Blue Sky Solar Residential purposes E-Book1-

http://blueskysolar.today

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1. HISTORY OF SOLAR ENERGY-

It is being known to all that the solar power that we use is not more than six decade old. But it is quite interesting to note that it was the part of a discovery began almost couple of centuries back. These discoveries dealt with the characteristics of light along with conductivity that creates solar power that we are using the modernized world. In order to help you out and make you understand in a lucid format we have taken up the responsibility of providing a specified timeline relating to the discoveries and inventions that led to their creations.

1839: Photovoltaic Effect is invented- French scientist Edmond Becquerel, was the first person to discover, photovoltaic effect in the year 1839. It was one such discovery that brought about a major change. To be specific it was the process that occurs while light is being observed by material and allows in creation of electrical voltage. As far as the latest studies maximum modernized solar cell does use silicon crystals in order to gain this effect.

1873–1876: Selenium's Photoconductivity is being invented- An electrical engineer from England named Willoughby Smith is being credited for the discovery of photoconductivity of selenium. It is nothing, but one of the approach that becomes electrically conductive while it absorbs light. After this particular transformation, three years later William Grylls Adams and Richard Evans Day brought to their understanding that selenium has the tenacity of producing electricity from light. It can be done without heat or moving parts that could be breakable. It was one such discovery that proved that solar power was quite easy to cultivate and maintain.

1883: First Solar Cell got created- New York based inventor Charles Frits, is being credited for creation of the first solar cell coating selenium with a thin layer of gold. This particular cell was successful in achieving an energy conversion rate of 1–2%. The modernized solar cells work at an efficiency of around 15–20%.

- Noted German physicist Heinrich Hertz first observed the photoelectric effect.
- Here light used to free electrons from a solid surface in creation of power.
- In opposing to the desired results, he found this particular practice producing more power while it exposes to ultraviolet light, rather than more intense visible light.
- Albert Einstein during his tenure as a scientist and exponent of latest theories further explained the theory in an elaborate manner.
- The modern-day solar cells depend on the photoelectric effect in conversion of sunlight into power.

1953–1956: Silicon Solar cells are produced in commercial manner- Varied physicists at Bell Laboratories discovered that silicon is much more effective than that of selenium. This particular invention led the solar cells towards powering electrical equipment. In the late 1950's Western Electric commenced to sell commercial licenses for its silicon PV technologies. But the high-priced silicon cells barred then form wider market saturation.

1958: Solar Energy is being used in space- After several years of experiment to improve and improvise the efficiency and commercial aspect of solar power, solar energy gained momentum. It was the time when the government started to use it in making space expedition successful. The first solar powered satellite Vanguard 1, has traveled more than 197,000 revolutions around Earth in five decades. This particular application made way for more and more research in order to lower the cost and add to the productions.

1970s: Research Drives Costs Down- The prices of oil rose in leaps and bounds in and after the 1970's due to crisis in the Arab and gulf countries. At that point of time the demand for demand for solar power increased. Exxon Corporation financed a particular research in order to create solar cells that would be made from lower grade silicon and cheaper materials. It would push the cost from $100 per watt to only $20–$40 per watt. The federal government also passed varied bills supporting solar power. At the same time initiatives were being taken for developing National Renewable Energy Laboratory (NREL) in 1977.

1982: The first solar park is created- Arco Solar is being credited for creation of the first solar park, which is basically a solar power plant in Hesperia, California, in 1982. This particular park generated 1MW or 1,000 kilowatts in an hour. In the year 1983 Arco Solar did carried out the task of building up the second solar park in Carrizo Plains, California.

At that time it was the largest collection of sola rays in the entire world. It contained near about 100,000 PV arrays that was capable of generating 5.2 megawatts at full capacity. As these plants fell in disarray with the return of oil to complete effect, they confirmed the potential for production of commercial solar power.

1995: Retractable RV Solar Panels are created- The research on solar continued, to expand its tendrils in other industries. Thomas Faludy filed a patent in 1995 for a retractable awning with integrated solar cells. This was one of the first solar cells that were being used in recreational vehicles. Today this particular characteristic is quite popular way to power RV's.

1994–1999: Photovoltaic Conversion Reaches New heights- In the year 1994; the National Renewable Energy Laboratory designed a latest solar cell from gallium indium phosphide and gallium arsenide that went beyond 30% conversion efficiency. By the turn of the century, the laboratory was successful in designing thin-film solar cells that converted 32% of the sunlight it composed, into usable energy.

2005: DIY Solar Panels Becomes Popular- With the passage of time technology along with efficiency of solar cells did gained more prominence and momentum. Residential solar power gained importance and become popular among the individuals. DIY solar panels started to hit the market in 2005 and become more popular with the passage of each year. Today there are numerous ways in making your own solar panels.

2015: Flexible Printed Solar Panels Hit the Market- The current solar cells can be manufactured through the usage of printers. They do have the propensity of 20% power conversion efficiency. It is to be noted that a singular strip can produce up to 50 watts per square meter. This is indeed good news for 1.3 billion people in developing countries. These strips are flexible and are quite inexpensive to produce.

2016: Sunless Solar Power is invented- A research unit from the University of California, Berkeley, and the Australian National University discovered new properties of nonmaterial. One of these properties is being defined as magnetic hyperbolic dispersion.

- It generally means that the material glows while it heats.
- If it is being mixed with thermo photovoltaic cells, it could turn heat into electricity without the need for sunlight.
- This technological progression shows no such signs of slowing down.
- To be honest it is advancing at an unprecedented rate. You can stay up dated on the latest solar news and advances, if you feel that solar power is corrective for you.

2.Which solar panel is best? Mono- vs. Polycrystalline vs. Thin film:

If you are ready to purchase solar panels, but confused about the type of products that you want to purchase, then do not go too far, just come up to us and we would be able to help you out. There are countless options available while you are purchasing a photovoltaic (PV) system. It is our job to help you out as and when being required. This write up will help you out with all the details that you are pining for. Listed below are the types of solar panels and their advantages and disadvantages.

Contents

- *Crystalline Silicon*
- *Mono crystalline*
- *Polycrystalline*
- *Thin-Film Solar Panels*
- *Building Integrated Photovoltaic's*
- *Best Solar Panel Type for Home Use*

The term solar panels will be used in order to describe photovoltaic solar panels, which is not similar to solar thermal collectors.

Crystalline Silicon (c-Si) - It has been estimated that 90% of the world's photovoltaic's today are based on some variation of silicon. In the year 2011 about 95% of all shipments by U.S. manufacturers to the residential sector were crystalline silicon solar panels.

The silicon used in PV takes many forms. The major difference is purity of the silicon. A question that arises is what does silicon purity mean? The more perfectly aligned silicon modules are better for the solar cells. It will help in converting solar energy into electricity. The efficiency of solar panels goes hand in hand as it comes to the aspect of purity. But the process of carrying it out is quite expensive. Efficiency should not be the ultimatum as it takes it effects in numerous sectors.

Solar cell comparison data of 10,000 solar modules have been estimated. It has also been brought to the understanding about the advantages. Crystalline silicon forms the basis of mono- and polycrystalline silicon solar cells

Mono crystalline-Solar cells that are being made of monocrystalline silicon are also called single-crystalline silicon. These are very easily recognized by an external even coloring and uniform look. It indicates optimal purity as cited in the picture.

Monocrystalline solar cells are being made from silicon ingots. These are cylindrical in shape. In order to carry out optimization and decrease the cost of a single monocrystalline solar cell, four sides are being cut of cylindrical ingots in making silicon wafers. This is something that provides monocrystalline panels get the desired looks.

The advantages of this approach:

- They have high level of efficiency as they are being made from high grade silicon. The efficiency rate is in and around 15-20%. Sun power produces high efficient solar panels in the US market. Their E20 series provide panel conversion efficiencies of up to 20.1%.
- They are quite good for using in space. They produce four times the amount of electricity as thin film solar panels.
- It has a longer longevity.
- Maximum manufacturers put up a warranty period of more than couple of decades.
- It performs better than rated polycrystalline solar panels at low-light conditions.

The disadvantages of this approach:

- The solar panels are quite expensive.
- The panels are partially covered with shade, dirt or snow. It is to be noted that the entire circuit can break down.

- The Czochralski process is used to produce monocrystalline silicon. It results in larger cylindrical ingots.
- It is more efficient in warmer weather condition, but the performance suffers as the temperature goes up.

3.Pros & Cons of Solar Energy

Below you`ll find a list over the various pros and cons of solar energy. By clicking on one of the blue links, you will be taken further down on the page for more in-depth information. Everything you are about to read is properly referenced at the bottom.

Pros

1. *Renewable*
2. *Abundant*
3. *Sustainable*
4. *Environmentally Friendly*
5. *Good Availability*
6. *Reduces Electricity Costs*
7. *Many Applications*
8. *Shared Solar*
9. *Silent*
10. *Financial Support from Government/State*
11. *Low Maintenance*
12. *Technology is Improving*

Cons

1. *Expensive*
2. *Intermittent*
3. *Energy Storage is Expensive*
4. *Associated with Pollution*
5. *Exotic Materials*
6. *Requires Space*

Advantages of Solar Energy

Renewable- Solar energy is renewable- It means that there would be no such shortage of solar as opposed to non-renewable energy sources. According to NASA "We will have access to solar energy for as long as the sun is alive – another 6.5 billion years"

Abundant-The earth surface receives 120,000 terawatts of solar radiation (sunlight) – 20,000 times more power than what is needed to supply for the entire world.

Sustainable- An abundant and renewable energy source is also sustainable**-** A sustainable energy source meets the needs and demands without even compromising the ability of future generation. It is sustainable as there is no such way we can over consume it.

Environmentally Friendly- Solar energy does not cause any harm to the environment. Though there are emission from transportation and installation of solar power system. Solar energy decreases our dependence on non-renewable energy sources. This is an important step in fighting the climate crisis.

Good Availability- It is available all over the world. It is found not only in countries close to the equator but it is also being available by countries away from the equator. Germany has the highest capacity of solar power in the entire world.

It decreases cost of electricity- With the introduction of net metering and feed-in tariff (FIT) schemes, homeowners can now sell of the existing electricity. At the same time one can receive credit during time as they produce more electricity on what they are actually consuming.

In simpler terms homeowners can decrease overall electricity expenses. Statistics from One Block Off the Grid reveals that adding solar panels to your home can bring in monthly savings of well above $100 in many states. In Hawaii, residents save on average $64,000 after couple of decades. The chance of homeowners choosing leasing or power purchase agreements to finance their solar panels decreases the costs.

Solar power can be used in varied application- Solar energy can be used in generation of electricity in places that lacks grid connection, for distilling water in Africa, or even to power satellites in space. With the introduction of thin fill solar cells, the solar power can be seemingly integrated into the material of the building.

Shared solar- Because of shading and insufficient space and ownership issues, 1/5 homes in the US are simply not being fitted for usage of solar panels. Through this approach

homeowners can subscribe to "community solar gardens" and generate electricity without even having solar panels.

It is silent- There are no moving parts involved in almost all application of solar power. No such noise is being generated. It is much more favorable than the green techs like wind turbines.

Financial support and stability from the government- Government of all countries have supported this particular approach. This means the prices of the solar panels are much less. In some cases, the price of a residential photovoltaic system can be under 50%. As of 12/31/2008, the U.S. government offers a 30% tax credit with no upper limit. Chances are your home is also eligible for other grants and rebates.

Low cost of maintenance- The solar power does not require much of maintenance. It requires cleaning for couple of times. It can last up to near about three decades.

Technology is improving rapidly- Technological advancement is being made constantly in order to meet up the standards. Innovation in nanotechnology and quantum physics has the tenacity to multiply the output three times more.

Disadvantages of Solar Energy

It is quite expensive- Is solar energy expensive is a debatable question. The driving forces behind the development of solar energy are rooted in politics. Solar power is motivated to compete against other energy sources on the market. On the other hand, the U.S. government, like that of the rest of the world, provides incentives to every major energy production market – not just solar. In 2010, coal received $1,189 billion in federal subsidies and support for electricity production while solar is not far behind at $968 billion.

Solar energy is an intermittent energy source- Access to sunlight is not much. It is quite a difficulty during the over cast days. However, solar power has few obstacles than wind power when it comes to intermittence.

Energy storage is expensive- Energy storage space systems such as batteries will help smooth out demand and weight, making solar power more stable, but these technologies are also expensive.

Exotic materials- Certain solar cells requires materials that are quite expensive and are rare in nature. This is especially true for thin-film solar cells

Requires more space- Power density, or watt per square meter (W/m^2), while looking at how much power can be derived from a specified area of real estate of an energy source. Low power density indicates that too much real estate is required to provide the power we demand at an effective price.

4.Top 10 Benefits of Going Solar

The market for solar in the US grew at 76% in the year 2012, before 2012 it was not available at quantum in American households. There were indeed some advantages that the homeowners felt.

Listed below are those advantages:

Saves numerous dollars- According to One Block off the Grid, addition of solar panels to your home can indeed bring in numerous savings well above $100 in many states. In Hawaii, residents save on average $64,000 the first couple of decades.

Start saving from the first day- Solar purchase power agreements (PPAs) and solar leasing, has made things possible that homeowners do not have to pay for anything more. Numerous homeowners choose to finance their solar panels with one of the pay as you go financing options.

It means the third party company owns the solar system and takes care of installation along with maintenance and repairing work. As of June 2013, 75% of all American homes have access to pay-as-you-go solar

Low payback period- If you are choosing to pay in cash, the payback period in numerous cases is less than one decade. In Hawaii, it takes homeowners on average 5 years, before the monthly savings meets the entire cost of the solar system.

It increases the values of your home- Purchasing a home with a solar panel installed in it, would increase the value of your home while you resale it. A study conducted by National Renewable Energy Laboratory (NREL) concluded that homes with solar panels sell 20% faster and for 17% more money.

A study conducted by National Renewable Energy Laboratory (NREL) is of the opinion that homes with solar panels sell 20% faster and for 17% more money. U.S. Department of Energy's (DOE) Lawrence Berkeley National Laboratory is of the opinion that sales price of the average home increased $17,000 with solar panels.

Taking advantages of incentives- As of 2009, the $2,000 cap on the Federal Solar Tax Credit is lifted. As an individual you will be getting 30% of total system costs back. It means you should save $7,500 on a solar system worth $25,000. If you are adding this up with state and localized rebate and Solar Renewable Energy Credits (SRECs), what you will witness is that the prices have been cut to half.

Solar is indeed a secure investment- With solar panels one can calculate, how much electricity would be generated, and at what price. It can be estimated for the coming couple decades.

Creates energy independence- A day will come when we would run out of natural resource. In order to save the earth it is being advised to install solar panels. At the same time it helps towards saving money, as there will be less import on crude oil.

Solar is easy to get- In our research it has been estimated that the sun's energy will remain for ages and will not perish. Thereby it is easy to get. On the other hand renewable energy of nature can be saved. Our team of independent solar consultants will help you sort through your options.

5.What's Involved and What to Expect?

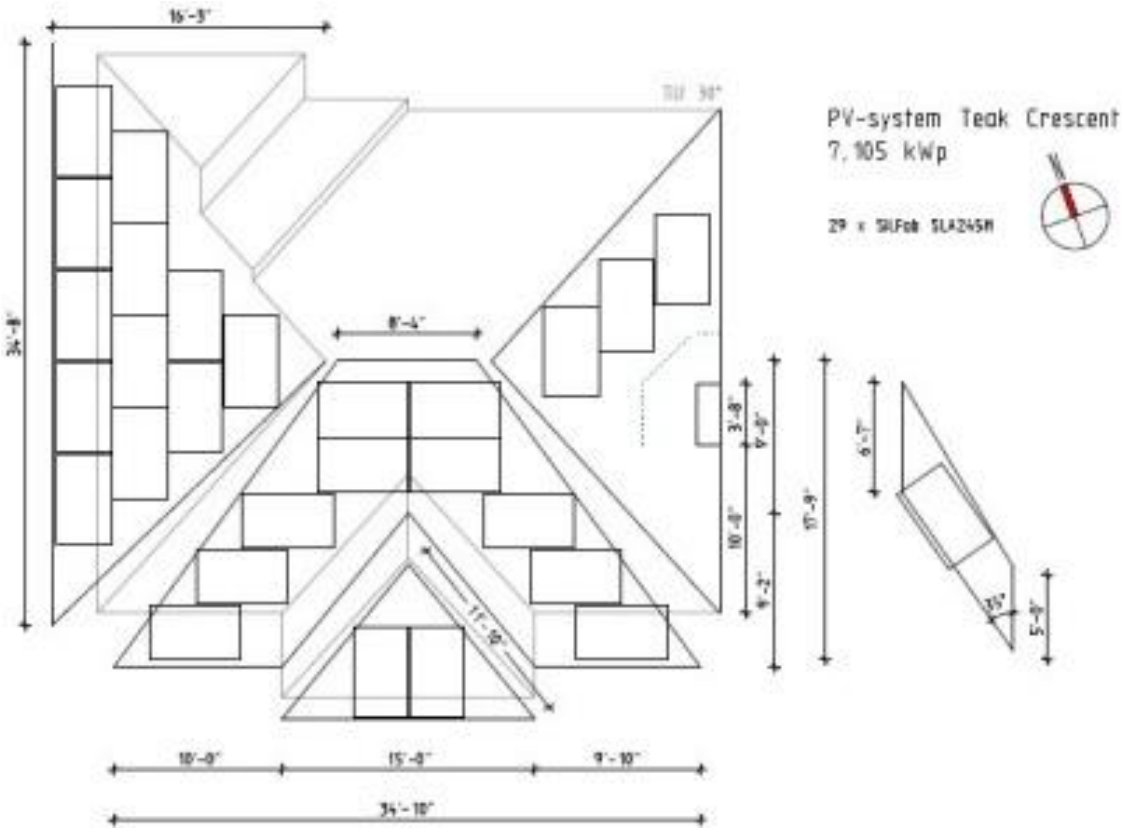
Get some solar quotes

Simply fill out a **request form**, provide details about your solar project, and request FREE solar quotes from professional solar installers in your area! Here's how it works:

Initial consultation and solar site assessment

Solar site assessment- During this particular stage, the solar panel installer would be visiting your property and identify the areas and roof segment which would be suitable for installation. They would be determining the exact azimuth and tilt angles of the proposed solar panels array. In the final steps he would be assessing the shading from tress or neighboring buildings and take some roof measurements.

Review System Design, Quote, Purchasing Agreement



Rooftop Solar Module Layout- Roof measurements are the basis for a solid engineered design and equipment specifications. Your solar panels installer should present a detailed module layout showing you exactly where solar panels are going to be installed. Before you sign on the dotted line, be sure to review details of the Solar Quotation, Financial Analysis, and Purchasing Agreement. Some of the solar contractors may present very attractive numbers to you,

Sign Agreement. Submit your microFIT/Net Metering application.

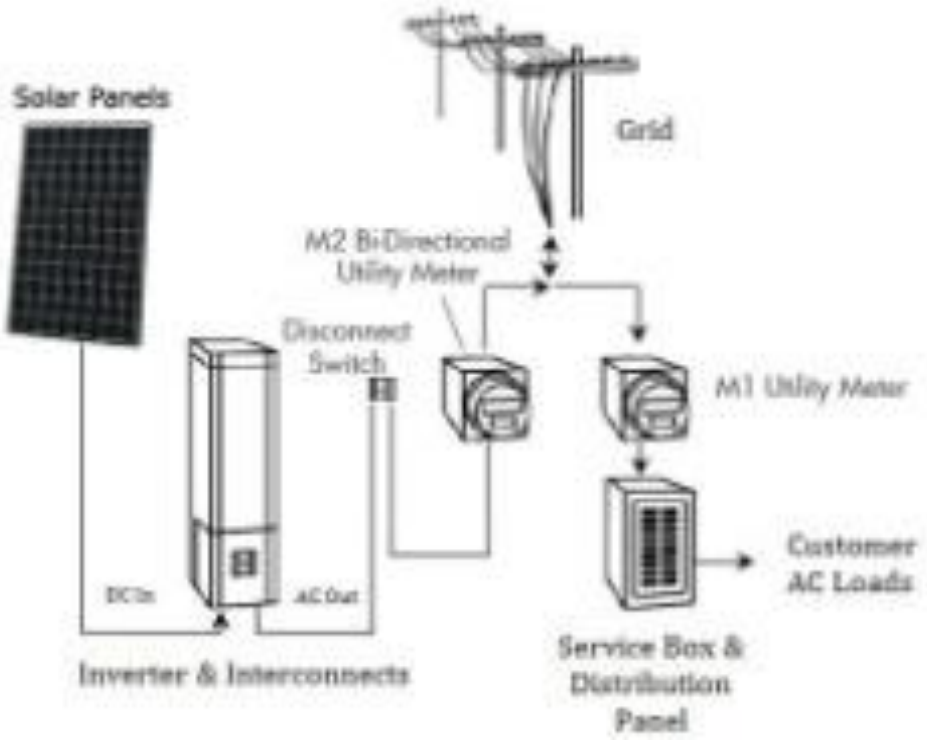
As you are comfortable with the respective price of the turn key system, quality of the components, and qualification of your solar installer, sign the Installation Agreement, and ask for their help in submitting your application for the Solar Energy Incentives program. Maximum of the solar organization in Ontario provide the services absolutely for free. You should obtain the concerned documents and then apply for solar panel incentive program in a quick manner.

All you need to do is, contact the local company and apply for building permit- At this particular stage; you will definitely need help from your solar panels installer. All you need to do is submit a form C to the local distribution organization. All you need to do is specify the type of equipment that you would be using and provide module layout and so on. Another pivotal step is applying for a building permit in order to install the solar panel system. This is while an inspection along with report from a licensed professional Engineer in

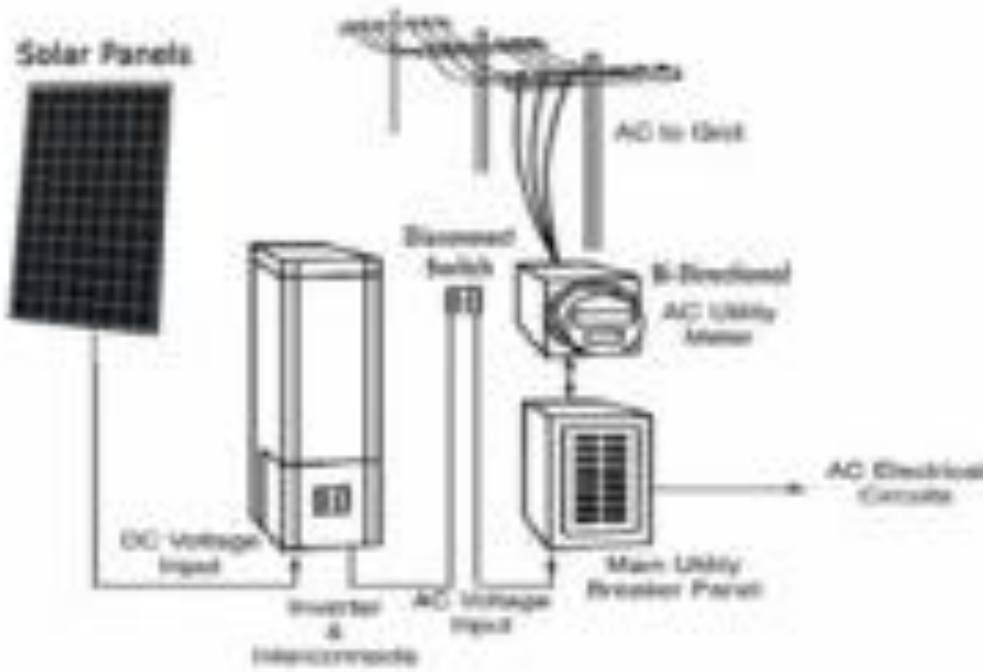
Ontario is going to required helping you out.

Installation of your Solar Panels System

In case of the microFIT program, you will be having 180 days from the data LDC for approving your request in order to install and connect the solar panel system. It will be including m Mechanical Integration and Electrical Connection. Make sure it that it is being done by professionals.



MicroFIT – Typical Connection Diagram



Net Metering – Typical Connection Diagram

Electrical Safety Authority

For inquiries:
TOLL FREE TEL: 1-877-372-7233 TOLL FREE FAX: 1-800-667-4278

www.esasafe.com

Connection Information:

Connection Type: STANDARD
Voltage Phase: 120/240 1PH 3 WIRE
Ampere Rating: 60
Metering Description: S-BASE
Service Details: < 10 KW SOLAR
40 PANELS,10 KW

Connection Authorization is only **Valid for 6 months** following the Notice Date.
After 6 months, **Re-inspection & NEW Connection Authorization are Required.**

ESA Inspection Certificate- The ESA inspectors, will be visiting, your property and they will be confirming the system is being installed as per local electrical code. It includes inspection of the equipments along with wiring, conduits, grounding, system disconnects, etc. As the ESA approval is received, the electric utility will install generation meter and connect your system to the grid. Notice for grid connection will be send by your utility the OPA (IESO).

Choosing the building permit and Accept your microFIT/Net Metering Contract- Depending on the municipality, the building inspector might not be visiting your property. It will be inspecting your solar inspection and review the roof connection details. It will be providing sign-off in closing your building permit. Once the OPA (IESO) receives a green signal from the LDC confirming your solar system is connected, they will be sending you contract to review and accept.

Start receiving payments or credits towards your energy bills- You will commence to receive maximum on your bills. In order to find out how much you can make by selling electricity back to the grid, check out our solar panels calculator for energy and income right from here.

6.Here is what IESO (former OPA) is considering doing:

Keep micro FIT program open only for solar PV, and take away all other types of renewable- Over the last few years the micro FIT program has primarily become PV program. As per as the statistics are concerned 90% of the submitted applications that is being received were for solar rooftop projects. The 9% for ground mount and only 1% for other types of renewable is something that has been seen. This is what the statistics have brought about. It is to be noted that 95% were for rooftop, and only 5% for ground mount installations.

Roll the unused portions of procurement targets for 2013 and 2014 into 2015- Approximately about 50% of 2013 and 2014, the procedure targets were never being claimed and thereby not awarded. These particular numbers got rolled over into 2014 and 2015 respectively. Up to date there is still 40 MW out of the total 80 MW capacity that is being available.

Open micro FIT program to other entitled participants and allow 2 or even 3 solar PV projects per applicant- In order to drive past the number of solar application the IESO is all set to open the program to other varied participants. These generally include charities, conservation authorities, and businesses. Furthermore the quantity of the projects allowed per applicant might generally increase to 2 or 3. The previous and the current owners are completely encouraged to participate in varied programs.

Propose an "IN SERIES" meter connection configuration- Since May 2010 an "In series" connection configuration has not been allowed by the OPA. IESO is looking ahead towards meeting measurement. With the changes the IESO is expecting connections to become less expensive.

Extend duration for connecting micro FIT project from current 180 days to 240 days- If the applications are in requirement of the approach of more than 180 days to connect the project they would still be very much responsible for the extension and maintenance of valid LDC authorization to connect.

2015 Procurement Target for micro FIT projects December 16, 2015

On December 10th, 2015 the IESO (former OPA) reported that 50MW procurement target for micro FIT projects have been successfully achieved. They will continue to process applications if the capacity becomes available.

It is to be reminded that you can still and completely qualify for 2015 micro FIT rates only if you receive Application Approval notice prior to January 1, 2016. If you are all ready to receive application notice prior to January micro FIT rates only if you receive Application Approval notice prior to January 1, 2016. If you already have received an offer in order to connect from your local utility company, but the desired application is not be changed. You might want to contact the local distribution organization as quick as possible.

September 17, 2015 New pricing schedule for 2016 FIT and micro FIT. If your micro FIT project application does receive an approval notice by January 1st 2016, it will be subjected to the latest rates. For FIT projects latest pricing will only apply to any FIT contracts that are being offered after January 1st 2016, inclusion of FIT contracts that is being offered through the FIT 4 procurement.

Here's the new pricing schedule from the IESO, effective January 1, 2016 for FIT and micro FIT:

Renewable Fuel	Project Size Tranche*	Price (¢/kWh)	Escalat
Solar (PV) (Rooftop)	≤ 10 kW	29.4	0.00%
	> 10 kW ≤ 100 kW	24.2	0.00%
	> 100 kW ≤ 500 kW	22.5	0.00%
Solar (PV)	≤ 10 kW	21.4	0.00%
(Non-Rooftop)	> 10 kW ≤ 500 kW	20.9	0.00%
On-Shore Wind	≤ 500 kW	12.8	20.00%
Waterpower	≤ 500 kW	24.6	20.00%
Renewable Biomass	≤ 500 kW	17.5	50.00%
On-Farm Biogas	≤ 100 kW	26.3	50.00%
	> 100 kW ≤ 250 kW	20.4	50.00%
Biogas	≤ 500 kW	16.8	50.00%
Landfill Gas	≤ 500 kW	17.1	50.00%

July 17, 2015 2016 FIT and micro FIT price review.

In order to determine FIT and micro FIT pricing for 2016, the IESO has really started the annual price review. If you

are interested towards providing your own input, all you need to do is feel free to fill out a questionnaire on the concerned website. The responses will form an important part of the process for reviewing. It will be helping the IESO towards development of the pricing schedule for 2016. This ensures a fair market feed-in-tariff to, and the responsible rate returns for the investors.

January 1, 2015 OPA merges with IESO- the Ontario Power Authority (OPA) is merging with an organization called Independent Electricity System Operator (IESO). The roles for this particular organization is towards balancing the demand for electricity against the available supply through the entire whole sale market and direct the entire flow of electricity all across the transmission system. Micro FIT program will be completely administered by IESO from now on. More information on the merger on the official OPA website: https://microfit.powerauthority.on.ca/

December 22, 2014 New pricing schedule for FIT and Micro FIT projects- If the present status of the micro fit application does not change to "Pending Connection" prior to 1st January 2015, it will be subjected to the latest FIT/micro FIT schedule. Here's the new pricing schedule from the OPA, effective September 30, 2014 for FIT and January 1, 2015 for micro FIT:

Renewable Fuel	Project Size Tranche*	Price (¢/kWh)	calati
Solar (PV) (Rooftop)	≤ 10 kW	38.4	0.00%
	> 10 kW ≤ 100 kW	34.3	0.00%
	> 100 kW ≤ 500 kW	31.6	0.00%
Solar (PV)	≤ 10 kW	28.9	0.00%
(Non-Rooftop)	> 10 kW ≤ 500 kW	27.5	0.00%
On-Shore Wind	≤ 500 kW	12.8	20.00%
Waterpower	≤ 500 kW	24.6	20.00%
Renewable Biomass	≤ 500 kW	17.5	50.00%
On-Farm Biogas	≤ 100 kW	26.3	50.00%
	> 100 kW ≤ 250 kW	20.4	50.00%
Biogas	≤ 500 kW	16.8	50.00%
Landfill Gas	≤ 500 kW	17.1	50.00%

December 20, 2013 micro FIT applications currently in review- The OPA has made specified decision in order to keep up the current applications being submitted before December 31st, 2013. As a generalized rule these could have been terminated, but as per as the current standings, the applications will be carried over into 2014 regardless of whether they have received approval for the application notice or not. In December 13th the OPA is showing 16.8 MW remaining towards announcement in August 30MW procurement

target. This is indeed more than 50%. The remainder will most likely be added to the 2014's 50MW target.

November 1, 2013 micro FIT pricing for 2014- The micro Fit pricing standard that is being reviews for the year 2104 is being completed. For the very first time in the history of micro Fit program in Ontario, the feed-in-tariffs remains absolutely unchanged. This is nothing but one of the superlative news for all and sundry, who are becoming ready for installing solar panel system on the roof. This price will apply to any new contracts that are issued on or after January 1st, 2014. An official release can be found on the OPA website at https://microfit.powerauthority.on.ca/news/new-fitmicrofit-price-schedule-available

August 29, 2013 micro FIT 3.0 is launched- Micro FIT program is up and running again. As of yesterday, August 28th 2013, the new version was launched. The Ontario residents can now again submit their application to the OPA. A new 30 MW procurement target is in effect for the remainder of 2013. Version 3 documents can be viewed online at

https://microfit.powerauthority.on.ca/microfit-program-resources/version-3-documents.

7.Amazing Solar Projects around the World

Solar panels in the shape of Mickey Mouse's head -

A gigantic solar panel array as according to the shape of Mickey Mouse's Head started its operation few months ago in the state of Florida, in USA. It is being made of 48'000 solar panels, owned by 5MW and it is being operated by Walt Disney World Resort, and Duke Energy. This particular solar farm generally produces more than enough electricity in order to meet the needs and demands of the resort itself and it also surfaces the customers, this includes the ranks of four season resort and hoteliers along Hotel Plaza Boulevard. All you need to do is go solar and have a gala time.

Solar powered airplane Solar Impulse 2 is ready to continue its journey

After spending about seven months on the ground due to respective battery repairs, the solar impulse 2 solar powered airplanes are already in readiness to commence its first round- The world solar flight. This time around it will be taking off from Hawaii and it will attempt to reach continental US West Coast in approximately 4 days. The last leg of 4,481 miles from Japan to Hawaii took record breaking 117 hours, 52 minutes, while the plane flew 5 days and 5 nights without any fuel. It was being powered by energy stored only in its batteries.

The plane does have a wing span of a Boeing 747 Jumbo jet, weight a family car. At the same time it can carry near about 17'000 photovoltaic cells that charges on board batteries when the sun is shining during the day.

The challenging projects have been founded and are being guided by 2 entrepreneurs and pioneers, Bertrand Piccard and André Borschberg. They were forced to face numerous obstacles, but they were finally successful in

demonstrating possibilities of clean technologies and renewable energy.

Nevada Solar One

Nevada Solar One is the second largest Solar Thermal Plant built in the US (64 MW capacity), and it is being located near Boulder City in Nevada. Since the year 2007, while it went to operation, it had the tenacity of helping offset CO2 emissions from approximately 20'000 vehicles in a maiden year.

One would be proud to know that it has more than 182,000 mirrors that concentrate solar radiation onto tubes that contains a heat transferred fluid. This particular fluid is then being heated 391 °C and exchanged to water in order to produce steam that generally drives a conventional turbine. Turbine is then being connected to a generator in order to produce electricity.

Solar Bike Road

The first solar bike in the world is defined as solar road, which operates in a town of Krommenie, about 25km from Amsterdam, the Netherlands. As per as the operation of this particular bike is concerned, let us narrate that the solar path works like a gigantic long panel, as the sunlight hits the surface. The solar cells generate electricity and then feed it back into the local utility grid.

It has been seen that the amount of solar energy it produces at an annual basis is completely enough in powering up 2 to three average houses. The solar panels are being encased into a pre-fabricated concrete lab. On the top the cells are being protected by a ticked layer of toughened glass with a skid resistant coating. The concerned length of the first solar bike road is only 320 feet.

The pivotal purpose of this bike is to collect as much data as it can. It also should be providing test ground for a required research and technology. The owners are looking ahead for a payback of one decade and five years. If it is being done in this basis, then the process is sure to gain success. It is in all likeness to be extended and the technology is about to be integrated in varied parts of the country. The details of the website are cited in https://en.solaroad.nl/

8.Frequently Asked Questions

Will my property go up in value if I install rooftop solar panels?

Though no such data is being available from the Canadian Real Estate Association, One of the most recent researches on into homes sale prices in 6 US States (California, Florida, Maryland, Oregon, North Carolina, and Pennsylvania) have brought out that the solar panel system might be very significant for residential properties. It was found out those 4’000 recent real estate transactions from May 2010 till October 2014, have used solar panels and solar panels were sold at almost 4% premium compared to the average selling price on the market.

For example, if a typical house next door is being sold for $500'000, your own property with solar panel system should be appraised higher by min $20'000. This is off course would also be appraised higher by a minimum of $20'000. This also depends on the age of the solar panel.

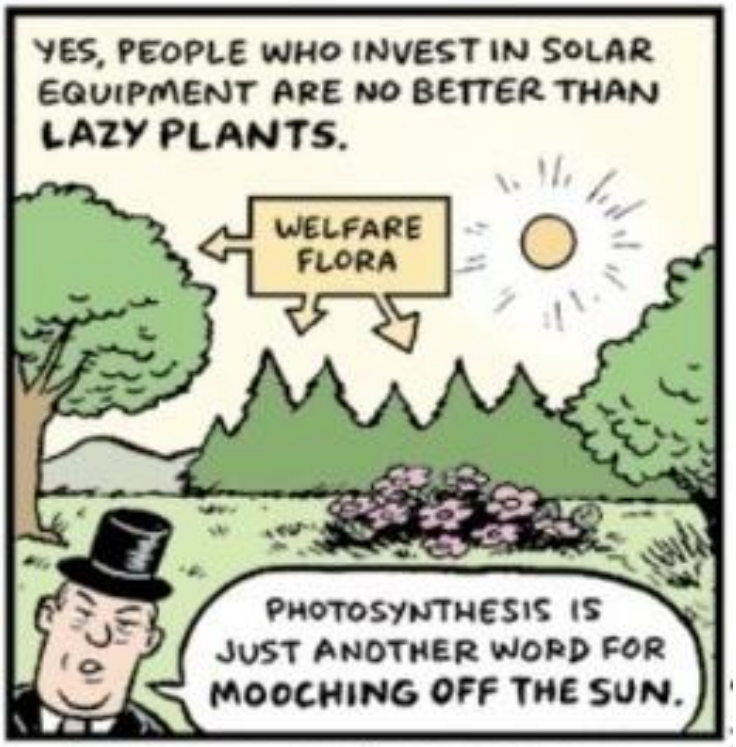
Can I recover HST paid on the purchase of solar panel system?

Yes, if the solar panel system is being connected to the grid and is being used exclusively to sell of electricity to the IESO (former OPA. Maximum participants in the microFIT program are considered as miniature suppliers for the HST purposes.

If you are voluntarily registering for the HST number, you are then required towards collecting the remit HST on your taxable sales of electricity to your local hydro company.

As per as the laws Canada Revenue Agency GST/HST info sheet GI-122 dated September 2011, if a person is a GST/HST registrant, you are completely eligible towards full claim and full input tax credits for the total costs being associated with the individuals purchasing and installing your solar panel system. All you need to do is make sure that yolu provide proper and authentic documentations.

Will my property taxes increase if I install solar panels?



If you are installing your solar panel system concerning any such size on the rooftops on your property, the particular assessment and tax classification will not be changing as per Ontario Regulation 282/98 under the Assessment Act dated January 4, 2012. The very same rule applies towards the ground mount solar panel installation. But as the size is being limited towards 10kW, if you go with a medium sized system, your solar panel system generation facility will be absolutely tax based on the adjacent land used rate. As for example residential, commercial, farm, etc.

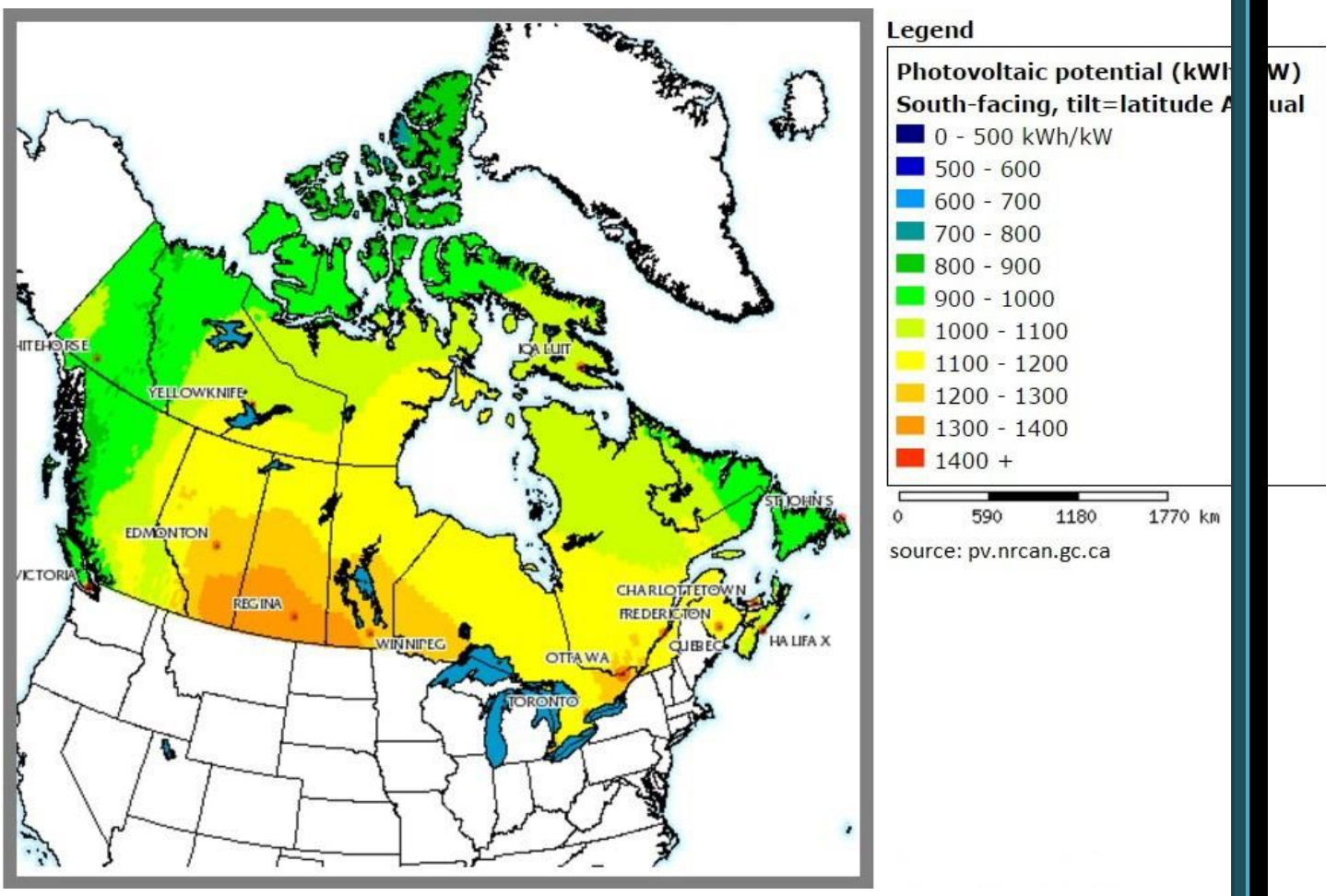
How much solar does Ontario actually get?

As it is known to all that the winters can really be harsh at times, but we are fortunate enough for the amount of energy we derive from the sun. The amount of solar energy that is being received on a flat surface each and every year is the pivotal piece of information. It is being needed as according to size and estimate performance of the solar panel system. This is the base for all the your future Solar Energy Generation and Income calculations

The natural resource Canada has been counting the records Solar Energy/Isolation and other parameters from 144 meteorological stations in and around the states of Canada for more than four decade. This would result towards accurate and informative tables and maps are available for you to use here: www.pv.nrcan.gc.ca

As for example Solar Photovoltaic potential for the City of Toronto is 1163 kWh/kW, This estimates that every 1000W (1kW) of DC power (for example, 4 solar panels of 250W each) can generate 1163 kWh of AC electricity every year. If you are installing a 10kW solar panel system, it will be producing 1163kWh/kW x 10kW=11'630 kWh per year on average.

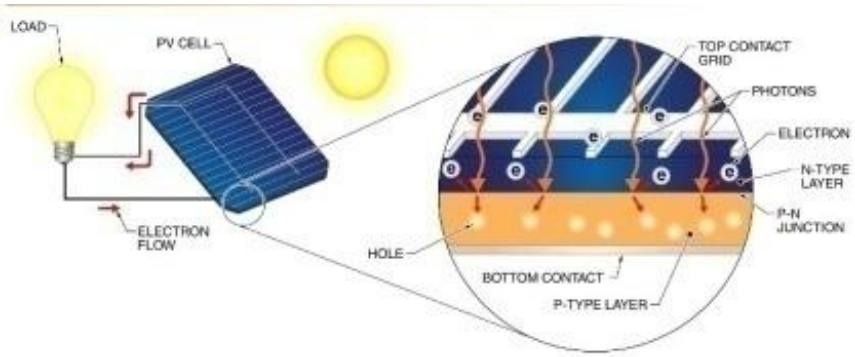
The City of Vancouver gets 1007 kWh/kW, Calgary – 1291 kWh/kW, Halifax – 1073 kWh/kW. If you compare these numbers with the rest of the world like London, England (728 kWh/kW), Berlin, Germany (848 kWh/kW), Beijing, China (1148 kWh/kW), you can see that Canada has an amazing solar photovoltaic potential.



Photovoltaic Map of Canada

How do solar panels work?

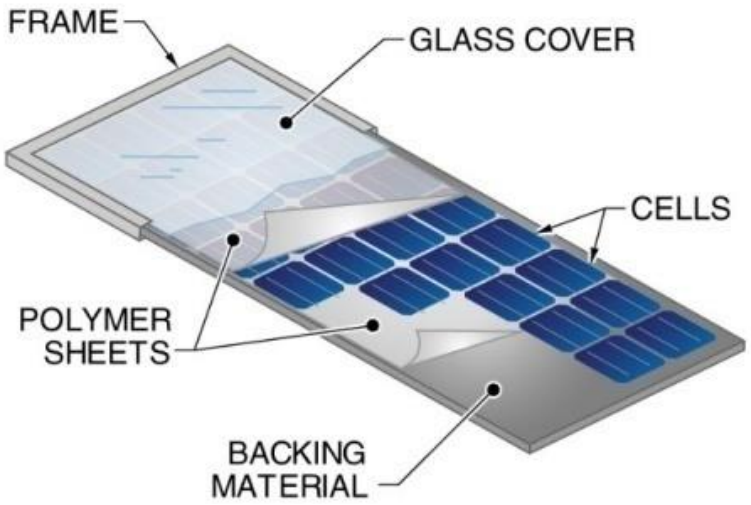
The solar panel generally consists of numerous cells that generally captures the sunlight and then convert it into electrical energy. It is to be noted once a solar cell is being exposed to sunlight; the energy of the suns is gradually transformed to electrons towards the material surface. The added energy allows electrons towards escaping from the atoms and commence to move, thus it produces electric current. The movement of electrons is also called a photovoltaic effect (PV).



What materials are used to make a solar panel?

The solar cells are usually being made of polysilicone, this a product refined from quartz and silica sands. The various grades are being used to fabricate solar cells of varied qualities and crystalline silicone is currently the superlative in terms of efficiency and costs.

The numerous solar cells are then being laminated within a plastic substrate in order to hold forth them in place and protect the electrical connection. In the final stages the solar panels are being sealed in between a sheet of tempered glass on the top along with the backing material. It is being framed with aluminium channels in and around. A junction box with all the electrical connections is mounted on the back of a solar panel.

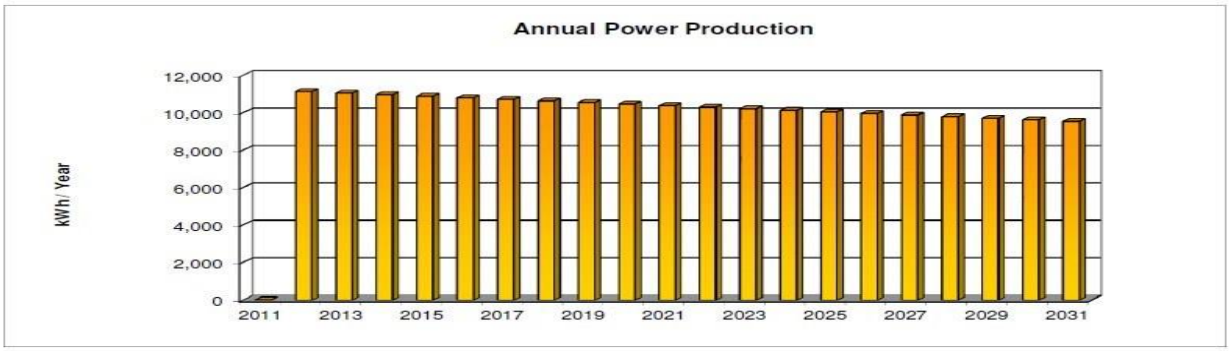


JUNCTION BOX

What long do solar panels last?

The solar panels lose in and around 0.5% to 0.75% in power output every year due to solar cells degradation and other factors. So if you were to install solar panel today, couple of decades down the line they would still be producing around 85% nominal power. This particular decrease in output must always be factored in while calculating annual power production and micro FIT Income. All you need to do is make sure quotes and financial analysis you are getting from solar panels installers do reflect that.

The chart given below shows reduction of annual power output (in kWh) of a typical 10kWp micro FIT system over the course of 20 years.



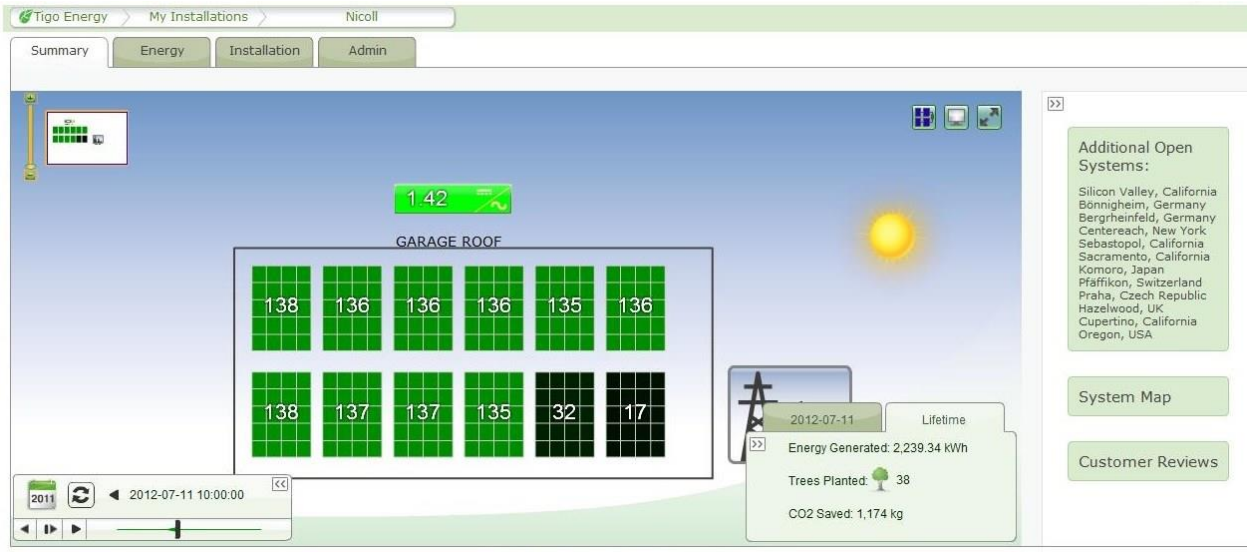
How do micro-inverters work?

Demonstrates in detail how micro-inverters work. This video provided by Enecsys, one of the leading micro-inverter manufacturers.

https://www.youtube.com/watch?v=lXlWdjFXcp0

Why do I need Solar Monitoring?

Once the solar panel is being installed, it is not enough to flip the switch. Commence to make power and just walk away. You would probably want to be able to monitor your system and make sure that everything is running in tandem. At the same time check the energy production and income numbers at an occasional basis. Having a reliable monitoring approach with a chromatic graphical interface would make all and sundry to easily understand.



Tigo monitoring system showing issues with 2 solar panels at the bottom right corner

Till a year ago, most inverters had an LCD display right on the unit that was used to initialize the system, monitor production and do troubleshooting. They did a good job they were not good to look at. It did not have any such aesthetic appeal.

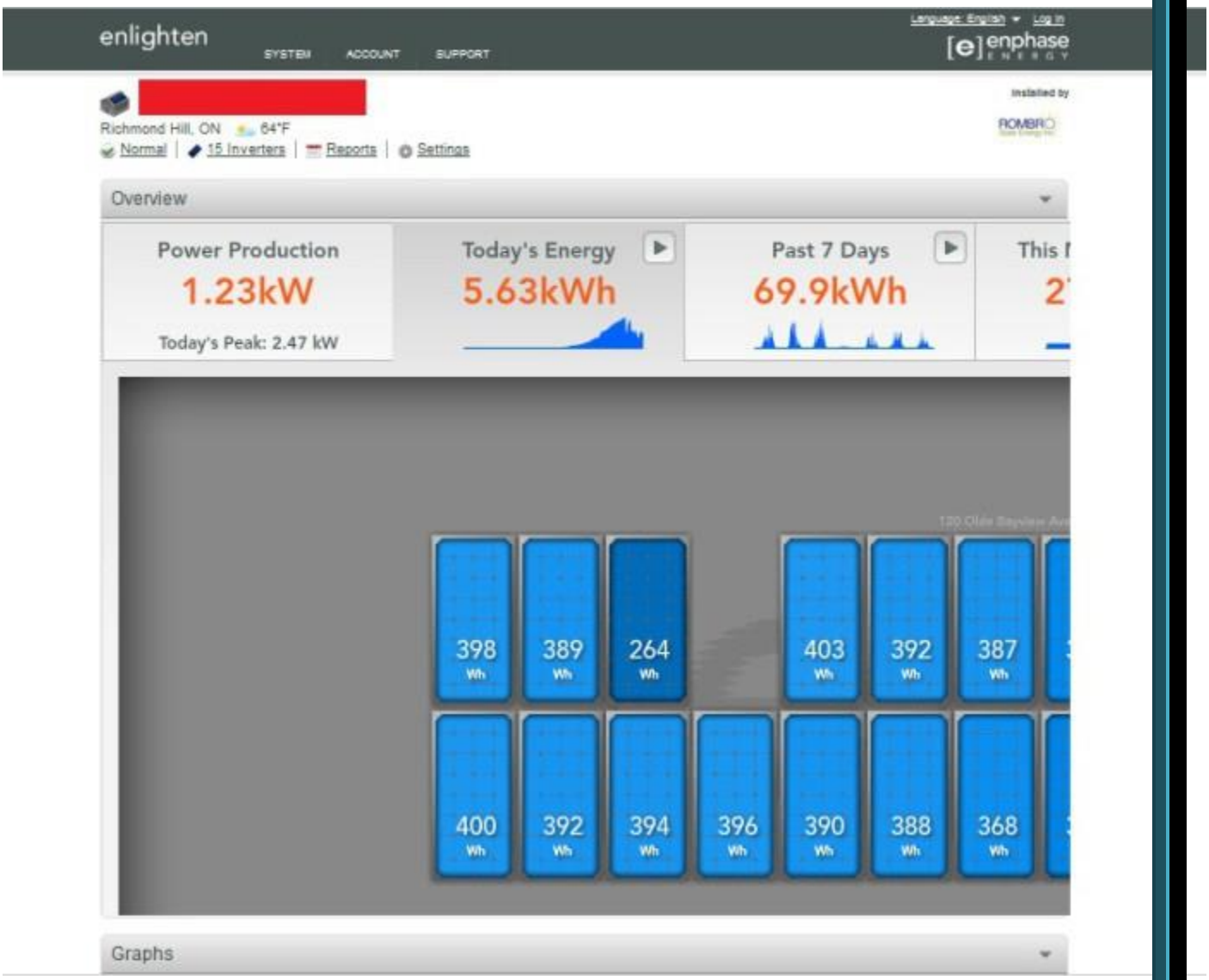
After this approach numerous third party, monitoring system cropped up. These third parties provided Ethernet connections to a PC and output data as a spreadsheet. Times have flown by and monitoring systems have leaded the way in the era of the “internet of things”. Now all individuals can get real-time information from your PV system whenever you want. Listed below are few characteristics to look out for while considering on how you want to interact with the PV system.

There are basically three parts to a monitoring system:

- Data Logger, which gathers the data
- Communications Gateway- It delivers the information via Ethernet or radio
- Web Portal- It gathers graphical interface for you and look at the data.

The varied levels of details are being available that generally depends on if you are using string inverters that manages a group of solar panels. For the string inverter system, through which you can get basic production numbers for the numerous daily and weekly, monthly, yearly DC and AC voltage.

For and hat is power optimizer systems, the data is more in-debt. It is because you can witness what is going on and what not. This is quite helpful while trouble shooting a problem. The web portal will show you a “map” of the panels in the system, and you can see exactly where a broken panel or micro inverter is.



Enphase monitors energy production at each individual solar panel

Maximum inverter manufactures off late now include some sort of data collection either as part of the package or as an extra add-on. Fronius, Power-One, SMA, Enphase and others have a good looking and easy to use web based monitoring system. There are also third party monitoring systems for all sorts of special applications if you are not a follower of what the specified manufacture has to offer.

Some are being designed only for simplicity and for non technical residential usage. At the same time some are being designed for commercial usage. Some are quite sophisticated products like OWL Intuition-PV. They not only monitor your solar but the entire usage of production profile. This can surely be a great benefit that you are pining for. It maximises energy efficiency and charging capacity.

Why do I need Solar Monitoring?

Drones & Solar: High Tech Cross-Over →

Can you install solar panels yourself?

Solar equipment has got more and more standard it is more like "plug and play" equipment. You should be able to save a lots and lot of money by installation of a solar project all by yourself. But this is not really a smart move. Listed below are few reasons why you need to hire a professional solar installer in the location of Ontario.

- You would be getting warranty- Any of the reputable solar installer will be offering an warranty on workmanship. If anything goes wrong due to improper installation, the installer is on the hook to fix it up. If you are carrying it all by yourself, you only have to blame yourself and none else. If an expensive piece of equipment is damaged then it is only because it was not at all installed in a proper manner.

- Furthermore maximum of the solar equipment manufacturers will not be honoring their warranty in this particular case.
- The paper works are to be done with tandem. There are lots of paper works that needs to be carried out for installation of micro FIT or Net Metering solar project in Ontario. Applications, Request for Connection forms, ESA approvals, specs submittals, codes, permitting, connection agreements, wiring diagrams, solar rebate application forms,

etc, are something that some of the experienced installation company will make you aware off.

- In order to qualify for interconnection or rebate a professional installer would help you out.
- At times it is understood that you can carry out the task all by yourself, but you do not really have the time, so thereby you need to get in touch with a professional.