

August 17, 2015

TO: The City of Austin Electric Utility Commission Members

FROM: EUC Working Group on Solar RFP Models

RE: Conclusions Regarding Various Models for Cost Comparisons of Solar

The Assignment

At the August 3 special called meeting of the Austin Electric Utility Commission (“EUC”) the Chairman appointed a working group to assess the advisability of Austin Energy contracting for up to 600 MW of solar capacity from the proposals (the “Proposals”) for PPAs received from various vendors in response to the recent RFP from Austin Energy. The working group members are: Brent Heidebrecht, Derrick Norris, Karen Hadden and Cary Ferchill, Chairman.

The working group met with Austin Energy on Wednesday, August 5 for three hours where we discussed numerous topics regarding their methodologies for analyzing the prospective financial results of the Proposals as well as the technical limitations and challenges to forward-looking assumptions and projections. We thank Austin Energy staff for their generous contribution of several employees for several hours for this project.

The working group also met with Cyrus Reed of the Sierra Club and former EUC member Joep Meijer, each of whom presented financial projection models for the analysis of the Proposals to the EUC on August 3. The working group requested that both Mr. Reed and Mr. Meijer share their analyses with Austin Energy staff, which they did. Separately the Chairman met with both Mr. Meijer and Mr. Reed to confirm their technical assumptions.

The Committee met again on Friday, August 14 to review the information and write this report.

Recommendation

The working group recommends that Austin Energy present to the City Council its best plan for achieving an additional 600MW of solar power capacity by year-end 2017. Such plan should include, if financially feasible, Austin Energy ownership of a portion of the 600MW located at the site Austin Energy already owns in West Texas, and options to acquire the facilities supplying PPAs after the ITC recapture period has passed.

Summary of Conclusions

1. Based on pricing assumptions we have confirmed with Austin Energy, the long-term cost of the proposed solar energy contracts is at or below the projected cost of similar energy resources available from the ERCOT market. All of the financial analyses come to reasonably similar conclusions about the likely impact on Austin Energy’s affordability measures, *i.e.*, all other

things being equal, in the first year or so the 600MW Proposals should result in a projected zero to 1.5% increase in the PSA, thereafter turning to a small and improving long-term net decrease in the PSA in later years. The impact on the average residential electric bill would likewise probably be quite small, less than 1% increase in the first few years and somewhat reducing the residential rate in later years.

2. Both models from Mr. Reed and Mr. Meijer suggested the possibility of two additional factors that might enhance the value of the Proposals: (i) the possibility of positive arbitrage between the local node pricing for sales to ERCOT in certain of the West Texas node locations versus purchases by Austin Energy in the Austin load zone; and (ii) the possibility of financial gains from resource substitution by Austin Energy's reduction in the use of less efficient generation resources when the PSAs become available. For reasons discussed below we have concluded that neither of these factors should be included in this exercise.
3. The benefits described above relate only to the financial impacts of the Proposals. The working group notes that any investment in solar energy will also move Austin Energy well along toward Austin's greenhouse gas emissions goals.

Discussion of the Working Group Findings:

The Financial Models

The basic assumptions of each model were: (i) the Proposals would be long-term solar PPAs for West Texas-based facilities producing solar energy at a fixed price of \$38 - \$40/MWh for delivery to ERCOT at a non-specified West Texas node; and (ii) Austin Energy would avoid the purchase of the same amount of MWh in our local load zone at the times reflecting the production curve for West Texas solar plants.

The financial models from Sierra Club and Mr. Meijer are basically sound insofar as they use reasonable assumptions for pricing of the Proposals and reasonable assumptions regarding ERCOT market prices of future alternatives to the proposed PPAs and the time-of-day value of the energy available under the Proposals. We had the opportunity to discuss with Austin Energy staff the financial forecasting approaches they have used in analyzing investment decisions represented by the Proposals and find that they are sophisticated, if somewhat complex, and are reasonable in both methodology and conclusions. Furthermore, they are in substantial agreement with the conclusions from the models we studied. Austin Energy should prepare a more detailed projection based on their more precise database available in UPLAN.

A good indication of the modeling results is shown below from Mr. Reed's document. This table illustrates his estimate of the likely impact of the full 600MW of solar plants pursuant to the Proposals for the first seven years of the term. As can be seen below, assuming a fixed price of \$38/MWh the projection for the 600 MW Proposals suggests a marginal increase in the PSA in the first two years and modest but improving reductions in the PSA in years 3 and later. When the PSA is flowed through to the

average residential bill, it shows a .5% increase in year one and marginal reductions in average consumer bill in years 3 and later.

| NEW 600MW PPA | PSA Impact (\$mil) | % PSA Impact | % Bill Impact |
|------------------------------|-----------------------------------|-------------------------|--------------------------|
| 2015/16 | 7.31 | 1.62% | 0.57% |
| 2016/17 | 1.10 | 0.24% | 0.09% |
| 2017/18 | -1.92 | -0.43% | -0.15% |
| 2018/19 | -3.60 | -0.80% | -0.28% |
| 2019/20 | -4.05 | -0.90% | -0.32% |
| 2020/21 | -3.60 | -0.80% | -0.28% |
| 2021/22 | -3.16 | -0.70% | -0.25% |

It is notable that this is a substantial improvement from the Recurrent PPA for 150 MW of solar from a year ago (approximately \$49 MWh) , for which the same analysis suggests modest increases in PSA and consumer bill impacts in each of the first seven years in respect of that PPA.

| Recurrent 150 Results | PSA Impact (\$mil) | % PSA Impact | % Bill Impact |
|--------------------------------------|-----------------------------------|-----------------------------|--------------------------|
| 2015/16 | 6.55 | 1.46% | 0.51% |
| 2016/17 | 5.00 | 1.11% | 0.39% |
| 2017/18 | 4.24 | 0.94% | 0.33% |
| 2018/19 | 3.82 | 0.85% | 0.30% |
| 2019/20 | 3.71 | 0.82% | 0.29% |
| 2020/21 | 3.82 | 0.85% | 0.30% |
| 2021/22 | 3.93 | 0.87% | 0.31% |

It is also notable that taken together, the Recurrent Proposal and the new Proposals collectively will have a somewhat higher overall but still modest impact on the PSA and the average residential bill over the same period.

| Combined 750 MW Results | PSA Impact (\$mil) | % PSA Impact | % Bill Impact |
|--|-----------------------------------|-------------------------|--------------------------|
| 2015/16 | 13.86 | 3.08% | 1.08% |
| 2016/17 | 6.09 | 1.35% | 0.47% |
| 2017/18 | 2.32 | 0.52% | 0.18% |
| 2018/19 | 0.23 | 0.05% | 0.02% |
| 2019/20 | -0.34 | -0.08% | -0.03% |
| 2020/21 | 0.22 | 0.05% | 0.02% |
| 2021/22 | 0.78 | 0.17% | 0.06% |

As Mr. Reed noted in his report, longer term price predictions suggest that market prices of alternatives will rise even higher in the period beyond this projection, which if accurate would probably mean an

ever-increasing return to this investment.¹ Both the working group and Austin Energy believe it is reasonable to project increasing market prices in the long term.

Additional Factors Considered

As noted above, both Mr. Reed's and Mr. Meijer's models considered possible additional increased benefits to the Proposals from nodal pricing arbitrage and resource substitution opportunities.

The possibility of nodal pricing arbitrage was suggested by research done by Mr. Meijer. He observed that there are specific ERCOT delivery nodes in West Texas that appear to have experienced significant increased prices compared to the prices prevailing in the Austin load zone. He posited that by strategically locating any proposed projects near the most favorable possible settlement point in West Texas, Austin Energy could capture some nodal pricing arbitrage and effectively lower the net PPA cost. Upon consideration of this proposal, the working group concluded along with Mr. Meijer that any such arbitrage potential would be difficult to model and would likely be transitory. The ERCOT market is designed to assure that such differentials are addressed by the market and any benefits might be short term in nature. Nonetheless the working group suggests that Austin Energy study the suggestion and attempt to take advantage of an opportunity if it can be sufficiently confirmed.

Resource substitution was also discussed as a possible additional source of benefits for the solar PPAs by both Mr. Meijer and Mr. Reed. The concept is that additional value might be obtained by Austin Energy through reducing its reliance on its existing generation portfolio when solar resources become available under the Proposals. This assumes that Austin Energy would be able to reduce overall costs by reducing the use of some existing generation resources. However, the working group concluded that at this time we do not have sufficient data on which to model resource substitution and we have not taken it into account.

Relevant Future Uncertainties

The future PSA and bill impact conclusions of the Proposals are reasonably predictable because any resulting PPA would certainly guarantee delivery at a price set in the initial contract. What cannot be determined for sure at this time is whether there might in the future be even more favorable alternatives, *i.e.*, could the positive results of the Proposals be improved upon even more if all or a portion of the investment is delayed for some time when market conditions may be even more favorable? Below we address the most relevant factors and how they might weigh on an investment decision now.

¹ From Reed's report: "Longer-term price predictions – such as ERCOT's long-term study and a recent study by Brattle for the Clean Energy Coalition– however, would suggest that prices will rise higher than these short-term predictions, making the solar RFP a good deal. Thus, predictions by Brattle of prices rising to \$50 per MWh and by ERCOT of prices rising to nearly \$70 per MWh by the end of the next decade, suggest such a solar contract could make Austin ratepayers significant money. Thus, long-term solar plants are a good deal for Austin ratepayers beyond 2020 if these recent ERCOT and Brattle studies, which assume some rise in gas prices post-2020, are accurate."

The working group believes that the most significant future uncertainties that may affect the assessment of these opportunities are as follows:

Expiration of the existing federal Investment tax credit (ITC). Currently the ITC is set at 30%, which has been a significant factor in keeping pricing down for privately developed renewable energy projects. Under current law the ITC is scheduled to be reduced to 10% at year-end 2016. It is widely anticipated, although not certain, that Congress will allow the ITC to expire on its current schedule. The value of the current ITC to project developers is a cost savings of roughly 20-25%, which presumably is reflected in a 20-25% reduction of cost under a PPA. If expiration occurs, and no other significant events immediately occur to reduce the cost of building other solar facilities, then almost certainly the cost of future solar projects will rise in the short term, perhaps as much as 20-25%.

Future cost reductions for production of solar energy. Utility scale solar project costs have declined dramatically in recent years, over 50% overall since 2008. Austin Energy's PPA with Recurrent, signed a year ago with the advantage of the 30% ITC, was roughly 20% more expensive than current Proposals. Many industry experts believe that the cost of solar projects will continue to decline sufficiently that in one to three years the reduced costs will make up for the effect of the ITC expiration. The recent history of solar energy projects and pricing suggest that is a likely scenario, but it is uncertain, particularly if in the short term the loss of the ITC negatively impacts the industry's health.

The future of natural gas prices. As of August 11, natural gas was trading at \$2.84/mmBTU, somewhat below the average price during the past four years and certainly lower than average price over the last ten years. If these gas prices were to persist into the distant future or even decline from the current lows, that would negatively impact the relative value attributed to the Proposals compared to current ERCOT prices since all of the financial projects have assumed a gently rising price for gas. However, it is widely anticipated that existing gas prices are quite low and likely to trend higher, especially in the longer term. Both Austin Energy and the Working Group believe this is a reasonable assumption at this time.

Interest Rates Overall Solar project costs are heavily influenced by prevailing interest rates, which are currently at historically low levels. It is generally anticipated that interest rates will soon begin to climb, but only marginally and slowly over time. As a result, we do not anticipate that this factor will have a significant impact in the near term.

Value of Ownership The working group believes that Austin Energy can obtain substantial benefits from ownership of its solar resources in the future. This has not

been economical in the past due to the role of the ITC in overall cost of solar energy projects. However, if the ITC expires on schedule, the playing field will be substantially changed. Austin Energy should consider acquiring ownership of solar facilities in the future, especially since Austin Energy's cost of capital is significantly below that of most private solar project developers and could lead to additional project cost savings.