2018

Village of Oak Park: Energy Initiative Program Option Assessments

PRELIMINARY ANALYSIS OF OPTIONS FOR VILLAGE ENERGY INITIATIVES

VILLAGE OF OAK PARK

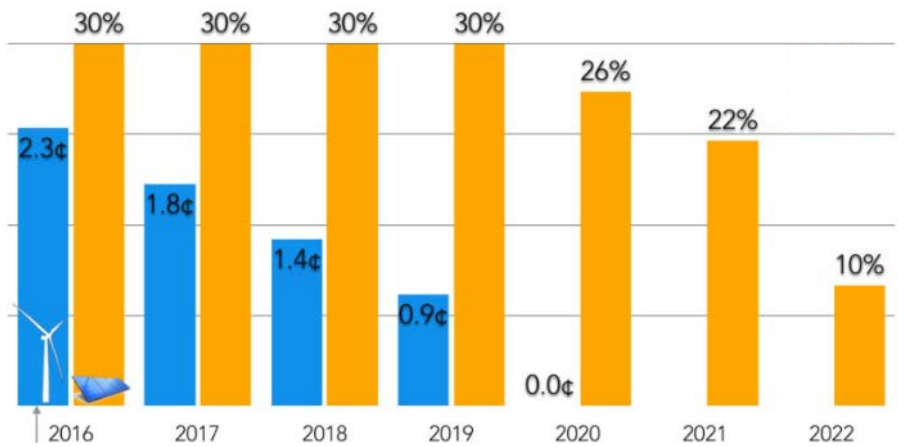
Contents

Executive Summary

The Future Energy Jobs Act (FEJA) of 2016 established new statewide goals for renewable energy and energy efficiency in Illinois and provides enhanced funding to support programs and projects in these sectors. Renewable energy incentives through FEJA are subject to a hard rate cap and are structured to provide higher incentives for projects that can be deployed in the near term and lower incentives for later projects.

Similarly, federal incentives for renewable energy projects are set to decline over the near term. As noted in the chart to the right, incentives for wind projects (the production tax credit) will decline from 2.3 cents per kWh to 0 cents per kWh in 2020. Additionally, incentives for solar projects (the investment tax credit) will decline from 30% of total project capital cost to 10% of total project capital costs in 2022.

Phase-out of Federal Incentives for Renewable Energy



In sum, the FEJA and federal incentives for renewable energy set strong financial incentives for projects that can be deployed in the near term. As a leader in sustainability planning and programming, the Village of Oak Park has an opportunity to leverage FEJA funding and federal tax credits with funds collected through the Village's Community Choice Aggregation program to benefit the entire community.

At the direction of the Board, Staff has undertaken an evaluation of eight (8) renewable energy and energy efficiency program that could be supported by a combination of FEJA and federal incentives and the Community Choice Electrical Aggregation Fund (CCA-Fund). In its evaluations, Staff sought to define appropriate goals and approaches and to score each option by key metrics as well as general economics. The key metrics applied by Staff included:

- Sustainability – What volume of energy efficiency or renewable energy generation can the option deliver?
- Economics – What is the balance between economic value delivered vs. program cost?
- Resource Requirements – What level of Village resources will be required to manage the program?
- Unknowns – How much experience exists in the market to support the program or related technologies?
- Longevity – What is the life cycle duration of the assets supported by the program?
- Complexity – What is the level of complexity related to managing the program?
- Scalability – What level of funding flexibility can the program accommodate?
- Calendar – What is the likelihood that the program can commence in calendar year 2018?

Staff then made recommendations for each program based on the results of the metrics evaluation. The table below consolidates the scoring values, composite scores, staff recommendations, and budget guidance for each of the options considered. Scores range from 1 to 5, with 1 indicating poor performance and 5 indicating superior performance.

Metric	Village Hall Rooftop Solar / Site-Consum	Village Hall Rooftop Solar / Community Solar	Community Solar Subscrip for Village Facilities	Community Solar Subscrip for CCA Program	Credit Enhance-ment Program for Rooftop Solar	LED Street lights	Promote Existing Utility Energy Efficiency Programs	Utility Scale Solar
	A	B	C1	C2	D	E	F	G
Sustainability	2	2	5	5	[redacted]	5	5	5
Economics	1	3	5	5	[redacted]	3	5	1
Resources	3	3	4	5	[redacted]	5	5	1
Unknowns	5	4	4	5	[redacted]	5	5	5
Longevity	5	5	5	5	[redacted]	5	5	5
Complexity	4	4	4	4	[redacted]	4	3	1
Scalability	2	3	4	4	[redacted]	5	5	1
Calendar[1]	4	4	5	5	[redacted]	5	5	1
Composite Score	**26**	**28**	**36**	**38**	[redacted]	**37**	**38**	**20**
Staff Recommendation	**Pursue**	**Pursue**	**Pursue**	**Pursue**	**Not Recommended**	**Pursue**	**Pursue**	**Table**
Budget Guidance	**~$250,000 in CCA Funding**	**~$166,000 in CCA Funding**	**No CCA funding required**	**No CCA funding required**	**Not Recommended**	**CCA funding**	**3% of CCA**	**Not recommend for CCA Funding**

[1] FEJA incentives for all solar projects will not be available until late fall 2018. As a result, Staff believes that any solar projects would be completed within calendar year 2019.

A. Rooftop Solar Array for Village Hall (to Support Village Consumption)

Description. Rooftop solar arrays with installed generating capacity of less than 2,000 kW can receive substantial financial incentives under FEJA. By connecting a rooftop solar array to a building's electrical system, the solar energy generated can replace some or all the electricity purchased from the local utility. Financing the construction of rooftop solar arrays typically depends on revenues from multiple sources: federal tax incentives, the sale of Renewable Energy Credits (SRECs) to local utilities, direct capital investment by the property owner, and the avoided cost savings resulting from reduced electricity purchases from the local utility.

The Village could install a small solar array on the rooftop of the Village Hall, and utilize the electricity generated to offset electricity deliveries from Commonwealth Edison to that facility.

Sector. Renewable Energy (government)

Goal. To supply a portion the electricity consumption of the Oak Park Village Hall with electricity generated by a rooftop solar asset.

Approach. The Village can solicit bids from solar installation companies to design and build a solar array on the Village Hall roof. Typically, rooftop solar projects are financed through power purchase agreements, equipment leases or cash payments plus utility and tax incentives. The simplest method for the Village to finance a rooftop solar array for Village Hall would be to: i) sell the SRECs generated by the array over a 15-year period to Commonwealth Edison; and, ii) pay the remaining costs from the CCA-Fund.

Operational Assessment. Staff's evaluation of the Rooftop Solar Array option for Village Hall according to key operational characteristics is found in the following table. Scores range from 1 to 5 with 1 indicating poor performance and 5 indicating superior performance.

Category	Description	Score (1-5)
Sustainability	Volume of energy efficiency results or renewable energy generation	2
Economics	Level of economic value vs. cost	1
Resources	Level of Village resources required to create and manage program activities	3
Unknowns	Level of market experience with approach or technology	5
Longevity	Duration of project life cycle	5
Complexity	Level of management complexity	4
Scalability	Level of ability to increase or decrease funding levels as needed	2
Calendar	Ability to facilitate the approach in 2018	4

Staff Recommendation: Staff recommends that the Rooftop Solar Array for Village Hall be considered by the Board. The recommendation is supported by the relatively low cost of the project, and the visibility the project would have for residents and businesses that are considering their own rooftop solar projects. Additionally, Staff recommends further evaluation of: i) utilizing solar PV film for the Rooftop Solar Array (as opposed to solar PV panels); ii) examining options for utilizing more rooftop square footage for generation; and iii) evaluating the option of installing solar canopies in the Village Hall parking lot.

Economic Benchmarking. Development and management of a Rooftop Solar Array for Village Hall will not reduce electricity supply costs for the Village as the Village Hall receives unbilled electricity supply service from Commonwealth Edison through the Village's utility franchise agreement. As such, the economic benchmarking assessment of a Rooftop Solar Array for Village Hall project presents a net negative value. However, initial cost estimates for the project indicate that the cost of installing a rooftop solar array (after incentives) can be supported by the CCA-Fund. The table below conveys the preliminary economic analysis of the Rooftop Solar for Village Consumption option. Staff can continue to refine the economic analysis at the direction of the Board.

Variables		Calcs	Village Hall
Rooftop Solar Project Capacity			
A	Available Roof Space (Square Feet)	A	9,000
B	Potential Solar Generating Capacity (kW)	B	120
C	Solar Capacity Factor	C	16%
D	Hours in a Year	D	8,760
E	Annual Solar Generation Potential (kWh)	E = B * C * D	168,192
F	Annual Consumption (kWh)	F	2,237,000
G	Solar Offest Value (%)	G = E / F	7.5%
Solar Project Installation Costs			
H	Potential Solar Generating Capacity (kW)	H = B	120
I	Estimated Unit Cost of Solar ($/kW)	I	$3,500
J	Estimated Total Cost of Solar Project	J = H * I	$420,000
K	Estimated SREC Incentives (15-year contract, payment in 1st 4 years)	K	($135,554)
L	Estimated Inverter Incentives ($250/kW, 1 time payment, year 1)	L	($30,000)
M	Net Solar Project Capital Cost	M = J + K + L	$254,446
Cost Offsets from Solar Project Installation			
N	Electricity Supply Cost ($/kWh)	N	$0.0000
O	Annual Solar Generation Potential (kWh)	O	168,192
P	Potential Annual Avoided Cost for Solar Project	P = N * O	$0
Net Results for Solar Project Installations			
Q	Net Solar Project Capital Cost	Q = M	$254,446
R	Potential Annual Avoided Cost for Solar Project	R = P	$0
S	Net Cost to Village for Solar Project Installation	S = R - S	($254,446)

*Capacity Factor is the ratio of energy generated over 1-year, divided by the installed capacity.

B. Rooftop Solar Array for Village Hall (to Support Community Solar)

Description. Community Solar projects with an installed generating capacity of less than 2,000 kW can also receive substantial financial incentives under FEJA. By connecting an array of solar panels to the Commonwealth Edison distribution system, the electricity generated by the array can be credited to the accounts of any Commonwealth Edison customer that subscribes to that Community Solar array – a process called Net Metering. Financing the construction of Community Solar arrays typically depends on revenues from multiple sources: federal tax incentives, the sale of Renewable Energy Credits (SRECs) to local utilities, direct capital investment by the property owner, and subscription fees from project subscribers.

The Village could install a community solar array on the rooftop of the Village Hall and allow residents to subscribe to the array to offset all or a portion of their own electricity consumption through the Net Metering Process.

Sector. Renewable Energy (Residential)

Goal. To host a community solar array for Oak Park residents on the roof of the Oak Park Village Hall.

Approach. The Village can solicit bids from solar installation companies to design and build a Community Solar array on the Village Hall roof. The Community Solar array would export electricity to the Commonwealth Edison distribution system. The simplest method for the Village to finance a community solar array for the Village Hall roof would be to: i) sell the SRECs generated by the array over a 15-year period to Commonwealth Edison; and, ii) pay the remaining costs from the CCA-Fund. Residents may enter into 15 to 20-year agreements to subscribe to the Community Solar Array to purchase a portion of the array's output.

Operational Assessment. Staff's evaluation of the Community Solar Array for the Village Hall Roof option according to key operational characteristics is found in the following table. Scores range from 1 to 5 with 1 indicating poor performance and 5 indicating superior performance.

Category	Description	Score (1-5)
Sustainability	Volume of energy efficiency results or renewable energy generation	2
Economics	Level of economic value vs. cost	3
Resources	Level of Village resources required to create and manage program activities	3
Unknowns	Level of market experience with approach or technology	4
Longevity	Duration of project life cycle	5
Complexity	Level of management complexity	4
Scalability	Level of ability to increase or decrease funding levels as needed	3
Calendar	Ability to facilitate the approach in 2018	4

Staff Recommendation: Staff recommends that the Community Solar for the Village Hall Roof option be considered by the Board. The recommendation is supported by the relatively low cost of the project, and the visibility the project would have for residents and businesses, and the financial benefits that may be realized by subscribers. Additionally, Staff recommends further evaluation of i) utilizing solar PV film for the Rooftop Solar Array (as opposed to solar PV panels); ii) examining options for utilizing more rooftop square footage for generation; and iii) evaluating the option of installing solar canopies in the Village Hall parking lot.

Economic Benchmarking. Development and management of a Community Solar Array on the Village Hall Roof project will not reduce electricity supply costs for the Village as the electricity generated by the array will be delivered into the Commonwealth Edison distribution and credited to subscribers' accounts. As such, the economic benchmarking assessment of the Community Solar on the Village Hall Roof project presents a positive economic value for subscribers. The table below conveys the preliminary economic analysis of the Utility-Scale Solar option. Staff can continue to refine the economic analysis at the direction of the Board.

	Variables	Calcs	Village Hall
Rooftop Solar Project Capacity			
A	Available Roof Space (Square Feet)	A	9,000
B	Potential Solar Generating Capacity (kW)	B	120
C	Solar Capacity Factor	C	16%
D	Hours in a Year	D	8,760
E	Annual Solar Generation Potential (kWh)	E = B * C * D	168,192
F	Annual Consumption (kWh)	F	2,237,000
G	Solar Offest Value (%)	G = E / F	7.5%
Solar Project Installation Costs			
H	Potential Solar Generating Capacity (kW)	H = B	120
I	Estimated Unit Cost of Solar ($/kW)	I	$3,500
J	Estimated Total Cost of Solar Project	J = H * I	$420,000
K	Estimated SREC Incentives (15-year contract, payment in 1st 4 years)	K	($223,956)
L	Estimated Inverter Incentives ($250/kW, 1 time payment, year 1)	L	($30,000)
M	Net Solar Project Capital Cost	M = J + K + L	$166,044
Simple Cost for Community Solar Subscriptions			
N	Annual Solar Generation Potential (kWh)	N = E	168,192
O	Community Solar Contract Term (Years)	O	15
P	Solar Generation Potential for Community Solar Contract Term (kWh)	P	243,710,208
Q	Net Solar Project Capital Cost	Q = M	$166,044
R	Average Subscription Unit Cost ($/kWh)	R = P / Q	$0.00068
Consumer Benefit from Community Solar Subscription			
S	Estimated annual consumption per household (kWh)	S	7,500
T	Number of Households Served by Community Solar Installation	T	22
U	Projected Unit Price for Elecrticity Supply (Grid)	U	$0.03000
V	Average Subscription Unit Cost ($/kWh)	V = R	$0.00068
W	Annual Cost savings per Subscription Houehold	W = (U - V) * S	$219.89

*Capacity Factor is the ratio of energy generated over 1-year, divided by the installed capacity.

C-1. Offsite Community Solar Subscriptions for Village Electricity Accounts

Description. Community Solar arrays with nameplate (installed) generating capacity of less than 2,000 kW can receive substantial financial incentives under FEJA. By connecting an array of solar panels to the Commonwealth Edison distribution system, the electricity generated by the array can be credited to the accounts of any Commonwealth Edison customer that subscribes to that Community Solar array – a process termed Net Metering. Several hundred Community Solar projects have been proposed for the Commonwealth Edison service region. Community Solar arrays are typically financed from multiple sources: federal tax incentives, the sale of Renewable Energy Credits (SRECs) to local utilities, and subscription fees from project subscribers.

The Village could subscribe some or all the Village's own Commonwealth Edison accounts to one or more of the Community Solar arrays under development in the region. By paying a subscription fee to the Community Solar array developer, the Village would receive on-bill credits on monthly Commonwealth Edison bills. Depending on the type of supply arrangements (i.e. default rate, or retail supply), the cost of Community Solar subscriptions may be less than the resulting on-bill credits – yielding a potential cost savings to the Village.

Sector. Renewable Energy (Government Facilities)

Goal. To subscribe Village accounts to one or more community solar arrays to reduce operating costs.

Approach. The Village may enter into subscription agreements with Community Solar developers for periods of up to 20 years. The subscriptions will generate on-bill credits for subscribed accounts monthly. The on-bill credits can be applied to current balances or can be transferred to outstanding balances on other Village accounts. The Village can seek pricing from Community Solar developers to determine which accounts have the potential to generate cost savings for the Village.

Operational Assessment. Staff's evaluation of the Community Solar option for Village electricity accounts according to key operational characteristics is found in the following table. Scores range from 1 to 5 with 1 indicating poor performance and 5 indicating superior performance.

Category	Description	Score (1-5)
Sustainability	Volume of energy efficiency results or renewable energy generation	5
Economics	Level of economic value vs. cost	5
Resources	Level of Village resources required to create and manage program activities	4
Unknowns	Level of market experience with approach or technology	4
Longevity	Duration of project life cycle	5
Complexity	Level of management complexity	4
Scalability	Level of ability to increase or decrease funding levels as needed	4
Calendar	Ability to facilitate the approach in 2018	5

Staff Recommendation: Staff recommends that the Community Solar Subscriptions for Village Facilities be considered by the Board. The recommendation is supported by the potential cost savings of the project, and the relatively low level of management required to facilitate and manage the subscriptions.

Economic Benchmarking. A Community Solar Subscriptions Project for Village electricity accounts can reduce electricity supply costs for the Village when the cost of subscriptions is less than the value of the resulting on-bill credits. Economic benefits differ among accounts based on account size, rate, and supplier. A preliminary review of the Village's accounts indicates an annual potential savings of $27,000 can be achieved through community solar subscriptions that extend for a 20-year period. The specific terms of any community solar subscription agreement will establish costs, benefits, duration, and options for exiting the agreement.

C-2. Offsite Community Solar Subscriptions for the Village Community Choice Electricity Aggregation Program

Description. Community Solar arrays with nameplate generating capacity of less than 2,000 kW can receive substantial financial incentives under FEJA. By connecting an array of solar panels to the Commonwealth Edison distribution system, the electricity generated by the array can be credited to the accounts of any Commonwealth Edison customer that subscribes to that Community Solar array – a process termed Net Metering. Several hundred Community Solar projects have been proposed for the Commonwealth Edison service region. Community Solar arrays are typically financed from multiple sources: federal tax incentives, the sale of Renewable Energy Credits (SRECs) to local utilities, and subscription fees from project subscribers.

The Village could incorporate Community Solar subscriptions to one or more Community Solar arrays into the Village's CCA for a possible net neutral or cost savings for participants.

Sector. Renewable Energy (Residential, Small Commercial)

Goal. To include subscriptions to one or more Community Solar arrays into the Village's CCA Program.

Approach. The Village may solicit supply offers from retail electricity suppliers this summer that include a defined level of Community Solar subscriptions within the supply price for the Village CCA program. Any benefit from billing credits would be spread equally across all CCA accounts. The cost and contract terms of this approach will need to be negotiated. The Village should weigh whether short-term (3-5-year) or longer-term (20 year) commitments are appropriate.

Operational Assessment. Staff's evaluation of the Community Solar Subscriptions for the Village's CCA program according to key operational characteristics is found in the following table. Scores range from 1 to 5 with 1 indicating poor performance and 5 indicating superior performance.

Category	Description	Score (1-5)
Sustainability	Volume of energy efficiency results or renewable energy generation	5
Economics	Level of economic value vs. cost	5
Resources	Level of Village resources required to create and manage program activities	5
Unknowns	Level of market experience with approach or technology	5
Longevity	Duration of project life cycle	5
Complexity	Level of management complexity	4
Scalability	Level of ability to increase or decrease funding levels as needed	4
Calendar	Ability to facilitate the approach in 2018	5

Staff Recommendation: Staff recommends that a Community Solar option be included in the Village's upcoming CCA Program solicitation. The recommendation is supported by the potential cost savings of the project, and the relatively low level of management required to facilitate and manage the subscriptions.

Economic Benchmarking. Including Community Solar into the CCA Program may be either net neutral or cost beneficial for participants. A complete cost analysis of the option can be completed after receiving offers from retail electricity suppliers.

D. Credit Enhancement for Residential Rooftop Solar Installations

Description. The option of structuring a credit enhancement program to support the installation of rooftop solar installations on residents' homes was rejected by the Board due to the potential costs and complexity. Staff notes that the recent SolSmart certification for Oak Park provides residents with streamlined permitting and other technical assistance to facilitate the installation of rooftop solar on their properties.

E. Streetlighting Upgrades

Description. LED technologies provide high quality streetlighting while consuming less energy than the traditional lighting options currently in use by the Village (i.e. metal halide, mercury vapor, etc.). The Village has replaced some streetlighting units with LED technologies, but a large portion of the Village's streetlighting portfolio still require updating. The Village may use its CCA-Fund to support a complete conversion of the Village's streetlighting inventory to an LED platform.

Sector. Energy Efficiency (Government)

Goal. To reduce energy consumption and costs for the Village's streetlighting inventory.

Approach. Village staff will coordinate the Village's streetlighting system modifications as approved by the Board.

Operational Assessment. Staff's evaluation of the LED Streetlighting Program according to key operational characteristics is found in the following table.

Category	Description	Score (1-5)
Sustainability	Volume of energy efficiency results or renewable energy generation	5
Economics	Level of economic value vs. cost	3
Resources	Level of Village resources required to create and manage program activities	5
Unknowns	Level of market experience with approach or technology	5
Longevity	Duration of project life cycle	5
Complexity	Level of management complexity	4
Scalability	Level of ability to increase or decrease funding levels as needed	5
Calendar	Ability to facilitate the approach in 2018	5

Staff Recommendation: Staff recommends pursuing an LED Streetlighting Program that receives fund allocations approved by the Board on an annual basis to support LED Streetlighting conversions. The recommendation is supported by the high levels of economic benefits for residents, low technology risks, and manageable levels of program complexity.

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Economic Benchmarking. An economic cost benefit analysis for the LED Lighting Incentive Program is provided below

Cost / Savings Component	Without EE Grants Estimate	With EE Grants Estimate
Number of Streetlighting Units	5,051	5,051
LED Unit Costs	$200.00	$200.00
Total Capital Cost	$1,010,200	$1,010,200
Utility Rebate Rate ($/Watt Reduction)	$0	$0.70
Utility Rebate Total ($/Watt Reduction)	$0	$200,000
Net Replacement Cost	**$1,010,200**	**$810,200**
Annual Energy Cost Savings	$258,435	$258,435
Annual Replacement Savings	$20,000	$20,000
Annual Subtotal Savings	**$278,435**	**$278,435**
Simple Payback (Years)	**3.6**	**2.9**

F. Promoting Existing Utility Efficiency Programs

Description. A range of high value energy efficiency products and services are available to reduce energy consumption and costs for consumers. Recognizing that many of these technologies cost more than traditional technology, Commonwealth Edison and Nicor Gas currently provide consumers with rebates and other assistance to help consumers capture cost-saving opportunities. The Village may use the CCA-Fund to support outreach to residents concerning the benefits of utility energy efficiency programs and provide additional incentives to Village residents that purchase and install energy efficiency products.

Sector. Energy Efficiency (Residential, Small Commercial, Government)

Goal. To reduce energy consumption and costs in Village 's households and small businesses.

Approach. Village staff will coordinate with Commonwealth Edison and Nicor to create local efficiency rebate enrollment channels. These channels will allow Village residents to purchase energy efficiency products and services by monetizing both utility and the Village rebates. The Village may also undertake a communication campaign to residents to inform them of the new incentives and support it with information on the Village's website. Bulk purchasing of certain products may be used as a tool to capture additional manufacturer's rebates based on increased volumes of product purchases. Special programming can focus on low-income households that may require additional support in acquiring energy efficiency options.

Additionally, the Village may utilize the Energy Star Portfolio Manager by the US Environmental Protection Agency to securely track and assess energy and water consumption for the Village's building portfolio. Utility consumption and cost data entered in Portfolio Manager can be used to benchmark building efficiency, set investment priorities, identify under-performing buildings, verify efficiency improvements, and support application for Energy Star building certification. The Portfolio Manager is the leading portfolio energy management tool and is available for use at no charge to public sector entities. Lastly, the Village may conduct a new Greenhouse Gas (GHG) inventory with 2015 data to replace the last inventory completed in 2007.

Operational Assessment. Staff's evaluation of Promoting Exiting Utility Efficiency Program option according to key operational characteristics is found in the following table.

Category	Description	Score (1-5)
Sustainability	Volume of energy efficiency results or renewable energy generation	5
Economics	Level of economic value vs. cost	5
Resources	Level of Village resources required to create and manage program activities	5
Unknowns	Level of market experience with approach or technology	5
Longevity	Duration of project life cycle	5
Complexity	Level of management complexity	3
Scalability	Level of ability to increase or decrease funding levels as needed	5
Calendar	Ability to facilitate the approach in 2018	5

Staff Recommendation: Staff recommends allocating 3% of the CCA-Fund balance to Promote Existing Utility Efficiency Programs and update the Village's GHG inventory (2% allocated to efficiency program promotion, and 1% allocated to the cost of updating the Village GHG inventory). The Promoting Existing Utility Efficiency

Programs activities will be used to cover outreach costs and support local incentives for Smart Thermostats and LED lighting purchased and installed by Village residents. The recommendation is supported by the high levels of economic benefits for residents, low technology risks, and manageable levels of program complexity.

Economic Benchmarking. An economic cost benefit analysis for the Smart Thermostat Incentive Program is provided below.

Variables		Calcs	Values
Incentive Budget			
A	Community Incentive Amount	A	$10,000
B	Outreach Budget (Mailings)	B	($1,000)
C	Capital Budget (Smart Thermostats)	C = A - B	($9,000)
D	Total Budget Use	D = B + C	($10,000)
Energy Impact (Electricity)			
E	% Reduction in Annual Individual Electricity Use	E	10%
F	Average Annual Individual Electricity Use (kWh)	F	7,500
G	Average Annual Individual Electricity Use Reduction (kWh)	G = E * F	750
H	# NEST Units Deployed	H = C / $50	180
I	Annual Community-wide Electricity Use Reduction	I = G * H	135,000
J	Average Electicity Supply Unit Cost ($/kWh)	J	$0.0760
K	Annual Community-wide Electricity Cost Reduction	K = I * K	$10,260
L	Measure life expectance	L	10
M	Long-Term Community-wide Electricity Cost Reduction	M = K * L	$102,600
Energy Impact (Natural Gas)			
N	% Reduction in Annual Individual Electricity Use	N	20%
O	Average Annual Individual Natural Gas Use (Therms)	O	900
P	Average Annual Individual Natural Gas Use Reduction (Therms)	P = N * O	180
Q	# NEST Units Deployed	Q = C / $50	180
R	Annual Community-wide Natural Gas Use Reduction	R = P * Q	32,400
S	Average Natural Gas Supply Unit Cost ($/kWh)	S	$0.3500
T	Annual Community-wide Natural Gas Cost Reduction	T = R * S	$11,340
U	Measure life expectance	U	10
V	Long-Term Community-wide Natural Gas Cost Reduction	V = T * U	$113,400
Net Energy Impact			
W	Program Cost	W = D	($10,000)
X	Annual Economic Benefit	X = K +T	$21,600
y	Annual Leverage Ratio	Y = X / W	2.2
z	Annual Leverage Ratio	Z = M + V	$216,000
AA	Lifetime Leverage Ratio	AA = Z / W	21.6

An economic cost benefit analysis for the LED Lighting Incentive Program is provided below.

	Variables	Calcs	Values
Incentive Budget			
A	Community Incentive Amount	A	$10,000
B	Outreach Budget (Mailings)	B	($1,000)
C	Capital Budget (LED Lighting Incentives)	C = A - B	($9,000)
D	Total Budget Use	D = B + C	($10,000)
Energy Impact (Electricity)			
E	% Reduction in Annual Individual Bulb Use	E	50%
F	Average Annual Individual Bulb Use (kWh)	F	44
G	Average Annual Individual Electricity Use Reduction (kWh)	G = E * F	22
H	# LED Lighting Units Deployed	H = C / $2.50	3,600
I	Annual Community-wide Electricity Use Reduction (kWh)	I = G * H	78,840
J	Average Electicity Supply Unit Cost ($/kWh)	J	$0.0760
K	Annual Community-wide Electricity Cost Reduction	K = I * K	$5,992
L	Measure life expectance (Years)	L	10
M	Long-Term Community-wide Electricity Cost Reduction	M = K * L	$59,918
Net Energy Impact			
N	Program Cost	N = D	($10,000)
O	Annual Economic Benefit	O = K	$5,992
P	Annual Leverage Ratio	P = N / O	0.6
Q	Annual Leverage Ratio	Q = M	$59,918
R	Lifetime Leverage Ratio	R = Q / N	6.0

G. Utility-Scale Solar Array

Description. Utility-scale solar arrays larger than 2 MW in nameplate capacity are being proposed in Illinois due to FEJA incentives. For reference, a 200 MW utility-scale solar array located in Illinois can generate as much as 400,000 MWh per year – slightly more than the 353,700 MWh of annual electricity consumption by all residential and commercial accounts located in Oak Park.[2] Generally, utility scale solar arrays are financed by monetizing federal tax and depreciation credits, the sale of Solar Renewable Energy Credits (SRECs), and the sale of electricity generated for a period of between 10 and 30 years.

The Village could purchase a volume of electricity generation from a utility-scale solar array to offset the volume of electricity consumed by all residential and commercial accounts located in Oak Park. Such an offset would require the output of a 175 MW utility scale solar array located on roughly 1,700 to 2,000 acres.

Sector. Renewable Energy (Residential, Commercial, Industrial).

Goal. Offset the electricity consumption of all consumers in Oak Park with output from a utility scale solar array.

Approach. Due to physical and legal barriers, a utility-scale solar array contracted or owned by the Village cannot directly supply the needs of accounts within the Village. As an alternative, the Village can offset Village consumption with the output of a utility-scale solar array located anywhere in Illinois. This offset approach is used by large corporations (i.e. Google, Amazon, etc.) to achieve their 100% renewable energy goals. Typically, offset approaches use either a 'Contract for Differences' (CFD) or simple ownership contracting structure. Under a CFD, the Village would pay a fixed price for the electricity generated from the utility-scale solar array, and then immediately sell that electricity into the wholesale market at prevailing hourly energy prices. Under an ownership approach, the Village would pay the capital cost of constructing the utility-scale solar array, and then sell the electricity generation into the wholesale market at the prevailing hourly energy price and utilize that revenue as reimbursement for the initial investment. Under both approaches, the Village would be effectively injecting an equivalent amount of renewable energy into the grid as its residents take out. Under both approaches, the Village would bear the risk of economic loss whenever the hourly energy price in the wholesale market was less than: i) the contract rate (in a CFD approach); or, ii) the cost of financing (in an ownership approach).

Operational Assessment. Staff's evaluation of the Utility-Scale Solar option according to key operational characteristics is found in the following table. Scores range from 1 to 5, with 1 indicating poor performance and 5 indicating superior performance.

Category	Description	Score (1-5)
Sustainability	Volume of energy efficiency results or renewable energy generation	5
Economics	Level of economic value vs. cost	1
Resources	Level of Village resources required to create and manage program activities	1
Unknowns	Level of market experience with approach or technology	5
Longevity	Duration of project life cycle	5
Complexity	Level of management complexity	1
Scalability	Level of ability to increase or decrease funding levels as needed	1
Calendar	Ability to facilitate the approach in 2018	1

[2] 'Oak Park Baseline Metric Data', Oak Park River Forest Baseline Metric Study, Center for Neighborhood Technology, 2011

Staff Recommendation: Staff recommends that the Village table consideration of a Utility-Scale Solar option. The recommendation is based on the substantial near-term negative economic benefits for residents and businesses, a high level of program complexity, and a protracted planning, financing and negotiation process to establish either the CFD or the direct purchase and construction of a utility-scale solar resource.

Economic Benchmarking. Development of a Utility-Scale Solar array to offset residential and commercial electricity consumption in Oak Park would require funding beyond the current resources of the Village's Energy Initiative Fund. As such, the economic benchmarking assessment of a Utility-Scale Solar option presents a net negative value. The table below conveys the preliminary economic analysis of the Utility-Scale Solar option. Staff can continue to refine the economic analysis at the direction of the Board.

	Variables	Calcs	Residential	Commercial / Multi-Family
Utility-Scale Solar Cost Structure				
A	Annual Electricity Load Requirement (MWh)	A	144,494	209,207
B	Utility Scale Solar Capacity Factor (%)	B	20%	20%
C	Hours in a Year	C	8,760	8,760
D	Load Volume Matching Capacity of Utility Scale Solar (MW)	D = A / B / C	82.5	119.4
E	Average Capital Cost Utility Scale Solar ($/MW)	E	$1,000,000	$1,000,000
F	Capital Cost of Load Volume Matching Utility Scale Solar ($)	F = D * E	$82,473,846	$119,410,194
Contract for Differences Results				
G	Contract Rate for Solar Offtake (20 year rate)	G	$48	$48
H	Annual Cost to Village for Offtake from Utility Scale Asset	H = A * G	$6,935,721	$10,041,920
I	Current Rate for MISO Wholesale Electricity ($/MWh)	I	$32	$32
J	Annual Revenue to Village from MISO Wholesale Market	J = A * I	$4,623,814	$6,694,613
K	Benefit / (Loss) for Village on MISO transactions ($/Annum)	K = J - H	-$2,311,907	-$3,347,307
L	Benefit / (Loss) for Village on MISO transactions ($/MWh)	L = K / A	-$16	-$16
Net Results for Consumers				
M	Annual electricity consumption (MWh)	M = A	144,494	209,207
N	Annual Benefit / (Loss) from Contract for Differences ($/MWh)	N = L * M	-$16	-$16
O	Annual Benefit / (Loss) from Contract for Differences ($/annum)	O = M * N	-$2,311,907	-$3,347,307
P	Average consumption per account (MWh)	P	7.8	67.8
Q	Annual Benefit / (Loss) from Contract for Differences ($/annum)	Q = N / P	-$125	-$1,085

*Offtake: Agreement entered between a producer and buyer to buy/sell a certain amount of future production. It's generally negotiated long before the construction of a facility to guarantee a market for the facility's future production and improve the chances of getting financing for the installation.