SOLAR DECATHLON

Solar Decathlon 2007
Instrumentation and Monitoring

The Solar Decathlon Instrumentation and Monitoring Group (IMG), led by Mountain Energy Partnership (MEP) personnel, installed sensors and monitoring equipment in each house during assembly and removed the equipment during disassembly. The locations of sensors and monitoring equipment were planned in advance through negotiations between the organizers and each team.

Installation had to be completed on the Mall at least two days before the start of the objectively measured contests (October 15, 2007). 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 IMG had to allow time to verify correct functioning of the monitoring systems and to correct any problems with the systems. The IMG 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 judges due to the unsightly nature of the sensors.

Water flow rate

Contest: Hot Water
Instrument: Turbine flow meter, high temperature limit of 190°F (87.8°C)
Source: Omega Engineering, Inc., model FTB4105P
Accuracy: 1.5% of reading, from 0.2 gpm to 13 gpm
Location: Showerhead

DC current

Contest: Energy Balance
Instrument: Shunt, 500A
Source: Canadian Shunt Industries Ltd., model LB-500-50
Accuracy: 0.25%
Location: Single negative conductor into main battery

DC voltage

Contest: Energy Balance
Instrument: Voltage divider, 100:1, 0.5% resistors
Source: Constructed at NREL

Accuracy: About 0.5%
Location: Main battery positive to negative

Lighting levels

Contest: Lighting
Instrument: Photometer, photovoltaic type with filter
Source: Licor, Inc., model LI-210 photometric
Accuracy: 5% of reading
Location: Home office workstation

Inside 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 main living area, 4 to 5 ft (1.2 to 1.5 m) above floor level

Temperature

Contests: Appliances and Hot Water
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: Inside refrigerator and freezer, immersed in glycol solution; inside insulated container for shower tests.

Instrumentation and Monitoring Group

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