City of Palo Alto (ID # 7862)

City Council Staff Report

Report Type: Consent Calendar **Meeting Date: 4/3/2017**

Summary Title: Update of Ten-year Gas Efficiency Goals

Title: Approval of the Update of the Ten-Year Gas Efficiency Goals

From: City Manager

Lead Department: Utilities

Recommendation

Staff and the Utilities Advisory Commission (UAC) recommend that Council approve the proposed annual and cumulative gas efficiency goals for the period 2018 to 2027 as shown in the table below.

Summary Table: Annual Gas Efficiency Goals

	% City load	therms
2018	1.0%	287,000
2019	1.05%	301,000
2020	1.1%	316,000
2021	1.1%	314,000
2022	1.15%	327,000
2023	1.2%	342,000
2024	1.2%	342,000
2025	1.2%	343,000
2026	1.2%	346,000
2027	1.2%	350,000
Cumulative 10-year EE Goal	5.1%	1,491,000

Executive Summary

Palo Alto adopted its first set of ten-year energy efficiency (EE) goals in 2007 to meet the state mandate on EE goal-setting and adhere to Council's policy directive to include cost-effective energy efficiency as the highest priority energy resource.

Since 2007, the City has updated both the electric and gas EE goals in 2010 and 2012. In February 2017 staff presented a revised set of aggressive electric EE goals for the period from 2018 to 2027 to the UAC for consideration and recommendation for Council adoption. In this

current report, staff proposes a similarly aggressive set of gas EE goals for 2018 to 2027, with an annual gas efficiency target of 1% in 2018, increasing to 1.2% in 2027, and a cumulative ten-year gas efficiency savings of 5.1% of the City's projected gas load. These proposed targets are approximately double the gas efficiency targets in 2012.

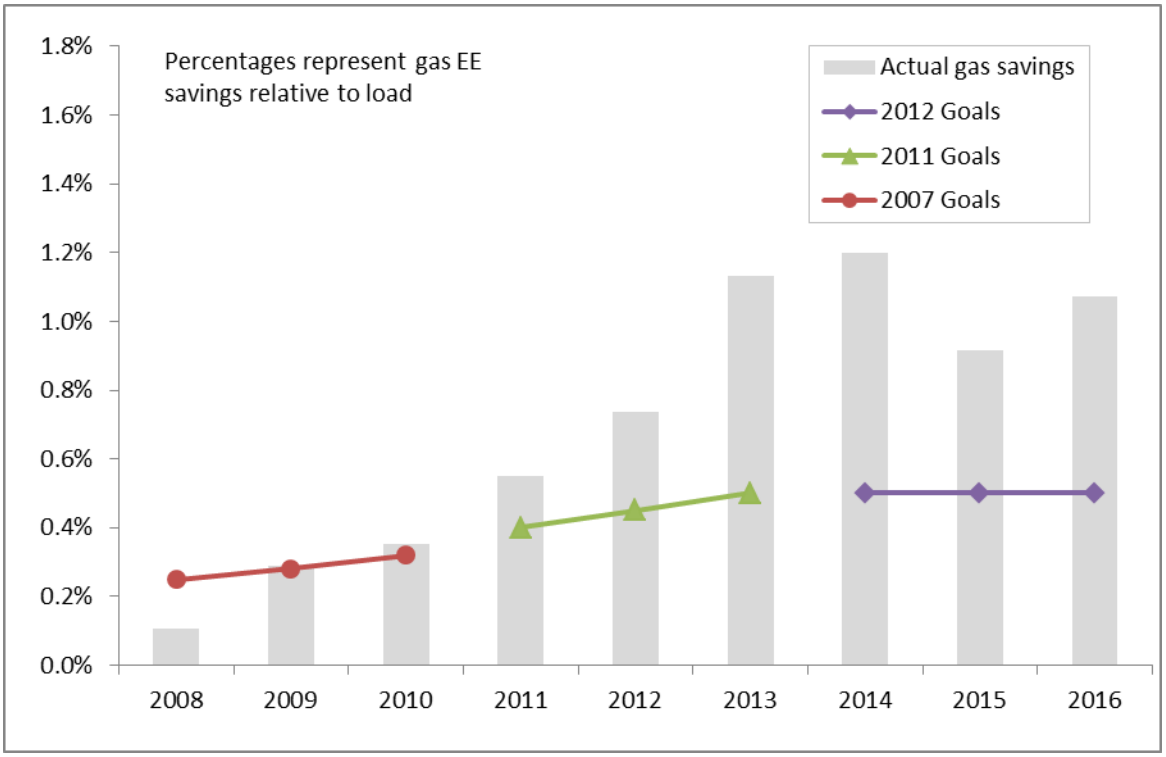
Background

Council adopted the City's first ten-year gas EE goals in April 2007, which were to reduce the City's gas usage by 3.5% by 2017. Gas efficiency has been recognized by Council as an important strategy to meet the City's greenhouse gas reduction (GHG) targets, initially in the 2007 Climate Protection Plan (CMR: 435:07), and subsequently in the 2016 Draft Sustainability and Climate Action Plan (Staff Report #6754). Also, gas efficiency is a key part of the City's Gas Utility Long-term Plan (GULP), which sets out the objective of deploying all feasible, cost-effective energy efficiency measures. In April 2011 Council adopted an updated set of gas EE goals for the period from 2011 to 2020. The most recent set of gas EE goals were adopted by Council in December 2012, in conjunction with an updated set of electric EE goals. The City traditionally updates gas EE goals around the same time it updates electric EE goals, every four years.[1]

Figure 1 provides a summary of the annual gas EE goals and achievements since Fiscal Year (FY) 2008. The figure shows that actual EE achievements have exceeded goals for most years. The cumulative gas efficiency savings over the period from 2008 to 2016 is around 3.6%.

[1] AB 2021 (2006) required publicly owned electric utilities to adopt annual energy efficiency savings goals over a ten-year period, with the first set of goals due by June 1, 2007 and every three years thereafter. AB 2227 (2012) changed the triennial electric EE target-setting schedule to a quadrennial schedule, beginning March 15, 2013 and every fourth year thereafter.

Figure 1. Gas EE Goals and Achievements for 2018-2016



Committee Review and Recommendation

The Utilities Advisory Commission (UAC) considered staff's recommendation at its February 1, 2017 meeting. After discussion, the UAC voted 6-0, with one commissioner absent, to accept the staff recommendation and recommended that Council adopt the proposed 10-year gas EE goals.

Staff described the history and policy context for these gas EE goals, including previous updates of the 10-year gas EE goals, and historic gas EE achievements. Staff explained the modeling framework behind the proposed EE goals, including an overview of the current portfolio of gas EE programs and new programs in development. Utilities Advisory Commissioners inquired why staff is recommending an aggressive set of gas EE goals. Staff explained that while the proposed gas EE goals are aggressive, they are not reach goals, and are based on achievable, cost effective gas EE potential within the City. Additionally, gas EE is an important strategy to meeting the City's GHG reduction targets in a cost effective manner. Commissioners asked what comprised the Residential Behavioral savings. Staff explained that the Home Energy Report program, launched in 2011 and discontinued in 2015, has been the key driver behind residential behavioral savings. These savings have continued to persist after the Home Energy Report program ended. In the meantime, CPAU is planning to launch an Energy Lottery program in the near future to encourage residential customers reduce energy usage in their homes, with attractive prizes for customers with the biggest reductions in their home energy usage. Commissioners asked if the City can continue its gas EE programs with no changes. Staff explained a few prior gas EE programs, such as the new construction programs to incentivize

buildings to install more efficient equipment and/or building envelope than the state mandated efficiency standards have been discontinued. The Green Building Code has displaced these new construction programs, and the City needs to be able to count the savings from the Green Building Code.

After discussion, the Utilities Advisory Commission voted unanimously to recommend that the Council approve the proposed electric 10-year EE goals in this report as the updated electric EE goals for 2018 to 2027. The excerpted minutes from the UAC discussion is provided as Attachment B.

Discussion

Overview of Gas EE Goal Setting Process

The first step in establishing gas EE goals is to determine the potential gas savings in the City. This step was completed using a gas EE potential model developed by Navigant Consulting, which is similar to the electric EE potential model used by publicly owned electric utilities statewide in setting their 2018-2027 electric EE goals. The model uses a bottom-up approach to estimate the total economic potential of market-ready gas efficiency technologies as well as emerging technologies. The proposed gas EE goals are based on the market potential, which applies an adoption curve to the economic potential to reflect customers' awareness and willingness to adopt energy efficient technologies. The market potential assumes continuation of existing EE programs, addition of new EE programs, and calibrates the potential savings based on the historical EE program achievements.

In addition to the existing gas EE programs, which includes traditional rebate programs, direct installation assistance programs, and residential behavioral program (i.e. Home Energy Report), the 2016 gas EE potential model added a key new program area to the gas EE portfolio. This new program area is the Green Building Code. Since 2015, Council has adopted an energy reach code within the City's Green Building Ordinance that requires additional energy savings beyond California's Title 24 Building Energy Standards for residential and non-residential new construction projects[2]. As an energy reach code specific only to the City of Palo Alto, energy savings from the Green Building Ordinance are included in the market potential and therefore the proposed EE goals. By contrast, energy savings captured under the state's building energy standards and the federal appliance standards are excluded from the City's market potential and the proposed EE goals.

Appendix A gives a more detailed description of the EE potential model.

Proposed Gas Efficiency Goals

Staff proposes new annual gas EE targets at 1% of forecasted gas load beginning in FY 2018, increasing to 1.2% by FY 2023, and remaining at 1.2% through FY 2027. These proposed goals are approximately twice the annual gas EE targets adopted in 2012 (see Figure 2).

[2] For building permit applications submitted between September 2015 and December 2016, Palo Alto's Energy Reach Code requires 15% energy efficiency savings beyond the 2013 Title 24 Building Energy Standard for all residential and non-residential new construction projects. For building permit applications submitted between January 2017 and December 2019, Palo Alto's Energy Reach Code requires 10% energy efficiency savings beyond the 2016 Title 24 Building Energy Standard for all residential and non-residential new construction projects if the proposed project does not include a photovoltaic system; a different set of requirements apply to projects that includes a photovoltaic system and all-electric new construction projects.

Figure 2. Proposed versus Current Annual Gas EE targets

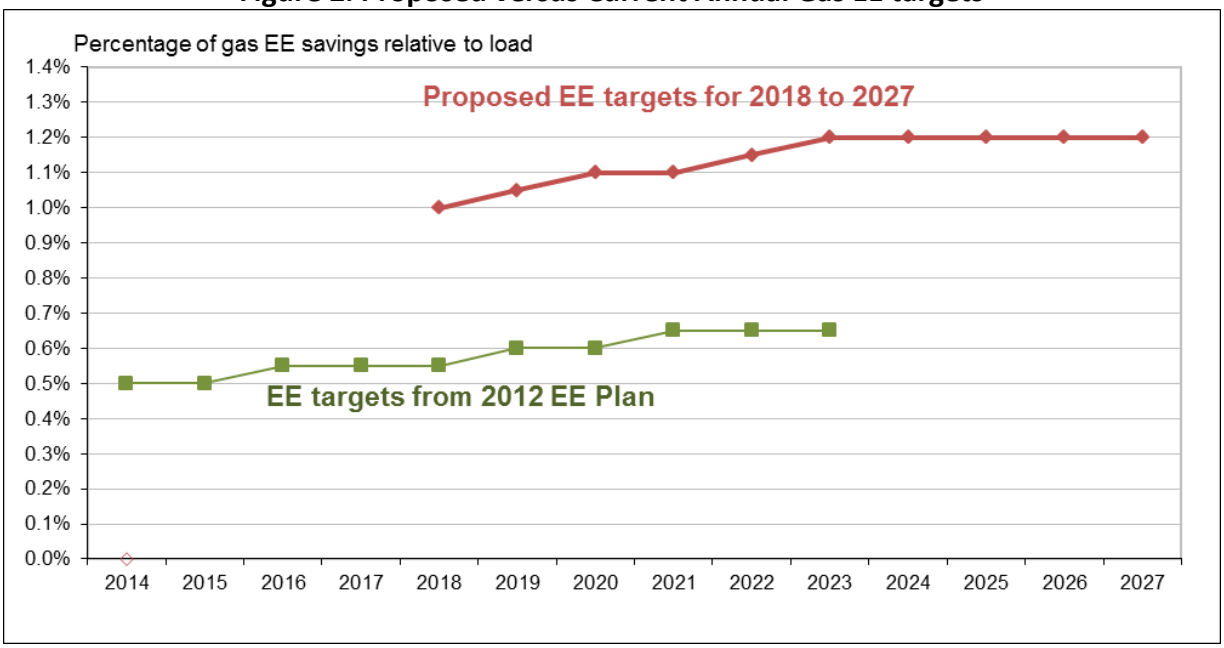
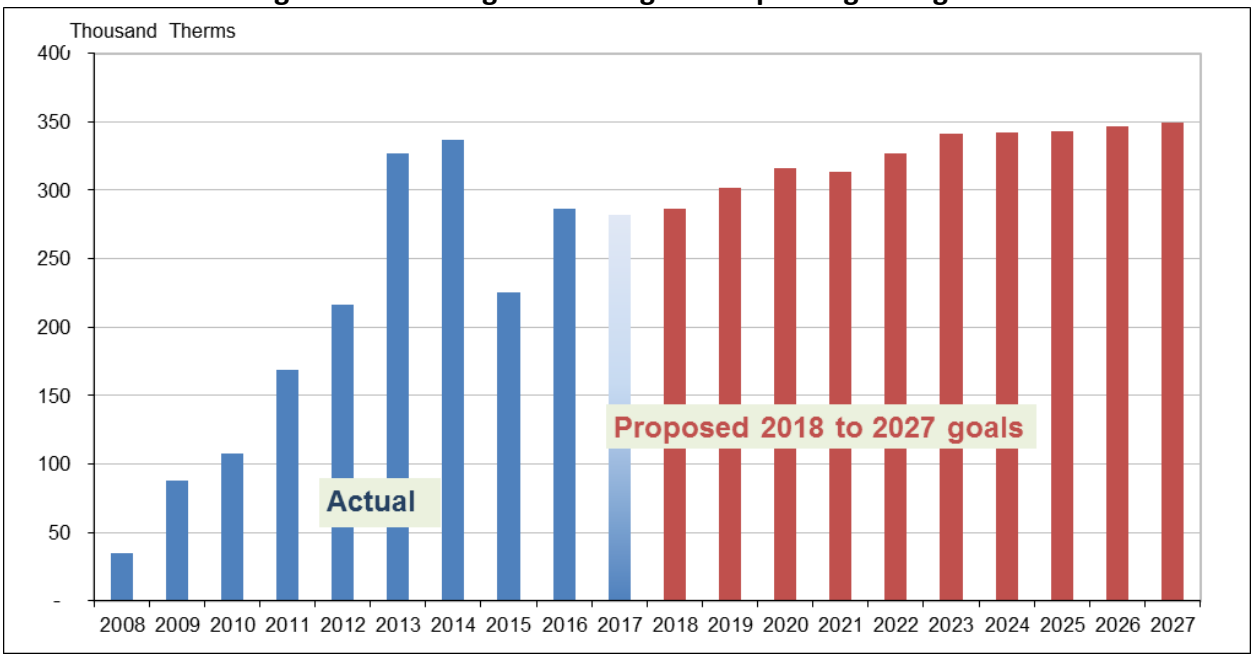


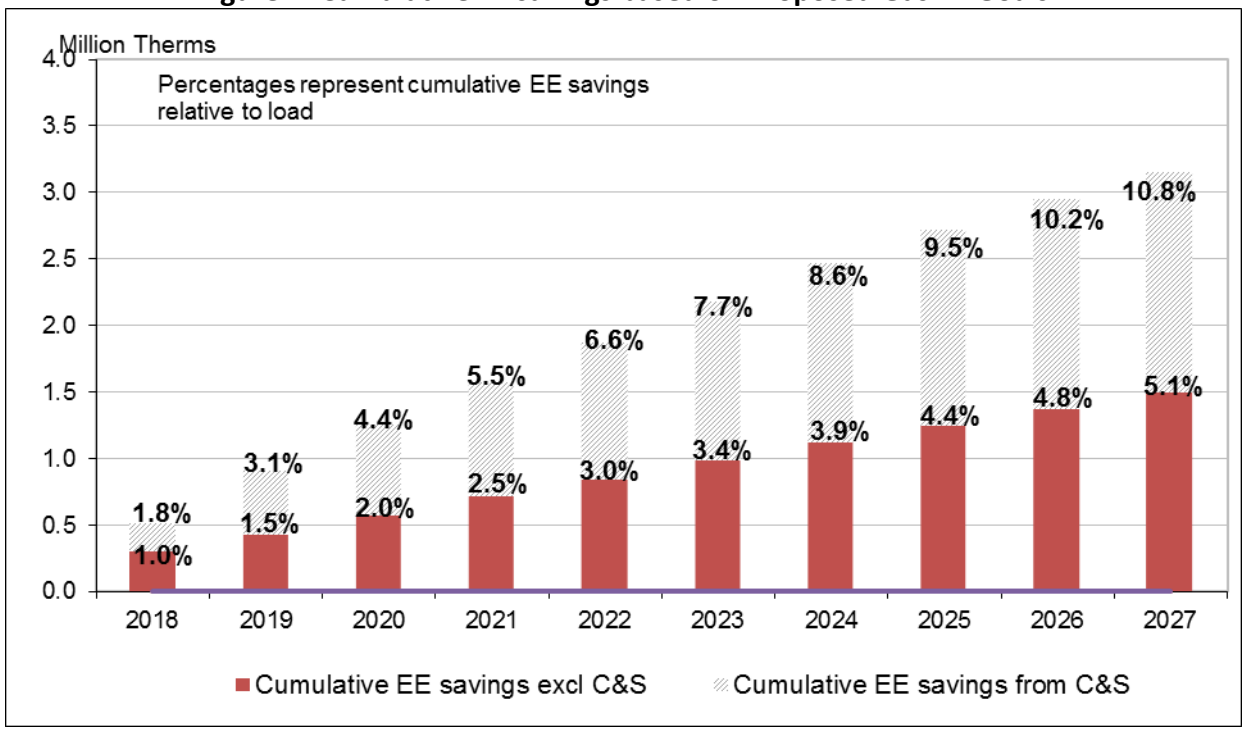
Figure 3 shows the actual historic gas EE savings, and the proposed 2018 to 2027 EE goals on a therm basis, which starts off in 2018 at the same level as the gas EE savings achieved in 2016. Nevertheless, assuming relatively low gas prices over the next decade (which make EE less cost effective), and assuming no new cost breakthroughs in gas EE technologies, the proposed gas EE goals are ambitious.

Figure 3. Historic gas EE savings vs Proposed gas EE goals



As shown in Figure 4, the cumulative ten-year gas savings based on the proposed gas EE goals is projected to be 5.1% of the gas load in 2027.[3] For context, Figure 4 also shows savings due to the State's Title 24 Energy Code requirements and Department of Energy appliance standards. These "Codes and Standards" (C&S) savings are not counted in utility gas EE savings. If gas savings C&S standards are included, the cumulative ten-year gas savings from all EE is projected to be 10.8% of the gas load in 2027.

Figure 4. Cumulative EE savings based on Proposed Gas EE Goals



Estimated GHG Reductions based on Proposed Gas EE goals

Gas efficiency is a key strategy to meeting the City's aggressive GHG reduction targets in 2030. The total GHG emissions reduction based on the cumulative gas savings of the proposed gas EE targets is estimated at 7,800 metric tons in 2027, a 5% reduction from current levels.

Projected Gas EE Program Costs

The City has historically recovered the cost of gas EE programs through gas rates.[4] Gas EE program expenditures have been steadily growing, from around $500,000 in 2009 to nearly $700,000 in 2016. Expressed as a percentage of gas utility revenues, gas EE program

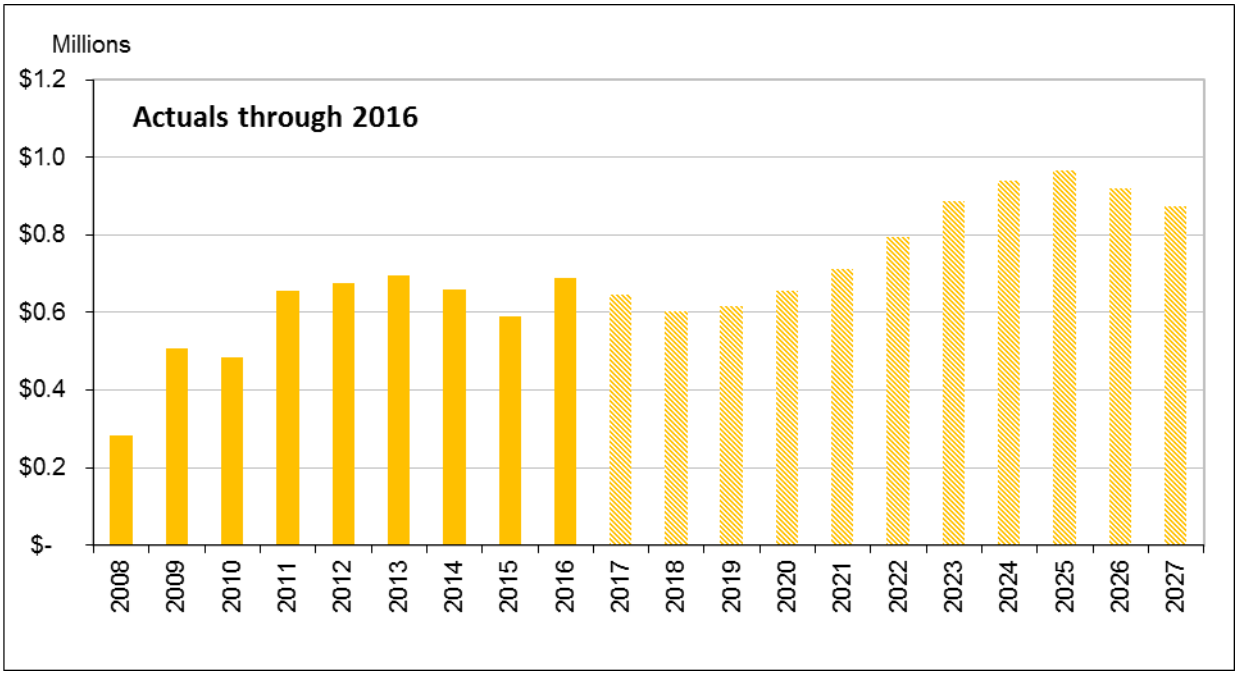
[3] Note that the cumulative EE impact over the ten-year period is not equal to the sum of the annual EE goals because some measures expire before the ten year period is over. As an example, while replacing a gas boiler can generate savings over 20 years, savings due to behavioral programs have a much shorter life unless regularly reinforced.

[4] In 1996, Council proactively adopted a funding target of between 0.75% and 1.25% of natural gas revenues for Demand Side Management programs (CMR:209:96).

expenditures were 1.1% and 2.4% in 2009 and 2016 respectively. Gas revenues have been steadily declining since 2009 due to depressed natural gas prices and lower gas consumption.

To meet the proposed EE goals, staff estimates that the annual gas EE budget will grow from about $600,000 in 2018 to just over $900,000 by 2024. Figure 5 shows the actual gas EE program expenditures for 2008 through 2016 and the estimated annual program budget needed to achieve the proposed EE targets. Staff will continue to evaluate the cost effectiveness and customer appeal of various gas efficiency programs and adjust the gas EE portfolio as necessary to control costs. In addition to the current mechanism of recovering the cost of gas EE programs through gas rates, funding for future gas EE programs can also come from the cap-and-trade auction revenue for the allocated allowances to the City's gas utility. The annual cap-and-trade revenue is projected to grow from $700,000 in 2017 to $1.2 million in 2020.

Figure 5. Actual and Projected Gas EE Program Costs



Retail Rate Impact of the Proposed Gas EE Goals and EE Budget

EE programs impact retail rates in two ways. First, the gas EE budget increases the revenue requirements for the gas utility. Second, lower gas load means that fixed costs (capital and operating costs to run the gas utility) must be distributed over a lower gas sales volume, thereby increasing the average retail rate.

Based on the proposed 2018 to 2027 gas EE goals and estimated annual program costs, the retail gas rate in 2027 under the proposed ten-year goals is estimated to be about 5% to 6% higher compared to a scenario with no EE programs. The net average bill impact of the proposed goals and budget is estimated to be neutral over the lifetime of the EE savings. This is

because customer use is lower due to EE even though rates are higher, with the two trends offsetting each other.

Resource Impact

Although this report contains preliminary estimates of the costs of achieving the proposed gas EE goals, the detailed budget plan and staffing needs to meet the annual EE goals will be developed as part of the annual City budgeting process. The annual budget will present the costs for both internally administered, as well as contractor supported, efficiency programs.

Policy Implications

The proposed gas EE goals conform to the Council-approved Gas Utility Long term Plan (GULP) Guideline, which calls for the deployment of all feasible, reliable, and cost-effective energy efficiency measures. The proposed goals will replace the existing gas EE goals adopted by Council in 2012 and will be integrated into the City's Sustainability Implementation Plans. They are an integral part of achieving the GHG reduction goals laid out in the City's Sustainability and Climate Action Plan (S/CAP).

Environmental Review

Approval of the proposed gas EE goals does not constitute a project under Section 21065 of the California Environmental Quality Act (CEQA) and the CEQA Guidelines, and therefore, no environmental review is required.

Attachments:

- Attachment A: Overview of Gas Energy Efficiency Potential Model
- Attachment B: Excerpted Draft Minutes of the February 1, 2017 UAC Meeting

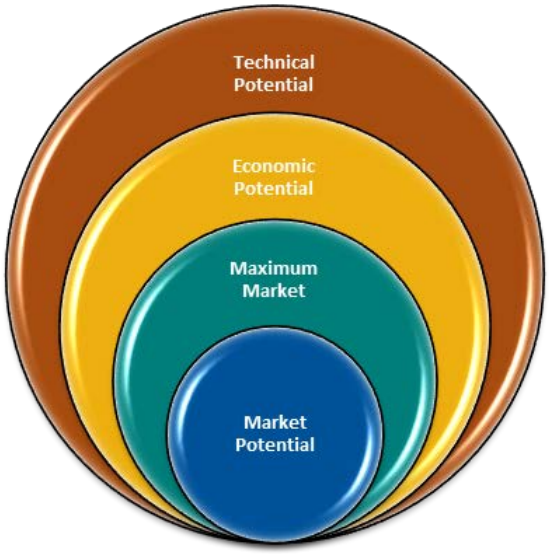
APPENDIX A: Overview of Gas Energy Efficiency Potential Model

The first step in establishing gas EE goals is to model the potential for energy savings within the City. This step was completed using an EE potential model developed by Navigant Consulting. The 2016 gas EE potential model is similar to the electric EE potential model used by staff to update the City's 2018-2027 electric EE targets. The model estimates the technical, economic and market potential for energy efficiency measures for residential and non-residential customers, defined as follows:

- **Technical potential** is the energy savings that would result from installation of the most energy efficient measures that are commercially available, regardless of cost-effectiveness.
- **Economic potential** includes only savings from the installation of cost-effective EE measures.
- **Maximum Market potential** is a subset of the economic potential that reflects customers' awareness and willingness to adopt energy efficient equipment over time.
- **Market potential** is the achievable portion of the maximum market potential calculated by the model, given: 1) the calibration of the model based on actual EE savings for a specific utility, and 2) the programs the utility chooses to include.

The model is calibrated based on the achieved EE savings by end use, and uses a 3-year average from 2013 to 2015 as the base year. The model also takes into account past EE program achievements as well as Palo Alto-specific input such as projected gas supply costs, natural gas retail rates, a discount rate, and the building stock. Efficiency measures included in the analysis cover both current and emerging gas efficiency measures. For each year starting in 2015, the model steps through the calculation of the technical potential, then filters out the non-cost effective measures to determine the economic potential, then estimates the maximum market potential based on customers' awareness and willingness to adopt and, finally, computes the market potential by applying a diffusion curve function to the maximum market potential for the portfolio of EE programs. The calculated market potential forms the basis of the proposed EE goals for 2018 to 2027. Figure A-1 shows the model's sequential narrowing from technical potential to market potential.

Figure A-1. EE Potential Modeling Schematic



Limitations of the EE Potential Model

The 2016 gas EE potential model has some intrinsic limitations. One source of uncertainty is the values for "willingness and awareness" factors used within the model, which attempt to approximate customer awareness of individual technology measures and their willingness to install the measure. The 2016 EE potential model applies generic values adopted from the IOUs' EE potential model. Given the unique demographics of Palo Alto, the "willingness and awareness" numbers for Palo Alto may be different from the IOUs'.

Also, the 2016 gas EE potential model assumes avoided gas costs based on the natural price forward price curve as of September 2016 and projected Cap and Trade compliance cost as of November 2016. Given the uncertainty of future natural gas prices and California's Cap and Trade program, future avoided gas costs could be different from the assumed values, and which in turn would affect the cost effectiveness of the various gas efficiency measures and therefore the overall market potential.

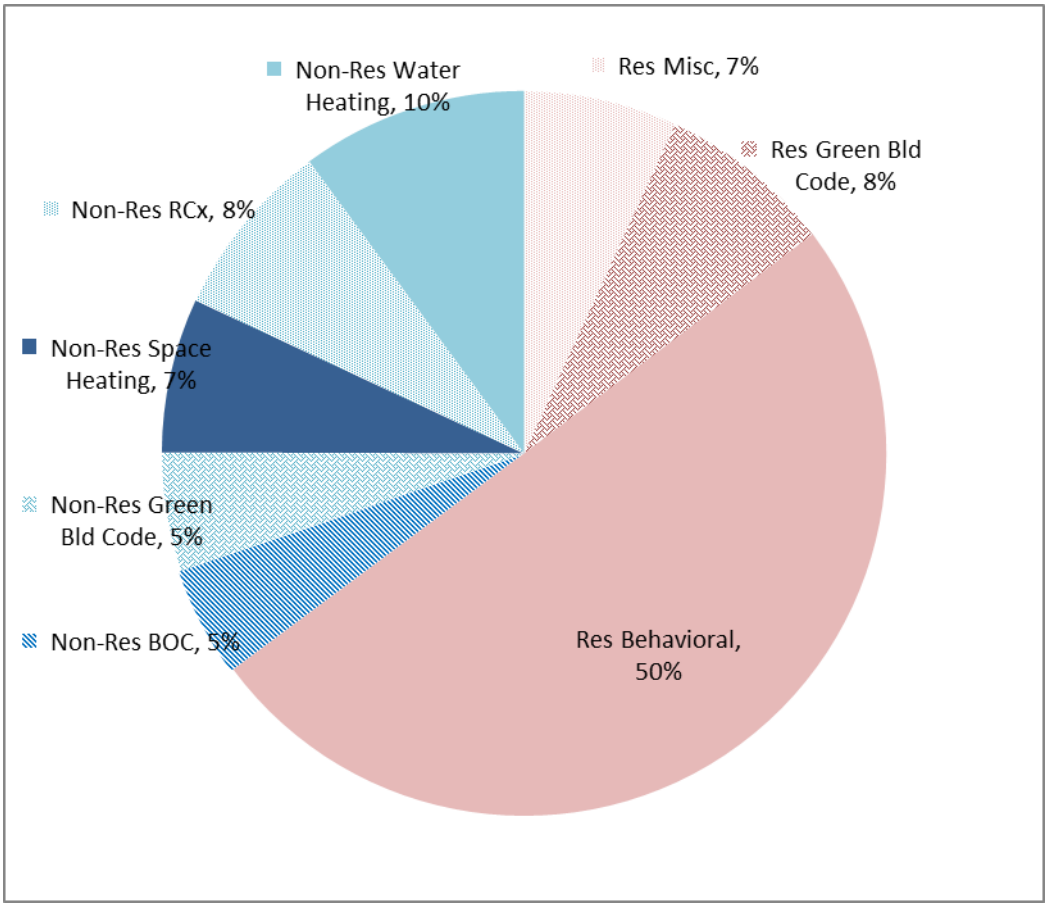
More broadly, this model cannot predict future disruptive technologies, or calculate savings from programs with completely new and different structures. The model incorporated two new programs in the overall potential analysis: the Green Building Code, which counts energy savings attributed to Palo Alto's Green Building Ordinance that are beyond the state's building energy standards, and the Building Operation Certification program, which offers training to facility managers to operate buildings more efficiently. The savings assumptions behind these two programs, however, are based on the IOUs' model since Palo Alto-specific numbers are not available.

Model Results

For Palo Alto, the 2016 EE potential model estimates an annual incremental market potential of 1% of the forecasted load in 2018, increasing to 1.2% by 2023 and beyond. This assumes an expanded EE portfolio by offering early retirement incentives to customers to replace older, inefficient equipment with efficient alternatives, counting energy savings from the Green Building Code, and offering the Building Operator Certification program. If the City relies solely on a business as usual approach, the model projects gas savings that are 16% lower in 2018, and 23% lower in 2023.

The 2016 EE Potential model also projects future market potential by end use. Figure A-2 shows that the 65% of the 2018 energy savings are expected from the residential sector, with residential behavioral savings accounting for half of the total gas savings. Gas savings attributed to the Green Building Code accounts for 13% of the savings. Retrocommissioning (RCx) activities such as resetting temperatures and schedules of the building HVAC systems account for another 8% of the savings.

Figure A-2. Composition of Gas EE Market Potential in 2018



CITY OF PALO ALTO

EXCERPTED DRAFT MINUTES OF THE FEBRUARY 1, 2017 UTILITIES ADVISORY COMMISSION

ITEM 3. ACTION: Staff Recommendation that the Utilities Advisory Commission Recommend that the City Council Approve the Updated Ten-year Gas Efficiency Goals for the period 2018 to 2027

Senior Resource Planner Christine Tam provided a summary of the written report. She described the benefits of cost effective gas energy efficiency (gas EE), which include reducing the City's greenhouse gas emissions and lowering the City's gas supply cost. Since 2008, the City's annual gas EE achievements have surpassed the gas EE goals in most years, particularly for years when the City introduced new programs. For example, savings were high when the Home Energy Report was introduced in 2011 and when two new commercial EE programs introduced in 2013.

Tam gave an overview of the gas EE modeling framework, and emphasized that the energy savings mandated through the state's building and appliance energy standards are excluded in the gas EE potential. Tam presented the proposed gas EE goals, which were double the previous gas EE goals adopted by City Council in 2012. However, in the context of therm savings and the achieved gas EE savings in the past few years, the proposed 2018-2027 goals were aggressive but not unattainable.

Commissioner Schwartz asked why the City needed to be so aggressive with the proposed goals, given that there were no advanced gas meters to give feedback to residents. In the absence of better technology, the City might want to pursue simpler approaches to help customers improve their envelope rather than setting a standard beyond the state's requirements.

Tam explained that the proposed goals were developed from the gas EE potential model, which considered gas EE savings that were feasible, cost effective, and took into account the likely uptake from customers.

Assistant Director of Resource Management Jonathan Abendschein also pointed out the proposed goals were in line with historic gas EE savings achieved by the City. He stated that the proposed goals were aggressive but achievable.

Commissioner Ballantine clarified that with the electric EE goals, as compared to gas EE, there was a state requirement to pursue aggressive goals.

General Manager Shikada stated there was some desire to accommodate California Energy Commission (CEC) goals for gas EE and to be consistent with the mission of the Utilities Department.

Vice Chair Danaher expressed that he had no doubt that there is much efficiency to be gained given the existing use patterns.

Commissioner Forssell asked for a description of Residential Behavioral measures.

Tam responded that the City launched the Home Energy Report program in 2011, continuously ran the program for 4 years, and ended the program in 2015. While residents no longer receive the Home Energy Reports, some of the behavioral savings such as turning off lights and changing the thermostat setting persist. Staff was developing a new program, the Energy Lottery, which would encourage residents to reduce their energy usage through a competition, with an attractive prize for the winner. The Energy Lottery covers both electric and gas savings within households.

Commissioner Forssell asked for an explanation of RCx, which was mentioned in the slide showing the composition of gas EE savings.

Tam explained that RCx stands for Retro-commissioning, which are programs where third-party energy service providers help facility managers optimize the building's energy management system, such as to avoid simultaneous heating and cooling.

Commissioner Forssell also asked about what the percentage of gas EE savings relative to load in the slide "Gas EE goals & Achievement" represented. She clarified that for 2016, the 1% savings shown does not mean the City's gas usage went down by 1%, but instead represents predictable gas savings associated with the installed measures.

Tam confirmed that the 1% represents gas savings attributed to the gas EE programs based on the type of EE project rather than measured decreases in citywide gas usage , and that the City uses an EM&V consultant to evaluate and determine that the reported gas savings are real.

Commissioner Johnston asked how much of the goals will be met by existing gas EE programs versus new programs.

Tam pointed out that some of the EE programs in 2015 have been discontinued. An example is the New Construction program, which no longer makes sense given the strict energy requirements of the Green Building Code. In order to meet the aggressive EE goals, the City will need new programs as well as counting savings from the Green Building Code.

ACTION: Commissioner Ballantine made a motion to recommend Council approval of the proposed ten-year gas efficiency goals for 2018 to 2027. Commissioner Forssell seconded the motion. The motion passed unanimously (6-0) with Vice Chair Danaher and Commissioners Ballantine, Forssell, Johnston, Schwartz, and Trumbull voting yes and Chair Cook absent.