AGENDA STATEMENT

City of Bellaire

MEETING: City Council - Apr 17 2023
PREPARED BY: Sharon Citino
DEPARTMENT: City Manager's Office

ITEM TITLE:

Presentation and discussion of a proposal from the Environmental Sustainability Board of the City of Bellaire, Texas, to install a rooftop solar energy system on City Hall - Submitted by Sharon Citino, City Manager; presented by Rajiv Pandya, Environmental Sustainability Board Member.

RECOMMENDATION:

The Environmental Sustainability Board recommends City Council conduct a workshop to discuss a proposal to install a rooftop solar energy system on City Hall.

BACKGROUND/SUMMARY:

As adopted by City of Bellaire Ordinance No. 02-122, the Environmental Sustainability Board (ESB) is charged with the following duties and powers:

1. Review and make advisory recommendations to City Council in the initiation, prioritization, and development of programs, policies, and activities relating to environmental sustainability, including, but not limited to, energy and natural resource conservation and recycling;
2. Research and recommend financial resources to offset costs of programs and initiatives relating to sustainability, including without limitation grants, sponsorships, and cost-savings programs; and
3. Develop programs to educate the public and increase city residents' participation in and knowledge of environmental sustainability practices.

Within this context, in 2021, the ESB adopted the goal of investigating the feasibility of installing rooftop solar on City of Bellaire municipal buildings. The result is the attached "Feasibility Study for Rooftop Solar on City Hall." The ESB reviewed the study and on January 4, 2023, unanimously approved the following resolution:

> "The ESB supports submitting the City Hall Solar Energy project proposal to the City of Bellaire City Council for their consideration and initiation of a Request for Proposal (RFP) process"

Below are some key findings from the study:

The City Hall and Civic Center Buildings are ideal candidates for a solar photovoltaic energy system based on:

- Flat roof allowing for panels to be oriented for optimum tilt and azimuth (180° due South)
- Limited number of obstructions and external shading

- White membrane surface allowing for bi-facial solar panel utilization (sunlight absorbed from both sides of panel) resulting in electricity production boost
- Ballasted mounting design requiring little to no penetrations or holes to be poked in roof
- Solar panels will mostly be hidden from view at street level
- Enhancement of the existing LEED Silver certification status of the City Hall building
- Free electricity for the City after an estimated "payback" of 7 years is achieved

In general, solar energy systems are very reliable and require very little maintenance based on:

- No moving parts and are designed to withstand Category 3 hurricane wind speeds
- Major equipment (solar panels and inverters) has warranties up to 25 years
- Solar equipment with targeted sourcing from Tier One companies in USA, Canada, or Europe
- System life is expected to be 30 to 35 years
- Annual proactive cleaning/preventative maintenance (O&M) and insurance
- Online performance monitoring available with data updated every 5 minutes

A draft rooftop solar layout (shown in the attached study) calculated an estimated system size of 163 Kw DC, comprising of appx 100 Kw DC on the City Hall roof and 63 Kw DC on the Civic Center roof. 163 Kw DC will yield appx 283 MwHr of electricity annually on the City Hall and Civic Center rooftops, using bifacial solar panels. With City Hall's annual electricity consumption of appx 541 MwHr, the solar energy generated would offset around 52% of City Hall's electricity consumption (283 KwHr / 541 KwHr), with the remaining 48% coming from the electrical grid. The 52% solar offset can be increased if the building's energy consumption is reduced.

Funding wise, the net system cost is estimated at $103,150 based on the following:

- All in system cost estimated at $244,500 (to be confirmed via RFP)
- Incentive of $73,350 through 30% federal Investment Tax Credit (ITC) "Direct Pay" option for all non-profit and tax-exempt entities, with optimal timing of project completion by end of 2023
- Incentive of $50,000 funded through Shell/MP2 Contract Grant
- Incentive of $18,000 funded through CenterPoint's 2023 SCORE and CitySmart Program, with 2023 funds reserved by CenterPoint after application approval and project completion required before December 1, 2023

Pending confirmation through an RFP, the ESB currently estimates the fiscal impact/benefit as:

- City net capital investment = $103,150
- Investment payback = 7 years
- Electricity cost savings over 30 year system life =
    - $383,247 based on 1% inflation rate
    - $461,811 based on 2% inflation rate
    - $556,772 based on 3% inflation rate

From a social perspective, deploying solar energy on the City Hall building will generate goodwill and positive interest within the community, and will be a very visible symbol of the City long term commitment to environmental sustainability. Also, there is a very strong endorsement on all fronts by Mr. Lou Waters (Solar Focal Point) on behalf of the Evelyn's Park Conservancy for the City to expand the deployment of solar energy on its municipal buildings if feasible, based on Evelyn's Park's very positive experience with their existing 75 Kw solar energy system.

CITY ATTORNEY REVIEW:

☐ **Yes** ☑ **No**

Environmental Sustainability Board
2023 Goals and Objectives

City of Bellaire

Feasibility Study for Rooftop Solar on City Hall

March 2, 2023

ESB Goal Champion: Rajiv Pandya

System Location and Solar Reliability

The following is a summary from an ESB sub-team that has been investigating since mid 2021 the feasibility of installing solar energy on CoB municipal building rooftops

1. The CoB City Hall Building is a perfect candidate for a Solar Photovoltaic Energy system and is the best facility to initially consider for the City of Bellaire based on:

   - Flat Roof allowing for panels to be oriented for optimum tilt and azimuth (180° due South)
   - Limited number of obstructions and external shading, and panels are mostly hidden from street view
   - White membrane surface allows for bi-facial solar panel utilization (sunlight absorbed from both sides of panel) resulting in electricity production boost
   - Ballasted mounting design requiring little to no penetrations or holes to be poked in roof
   - Enhancement of the existing LEED Silver certification status of the City Hall Building

2. Solar Energy systems are very reliable and require very little maintenance based on:

   - Have no moving parts and are designed to withstand Category 3 hurricane wind speeds
   - Major equipment (solar panels and inverters) has warranties up to 25-years
   - Solar equipment with targeted sourcing from Tier One companies in USA, Canada, or Europe
   - System life is expected to be 30 to 35 years
   - Annual proactive cleaning / preventative maintenance (O&M) and insurance
   - Online performance monitoring available with data updated every 1 minute

3. Very strong endorsement on all fronts by Mr Lou Waters (Solar Focal Point) on behalf of the Evelyn's Park Conservancy based on Evelyn's Park's positive experience with their existing 75 Kw system (see slide 13)

4. Deploying solar energy on the City Hall Building will will generate a tremendous amount of goodwill and positive interest within the community, and will be a very visible symbol of the City of Bellaire's long-term commitment to Environmental Sustainability

System Size and Solar Production

3. Draft rooftop solar layout (shown below) shows an estimated system size of 163 Kw DC, comprising of appx 100 Kw DC on the City Hall roof and 63 Kw DC on the Civic Center roof –

- 163 Kw DC will yield appx 283 MwHr of electricity annually, using bi-facial solar panel
- City Hall's annual electricity consumption is appx 541 MwHr
- The solar energy generated would offset around 52% of City Hall's electricity consumption (283 KwHr / 541 KwHr), with the remaining 48% coming from the Grid
- The 52% solar offset can be increased if the building's energy consumption is reduced
- Project can be staged with solar installed on Civic Center and City Hall at different times

City Hall Electricity Consumption & Cost

4. Most recent data provided by the CoB Finance Department (Mr Terrence Beaman) for the City Hall Building, showing 540,480 KwHr of electricity consumed over 12 months from October 2021 to September 2022, and an avoided rate of $.05904 per KwHr

Consumption Month	Start Date	End Date	Invoice Usage (kWh)	Usage Charges	Tax Charges	Utility Charges	Total Charges		Usage Charges per KwHr	Tax Charges per KwHr	Utility Charges per KwHr	Total Charges per KwHr
Amounts billed under GLO contract:												
Oct-21	10/5/21	11/3/21	34,368				$3,569.00					$0.10385
Nov-21	11/3/21	12/6/21	39,552				$2,465.88					$0.06235
Dec-21	12/6/21	1/10/22	46,848				$2,206.02					$0.04709
			120,768				$8,240.90					$0.06824
Amounts billed under MP2 contract:												
Jan-22	1/10/22	2/8/22	39,552	$1,428.18	$53.33	$1,129.56	$2,611.07		$0.03611	$0.00135	$0.02856	$0.06602
Feb-22	2/8/22	3/9/22	40,896	$1,490.03	$47.29	$790.54	$2,327.86		$0.03643	$0.00116	$0.01933	$0.05692
Mar-22	3/9/22	4/7/22	38,016	$1,492.29	$45.31	$730.40	$2,268.00		$0.03925	$0.00119	$0.01921	$0.05966
Apr-22	4/7/22	5/6/22	42,432	$1,661.52	$50.69	$826.42	$2,538.63		$0.03916	$0.00119	$0.01948	$0.05983
May-22	5/6/22	6/7/22	52,608	$1,949.52	$59.46	$976.19	$2,985.17		$0.03706	$0.00113	$0.01856	$0.05674
Jun-22	6/7/22	7/7/22	51,840	$2,063.59	$62.83	$995.67	$3,122.09		$0.03981	$0.00121	$0.01921	$0.06023
Jul-22	7/7/22	8/5/22	54,912	$1,994.25	$63.00	$1,082.02	$3,139.27		$0.03632	$0.00115	$0.01970	$0.05717
Aug-22	8/5/22	9/6/22	55,104	$1,984.48	$62.86	$1,086.71	$3,134.05		$0.03601	$0.00114	$0.01972	$0.05688
Sep-22	9/6/22	10/5/22	44,352	$1,606.53	$53.37	$994.37	$2,654.27		$0.03622	$0.00120	$0.02242	$0.05985
			419,712				$24,780.41					$0.05904
		Total 12 Mo =	540,480			Total 12 Mo =	$33,021.31					

Proposal Estimated CF Summary (1% Inflation)

5. Here is an estimated Cash Flow summary for the proposal

Assumptions		
Solar Project Size =	163.00	Kw
Bi-Facial Solar Production Factor =	1,735	KwHr / Kw
Solar Degradation =	0.50%	% / Year
Solar Production Year 1 =	282,805	KwHr
City Hall Consumption =	540,480	KwHr / Year
Solar Offset - Production / Consumption =	52.32%	%
Avoided Utility Rate =	$0.0590	$ / KwHr
Avoided Utility Rate Inflation =	1.00%	% / Year
Avoided Utility Payment Year 1 =	$16,697	$
Estimated System Cost =	$1,500	$ / Kw
Estimated System Cost =	$244,500	$
30% Federal ITC Refund =	$73,350	$
Shell / MP2 Grant (over 5 years) =	$50,000	$
CenterPoint Rebate =	$18,000	
CoB Net Capital Cost =	$103,150	$
O&M, Insurance Cost Year 1 =	$1,500	$ / Year
O&M, Insurance Cost Inflation =	1.00%	% / Year
CoB ROI (IRR) =	12.6%	%
CoB ROI (Payback) =	7	Years
NPV at 8% WACC =	$62,816	$
CoB Savings over 30 Years =	$383,247	$

At 1% Inflation Rate
Payback = 7 years, Total Savings = $383,247
NPV @ 8% WACC = $62,816, IRR = 12.6%

At 2% Inflation Rate (see slide 10)
Payback = 7 years, Total Savings = $461,811
NPV @ 8% WACC = $80,795, IRR = 13.4%

At 3% Inflation Rate (see slide 11)
Payback = 7 years, Total Savings = $556,772
NPV @ 8% WACC = $101,694, IRR = 14.3%

City of Bellaire - Simple Cash Flows										
Year	Solar KwHr Production	Avoided Utility Rate	Avoided Utility Payment	Estimated System Cost	30% Federal ITC Refund	Shell MP2 Grant	CenterPoint Rebate	O&M, Insur	Annual Savings	Cumulative Savings
0	0	$0	$0	$244,500	$0	$10,000	$18,000	$0	-$216,500	-$216,500
1	282,805	$0.0590	$16,697	$0	$73,350	$10,000	$0	$1,500	$98,547	-$117,953
2	281,391	$0.0596	$16,779	$0	$0	$10,000	$0	$1,515	$25,264	-$92,689
3	279,984	$0.0602	$16,863	$0	$0	$10,000	$0	$1,530	$25,332	-$67,356
4	278,584	$0.0608	$16,946	$0	$0	$10,000	$0	$1,545	$25,401	-$41,956
5	277,191	$0.0614	$17,030	$0	$0	$0	$0	$1,561	$15,469	-$26,487
6	275,805	$0.0621	$17,114	$0	$0	$0	$0	$1,577	$15,538	-$10,949
7	274,426	$0.0627	$17,199	$0	$0	$0	$0	$1,592	$15,607	$4,657
8	273,054	$0.0633	$17,284	$0	$0	$0	$0	$1,608	$15,676	$20,333
9	271,689	$0.0639	$17,370	$0	$0	$0	$0	$1,624	$15,745	$36,078
10	270,330	$0.0646	$17,456	$0	$0	$0	$0	$1,641	$15,815	$51,893
11	268,979	$0.0652	$17,542	$0	$0	$0	$0	$1,657	$15,885	$67,779
12	267,634	$0.0659	$17,629	$0	$0	$0	$0	$1,674	$15,955	$83,734
13	266,296	$0.0665	$17,716	$0	$0	$0	$0	$1,690	$16,026	$99,760
14	264,964	$0.0672	$17,804	$0	$0	$0	$0	$1,707	$16,097	$115,856
15	263,639	$0.0679	$17,892	$0	$0	$0	$0	$1,724	$16,168	$132,024
16	262,321	$0.0685	$17,980	$0	$0	$0	$0	$1,741	$16,239	$148,263
17	261,010	$0.0692	$18,069	$0	$0	$0	$0	$1,759	$16,311	$164,573
18	259,704	$0.0699	$18,159	$0	$0	$0	$0	$1,776	$16,382	$180,956
19	258,406	$0.0706	$18,249	$0	$0	$0	$0	$1,794	$16,455	$197,410
20	257,114	$0.0713	$18,339	$0	$0	$0	$0	$1,812	$16,527	$213,937
21	255,828	$0.0720	$18,430	$0	$0	$0	$0	$1,830	$16,600	$230,537
22	254,549	$0.0728	$18,521	$0	$0	$0	$0	$1,849	$16,673	$247,209
23	253,276	$0.0735	$18,613	$0	$0	$0	$0	$1,867	$16,746	$263,955
24	252,010	$0.0742	$18,705	$0	$0	$0	$0	$1,886	$16,819	$280,774
25	250,750	$0.0750	$18,798	$0	$0	$0	$0	$1,905	$16,893	$297,667
26	249,496	$0.0757	$18,891	$0	$0	$0	$0	$1,924	$16,967	$314,634
27	248,249	$0.0765	$18,984	$0	$0	$0	$0	$1,943	$17,041	$331,675
28	247,008	$0.0772	$19,078	$0	$0	$0	$0	$1,962	$17,116	$348,791
29	245,773	$0.0780	$19,172	$0	$0	$0	$0	$1,982	$17,191	$365,982
30	244,544	$0.0788	$19,267	$0	$0	$0	$0	$2,002	$17,266	$383,247

Proposed Funding Strategy

6. The recommended funding process for the system is based per the following strategy –

- "All In" System Cost is **estimated at $244,500**, Targeted funding breakdown:
  - **$73,350** through 30% Federal Investment Tax Credit (ITC) **"Direct Pay"** option for all Non-Profit and Tax-Exempt entities (part of the Climate Provisions in the recently enacted Federal Inflation Reduction Act)
    - IRA allows for cash in lieu of tax credit for municipalities; updated guideline pending
    - Summary Links: Solar United Neighbors and Solar Energy Industries Association
    - The Federal ITC has been the "bedrock" incentive for the US solar industry for 20+ years
    - Optimum timing is to complete project before end of 2023
  - **$50,000** funded through Shell / MP2 Contract Grant
    - $10,000 per year for 5 years, with first payment in June 2022
  - **$18,000** funded through CenterPoint SCORE and CitySmart Program for 2023
    - Application must be approved by CenterPoint with 2023 funds allocated / committed
    - Project must be completed before December 1, 2023
  - **$103,150** funded by CoB Capital Budget
    - Payback estimated at 7 years per Cash Flow table
    - Numbers will be heavily impacted by RFP feedback from solar EPC company bidders
- The City of Bellaire issues an RFP (Request for Proposal) to qualified solar EPC company bidders for turnkey project services (ie Design, Permitting, Installation, Startup), leveraging experiences from Evelyn's Park solar rooftop installations as much as possible

Next Steps

7. To potentially move forward with this project, the following steps and approvals targeted over the coming weeks and months -

- Finalize project scope with support from the following resources (COMPLETED ON DEC 15, 2022)
  - David Roylance – CoB Energy Consultant
  - Karl Miller – CoB Facilities Director
  - Terrence Beaman – CoB Chief Financial Officer
  - Lou Waters – Evelyn's Park Conservancy Solar Focal Point
- Gain ESB approval on the following RFP Resolution Statement (COMPLETED ON JAN 4, 2023)
  - "The ESB supports submitting the City Hall Solar Energy project proposal to the City of Bellaire City Council for their consideration and initiation of a Request for Proposal (RFP) process"
- Gain City Council approval to direct City Staff to initiate a project Request for Proposal (RFP) based on the following (PENDING)
  - The main purpose of the RFP will be to validate key estimates of the study and to provide more accurate estimates of project cost and anticipated payback period.
  - Issuance of an RFP will not commit the City to action; it is intended to augment the information currently available to assist the City Council in future decision
- Gain City Council Approval to move forward with the project based on the following (PENDING)
  - RFP feedback is assessed and summarized by CoB Staff with support from the ESB as needed
  - If the best offer is deemed acceptable, the project is presented to City Council for their approval to commit funds, award to successful bidder, and launch the project

Backup Slides

Why Communities Install Solar

Usually, a combination of one of these four reasons:

To Save Money

To Save The Environment

To Have Energy Independence

To Have Technology Diversification

Proposal Estimated CF Summary (2% Inflation)

5. Here is an estimated Cash Flow summary for the proposal

Assumptions		
Solar Project Size =	163.00	Kw
Bi-Facial Solar Production Factor =	1,735	KwHr / Kw
Solar Degradation =	0.50%	% / Year
Solar Production Year 1 =	282,805	KwHr
City Hall Consumption =	540,480	KwHr / Year
Solar Offset - Production / Consumption =	52.32%	%
Avoided Utility Rate =	$0.0590	$ / KwHr
Avoided Utility Rate Inflation =	2.00%	% / Year
Avoided Utility Payment Year 1 =	$16,697	$
Estimated System Cost =	$1,500	$ / Kw
Estimated System Cost =	$244,500	$
30% Federal ITC Refund =	$73,350	$
Shell / MP2 Grant (over 5 years) =	$50,000	$
CenterPoint Rebate =	$18,000	
CoB Net Capital Cost =	$103,150	$
O&M, Insurance Cost Year 1 =	$1,500	$ / Year
O&M, Insurance Cost Inflation =	2.00%	% / Year
CoB ROI (IRR) =	13.4%	%
CoB ROI (Payback) =	7	Years
NPV at 8% WACC =	$80,795	$
CoB Savings over 30 Years =	$461,811	$

At 1% Inflation Rate (see slide 5)
Payback = 7 years, Total Savings = $383,247
NPV @ 8% WACC = $62,816, IRR = 12.6%

At 2% Inflation Rate
Payback = 7 years, Total Savings = $461,811
NPV @ 8% WACC = $80,795, IRR = 13.4%

At 3% Inflation Rate (see slide 11)
Payback = 7 years, Total Savings = $556,772
NPV @ 8% WACC = $101,694, IRR = 14.3%

City of Bellaire - Simple Cash Flows

Year	Solar KwHr Production	Avoided Utility Rate	Avoided Utility Payment	Estimated System Cost	30% Federal ITC Refund	Shell MP2 Grant	CenterPoint Rebate	O&M, Insur	Annual Savings	Cumulative Savings
0	0	$0	$0	$244,500	$0	$10,000	$18,000	$0	-$216,500	-$216,500
1	282,805	$0.0590	$16,697	$0	$73,350	$10,000	$0	$1,500	$98,547	-$117,953
2	281,391	$0.0602	$16,946	$0	$0	$10,000	$0	$1,530	$25,416	-$92,538
3	279,984	$0.0614	$17,198	$0	$0	$10,000	$0	$1,561	$25,637	-$66,900
4	278,584	$0.0627	$17,454	$0	$0	$10,000	$0	$1,592	$25,863	-$41,038
5	277,191	$0.0639	$17,714	$0	$0	$0	$0	$1,624	$16,091	-$24,947
6	275,805	$0.0652	$17,978	$0	$0	$0	$0	$1,656	$16,322	-$8,625
7	274,426	$0.0665	$18,246	$0	$0	$0	$0	$1,689	$16,557	$7,932
8	273,054	$0.0678	$18,518	$0	$0	$0	$0	$1,723	$16,795	$24,727
9	271,689	$0.0692	$18,794	$0	$0	$0	$0	$1,757	$17,037	$41,764
10	270,330	$0.0706	$19,074	$0	$0	$0	$0	$1,793	$17,281	$59,045
11	268,979	$0.0720	$19,358	$0	$0	$0	$0	$1,828	$17,530	$76,575
12	267,634	$0.0734	$19,647	$0	$0	$0	$0	$1,865	$17,782	$94,357
13	266,296	$0.0749	$19,939	$0	$0	$0	$0	$1,902	$18,037	$112,394
14	264,964	$0.0764	$20,237	$0	$0	$0	$0	$1,940	$18,296	$130,690
15	263,639	$0.0779	$20,538	$0	$0	$0	$0	$1,979	$18,559	$149,249
16	262,321	$0.0795	$20,844	$0	$0	$0	$0	$2,019	$18,825	$168,074
17	261,010	$0.0810	$21,155	$0	$0	$0	$0	$2,059	$19,095	$187,169
18	259,704	$0.0827	$21,470	$0	$0	$0	$0	$2,100	$19,369	$206,539
19	258,406	$0.0843	$21,790	$0	$0	$0	$0	$2,142	$19,647	$226,186
20	257,114	$0.0860	$22,114	$0	$0	$0	$0	$2,185	$19,929	$246,115
21	255,828	$0.0877	$22,444	$0	$0	$0	$0	$2,229	$20,215	$266,330
22	254,549	$0.0895	$22,778	$0	$0	$0	$0	$2,273	$20,505	$286,835
23	253,276	$0.0913	$23,118	$0	$0	$0	$0	$2,319	$20,799	$307,634
24	252,010	$0.0931	$23,462	$0	$0	$0	$0	$2,365	$21,097	$328,731
25	250,750	$0.0950	$23,812	$0	$0	$0	$0	$2,413	$21,399	$350,130
26	249,496	$0.0969	$24,167	$0	$0	$0	$0	$2,461	$21,706	$371,836
27	248,249	$0.0988	$24,527	$0	$0	$0	$0	$2,510	$22,017	$393,852
28	247,008	$0.1008	$24,892	$0	$0	$0	$0	$2,560	$22,332	$416,184
29	245,773	$0.1028	$25,263	$0	$0	$0	$0	$2,612	$22,651	$438,835
30	244,544	$0.1048	$25,639	$0	$0	$0	$0	$2,664	$22,976	$461,811

Proposal Estimated CF Summary (3% Inflation)

5. Here is an estimated Cash Flow summary for the proposal

Assumptions		
Solar Project Size =	163.00	Kw
Bi-Facial Solar Production Factor =	1,735	KwHr / Kw
Solar Degradation =	0.50%	% / Year
Solar Production Year 1 =	282,805	KwHr
City Hall Consumption =	540,480	KwHr / Year
Solar Offset - Production / Consumption =	52.32%	%
Avoided Utility Rate =	$0.0590	$ / KwHr
Avoided Utility Rate Inflation =	3.00%	% / Year
Avoided Utility Payment Year 1 =	$16,697	$
Estimated System Cost =	$1,500	$ / Kw
Estimated System Cost =	$244,500	$
30% Federal ITC Refund =	$73,350	$
Shell / MP2 Grant (over 5 years) =	$50,000	$
CenterPoint Rebate =	$18,000	
CoB Net Capital Cost =	$103,150	$
O&M, Insurance Cost Year 1 =	$1,500	$ / Year
O&M, Insurance Cost Inflation =	3.00%	% / Year
CoB ROI (IRR) =	14.3%	%
CoB ROI (Payback) =	7	Years
NPV at 8% WACC =	$101,694	$
CoB Savings over 30 Years =	$556,772	$

At 1% Inflation Rate (see slide 5)
Payback = 7 years, Total Savings = $383,247
NPV @ 8% WACC = $62,816, IRR = 12.6%

At 2% Inflation Rate (see slide 10)
Payback = 7 years, Total Savings = $461,811
NPV @ 8% WACC = $80,795, IRR = 13.4%

City of Bellaire - Simple Cash Flows

Year	Solar KwHr Production	Avoided Utility Rate	Avoided Utility Payment	Estimated System Cost	30% Federal ITC Refund	Shell MP2 Grant	CenterPoint Rebate	O&M, Insur	Annual Savings	Cumulative Savings
0	0	$0	$0	$244,500	$0	$10,000	$18,000	$0	-$216,500	-$216,500
1	282,805	$0.0590	$16,697	$0	$73,350	$10,000	$0	$1,500	$98,547	-$117,953
2	281,391	$0.0608	$17,112	$0	$0	$10,000	$0	$1,545	$25,567	-$92,386
3	279,984	$0.0626	$17,537	$0	$0	$10,000	$0	$1,591	$25,946	-$66,441
4	278,584	$0.0645	$17,973	$0	$0	$10,000	$0	$1,639	$26,334	-$40,107
5	277,191	$0.0665	$18,419	$0	$0	$0	$0	$1,688	$16,731	-$23,376
6	275,805	$0.0684	$18,877	$0	$0	$0	$0	$1,739	$17,138	-$6,238
7	274,426	$0.0705	$19,346	$0	$0	$0	$0	$1,791	$17,555	$11,317
8	273,054	$0.0726	$19,827	$0	$0	$0	$0	$1,845	$17,982	$29,299
9	271,689	$0.0748	$20,320	$0	$0	$0	$0	$1,900	$18,419	$47,719
10	270,330	$0.0770	$20,825	$0	$0	$0	$0	$1,957	$18,867	$66,586
11	268,979	$0.0793	$21,342	$0	$0	$0	$0	$2,016	$19,326	$85,912
12	267,634	$0.0817	$21,872	$0	$0	$0	$0	$2,076	$19,796	$105,708
13	266,296	$0.0842	$22,416	$0	$0	$0	$0	$2,139	$20,277	$125,986
14	264,964	$0.0867	$22,973	$0	$0	$0	$0	$2,203	$20,770	$146,756
15	263,639	$0.0893	$23,544	$0	$0	$0	$0	$2,269	$21,275	$168,031
16	262,321	$0.0920	$24,129	$0	$0	$0	$0	$2,337	$21,792	$189,823
17	261,010	$0.0947	$24,729	$0	$0	$0	$0	$2,407	$22,321	$212,144
18	259,704	$0.0976	$25,343	$0	$0	$0	$0	$2,479	$22,864	$235,008
19	258,406	$0.1005	$25,973	$0	$0	$0	$0	$2,554	$23,419	$258,427
20	257,114	$0.1035	$26,618	$0	$0	$0	$0	$2,630	$23,988	$282,415
21	255,828	$0.1066	$27,280	$0	$0	$0	$0	$2,709	$24,571	$306,986
22	254,549	$0.1098	$27,958	$0	$0	$0	$0	$2,790	$25,167	$332,153
23	253,276	$0.1131	$28,652	$0	$0	$0	$0	$2,874	$25,778	$357,931
24	252,010	$0.1165	$29,364	$0	$0	$0	$0	$2,960	$26,404	$384,335
25	250,750	$0.1200	$30,094	$0	$0	$0	$0	$3,049	$27,045	$411,380
26	249,496	$0.1236	$30,842	$0	$0	$0	$0	$3,141	$27,701	$439,081
27	248,249	$0.1273	$31,608	$0	$0	$0	$0	$3,235	$28,373	$467,455
28	247,008	$0.1311	$32,394	$0	$0	$0	$0	$3,332	$29,062	$496,516
29	245,773	$0.1351	$33,199	$0	$0	$0	$0	$3,432	$29,767	$526,283
30	244,544	$0.1391	$34,024	$0	$0	$0	$0	$3,535	$30,489	$556,772

At 3% Inflation Rate
Payback = 7 years, Total Savings = $556,772
NPV @ 8% WACC = $101,694, IRR = 14.3%

Frequently Asked Questions About Solar

What if the entire roof has to be replaced in the future ?

Fortunately, the CoB City Hall building's roof is less five years old and a full roof replacement will likely not be needed for another 20 years. When this does happen the solar panels (and other rooftop equipment: HVAC, Communication, etc ..) will have to be removed and re-installed (estimated at 17 cents per watt or $27,000 for City Hall). This cost will be fully covered by insurance if the roof replacement is filed under a claim.

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What will happen to the panels during hurricane force winds ?

Like most rooftop equipment, solar energy systems are required by code to be designed, engineered and permitted to withstand 120 mph winds or a Category 3 Hurricane. Also documented history has shown that very rarely will an extreme weather event impact only the solar panels, without major damage occurring to the actual roof as well.

Do Solar Panels work on a Cloudy or Rainy Day ?

Solar panels will work during cloudy or rainy days but will not generate as much electricity compared to a sunny day.

Will the Panels get damaged from Hail ?

Depending on the intensity of the event, hail can damage solar panels. However, most property insurance policies cover that damage.

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Evelyn's Park Conservancy – 74 Kw Solar Project

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Example View of Online Solar Monitoring

- Monitoring is included as part of the Solar Inverter package
- Main capability is to collect and send real time power level data and diagnostics through an Online Portal

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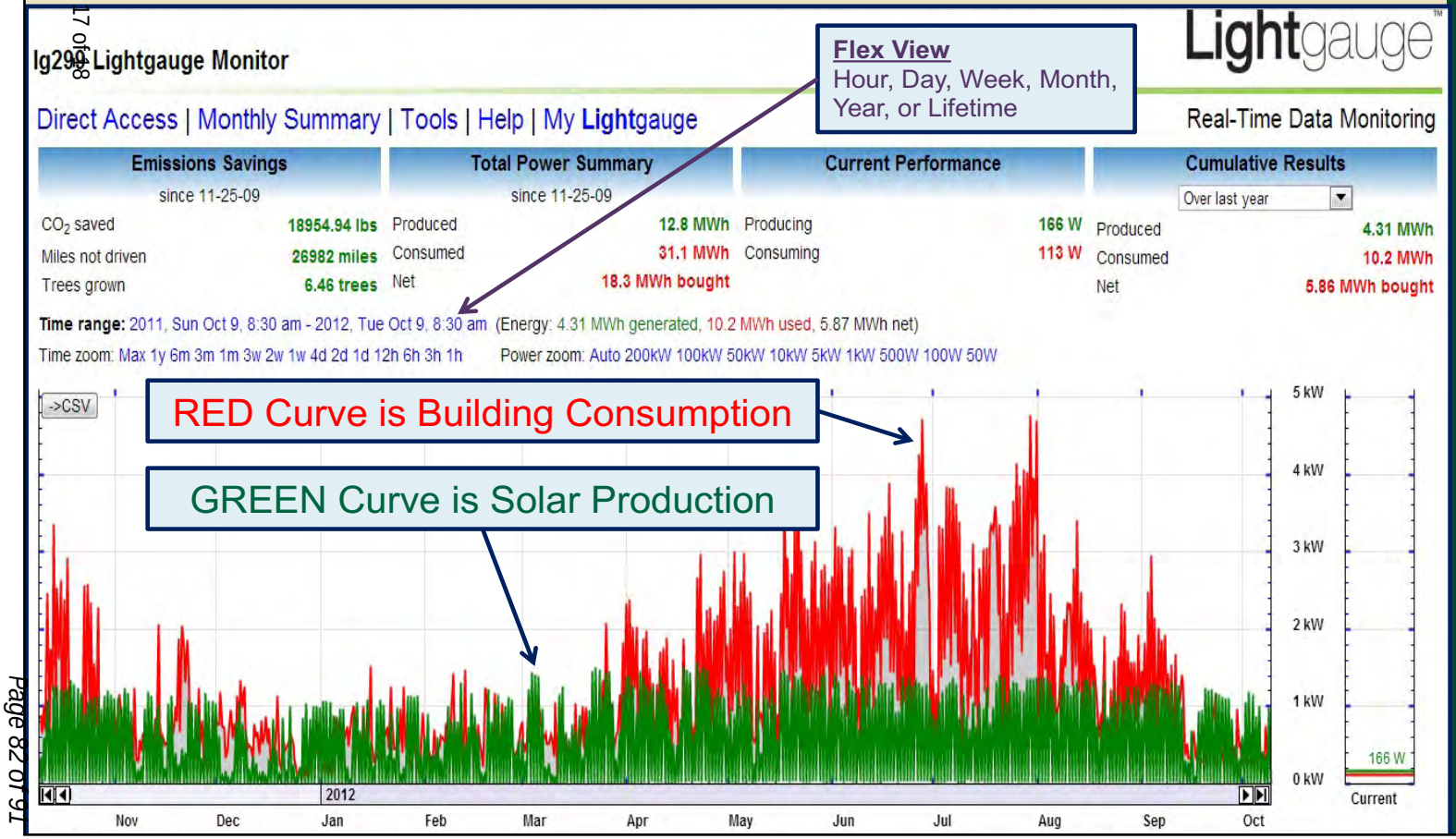

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Previous 2019 / 2022
CoB Building Electricity Bill Data

	Bldg Name	Court & Police			Fire Station			City Hall		
	Address	5110 Jessamine St, Bellaire, TX 77401			5101 Jessamine St, Bellaire, TX 77401			7008 S Rice Ave, Bellaire, TX 77401		
	ESI ID	10089010019014369601l8			10089010229004113201l0			1008901024901413001l8		
	Cust ID	5218002029			5213003406			5218001827		
Year	Usage Mo	$	KwHr	$ / KwHr	$	KwHr	$ / KwHr	$	KwHr	$ / KwHr
2019	June	$6,680	117,888	$0.0567	$2,710	46,280	$0.0586	$3,852	65,280	$0.0590
2019	July	$6,401	112,800	$0.0568	$2,606	45,569	$0.0572	$3,231	52,992	$0.0610
2019	Aug (est)	$6,401	112,800	$0.0568	$2,606	45,569	$0.0572	$3,231	52,992	$0.0610
2019	Sept (est)	$6,401	112,800	$0.0568	$2,606	45,569	$0.0572	$3,231	52,992	$0.0610
2019	Oct	$11,668	93,596	$0.1247	$4,498	37,446	$0.1201	$5,741	42,816	$0.1341
2019	Nov	$4,809	84,096	$0.0572	$2,195	39,717	$0.0553	$2,787	45,312	$0.0615
2019	Dec	$4,740	85,152	$0.0557	$2,231	41,221	$0.0541	$2,682	45,888	$0.0584
2020	Jan	$9,135	76,608	$0.1192	$4,154	34,352	$0.1209	$5,051	39,744	$0.1271
2020	Feb	$4,770	83,040	$0.0574	$2,028	37,033	$0.0548	$2,437	40,512	$0.0601
2020	Mar	$4,756	83,520	$0.0569	$2,039	37,063	$0.0550	$2,249	34,368	$0.0654
2020	Apr	$5,213	87,264	$0.0597	$2,087	36,834	$0.0567	$2,539	43,584	$0.0583
2020	May	$5,338	91,680	$0.0582	$2,226	38,769	$0.0574	$2,636	44,544	$0.0592
	Total	**$76,312**	**1,141,244**	**$0.0669**	**$31,986**	**485,422**	**$0.0659**	**$39,665**	**561,024**	**$0.0707**

These 3 buildings initially identified due to newer build and good physical roof characteristics; other CoB properties (Recreation Center, New Library, New MTC) can be considered also for the future

AGENDA STATEMENT

City of Bellaire

MEETING: City Council - Apr 17 2023
PREPARED BY: Travis Tanner
DEPARTMENT: Development Services

ITEM TITLE:

Review and discuss draft outdoor lighting regulations recommended by the Planning and Zoning Commission of the City of Bellaire, Texas - Submitted by Travis Tanner, Director of Development Services.

RECOMMENDATION:

Travis Tanner, Director of Development Services, recommends City Council conduct a workshop to discuss proposed changes to the Code of Ordinances regarding outdoor lighting recommended by the Planning and Zoning Commission.

BACKGROUND/SUMMARY:

This item was discussed with City Council on March 20, 2023, and is being brought back for further review and discussion. As discussed, on February 9, 2023, the Planning and Zoning Commission recommended City Council adopt lighting regulations. The regulations had been worked on and discussed by staff and the Commission over the last several months. Existing regulations regarding lighting located in the Code of Ordinances are minimal and lacking in provisions related to enforcement to effectively address lighting issues. The proposed regulations address outdoor lighting accompanying new construction and increase enforcement capability for lighting issues unrelated to new construction. Specifically, the draft regulations provide the following:

- A purpose of preventing undesirable light and glare onto adjoining properties in the interest of public health, safety, and welfare;
- Definitions for terms in the ordinance (e.g., footcandle);
- Prohibition of outdoor lighting projecting glare on adjoining lots (specifically, properties cannot cause greater than 0.2 footcandles of lighting on adjoining properties);
- Exceptions for lighting of public streets, emergency vehicles, etc.;
- Ability of the City to inspect properties and enforce the above provisions;
- Exceptions for seasonal lighting;
- Provisions for parking lot lighting and photometric plan requirements for new construction; and
- Enforcement and penalty provisions.

Following the discussion on March 20, changes were made to the draft regulations to address City Council feedback. The changes are attached for review. Specifically, unnecessary definitions were removed, the maximum lighting impact on adjoining properties was reduced from 1/2 to 0.2 footcandles, a lighting color warmth requirement of a maximum of 3,000 Kelvin was added, clarification was added for residential recreation facility requirements to include pools, and other minor changes were made.