

MEMORANDUM

TO: UTILITIES ADVISORY COMMISSION
FROM: UTILITIES DEPARTMENT
DATE: DECEMBER 7, 2011
SUBJECT: Plan to Achieve Carbon Neutrality for the Electric Portfolio



REQUEST

Staff requests that the Utilities Advisory Commission (UAC) recommend that the City Council support a policy to pursue a carbon-neutral electric portfolio and direct staff to develop a plan by December 2012 to achieve that goal.

SUMMARY

Palo Alto has a long-standing reputation as a leader in issues related to the environment and sustainability as reflected in Council's action to identify environmental sustainability as one of its top priorities. Adoption of a carbon-neutral electric portfolio policy is in direct support of environmental sustainability and would further establish the City as a leader in sustainability.

By the year 2020, the City's electric portfolio is expected to reach its 10-year energy efficiency goal of 7.2% reduction in usage and will have renewable energy provide at least 33% of its annual needs with carbon-free large hydroelectric supplies providing another 49% of the City's needs. Therefore, by 2020, about 80% of the City's electricity supply will be from carbon-neutral resources.

Recognizing Council's commitment to environmental sustainability and community support for measures to protect the climate, staff evaluated several strategies to further reduce the carbon content of the electric portfolio in pursuit of carbon neutrality. Specifically, staff examined increasing energy efficiency goals, increasing renewable energy targets, procuring additional carbon-free resources, such as large hydroelectric generation, and procuring renewable energy certificates (RECs), environmental offsets, and/or carbon allowances. Staff conducted a preliminary assessment of the benefits, costs, rate and bill impacts and risks of pursuing such strategies.

Preliminary results show that depending on the strategy taken and market conditions, the cost of achieving carbon neutrality may result in incremental rate impacts of 0.1 to 1.3 cents per kilowatt hour (kWh), or \$0.40 to \$5.30 per month for the average residential bill¹. This rate impact is in addition to the cost to meet the state requirement to meet a 33% Renewable Portfolio Standard

¹ Assumes a typical residential bill of 400 kWh per month.. A typical small commercial customer will use about 800 kWh per month.

(RPS). Current estimates suggest it will cost the City 0.35 to 0.5 cents per kWh to achieve the 33% RPS.

Further, the electric utility industry faces an unprecedented amount of legislative, regulatory and market uncertainty over the next few years, mainly attributed to the State's pursuit to reduce greenhouse gas (GHG) emissions through implementation of California's Global Warming Solutions Act of 2006 (AB32). The final rules for the implementation of the cap-and-trade system to meet AB32 goals along with regulations for the enforcement of California's recently approved legislation to mandate an RPS of 33% by 2020 are not yet known. Additionally, Governor Jerry Brown has made certain policy goals public including the possibility of increasing the RPS and mandating the development of local, renewable distributed generation. This uncertainty makes it difficult and risky to plan for, and acquire, long-term resources.

Moreover, staff is undertaking several key initiatives and efforts over the next twelve to fifteen months, which may impact how and when the Council chooses to move forward in pursuing carbon neutrality, including:

1. Updating and pursuing the City's RPS target of 33% by 2015, and development of an RPS compliance program to meet the new state mandate of 33% by 2020;
2. Full assessment of the costs, benefits and risks associated with cap-and-trade and necessary policies, guidelines and authority to manage the electric portfolio accordingly;
3. Possible resolution on several environmental orders and/or opinions which may impact the availability and value of the City's long-term hydroelectric generation resources;
4. Redesign of the PaloAlto**Green** program; and
5. Development of a new Ten-year Electric Energy Efficiency goal by the end of 2012.

In order to complete the initiatives and allow time for the regulatory and legislative uncertainties to be resolved, staff recommends developing a plan for the electric portfolio to achieve carbon neutrality over the next year. At a minimum, the plan will include the following components:

1. Assessment of the community's desire to pursue a carbon-neutral electric portfolio and willingness to pay for such an endeavor;
2. Appropriate rate impact limit;
3. Definition and measurement of carbon neutrality;
4. Identification and evaluation of types of resources to reach a carbon-neutrality goal;
5. Evaluation of alternate electric portfolio resource acquisition strategy including levels of energy efficiency, renewable energy, and any other resource identified;
6. Determination of how the PaloAlto**Green** program can help, or be modified to help, achieve a carbon-neutral goal;
7. Mitigation and/or contingency measures to deal with uncertainties such as changes in regulations;
8. A time-line to achieve a carbon-neutral electric portfolio; and
9. Recommendation of a strategy to achieve a carbon-neutral electric portfolio.

BACKGROUND

Policy framework

Council approved the City's Climate Protection Plan (CPP) in December 2007 (CMR 435:07). The CPP set a goal to reduce GHG emissions by 15% from 2005 levels by the year 2020. In March 2011 Council approved the Long-term Electric Acquisition Plan (LEAP) (Staff Report 1317) establishing, among other things, a least cost resource acquisition objective and general direction for efforts to reduce the electric portfolio's carbon intensity to achieve certain GHG reduction goals under Strategy #5 – Climate Protection, consistent with the City's CPP and AB32. Further, in July 2011 Council approved the Utilities Strategic Plan (Staff Report 1880), including a performance measure to reduce the carbon intensity of the electric portfolio.

City's Climate Protection Plan and Role of Electric Supply in Community Emissions

In 2005, the City's community GHG emission levels were 794,000 metric tons of carbon dioxide equivalent² (CO₂e) of which 145,000 metric tons of CO₂e were attributed to the use of electricity³. The CPP set a community reduction goal from 2005 levels of 15% GHG emission reduction by 2020. The Utilities Strategic Plan's target is to reduce the electric portfolio's carbon intensity to 80% of 2005 emission levels by 2015. Since 2005, due to the combination of an increased share of renewable energy in the electric portfolio and lower loads due to efficiency measures and the economic downturn, the carbon content of the electric supply was 109,000 metric tons in 2010⁴. Further, by 2015 as energy efficiency and RPS goals are met, GHG emissions from electricity consumption are projected to decrease to about 84,000⁵ metric tons, a 42% reduction from 2005 levels. This result is in spite of a large increase in total City load related to a facility expansion planned by a large commercial customer. Beyond 2015, the emissions are expected to remain relatively flat through 2020. Figure 1 illustrates the gradual decline of emissions over time due to higher renewable and efficiency penetration, but it also illustrates how annual emission levels are highly sensitive to changes in the annual hydroelectric supply.

At the time that Council approved LEAP, staff recommended not to pursue a policy to achieve a carbon-neutral portfolio for Palo Alto. Staff's reasons for not recommending a carbon-neutral policy and/or adoption of carbon intensity goals included: a high level of uncertainty related to implementation of AB32's cap-and-trade provisions to regulate GHG emissions; staff's expectation that adoption of an RPS would be required by Californian state law; and sensitivity to rate increases related to additional climate protection measures. However, the LEAP Implementation Plan included a task to re-evaluate the costs, benefits and impacts of the implementation of a carbon-neutral policy for the electric portfolio and the setting of quantitative goals to reduce GHG emissions⁶.

² CO₂e, or carbon dioxide equivalent, is the concentration of carbon dioxide that would cause the same amount of global warming impact as a given mixture of carbon dioxide and other GHG. For example, the global warming potential for methane is 21. This means that the emission of one metric ton of methane is equivalent to the emission of 21 metric tons of carbon dioxide.

³ Source: Climate Protection Plan approved by City Council on December 3, 2007.

⁴ Assumes unspecified market purchases accounted for 35% of load or (353 GWh) in 2010 and a carbon content of 879 pounds of CO₂e per MWh of unspecified market resources.

⁵ Assumes average hydro conditions and unspecified market purchases will account for 20% of load or (212 GWh) and a carbon content of 879 pounds of CO₂e per MWh of unspecified market resources.

⁶ LEAP Implementation Plan Task No. 26

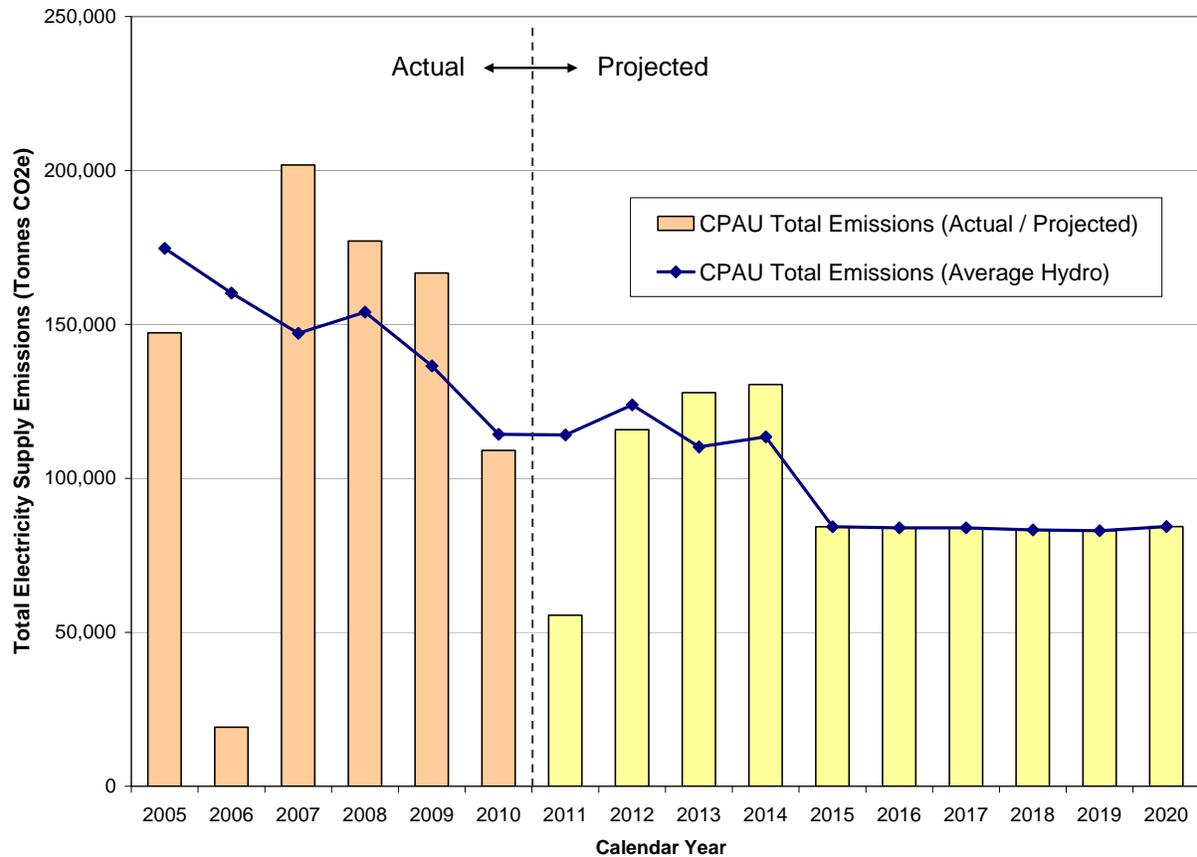


Figure 1: Actual and Projected GHG Emissions for Palo Alto’s Electric Portfolio

DISCUSSION

Impact of California Regulations to Reduce Electric Sector Carbon Emissions under AB32

AB32 has statewide goals for reducing GHG emissions by 2020. The three main tenets of AB32 include: 1) pursuit of all cost effective energy efficiency; 2) adoption of a state-wide RPS; and 3) implementation of a state-wide cap-and-trade program to promote the development of low-carbon emitting resources.

The California Air Resources Board (CARB) is in the process of finalizing regulations to achieve the 2020 emission reduction goals set-forth in AB32. The cap-and-trade regulations are expected to be finalized in 2012 for implementation to begin January 2013. Under the cap-and-trade regulations applicable to the electricity sector, CARB will be issuing “emission allowances” that electric generators have to procure equivalent to the amount of carbon dioxide and other GHGs the generators expect to emit.

To help offset the additional cost to electricity consumers associated with meeting AB32 goals, CARB staff proposes to allocate allowances free of charge to electric Load Serving Entities (LSEs), such as the City, under the stipulation that LSEs in turn sell these allowances in a centralized market or auction and collect revenue to reduce the impact to their customers who will be paying higher wholesale electricity prices. CARB staff recommends that allowances be allocated to individual utilities at the start of the program for 2013 to 2020. To allow for certainty in planning, LSEs will be

given allocations for the eight-year period, with the amount of allowances decreasing each year after 2013. Allocations of free allowances are not expected beyond 2020.

Market evidence suggests that the forward price for electricity already includes the additional cost of emission allowances resulting from cap-and-trade. Figure 2 shows the trading history of forward wholesale electric prices in Northern California for calendar year strips for 2012 and 2013 and illustrates the immediate increase and decrease in forward prices following certain regulatory announcements by CARB. When CARB delayed the implementation of cap-and-trade to be effective in 2013, instead of 2012, the price of electricity for calendar year 2012 immediately fell by the market value of carbon allowances that was embedded in those prices. Based on current market trading data, the cost of carbon allowances in the near-term (2013 to 2014) is about \$16 to \$18 per metric ton of CO₂e, which translates to a premium of about \$7 to 8 per Megawatt-hour (MWh) embedded in wholesale electric prices starting in 2013.

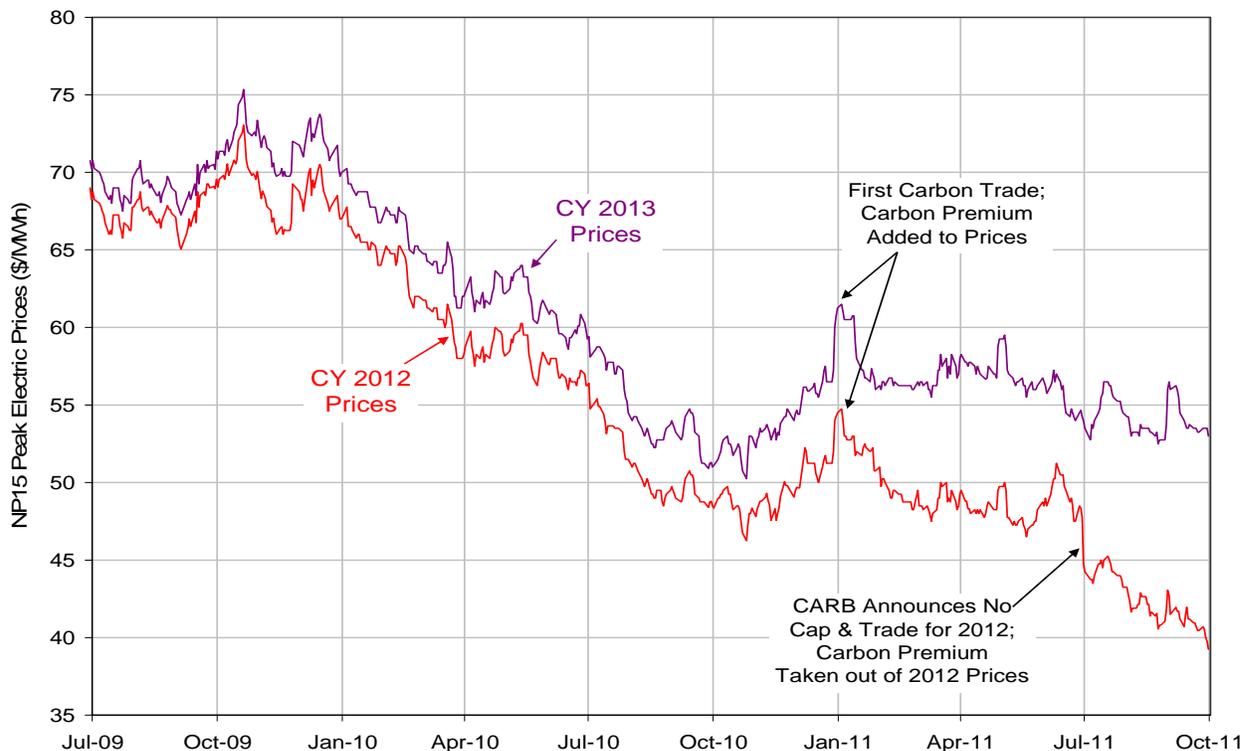


Figure 2: Electric Wholesale Prices in Northern California

The City’s exposure to the cost of carbon is a direct function of its exposure to the wholesale electricity market. The City’s market purchases are expected to be about 31% of load⁷ in 2013 and decreasing to 20% in 2020. The City’s exposure to the carbon market fluctuates with changes in load and supply resources as shown in Figure 3⁸. As part of the plan to move forward with pursuing carbon neutrality, staff will provide a thorough assessment of the potential impacts to the City of

⁷ Load represents total supply acquired. Based on load forecasts and projections for energy efficiency (EE) savings as of November 2011, the City’s load is projected to be 1,044 GWh in 2013 increasing to 1,084 GWh in 2020.

⁸ The supply resources represented in Figure 3 assume that the City’s RPS will be 33% of sales for 2015 and beyond.

cap-and-trade regulations and changes needed to manage the electric portfolio under the new regulatory requirements.

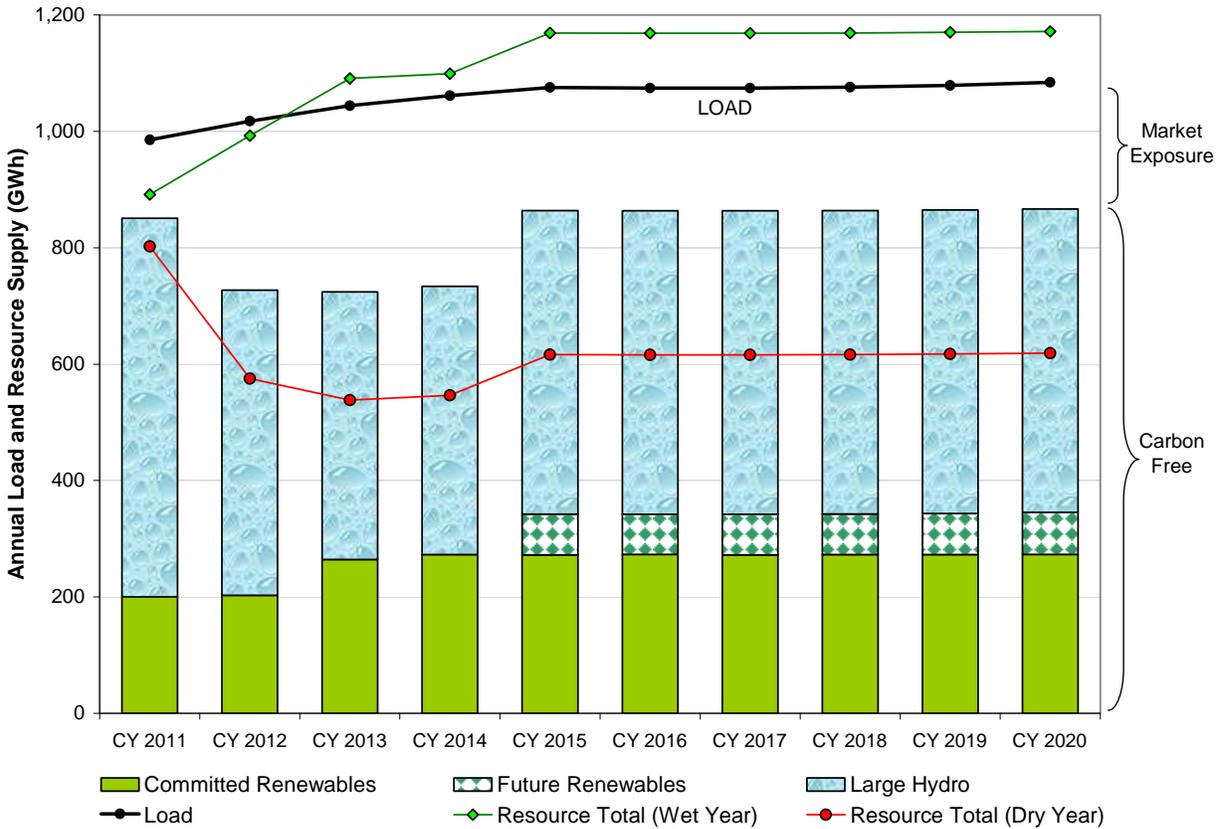


Figure 3: Annual Load and Supply Resources under Various Hydrological Conditions

Energy Efficiency

The City’s adopted 10-Year Electric Energy Efficiency (EE) goal to reduce electric energy use by approximately 74 Gigawatt-hours per year (GWh/year) by 2020⁹, or 6.4% of the City’s usage, based on the amount of cost-effective EE the City could realistically obtain. If higher levels of EE could be achieved, it would offset the amount of wholesale market purchases (and, potentially, the renewable energy supplies) needed.

The cost of electric EE has continued to increase as the City sets higher efficiency goals for several reasons. Programs have expanded beyond the most cost-effective programs such as residential refrigerator recycling and lighting into less cost-effective programs such as heating, ventilation and air conditioning for businesses and behavioral programs for residents (e.g., Home Energy Reports). Also, the California Energy Commission (CEC) continues to ramp up energy efficiency standards for construction and new appliances under Titles 24 and 20. Since utilities are only able to count savings for efficient systems, equipment and appliances above these higher standards, the amount of

⁹ The 10-year EE adopted goal is to reduce energy use by 7.2% of the forecasted load of 1,014 GWh, based on the load forecast completed in November 2010. This corresponds to 74 GWh/year reduction by 2020. The updated forecast is for load in 2020 to be 1,084 GWh, for which 74 GWh of EE savings translates to an energy efficiency reduction target of 6.4%.

savings that can be counted for each upgrade is reduced. Thus, the benefit-to-cost relationship for programs is impacted on both sides of the equation, with the benefits that can be counted reduced, and costs to implement programs increased.

State law (AB 2021; passed in 2006) requires that all investor- and publicly-owned utilities, such as the City, develop a ten-year EE plan every three years. The City’s next ten-year EE plan will be completed by the end of 2012. The goals set forth in the next ten-year EE plan will re-evaluate the amount of cost-effective EE available. This evaluation will be used to develop the plan to achieve carbon neutrality.

Renewable Portfolio Standard (RPS)

In April 2011, California’s Governor Jerry Brown signed Senate Bill X1-2 (SB X1-2) into law, mandating a 33% RPS by 2020 for all LSEs, including municipal utilities such as Palo Alto. SB X1-2 establishes the amount of renewable supplies, as a percent of retails sales volume, to be met by certain compliance periods. The law maintains the CEC’s definition of eligible renewable resources based on the resource’s technology, vintage, size and location. The law further establishes three different categories or “buckets”¹⁰ of renewable resources based on whether the resource is generated: in-state (Bucket 1); out-of-state or is a bundled product with energy and REC¹¹ (Bucket 2); or a REC-only product (Bucket 3). Table 1 below summarizes the procurement requirements established by SB X1-2 for each of the three compliance periods, as well as the limits on the use of Bucket 1 and Bucket 3 renewables for each period.

Table 1: Summary of SB X1-2 Procurement Requirements by Compliance Period

Compliance Period	RPS Target	Minimum % for Bucket 1	Maximum % for Bucket 3
2011 – 2013	20%	50%	25%
2014 – 2016	“Reasonable progress” to ensure 25% renewable energy by the end of this period	65%	15%
2017 – 2020	“Reasonable progress” to ensure 33% renewable energy by the end of this period	75%	10%

In November 2011, staff provided a thorough report to the UAC on the implications of SB X1-2 on the City’s RPS along with recommended policy changes to align the City’s RPS with certain aspects of the state mandate. Included in that report was an assessment of the value of the City’s existing

¹⁰ Bucket 1 renewables includes in-state projects which deliver energy directly into a California balancing authority such as the California Independent System Operator (CAISO); Bucket 2 renewable resources consists of energy generated out-of-state that is used by the local grid as it is generated, and then later an equal amount of energy from a different resource is delivered into the California grid as a “firmed and shaped”; Bucket 3 renewables encompasses all REC-only transactions, otherwise known as unbundled-RECs since there is no underlying energy associated with the contract. With an unbundled-REC, the renewable energy is generated and consumed separately from the RECs, which are sold later.

¹¹ A REC represents the environmental attributes associated with the energy that was generated and one REC is associated with one MWh of energy produced.

renewable resources, all in Bucket 1, and the potential opportunity to swap surplus Bucket 1 resources with less valuable resources from Bucket 3. Specifically, the City could sell the energy and green attributes associated with its existing in-state, landfill gas and/or wind renewable contracts – the green attribute alone is currently valued at about \$40/MWh – and replace with less expensive Bucket 3 renewable resources (i.e., RECs) and generic market energy. A preliminary estimate of the value to the City of undertaking such a strategy is \$20 million over the next 10 years. In the report to the UAC, staff recommended not pursuing such opportunities, since doing so may contradict the Council’s original intent of committing to the resources for the purpose of meeting certain environmental sustainability goals through the support of long-term renewable resources as opposed to short-term RECs. However, staff reviewed this potential opportunity further and will complete a more detailed analysis of the costs, benefits, and risks involved in the context of a plan to achieve a carbon-neutral policy. The plan to achieve carbon neutrality will include a discussion of the appropriateness of carrying out such a strategy along with a recommendation on whether or not to pursue.

As part of LEAP and the City’s current RPS target of 33% by 2015, Council restated the annual rate impact limit of 0.5 ¢/kWh. Through a request for proposals (RFP) recently issued for renewable resources, the City has received several proposals which reflect a much lower cost of renewable premiums than estimated in 2010, when the last set of renewable resource contracts were brought to Council for approval. At that time, the renewable premium was approximately \$40 per MWh for a twenty-year contract for an in-state project. Preliminary results from the recent RFP show the premium for the same type of renewable resource has decreased to about \$20 per MWh. Staff is in the process of evaluating the proposals based on several criteria, including project viability. If the proposals prove to be viable, it is conceivable that the City could reach a 33% RPS with an estimated annual rate impact of 0.35 ¢/kWh. Alternatively, utilizing the 0.5 ¢/kWh rate impact limit, the City could potentially achieve a 40% RPS. The plan to pursue carbon neutrality will examine the potential rate impacts required to first reach the City’s RPS goal, and then achieve a carbon-neutral portfolio with renewable resources.

Defining Carbon Neutrality

A consistent and standard definition of carbon neutrality does not exist in the energy sector. Generally, carbon neutrality is defined as achieving net zero carbon emissions by balancing a measured amount of carbon emissions with an equivalent amount of carbon offset, through some type of carbon reduction activity, or through the acquisition of energy resources deemed to be carbon-neutral. Achieving carbon neutrality for the City’s electric portfolio could be defined as annually reporting zero net GHG emissions according to The Climate Registry (TCR)¹² protocols. While this method may be deemed an acceptable measure of carbon neutrality, there are several inconsistencies between TCR’s acceptance of certain resources as carbon-neutral, the standards set by CARB for GHG reduction measures, resources deemed RPS eligible by the CEC, and how resources are reported annually in the City’s Power Content Label. Further, using an annual measure of carbon neutrality may prove difficult given variations in load and supply resources.

¹² TCR is a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report GHG emissions into a single registry. TCR supports both voluntary and mandatory reporting programs and provides comprehensive, accurate data to reduce GHG emissions. The City is a member of TCR and has been reporting its GHG emissions since 2005.

Ultimately, in its quest to achieve carbon neutrality, the City will need to develop its own definition of carbon neutrality for the electric portfolio, while recognizing the possible discrepancies in external reporting protocols. The plan will need to establish a definition of carbon neutrality early as it will drive the alternatives evaluated. The definition will also need to address the timeframe for measuring carbon neutrality due to the annual variability of supply generation in the portfolio.

Load and Supply Resource Uncertainty

Under the current plan in 2020, the City’s electric portfolio is expected to require market purchases of about 20% of the load; however, even in an average hydroelectric year the portfolio will have surpluses in months when hydroelectric generation and wind output are highest. Procuring additional resources to meet carbon neutrality could further exacerbate this problem and increase market price exposure. Figure 4 is an illustration of supply resources by month in 2020 and shows the high level of variability of the City’s hydroelectric resources, which represent from 30 to 80% of the City’s annual electric needs depending on hydrologic conditions. Currently, under wet hydrologic conditions the City can have resources surplus to load by as much as 55% during the spring months. Adding additional carbon-neutral resources to the portfolio would extend these surplus positions even further, particularly if the new resources had a monthly load shape like hydroelectric resources or solar resources.

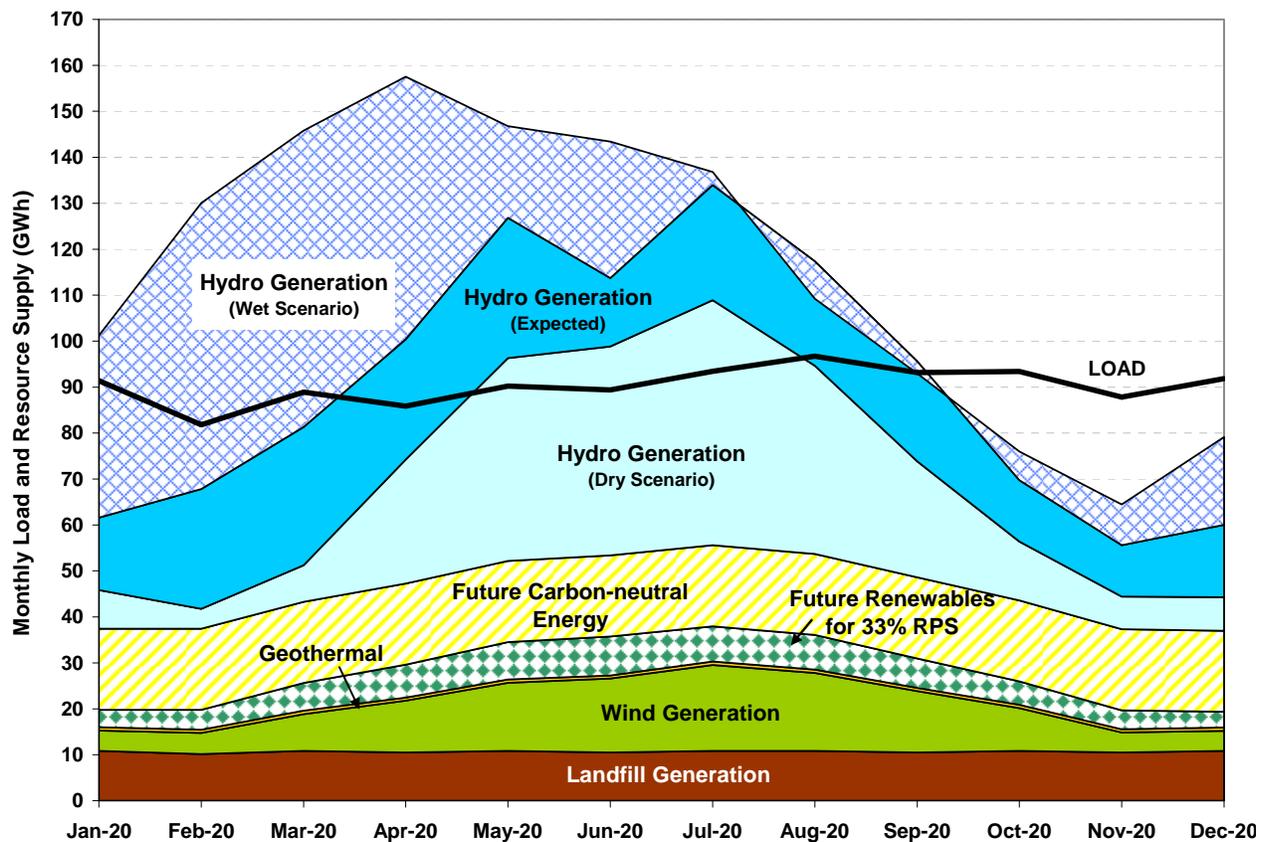


Figure 4: Monthly Load and Supplies in 2020 under Various Hydroelectric Conditions

Figure 5 illustrates that even though a rolling-three year average of the hydroelectric supply is volatile, it is less volatile than using the annual calculation. An alternative to trying to achieve carbon neutrality on an annual basis would be to use a rolling three-year average hydroelectric supply to avoid huge fluctuations in the amount of additional carbon-neutral resources needed.

In addition, there is uncertainty related to the future of the City’s two hydroelectric resources. Several Biological Opinions and proposed Delta Outflow Criteria related to the Bay Delta conditions could jeopardize the availability and value of long-term hydroelectric resources. Should such risks materialize and the City’s long-term availability of hydroelectric generation is less than currently projected, the cost of achieving carbon neutrality will increase as the City will need to procure additional carbon-free resources.

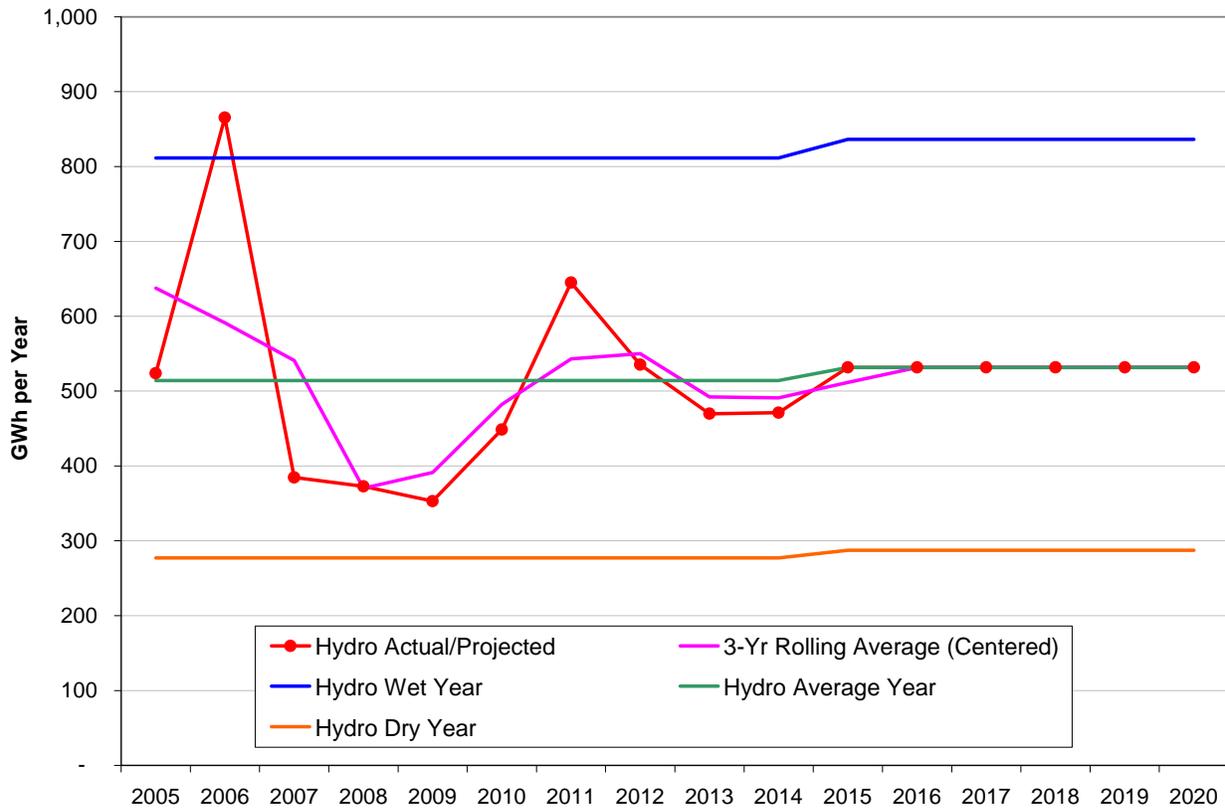


Figure 5: Variations in Hydroelectric Supply (Western Base Resource and Calaveras)

The development of a plan to achieve carbon neutrality will need to address how to handle annual and seasonal variations in load and/or supply and the appropriate time frame in which to measure carbon neutrality.

Regulatory and Legislative Uncertainty of Cap-and-trade and RPS Rules

State-level regulations for implementation of AB32 and RPS still face high levels of uncertainty. Even after the GHG cap-and-trade program is approved and implemented, there is a chance that the allowances may be reallocated by CARB to address unforeseen changes in the electric sector and/or additional requirements may be placed on LSEs. Also, directions from Governor Brown suggest an

increase in the RPS beyond 33% as well as potential state mandates that dictate a certain mix of RPS resources for all LSEs.

Another uncertainty centers on California's Governor Jerry Brown's call for 12,000 megawatts (MW) of local renewable distributed generation by 2020 and whether or not this will become a mandate for LSEs. It is unclear how such requirements would be implemented, if mandated, and what Palo Alto's specific requirement for building local distributed generation might be.

Pursuit of a carbon-neutral portfolio at this stage of regulatory uncertainty could result in stranded assets (i.e., long term contracts that do not meet electric portfolio requirements mandated by state law). The plan for moving forward with carbon neutrality will assess the impacts of the final CEC regulations for SB X1-2 in addition to any new mandates related to resource acquisition.

PaloAltoGreen Program

PaloAlto**Green** is a voluntary program, which allows participants to pay an additional 1.5 ¢/kWh for their electricity usage and in turn the City procures RECs equivalent to their total annual energy usage. PaloAlto**Green** participants account for 7% of the City's electric load and approximately 20% of the City's electric customers are on the PaloAlto**Green** rate.

Design modifications to the PaloAlto**Green** program are being considered, including how the program may assist in meeting the City's RPS. The plan to achieve carbon neutrality will also need to consider how PaloAlto**Green** can help.

Resource Acquisition Strategies to Pursue Carbon Neutrality

The following is a brief description of the types of resources and/or environmental products that the City could use to achieve an electric portfolio carbon-neutral goal.

1. Energy Efficiency

Pursuit of additional electric EE, above the goals set in the current ten-year Electric EE plan, could be used to reduce load and thus reduce the City's exposure to the wholesale market as a way to achieve carbon neutrality. The current estimate of achieving EE in the ten-year plan is roughly 7 ¢/kWh. The cost of EE measures is expected to increase from 2 ¢/kWh in 2007 for easy to achieve efficiency to about 14 ¢/kWh in 2020 for harder to reach efficiency.

2. RPS Eligible Resources:

The City could acquire additional RPS eligible renewables (e.g., Bucket 1 and Bucket 2 resources) in the same manner it does now, either through a long-term power purchase agreement with a remote renewable supplier or through a feed-in tariff program.

3. Renewable Energy Certificate (REC) Only Products

Although procurement of RECs without any physical energy associated with them (i.e., unbundled-RECs) satisfies the renewable resource supply requirements under California's RPS law (SB X1-2)¹³, they are not considered a carbon-free resource by TCR¹⁴ nor are they recognized by CARB as a carbon reducing resource; therefore they do not assist in meeting AB32 GHG reduction goals.

¹³ California Renewable Energy Resources Act, SB X1-2, Section 22, Laws of California (2011).
http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0001-0050/sbx1_2_bill_20110412_chaptered.pdf.

4. Carbon-free, Non-RPS Eligible Renewable Resources

Non-RPS eligible resources that can be reported as being carbon-free under the TCR protocols include large hydroelectric, nuclear and out-of-state renewables built before 2005. In the year 2020, roughly 49% of the City's electric portfolio mix is expected to come from large in-state hydroelectric resources, which do not qualify as RPS eligible resources, however are carbon-free resources.

The market for such resources tends to be illiquid, thus making it difficult to assess premiums. If available, carbon-free non-RPS eligible resources can be expected to carry a relatively small premium over the generic wholesale market. Thus this would likely be a relatively inexpensive option for achieving carbon neutrality.

5. Carbon Emissions Allowances

An emissions allowance is an authorization to emit a fixed amount of a pollutant. Under the AB32 cap-and-trade regulations applicable to the electricity sector, CARB will be issuing "emissions allowances" that electric generators are required to procure equivalent to the amount of carbon dioxide and other GHGs the generators expect to emit. To help offset the additional cost to electricity consumers associated with meeting AB32 goals, CARB staff proposes to allocate allowances free of charge to electric LSEs, such as the City, under the stipulation that LSEs sell these allowances in a centralized market or auction and collect revenue to reduce the impact to their customers who will be paying higher wholesale electricity prices.

Carbon allowances for California are currently being traded through commodity exchanges like the Chicago Climate Futures Exchange (CCFE)¹⁵ as a tool to hedge against the future cost of carbon. It may be possible for the City to procure additional allowances other than the free allowances allocated by CARB, and retire them rather than selling them into the auction thus eliminating the possibility that another entity could purchase them in order to emit GHG. Such an action could have the impact of reducing the overall state's electricity sector GHG emissions to levels below the AB32 goals and making an incremental difference in GHG emissions. However retirement of additional allowances would not directly alter the GHG emissions reported by the City. Utilizing such an approach may be another option available to achieve carbon neutrality of supply, though whether such an action would be permitted under AB32 regulations is still unclear.

6. Environmental Offsets.

Offsets are tradable credits issued for emissions reductions resulting from qualifying GHG mitigation projects that are outside of the cap-and-trade system. Offsets are certified and issued by the Climate Action Reserve and can be traded on certain commodities exchanges like the CCFE. CARB currently recognizes offsets issued by the Climate Action Reserve for several types of GHG mitigation projects—including forestry, urban forestry, livestock methane, and ozone depleting substances—for meeting up to 8% of an entity's AB32 compliance obligations.

¹⁴ General Reporting Protocol, v. 1.1, The Climate Registry (2008).

<http://www.theclimateresistry.org/downloads/GRP.pdf>

¹⁵ <http://www.ccfce.com>

With the final rules regarding the use and eligibility of various types of offset products not yet in place, the market for offsets is currently very illiquid and there is a great deal of uncertainty around the long-term market price of these products. However, staff expects that the price of offsets will be less than the price of carbon allowances or of procuring additional RPS eligible resources, making this a less expensive strategy for achieving carbon neutrality.

Table 2 is a summary of the attributes of the various renewable resources and environmental products available to help achieve carbon neutrality including an approximate price in 2020 stated either as a premium to the brown market or as a cost per metric ton of CO₂e; and how the product may be reported in the City’s Power Content Label and TCR.

Table 2: Summary of Various Renewable Energy and Other Environmental Products

	RPS Eligible Energy	RPS Eligible RECs	Non-RPS RECs	Carbon-free Energy	Carbon Allowances	Environmental Offsets
Description	Bucket 1: In-state projects, and Bucket 2: firmed and shaped products from out-of-state resources	Bucket 3: REC-Only deals or other transactions – subject to compliance limits	Unbundled RECs from projects not RPS certified by the CEC used for a voluntary renewable energy program such as PaloAltoGreen	These could include large hydro or older out-of-state renewable energy projects.	Permits for the right to emit the equivalent of one metric ton of CO ₂ under a cap-and-trade system	Emissions reduction credits from qualifying GHG mitigation projects
RPS Eligible?	Yes	Yes	No	No	No	No
Price Premium (\$/MWh) *	20-30	5-20	4-10	3-10	12-28 †	8-24 †
Carbon Price (\$/ton of CO₂e)	50-75 †	13-50 †	10-25 †	8-25 †	30-70	20-60
Power Content Label	Renewable	Renewable	Renewable	Large Hydro	Unspecified Market	Unspecified Market
The Climate Registry	Zero emissions	Emissions reported	Emissions reported	Zero emissions	Emissions reported	Emissions reported

* Price Premium reflects the cost above the cost of generic wholesale energy

† Estimated price based on unspecified market purchases with a carbon content of 879 pounds of CO₂e per MWh

Alternative Strategies to Achieve Carbon Neutrality

Recognizing the different environmental and cost attributes of the products described above, staff identified and conducted preliminary analysis on several electric portfolio strategies to achieve carbon neutrality. Although certain resources are not deemed to be carbon-free by certain regulatory bodies, staff included them in the alternatives evaluated to show how they compare to other alternatives.

Staff identified resource acquisition strategies which would directly alter the City’s electric load and/or supply along with less direct alternatives of purchasing environmental products in an amount equivalent to the City’s exposure to wholesale market purchases. Specifically, staff evaluated the following alternatives:

1. Increase the ten-year electric EE goal from 6.4% to 7.8% of load and increase the City’s RPS to 51%;
2. Increase the City’s RPS to 52%;
3. Purchase non-RPS eligible renewables such as large hydroelectric generation;
4. Purchase non RPS eligible REC-only products;
5. Purchase and retire carbon allowances; and
6. Purchase environmental offsets.

Figure 6 illustrates the strategies staff evaluated. Note that the resource portfolio for each strategy has the existing large hydroelectric resources as well as the minimum 33% RPS resources required by state law. The balance of the resources required to meet load are differentiated by strategy.

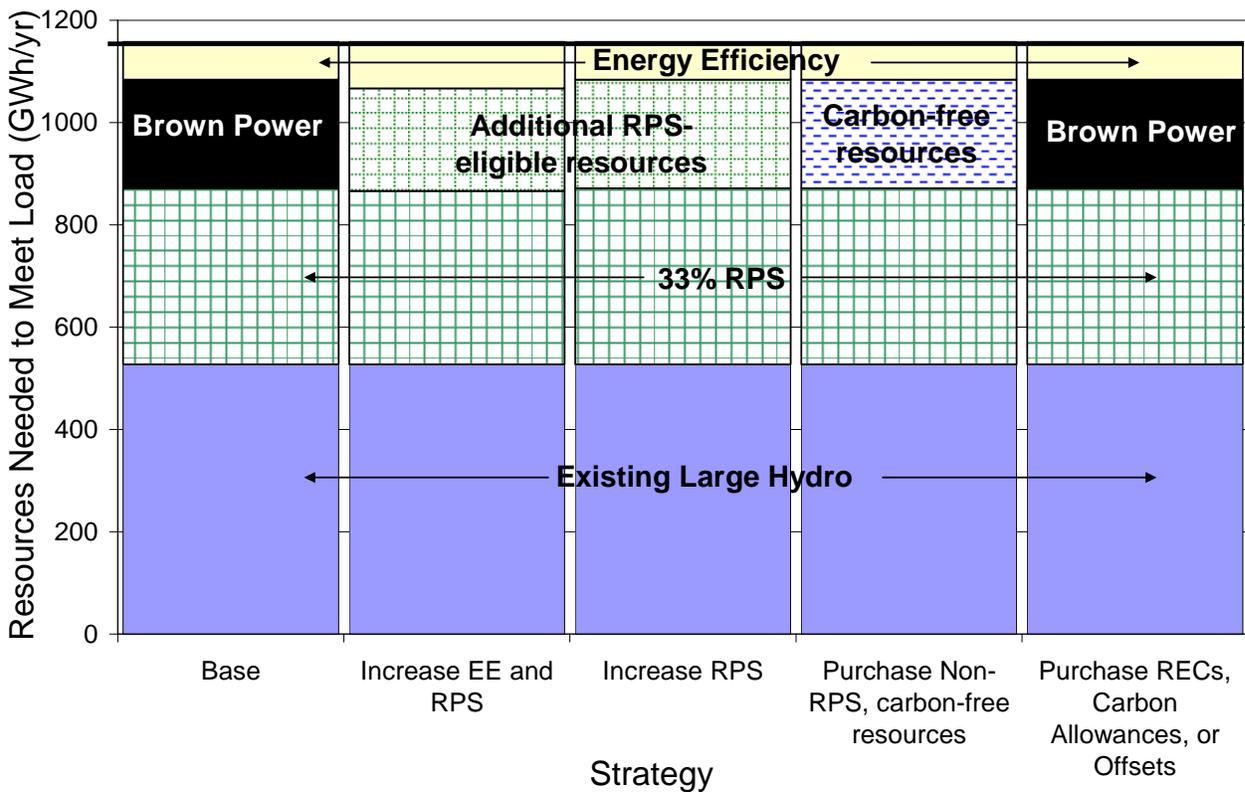


Figure 6: Resource Portfolios for Each Strategy Evaluated

Table 3 summarizes the results from the preliminary analysis. The merits and the impacts of several alternatives are shown relative to the City’s current plan “base case”, which includes 33% RPS and an electric energy efficiency goal of 74 GWh/year by 2020. The incremental cost, rate and bill impacts represent a preliminary range of cost for each alternative in 2020, depending on several market condition factors. Staff did not evaluate the impacts of each alternative under various load and/or hydroelectric conditions.

Table 3: Summary of Carbon-Neutral Portfolio Strategies and Impacts in 2020

	Base Case	Increase EE & RPS Targets	Increase RPS Target	Purchase Carbon-free Resources (Non-RPS eligible)	Purchase Un-bundled RECs	Purchase Carbon Allowances	Purchase Offsets
Cost and Rate Impacts							
Carbon Neutrality Incremental Cost to Base Case (\$/year)	NA	\$9.4 M to \$11.4 M	\$4.2 M to \$6.4 M	\$0.6 M to \$2.1 M	\$1.1 M to \$4.2 M	\$2.5 M to \$7.6 M	\$1.7 M to \$5.1 M
Rate Impact (¢/kWh)	NA	1.2-1.3	0.4-0.6	0.1-0.2	0.1-0.4	0.2-0.7	0.2-0.5
Rate Impact (%) *	NA	8.3-9.0	2.8-4.1	0.7-1.4	0.7-2.8	1.4-4.8	1.4-3.4
Average Residential Bill Impact (\$/year) •	NA	58-63	20-29	5-10	5-20	10-34	10-24
Power Content Label (% of load)							
Large Hydroelectric Supply	48.6%	49.4%	48.6%	48.6%	48.6%	48.6%	48.6%
Other Large Hydro or Carbon-free Resources	0%	0%	0%	19.6%	0%	0%	0%
Qualified Renewables †	31.8%	50.6%	51.3%	31.8%	51.3%	31.8%	31.8%
Market Purchases “unspecified”	19.6%	0%	0%	0%	0%	19.6%	19.6%
Portfolio Carbon Content							
Reported (thousand metric tons of CO2 per year) +	85	0	0	0	85	85	0

- * Percentage rate impact assumes that system average retail rate for base case = 14.5 ¢/kWh in 2020
- Assuming median residential class usage of 407 kWh/month (actual from FY 2011)
- † Renewable content of 31.8% of load is equivalent to 33% of sales (the basis for the RPS requirement in state law)
- + According to The Climate Registry (TCR) protocols

Staff’s preliminary assessment concludes that depending on the alternative pursued and market conditions, achieving carbon neutrality in the year 2020 could have annual incremental cost of \$0.6 to \$11.4 Million. This would result in an upward impact on rates (above the rate impact to achieve 33% RPS) of from 0.1 to 1.3 ¢/kWh. Assuming that the system average retail rate is 14.5 ¢/kWh in 2020, the upward rate impact from implementing these strategies could range from 0.7% to 9.0%.

The plan to achieve carbon neutrality will need to further address market availability of certain resources and the range of costs and set a reasonable rate impact limit, taking into consideration rate impacts associated with meeting the City’s RPS and the community’s willingness to pay for additional climate protection measures.

NEXT STEPS

Staff plans to take the findings of its preliminary analysis along with the recommendation to develop a plan by December 2012 to achieve carbon neutrality to the Finance Committee in January 2012 and to Council in February 2012. Pending Council support to move forward with the development of a plan to achieve carbon neutrality, staff will return to the UAC with a time-line and approach to develop the plan and will return at many steps along the way to get input and direction before the plan and recommendations are developed.

RESOURCE IMPACT

There is no direct resource impact as a result of staff's recommendation to develop a plan to achieve carbon neutrality. The plan will address the resource impacts required to achieve a carbon-neutral electric portfolio.

POLICY IMPLICATIONS

The proposed recommendation meets the Council-approved LEAP Objectives, Strategies and Implementation Plan; supports the Council-approved 2011 Utilities Strategic Plan's environmental sustainability objective; is consistent with the City's Climate Protection Plan; and supports environmental sustainability, one of the City Council's top five priorities.

ENVIRONMENTAL REVIEW

Support of staff's recommendation to develop a plan to achieve a carbon-neutral electric portfolio does not constitute a project for the purposes of the California Environmental Quality Act.

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