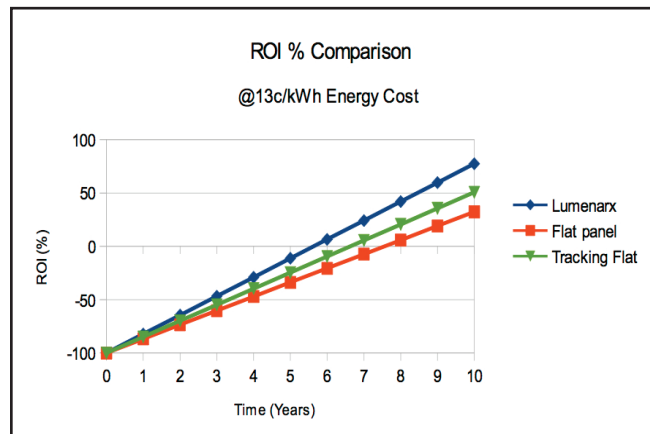
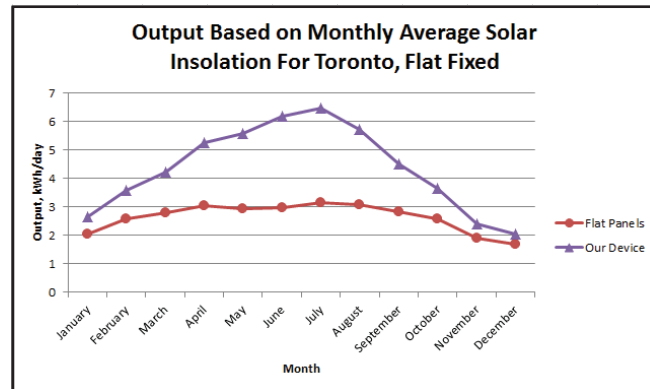
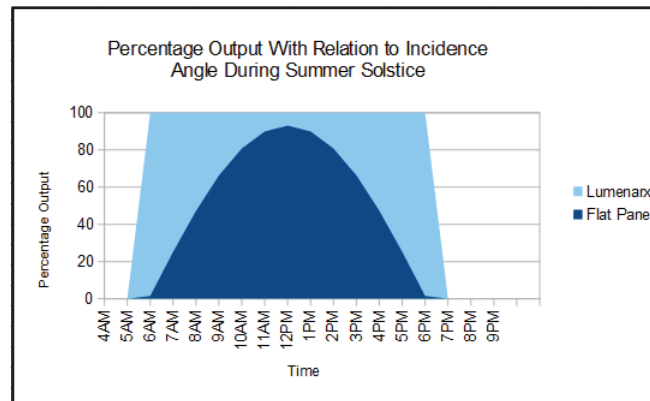


# OVERVIEW

Lumenarx is a scalable, low-concentrated photovoltaic (LCPV) unit that arranges existing photovoltaic cells into a structure to increase the total power output. The device, optimized by in-house software, uses mirrors to collect and concentrate solar rays onto downward-facing photovoltaic cells. For maximum performance, Lumenarx is used in conjunction with a dual-axis tracking system.

Lumenarx does not require specialized manufacturing techniques, and can be used off-grid. It has a competitive payback period and increased power output over both flat fixed-angle and dual-axis tracking photovoltaic cells, as shown below.



For all graphs and tables: Lumenarx uses a dual-axis tracking system, while the flat panels are fixed at an incline angle equal to the latitude of installation. The Installation size used for the comparison is 560W in all cases. We use 25C as the NOCT where scattered light is absorbed by Lumenarx, with flat panel and dual axis tracking data from NRCAN. The conditions for heat is 30 degree's celsius with a 12km/hr wind.

# RAY TRACING SOFTWARE

The 3D ray-tracing software was developed in-house in order to optimize the arrangement of the mirrors and photovoltaic cells. The software uses mathematical principles to simulate the incoming light rays and draw out their paths as the rays reflect off the mirrors and onto the photovoltaic cells.

The integration of solar geometry yields accurate results for any location on earth for any day of the year. The software also allows for extrapolation from flat solar irradiance data to other setups, with or without tracking systems.

The software has proven to be a valuable and innovative approach.

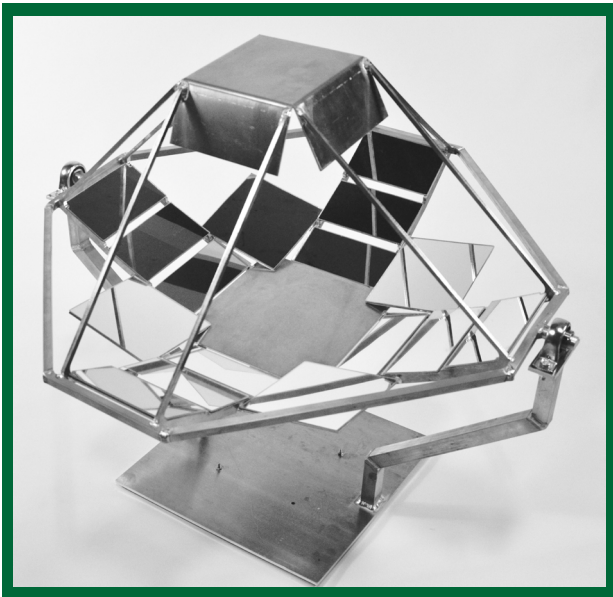
# ANNUAL AVERAGE OUTPUT (kWh/day)

Location	Lumenarx	Flat Fixed	Flat Tracking
Calgary	3.98	2.45	3.48
Toronto	4.35	2.63	3.78
Phoenix	5.54	3.64	4.68

# ECONOMICS

Manufacturing cost estimates for large-scale production are ~\$3.07/W and ~\$2.78/W for the 560W Lumenarx and 560W flat panel pole rack system respectively, including labour and materials but not installation.

A 560W Lumenarx has an expected 1-2 year shorter payback period over 560W flat panels.



## ADVANTAGES

- Increased power output
- Increase in ROI
- Shorter payback period
- Fully scalable
- Off-grid capabilities
- Ease of manufacturing
- Mathematically optimized
- Very little glare
- Weather protected cells
- Modular industrial design

## COMPANY OVERVIEW

Geometric Energy Corporation (GEC) is a research and development (R&D) firm focusing on sustainable distributed energy resource systems. GEC was incorporated in the summer of 2015 with the intention of commercializing sustainable energy technology. Having expanded to over 20 personnel and opened company offices in 2016, GEC plans on commercializing our technologies throughout 2017. We have two primary divisions, a photovoltaic systems engineering division and an electrochemical R&D division.

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GEOMETRIC  
ENERGY  
CORPORATION 

## LUMENARX

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