



U.S. DEPARTMENT OF ENERGY

# SOLAR DECATHLON

## Solar Decathlon 2009 Instrumentation and Monitoring

The Solar Decathlon instrumentation team, led by Mountain Energy Partnership (MEP) personnel, installed data acquisition systems in each house during assembly and removed the systems during disassembly. The locations of sensors were planned in advance through negotiations between the organizers and each team.

Installation had to be completed on the National Mall before the start of the objectively measured contests (October 8, 2009). Most of the teams, despite their best intentions, were finishing construction of their houses during assembly on the Mall, which made installation of instrumentation a bit tricky. MEP is accustomed to working with the normal last-minute nature of construction, and they were able to work with the teams to install equipment as soon as the houses became ready.

Before active scoring began, the instrumentation team had to allow time to verify correct functioning of the monitoring systems and to correct any problems with the systems. The instrumentation team attempted to accommodate the aesthetic and technical requirements of the teams when installing equipment. The needs of the competition required that the organizers locate sensors and wires in architecturally pristine spaces, but the teams were assured that no point deductions would be made by any jurors due to the unsightly nature of the sensors.

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### Lighting levels

**Contest:** Home Entertainment

**Instrument:** Photometer, photovoltaic type with filter

**Source:** Licor, Inc., model LI-210 photometric

**Accuracy:** 5% of reading

**Location:** Home office workstation

### Indoor temperature and relative humidity (RH)

**Contest:** Comfort Zone

**Instrument:** RTD, variable capacitance RH, linear DC output

**Source:** Vaisala, Inc., model Humitter

**Accuracy:** 0.7°F (0.4°C) temperature, 3% RH

**Location:** In radiation shield in conditioned zone, 4 ft to 5 ft (1.2 m to 1.5 m) above floor level



## Temperature

**Contests:** Comfort Zone and Appliances

**Instrument:** Type-T thermocouple, special limits of error

**Source:** Omega Engineering, Inc., part number TT-T-24S-TWSH

**Accuracy:** About 0.9°F (0.5°C)

**Locations:** In radiation shield in conditioned zone, 4 ft to 5 ft (1.2 m to 1.5 m) above floor level; inside refrigerator and freezer, immersed in glycol solution; inside insulated container for shower tests

## AC electricity

**Contest:** Net Metering

**Instrument:** Utility grade meter

**Source:** GE kV2c Encompass meter

**Accuracy:** 0.5%

**Location:** In a meter housing mounted on the house or on a free-standing structure on the team's lot

## Instrumentation and Monitoring Group

Greg Barker, Christina Haley, and Ed Hancock, *Mountain Energy Partnership*

Greg Shoukas and Mark Eastment, *independent subcontractors*

Norm Weaver, *Fort Collins Utilities*

