

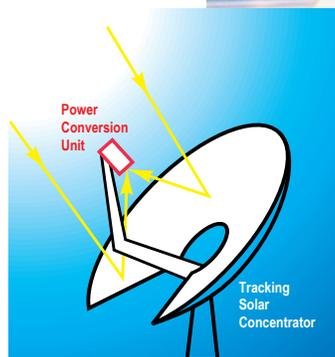
UNLV Solar Dish-Engine Demonstration

The UNLV Solar Dish-Engine Demonstration Project exploits the complementary strengths of the Department of Energy and its National Laboratories, the University of Nevada Las Vegas, and private industry to operate two systems on the UNLV campus to demonstrate clean, renewable, solar dish-engine technology in Nevada.

What Is a Solar Dish and How Does it Work?

A solar dish-engine system collects sunlight to produce electricity.

The solar concentrator tracks the sun, reflecting sunlight into the power conversion unit (PCU). In the PCU, the concentrated sunlight is absorbed on a thermal receiver where it is converted into heat to power a Stirling engine. The engine drives a generator producing electricity.



Why Is This Important to the Country?

Large-scale deployment of these systems will help us address current and future electrical power supply needs. The Southwest U.S., Nevada in particular, is an excellent location for the development and deployment of Solar Dish power generation systems because of the intensity of sunlight available.

How Much Power Does It Produce?

Solar Dishes produce peak power from 9 to 25 kWh each. On a good solar summer day in Las

Vegas, a 25 kW Solar Dish will produce about 230 kWh hours of electrical energy, enough to power more than 20 homes.

What Do You Do When the Sun Doesn't Shine?

These two units produce power only when the sun shines. Other dish-Stirling units are also equipped to burn natural gas and are capable of producing power when the sun is not shining.



Sponsors:

- U.S. Department of Energy, Office of Power Technologies, Concentrating Solar Power (CSP) Program
- DOE Albuquerque and Nevada Operations Offices
- University of Nevada Las Vegas
- Nevada Power Company

Participants:

- UNLV Center for Energy Research
- Stirling Energy Systems (SES), Phoenix, AZ
- Science Applications International Corporation (SAIC), San Diego, CA
- STM Power, Inc., Ann Arbor, MI
- The Boeing Company, Canoga Park, CA
- SunLab (a partnership between CSP activities at Sandia National Laboratories and the National Renewable Energy Laboratory)



SES System



Solar Concentrator

Type:	Fixed focus facets
Area:	87.7 m ²
Number of Facets:	82
Reflective Surface:	0.7 mm glass
Reflectivity:	> 91%
Focus:	7.45 m

Power Conversion Unit

Type:	Kockums (SES) 4-95, Double-Acting, Kinematic Stirling Engine
Working Gas Temp.:	720°C (1325°F)
Thermal Efficiency:	42%
Power Control:	Variable Pressure
No. of Cylinders:	4
Engine Displacement:	380 cc (23 in ³)
Receiver:	Direct Illumination

Solar Dish/Stirling System

System Height:	11.6 m (38 ft)
Electrical Output:	25 kWe at 1000 W/m ² Insolation
Voltage:	480 V, 3 Phase, 50/60 hz
Availability:	Whenever the sun exceeds 200 W/m ²
Peak Power/Peak Efficiency:	24.9 kW/28.9%
Annual Power Production in Las Vegas:	54,500 kWhrs

<http://www.stirlingenergy.com>
(602) 957-1818 • ses@stirlingenergy.com

SAIC System



Solar Concentrator

Type:	Stretched-Membrane Faceted Dish
Area:	113 m ²
Number of Facets:	16
Reflective Surface:	1.0mm Low Iron Glass
Reflectivity:	>90%
Focus:	Variable, Active

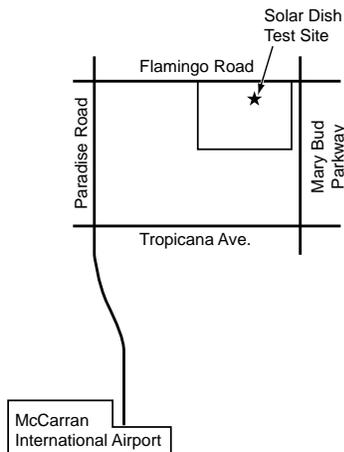
Power Conversion Unit

Type:	Gen III STM 4-120 Double-Acting Kinematic Engine
Working Gas Temp.:	720°C (1325°F)
Thermal Efficiency:	42%
Power Control:	Variable Swashplate
No. of Cylinders:	4
Engine Displacement:	480cc (29 in ³)
Receiver:	Direct Irradiation Solar Receiver

Solar Dish/Stirling System

System Height:	15 m (50 ft.)
Electrical Output:	22 kWe Net at 1000W/m ² Insolation
Voltage:	480V, 3 Phase, 50/60Hz
Availability:	Whenever the sun exceeds 300 W/m ²
Peak Power/Peak Efficiency:	22 kW/24.3%
Annual Power Production in Las Vegas:	43,900 kWhrs

<http://www.saic.com>
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Demonstration location on the UNLV campus in Las Vegas, NV.

For on-line information about Sun♦Lab, please visit <http://www.eren.doe.gov/sunlab>. Information about the U.S. Department of Energy's Concentrating Solar Power Program can be found at <http://www.eren.doe.gov/csp>.



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Produced by Sun♦Lab:
Bringing together solar energy expertise from Sandia National Laboratories and the National Renewable Energy Laboratory, DOE national laboratories.

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