

Solar and Wind Energy Systems: Residential and Small Commercial

Solar and Wind Energy Overview

Defining residential and small commercial scale systems

- Technology markets

Comparing solar photovoltaic, solar thermal, and wind energy

- Energy collection/harvesting
 - System efficiencies
 - Assessments, data monitoring, and siting
 - System costs, including operations and maintenance
 - Industry, zoning and building codes, and standards
 - Interconnection and net metering
 - Incentives
 - Real estate and property values
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Technology Details

Solar thermal (ST)

- Air systems: roof collectors, vertical wall collectors, remote air, transpired air collectors
- Liquid (Hydronic) Systems – low/medium temperature, passive and active systems, high temperature thermal applications

Solar photovoltaic (PV)

Inverters

Wind energy

Case studies including economic models

Assessing Solar and Wind with Building Dimensions and Energy Usage

Initial assessment; solar and/or wind technologies

You are encouraged to bring a project idea for a particular building and you will have the opportunity to make an initial determination of what type or types of technologies could be used.

Solar Photovoltaic and Thermal Systems Design

Introduction – Site Assessment

Knowing the resource: understanding insolation

Screening a site for solar and site specific solar assessment, including shade analysis

Survey tools, on-site and off-site checklists, specialized solar survey instruments

Information to collect – checklists: PV and

ST Site safety evaluation – OSHA and other rules that apply

Photovoltaic Systems (PV)

Grid or off-grid

Aspects to consider and address for designing a PV array

- Distinctions between collector technologies
 - Aesthetic aspects to consider
 - Current building-integrated photovoltaic products available
 - Integrating into new and onto existing buildings
 - Tracking arrays – comments
 - Tips for designing efficiently and sizing systems
- Understanding the technology
- PV system integration,
- National Electric Code, permits and inspection
- Net metering and interconnection
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Solar Thermal Systems (ST)

Thermodynamics 101 for solar thermal systems

Types of solar thermal systems and technologies

Designing an ST system

- System sizing methods
- Mounting the collectors and locating other equipment
- Domestic hot water systems (DHW), backing up with tankless and indirect HWH units
- Supplementing space heat
- Permits and inspection
- A review of state-of-the-art technologies and approaches