

# Clark County Sustainable Communities

02/18/10 Clark County  
Sustainable Communities  
Presentation

## The Living Farm



**GREENSTONE**  
ARCHITECTURE PLLC



MacKay & Sposito, Inc.



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# The Living Farm – Project Ethos

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- Project Demonstration Goals:
  1. Sustainable Design / Construction
  2. Sustainable Farm Management Practices
  3. On-going Sustainable life-style demonstration

# The Living Farm – Project Ethos

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## ■ Project Priorities:

1. Affordability
2. Sustainable Housing
3. Accessible / Barrier Free Housing
4. Emphasis on “Buying Local”
5. Illustrate a degree of self-sufficiency

# Living Farm Functional Program

## Living Farmhouse

Preliminary target space program elements

### Minimum Internal Living Functions/Spaces

Family Living	
Primary Bedroom	
Kitchen	
Pantry	
Dining area	
Full Bathroom	
Mud Room	<i>(adjacency to Kitchen)</i>
Laundry function	<i>(adjacency to bed, access to outdoor drying)</i>
Utility	<i>(centralized, within envelope)</i>

### Optional Internal Functions / Spaces

Second Bedroom	
Private Bath	<i>(associated with Prime Bed)</i>
Walk in Closet	<i>(associated with Prime Bed)</i>
Entry Vestibule	
Office/Library	
Sunroom / Attached greenhouse	
Additional Storage	

Maximum Target Square footage: 1,800 sf

### Preliminary estimated areas:

225	
192	
160	
80	
100	
100	
80	
20	
70	
<i>sub total</i>	<b>1,027 sf</b>
120	
100	
80	
64	
100	
150	
100	
<i>sub total</i>	<b>714 sf</b>
<b>Projected Total</b>	<b>1,741 sf</b>

### Other amenities

Covered Outdoor living	
Composting / recycling	<i>(adjacency to Kitchen)</i>
Outdoor laundry drying	<i>(adjacency to Laundry)</i>

## Living Farm ~ Ancillary Functions / Structure(s):

Other separate structures (combined or independent):

Garage (Detached from House Envelope)	<i>Electric Vehicle(s)</i>
Farm Equipment Storage	
Barn	
Greenhouse	
Farm animal related structures?	

Site  
Considerations?

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# Living Farm House

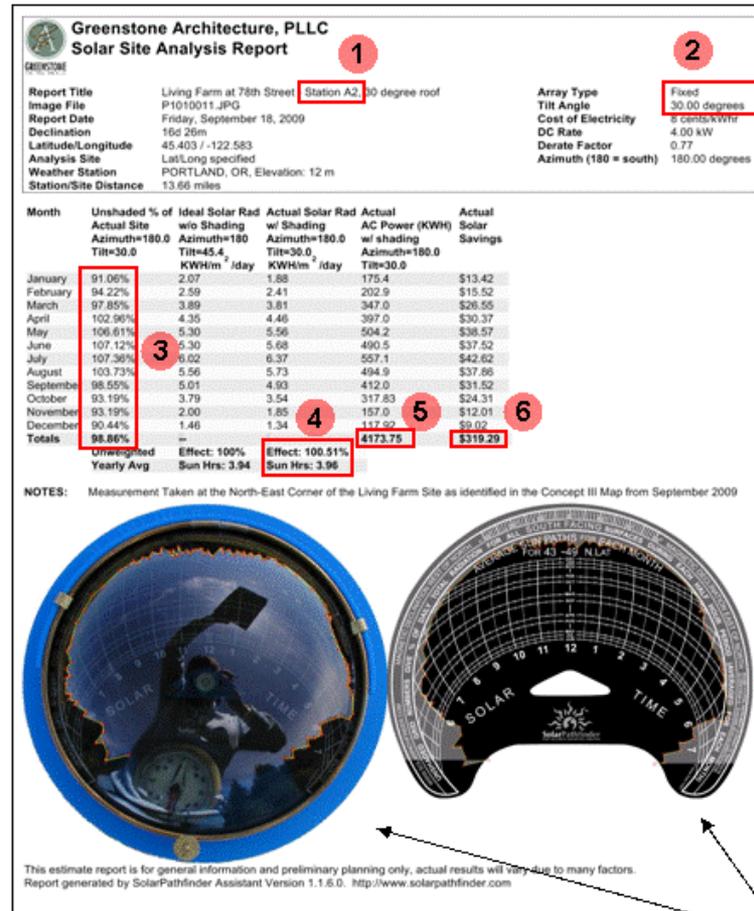
78<sup>th</sup>  
Street  
Property  
?



# Solar

Some key elements in reading the following Solar Analysis Report Data:

- 1 Station Location
- 2 Type and Angle of array
- 3 Unshaded % through the year of site solar access compared to a fixed 45.4 degree angle
- 4 Sun Effect, and Yearly Average sun hours (compared to 45.4 degree angle with no shading)
- 5 Theoretical Annual power generation (per square meter of PV in KWH)
- 6 Theoretical per Square meter PV savings at .076\$/kWh



Solar Pathfinder Site collected Data:

- Field image
- Solar shading graph

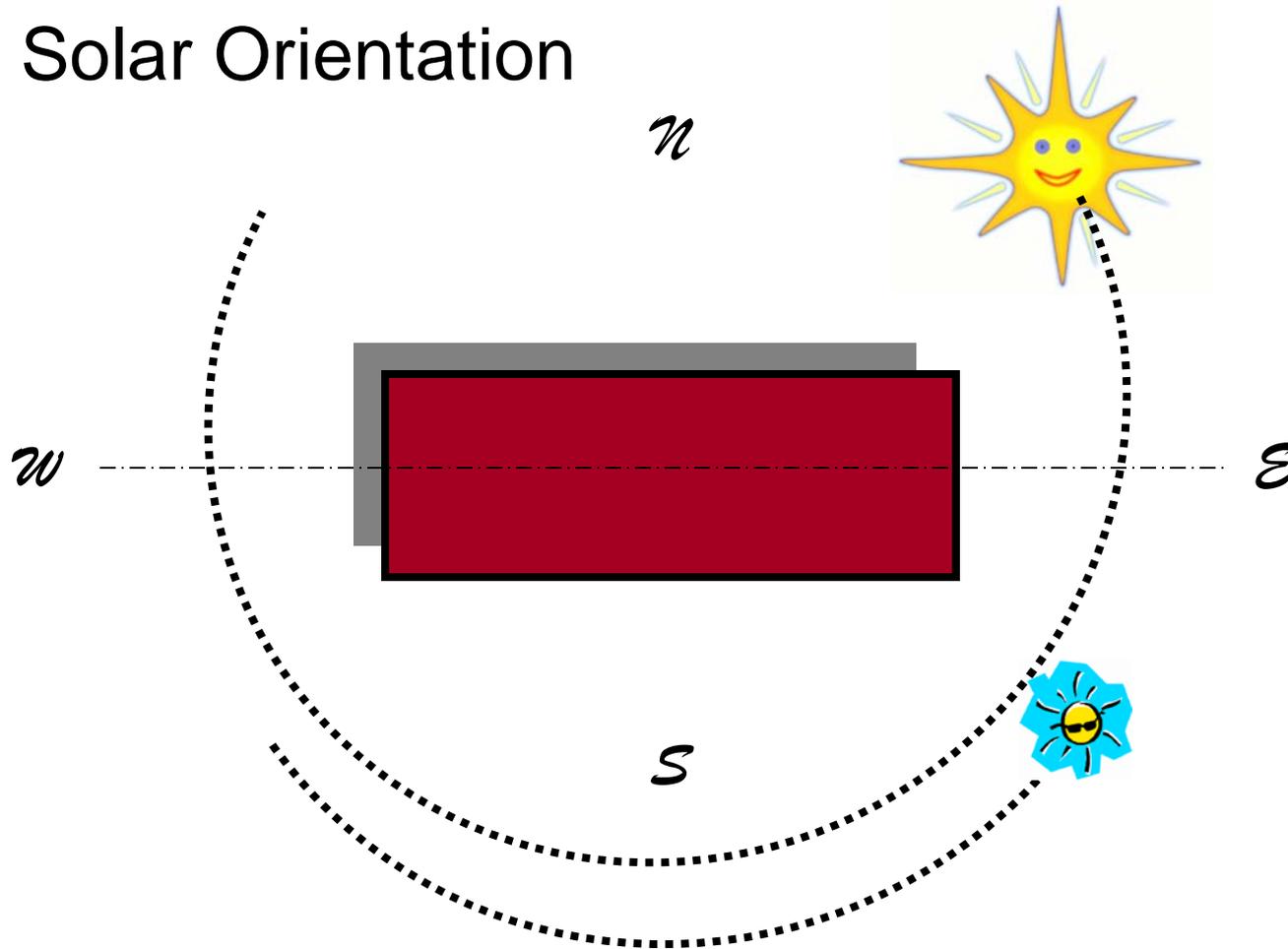
# Solar Analysis

Solar power potential per square meter (KWH)				Order of Effective Solar Access
Site Station Location	45.4 degree	30 degree	2 axis tracking	
A3	4,191.40	4,176.10	5,294.10	1
A1	4,082.68	4,169.91	5,265.16	2
A2	4,089.57	4,173.75	5,254.60	3
B1	4,069.16	4,157.95	5,219.45	4
B2	4,065.12	4,153.09	5,186.70	5
B5	4,031.08	4,112.08	5,052.24	6
B3	3,978.71	4,057.25	4,961.44	7
B4	3,645.21	3,706.16	4,443.30	8

88.75%  
range

# Bio-Climatic Design

- Solar Orientation

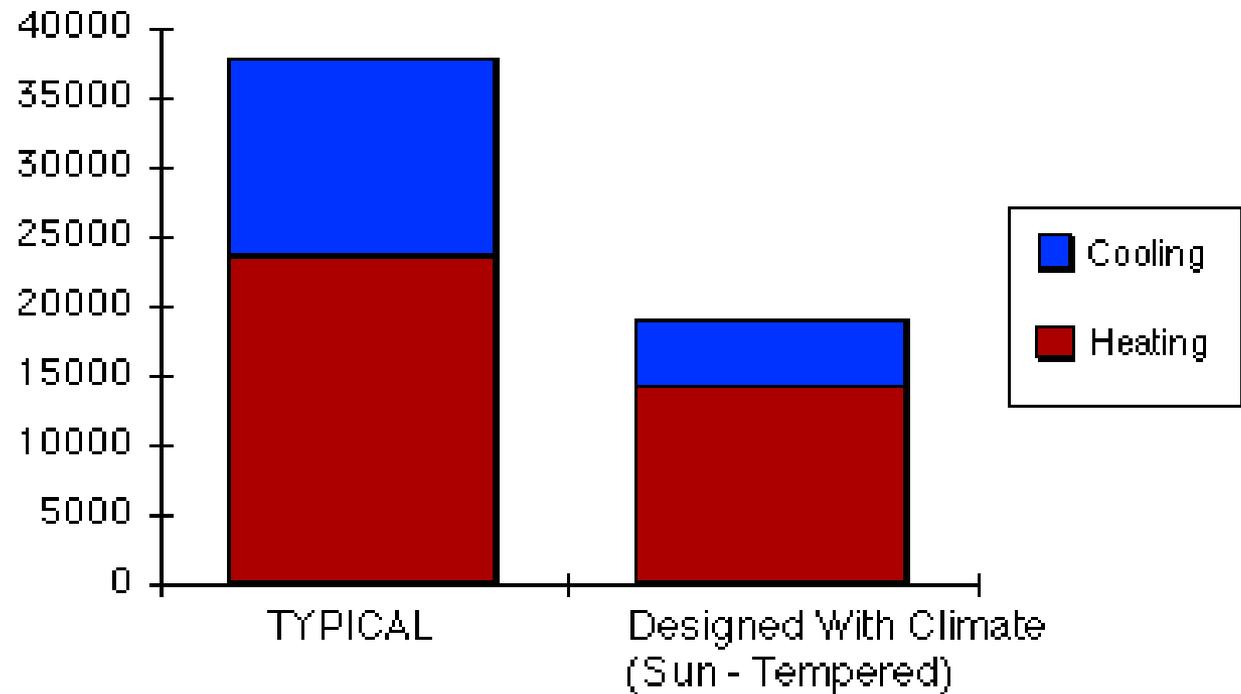


# Advantage of Tempered Solar Design

## ■ Tempered

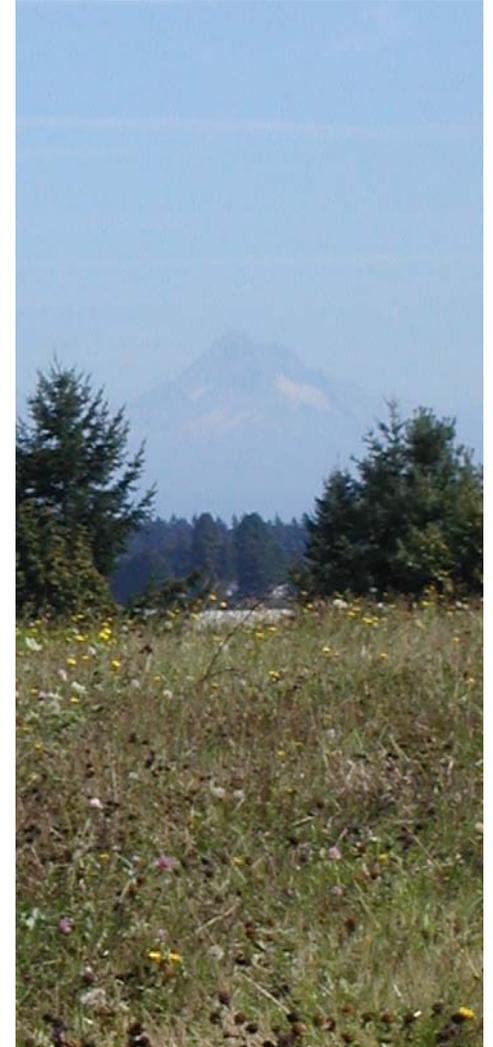
Solar

Performance  
( Btu / yr-sf )

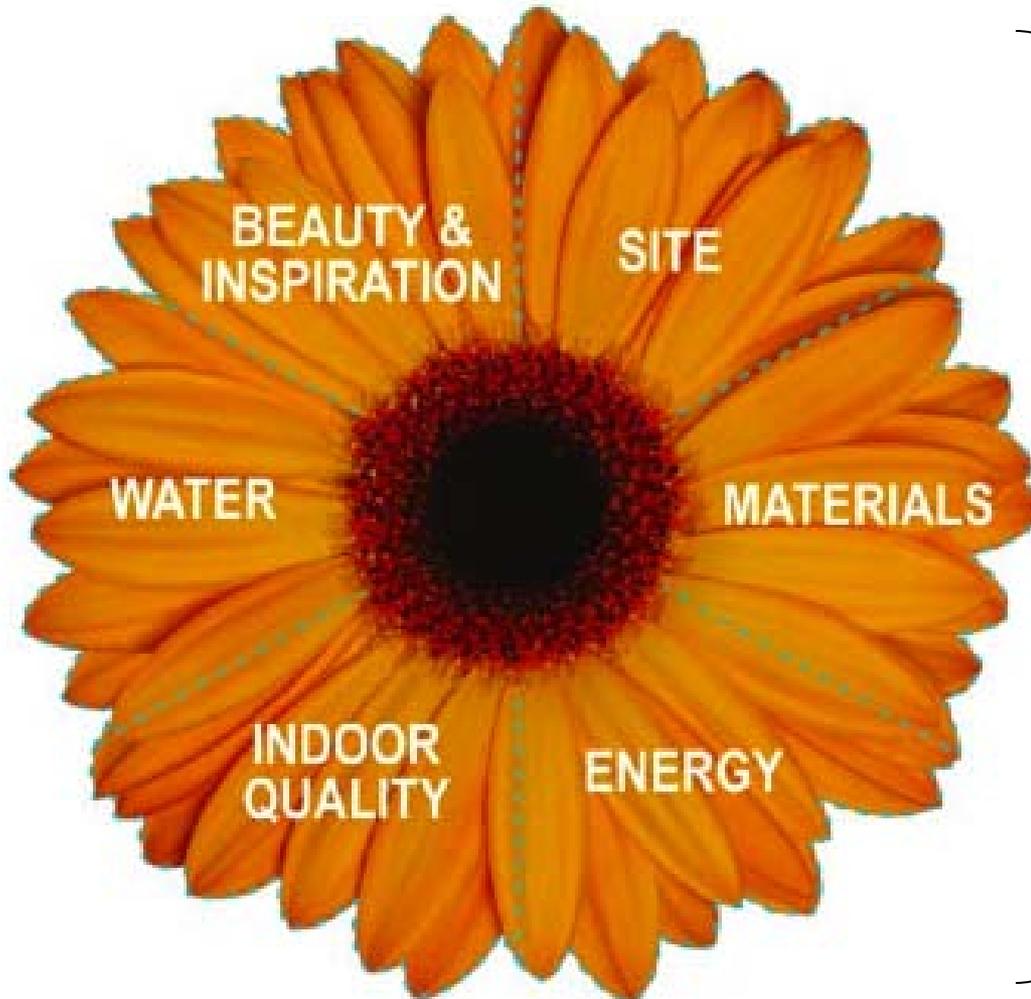


# “The Shire”

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# How will it stack up to the Living Building Challenge?

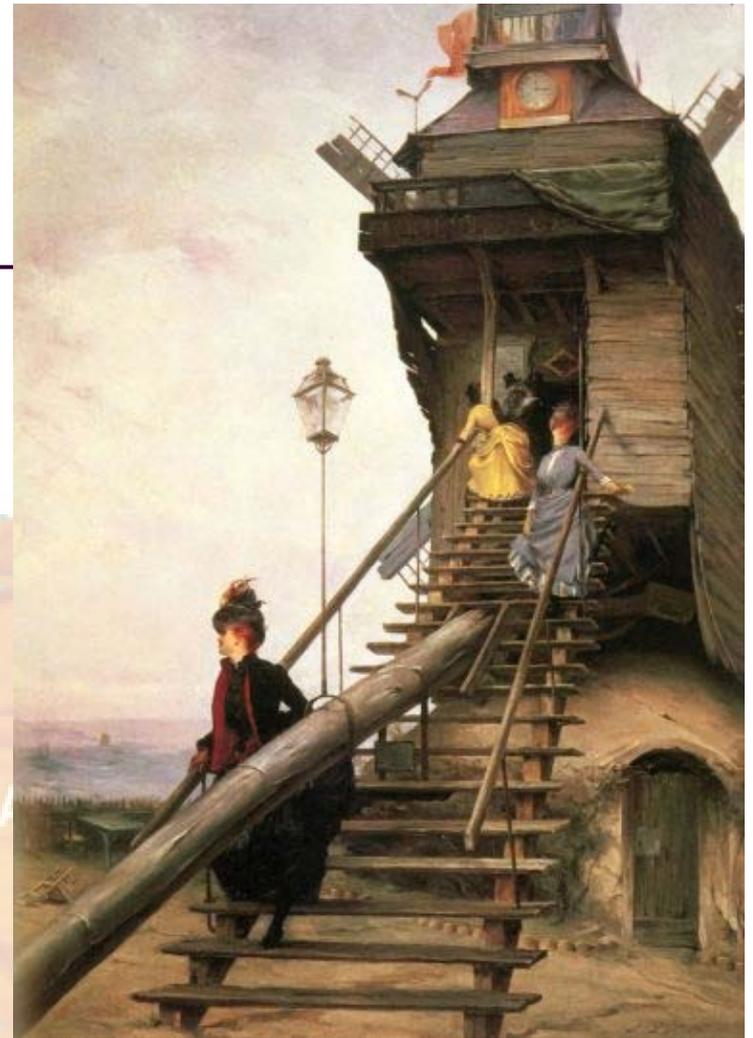
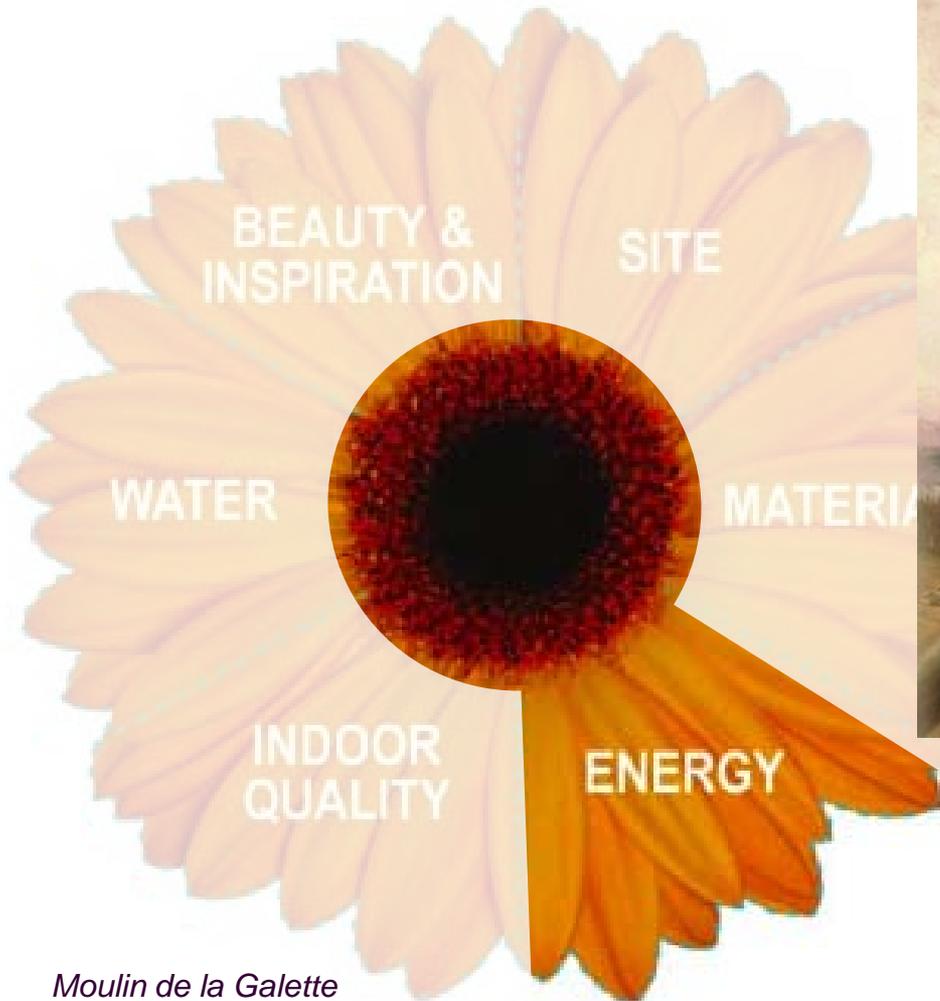


Petal  
Categories

16 prerequisites

# Energy Efficiency

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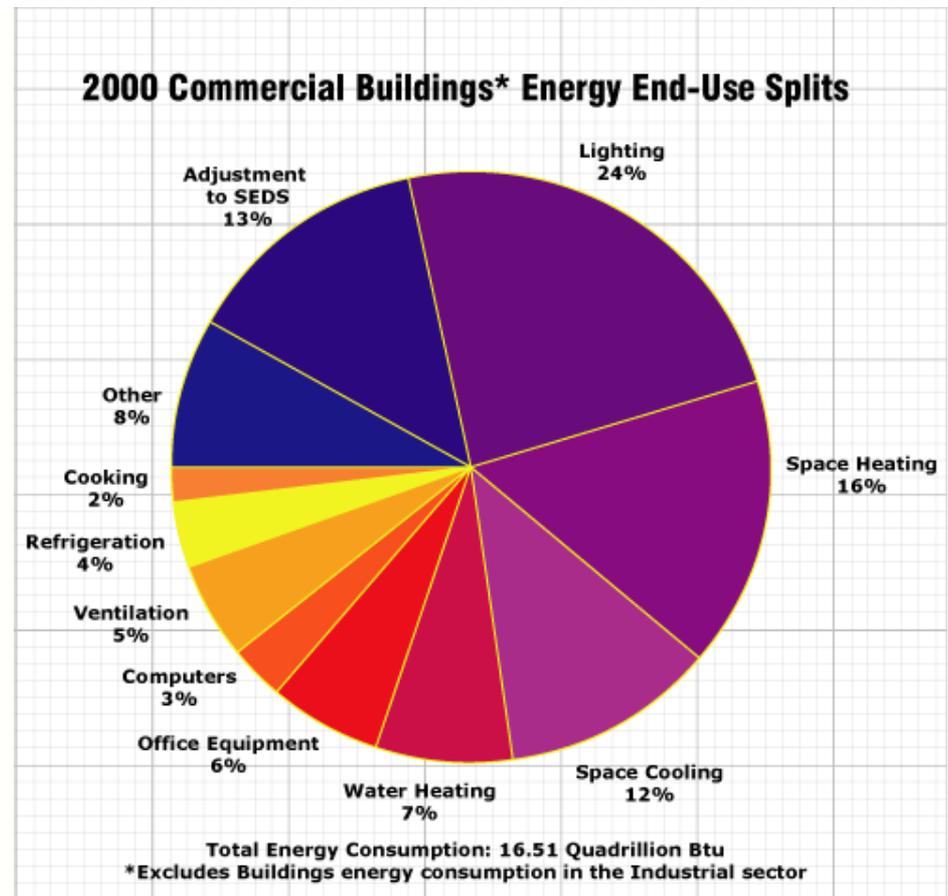
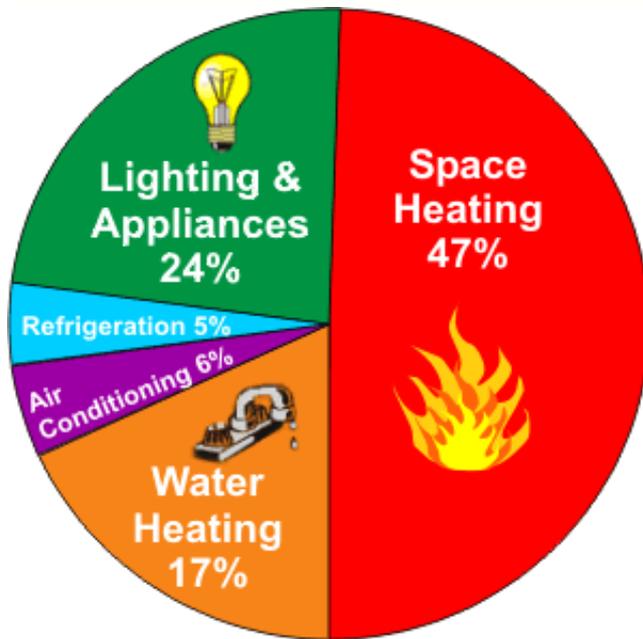


Prerequisite 4:  
Net Zero Energy

*Moulin de la Galette  
Paul Francois Quinsac*

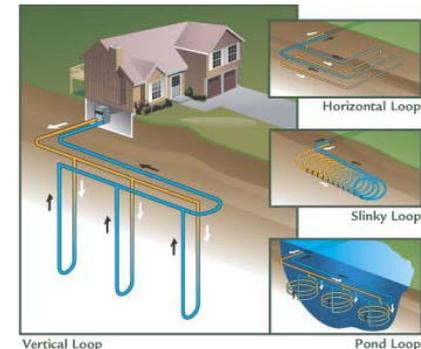
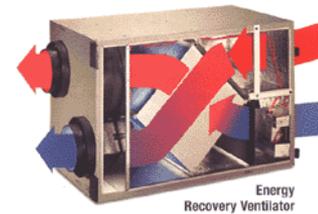
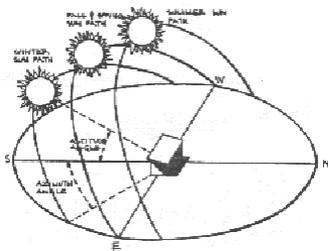
# Energy Use

- Where is energy typically used

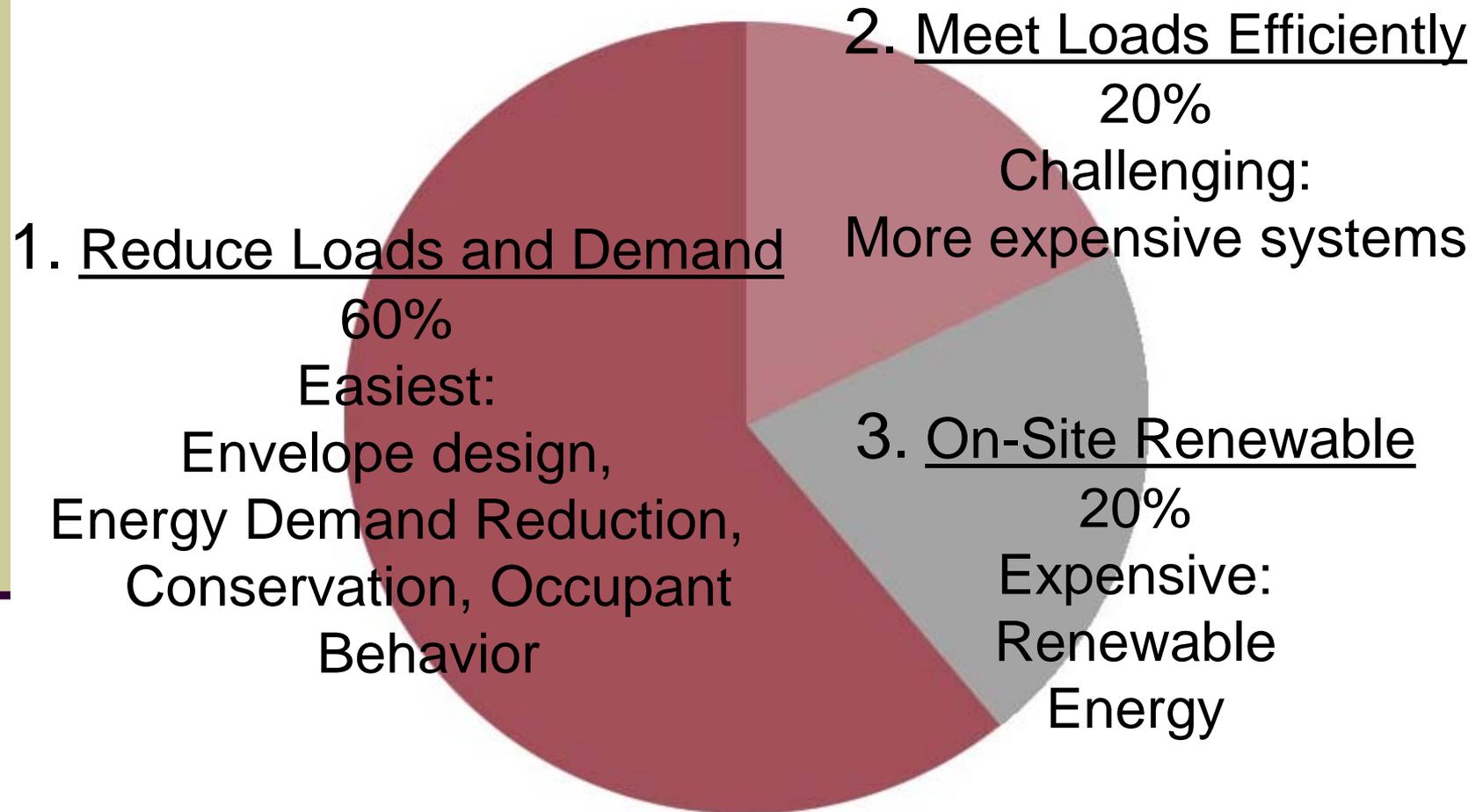


# 3 key steps to Energy Efficiency

1. Reduce Loads and Demand
2. Meet Loads Efficiently and Effectively
3. Future On-Site Renewable Energy ?



# Energy Reduction Priorities

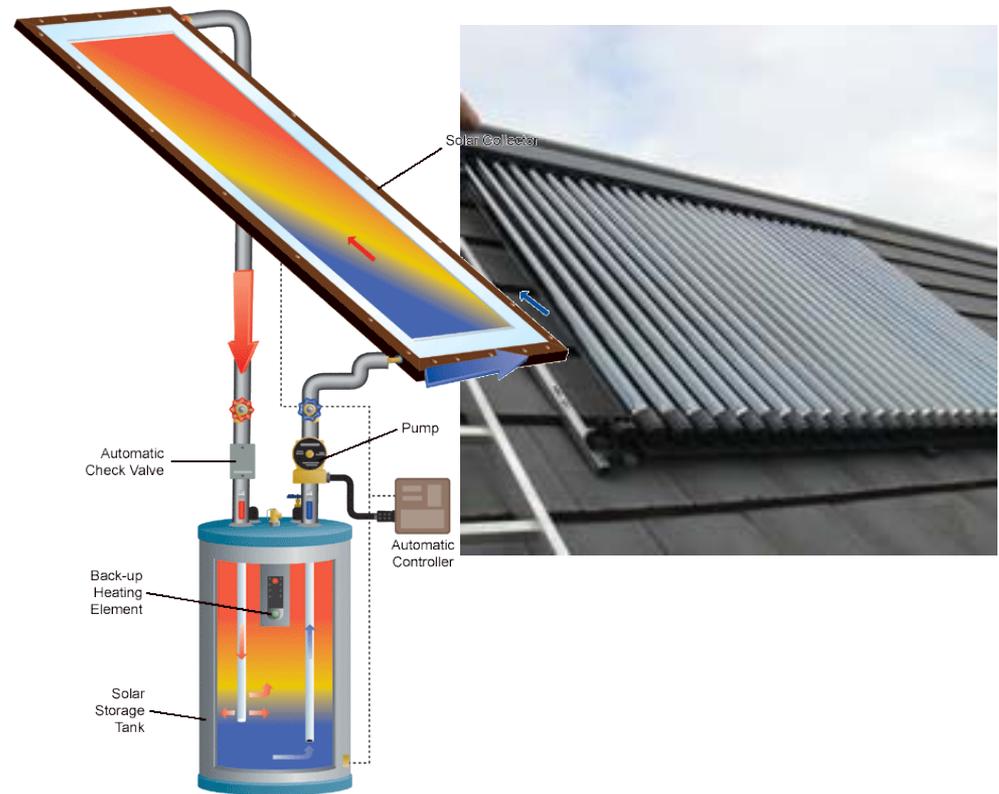


# Passive House Design Principles

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- Super Insulate
- Eliminate Thermal Bridging
- Make it Airtight
- Heat Recovery Ventilation
- High Performance Windows and Doors
- Optimize passive-solar and internal heat gains

# Solar Thermal

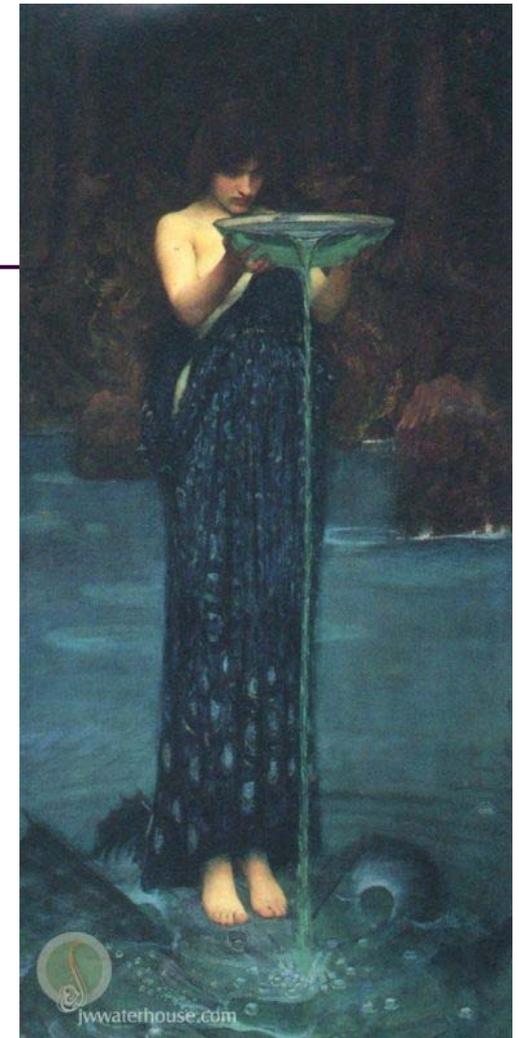


***“I’d put my money on the sun and solar energy. What a source of power! I hope we don’t have to wait ‘til oil and coal run out before we tackle that.”  
-Thomas Edison (1847-1931)***

# Water Module



*Circe Invidiosa*  
Waterhouse: 1892



Prerequisite 10:  
Net Zero Water

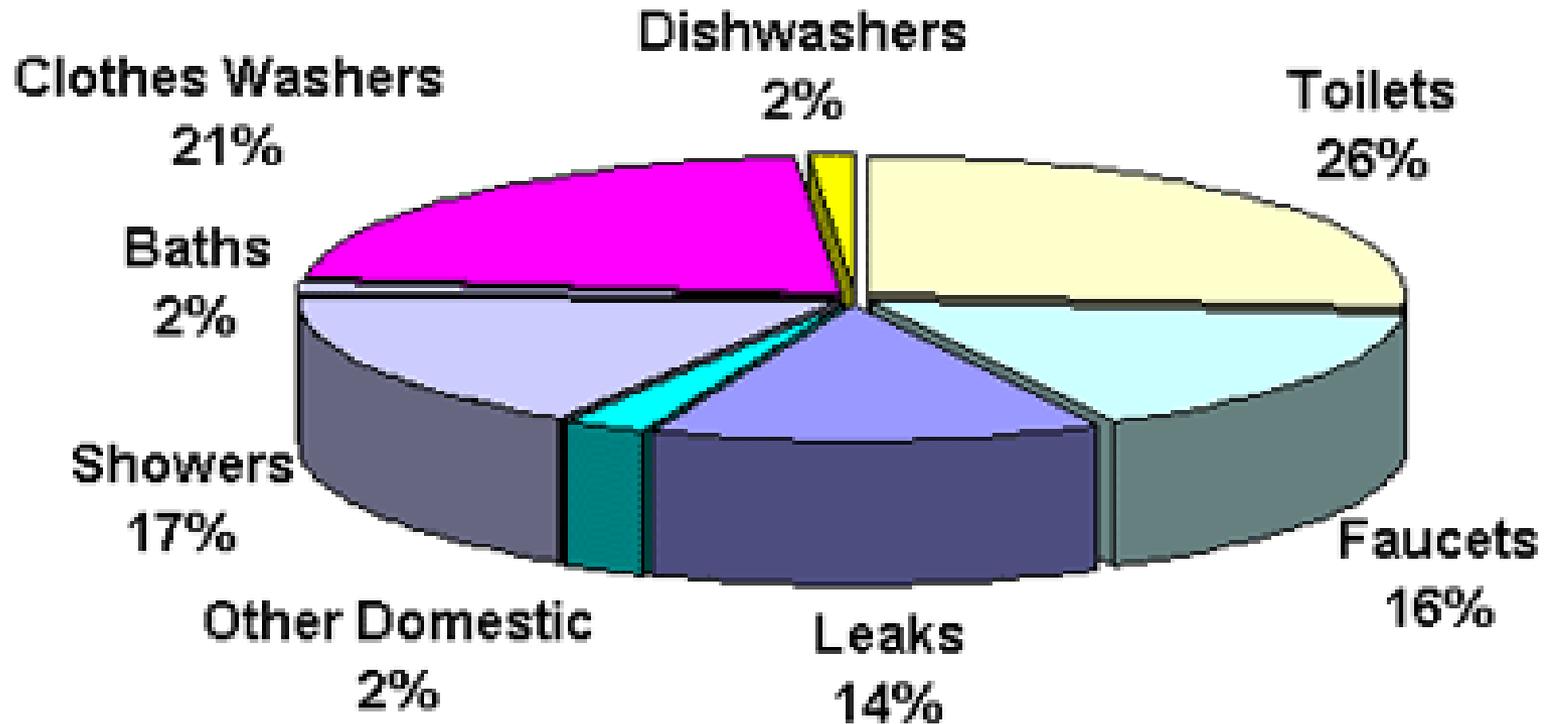
# Water Conservation

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- Rain Water Harvesting.
- The less the demand, the less storage required.
- Grey Water for irrigation?
- Strategies to reduce:
  - Flushing
  - Conserving fixtures and appliances
  - Occupant Behavior

# Water Conservation

## ■ Indoor Water Use



# Rain Water Harvesting

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- Collection
- Pre-filtration
- Storage



# Rain Water Harvesting

## ■ Filtration



# Rain Water Harvesting

- UV Treatment

