



Roof Mount Solar Information

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Roof Mount Solar Information

A rooftop solar project is a customized installation; your situation, and therefore your solar opportunity and resulting investment opportunity, will be specific to your building, your roof and your interests.

Types of Rooftop Projects

Roof Mount Solar Project Size (AC)	Required Connection	OPA Price Offering	OPA Application Process
10kW	Single Phase	80.2 cents / kWh	microFIT
80 – 250kW	Three Phase	71.3 cents / kWh	FIT
400 – 500kW	Three Phase	63.5 cents / kWh	FIT

Structural Assessment; Achieving P.Eng Approval

1) When was the roof built?

- Metal roof – The oldest metal roof that is likely viable to look at is 10 - 15 years old because:
 - (a) snow loads increased across ON in 2006 and structurally the building will need to be able to carry the solar system (total 4 to 5 lb per sqft)
 - (b) any need to replace the roof in the next 30 - 40 years would be a problem
- Non Metal roof (flat with stone / pebble) – The oldest to look at is 6 – 8 yrs because this roof only lasts 10 - 15 years and will need to be replaced before the contract with the OPA has expired

2) Do you have engineering drawings of the building?

- A structural engineer will need to approve the roof for the solar array. Having engineering drawings will allow for an assessment more efficiently than not. Drawings will be also necessary to design the solar system; module layout and fastening system.



Production Expectations

1) What is the size of the roof?

A 10kW system needs roughly 1,000 sqft, and a 100kW needs 12,000 sqft.

To estimate size of potential installation and performance of a system:

- Determine the roof area
- Consider any ventilation or obstacles that would interrupt the coverage of the roof with modules and create shading issues and subtract its area from the total
- Use 80% of the area as the potential for size of system

2) Which way is the building facing?

South facing is optimal.

- If not facing directly due south, a solar system will lose production capability by approximately 10% at 20 degrees off due south, 30% at 45 degrees off due south (SE or SW)
- Depending on the pitch of the roof and other factors, facing SE / SW can often be financially viable for a solar project

3) What is the angle or pitch of the roof?

The best roof pitch is 30 degrees (7 – 12), but most roofs are not typically built this steep.

- Most roofs are “3-12’s” or “4-12’s”, (where the rise is 3 feet or 4 feet for each 12 feet of run (horizontally))
- If building a new facility, you would evaluate the cost of increased pitch (materials) vs increased production of solar system; this is not usually viable past 20 degrees

4) Are there any shading obstacles?

Any shading on the solar panels will reduce the electricity production the system. A solar system may not include panels near any vents or fans that emerge from the roof or areas of the roof that are shaded by silos, buildings or trees.

Ballpark Prices

System Size (AC kW)	System Size (DC kW)	Roof Area Required (sqft)	Approximate Turnkey Installation Cost
10	11	1,000	\$78,000*
100	115	12,000	\$700,000
250	287	27,700	\$1,500,000
500	575	55,500	\$3,000,000

*Does not include structural assessment and PEng stamp approval of the roof

These prices consist of component costs = 65% (50% being modules), installation costs =20%, engineering / project management costs =15%

- Keep in mind these prices are based on importing modules, based on a 93 cent CAD; prices for ON assembled modules could vary considerably (10% to 40%)
- On a standing seam roof panels are clamped directly onto the seam
- On corrugated metal roofs, metal rails are fastened to (and therefore penetrating) the roof and panels are clamped to the rails
- Flat roofs require racking; the angle/ pitch of the racking will not be ideal, as uplift and wind rating will not allow for 30 degrees, and you can usually not add weight to offset uplift due to structural / weight constraints

S5 Clamps for Standing Seam Metal Roof





Process for FIT - Large Roof Projects

Prefeasibility Study

This is a free study, where modelling within software to assess project viability is performed. The outcome is a one page report containing the:

- Potential revenue generation
- Estimated cost of the project – completely installed and commissioned, broken down into 3 categories: system components (~65%), installation costs (~20%), and engineering / project management / legal (~15%)
- Estimated total approval and installation process lead time
- Price for the next step – Feasibility Study

Feasibility Study

The study takes 3 -4 weeks to complete, requires significant access to facility, inspection of electrical room and roof. The fee for this study ranges from \$10,000 to \$15,000.

A detailed analysis of the project includes:

- Facility structural engineering analysis and approval / stamp
- Complete PV system design: roof analysis, panel layout, component requirement, mounting solution, obstructions
- Field study: shading analysis, measurements
- Single line electrical drawing, grid connection assessment including settlement
- Energy output and economic modelling
- Development, logistics, installation, OPA contract requirements, system maintenance
- Reporting & project management: number and type of modules and inverters, system cost analysis

Design and Proposal

Unique characteristics of the system are evaluated and the final design and proposal are completed. When accepted, the project is scheduled.



OPA's FIT Process

Application

- A \$500 application fee to the OPA is required, it is non-refundable
- The application form is much more detailed than the microFIT application, it requires utility connection information, (the utility does not usually have to visit the site), need to know the feeder name, transformer station, connection voltage, current distribution system capacity
- The application is completed on-line, hard copies are sent to the OPA within five business days of online application
- Most application for systems that are equal or less than 500kW are considered "Capacity Allocation Exempt" projects and have fewer steps
- Application processing is expected to take 4 – 6 months, though it is currently taking longer

Contract

- Once processed, the OPA returns a Contract
- Accepting/ moving forward requires \$50 per kW Connection and Performance Security to the OPA, it is returned when the project is commercially operating, no interest paid
- Licenses / approvals may be required:
 - Environmental Assessment – not required for rooftop solar
 - Generating License – required for >500kW projects
 - ESA Inspection – required for all projects
 - Municipal Building Permits – vary by municipality

CIA

- A Connection Impact Assessment (CIA) by the utility must be performed for projects all FIT projects. They cannot take more than 60 days to complete it. Results of these studies are used to determine if upgrades are required to the distribution / transmission system.
- The total charge by the utility to complete a CIA will vary heavily by site due to the connection specifics, the average will be approximately \$15,000, when complete, the Applicant receives a Connection Cost Recovery Agreement specifying the exact costs to the applicant to connect the project and expected timelines, the connection cost could be \$10,000, it could be \$100,000
- Each project is assigned a timeframe that it can apply for its CIA



Installation and Contract Execution

- Applicant submits a Notice to Proceed (“NTP”) request, with the following:
 - Evidence of completed environmental assessment (if required)
 - Domestic content plan
 - Financing plan
 - Evidence of completed impact assessment – *this is the big hold up in the process*
- Execution of Contract Date, or Commercial Operation for solar FIT projects is three years
- At this stage, a 2nd Connection and Performance Security of \$25 per kW required, it is returned when the project is commercially operating, no interest is paid
- The OPA can request up to four times per year for status updates on efforts made to meet milestone date, progress made on the facility construction, have 30 days to respond
- Upon commercial operation (in service, complete connection to the grid, synchronized to the electricity grid and capable of delivering electricity at 90% capacity), the Applicant must submit a declaration of commercial operation to the OPA for FIT payments to begin
 - Provide metering plan
 - Single line electrical drawing identifying connection point, transmission and distribution facilities
 - Independent engineering certificate
 - Commercial operation declaration
- Within 30 days of the commercial operation date, the Applicant must supply to the OPA the Domestic Content Report which specifies how the facility achieves the necessary ON content (60%)
- Projects connected to the distribution system are paid through the utility according to the billing cycle

Other Contract Information

- The OPA will own all related products generated from the project such as any environmental attributes or carbon credits
- If ecoEnergy for Renewable Power Program funds are received for the project, the Applicant must give 50% of the funds to the OPA
- The OPA may not penalize a contract holder for failing to generate electricity, but may terminate a contract if a project does not generate electricity for two consecutive years
- Regardless of when a late Commercial Operation date occurs, the OPA contract expires 20 years from the Commission Date / Connection Date