

Barrie Solar Mapping Discussion

Purpose: To Provide Barrie Residents a Mapping tool to Visualize Roof Top Solar Potential.

Background:

On March 28, 2022, Barrie City Council approved the **Community Energy & Greenhouse Gas Reduction Plan**. The plan includes actions and strategies for improving energy efficiency and reducing community wide greenhouse Gas (GHG) emissions.

The outlines four "Big Moves" - Buildings, Transportation, Circular Economy, Natural Environment and Land Use.

Big Move: Buildings

Goal: Near zero emissions in new and existing buildings

Strategies:

- Deep energy efficiency retrofit program
- Green development standard
- Energy management and benchmarking
- Solar generation
- District energy (pre-feasibility study)
- Larger renewables (pre-feasibility study)

Strategy 4: Solar Generation

Description: Develop and implement a rooftop and ground-mounted solar program across all sectors.

The solar photovoltaic (PV) program will be implemented across the community and will include both rooftop and ground-mounted installations. The business case and program design for the Deep Energy Efficiency Retrofit Program will include a solar generation strategy for rooftop PV, though the deployment of the two programs will be separate. The Green Development Standard will include consideration for building rooftop design that can accommodate solar generation.

Target Participation:

Immediate Actions: Solar Generation

- Eligible Residential Rooftops have 5% coverage of Solar Panels by 2030 and 15% by 2050
- Communicate and provide tools/resources to educate the public and businesses on the benefits of solar generation and access supports/funding.
 - Advocate for energy rebates and efficiency/affordability programs at all government levels.

Potential Tool / Resource: a number of Canadian cities provide their Residents with an interactive mapping tool to visualize roof top solar potential, costs and savings. Barrie could provide the same type of tool.

Barrie Solar Mapping Discussion – Why Now?

Reason 1

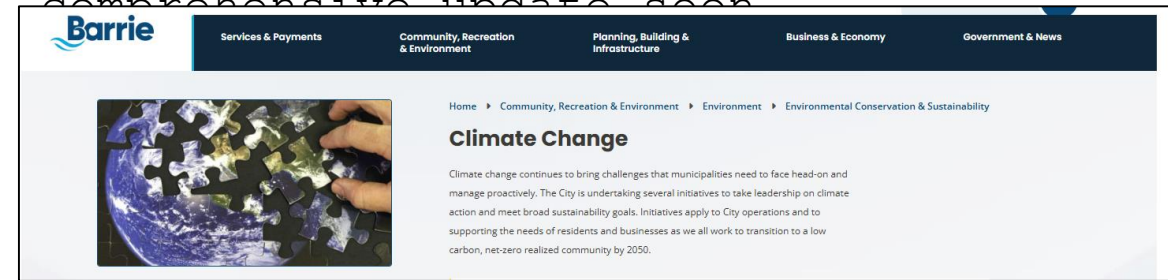
Enbridge Gas and Save on Energy, with support from the Ontario Government, have partnered to launch the new Home Renovation Savings™ program to help Ontarians improve home energy efficiency and receive up to \$5,000 for solar panels, plus the option to bundle with battery storage for an additional rebate, up to \$5,000.



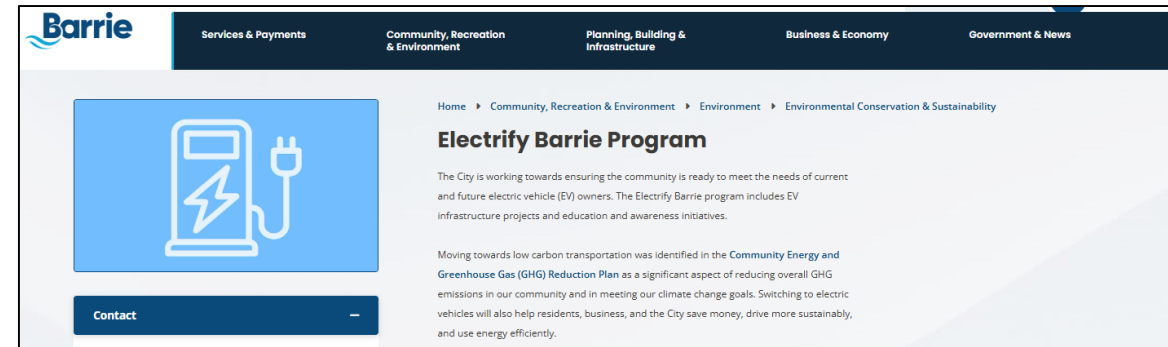
The screenshot shows the 'Home Renovation Savings' website. The main heading is 'Go solar and save'. Below it, a subheading reads: 'Adding rooftop solar panels and a battery energy storage system to your home can help you generate your own clean, renewable energy year round.* A home energy assessment is not required.' There is a 'Get started' button. On the right, there is a photo of a smiling man in a white hard hat and a dark jacket standing next to a large solar panel. Above the photo are three buttons: 'Back to home', 'Rebates', and 'Check eligibility'. At the top right of the page is a 'Get started' button.

Reason 2

The web pages for Electrify Barrie and Climate Change are scheduled for a comprehensive update soon.



The screenshot shows the Barrie website's 'Climate Change' page. The navigation bar includes 'Services & Payments', 'Community, Recreation & Environment', 'Planning, Building & Infrastructure', 'Business & Economy', and 'Government & News'. The breadcrumb trail is 'Home > Community, Recreation & Environment > Environment > Environmental Conservation & Sustainability'. The page title is 'Climate Change'. The text reads: 'Climate change continues to bring challenges that municipalities need to face head-on and manage proactively. The City is undertaking several initiatives to take leadership on climate action and meet broad sustainability goals. Initiatives apply to City operations and to supporting the needs of residents and businesses as we all work to transition to a low carbon, net-zero realized community by 2050.' There is a photo of a hand placing a puzzle piece on a globe.



The screenshot shows the Barrie website's 'Electrify Barrie Program' page. The navigation bar is the same as the previous page. The breadcrumb trail is 'Home > Community, Recreation & Environment > Environment > Environmental Conservation & Sustainability'. The page title is 'Electrify Barrie Program'. The text reads: 'The City is working towards ensuring the community is ready to meet the needs of current and future electric vehicle (EV) owners. The Electrify Barrie program includes EV infrastructure projects and education and awareness initiatives.' Below this, it says: 'Moving towards low carbon transportation was identified in the Community Energy and Greenhouse Gas (GHG) Reduction Plan as a significant aspect of reducing overall GHG emissions in our community and in meeting our climate change goals. Switching to electric vehicles will also help residents, business, and the City save money, drive more sustainably, and use energy efficiently.' There is a blue icon of a car with a lightning bolt and a 'Contact' button.

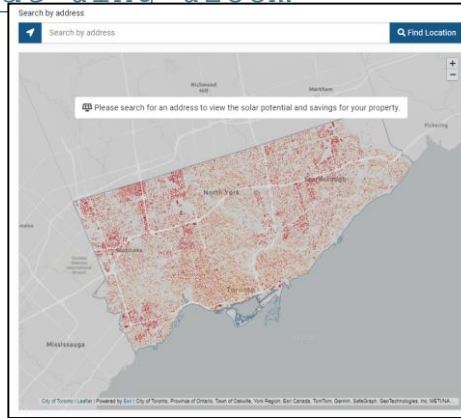
Now is an opportune time to “provide tools/resources to educate the public and businesses on the benefits of solar generation” and actively encourage Solar PV adoption.

Barrie Solar Mapping Discussion - Options (Inhouse GIS Development)

Example: Toronto - <https://www.toronto.ca/services-payments/water-environment/net-zero-homes-buildings/solar-to/solarto-map/#location=&lat=&lng=&zoom=>

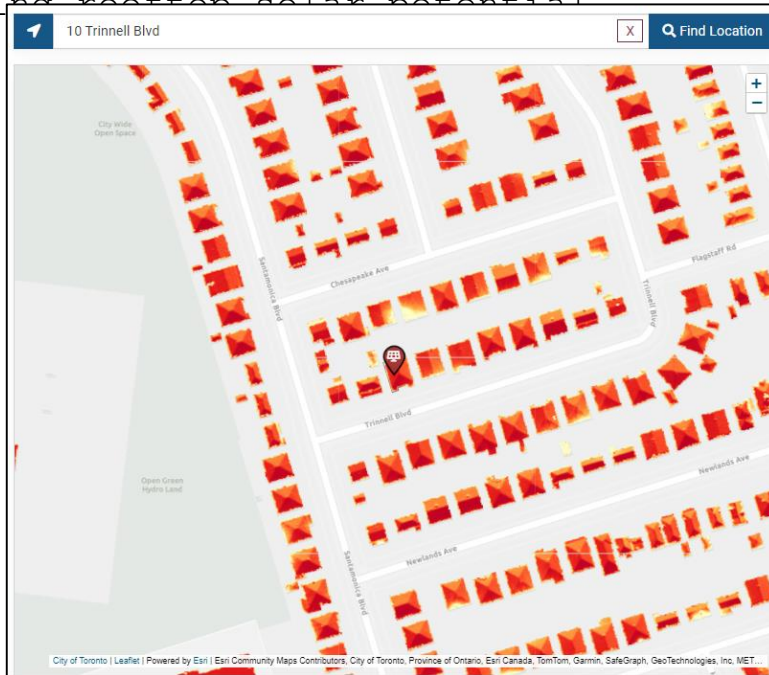
Toronto has developed their Solar TO Map through a Geographic Information Systems (GIS) analysis of Light Detection and Ranging (LiDAR) data. LiDAR technology captures high accuracy elevation data. The software takes into account geographical latitude, as well as the sun's daily position throughout the year to provide


Results: access to an interactive map visualizing rooftop solar potential




Residents simply type in their address or zoom in to select their home

Note Barrie could develop their own Map and share it through the Discover Barrie Portal (<https://discover.barrie.ca/pages/apps>)




**10 Trinnell Blvd - Structure 1 - (Land ID 58785)**

**Solar Potential**
System size: 10 kw
Annual electricity generation: 11588 kwh
Roof size suitable for solar: 1,190 sq ft

Financial Benefits
System cost: \$27,000
First Year Bill Savings: \$1,814
25 Year Bill Savings: \$80,841
Payback period: 9 years

Environment Benefits
Annual greenhouse gases reduction: 811 kg CO2e
Total greenhouse gases reduction over 25 years: 20,300 kg CO2e
Number of Trees grown for 10 years: 337
Number of Cars off the road: 4

Estimated Solar PV System
 **\$27,000**

Estimated Savings over 25 years
 **\$80,841**



Note: The above data pertains to Net Metered projects only.

Barrie Solar Mapping Discussion - Options (Inhouse GIS Development)

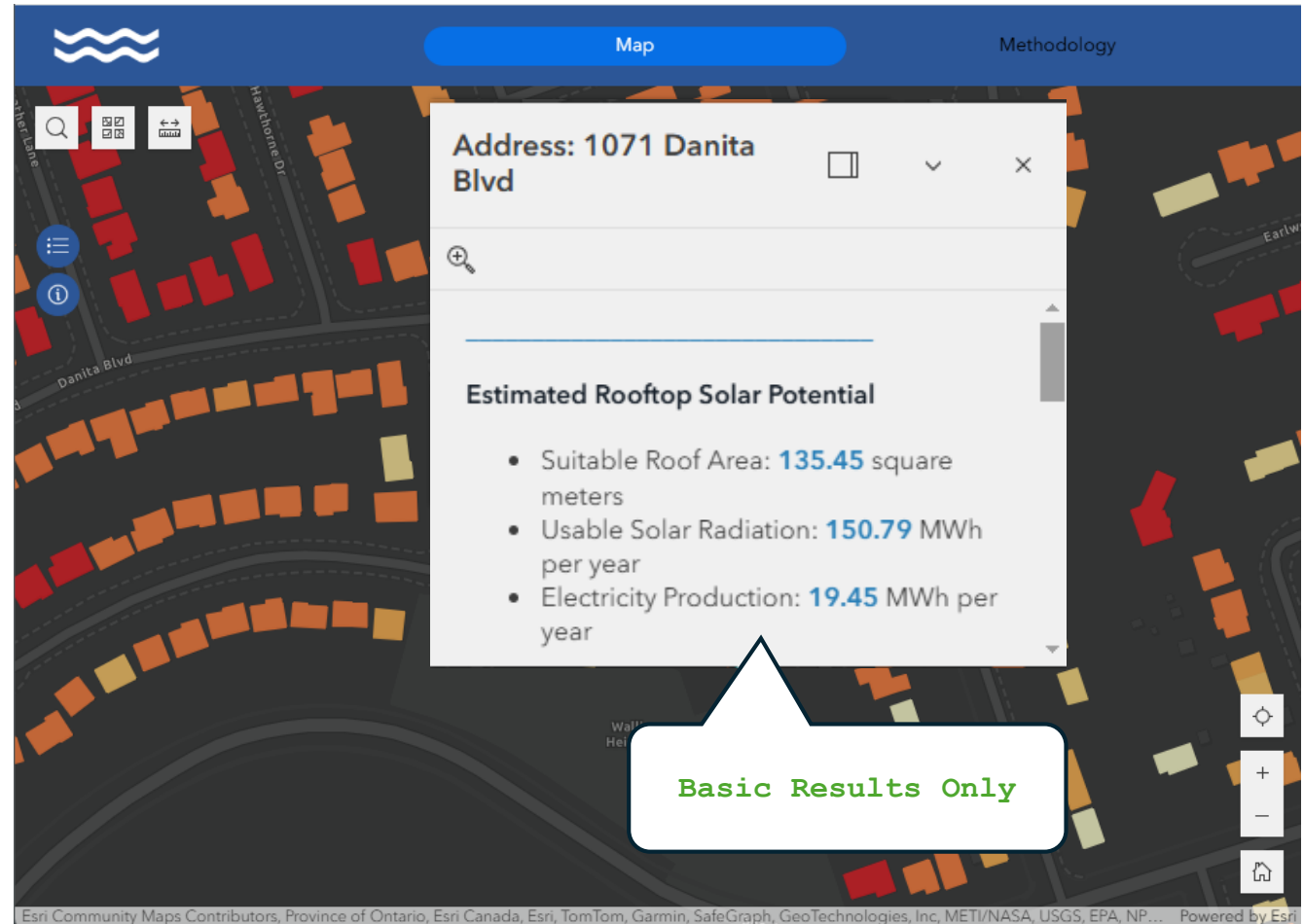
Example: Peterborough -

<https://experience.arcgis.com/experience/fcb650607a9148a688e23f8b7ff38d65/page/Map>

An interactive solar panel map that identifies the solar potential of buildings in Peterborough was developed in partnership with Fleming College. Installing solar technologies like solar photovoltaic (PV) to generate electricity or solar thermal to heat water are excellent solutions to help lower your carbon footprint and actively tackle climate change. Solar PV can also support property owners with decreased monthly electricity bills during peak time-of-use periods.

How to use the solar panel eligibility map:

1. Select and click your building from the map
2. A pop-up window will appear that lists:
 1. Suitable rooftop area in square meters for installing solar technologies on your building
 2. Usable annual solar radiation in Megawatt-hour (MWh) for the rooftop
 3. Estimated solar electricity produced (MWh) and avoided greenhouse gases associated with grid electricity in kilograms
 4. Potential range of annual electricity cost savings from not purchasing grid

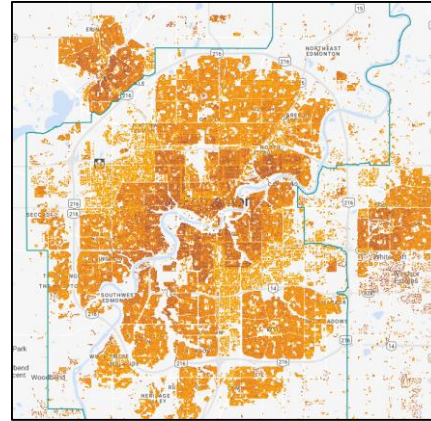


Barrie Solar Mapping Discussion - Options (3rd Party Apps)

Example: Edmonton - 3rd Party Solution (<https://solar.myheat.ca/edmonton/>)

The City of Edmonton has partnered with MyHEAT to provide Residents access to an interactive map visualizing rooftop solar potential. Residents simply type in their address or zoom in to select their home.

Results:



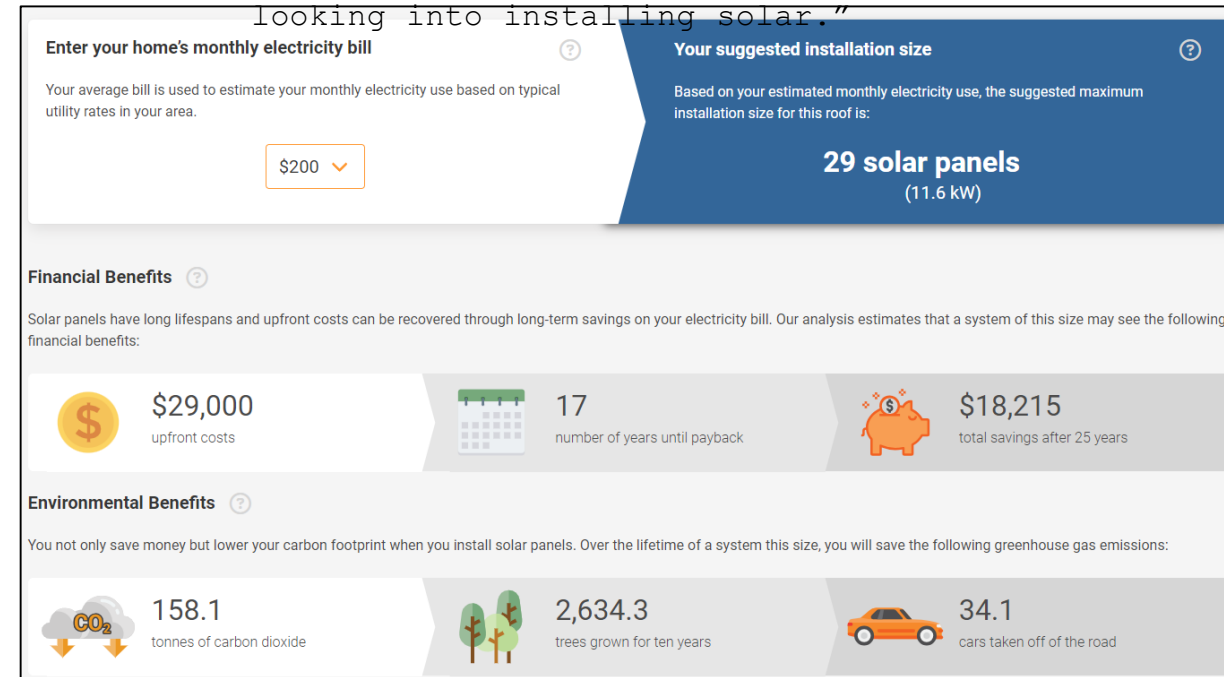
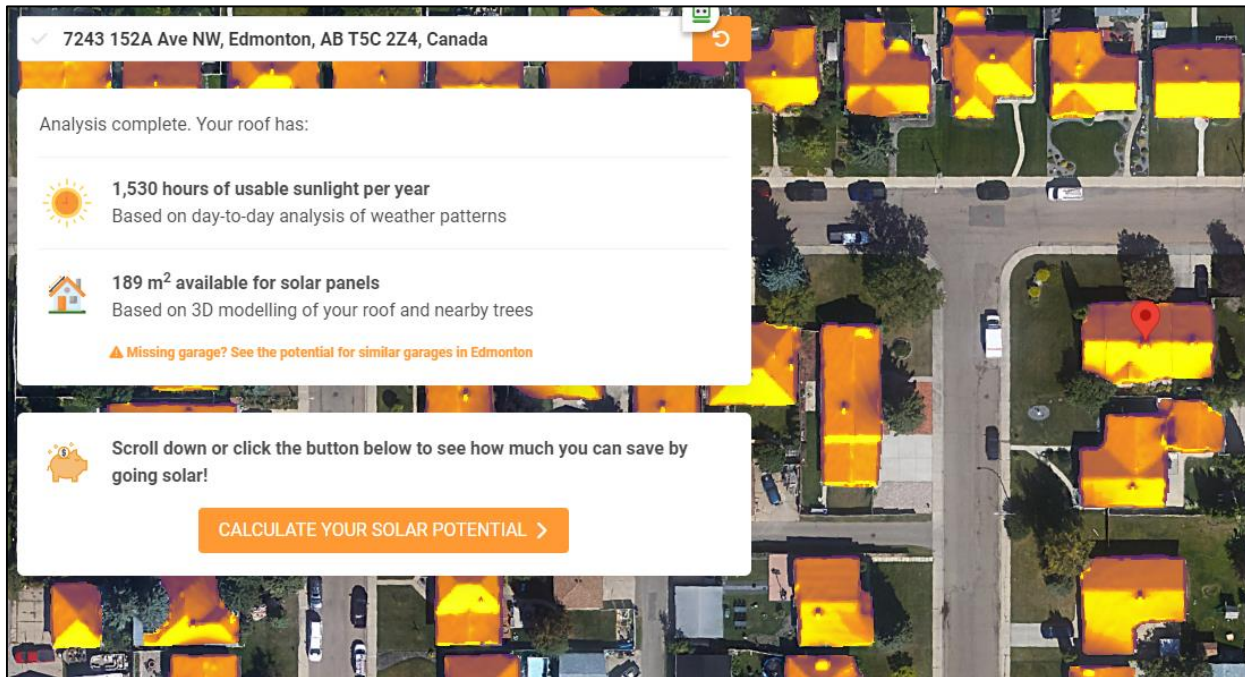
When asked "What do you like or dislike about Edmonton's Solar Potential Map? Do you have any feedback on the tool and its functionality?", residents of Edmonton shared these responses:

"It helps sell the idea that a northern community still has great solar potential."

"The roof of my house is entirely shaded by American Elms but the map alerted me to the potential of my garage, where I installed 24 panels"

"It was the key in my decision to have solar panels installed on my house."

"It was the first thing we did when we started looking into installing solar."



Barrie Solar Mapping Discussion - Options (Inhouse HTML & JavaScript Tool)

Create a simple tool with HTML & JavaScript with basic user input (Example:

<https://barrie.wuaze.com/Solar-PV-Calc/>)

Simple form with set Default Utilizing the Google Maps

Utilizing the NREL's [PVWatts®](#)

A very basic estimate of Solar PV Size, Production and Savings.

Location (Address, City, Province):

Get Current Location

Available Roof Area (m²):

Measure Area on Map

Panel Wattage (W):

Panel Area (m²):

System Efficiency (%): (Typical range 75-85%)

Solar Production Calculator

Module Type:

Array Type:

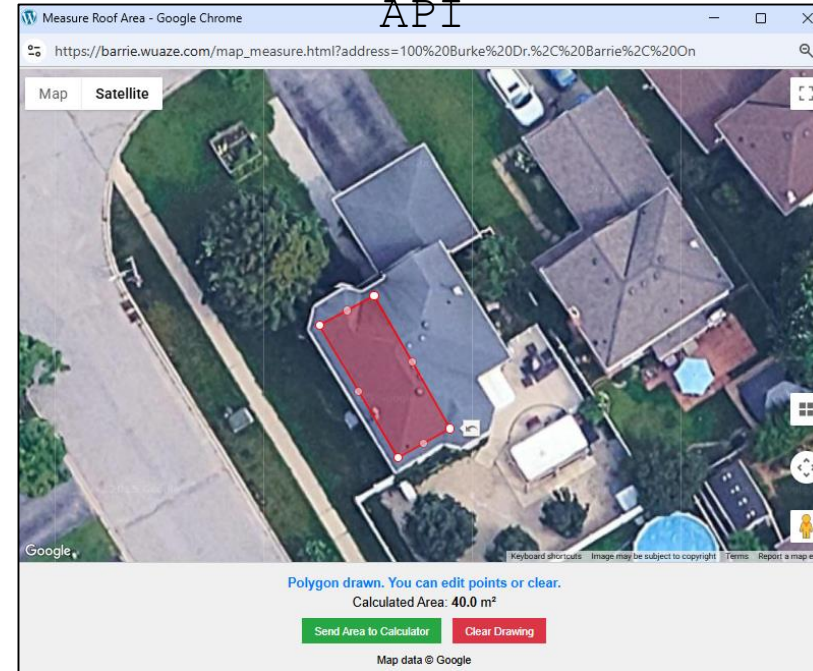
Tilt Angle (Degrees):

Azimuth (Degrees): [N=0, E=90, S=180, W=270]

System Losses (%): (Includes wiring, inverter, snow, dirt etc. Default: 14%)

Electricity Rate (\$/kWh): [Ontario Rates](#)

Calculate Size & Production



Google Maps integration allows users to calculate the Roof Area by zooming on your building and selecting the appropriate section.

Annual Results:

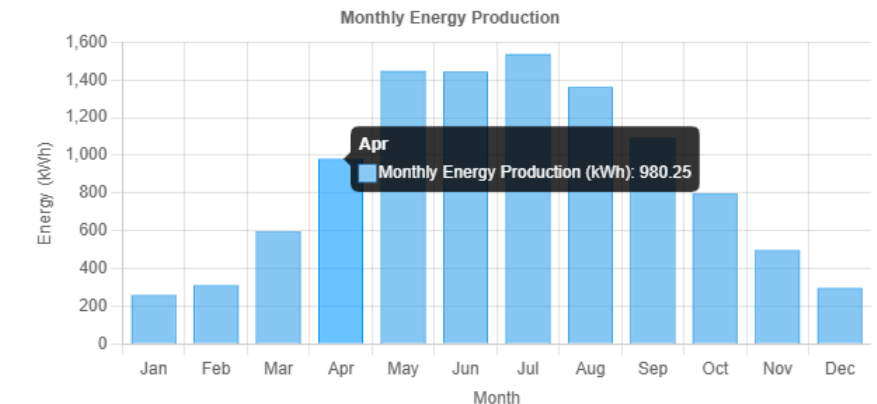
Estimated Annual Energy Production: 12522.47 kWh

Annual Solar Radiation: 4.39 kWh/m²/day

Capacity Factor: 14.30%

Annual CO2 Reduction: 475.9 kg

Estimated Annual Cost Savings: \$1,527.74



Fairly simple interface
requires confirmation of base assumptions during
development.


Barrie Solar Mapping Discussion - Options (Link to PVWatts)

Links to other solutions, information, tools

NREL's [PVWatts®](#) is a web application developed by the US National Renewable Energy Laboratory (NREL)

Step 2

Step 4

PVWatts® Calculator 

My Location 100 Burke Dr, Barrie, ON
Change Location

English Español Tagalogina HELP FEEDBACK

RESOURCE DATA SYSTEM INFO RESULTS

SOLAR RESOURCE DATA


The latitude and longitude of the solar resource data site is shown below, along with the distance between your location and the center of the site grid cell. Use this data unless you have a reason to change it.


Solar resource data site Lat, Lng: 44.41, -79.7 0.8 mi

[Go to system info](#)

Resource Data Map

The blue rectangle on the map indicates the NREL National Solar Radiation Database (NSRDB) grid cell for your location. If you want to use data for a different NSRDB grid cell, double-click the map to move the rectangle. Dragging the rectangle will not move it. If your location is outside the NSRDB area, the map shows pins for the nearest alternate data sites instead of a rectangle. Click a pin to choose the site you want to use. See [Help](#) for details.



PVWatts® Calculator 

My Location 100 Burke Dr, Barrie, ON
Change Location

English Español Tagalogina HELP FEEDBACK

RESOURCE DATA SYSTEM INFO RESULTS

SYSTEM INFO

Modify the inputs below to run the simulation.

Go to resource data

RESTORE DEFAULTS

Go to PVWatts results

DC System Size (kW): 12.0

Module Type: Standard

Array Type: Fixed (open rack)

System Losses (%): 14.08

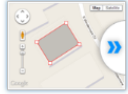
Tilt (deg): 20

Azimuth (deg): 180

Advanced Parameters

Rooftop Size Estimator

Click below to estimate the system size from your roof area on a map. (optional)




Step

Rooftop Size Estimator


Click the map below to draw the area to be occupied by the array. The size estimate is based on the area of a horizontal polygon. It does not account for roof tilt and azimuth, or shading.

System Capacity: 12.0 kWdc (80 m²)

Map Satellite



RESET CANCEL SAVE

PVWatts® Calculator 

My Location 100 Burke Dr, Barrie, ON
Change Location

English Español Tagalogina HELP FEEDBACK

RESOURCE DATA SYSTEM INFO RESULTS

RESULTS

15,196 kWh/Year*

Print Results

Go to system info

Month	Solar Radiation (kWh / m ² / day)	AC Energy (kWh)
January	2.28	744
February	3.21	934
March	4.65	1,451
April	5.15	1,510
May	6.02	1,760
June	6.19	1,679
July	6.66	1,872
August	5.83	1,642
September	5.02	1,398
October	3.13	941
November	2.17	647
December	1.93	618
Annual	4.35	15,196

User Comments

Type here to add optional comments to printout.

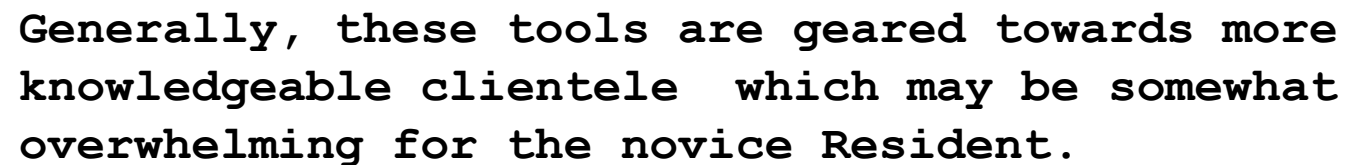
Download Results: Monthly | Hourly

Find A Local Installer

* Caution: The PVWatts energy estimate is based on an hourly performance simulation using a typical-year weather file that represents a multi-year historical period for 100 Burke Dr, Barrie, ON for a Fixed (open rack) photovoltaic system. These results are based on assumptions described in [Help](#) that may not accurately represent technical characteristics of the project you are modeling.

Fairly simple interface but lacks integrated financial (investment / payback) or

<https://irc.eec.europa.eu/pvg/tools/en/> Starts in Europe but you can type in Barrie, Canada as the



Barrie Solar Mapping Discussion – Sample Decision Matrix

Solution	Appropriate Report Details		User Interface (Ease of Use)		Solution Delivery Speed		Cost Effectiveness		Score
Inhouse GIS Development	H	-Usable sunlight -Panel Quantity -Financial (investment / payback) benefits -Environmental benefits	H	Click on Map or Enter Address	L	Estimate: 6 – 12 months to develop after approval.	L	Estimated Development Cost: \$50k – \$200k Ongoing Costs: ?	8
3 rd Party Apps (MyHeat Solar Map)	H	-Usable sunlight -Panel Quantity -Financial (investment / payback) benefits -Environmental benefits	H	Click on Map or Enter Address	H	4-6 weeks after approval	M	3-year term: \$25,000/year plus applicable tax billed annually	11
Barrie Inhouse HTML & JavaScript Tool	H	Can-Usable sunlight -Panel Quantity -Financial (investment / payback) benefits -Environmental benefits	H	Enter Address and available space	H	< 2 weeks to verify & modify sample code	H	< \$1000	12
Link to PVWatts	L	-Monthly DC/AC production based on system size -Daily Irradiance -No financial (investment / payback) or environmental benefits	M	Several steps – enter address, array size or area, etc...	H	1– 7 days	H	\$0 – \$100: Just add description & link to City Website	9
Links to other		-Monthly DC/AC production based on system size		Several steps requiring				\$0 – \$100: Just add	

H=3, M=2, L=1

Questions and Discussion