service oriented, and able to provide customized energy solutions
- **Adaptable.** Adaptable to new information and new expectations without unsustainable investments in nonrenewable resources or inefficient regulatory practices
- **Reliable.** Able to provide high reliability to reduce customers' costs
- **Clean.** Committed to securing increasingly clean power, while offering customers enhanced opportunities to manage their energy and save money
- **Innovative.** Agile and competitive, while promoting local innovation and engaging local industry and institutional leaders in partnerships that will further enhance service
- **Energy as a service.** Offer a new business model that provides energy as a

service and is able to adjust to a decreasing demand, rather than relying on increasing electricity sales and building more generation plants as the path to profitability

Boulder Energy Future Goals In the Overall Boulder Sustainability Context

The Energy Future goals are one elements of a broader "family" of strategy documents that integrates these goals with a broader Energy and Climate Vision, a Sustainability Framework, and the Boulder Comp Plan. The graphic below summarizes this set of relationships.




**Energy Systems Analysis**

Over the four-year period between the City Council approval of the Boulder Energy Future purpose, framework and goals document to the present, the City has commissioned or conducted millions of dollar of sophisticated technical and qualitative analysis to help make choices about its energy future. This analysis has fallen into several different categories, including:

- General consulting reports assessing clean energy options.
- Analysis of the feasibility of establishing a municipal utility.
- Legal analysis and filings to defend against lawsuits and establish the city's right to acquire Xcel's assets.

The key documents are summarized below, with hyperlinks. All of these documents are available on the Boulder Energy Future web site, on the "Library of Resources" web page.

| Category | Document Links |
|---|---|
| *Municipalization Analysis* | • Preliminary Municipalization Feasibility Study , R.W. Beck 2005)<br>• Electric Municipalization Project Administrative & Operational Issues Report , R.W. Beck (2007)<br>• Boulder Municipal Utility Feasibility Study , Robertson-Bryan, Inc. (2011)<br>• Boulder Municipal Utility Business Plan , Robertson-Bryan, Inc. (2011)<br>• Independent Expert Findings: Review & Verification of Modeling of New Electric Utility, PowerServices, Inc. (2013)<br>• Review of Updated Model for New Electric Utility , PowerServices, Inc. (2013)<br>• Report of Transition Planning for New Electric Utility, PowerServices, (2014) |
| *Community Guides to Boulder's Energy Future* | • Community Guide 1.0 (2011)<br>• Community Guide 2.0 (2011)<br>• Community Guide 3.0 (2013) |
| *Documents and Reports Related to the Xcel Relationship* | • Updates on Side Agreements<br>• Study Session on Xcel Franchise (2010)<br>• Extension of Franchise Agreement (2010)<br>• Life Without a Franchise Report , Decarbonization Team (2010)<br>• Exploring Alternative Opportunities for Reaching Boulder's Energy Future Goals (2012)<br>• Boulder-Xcel Energy Task Force Report (2013) |
| *General Energy Reports* | • Localization Portfolio Standard , Local Power, Inc. (2011)<br>• Energy Baseline Report , Nexant et al. (2011)<br>• Smarter Cities Challenge Report , IBM (2011), Staff Report and Memorandum )<br>• Analysis of Boulder's Cost Model , UtiliPoint<br>• Climate Action Plan Analysis Report , Rocky Mountain Institute (2012)<br>• City of Boulder Energy Programs: Options and Conclusions , The Brendle Group (2012) |

**Implementing the Municipalization Strategy**

Establishing the Legal and Regulatory Context

A key part of the energy system analysis has included legal analysis and legal action to establish the conditions under which the City can acquire the Xcel assets needed to run its utility. Boulder operates under a "home rule" charter, so they clearly have the right to exercise eminent domain to achieve public purposes. The specific language from the Colorado constitution states:

> *"[Home rule cities]. . . shall have the power, within or without its territorial limits, to construct, condemn and purchase, purchase, acquire, lease, add to, maintain, conduct, and operate water works, light plants, power plants, transportation systems, heating plants, and* ***any other public utilities or works*** *or ways local in use and extent, in whole or in part, and everything required therefore, for the use of said city and county and the inhabitants thereof, and any such systems, plants, or works or ways, or any contracts in relation or connection with either, that may exist and which said city and county may desire to purchase, in whole or in part, the same or any part thereof may be purchased by said city and county which may enforce such purchase by proceedings* at law as in taking *land for public use by right of eminent domain…" (Emphasis added)*

Boulder established its intent through several actions:

- Approval by voters of multiple ballot issues in support of pursuing municipalization.
- The passing of an ordinance creating a local electric utility.

The legal and regulatory issues that have needed to be clarified have included:

- Does Boulder have the right to condemn Xcel assets? In June of 2014, Xcel filed a lawsuit seeking to dismiss Boulder's condemnation proceedings, based on an argument that the formation of a utility is "premature" and that the City failed to meet requirements set out in the City Charter. There has been no ruling yet on this lawsuit. Boulder believes that the lawsuit will be dismissed if the PUC approves their transition plan.

- Does Boulder need PUC approval for its condemnation plan? The Boulder District Court dismissed Boulder's condemnation petition based on the finding that it required CPUC approval before condemnation proceedings commence. Boulder appealed this ruling, but then decided to comply with it and is in the process of submitting a proposal to the PUC for their deliberation.

- Does Boulder need Federal Energy Regulatory Commission (FERC) approval? In December of 2014, FERC affirmed Boulder's right to move forward with condemnation.

When Boulder does proceed with condemnation, there will be additional negotiations and likely legal action around the precise assets being acquired, and what Boulder needs to pay Xcel to compensate for their condemnation. The exact steps in the condemnation process are described in the 2013 Community Guide:

- The constitution requires that the city pay what the law calls "just compensation" to the property owner before being able to take the property. If both parties can agree on a purchase price, the issue can be resolved through a negotiated settlement.
- If negotiations are not successful, Boulder would file a petition in condemnation with the Boulder District Court to acquire the property and electric facilities serving the city.
- If Xcel disputes the city's authority to acquire its property, the court would first verify that the property was necessary for a legitimate public purpose of the city and that the city had conducted good faith negotiations.
- If verified, the court would proceed through the process of determining the fair market value of the property that the city must pay. The city estimates it would take 10 to 14 months after a determination that the city has the authority to acquire Xcel's property before a trial could be scheduled.
- During the intervening time, there would be discovery by both sides and legal arguments made to the court. At the trial, the jury hears only evidence of the fair market value of the property.

Establishing Feasibility for the Municipal Utility

The sequence of municipalization feasibility assessments was particularly rigorous in their technical and financial details. These reports had to establish a number of parameters and the degree to which they could be configured to meet the Charter performance requirements for the municipal utility. These included:

- The exact configuration of physical assets that the City needed to effectively operate a utility. This meant making decisions on transmission lines; sub-stations; distribution systems; meters; etc. at a very high level of detail.

- The cost of utility operations – staffing, maintenance, management, debt payments, etc.

- Power purchasing options and their impacts on costs and carbon content.

- Cost and carbon content under a high level of unpredictable future variables.

The City ended up integrating multiple modeling tools in order to forecast potential performance. They ran more than 700 scenarios looking at the impact of fuel prices, renewable prices, interest rates, carbon taxes, operating costs; etc. to determine the probability that they could dramatically reduce GHG emissions and not increase rates for consumers. The following summary of the modeling process provides a sense of the complexity of the process:

> *"The analysis incorporated five major areas of focus: financial, reliability, resource mix, asset acquisition and legal issues. Models were designed to span 20 years, from 2017 to 2037. An extensive list of inputs, which were vetted by community working groups and consultants, drew upon current market pricing, analyses by federal laboratories, benchmarking from American Public Power Association and regional utilities, and a diversity of other sources to ensure that data was accurate, realistic, conservative, and locally relevant. A smaller number of high-impact variables were modeled with wide cost ranges to show the risks associated with future uncertainty. These variables included gas prices, wind prices, interest rates, operations and maintenance costs, stranded and acquisition costs, and the ability of the utility to generate sufficient debt service coverage." (February 26, 2013 City Council Study Session materials, p. 4.)*

The modeling process established a high level of confidence that the utility design could achieve the Charter outcomes, including:

- **Lower rates.** Offer all three major customer classes (residential, commercial and industrial) lower rates than what they would pay Xcel, not just on day one, but on average over 20 years;
- **Reliability.** Maintain or exceed current levels of system reliability and emergency response, and, if the community chose to, use future investments to enhance dependability;
- **50% GHG reduction.** Reduce harmful greenhouse gas emissions by more than 50 percent from current levels and exceed the Kyoto Protocol target' in year one;

- **54% renewables.** Obtain 54 percent or more of its electricity from renewable resources; and
- **Model utility.** Create a model public electric utility with leading-edge innovations in reliability, energy efficiency, renewable energy, related economic development and customer service. (2.26.13 City Council materials, P. 3)

The city modeling and projects were subject to a rigorous third party review, which confirmed their viability.

Xcel Relationships

The City began negotiations with Xcel on a potential partnership plan beginning in 2010. The Xcel relationship. In 2012 a white paper with partnership options was developed. In 2013, a community/Xcel task force was developed and met extensively to try and find middle ground. They issued a lengthy report in 2013. Ultimately, the two sides found their difference irreconcilable and decided to break off negotiations.

Developing and Executing on the Transition Plan

Early business plans and models established some of the basic parameters for the municipal utility business model.

The utility transition plan describes the detailed steps and timelines for implementing the transition to a municipal utility. Some of the key elements of the plan include:

- A detailed interconnection plan
- Functional organizational chart
- A description of key functions:
    - Construction, operations and maintenance
    - Customer service
    - Energy services
    - Finance and accounting
    - Planning and engineering
    - Power supply and delivery
    - Legal and regulatory
    - Support services
- A detailed schedule of milestones and tasks

The budget and expenses (P&L pro-forma) were established in early business plan documents.

As noted above, the target date for full transition to a City-run utility in January of 2018.

The Next Stage – Developing a Comprehensive Energy Systems Transformation "Blueprint"

There are three primary components to a clean energy supply strategy:

1. **Electricity de-carbonization**
    a. Increased local generation by individuals and enterprises

b. Clean power purchasing
c. Municipal power supply de-carbonization

2. **Thermal de-carbonization**
    a. Conversion to lower carbon combustion fuels
    b. Biofuels
    c. Heating electrification from renewables

3. **Mobility fuel de-carbonization**
    a. Electric vehicles
    b. Clean fuels (CNG)
    c. Hybrid vehicles
    d. Hydrogen/fuel cell vehicles

The Boulder energy supply strategy has focused to date most of its resources on the municipalization strategy (1a). The City is in the process of developing a more robust "Energy System Transformation Blueprint" that addresses all energy supply issues, including local generation, thermal conversion and clean transportation. Some of the key components of this plan will include:

- Setting specific targets for clean energy performance across the new utility, transportation and other energy services.

- Analysis of the interconnection between electricity, thermal and transportation strategies (e.g. how will heat electrification or EV implementation at scale affect the performance requirements of the grid?)

- Develop a strategy for energy system resilience.

- Develop a more detailed strategy for deeper localization of energy generation.

- Develop a broader and more comprehensive strategy for community engagement that extends the dialogue beyond municipalization.

## Attachment 1 – Boulder Energy Supply Strategy Timeline

| Year | Milestones |
|---|---|
| 2002 | • City Council establishes the target of a 7% GHG reduction below 1990 levels by 2012. |
| 2005 | • City begins researching power supply options and funds a "Preliminary Municipalization Feasibility Study". |
| 2006 | • Voters approve a local carbon tax.<br>• Climate Action Plan approved by City Council. |
| 2010 | • Xcel franchise expires and the city decides not to renew it. Boulder voters approve a utility occupation tax to replace the franchise fee. |
| 2011 | • City Council approves Boulder Energy Future purpose, framework and goals.<br>• Voters pass a ballot measure to fund ($1.9 million per year) the evaluation of a municipal utility, and establish charter requirements for the utility.<br>• Municipal utility feasibility plan and business plan commissioned and completed.<br>• First Community Guide to Boulder's Energy Future and municipalization strategy is published.<br>• Energy localization study commissioned. |
| 2012 | • White paper on potential Xcel partnership options is developed. |
| 2013 | • Detailed analysis and modeling conducted to determine if a municipal utility could meet the Charter requirements.<br>• City projections are validated by a third party independent review.<br>• City Council authorizes the filing of condemnation to acquire Xcel assets if negotiations fail.<br>• The Boulder-Xcel Task Force is launched and issues its report.<br>• After extensive negotiations, Xcel and the city decide to terminate discussions because of a lack of agreement.<br>• Voters approve a ballot measure to authorize city bonding to purchase Xcel assets.<br>• Voters defeat a ballot measure sponsored by Xcel that would prevent municipalization.<br>• The Colorado Public Utility Commission issues a ruling that requires CPUC approval before Boulder moves ahead on municipalization. |
| 2014 | • City Council forms a utility in the charter.<br>• A detailed transition plan for establishment of the utility is developed and approved by City Council.<br>• Voters approve a ballot measure allowing the City Council to hold private executive sessions to discuss legal advice for creation of a local utility.<br>• City files a condemnation petition in Boulder District Court.<br>• Xcel files suit to block the City condemnation petition.<br>• FERC affirms Boulder's right to move forward with condemnation without needing FERC approval. |
| 2015 | • City petition for condemnation is dismissed, based on a decision that the city needs to get CPUC approval first.<br>• Boulder files a proposal for municipalization with the PUC.<br>• Staff begin work on a broader Energy System Transformation Blueprint. |

## City of Boston Energy Supply Strategy Profile

### Summary

Boston's vision for transforming its energy system is embedded in it 2014 Climate Action Plan. The strategy focuses on three approaches – 1) advocating for continued strong state policies on energy efficiency and renewable energy (note that Massachusetts and Boston are both ranked #1 in the country by ACEEE on energy efficiency); 2) creating a structured partnership with utilities; and 3) advancing district energy and microgrids.

The core strategy is increasing the amount of energy supply (thermal and electrical) that comes from district energy and microgrids by expanding the district energy business model out from single owner campus structures to more multi-user microgrids (MUMs).

Boston is in the middle of a citywide energy study that will establish the analytical framework for identifying opportunities for distributed generation; articulating and defining the benefits; formalizing the community-wide energy planning function; integrating district energy into the City's development planning; and removing regulatory barriers.

### The Boston Energy Supply Context

| Context | Description |
|---|---|
| *Demographics* | • Population = 655,884<br>• Land size = 48.4 square miles |
| *Utility Regulation* | • Massachusetts is a deregulated utility market. Utilities do not generate power, but have exclusive franchise rights for power distribution.<br>• Community Choice Aggregation is allowed in Massachusetts.<br>• Municipalization is also allowed. |
| *Energy Cost* | • Boston is in a generally high cost power market.<br>• Retail and commercial rates are in the 17¢ to 23¢ per kWh range.<br>• Industrial electricity rates are in the 7¢ to 15¢ per kWh range. |
| *Energy Supply and Demand* | • The City consumes 6,873 GWh of electricity annually<br>• Boston is served by two IOUs under State and Federal regulatory authority:<br>  o Eversource Energy for electricity<br>  o National Grid for natural gas<br>• Veolia North America manages a downtown steam system<br>• MATEP, LLC supplies trigeneration services to the Longwood Medical Area campus of 9 million+ square feet of medical real estate<br>• Electricity generation and transmission is under the regulation of ISO New England and FERC |
| *Renewable Power Incentives* | • The state has a Renewable Portfolio Standard that requires utilities to have 15% renewable sources by 2020, with 1% increases for each year after that.<br>• Net metering cap is set at 12% of a utility's maximum demand. Half of the cap is reserved for public users and half for private users.<br>• Net metering credits vary by the size of the project.<br>• Solar renewable energy credits (SRECs) are limited to systems of 6 MW or less.<br>• "Virtual net metering" is allowed if the power source is within the |

| Context | Description |
|---|---|
| | customers utility service area and ISO load zone. |
| *Energy Efficiency Incentives* | • Massachusetts has the most aggressive rate payer funded energy efficiency program in the country on a per capita basis. Over $700 million a year of EE incentives are administered by the utilities.<br>• The 2013-2015 plan targets annual efficiency savings of 2.55% per year. |
| *Carbon Pricing* | • None |
| *Electricity Supply Profile* | • 44% -- Natural Gas<br>• 34% -- Nuclear<br>• 9% -- Renewables<br>• 8% -- Hydro<br>• 5% -- Coal<br>• 1% -- Oil |
| *GHG Emissions Profile* | • 52% -- Commercial/Industrial Buildings<br>• 21% -- Residential Buildings<br>• 27% -- Transportation |

**Establishing the Aspiration and Vision for a Clean Energy System**

Boston's targets for a clean energy system are embedded in its basic GHG emissions reductions targets – 25% by 2020 and 80% by 2050. The 2014 Climate Action Plan includes a number of sub-targets and strategies related to energy supply. These include:

2020 Energy Supply Targets

- 15% energy use from co-generation
- 10 MW of commercial solar generation within the city

2020 Energy Supply Strategies

| Climate Plan Strategy | Description |
|---|---|
| ***Neighborhoods*** | |
| *2.12 Accelerate Residential Solar* | Continue to accelerate solar deployment by continuing the Solarize program and tackling existing barriers in the multi-family and renter market. |
| *2.18 Transition to Low Carbon Heating Sources* | Work with the Commonwealth to shift residential units and small businesses away from inefficient and carbon-intensive heating systems, including electric resistance heat, oil heat, and inefficient natural gas heat. |
| ***Large Buildings and Institutions*** | |
| *1.72 Promote On-Site Combined Heat and Power and Renewables* | Encourage commercial CHP, solar and ground-source heat pumps. |
| *1.73 Facilitate Expansion Of District Energy* | Expand district heating, cooling, and microgrids, through district-level planning and a potential requirement for new buildings to study the costs and benefits of connection. |
| *1.74 Expand Municipal Installation of Renewables, CHP and District Energy Connections* | Evaluate feasibility for all municipal buildings and install solar wherever possible. |
| *1.81 Support Regional Transition to Low Carbon Fuels* | Work with the Commonwealth to develop a low carbon fuel standard and increase the supply of carbon-free energy in the region. |

| | |
|---|---|
| *1.82 Promote green power purchasing.* | Promote renewable energy purchasing, including buildings that have linked off-site renewable projects. |
| *1.85 Increase municipal green power purchases.* | Expand renewable energy purchasing and use of electricity and renewable fuels for the municipal vehicle fleet. |

2050 Energy Supply Goals and Strategies

The long-term goal is complete de-carbonization of the grid and thermal power sources. Action will need to be taken at both the City and the State levels.

| City Strategies | State Strategies |
|---|---|
| • Creation of more local district energy systems.<br>• Consideration of a carbon-neutral district energy system.<br>• Exploration of the feasibility of district cooling, especially using ocean water.<br>• District heating and cooling for municipal facilities. | • Utility 10-year grid modernization plans (required by the Dept. of Public Utilities at the state level)<br>• Standardized rules for grid interconnection.<br>• Lowering of the GHG gap in the regional cap and trade systems (RGGI).<br>• Setting aggressive incremental state level clean energy goals and use of those goals to evaluate energy infrastructure decisions. |
| • | • |

**Energy Systems Analysis**

Boston is in the early stages of developing a comprehensive city energy plan. The purposes of this plan are articulated in the following excerpt from the Climate Action Plan:

> *"Boston is pursuing a long-term energy infrastructure management and resiliency strategy. The City is currently conducting a citywide energy study—the first to be done in New England. This study will inform the potential for job opportunities from energy investments, how much energy the City will demand in the future, and how much capital the City can keep locally for energy services. This will help Boston identify investment opportunities for reliable, local energy resources.*
>
> *The City is also engaging in other energy planning efforts, including a pilot microgrid development project, a legal analysis of microgrid ownership in Massachusetts, and a multi-stakeholder planning process for microgrid business models." (Boston Climate Action Plan, P. 73)*

The purpose of the citywide energy study is to help answer the following strategic questions:

- How much thermal and electric energy can we locally produce in Boston?
- How could that energy be distributed?
- What are the benefits of producing local energy for our communities and businesses?

MIT's Building Technology Department and MIT Lincoln Labs are conducting the study. The final report is expected to be issued by November of 2015.

The study will create three deliverables:

- An **Energy Data Set** that is capable of modeling the energy demands of Boston's existing and future building stock.
- A set of **scenarios** for clean and renewable energy supply. These scenarios will model the impacts of deploying different mixes and different levels of local energy supply, including solar PV, solar thermal, battery storage, cogeneration, district heating, district cooling and microgrids. The scenarios will estimate the GHG emissions and energy system resilience of different combinations.
- **Software** to manage incorporation of new building data and future scenarios.

The final report will include:

1. A written summary of Boston's existing and future energy demand and how the local energy supply scenarios will affect the City's environmental and resilience performance.
2. Visual representations of the energy loads throughout the city.
3. A summary of the clean and renewable energy scenarios.

The citywide energy study will establish the foundation for an on-going city energy planning function for Boston that will allow the City to integrate energy decision making into its development planning and its capital investment strategies.

**Energy System Strategy**

Boston's energy system strategy is three-pronged:

- **State Policies.** Advocate for state-level policies that advance energy efficiency, high renewable portfolio standards, and grid modernization.

- **Utility Partnership.** Create a structured partnership with the two major utilities serving Boston (Eversource and National Grid) that aligns utility and City of Boston Climate Action Plan goals and strategies.

- **District Energy and Microgrids**. Increase the amount of Boston's energy supply that comes from local, low carbon sources.

State Policies

- At the state level, there is a very progressive policy regime in place for aggressive GHG reduction goals (the Commonwealth has an 80X50 goal in place), energy efficiency investments, and Renewable Portfolio Standards.
- Community Choice Aggregation is already allowed under state law.
- Through its grid modernization orders, the Public Utility Commission is beginning the process of grid modernization to support large-scale renewables integration. The City is engaging with its utilities on its grid modernization plans in advance of their submission.

Utility Partnership

In 2010, the City of Boston created a structural partnership with its two main utilities (Eversource for electricity and National Grid for natural gas). Called Renew Boston, this initiative includes a full time embedded executive from Eversource who is located in City Hall to coordinate between the utilities and the City on common energy efficiency and energy supply objectives. A more detailed description of Renew Boston is included in Attachment 1.

Microgrid and District Energy Strategy

In the near term, Boston's core strategy for transforming its energy system is focused on advancing the development of microgrids and district energy systems. Boston and its neighbor, Cambridge, have a significant endowment of district energy systems.

- The **Medical Area Total Energy Plant (MATEP)** is a district system and microgrid that serves hospitals and research facilities in a densely populated 213-acre area of Boston called the Longwood Medical Area (LMA). MATEP generates and distributes steam, chilled water and electricity. It is capable of operating in an "island" mode while still meeting the energy needs of its customers. MATEP can produce up to 84 MW of electricity, 1 million lbs/hr of steam and 42,000 tons of chilled water.
- Harvard University's **Blackstone Station** provides steam heat and chilled water to 160 buildings in Boston and Cambridge.
- The **Biogen Energy Plant** is a 5.4 MW CHP system by the Biogen company that is now connected with the downtown steam system operated by Veolia.
- **Veolia**, North America's largest operator of district energy systems, operates a downtown CHP system that provides electricity and thermal services to 250 commercial customers with over 45 million square feet of building space.

Boston's strategy is focused on maximizing the use of district energy systems and microgrids to reduce greenhouse gas emissions and increase system resilience. In particular, the strategy looks at the potential for "Multi-User Microgrids" (MUMs). A MUM is a tri-generation microgrid that:

- Produces heating, cooling and electricity services for a group of buildings that have multiple owners
- Is capable of supporting mission-critical loads when the surrounding electric grid fails

As the microgrid market evolves from the single owner campus and critical public infrastructure models, more complex multi-party constructs built around economic development, area redevelopment, and resiliency as an enhanced private sector service will need to emerge. Regulatory, statutory, and financing innovations are required to achieve the technology transfer of campus scale energy systems into districts of privately owned buildings.

The Boston strategy for advancing multi-user microgrids will be driven by the results of the citywide energy study. The energy study will quantify the opportunity and identify specific locations in the city where microgrids could make good business sense. The City strategy could possibly address the following elements over time:

- **Benefit Documentation.** Clearly articulating and measuring the economic, environmental and resilience benefits of microgrids. These benefits include:

    - Significant improvements in the efficiency with which fuel is converted to heat and power. (Separate electricity generation will have a typical efficiency rating of around 45%, whereas a combined heat and power system can be more than 80% efficient.)
    - Ability to plan whole-building energy efficiency measures in conjunction with the microgrid implementation in order to properly size the system.
    - Lower total energy costs.
    - Reduced capital costs and operations and maintenance costs for building owners.
    - Improved system resilience and reliability.

- **Energy Planning.** Development of a formal community-wide energy planning function for the City of Boston. This planning function will be designed to answer the following questions:

    - Where and how is energy currently used today in the community, and how is that expected to change?
    - Where does the community expect development to occur in the future? Would microgrid infrastructure installation at these sites be most economical as part of the larger development?
    - What type(s) of economic activity does the community want to attract and can a microgrid be an economic development driver?
    - What critical infrastructure is vulnerable to regional power outages?
    - How does the community want to address its carbon footprint?

- **Integration Into Development.** Integration of microgrids into the City's development planning process.

    - Identification of areas of the City that are likely to be able to economically support microgrids.
    - Using zoning codes to incentivize microgrid development:
        - "District energy-ready" development requirements
        - District energy "zones" that require new development to connect to existing systems
    - Conducting pre-project development and due diligence functions to attract private system developers.
    - Providing regulatory and financial incentive for microgrids and district energy.

- **Regulatory Reform.** Working to reform regulatory barriers related to interconnection, franchise rights, standby tariffs, exit charges and other issues.

Analysis of Legal Barriers

As part of its regulatory reform strategy, the City commissioned an analysis of the legal obstacles to microgrid development in the city by the Emmet Environmental Law and Policy Clinic at Harvard University. This report, Massachusetts Microgrids: Overcoming

Legal Obstacles, identifies a number of ways in which franchise right barriers to microgrids can be overcome.

Because Massachusetts operates in an unregulated utility market, distribution utilities are granted exclusive franchise rights for specific geographic territories. The franchise restriction is summarized in the following language:

> "*Except with the written consent of the distribution company, no person other than a distribution company shall deliver electricity over lines operating between 110 and 69,000 volts from points on the transmission system or from a generating plant to a customer within the distribution company's service territory*."

The Harvard report sought to understand whether or not this franchise language means that utilities have approval control over microgrids – especially Multi-User Microgrids. The report found that the franchise clause would not apply to single owner microgrids, or multi-user microgrids where each of the users is also an owner of the microgrid assets, because no transfer of ownership and control of electricity occurs. In the case of a multi-user microgrid that operates without joint ownership, the report found that there is also a possible legal interpretation that would exempt such an arrangement from being subjected to the franchise clause. The following report language summarizes this finding:

> "*The [Department of Public Utilities] recently held that electric vehicle charging stations do not distribute or sell electricity because they use unique electrical equipment that is very different from traditional overhead electric lines and they provide a 'charging service' instead of only providing electricity. A microgrid operated by a non-utility entity as a package of services may resemble a charging station in various respects, thereby complying with the franchise clause and avoiding DPU regulation as an electric company." (P. 8)*

While not legally definitive, this finding opens up the possibility for broader development of microgrids in Boston's electricity market.

Microgrid Workshops

To spur interest in microgrid development, the City of Boston co-hosted a series of microgrid workshops that convened regulators, utilities, customers, infrastructure investors and legal experts in 2014. The objective was to develop a business model for MUMs. The workshop concluded with four key questions for further exploration in a pilot project. (1) What is the role of the Local Distribution Company in providing microgrid management services? (2) Will customers have to give up retail choice and modify the LDC's obligation to serve? (3) What are the financial contributions of each stakeholder? (4) Would this be handled as a special exemption or new regulatory carve-out?

A high-level consensus was reached as the group focused on the unique problems presented by Massachusetts statutes and regulations, which have set the table for a respectful collaboration between all parties. Boston is working with its utility partners to further the MUM concept through a pilot project.

**Key Boston Documents**

- City of Boston 2014 Climate Action Plan
- Citywide Energy Study RFP
- USDN Microgrids and District Energy White Paper (in development)
- Massachusetts Microgrids: Overcoming Legal Obstacles (Harvard Law School Emmett Environmental Law and Policy Clinic, September 2014)

## Attachment 1 – Background on Boston's Utility Partnership (Renew Boston)

### Renew Boston Mission and Strategy

In 2008, the Massachusetts Green Communities Act directed electric and natural gas utilities to help customers take all cost-effective measures for energy efficiency. Over the next three years, Boston ratepayers will pay approximately $145 million to fund utility energy efficiency programs. The mission of Renew Boston is to support and leverage the resources of utility energy efficiency programs to help Boston residents, businesses and institutions save energy and save money, and achieve the aggressive clean energy strategies in the City of Boston Climate Action Plan.

Renew Boston is a partnership between the City of Boston and investor-owned utilities (Eversource and National Grid) for the co-delivery of energy efficiency home and business improvements. Renew Boston enhances the impact of utility energy efficiency programs by:

- Providing a structure for direct collaboration between the City and utilities on the implementation of energy efficiency programs in Boston.

- Helping to integrate gas and electric energy efficiency strategies for users.

- Engaging in outreach, referral and account management to help residents and businesses access utility programs.

- Leveraging grants and financing that complement utility services and incentives.

Renew Boston was launched in 2010.

Renew Boston focuses on three primary market segments:

- Residential housing (single family and multi-family)
- Small Commercial/Industrial users
- Large Commercial/Industrial users (including the "MUSH" market – Municipal, University, Schools and Hospitals)

### Renew Boston Organizational Design

The organizational structure for Renew Boston has the following features:

- Staffing for Renew Boston comes from three sources:

    - Renew Boston is led by Brad Swing, Director of Energy Policy in the Environment, Energy and Open Space Cabinet.

    - Consulting and implementation support is provided on an ad hoc basis by outside consultants.

    - Coordination with utilities is enabled by placement of an embedded utility energy efficiency executive in the Environment, Energy and Open Space

office, as well as formal Memoranda of Understanding (MOUs) with both Eversource and National Grid. The utility executive represents the energy efficiency programs of both utilities.

- Strategic direction is provided by a Strategy Board with representation from the City of Boston; utilities; and foundations who are providing funding support for Renew Boston.

**Renew Boston Program Areas**

Renew Boston has focused on five programming areas over its history.

Residential

- In 2011, utilities provided $150,000 of funding for community outreach. The City provided an additional $150,000 from the EECBG to fund community outreach. This funding enabled Renew Boston to hire Community Based Organizations and three full-time Neighborhood Network Coordinators.
- EECBG funding was blended with utility funding for low income retrofit customers. As an example, for households with 60-120% of median income levels, utility programs pay for 75% of insulation costs up to $2,000, and $1.8 million of EECBG funding is being used to pick up the other 25%.
- A targeted strategy was developed for triple deckers.

Small Business

- Approximately $1 million of EECBG funding was used for "gap" funding to complement utility incentives for small business energy efficiency measures.

City Municipal Buildings

- The City of Boston is partnering with the utilities on implementation of energy efficiency measures in its own buildings and street lighting. The program model includes a combination of funding commitments from the utilities, as well as investment commitments from the City. As a result of these efforts, the City achieved its municipal goal of a 25% GHG reduction in 2014 – six years earlier than the original 2020 target date.

Large Commercial/Industrial

The Renew Boston and the City are collaborating on approaches to large property owners in the City. There are 50 property owners that control 60% of the non-residential building sector, and 11% of overall building square footage.

District Energy Aggregation

Through Renew Boston, the City is collaborating with its utility partners on the development of additional district energy and microgrids in the City.

## City of Minneapolis Energy Supply Strategy Profile

### Summary

In June of 2013, the City Council approved the Minneapolis Climate Action Plan that called for aggressive GHG reductions (15% by 2015; 30% by 2025), and also passed a Building Energy Benchmarking and Disclosure ordinance. As part of the implementation strategy for the plan, and in preparation for the expiration of the City's two energy franchise agreements, the Council authorized the development of the "Minneapolis Energy Systems Pathway" report to identify specific strategies for long-term de-carbonization of the City's electricity and natural gas energy sources.

A "Minneapolis Energy Vision" was developed in early 2014 to guide the pathway design. The pathway report, issued in February of 2014, analyzed four different approaches – renegotiation of utility franchise agreements; development of a city/utility clean energy partnership; implementation of Community Choice Aggregation; and municipalization of the Minneapolis utility services. The pathway report recommended short-term action on the first two strategies and steps to further explore the last two.

In 2014, the City renegotiated its franchise agreements with its electric (Xcel) and natural gas (CenterPoint) utilities, and signed MOUs with each utility committing to work together towards the city's clean energy goals. The Minneapolis Clean Energy Partnership was formally created in early 2015, with the first Board meeting in February of 2015. A 2015-2016 work plan is being developed to define joint initiatives for implementation.

In April of 2014, the City Council also approved a long-term GHG reduction goal of 80% by 2050

The city continues to be an active participant in e21, a state initiative to redesign the utility regulatory framework to enable clean energy targets and smart grid redesign.

### Minneapolis Context

| Context | Description |
|---|---|
| *Demographics* | • Population = 382,500<br>• Land size = 58.4 square miles |
| *Utility Regulation (See Attachment 2 for more detail.)* | • The state of Minnesota is served by 10 IOUs – 5 electric and 5 natural gas.<br>• The state has a regulated utility sector and energy market. Utilities own energy generation sources and consumer choice is not allowed at the retail level.<br>• Community Choice Aggregation is not allowed. |
| *Energy Cost* | • ~$0.10 /kWh including fixed charges |
| *Energy Supply and Demand* | • The City consumes 4.16 million MWh annually and 363 million therms annually. (2013 data)<br>• Minneapolis is served by two IOUs – Xcel for electricity and CenterPoint for natural gas.<br>• The City accounts for 13% of Xcel's Minnesota demand and 19% of CenterPoint's Minnesota demand. |

| Context | Description |
|---|---|
| | • NRG Thermal provides steam and chilled water to approximately 100 large downtown customers.<br>• Minneapolis peak electricity demand = [1,200 MW].<br>• Average electricity demand = [~470 MW] |
| *Renewable Power Incentives* | • The state has a Renewable Portfolio Standard that requires Xcel Energy to have 30% renewable sources by 2020. An additional 1.5 percent must come from solar.<br>• Net metering allowed up to 1 MW<br>  o Retail rate below 40kW<br>  o Avoided cost for between 40kW and 1 MW |
| *Energy Efficiency Incentives* | • State utilities provide incentives for Conservation Improvement Programs (CIP). In 2012, customers in Minneapolis received $9 million in CIP incentives. |
| *Carbon Pricing* | • None |
| *Electricity Supply Profile (2013)* | • 36.1% -- Coal<br>• 27.4% -- Nuclear<br>• 13.1% -- Wind<br>• 12.7% -- Natural gas<br>• 7.6% -- Hydro<br>• 2.7% -- Biomass<br>• 0.4% -- Other |
| *GHG Emissions Profile* | • 46% -- Commercial/Industrial Buildings<br>• 20% -- Residential Buildings<br>• 22% -- Transportation<br>• 7% -- Air travel<br>• 3% -- Solid waste and wastewater |

**Establishing the Aspiration and Vision for a Clean Energy System**

The City's "deep dive" into energy supply systems began with its 2013 Climate Action Plan which, in addition to setting aggressive GHG reduction goals, began laying some of the foundations for the Energy Systems Pathway analysis. Three climate action plan strategies in particular stand out in this regard:

> ***"Determine the feasibility of establishing conservation-based pricing or structuring of franchise fees and using the franchise agreement to support renewables.*** *During the update of franchise agreements with Xcel Energy and CenterPoint, Minneapolis should explore options to encourage energy conservation – through utility fee structure or the price passed on to customers. Examples could include structuring fees based on usage per customer or reducing fees if utilities meet energy efficiency goals. Franchise negotiations also provide an opportunity to plan for better integration of distributed solar PV into the grid (e.g., by linking up to the distribution system currently in place in many City rights-of-way).*
>
> ***Work with utility providers and the State of Minnesota to conduct a robust energy end-use analysis to inform future energy planning efforts by the City.*** *Energy end-use analyses can provide insights into the best options for*

*reducing energy consumption by identifying where energy is used inside a home or business (e.g., space and water heating, air conditioning, appliances, electronics). The Energy Information Agency (EIA) maintains this information for the country in general categories, but only has data through 2005. The State of Minnesota last updated an energy end-use analysis in 1988. Work with the state and utilities to determine if data is available and update an analysis for Minneapolis.*

***Support efforts to align utility practices with City and State renewable energy policy.*** *State and local policies express a clear preference for renewable energy and distributed generation. The City thus supports efforts to reform or eliminate all practices that discourage property owners from adopting on-site renewable energy generation. Efforts could include limiting standby rates, improving interconnection standards, modifying demand charges, expanding net metering benefits to large commercial/industrial businesses, and exploring concepts like feed-in tariffs. The City should continue intergovernmental relations efforts to reduce barriers and encourage development of renewable energy resources." (2013 Climate Action Plan)*

Despite these recommendations, the Energy Systems Pathways document highlights the fact that the city has not historically had a unified set of energy goals.

*"Despite this long history of progressive local action on energy issues, however, the City does not currently have a unified set of energy goals. Between the 1993 creation of the CO2 Reduction Project and the Minneapolis Energy Plan, and the 2013 Climate Action Plan, the City's local energy policy had largely evolved on an ad hoc basis. In addition, pending opportunities for the next generation of energy infrastructure and technologies are creating a new imperative for Minneapolis to clearly define its priorities." (Energy Systems Pathways, P. 25)*

The "City of Minneapolis Energy Vision 2014" was a first attempt to more clearly articulate the City's vision of its clean energy future. The Vision document established high-level aspirations for the characteristics the city's energy system should embody in 2040, as well as the specific elements related to social and economic impacts; energy supply; energy distribution and energy use.

The 2040 vision includes the following principles:

- ***Reliable and affordable energy services****, where all residents and businesses are supplied with competitive rates, and disparities in the relative cost of energy services for low-income households are mitigated.*
- ***Clean energy****, where the total carbon emissions and other waste products have substantially declined, and electricity supply is nearly carbon-free.*
- *Provision of **essential energy services** for all, affordably meeting the basic needs of residents, without disparity of impacts or benefits according to race, ethnicity, income, and age.*
- *An **increasing use of local resources** within the city, including renewable energy and efficient district heating. A robust local supply chain exists in the city for energy efficiency and renewable energy services, and Minneapolis is a national leader in advanced energy infrastructure.*
- ***Market integration of efficiency*** *that makes use of transparent data in*

*economic and purchasing decisions. Residents and businesses are empowered to save money and reduce their environmental impact.*

- ***Collaborative progress*** *on planning and investment decisions by the energy utilities that serve the city. These decisions reflect and support the City's climate action, economic development, and social equity goals.*

Key elements are summarized in the table below.

| Social and Economic | Energy Supply | Distribution System | Energy Use |
|---|---|---|---|
| • Improves social equity<br>• Reduces economic and health disparities<br>• Improves participation<br>• Expands economic development<br>• Supports current residents & businesses | • Low or no carbon<br>• Clean<br>• Affordable cost<br>• Reliable<br>• Predictable cost<br>• Diversified<br>• Local | • High level of reliability<br>• High level of safety<br>• Supports consumer choice<br>• Minimizes conflict<br>• Establishes a 21st Century distribution system<br>• Efficient and accessible | • Highest level of efficiency<br>• Maximizes efficiency's societal benefits<br>• Supports end-user self-sufficiency<br>• Delivers equity in rate structures<br>• Transparency |

The Vision document was used to guide the recommendations in the Energy Systems Pathways report.

In parallel with the Energy Systems Pathways work, the City participated in the e21 Initiative. E21 seeks to "develop a more customer-centric and sustainable framework for utility regulation in Minnesota that better aligns how utilities earn revenue with public policy goals, new customer expectations and the changing technology landscape." The e21 Initiative is convened by the Great Plains Institute (GPI), Center for Energy and Environment (CEE), Energy Systems Consulting Services (ESCS), George Washington University Law School (GWU), Xcel Energy, and Minnesota Power.

The e21 Phase 1 report highlights the need for a fundamentally new regulatory regime to accommodate the changes the electricity grid is facing:

> *"The current electric grid—with its large centralized power plants and miles of transmission and distribution lines—relies on many technologies that originated more than a century ago with Edison and Westinghouse. The rapidly emerging modern grid looks much more distributed and decentralized, with many actors on the system sending electricity and data back and forth.*
>
> *Proactively planning for an intelligent, flexible, nimble, efficient, open, and secure distribution system over the next several decades that can handle new distributed energy technologies and the complexity of many more actors on the system will require a coherent strategy. To develop this strategy, e21 recommends that Minnesota establish a distribution planning and grid modernization stakeholder process much like e21 itself. Such a process will help us understand where on the electric system new distributed energy technologies can provide the most value, how best to coordinate which technologies get put on the distribution system and when, and which distribution management systems and advanced control and communications technologies we will need to*

*enable seamless integration and interoperability of a wide variety of energy technologies and systems." (P. 4)*

The e21 principles and outcomes for a restructured regulatory regime align well with the principles in the Minneapolis Energy Vision:

Principles

- *Align an economically viable utility model with state and federal public policy goals.*
- *Provide universal access to electricity services, including affordable services to low-income customers.*
- *Provide for just, reasonable, and competitive rates.*
- *Enable delivery of services and options that customers value.*
- *Recognize and fairly value grid services and "distributed energy resource" services.*
- *Assure system reliability, and enhance resilience and security, while addressing customer privacy concerns.*
- *Foster investment that optimizes economic and operational efficiency of the system as a whole.*
- *Reduce regulatory administrative costs where possible (e.g., results in fewer rate cases or otherwise reduce the burden of the regulatory process).*
- *Facilitate innovation and implementation of new technologies. (e21 Phase I Report, December, 2014)*

Outcomes

- *An economically viable utility business model that focuses on performance outcomes we want utilities to achieve on behalf of customers and the public.*

- *A utility business model that supports energy efficiency, renewable energy, distributed energy resources, and advanced energy technologies.*

- *A regulatory framework that enables a fair return for energy producers, an equitable allocation of costs for all customer classes, with as few stranded assets as possible during the transition.*

- *Timely and predictable recovery of utilities' fixed costs that are not necessarily dependent on commodity sales, and more predictable rates for customers.*

- *A regulatory framework that allows for collaborative, flexible approaches that puts the interests and expectations of customers at the heart of the business model.*

e21 Phase 2 is currently underway and the goal is to develop the implementation details of the proposed performance based regulatory framework. The participant and observer profiles have been expanded and a set of 2015 work objectives has been developed.

**Energy Systems Analysis**

The Pathways report contains a detailed summary of the existing regulatory environment, incentives and energy-related programs in Minnesota and Minneapolis. It does not include a detailed analysis of the city's energy system.

**Energy System Strategy**

The strategy challenge for the City is articulated in the Pathways report:

> *"As cities become more engaged and proactive about energy use and production within their borders, as Minneapolis has, relying entirely on utilities to meet City energy goals is not an acceptable condition; communication must be better, expectations made clearer, interests more noticeably aligned.*
>
> *We believe that a city that has engaged in a lengthy and inclusive data-driven planning process and adopted a strong set of energy goals like those in the Climate Action Plan needs more control or influence over energy services, either directly or through a more cooperative, collaborative relationship with the energy utilities that serve that city, in order to ensure progress toward those goals." (Minneapolis Energy Pathways – A Framework for Local Energy Action, P. 47)*

The Pathways report was developed to create concrete strategies for achieving the city's goal of a GHG emissions reduction of 30% by 2025, with 10% of electricity generation from local renewable sources. The report analyzes four different options for the City to get more control over its energy future. These include:

> ***Pathway 1: Enhanced Franchise Agreement.*** *Either a single franchise agreement that includes a broader set of goals, or a traditional franchise agreement with a separate agreement that addresses those goals.*
>
> ***Pathway 2: City-Utility Partnerships.*** *Formal City-utility coordinating entity focused on setting and tracking local goals. Not a partnership in any legal sense, but an entity in which the City and utilities agree to act as willing partners to achieve shared goals.*
>
> ***Pathway 3: Community Choice Aggregation.*** *City contracts directly for energy supply.*
>
> ***Pathway 4: Municipal Utility.*** *City owns and operates independent utility.*

Attachment 3 includes a table with more detail on each of these options.

The report recommended pursuit of Pathways 1 & 2, with further exploration of Pathways 3 & 4.

Implementation of the Minneapolis Clean Energy Partnership

A key element of the city strategy was to use the renewal of the city utility franchise agreements as a leverage point to achieve deeper collaboration between the utility and the city on the city's energy vision. These franchise agreements were scheduled to

expire at the end of 2014. The City entered into negotiations with its two utilities – Xcel and CenterPoint – on renewal of the franchise agreements.

Ultimately, the franchise agreements were renewed with relatively minor changes. But they were accompanied by MOUs signed with both utilities that committed the utilities to participation in the Minneapolis Clean Energy Partnership. The core intent of the MOUs is summarized in the following language:

> *"The intent of this Memorandum is to facilitate the Parties' pursuit of the City's energy goals. Pursuant to the terms of this Memorandum, the Parties intend jointly and cooperatively to study, prioritize, plan, coordinate, implement as reasonably possible and permitted, market, track, and report progress on clean energy activities in the City in support of the City's Plan and 2040 Energy Vision (the "Work"). The Parties shall determine the tasks necessary to achieve these goals, direct the execution of tasks, and report the results of these tasks. The Parties shall harness available resources to advance the City's energy goals, and shall consider and prioritize the listing of goals." (Memorandum of Understanding – Clean Energy Partnership)*

The Partnership is governed by a Board consisting of an equal number of senior utility executives and City representatives. The City representatives include at minimum, the Mayor, two City Council members and the City Coordinator.

In early February, Bylaws for the Partnership were formally adopted and the Board held its first meeting. In addition, an Energy Vision Advisory Committee was established to advise the Board on its work plan. The 2015-2016 work plan was recently approved and can be accessed here.

Community Choice Aggregation

Community Choice Aggregation (CCA) allows municipalities to serve as energy suppliers to residents by aggregating their demand and contracting with Energy Service Providers (EPSs) to supply that demand. CCA does not change the utility role in distribution – only in supply. The local utility continues to maintain distribution infrastructure, and supply customer services of meter reading and billing.

Six states currently allow CCA by local governments – Illinois, Ohio, California, Massachusetts, New Jersey and Rhode Island.

CCA creates the opportunity for municipalities to organize energy supply contracts with high percentages of renewables, thereby contributing to a "cleaning" of the municipal energy supply system through voluntary market mechanisms.

Community Choice Aggregation is typically only allowed in states with deregulated retail power markets. Minneapolis has not pursued a CCA strategy because it is not currently allowed under the Minnesota energy regulatory framework. The Pathways report summarizes the extent of regulatory change that would be needed to enable CCA.

> *"Enabling CCA in Minnesota would require making significant changes to the current regulatory framework, including substantial revisions to two fundamental components of Minnesota's traditional regulatory structure: non-discriminatory regulated rates,*

*and exclusive service territories.*

*CCA therefore necessitates a certain unraveling of the regulatory structure and must address the complexities associated with deregulation. At a minimum, the electric utility distribution function would need to be separated from the electric generation and supply function, creating new unbundled rates. Other elements of state policy and utility regulation that might need to be modified or redefined include:*

- *The State's universal service goal and obligation to-serve requirement,*
- *The funding and administration of utility energy efficiency programs, and*
- *The disposition of long-term assets now embedded in rates (also known as "stranded costs")." (p. 55)*

Municipalization

The Pathways study conducted a brief but not in-depth analysis of the opportunity for Minneapolis to pursue the strategy Boulder, CO is pursuing – appropriating Xcel's assets through eminent domain and establishing its own municipal utility. The study concluded that the legal and financial barriers to this pathway were too high to make it viable to pursue.

Future Initiatives

The Pathways report concludes with a suggestion that some of the most promising opportunities are forward looking and focused on the long-term restricting of the grid infrastructure to accommodate smart grid technologies and a higher percentage of renewables supply. This opportunity is articulated in the Pathways chapter on "Strategies Beyond 2025 – A Focus on the 'Distribution Edge'":

> *"Cities will also be in the forefront of ushering in local green energy distribution infrastructure. While power plant development now occurs far outside the city boundaries, cities may be reintroducing hundreds of mini power plants that need to be integrated into the urban fabric…The City could develop a local planning framework for green infrastructure that makes use of local zoning and regulation powers to facilitate a distributed resource transition that minimizes conflict. Examples could include solar or combined heat and power priority zones based on linkages with city infrastructure*." (P. 87)

Engagement on Regulatory Reform

As part of its on-going work to align state policy with its energy goals, the City is becoming increasingly engaged in regulatory matters before the State Public Utility Commission. Minnesota now has a more active and progressive Public Utilities Commission than in the recent past. Xcel Energy is engaged in bi-annual long-term resource planning (15 years), including big decisions on whether to shut down a large coal plant in 2020 and what other resources should be added to the system in the 2030 timeframe. Beyond that planning horizon, the state, PUC and utilities must also consider what will happen to 30% of energy from nuclear when the permits for these plants are reviewed in 2030. The State legislature is also currently debating whether to raise the RPS to 40% by 2030 (the current RPS is 30% by 2020 for Xcel, a target they will meet). The state could be 80% fossil fuel free in 2035 with the continued operation of nuclear

and an increased RPS. The City is exploring the best options for engaging in public utility commission dockets. Having officially adopted long-term goals provides latitude to push for policies at the utility level that are beyond current commitments.

City engagement on utility reform involves:

- Tracking the PUC dockets
- Reading docket briefs and other documents
- Attending PUC hearings
- Submitting testimony
- Participating in PUC-sponsored workgroups on specific issues
- Partnering with other NGOs who are allied on common issues

## Attachment 1 – Minneapolis Energy Supply Strategy Timeline

| Year | Milestones |
|---|---|
| 2013 | • City Council adopt Climate Action Plan with GHG reduction targets:<br>  ○ 15% by 2015<br>  ○ 30% by 2025<br>• City Council adopts a Building Energy and Benchmarking Disclosure Ordinance.<br>• City Council authorizes the Minneapolis Energy System Pathways report. |
| 2014 | • Minneapolis Energy Vision adopted.<br>• Energy Systems Pathway report issued.<br>• City franchise agreements are scheduled to end in 2014.<br>• City renegotiates franchise agreements.<br>• City signs strategic MOUs with Xcel and CenterPoint to create the Minneapolis Clean Energy Partnership.<br>• City Council adopts a GHG reduction goal of 80% by 2050. |
| 2015 | • By-laws for the Clean Energy Partnership are adopted.<br>• Energy Vision Advisory Committee is established.<br>• The Partnership has its first Board meeting.<br>• A tentative list of work plan elements for the Partnership is developed.<br>• First two-year work plan of the Partnership is adopted (May 29th) |

Key Documents

- Minneapolis 2013 Climate Action Plan
- Minneapolis Energy Vision 2014
- Minneapolis Energy Systems Pathways (Feb. 2014)
- E21 Phase 1 Report (Dec. 2014)
- Utility Clean Energy Partnership MOUs
- Minneapolis Clean Energy Partnership By-Laws
- Minneapolis Clean Energy Partnership 2015 – 2016 Work Plan Elements

## Attachment 2 – Summary of Minneapolis Utility Regulatory Framework

Table 1: Comparison of Minnesota Regulatory Oversight by Topic and Type of Utility

| Regulatory Area | IOU | Muni | Co-op |
|---|---|---|---|
| Retail Rates | Set by MPUC | Set by Municipality or local governing board | Set by Co-op Board |
| Resource Planning | Yes, if above 10,000 customers | Yes, if above 10,000 customers | Yes, if above 10,000 customers |
| Certificate of Need (Large Energy Facilities) | Yes, by MPUC | Yes, by MPUC | Yes, by MPUC |
| Renewable Energy Standard (RES) | Xcel Energy: 30% by 2020<br>All other IOUs: 25% by 2025 | Municipal Power Agencies: 25% by 2025 | Generation and Transmission Cooperatives: 25% by 2025 |
| Energy Efficiency Resource Standard (CIP)<br>• Electric: 1.5% per year<br>• Gas: 1.0% per year | Yes, both gas and electric | Yes, electric; Yes, gas if muni provides more than 1 million cubic feet annually at retail | Yes, electric |
| Solar Energy Standard<br>• 1.5% by 2020 | Yes | No | No |
| Net Metering | Allowed up to 1 MW:<br>• Retail rate below 40 kW<br>• Avoided cost between 40 kW and 1 MW<br>Size restricted to 120% of the customer's on-site load. | Net metering allowed at retail rate for systems below 40kW | Net metering allowed at retail rate for systems below 40kW |
| Value of Solar alternative to Net Metering | Yes, but utility must opt in | No | No |
| Community Solar | Xcel Energy: Required<br>All other IOUs: Opt-in Projects may be up to 1 MW. Rate credited will be retail rate (next 3 years) or Value of Solar rate, at utility's discretion. | No, but allowed | No, but allowed |

(Minneapolis Energy Systems Pathways, P. 35)

## Attachment 3 – Minneapolis Energy System Pathways Options

| | Pathway | Advantages | Disadvantages |
|---|---|---|---|
| **Increasing Control and Responsibility**  | **Pathway 1: Enhanced Franchise Agreement**<br>Either a single franchise agreement that includes a broader set of goals, or a traditional franchise agreement with a separate agreement that addresses those goals. | • Near-term actionability<br>• Addresses broader set of goals and issues than traditional agreement<br>• If separate agreement, no legislation required, though beneficial<br>• City continues to rely on existing utility expertise and experience | • No on-going coordination function between the City and utilities<br>• Does not provide the City full control over energy services.<br>• City still reliant on utilities to plan and implement clean and low-income energy actions<br>• Legislation required to broaden scope of traditional franchise agreement to clean energy issues |
| | **Pathway 2: City-Utility Partnerships**<br>Formal City-utility coordinating entity focused on setting and tracking local goals.<br>Not a partnership in any legal sense, but an entity in which the City and utilities agree to act as willing partners to achieve shared goals. | • Near-term actionability<br>• Addresses broader set of goals and issues than traditional franchise agreement<br>• Allows the City to deeply engage in planning and coordination of clean energy activities<br>• No legislation needed, if created by agreement<br>• City continues to rely on existing utility expertise and experience | • Does not provide the City full control over energy services.<br>• City still reliant on utilities to implement clean and low-income energy actions<br>• May require legislation to authorize establishment of a stand-alone entity. |
| | **Pathway 3: Community Choice Aggregation**<br>City contracts directly for energy supply | • City can arrange for any desired clean energy supply mix for residents and businesses in the city<br>• Does not require City control and management over energy delivery<br>• City continues to rely on existing utility expertise and experience for energy delivery | • Requires major legislative and regulatory scrutiny and reform<br>• Does not necessarily address efficiency or low-income energy programs<br>• May increase cost of energy services within city<br>• Increased City exposure to external risk |
| | **Pathway 4: Municipal Utility**<br>City owns and operates independent utility | • Gives City full control over clean energy supply mix and programs in the City<br>• Easier to accommodate evolving policy priorities | • Substantial delay in implementation due to regulatory and legal process<br>• Increased cost of energy services within city<br>• Increased City exposure to external risk |

## City of Portland Energy Supply Strategy Profile

### Summary

Portland is a low cost energy state with a relatively mild climate. The City has set aggressive GHG reduction goals and a target for 50% renewable power by 2030 for the city as a whole.

The 2015 Climate Action Plan articulates seven strategies around energy supply issues. Because it is not pursuing a municipalization strategy (the City made an unsuccessful attempt to purchase its largest electric utility in 2005 but has not pursued municipalization since then), the City is strongly focused on advancing renewable energy supply strategies at the State level by engagement with the Legislature, the Public Utility Commission, and the utilities themselves.

### The Portland Energy Supply Context

| Context | Description |
|---|---|
| *Demographics* | • Population = 583,776<br>• Land size = 145 square miles |
| *Utility Regulation* | • Portland is a regulated utility market. Utilities own generation sources and are regulated by the Public Utility Commission.<br>• Community Choice Aggregation is not allowed in Oregon.<br>• Municipalization is allowed. |
| *Energy Cost* | • Portland is a relatively low cost power market.<br>• Retail and commercial rates are in the 8¢ to 11¢ per kWh range.<br>• Industrial electricity rates are in the 6¢ per kWh range. |
| *Energy Supply and Demand* | • The City consumes 6,873 GWh of electricity annually<br>• Portland is served by three Investor-Owned Utilities (IOUs):<br>  ○ Portland General Electric (serves 75% of the city; Portland is about a third of its total market)<br>  ○ Pacific Power (serves 25% of the city; owned by Pacificorp, a large seven-state utility company)<br>  ○ NW Natural (Oregon's largest natural gas utility) |
| *Renewable Power and Energy Efficiency Incentives* | • The state has a Renewable Portfolio Standard that sets large utility requirements:<br>  ○ 15% by 2015<br>  ○ 20% by 2020<br>  ○ 25% by 2025<br>• Net metering is allowed for commercial systems of up to 2MW and residential systems of up to 25kW<br>• The net metering credit is at the retail rate for excess generation<br>• There is an aggregate net metering cap at 0.5% of utility historical peak load<br>• Utilities are not required to offer "virtual net metering" so there is no "community solar" option in the state<br>• The Energy Trust of Oregon administers $150 million worth of rate payer energy efficiency and renewable energy programs at the state level |
| *Carbon Pricing* | • None |
| *Electricity Supply Profile* | • 43% -- Coal<br>• 25% -- Hydro<br>• 24% -- Natural Gas |

| Context | Description |
|---|---|
| | • 6% -- Wind<br>• 2% -- Other |
| *GHG Emissions Profile* | • 38% -- Electricity<br>• 24% -- Gasoline<br>• 13% -- Diesel<br>• 18% -- Natural Gas<br>• 4% -- Fuel Oil<br>• 3% -- Other |

**Establishing the Aspiration and Vision for a Clean Energy System**

The vision for energy system transformation is established in the 2015 Portland Climate Action Plan. The core goal 2030 objective is:

> *Supply 50 percent of all energy used in buildings from renewable resources, with 10 percent produced within Multnomah County from onsite renewable sources, such as solar.*

In the long term, reduced carbon intensity of electricity supplies is projected to account for 28% of the emissions reductions needed to get to an 80% reduction by 2050.

**Energy Systems Analysis**

Portland has not conducted a detailed citywide energy systems analysis.

**Energy System Strategy**

City Attempt to Purchase Portland's Local Utility

Portland's major electric utility, Portland General Electric (PGE) was purchased by Enron in 1997. PGE was one of the corporate assets that needed to be disposed of during the Enron bankruptcy proceedings. Because of uncertainty about what would happen to this utility asset during the liquidation process, in 2005 the City of Portland put in an offer to purchase the utility and manage it as a municipal utility. On July 6, 2015, the City Council unanimously adopted a measure to finance the acquisition of PGE by the sale of $3 billion in bonds.

The City offer was ultimately turned down by the interim CEO of Enron, and in April 2006, shares in a newly independent PGE were issued as part of an Enron distribution to its creditors.

Climate Action Plan Energy Supply Strategies

The 2015 Climate Action Plan includes seven strategies focused on energy supply systems.

| Energy Supply Strategies in the 2015 Climate Action Plan | |
|---|---|
| **Strategy** | **Description** |
| *Electricity Supply* | • Collaborate with Portland General Electric, Pacific Power, customers and stakeholders to reduce the carbon content in Portland's electricity mix by 3 percent per year.<br>• Communicate with utilities and the Oregon Public Utility Commission on the critical importance the City and County place on reducing the carbon content of electricity delivered to the City, County and other customers.<br>• Mitigate potential cost burdens to low-income households principally through efficiency measures that reduce energy use and cost. |
| *Installed Solar* | • Add another 15 megawatts of installed solar photovoltaic capacity.<br>• Motivate and assist households and businesses throughout the community to install solar.<br>• Revisit City solar access policy and regulations, recognizing changing conditions due to the proliferation of residential rooftop solar energy systems. |
| *Community Solar* | • Support the development of community solar projects that benefit all residents, particularly communities of color and low-income populations. |
| *Renewable Energy Policy* | • Participate in statewide policy discussions to expand the market in Oregon for renewable energy, including solar, wind, geothermal, biogas and biomass, and remove barriers to widespread participation in renewable energy programs like community solar. |
| *Biogas* | • Continue to support development of local and regional biogas resources, including anaerobic digestion of food scraps, while minimizing disproportionate impacts on low-income populations and communities of color. |
| *District Systems* | • Continue to support development and expansion of low-carbon district heating and cooling systems. |
| *Fossil Fuel Exports* | • Establish a fossil fuel export policy that considers lifecycle emissions, safety, economics, neighborhood livability and the environment; at the state level, oppose exports of coal and oil through Oregon. |

Energy Supply Strategy Comments

- **Limited solar opportunities.** Portland has relatively limited opportunities for on-site solar installations. There is currently installed capacity of approximately 15 MW. Adding another 15 MW will still amount to total solar well under 1% of citywide energy consumption.

- **No virtual net metering allowed.** State law does not yet allow community solar ("virtual net metering"). So expansion of that will require a change in state policy.

- **Reinstatement of state renewable tax credits.** Another key state policy change would be reinstatement of state tax credits for renewable energy. Until three years ago, the state had a 35% Business Energy Tax Credit for renewables that was then abolished.

- **Biogas.** Biogas is a real opportunity for the city. The local natural gas company currently offers some renewable gas products and is interested in expanding that market.

- **District systems.** The City is pursuing district energy systems on an "opportunistic" basis. The city's low energy costs and mild climate make the economics of district energy difficult to justify in many instances.

- **Fossil fuel exports.** The Mayor recently turned down a request for a major LNG export terminal in Portland without establishing an explicit strategy around the issue. The City is in the process of figuring out how to formalize its fossil fuel export strategy.

Next Steps on Strategy

PGE has one coal plant that is scheduled for retirement in 2020. Pacific Power uses 80% coal-powered electricity. The issue of how to accelerate retirement of coal plants, and what to replace them with, is the major state level energy supply issue.

City staff is very active in engaging on Public Utility Commission proceedings, both directly and through the City Attorney's office. Future energy planning is managed through the Integrated Resource Planning (IRP) process. So the key to the City "soft path" strategy is to figure out how to engage at the state level with key regulators and the utilities to institutionalize long-term planning for a renewable energy future.

The State of Oregon has a long-term GHG reduction goal of 75% by 2050. There is a "Roadmap to 2050" document that describes potential strategies for achieving this goal. But it has not been formally adopted by the Legislature, so there is no practical strategy for implementation of the 70X50 target at this point in time at the state level.

## City of San Francisco Energy Supply Strategy Profile

### Summary

Beginning in 2002, the City of San Francisco began a deliberate process of taking control of its energy future with the issuance of its first Electricity Resource Plan. The ERP set broad and aggressive goals for creating a clean power system for the city. In 2008 the Board of Supervisors endorsed the goal of a greenhouse gas free electricity system by 2030 and directed the City to update the ERP to reflect this goal.

A core strategy in the 2011 ERP is the implementation of a Community Choice Aggregation program called CleanPowerSF, which will provide all San Francisco residents the choice of procuring carbon-free power at competitive rates. CleanPowerSF is scheduled for full program launch in January of 2016.

### San Francisco Energy Supply Context

| Context | Description |
|---|---|
| *Demographics* | • Population = 852,000<br>• Land size = 46.9 square miles |
| *Utility Regulation* | • California is a regulated utility market<br>• Community Choice Aggregation is allowed under state regulations.<br>• Some IOUs are still allowed, through legacy agreements, to own generation sources<br>• While direct contracting between large users and merchant power suppliers is no longer allowed, some users have “legacy” agreements under which they still do this. |
| *Energy Cost* | • San Francisco is a relatively high cost electricity state<br>• 22¢/kWh for retail; 14¢/kWh commercial |
| *Energy Supply and Demand* | • Three electric utilities supply San Francisco:<br>  ○ PG&E, an IOU, serves 75% of the electricity demand<br>  ○ The San Francisco Public Utility Commission (SFPUC) Power Enterprise serves all municipal facilities and some selected other areas, providing about 17% of SF usage.<br>  ○ The remaining 8% is served by Energy Service Providers (ESPs) that serve direct access customers.<br>• Total electricity usage = 6,000 MWh per year.<br>• Peak demand is 970 MW; average demand is 700 MW. |
| *Renewable Power Incentives* | • Renewable Portfolio Standards:<br>  ○ 20% by 2014<br>  ○ 25% by 2017<br>  ○ 33% by 2020<br>• Net metering is allowed for systems up to 1 MW; bill credit is at the retail rate |
| *Energy Efficiency Incentives* | • A 2006 law requires a 10% reduction in electricity consumption by 2016<br>• The level of reduction required varies by utility |

| Context | Description |
|---|---|
| *Carbon Pricing* | • None |
| *Electricity Supply Profile* | • PG&E source mix includes:<br>  o 38% hydro and nuclear<br>  o 14% renewables<br>  o Remainder is primarily natural gas fired plants.<br>• SFPUC supply is 100% renewables and comes from three hydroelectric power plants that SFPUC owns and operates with the City's Hetchy Hetchy reservoir system. Average annual output is approximately 200MW.<br>• San Francisco has 13 MW of installed solar power in the city. |
| *GHG Emissions Profile* | • 40% -- Transportation<br>• 26% -- Natural Gas<br>• 18% -- Commercial Electricity<br>• 6% -- Residential Electricity<br>• 5% -- Waste<br>• 5% -- Other |

**Establishing the Aspiration and Vision for a Clean Energy System**

The San Francisco path to a clean energy supply system began in 2002 with the adoption of the City's first Electricity Resource Plan (ERP). The 2002 ERP came on the heels of the California energy crisis when a poorly managed deregulation strategy led to spiraling energy costs and the bankruptcy filing of its major utilities. The industry was still in the process of figuring out its restructuring strategy. The 2002 ERP focused on several strategies:

1. A Clean, Reliable Electricity Portfolio
    a. Strategies to shut down two aging and highly polluting power plants in the City (Hunters Point and Potrero Power Plant).
    b. Advance energy efficiency to 107 MW of capacity by 2012
    c. Implement 150 MW of new solar capacity by 2012
    d. Implement 250 MW of medium-sized generation by 2008
    e. Implement 72 MW of small-scale distributed generation by 2012
    f. Install new transmission lines to serve the city

2. Environmental Justice
    a. Target low income neighborhoods for clean energy implementation
    b. Monitor pollutants in neighborhoods

3. Implementation and Review
    a. Establish new funding sources
    b. Perform economic impact and employment analyses
    c. Target all sectors for implementation

In 2008, the Board of Supervisors endorsed a goal of an 80% reduction in GHG emissions by 2050, and a GHG-free electricity system by 2030. The 2011 update of the Electricity Resource Plan set out the framework and recommendations for achieving this aggressive goal.

Issues of control and system fragmentation are core to the challenges articulated in the San Francisco vision:

> *"The major challenge in developing a citywide electricity resource plan is the fragmented nature of the provision of electricity service in San Francisco. Currently, the responsibility for purchasing and procuring San Francisco's electricity needs is divided between PG&E (75% of total usage), direct access providers (8%) and the San Francisco Public Utility Commission's municipal load (17%).*
>
> *In order to significantly increase the renewable and GHG-free content of San Francisco's electricity supplies, San Francisco and its businesses and residents must either directly participate in the wholesale energy market or influence the wholesale procurement choices currently made by PG&E and other energy service providers."*
>
> *(San Francisco 2011 Updated Electricity Resource Plan, P. 5)*

The 2002 ERP established the following goals for the San Francisco electricity system:

- Assure Reliable Power
- Maximize Energy Efficiency
- Develop Renewable Power
- Increase Local Control
- Affordable Electric Bills
- Improve Air Quality
- Support Environmental Justice
- Promote Economic Opportunities

These same goals have been used to guide the 2011 ERP update. An additional set of goals for the CleanPower San Francisco (CPSF) initiative (the city's Community Choice Aggregation program) provides an additional level of detail for the vision:

- **Choice.** Provide customers with a choice for their electricity supplies.
- **Clean.** Reduce the City's reliance on fossil fuels and reduce pollution and greenhouse gas emissions associated with electricity generation necessary to serve San Francisco's residents and businesses.
- **Competitive.** Provide electricity supplies at rates that are competitive with PG&E service and to stabilize electricity rates for City residents and businesses enrolled in the program.
- **Local Control and Jobs.** Increase local control over electricity supplies and increase local green job opportunities.

**Energy System Strategy**

The 2011 ERP Update includes 21 different actions under three broad strategies. These are summarized below.

*Strategy 1 – Empowering San Francisco Citizens and Businesses to Reduce GHG Emissions*

1. **Energy Efficiency.** Improve and expand energy efficiency programs in San Francisco.
2. **Behind the Meter.** Promote the development of behind-the-meter resources to create jobs and encourage the optimal combination of energy efficiency, on-site generation (e.g. on-site wind or solar as well as efficient, low-emitting cogeneration) and load-shifting and demand response capability through smart-grid technology and energy storage.
3. **Technology Innovation.** Develop San Francisco as a "Green Test Bed" to promote and encourage the deployment of new energy technologies within the City and attract green energy firms to locate within the City, including finding alternate or new financing opportunities.
4. **Building codes.** Improve building codes and standards to promote energy efficiency.
5. **Distributed Generation.** Advance and support Community Scale Energy Systems, both privately-owned as part of new development and through increased use of City-provided infrastructure where possible.
6. **Storage.** Promote back-up storage deployment as an alternative to the existing use of diesel and natural gas-powered back-up generation.
7. **Community Choice Aggregation.** Implement Community Choice Aggregation consistent with guidance from the Board of Supervisors and the San Francisco Local Agency Formation Commission (LAFCo).

*Strategy 2 – Increase the Renewable and GHG-Free Content of San Francisco's Electricity Supplies*

8. **Transmission.** Evaluate and develop new City-owned transmission projects to increase the delivery of Hetch Hetchy and renewable power to San Francisco.
9. **Green Power Option.** Develop an optional "green pricing" option (through CCA and/or PG&E) allowing San Francisco customers to voluntarily commit to purchase electric energy from zero-GHG energy sources.
10. **Regulatory Engagement.** Participate in regulatory proceedings before the CPUC and FERC to encourage state and federal policies to promote the use of GHG reduction strategies and encourage the development of CCA.

*Strategy 3 – Continuing and Expanding SFPUC Electric Service to Guarantee Reliable, Reasonably Priced and Environmentally Sensitive Service*

11. **SFPUC Rate Reform.** Develop a rate structure for the SFPUC that reflects its cost-of-service, promotes the efficient use of electricity, and provides the SFPUC with the financial capability to use long-term financing to develop new resources.
12. **Increased Municipal Load.** Increase the use of municipal load supplied by electric energy from Hetch Hetchy to displace fossil-fuel use (e.g. shoreside docking, electric buses and light-rail vehicles, and recharging electric vehicles in City-owned parking lots).
13. **Interconnection Agreement.** Renegotiate the Interconnection Agreement (IA) with PG&E that governs the transmission and distribution of Hetch Hetchy energy to San Francisco that expires in June 2015.
14. **EJ Policies.** Continue to implement the SFPUC's recently adopted

Environmental Justice and Community Benefits policies.

The Emergence of Community Choice Aggregation as a Core Strategy

The two practical short-term strategies available to the city that could have a significant impact on electricity supply include:

- Implementation of Community Choice Aggregation.
- Expansion of the municipal power system (SFPUC Power Enterprise).

Community Choice Aggregation emerged as a core strategy for the City. The City's program was branded as "CleanPowerSF". To support the implementation of the CCA program, the City commissioned a study by EnerNex to analyze build out strategies for the program. The core recommendations of the report include:

- Utilize the capacities of the SFPUC Power Enterprise, which currently provides power to 17% of the city (municipal demand) for a number of CPSF functions, including power procurement. As the report notes: "*Because the skills, expertise, processes and systems needed to manage the procurement and portfolio management services for CPSF are essentially the same as those already in use and being further developed and refined within SFPUC PE, potential benefits and economies of scale may result from SFPUC's support of CPSF.*" (p.1) The report also suggests SFPUC could provide some services for customer services, including bill inquiries and bill calculations.

- Begin with a targeted goal of 20-30 MW procurement and expand it as needed.

- Offer both a 100% renewable plan, as well as a "Light Green" plan that would provide at least 50% renewable energy at the same rate as PG&E.

- Develop strategies for the creation of local renewable supplies, as well as procuring certified renewable energy from quality power retailers. (The report recommends looking at a combination of large solar, wind and geothermal projects.)

- Explore the option of having CPSF be a preferred customer of SFPUC's Power Enterprise (which has 100% renewable supplies from hydropower.)

- Develop a strategy to recruit large C/I customers to participate in CPSF. (California law requires CCA programs for residential customers to be on an "opt out" basis – meaning they are the default choice unless the customer decides otherwise. This requirement does not apply to large commercial/industrial customers.)

- Consider offering incentives for "Behind the Meter" renewable strategies through CPSF.

- Consider having CPSF offer more generous net metering reimbursements than those offered by PG&E.

CleanPowerSF is scheduled to launch in January of 2016.

Regulatory Advocacy

The City engages with the California Public Utility Commission (CPUC) proceedings through the Local Government Sustainable Energy Coalition (LGSEC), which has a consultant who tracks proceedings and hosts teleconferences to develop comments. There are several proceedings currently of interest, on subjects such as the EE Rolling Portfolio, Integrated Demand Side Management, EM&V, Distributed Resources, etc.

When appropriate, the City attends proceedings and sometimes speaks at the CPUC hearings. Through the Bay Area Regional Energy Network, a project of the nine counties of the Association of Bay Area Governments, the City has a staff person who also tracks the proceedings in coordination with the LGSEC consultant. The City has recently started coordinating with Marin Clean Energy and its own San Francisco Public Utility Commission on proceedings as they relate to the San Francisco Community Choice Aggregation strategy.

## Attachment 1 – San Francisco Energy Supply Strategy Timeline

| Year | Milestones |
|---|---|
| 2001 | • Board of Supervisors passes a resolution on: "Human Health and Environmental Protections for New Electric Generation" which directs the city to "…prepare an energy resource plan that considers all practical transmission, conservation, efficiency and renewable alternatives to fossil fuel electricity generation in the City and County of San Francisco." |
| 2002 | • Board of Supervisors approves the 2002 Electricity Resource Plan (ERP). The ERP set broad and aggressive goals for creating a clean power system for the city. |
| 2008 | • Ordinance 81-08 endorses the goal of a greenhouse gas free electricity system by 2030. |
| 2009 | • Ordinance 94-09 directs the SFPUC to update the 2002 ERP and develop a detailed plan to achieve a GHG-free electricity supply by 2030. |
| 2011 | • The 2011 ERP Update is issued. |
| 2015 | • A study is commissioned on options for CleanPowerSF to acquire renewable energy supplies as part of the Community Choice Aggregation (CCA) implementation strategy. |
| 2016 | • CleanPowerSF is scheduled to launch in January 2016. |

Key Documents:

1. San Francisco 2002 Electricity Resource Plan
2. San Francisco 2011 Electricity Resource Plan
3. Ordinance 81-08
4. RMI 2010 Report: "A Greenhouse Gas Free Electricity Strategy for City of San Francisco."
5. EnerNex – "Local Build-out of Energy Resources of the Community Choice Aggregation Program", January, 2015

## Energy System Strategy Profile – Seattle

**Summary**

Seattle launched its Climate Protection Initiative in 2005 with a goal or reaching the Kyoto Protocol goal of reducing emissions to 7% below 1990 levels by 2012. This commitment has resulted in continuous action to drive down emissions through efficiency, cleaner fuels, and behavior change. These efforts have had three broad phases:

**Climate Action Gets Underway** (~2005-2008)
***A focus on incentive-driven behavior change and cleaner fuels.***
Seattle's initial climate action strategies focused on behavior change initiatives in the transportation sector, and supporting shifts to cleaner fuels in transportation and utilities. In 2006, Seattle City Light, the city's municipally-owned electric utility, achieved its goal of carbon neutrality and committed to meeting all future load growth through a combination of conservation and renewables. Seattle also launched several outreach, education, and technical assistance programs.

**Climate Action Matures** (~2008 to 2011)
***A strong focus on building energy.***
In 2008, The Mayor engaged a broad set of community stakeholders to identify actions that would lead to carbon neutral new buildings by 2030, and actions that would reduce energy use in existing buildings by 20% by 2020. The resulting strategy included the following recommendations that the City acted upon:

- New Construction
  - PriorityGreen permitting
  - Strong energy codes
- Existing Buildings
  - Energy benchmarking & disclosure policy
  - Seattle City Light direct install and incentive programs
  - Retrofit support strategies, including information, incentives, financing, and workforce support

The formation of this strategy coincided with federal ARRA support for programs simultaneously driving energy efficiency and workforce development, which helped the City to pilot several efforts and refine its strategy.

**Carbon Neutral, Climate Ready** (2011 and beyond)
***A foucs on carbon neutrality, climate resiliency, climate justice, and cobenefits.***
In 2011, Seattle announced a goal of reaching carbon neutrality by 2050. This launched a planning process culminating in the adoption of Seattle's 2013 Climate Action Plan, which incorporated comprehensive strategies to achieving carbon neutrality by 2050 in the transportation, buildings, and waste sectors, and outlined a strategy for climate resilience planning. This plan also recognized the multiple community values and priorities that climate action can support and was developed to emphasize the many cobenefits of climate action and be implemented in sync with other city planning efforts. The Plan included several foundational actions to focus on in early years ("By 2015 Actions"), which have been directing the City's climate policy work over the last few years. Seattle is now looking to the next phase of work: conducting deeper analysis of

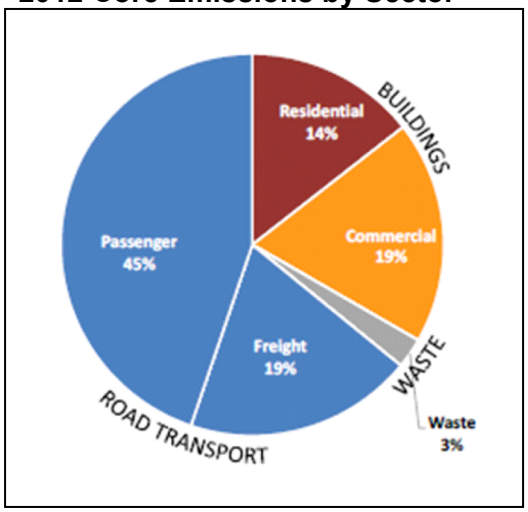
its building stock to help identify building sector-specific planning targets; developing the City's first comprehensive Climate Resilience Plan; and planning to update the Climate Action Plan to identify a new suite of near-term strategies and ensure the Plan continues to remain relevant and serve as a guide to the City's ongoing climate planning work.

**The Seattle Energy Supply Context**

- Population is 640,000; metro area population is 3.6 million.
- Washington has a regulated utility market for electricity and natural gas providers. District energy systems are not regulated in the state.
- Seattle is served by Seattle City Light, a municipal utility, for electricity; Puget Sound Energy, an investor-owned utility, for natural gas; and Enwave Seattle, a private district steam utility that operates in the downtown area.
- Seattle City Light's fuel source profile in 2013 included:
    - 89% -- Hydro
    - 4.5% -- Nuclear
    - 3.4% -- Wind
    - 1.7% -- Coal
    - 1.5% -- Other
- Washington has a state Renewable Portfolio Standard that requires utilities to generate 15% of their electricity from renewable sources by 2020.
- Washington allows net metering.
- The State of Washington does not participate in an Emissions Trading System.

The graphics below show Seattle's emissions profile.

**2012 Core Emissions by Sector**




**The Next Stage – Developing a Comprehensive Energy Master Plan**

Seattle is investigating planning options to comprehensive address our future energy needs– incorporating energy use and energy sources through both the building and transportation sector, and enhancing equity and climate resilience related to energy planning. This work will take place over the next several years, with the intention of creating a better understanding of the interlinkages between different energy needs and generating strategies that take advantages of synergies between systems and needs.