

Local Emission Reduction Grant Report

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1 Executive Summary

The Capital Area Council of Governments (CAPCOG) covers 10 counties in Central Texas – Bastrop, Blanco, Burnet, Caldwell, Fayette, Lee, Llano, Travis, and Williamson Counties. Five of these counties – Bastrop, Caldwell, Hays, Travis, and Williamson Counties – constitute the Austin-Round Rock Metropolitan Statistical Area (MSA). In 2015, CAPCOG was awarded \$1,247,165.59 in local air quality planning funding under Rider 7 to the appropriations for the Texas Commission on Environmental Quality (TCEQ) for fiscal year (FY) 2016 and FY 2017. Since this amount was higher than the amount CAPCOG had requested from TCEQ in its proposed work plan for FY 2016-2017 (\$1 million), CAPCOG decided to use the surplus funds to award sub-grants within the region to support the region’s air quality plan, the Ozone Advance Program (OAP) Action Plan. CAPCOG designed a grant program with the approval of the TCEQ in late 2015, and issued a solicitation for projects in February 2016. The focus of the program was to reduce emissions of nitrogen oxides (NO_x), the primary local contributor to regional ground-level ozone (O₃) pollution. Ultimately, CAPCOG only awarded one grant under this initial grant opportunity – a \$29,450 grant to support the installation of 103.7 kilowatts (kW) of solar panels at the Austin Community College (ACC) Highland Campus. ACC completed the installation of these solar panels in October 2017, and the panels began generating electricity on October 25, 2017. ACC had initially planned on completing the installation in January 2017 and completing the commissioning no later than February 28, 2017, but encountered significant logistical challenges that delayed the project. This project is expected to reduce about 1.1783 tons of NO_x emissions from electricity generation over the lifetime of the equipment, based on ACC’s application and some key assumptions CAPCOG used for this project. This equates to a cost-per-ton ratio of \$24,994 per ton of NO_x reduced. This report summarizes the results of this project to date. Since ACC is contractually obligated to continue providing data from these solar panels for another year, CAPCOG will provide new data in its quarterly progress reports to TCEQ as data become available.

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2 Background: Project Solicitation and Grant Award

CAPCOG's initial plan for awarding grants, developed in late 2015, involved awarding grants based on two categories:

- Commuter emission reduction grants; and
- Emission reduction technology grants.

Commuter emission reduction grants were designed to provide financial incentives to organizations that could achieve emissions reductions through reductions in single-occupancy vehicle commuting, while the emission reduction technology grant would provide financial incentives to organizations that could achieve emissions reductions through the use of technology. CAPCOG made a total of \$240,000 available for this grant opportunity.

CAPCOG established a maximum reimbursement rate of \$25,000 per ton of NO_x for any organization participating in the Clean Air Coalition (CAC), and \$10,000 per ton of NO_x for any other organizations. The \$25,000/ton level corresponded roughly to the benefit-per-ton of NO_x reductions estimated in EPA's Regulatory Impact Analysis (RIA) for the 2015 Ozone National Ambient Air Quality Standards (NAAQS), while the \$10,000/ton level corresponded roughly to the amount achieved by TCEQ's Diesel Emission Reduction Incentive (DERI) grants under the Texas Emission Reduction Plan (TERP) program. CAPCOG specified how different types of projects would need to calculate their emission reductions, based on a standardized set of emission factors and activity assumptions.

CAPCOG allowed organizations that were affiliated with a CAC member but were not directly a member of the CAC to submit an application through the CAC member. This enabled members of CLEAN AIR Force's Clean Air Partners Program to apply for funding under the higher \$25,000/ton mark.

Ultimately, CAPCOG received only two applications: one from ACC for \$29,450 for solar panels, and one from Oracle for \$50,000 for solar panels. Oracle subsequently withdrew its application, and CAPCOG awarded the \$29,450 grant to ACC on June 8, 2016. The grant agreement for this project was executed on August 8, 2016. The following totals reflect what was planned in the application.

- Grant amount: \$29,450.00
- Cash match from ACC: \$177,910
- Total Cost: \$207,360
- % of Total Cost Covered by grant: 14.2%

3 Basis for Emission Reduction Assumptions

As stated in CAPCOG's original grant plan from December 2015, CAPCOG based the NO_x reduction assumptions based on NO_x emissions and electricity generation data from fossil-fueled power plants in

the Austin-Round Rock MSA from 2011-2014, the following assumptions for estimating emission reductions from installation of solar panels:

$$\text{Rate} = \frac{\text{Total MSA Power Plant NO}_x \text{ Emissions 2011 – 2014}}{\text{Total MSA Electricity Generated 2011 – 2014}} \times \frac{1}{1 - \text{Texas Grid Loss Rate}}$$
$$\text{Rate} = \frac{6,550 \text{ tons NO}_x}{35,073,679 \text{ MWh}} \times \frac{1}{1 - 15.05\%} = 0.000187 \text{ tons per MWh} = 0.000373 \text{ lbs per kWh}$$

The NO_x emissions totals were based on 2011-2014 NO_x emissions and electricity generation totals from EPA's Air Market Program Data.¹ This included Bastrop Clean Energy Center, Decker Creek Power Plant, Lost Pines 1, Hays Energy Facility, and Sand Hill Energy Center, and Sim Gideon Power Plant. The Texas Grid Loss Rate was based on the calculated difference between total electricity generated and total electricity retail sales in Texas for 2012 from the Energy Information Administration (EIA).²

CAPCOG provided two additional activity assumptions that it directed applicants to use in their applications:

1. A 27.8% capacity factor;³ and
2. A 25-year useful life.⁴

This ultimately translated into a total reimbursement rate of \$284.24 at the \$25,000/ton of NO_x reduced rate, which CAPCOG estimated would account for 7-15% of the total cost for the panels.

4 Project Timeline & Milestones

- 12/11/2015: CAPCOG submits draft grant plan to TCEQ
- 12/31/2015: CAPCOG submits draft copies of grant solicitation and application forms to TCEQ for review
- 2/9/2016: CAPCOG submits revised copy of grant solicitation to TCEQ
- 2/16/2016: TCEQ approves revised grant solicitation documents, CAPCOG issues request for applications (RFA)
- 2/29/2016: CAPCOG submits TCEQ addendum that extends grant application deadline to April 15, 2016, due to requests for more time from prospective applicants
- 3/2/2016: TCEQ approves addendum and timeline

¹ CAPCOG applied adjustment factors for Decker Power Plant's gas turbine rates based on the ratio of data reported to TCEQ v. EPA data.

² EIA. State Electricity Profiles. Data for 2012. Release Date: May 1, 2014.
<https://www.eia.gov/electricity/state/archive/2012/>. Last accessed 12/4/2017.

³ Based on Energy Information Administration's Electric Power Monthly, Table 6.7.B: Capacity Factors for Utility Scale Generators Not Primarily Using Fossil Fuels, January 2013 – August 2015. Released October 27, 2015.
http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_6_07_b

⁴ Based on lower end of 25-40 year useful life identified for photovoltaics by the National Renewable Energy Laboratory (NREL), available at : <https://www.nrel.gov/analysis/tech-footprint.html> (last reviewed 12/4/2017).

- 4/15/2016: RFA closes, CAPCOG receives two applications totaling \$79,450 out of total \$240,000 available
- 6/10/2016: CAPCOG Executive Committee approves grant to ACC for \$29,450
- 6/15/2016: CAPCOG provides draft copies of grant agreement with ACC to TCEQ for review
- 8/15/2016: Grant agreement between CAPCOG and ACC is executed
- 12/9/2016: 1st report submitted by CLEAN AIR Force to CAPCOG
- 2/7/2017: 2nd report submitted by CLEAN AIR Force to CAPCOG
- 3/6/2017: 3rd report submitted by CLEAN AIR Force to CAPCOG
- 6/9/2017: 4th report submitted by ACC to CAPCOG
- 6/13/2017: CAPCOG submits termination letter to ACC for unspent balance of project, effective 6/27/2017
- 6/20/2017:
 - CLEAN AIR Force & ACC submit report and reimbursement requests for remaining balance of grant
 - CAPCOG notifies CLEAN AIR Force and ACC of error in report, corrects, and requests re-submission
 - ACC submits revised report
- 6/26/2017: CAPCOG rescinds ACC grant termination
- 6/27/2017: CLEAN AIR Force contract is terminated
- 8/29/2017: ACC submits quarterly report for period 5
- 10/16/2017: Contract with ACC extended to 10/31/2017 to allow for completion of solar panels
- 10/30/2017: ACC reports completed installation of 103.7 kW PV system at ACC Highland Campus and that the system is generating clean energy
- 10/31/2017: ACC submits final report

5 Technical and Logistical Issues

ACC got started on the project later than it had planned. ACC had to reset their timeline to allow for their internal bid selection process, various levels of internal management approval, and some other unanticipated issues, such as loss of plans submitted to the City of Austin. The initial plan did not account for the amount of time it took them..

ACC had only selected its vendor and started negotiating a contract at the end of February, when it had initially anticipated to be commissioning the equipment. In ACC's report covering 11/1/2016 – 2/28/2017, they reported that the estimated completion date had been moved back to August 31, 2017.

ACC's report for 3/1/2017 – 5/31/2017 indicated that the contractor had been selected, work had begun, and purchase orders had been issued for equipment. ACC reported that a drone pre-installation fly-over had been completed, that a distributed generation planning application had been approved by Austin Energy, and that equipment had been ordered and was expected to arrive by July 17. However,

not all of the design and engineering had been completed, ACC was awaiting a rebate application from Austin Energy, and was awaiting final permitting approval.

ACC's report for 6/1/2017 – 8/31/2017 reported that all design and engineering activities had been completed, that almost all equipment that had been ordered had been received, that all subcontracts and coordination had been completed, and that installation could now go forward. ACC noted in this report that "All structural and electrical plans have been completed, stamped and sealed and submitted to City of Austin for review. City lost plans so FSG has resubmitted plan set for review." The facility had also been prepped for installation upon receipt of the permit from the City of Austin and final components. Final permitting from the City of Austin had not yet been completed, apparently due to the City's permit department losing the project's permit set and the contractor needing to submit the information to the city again. ACC pushed its completion date back to 9/30/2017.

CAPCOG ultimately needed to issue another extension to ACC to 10/31/2017 in order to ensure that it was still in force until the project started generating electricity. ACC's final report indicated that the installation had been completed and that panels began generating electricity by the end of October. The picture below shows the final installed panels on the roof of ACC's Highland Campus.

Figure 5-1. Picture of Solar Panels Installed on ACC Highland Campus



6 Project Data

ACC's final report indicates that the solar panels started generating electricity on 10/25/2017, and ACC included the solar panel electricity generation data for 10/25/2017 – 10/31/2017 for this final report.

The following table shows a comparison of the data reported compared to what had been proposed in the application.

Table 6-1. Final Project Data through 10/31/2017

Data Point	Proposed in Grant	Data Reported
Period Solar Panels Would be Operational	3/1/2017 – 9/30/2017	10/25/2017 – 10/31/2017
Avg. Generating Capacity of Solar Panels Installed Using Grant Funding Over Reporting Period (kW)	103.7	103.7
Total Operating Time in Reporting Period (hours)	5,136	144
Total Energy Produced by Solar Panels Installed Using Grant Funding During Reporting Period (kWh)	148,064	5,620
Capacity Factor for Reporting Period	27.8%	37.64%
Estimated NO_x Reduction for Reporting Period (based on 0.000373 lbs/kWh)	55.23	2.10

Since CAPCOG will be still receiving a full year of data after this, CAPCOG expects a more complete picture of the data from future quarterly reports.

NREL’s website suggests that the useful life for solar photovoltaics ranges from 25-40 years, so while the project did not get started as quickly as had been hoped, CAPCOG believes that it will ultimately still generate approximately the same amount of electricity as had been initially planned. The 37.64% capacity factor for the 5.8 days of reporting time is not a reliable indicator of what the overall annual capacity factor for the panels will wind up being, or even the capacity factor for the month of October.

EIA’s most recent report on capacity factors for utility-scale generators not primarily using fossil fuel, January 2013-September 2017 represents a nation-wide average and so it may not be representative of the capacity factor in Texas, but it showed a 29.6% capacity factor for September 2017, and a 25.1% annual average for 2016. Using this more conservative 25.1% capacity factor, these solar panels would be expected to generate 5,700,285 – 9,120,456 kWh of electricity over their 25-40 year lifespan. Using the 0.000373 lbs of NO_x/kWh rate CAPCOG used for this project, this translates into 1.0631 – 1.7010 tons of NO_x over this time frame, or a rate of \$17,314 - \$27,702 per ton of NO_x reduced. ACC also reported a total of \$730.69 in electricity savings from these other panels not directly funded by this grant. Future savings will reduce the total cost/ton over the life of the project.

After being awarded this grant, ACC ultimately decided to also proceed with an additional \$150,000 in solar panel installations, which are separately metered, bringing the total installed capacity to 222.08 kW for a total cost of \$357,360. It’s not possible to directly attribute electricity generated by these other panels to this grant, and those panels are separately metered. But this project accounted for a majority of the expenses, and ACC undoubtedly achieved economies of scale as a result of this grant.

7 Conclusion

CAPCOG’s 1st attempt at a regional air quality grant program came up short in a number of important regards, but ultimately did lead to the installation of 103.7 kW of solar panels at the ACC Highland

Campus and helped CAPCOG better design its next round of grants using its 2016-2017 funding. Specifying the funding amount and having narrowly defined project categories and reimbursement amounts made it difficult for potential applicants to apply for funding. Therefore, as will be detailed in the final report for Task 7.2, CAPCOG redesigned the grant program the 2nd time in order to provide more of an opportunity for applicants to propose different types of projects beyond those that CAPCOG had specifically already anticipated and allow our stakeholders to determine how much to award to each project.

Once awarded, there were obviously significant delays in implementing this project, which postponed the NO_x reductions that CAPCOG had hoped to achieve during this time frame. A fuller accounting of the amount of time that was going to be needed for ACC to execute its grant agreement with CAPCOG, for ACC to complete its procurement for a contractor, and to obtain the necessary permits would have provided a more realistic time frame for the completion of this project. However, the project is now complete and CAPCOG anticipated that it will achieve or exceed the emission reductions targets that CAPCOG had for this project. CAPCOG will continue to receive reports from ACC for at least the next year and will provide these data to TCEQ in its quarterly progress reports.