

Borough of Fair Haven

Solar Feasibility Study Report



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Gabel Associates



Gabel Associates

- **Founded in 1993 as an Energy, Environmental, and Utility Consulting Firm**
 - First Energy Consultant registered in the state of NJ, in 2002
 - First Energy Agent registered in the state of NJ under EDECA (deregulation act)
 - Also registered as an Energy Aggregator with NJ BPU
 - Provides Economic, Regulatory, and Technical Analysis of Energy Markets, Policies, and Projects
 - Completed over 200 renewable energy projects in New Jersey
- **Key Practice Areas:**
 - Wholesale markets & energy suppliers
 - Policy and market development
 - Energy aggregation and procurement – currently buy energy for two-third of NJ's K-12 schools through ACES
 - Customer-sited energy projects (primarily solar and efficiency)
- **Not A Project Developer or ESCO: Independent Insight, Analysis, and Support**
- **Extensive Energy Project Expertise**
 - Generation: Solar, Wind, Landfill Gas, CHP and Fueled-Generation
 - Building efficiency and conservation
 - Energy technology, industry best practice
 - Procurement: project management, RFP processes, project contracting
 - Project financing and economic evaluation
 - Energy planning and implementation
 - Construction administration (serving as the customer agent)
 - Analysis of Environmental Aspects of Energy Plans
 - Regulatory Knowledge and Support
 - Energy Market Analysis and Forecasting
 - PJM Knowledge, utility, and interconnection expertise
- **Utility tariff and energy cost forecasting**

Gabel Associates: Solar Project Experience

- Atlantic City Convention Center
- Camden County
- Cresskill BOE
- Rutgers University
- State of New Jersey
- City of Ocean City
- Morris County Improvement Authority
- Wildwood Convention Center
- Mercer County Improvement Authority
- Somerset County Improvement Authority
- Franklin BOE (Hunterdon)
- Florham Park BOE
- Asbury Park BOE
- Kenilworth BOE
- Sterling Regional BOE
- Manchester & Haledon BOEs
- Readington BOE
- Delaware Valley Regional BOE
- Evesham Township School District
- Franklin Township School District (Gloucester)
- Delsea Regional High School
- NJ Meadowlands Commission
- Atlantic Cape Community College
- Wayne Township BOE
- Hopatcong BOE
- Cumberland County Improvement Authority
- North Warren BOE
- Plainfield Public Schools
- Elizabeth Public Schools
- Higher Education institutions
- Others

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Introduction



Why Solar?

- Generating Solar Electricity On-Site Partially Displaces Utility Purchase Of Power.
- Benefits To The Borough (and community):
 - Cost savings
 - Better budget predictability and control
 - Reduced carbon footprint
 - Reduced environmental impact
 - Learning asset for community
 - Greater energy independence
 - Local job creation
 - Eligible for Sustainable Jersey certification

Fair Haven Solar Opportunity

- Initial findings: There is opportunity to host solar at the four sites below but due to the potential system size from the available space and or building usage there is a risk of the project not being commercially viable.
- The buildings included in this study are listed in the following table:

Location	Address
*Police Department	35 Fisk St, Fair Haven, NJ 07704
DPW	1 Allen St, Fair Haven, NJ 07704
Borough Hall	748 River Rd, Fair Haven, NJ 07704
Concession Stand	Ridge Rd, Fair Haven, NJ 07704

*(The police building is currently in design-new construction)

- Gabel requested specific information and data to conduct our study. Fair Haven and it's professionals were able to provide some but not all of the requested information.
 - 1) A completed and signed Electric Data release form & copy of one recent electric utility bill for each account **Received**
 - 2) List of facilities included in the study including street addresses & utility accounts **Received**
 - 3) Electrical single line drawings for each facility **Did not receive**
 - 4) 12 months of electric utility bills for each utility account, for the existing facilities **Received**
 - 5) Design drawings of the planned facility, specifically site plans and roof plans with dimensions (Ideally, roof plans could show any HVAC equipment, vent stacks, and drains on the roof) **Did not receive, most recent roof and structural designs shared (but not to scale and not showing details)**
 - 6) Estimated electricity usage for the planned facility (at least planned hours of operation, building floor area, percent conditioned space, expected uses, information about the size transformer or service expected from the utility) **Did not receive, a load letter was provided**
- Gabel performed a site visits to assess the available space, analyzed historic energy usage information, and conducted a representative economic analysis including a tariff analysis.
- The following slides contain initial, preliminary system sizing's based on electrical capacity and available roof area for solar arrays
- These are based on Gabel's site visit, Google Earth aerial photos, and Gabel's sizing analysis.
- Further investigation may be needed to determine if these areas are truly viable for hosting solar.

Facility Assessments

- The following slides include information about the potential projects size and design for each site based on available area and estimated energy usage.

Fair Haven Police Department (New Building)

Estimated Array Size: 30- 40 kW DC

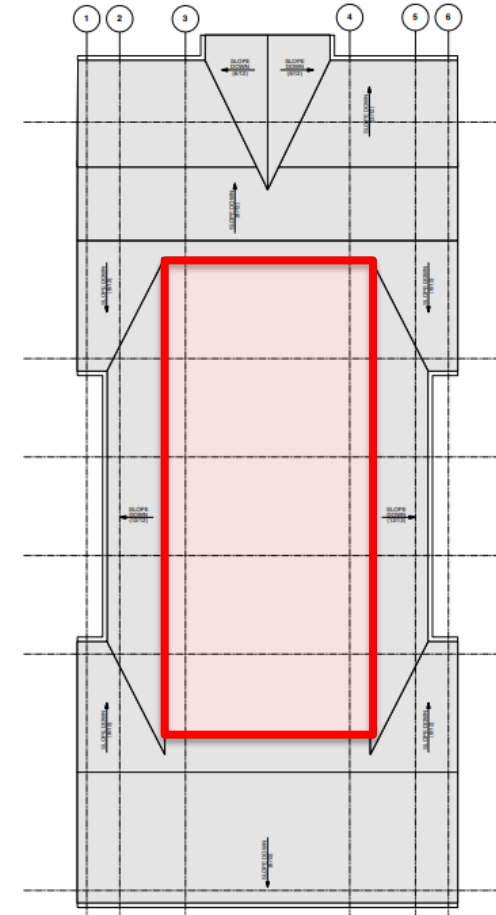
Assuming 1500-2000 sq.ft. of area on the flat roof section and assuming there will not be roof mounted HVAC equipment

Sloped roofs will be shingled; “flat” roofs will be EPDM membranes.

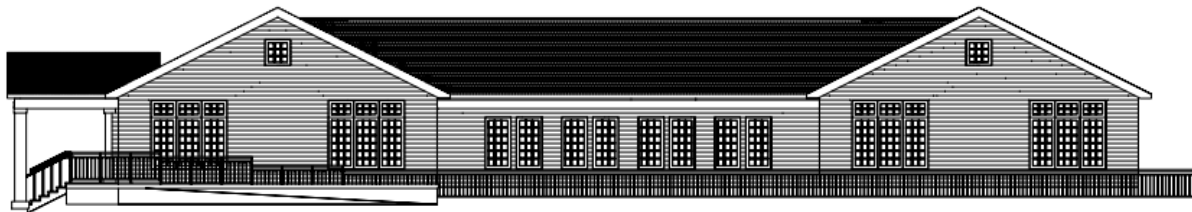
The building will be designed to support the arrays.

The useable area for solar may shrink through the finalization of the design.

Arrays should be on flat roof sections only, sloped roofs require penetrations, penetrations cause leaks eventually



301 POLICE BUILDING ROOF PLAN
Scale: 1/8" = 1'-0"



404 WEST ELEVATION
Scale: 1/8" = 1'-0"



402 SOUTH ELEVATION
Scale: 1/8" = 1'-0"

Fair Haven DPW (Building)

Estimated Array Size: 75 kW DC
With Tree Trimming or Removal – ●

Electric service – ●
Meter – 28 162 838
120/208 V
Three Phase
400 Amp

Antenna – ●

Gabel's team was not able to get on the roof only up a ladder to see the roof. Gabel was informed that this building and roof is scheduled to be refurbished in the next 12 -24 months.

New roof first, cannot be included in solar project cost



Fair Haven Borough Hall - Library

Estimated Array Size: 10 kW DC
With Tree Trimming or Removal – ●

Electric service – ●
Meter – S07 032 891
120/208 V
Three Phase
200 Amp



Fair Haven Fields (Concession Stand)

Estimated Array Size: 5 kW DC
With Tree Trimming or Removal – ●

Electric Service – ●
Meter – 20 068 630
120/240
Split Phase
200 Amp

Pitched, shingled roofs are not
recommended



Available Space Assessment

- Our analysis of the locations identified has resulted in the following estimated system sizes.

Location	Approx. Maximum System Size based Available Roof Space (kWdc)
Police Department (New)	40 kWdc
DPW Building	75 kWdc
Borough Hall	10 kWdc
Concession Stand	5 kWdc

- These sizes are the maximum size that could be built if solar is placed in all of the usable areas identified on the preceding slides.
- The Concession Stand has pitched asphalt shingle roof, we would not recommend due to voiding the roof warranty.

Usage Assessment - New Police Estimate

TGP provided the Omdex Incorporated Consulting Engineers load letter which contained the following information

1.	Lighting	6.0 kva
2.	Receptacles	12.0 kva
3.	Heat Pump	22.5 kva
4.	Ventilation	7.0 kva
5.	Electric Heat	22.5 kva
6.	<u>Water Heater</u>	<u>12.0 kva</u>
	Total	82.0 kva
	At 120/208v 3 ph =	<u>228 amps</u>

At the voltage in the load letter, the new facility will be serviced under the General Service Secondary service (tariff) classification from JCP&L.

kVa is Apparent Power not Actual Power. Actual Power is measured in kW and is less than the apparent power. If the building was 100% efficient the total maximum demand would be 82 kW, but no system/building is 100% efficient. The only way to know for certain how much load the building will have and will need to offset with the solar is to operate the building for 1 year and then assess. The next best option is building energy modeling.

Gabel used best practice, industry rules of thumb to estimate loads and usage, and experience-based assumptions to arrive at these estimates.

Estimated monthly demand - approximately 65 kW.

Estimated annual energy usage - approximately 150,000 kWhrs.

Usage Assessment

- Recent 12 months of historic utility energy usage – (2022) all four potential accounts as they exist today is combined 154,337 kWh.

Location	JCP&L Tariff Class	Annual Usage (kWh)	Approx. Maximum System Size Based on Electrical Load (KWdc)
Police Department*	GS*	150,000*	120*
DPW Building	GS	30,984	22
Borough Hall	GS	51,989	37
Concession Stand	GS	7,777	6

- By law and utility rules we cannot produce more than 100% of any specific account's historic usage, project limited by electrical usage not available space.

* Police Department will be a new building and therefore these values are high-level estimates based on the provided load letter and assumed annual hours of operation.

Sizing Recommendation

- Our analysis of the locations identified has resulted in the following estimated system sizes.

Location	Approx. System Size based on Available Roof Space (kWdc)	Maximum System Size based on Building Usage (kWdc)
Police Department (New)	40 kWdc	120 kWdc
DPW Building	75 kWdc	22 kWdc
Borough Hall	10 kWdc	37 kWdc
Concession Stand	5 kWdc	6 kWdc
Location	130 kWdc	185 kWdc

- **Recommended portfolio size: 72 kWdc**
- Concession Stand is not recommended due to pitch roofs, small size, and tree removal.

Commercial Considerations

- Current solar market and incentives
- Project Development Options
- Procurement Requirements

Current Solar Market

- Post Pandemic Economy
 - Increasing materials and labor costs
 - Product lead times and availability
- State Solar Incentive Transition:
 - Required closure of current SREC program upon attainment of 5.1% of all electricity in NJ from solar. Closure occurred on April 30, 2020.
 - Requires creation of
 - Transition Incentive Program (“TIP”) started May 1, 2020 & ended August 27, 2021
 - SREC-II or Successor Solar Incentive program (“SuSI”) began August 28, 2021
 - Two separate incentives – administratively set (“ADI”) like TIP and competitive solicitation (“CSI”)
 - This project would be eligible for the ADI program and with the public entity adder, eligible to receive \$120/SREC-II/MWh*
 - The ADI program has additional project maturity requirements compared to previous programs and will be undergoing it’s first incentive value review in August 2022 per the BPU.
- Federal Investment Tax Credit is 30% in 2023 (6% based + bonus). ITC can be monetized by a tax exempt-entity or transferred (sold)
- Many public entities choosing between direct ownership and third party ownership due to new Inflation Reduction Act incentives and Infrastructure Act funding availability.
- Market for non-residential, net metered projects is seeing a period of low activity through the SUSI ADI program.

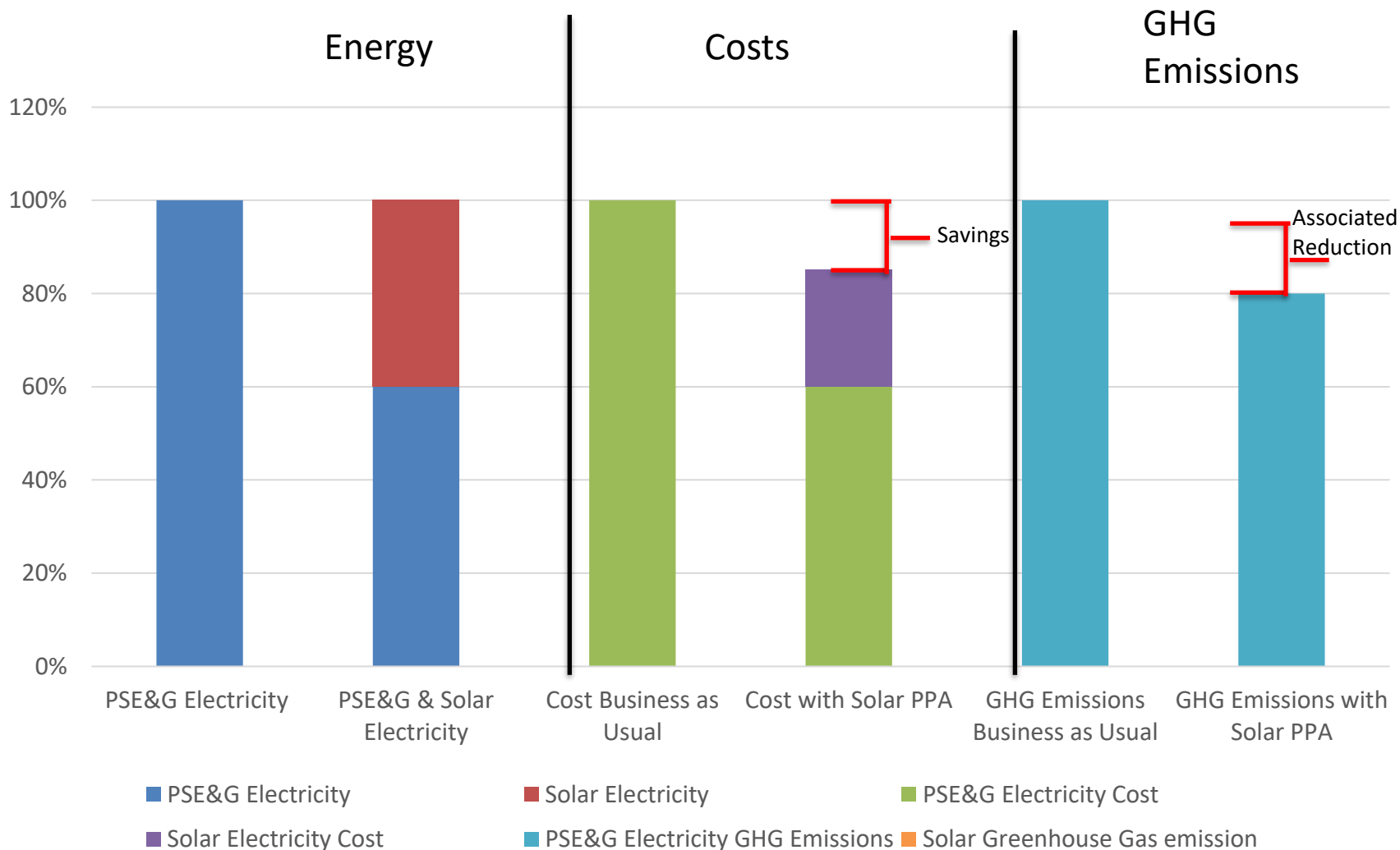
Project Development & Potential Benefits

- Benefits depend on development option
- Risks increase with ownership
- Cost decrease with third party involvement
- The following slides include a summary of the current solar market in NJ, the different development options, and an estimate of the potential benefits
- Development Options:
 - Direct Purchase/Self-own
 - PPA (Power Purchase Agreement)
 - Lease (project is too small for a lease to be attractive)

Development Options: PPA

- Most Solar Projects in NJ Are Based On A **Power Purchase Agreement (PPA)**:
 - Maximizes economic value
 - Minimizes hassle and risk
 - Strong competitive offerings from the market
 - Becoming “standard practice”, with significant contracting experience
- PPA: Third Party designs, builds, owns, operates, and maintains solar system on the property, and sells all electricity produced to the owner:
 - The Borough pays PPA provider for solar electricity, rather than utility (with savings)
 - Still connected to utility, which provides balance of power as needed
 - PPA provider takes all economic incentives (SRECs, tax credits, etc.)
 - Typical Term: 15 years
 - Includes all operation and maintenance
 - Typically multiple end-of term options: removal, ownership, etc
 - Solar array has a 25-40 year useful life, so economic savings continue after 15-yr “payback term”
- Minimizes Risk
 - No capital investment
 - Shielded from market and operational risk
- Project Development Costs Recovered As Part Of The Project (typical practice)

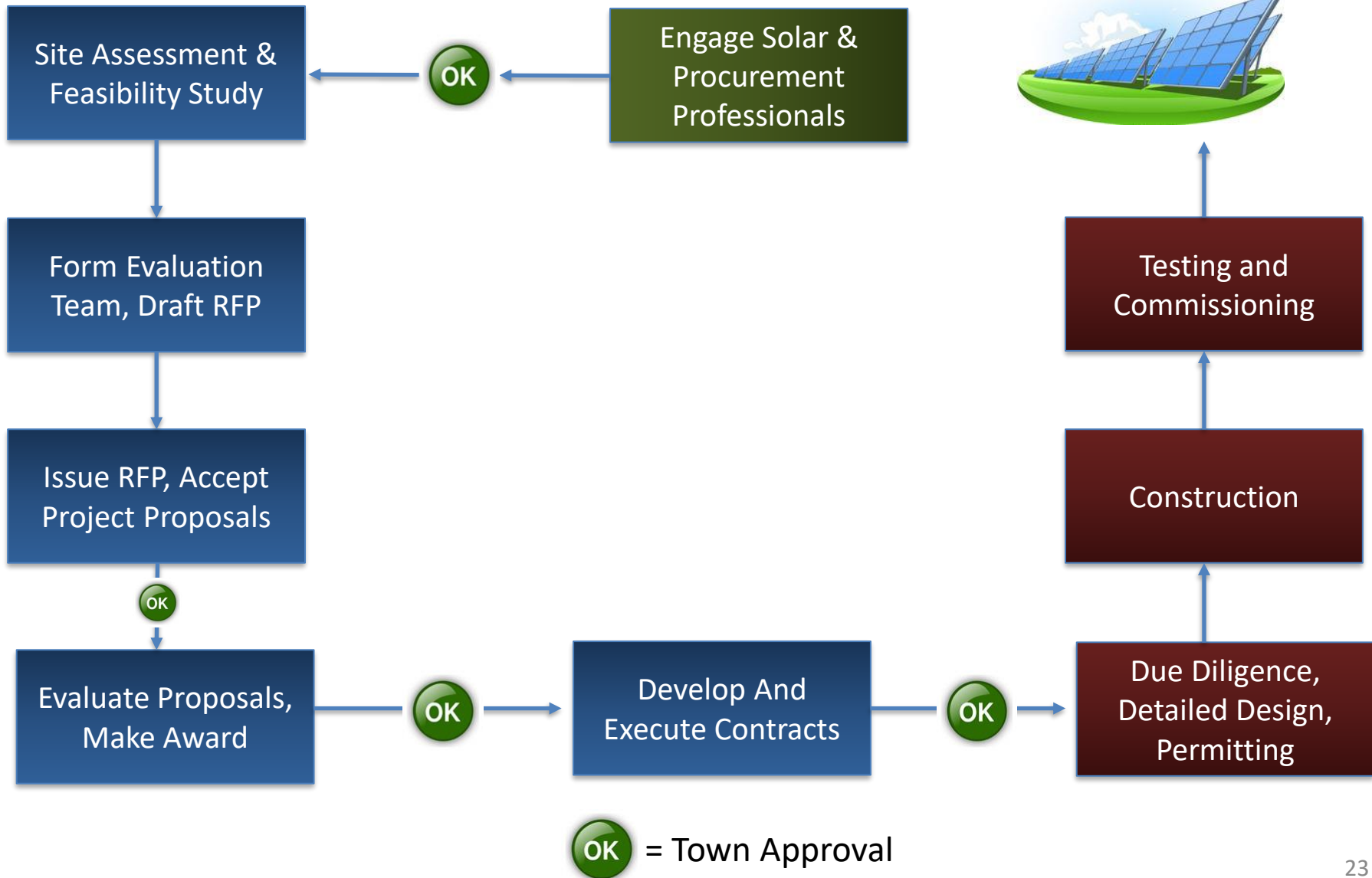
Power Purchase Agreement - EXAMPLE



PPA Procurement - RFP Process

- **Competitive contracting process:**
 - Develop RFP under DCA guidelines
 - Manage process according to relevant public procurement law
 - Evaluate responses considering economic and non-economic factors
 - Issue formal evaluation report
- **RFP May include multiple options**
- **PPA 15 year contract permitted under public contract law for local gov't**
- **PPA Contract Typically Includes:**
 - Fixed pricing with index
 - Performance guarantees
 - Risk containment
 - Cost reimbursement

Solar PPA RFP Procurement Process



Development Options: Direct Purchase/Self-own

Direct Purchase/Self-Own:

- Fair Haven borrows to finance, build, own, operate & maintain
 - Fair Haven CAN take the 30% Federal Investment Tax Credit
 - No guarantees
- All risk and expense on Fair Haven
- Fair Haven procures an Engineering to design, gain initial approvals, and bid the project.
- Fair Haven procures a vendor to construct the project
 - Construction firm responsible for permitting, procuring materials and trades, construction, commissioning, and close out
 - Requires low bid procurement
- Fair Haven procures a vendor to perform Operations & Maintenance
 - Requires low bid procurement every 2 years
- Project is likely going to be more expensive than if built by a third party
- Municipality may be eligible for additional grants or incentives from federal govt.

Development Options: Lease

Lease Option:

- Requires third party interest
- Third Party designs, builds, owns, operates, and maintains solar system on the property, the Borough would receive a monthly fee project owner.
 - Still connected to utility, which provides balance of power as needed
 - Lease provider takes all economic incentives (SRECs, tax credits, etc.)
 - Typical Term: 10- 20 years
 - Includes all operation and maintenance
 - Typically multiple end-of term options: removal, ownership, etc
- Minimizes Risk
 - No capital investment
 - Shielded from market and operational risk
- Requires low bid process

Representative Economic Analysis

- Leases are typically only commercially viable for large projects
- PPA and Direct Ownership have different benefits and risks
- PPA projects achieve benefit through avoided cost savings
- Direct Ownership projects earn a return on the investment through multiple revenue streams including SREC-II sales, tax incentives, and avoided cost savings
- The following slides detail the high-level analysis and results from Gabel's assessment.

Estimated JCP&L Cost per kWh

- Utility tariffs detail the charges and how they are applied for purchases of electricity from JCP&L.
 - Charges are based on kWh or kW measurements
 - Tariff includes Delivery and Supply costs
- The table below shows the estimated JCP&L Tariff Rates and estimated SPTC for the 4 potential location.
- SPTC (Solar Price to Compare) being generally about 2-3 cents less than the Gross Estimated Rate because the SPTC methodology only counts the portions of the tariff charges that can be offset by solar.

Location	Estimated Rate (\$/KWh)	Estimated SPTC Rate (\$/KWh)
Police Department	\$0.1243	\$0.104
DPW	\$0.1116	\$0.091
Borough Hall	\$0.1239	\$0.104
Concession Stand	\$0.1134	\$0.091

Representative High-Level Potential Benefits Analysis

Power Purchase Agreement

- If the SPTC is \$0.09/kWh and the market is offering PPA rates around \$0.07/kWh for attractive projects. This project would be small so it would be less attractive with more fixed costs spread over less production. PPA rates for a project this small would likely be higher than other projects so Gabel assumed a representative PPA rate of \$0.085/kWh. Therefore, the potential for savings is for half-a-cent per kWh produced by the solar projects or approximately \$500/yr from a 72 kW DC solar project portfolio, if we can find a vendor interested.
- PPA may not be a viable option due to low interest from market participants for projects and portfolios of this size

Direct Ownership

- Typical, roof mounted solar project cost around \$2/W installed, including labor & materials. Soft costs could increase this amount. For this representative analysis, Gabel assumed a \$2.50/W installed cost with estimated soft costs and a total installed cost of approximately \$200,000. To receive the investment tax credit the project would be required to pay prevailing wage and have an apprenticeship program. Also the Governor just announced that new renewable energy projects will be required to utilize union labor. If union labor is used we can assume higher cost to construct
- If it costs approximately \$200,000 the ITC would be worth approximately 30% or \$60,000, but with any transfer or “cash-in” the payout would be less than the full amount so we should assume 27% or \$54,000. Leaving \$146,000 that would need to be offset by State incentives (SREC-II sales) and savings.
- SREC-II from roof mounted projects on public entity facilities have an adder applied, and a total value of \$120/MWh/SREC-II. Based on the recommended estimated 72kWdc system size, with a total annual production of approximately 96,250 kWh, the potential solar portfolio would produce about 96 SREC-II's per year or approximately \$11,500 in revenue from SREC-II sales.
- Savings would be the full SPTC value. Gabel used a representative SPTC value of approximately \$0.09/kWh. Resulting in a potential estimated savings of approximately \$8,500/year.
- There would be ongoing insurance and O&M costs that could cost as much as \$5,000/year.
- Based on these representative, approximate values it would take approximately 10 years of the 20 year useful system life to pay off the system.
- Year 10 typically requires an investment in new inverters and any additional costs could extend the payback period further.

Summary - Recommendation - Next Steps

Summary:

- It is possible to place panels on each roof, but the amount is solar capacity on each roof and in total across the portfolio is less than the threshold necessary to attract third party interest.

Recommendations:

- Revisit solar sizing analysis once the new construction has been fully designed. We recommend that any roof that is being designed with solar be free of roof obstructions such as HVAC equipment or vent stacks.
- Recommend further detailed economic analysis on direct/self – own option

Next Steps:

- Borough decide on preferred development approach
- Further analysis and maturation of new construction design
- Develop procurement documents

Thank you

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