Onyx Scientific Inc. Energy, Power & Propulsion Systems

ConSolWORX

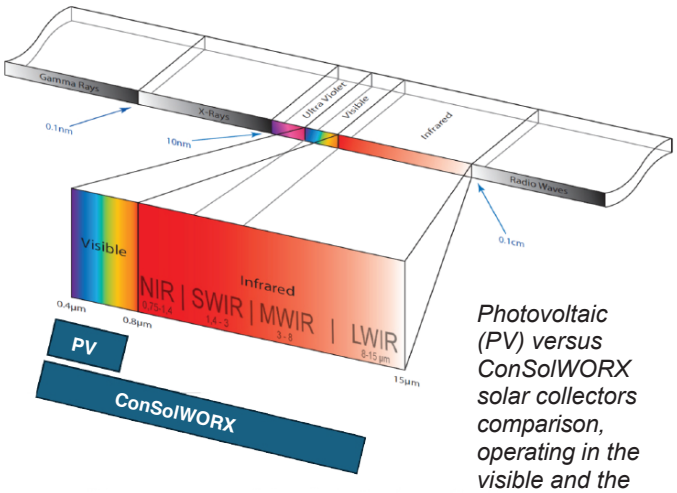
Concentrated Solar Collector & Storage System

PRODUCT INFORMATION

As a renewable energy technology, solar power is an obvious option. However, conventional collection systems' effectiveness is limited by the number of "usable" sun hours – particularly from cloud cover and the night sky. Various forms of Concentrated Solar Thermal (CST) and Concentrated Solar Power (CSP) when the heat collected are used for electric power generation now. Technology for four-junction concentrating photovoltaic (CPV) cells have been promoted to exhibit efficiencies of more than 47% – yet are not seen in the marketplace.

Over the past 12 years, ONYX Scientific Inc. has evolved our ConSolWORX system for concentrated solar collection and storage. The ConSolWORX system bridges *all* collectable solar thermal energy across the visible (VIS) and thermal Near Infrared (NIR), Short Wavelength Infrared (SWIR), Medium Wavelength Infrared (MWIR), and Long Wavelength Infrared (LWIR) bands during daylight hours – while also adding 15% to 20% thermal IR collection during night hours.

These technological breakthroughs bring our solar collection efficiency to **nearly 70% percent**. In addition to solar collection, the ConSolWORX system collects high temperature thermal energy to 3200°C and offloads stored energy using proprietary lossless thermal-to-electric conversion (as regulated AC and/or DC power) to the recipient grid utility.



Photovoltaic (PV) versus ConSolWORX solar collectors comparison, operating in the visible and the thermal infrared spectrum

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Key Features

ConSolWORX system differentiators include:

- **Concentrated Multi-band Collector** - Covers VIS, NIR, SWIR, MWIR and LWIR
- **Energy Storage Vessel** - Insulated storage integrated within the concentrated collector
- **Energy Storage Material** - Proprietary low-cost chemistry blend
- **Energy Conversion** - Built-in NO loss *thermal energy* to *electrical power* (AC and/or DC conversion)
- **Continous On-demand Power** - Regulated and conditioned electrical AC and/or DC power, compliant with grid utility standard

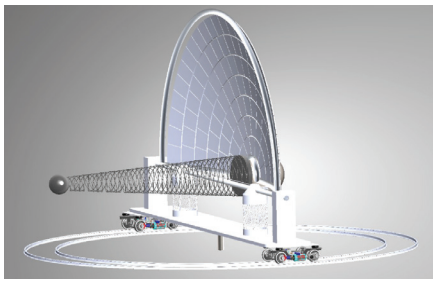
System operational dependencies include:

- **Deployment Property** - Designated property will withstand ConSolWORX system loads; enable unobstructed direct line-of-sight (DLOS) solar daily ephemeris collection; and ensure appropriate safety and security site management
- **Regulatory Compliance** - Customer collaboration to obtain compliance with jurisdiction regulatory standards
- **Utility Interface** - With designated utility electrical power grid
- **Utility Workforce** - Designated operations and maintenance team

Benefiting the Environment & the Bottom Line

The ConSolWORX system will help jurisdiction utilities alleviate power scarcity and reduce costs while achieving a well-managed power grid – providing economic flexibility and encouraging new power saving measures.

The proprietary Onyx Scientific Inc. solar collector singular unit system size is scalable from 2.5 to 57 meters.



Designed for Performance

Our ConSolWORX system – deployed as singular units and/or configured in an array – enables grid utility responsive switch action control of site energy-storage-to-electrical-power without traditional losses during conversion.

- **System Performance**
  - Basis of energy concentration is measured to one (1) square kilometer.
  - Energy to power performance falls between 208 MW and 420 MW per hour, 24/7/365.
- **System Energy Storage** - One (1) thermal storage vessel mounted within a fixture. Each ConSolWORX thermal-to-electric vessel is managed and controlled by the grid utility or at the site.
- **System Energy to Electrical Power Conversion** - Proprietary bi-directional NO loss (energy-to-power and/or power-to-energy) technology
- **Electrical Power Consumption** - Very low site loads (rail motors for collector solar tracking, energy and power management and control infrastructure)
- **System Footprint** - A sixty (60) meter unoccupied zone is situated between each solar panel.
- **System Design for Stress Environments** - Survive winds of over 190 mph
  - Solar collector will fold down into a stow mode, and when winds subside, it will erect itself.
  - Collector is designed for earthquake resistance.
- **System Packaging** - Modular preconfigured structures with minimal fasteners; internal thermal storage vessel and insulator thermal-to-electric management and control
- **System Standards** - ASHRAE Standard 93–77 which defines thermal performance test methods, and CSA Preliminary Standard F378-M1979 which also defines materials and device durability testing criteria to ensure satisfactory performance.
- **System Operational Life Expectancy** - Thirty (30) years

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Putting the ConSolWORX System to Work

Deploying the ConSolWORX system to serve as an electrical power source for utilities has the potential to mitigate grid power shortages. Key enablers include:

- Multi-axis solar collector tracking improves by horizontal irradiance (HI)
- Collector materials and coating boost efficiency
- Collector built-in energy to power storage
- Collector built-in lossless energy-to-power conversion improves utility grid conservation and distribution efficiency

Site-Specific Tailoring

The Onyx Energy, Power & Propulsion Systems and Architecture & Engineering Services teams understand that your goals and site(s) will guide the configuration of the flexible and scalable ConSolWORX system for your unique needs.

About Onyx

Onyx Scientific Inc. specializes in making connections, both scientific and intellectual, to move from science to engineering products and then to the marketplace. Our team provides an uncommon cross-disciplinary perspective, with knowledge ranging from particle physics to aerospace engineering, from product prototyping to information systems and from advanced mathematics to materials science. We collaborate widely with individuals and businesses whose proprietary technologies offer pioneering innovations, but that provide even greater marketplace value in combination with one another.

Onyx business divisions span:

- Architecture & Engineering Services
- Energy, Power & Propulsion Systems
- Medical Systems

Contact Us

To learn more about our ConSolWORX system or to obtain current pricing information, please contact us.

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