

Exterior Energy Use & House Size

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Exterior Energy Use & House Size

- Uses
- Energy Consumption
- Modelling
- Mitigation

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Exterior Energy Uses Identified:

- Snowmelt
- Pools
- Spas
- Icemelt

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Consumption and Prediction Variables:

- Temperature
- Wind Speed
- Snowfall
- Solar Gain
- Use Patterns
- Microclimate
- Utility Rates

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Mandatory Requirements :

- Controls
- Sensors
- Insulation
- No idling

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Mitigation Considerations:

- Fees
- Renewable Energy
- Btu/Btu Production
- Efficiency Bonus
- Year Round Production

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How do we determine Allowable
Exterior Energy Use?

Per square foot?

- Per House?
- Per Lot?
- Per Capita?
- Per Bedroom?
- Energy Balance?

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How Much Energy Does Each One Use?

- Snowmelt- 81,000 Btu/sf *yr
- Pools- 332,000 Btu/sf*yr
- Spas – 430,000 Btu/sf*yr
- Icemelt-Unknown

*Pitkin County Numbers

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Exempt Areas/Fees in Lieu:

- Snowmelt: 200 sf/ \$33 per sf
- Pools: 0 / \$136 sf
- Spas: 64 sf / \$176 per sf
- Icemelt ?

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Trade Offs:

- On site vs. Off site
- Solar Thermal
- Photovoltaics
- Wind
- Heat Pumps
- RECs

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Effectiveness:

- Solar Thermal-1:1 Oversized in summer
- Photovoltaics-3:1 Bonus Year round effectiveness
- Wind-Site specific
- Heat Pumps-2:1 Bonus Trade off
- RECs-Acceptable mitigation?

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Solar Thermal

- 1:1 Credit
- 60kBtu/day for 2-4'x8' flat plate, Max Credit Allowable
- 3.3 sf of solar thermal/sf of snowmelt
- Cost \$100 per sf

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Photovoltaics

- 3:1 Credit
- 10 watts per SF
- Cost \$5-\$10 per sf depending on incentives

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Solar Thermal Caps for Credit

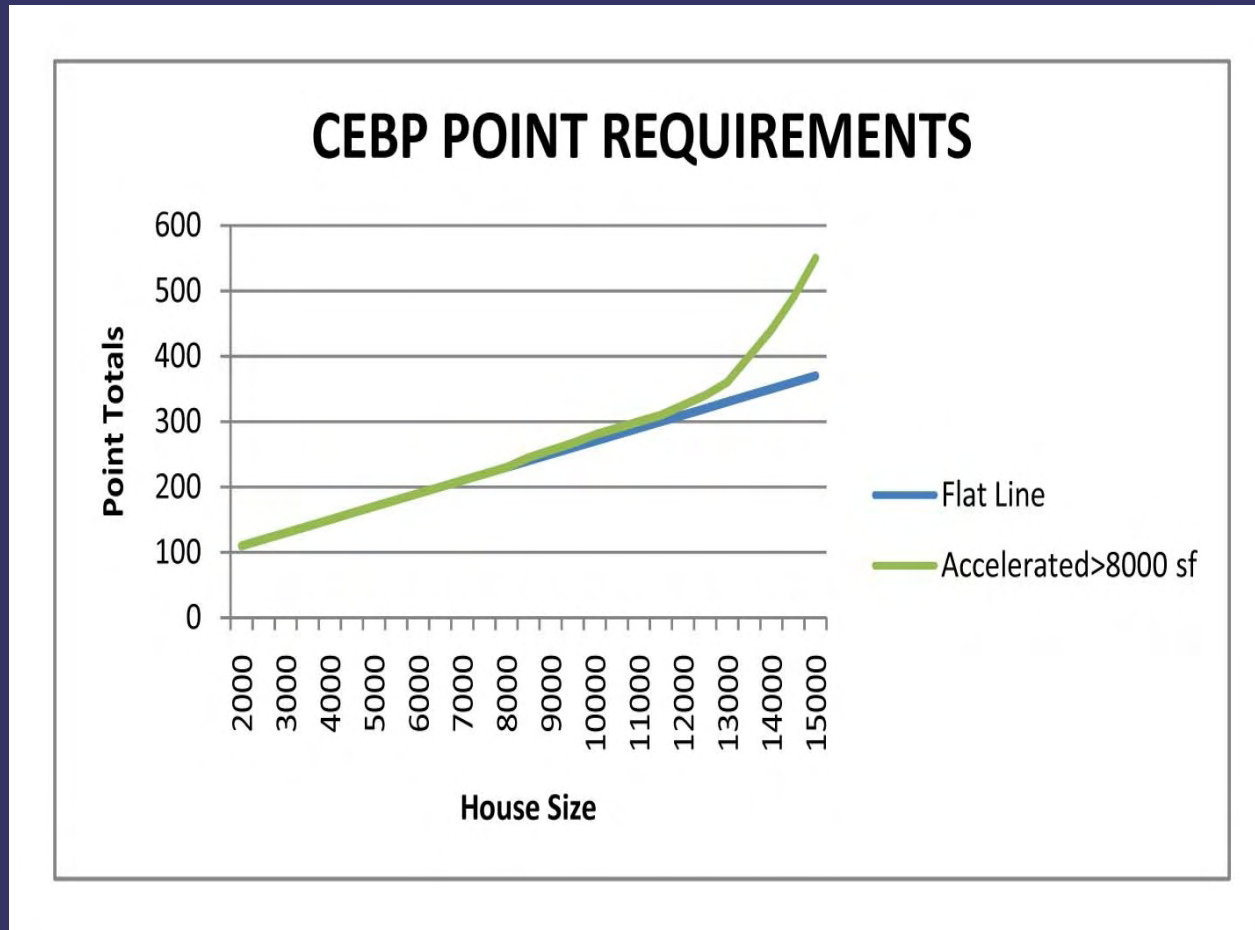
- Solar DHW- 2 Panels
- Solar Thermal for Heating-4 Panels
- SPA tied ST-2 Panels
- Pool tied ST-4 Panels

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Large Houses:

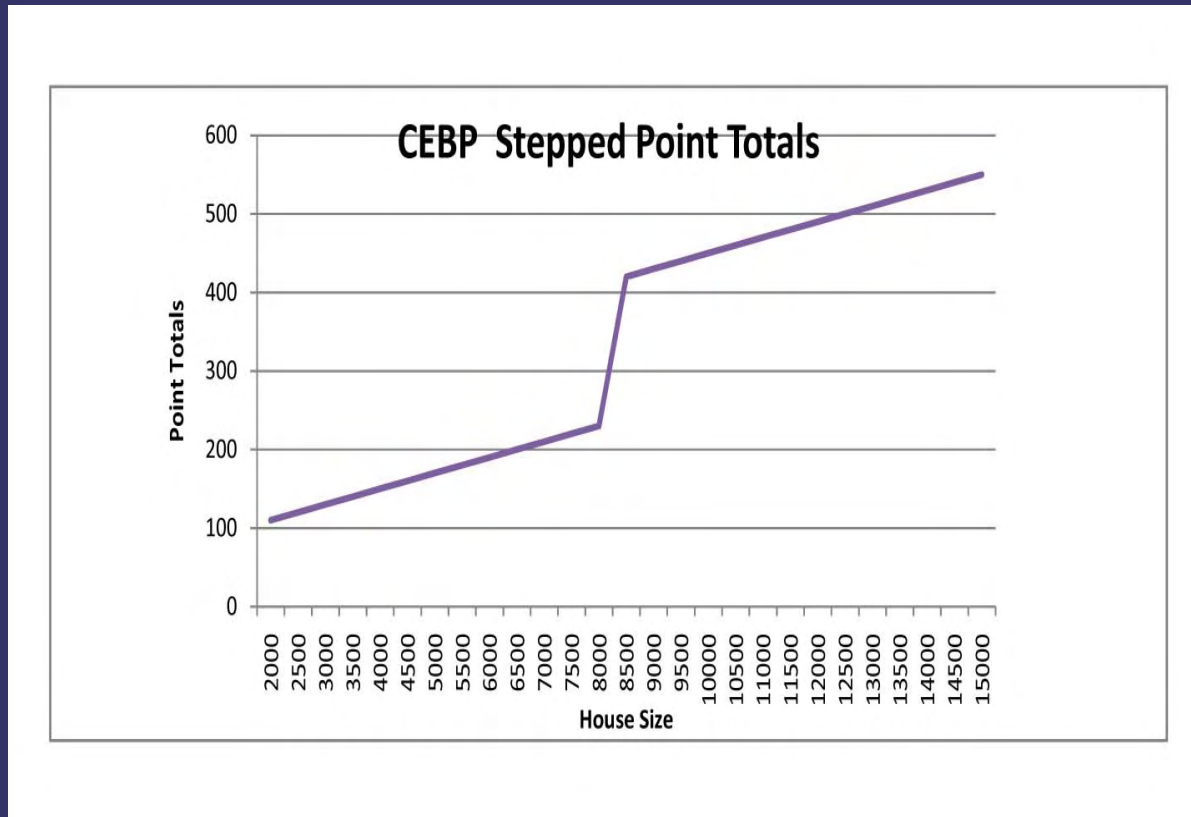
- > 3000 sf
- > 5000 sf
- > 8000 sf
- > 10,000 sf
- Flat Line or Ratcheting?

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- Flat Line or Ratcheting?

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- Stepped?

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ASHES Study Climate Mitigation Services

- 2nd homes use as much energy per square foot as standard homes, even though they are occupied only a small portion of the year, due to exterior energy consumption.

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Exterior Energy:

- Privilege or Right?
- Un-American to Limit it?
- Immoral to use it ?

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What is needed?:

- Monitoring Data from snowmelt installations
- Additional Research