MEMORANDUM

TO: UTILITIES ADVISORY COMMISSION
FROM: UTILITIES DEPARTMENT
DATE: MARCH 1, 2017
SUBJECT: Utilities Advisory Commission Recommendation That Council Approve an Update to the City of Palo Alto’s Ten-Year Gas Energy Efficiency Goals (2018 to 2027)

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

<table>
<thead>
<tr>
<th>Year</th>
<th>% City load</th>
<th>therms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>1.0%</td>
<td>287,000</td>
</tr>
<tr>
<td>2019</td>
<td>1.05%</td>
<td>301,000</td>
</tr>
<tr>
<td>2020</td>
<td>1.1%</td>
<td>316,000</td>
</tr>
<tr>
<td>2021</td>
<td>1.1%</td>
<td>314,000</td>
</tr>
<tr>
<td>2022</td>
<td>1.15%</td>
<td>327,000</td>
</tr>
<tr>
<td>2023</td>
<td>1.2%</td>
<td>342,000</td>
</tr>
<tr>
<td>2024</td>
<td>1.2%</td>
<td>342,000</td>
</tr>
<tr>
<td>2025</td>
<td>1.2%</td>
<td>343,000</td>
</tr>
<tr>
<td>2026</td>
<td>1.2%</td>
<td>346,000</td>
</tr>
<tr>
<td>2027</td>
<td>1.2%</td>
<td>350,000</td>
</tr>
<tr>
<td>Cumulative ten-year EE Goal</td>
<td>5.1%</td>
<td>1,491,000</td>
</tr>
</tbody>
</table>

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.
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. 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).

**Figure 2. Proposed versus Current Annual Gas EE targets**

![Proposed and Current Gas EE Targets](image)

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.

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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.
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. 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.

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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.
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. 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 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 7 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.

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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).
The annual cap-and-trade revenue is projected to grow from $700,000 in 2017 to $1.2 million in 2020.

**Figure 7. 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 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.

ATTACHMENT
A. Overview of Gas EE Potential Model

PREPARED BY: CHRISTINE TAM, Senior Resource Planner

REVIEWED BY: SHIVA SWAMINATHAN, Senior Resource Planner
BRUCE LESCH, Manager, Utilities Program Services
JONATHAN ABENDSCHEIN, Assistant Director, Resource Management

DEPARTMENT HEAD: EDWARD SHIKADA
General Manager of Utilities
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.
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**