Opening questions for you
Solar. 100% Sun.
Photovoltaics

- Grid-tied
- Grid-tied w/Battery
- Off-grid
- Hybrid Systems
- UPS
- Water Pumping
- Educational
- Demonstration
- LEED Credits EA2:3pts.
PV System Integration
IEEE Symposium

SolSource
Solar. 100% Sun.
Solar Resource

What are our major considerations?

– Determine best placement of PV array
– Design an effective power plant
– Size system for customer needs
– Educate client on seasonal output of PV system
– Determine cost-effectiveness of PV system
– Understanding financial landscape
Magnetic declination in Denver is $9^\circ \ 32'$ east of true North.
Importance of Shading

- Avoid shadows from trees, buildings and other obstacles
- Do not allow weeds or vegetation to grow over array
- Place array far off ground to allow snow shedding
Importance Tilt Angle

55° (Winter tilt)

40° (Latitude Tilt)

25° (Summer tilt)
Why Solar?
Reasons to go Solar

• Walk the talk
• Being part of the solution, not part of the problem
• Reduce electric bills
• Take advantage of new financial incentives
• Improve building’s resale value
• Lock-in utility rates
• Energy security
• Reduce vulnerability to grid
• Choose of environmentally-friendly power
• Proven technology
• Life-cycle assessment
Solar. 100% Sun.
Considerations for Integration

- Easily Accessible
- Service Amperage
- Service upgrades
- Sub-panels
- Available breakers
- Distance to array
- Inverter Location
- Wire sizing

- Location of AC Disco
- Grouping disconnects
- DC and AC
- Meter location
- Meter switch-out
- Commissioning
- Monitoring
- NEC 2008 Article 690
Crystalline Modules

- Stable conversion efficiencies
- Well established and tested
- Ease of installation
- Convection Cycle and air flow
- Materials and production costs
- Packing density
- Expandable strings possible
- Security from theft
- 2.5 lbs per square foot
- $5.00 - 6.15/watt (retail)
- www.solarbuzz.com
Crystalline Modules
Amorphous Silicon

- Lower efficiencies
- Lower material use
- Potential for low cost
- Higher cost of installation
- Performance in heat
- Expansion difficult
- Security from theft
- 1.5 lbs per square foot
- $5.75/watt (retail)
  www.solarbuzz.com
High efficiencies
Night time disconnect with Auto Transformer
Remote Monitoring through Fat Spaniel
Performance in heat
Low installation cost
Site Location and interconnection ready
• Highest efficiencies in class
• 10-year warranty
• Remote Monitoring
• Performance in heat
• Low installation cost
• String flexibility
• Interconnection ready
Pre-Con and Site planning
Architectural and engineering design collaboration
On-site project management
Utility interconnection and Solar Rewards management

PV technology education and sales training
On-going customer service and technical support
Extended warranties and maintenance programs
Cooperative marketing initiatives
BIPV in Colorado (AES)
Aspen and Denver
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Online Resources

- www.cres-energy.org
- www.nrel.gov
- dsireusa.org
- PV Watts Ver1
- www.solarbuzz.com
- www.solartoday.org
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Thank You!