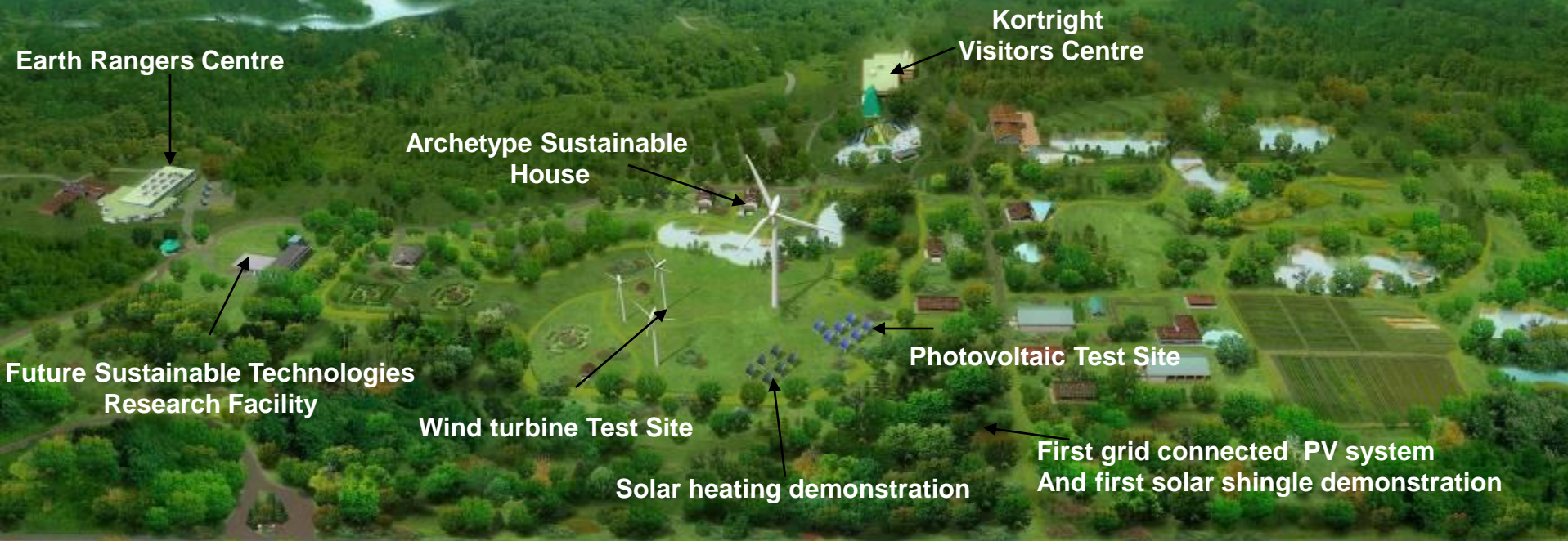


Living City Campus

@The Kortright Centre

A place that initiates, inspires, supports & monitors change toward sustainable living, through the use of sustainable technologies, practices, education and market transformation.



Living City Campus @Kortright

- One of Canada's Largest Environmental Education Centres
- Most comprehensive educational demonstrations on sustainable technologies
- 25 years of award- winning environmental and energy education programs
- 85,000 engaged students and 40,000 public visitors





*Education,
Training,
Data Collection,
Evaluation,
Demonstration.*

www.sustainabletechnologies.ca

www.solarcitypartnership.ca

www.sustainablehouse.ca

www.kortright.org

www.pvppv.ca

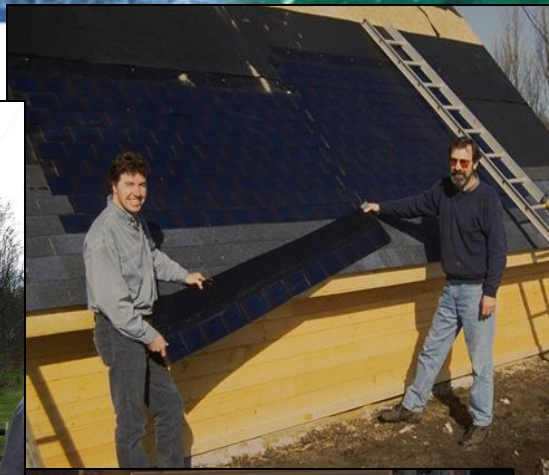




Experienced Staff

A unique small group of experts with over 75 years experience in solar PV, thermal & wind energy.

Not just our job, it's our passion!



Canada's First!

Test Data

March 30 1982 Tested by - NRC	August 17 2010 Tested by - Kortright
31.66 watts	29.7 watts

Time in service = 28 years

Decrease since new = 6.19%

Decrease per year = 0.221%



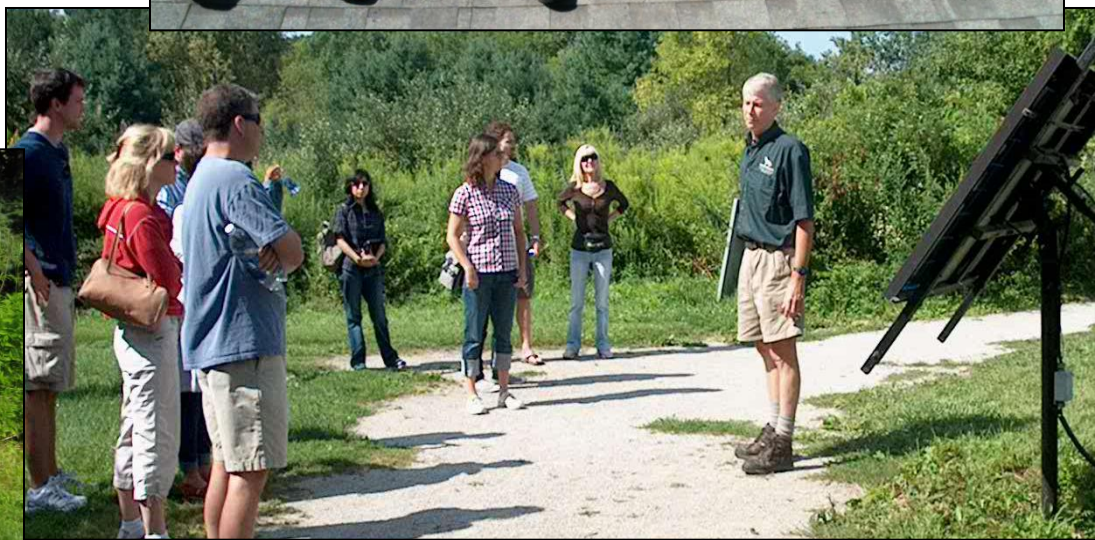


Public workshops & education

- Sustainable technology workshops since the late 1980s
- College & University partnerships.
- Corporate training.



Member of Conservation Ontario





The Green Energy Act



- Introduced in 2009 & pays up to \$0.802* for solar generated electricity.
- Since the introduction more than **42,905** MicroFit applications have been submitted.
- As of October 2011, **8,128** systems have been activated.



Micro FIT,

What are the fees for electrical inspection?

- \$260.00 - if installed by a Licensed Electrical Contractor (LEC)
- \$416.00 - if installed by the property owner
- If the installation involves the services of an unlicensed PV installer and an LEC (for the branch wiring) the fee is \$260 for the PV installer plus \$260 for the LEC

Challenges for Educational facilities

- **Instructors**
- **Curriculum**
- **Fast pace of technological change**
- **Many institutions entering at the same time**



Instructors

- **There is a rapid increase in demand for experienced people in the industry**
- **It is becoming increasingly difficult to retain instructors who are experienced**
- **We need more instructors, but it will be a challenge to hold onto the ones we have**
- **There is a need for a training facility for instructors, we will need to provide further training to existing instructors in other related fields.**
- **This training facility will need to be attractive to retain its own staff, possibly by conducting research**
- **The instructors will come from related trades, but these trades are also in demand**

Curriculum

- **Much of what makes up the solar trade can be gleaned from a multitude of conventional trades**
- **There is however a great deal of specialized knowledge involved in particular aspects**
- **This knowledge has been gathered by those with experience rather than having been taught in a conventional educational setting**
- **This is why experienced instructors are imperative at this time**
- **Excellent training materials are available from other markets but translation may be necessary**
- **Foreign materials must be localized, as our building techniques and materials differ greatly from European**
- **Canadian codes must also be integrated into the material**

Fast pace of technological change

- Renewable energy equipment is capital intensive
- The pace of change is very rapid
- New equipment will be obsolete in a short time span
- A central facility for hands on training could spread the cost of equipment among various institutions
- The central facility could also provide experienced instructors and a place for curriculum development
- It would also provide a central location for manufactures to support
- And could have the excellent knowledge base to support research into new technologies
- This research would help retain quality instructors
- An alliance with Universities could help bridge the gap between real world knowledge and theoretical science



- **Selected skills required for a solar PV installation**
 - **Electrician**
 - All wiring and conduit installation, special knowledge of PV circuits
 - **Instrumentation**
 - The PV monitoring system may be integrated with the Building Automation System, or connected to remote monitoring system
 - **Steeple Jack**
 - The PV modules often racked may need to be installed on a 45 degree pitched steel roof two stories up
 - **Assembly**
 - Mechanical assembly of the module racking system requires accurate layout of attachment points and assembly as prescribed by the structural engineering drawings
 - **Rofer**
 - Roof penetrations must be sealed, roof jack, and scaffolding used
 - **Framer**
 - Roof trusses must be reinforced to accept additional loading
 - **Millwright**
 - Assembling heavy trackers require rigging skills, foundation lay out and rebar assembly, concrete forming, and pouring.



- **A “perfect storm” of safety concerns confront a residential new construction Grid Tied PV installer**
 - **All the normal construction hazards**
 - Working around heavy equipment
 - Work at heights
 - Lifting large heavy objects by hand
 - Using lifting equipment
 - Electrocution hazard from over head wires while on roof
 - **Plus some hazards unique to PV**
 - Installing live electrical equipment
 - PV modules turn “ON” as soon as they are exposed to light
 - Ground faults are not de-energized by GFI detectors
 - Most short circuit faults do not cause the fuse to open
 - Fuses may fail to clear a short when a reversed polarity string is connected in parallel to other strings
- **Specialized safety training is required**



Professional Training

- PV theory
- Site Assessment
- PV Installation – Grid Tie
- Off Grid micro system
- Green Energy Act - Micro FiT
- Kortright Sustainable House Tour



PVPV

Photovoltaic Performance Verification

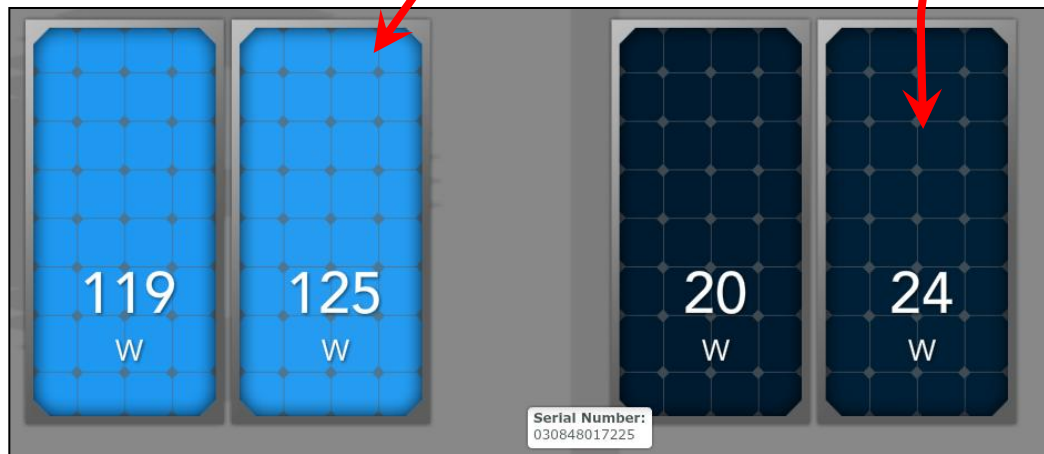
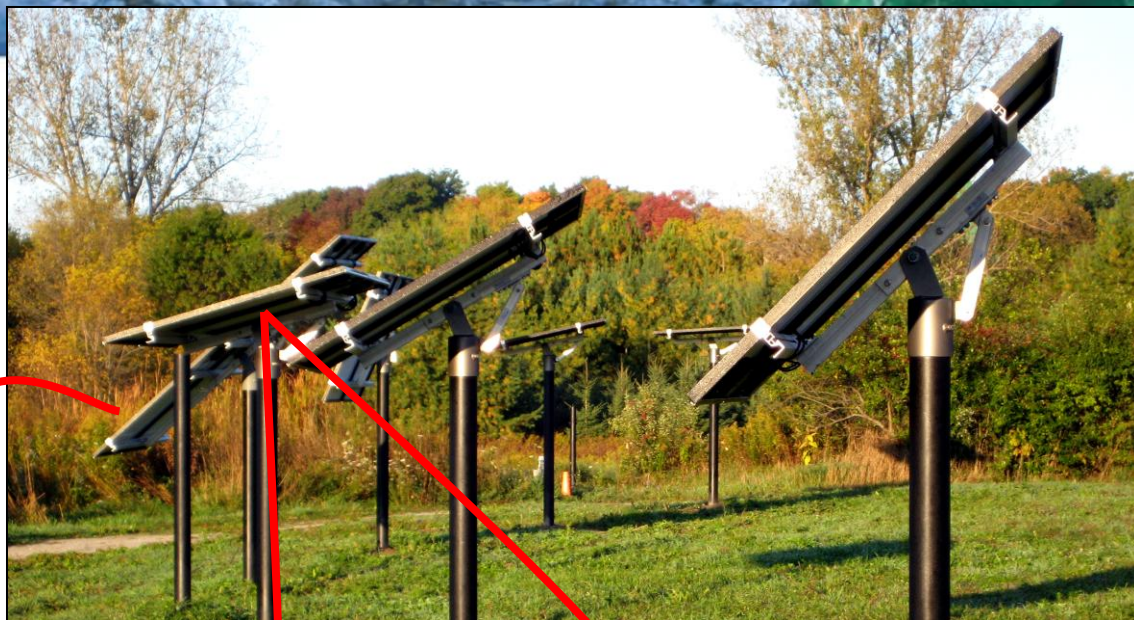
- Energy yield of Ontario made modules.
- An Oranges to Oranges comparison.





Snow Study

The effects of tilt angle & snow



<http://enlighten.enphaseenergy.com/public/systems/uhYK12095>



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Thermal Events in Ontario





David Nixon

Dnixon@trca.on.ca

Kortright Centre
Toronto and Region Conservation Authority

Partnerships & Associations

The Living City Campus
PROJECT

The Archetype
 Sustainable
 House

This project was made possible through
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Conservation
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David Knight



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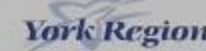
Ontario



RBC Financial Group

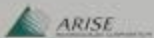


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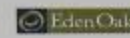
BERKSHIRE HOMES



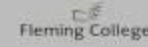
INFLOOR HEATING



Eden Oak



Eden Oak



Fleming College



FRAM



GEORGE BROWN



Habitat for Humanity



hydro one



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- Aquatech
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- Herring Doors
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