Innovations in Energy and Affordable Housing in Wisconsin

How do we Build Resilient Communities?

Fond du Lac

April 5, 2017

Peter H. Kilde

Presenter

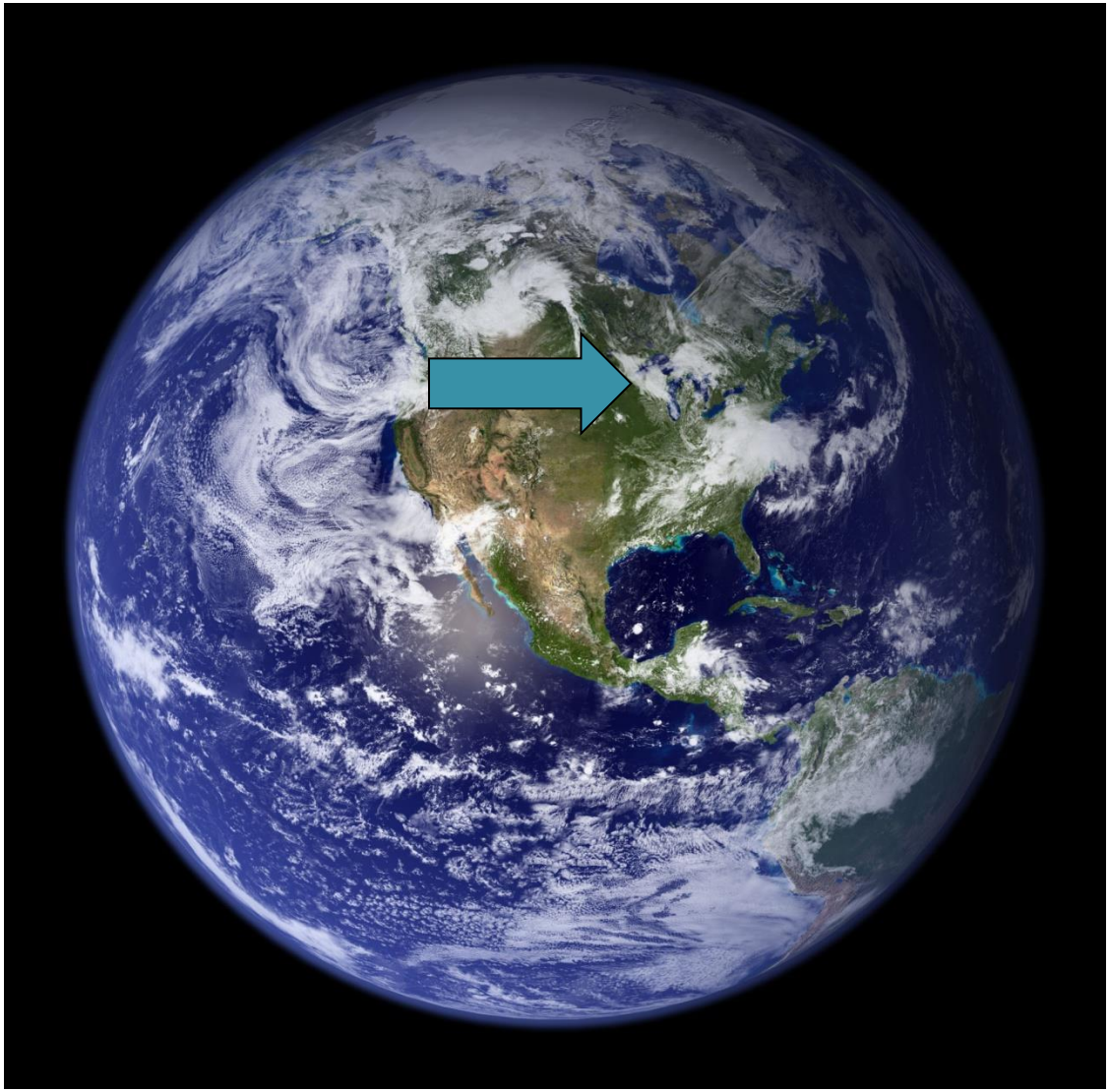
WEST CAP

I'm from here

WEST CAP

Or for you Global Thinkers…

I'm from here



And for the Re-localizers…

I'm from here

CO2 and You

=

=

5442 kWh of Energy

1 ton of CO2

1,814 kWh electricity <u>delivered</u>

= $181 @ .10 KWh

Deep Retrofit: How Existing Housing Stock Can Achieve Net Zero Energy Use and Remain Affordable

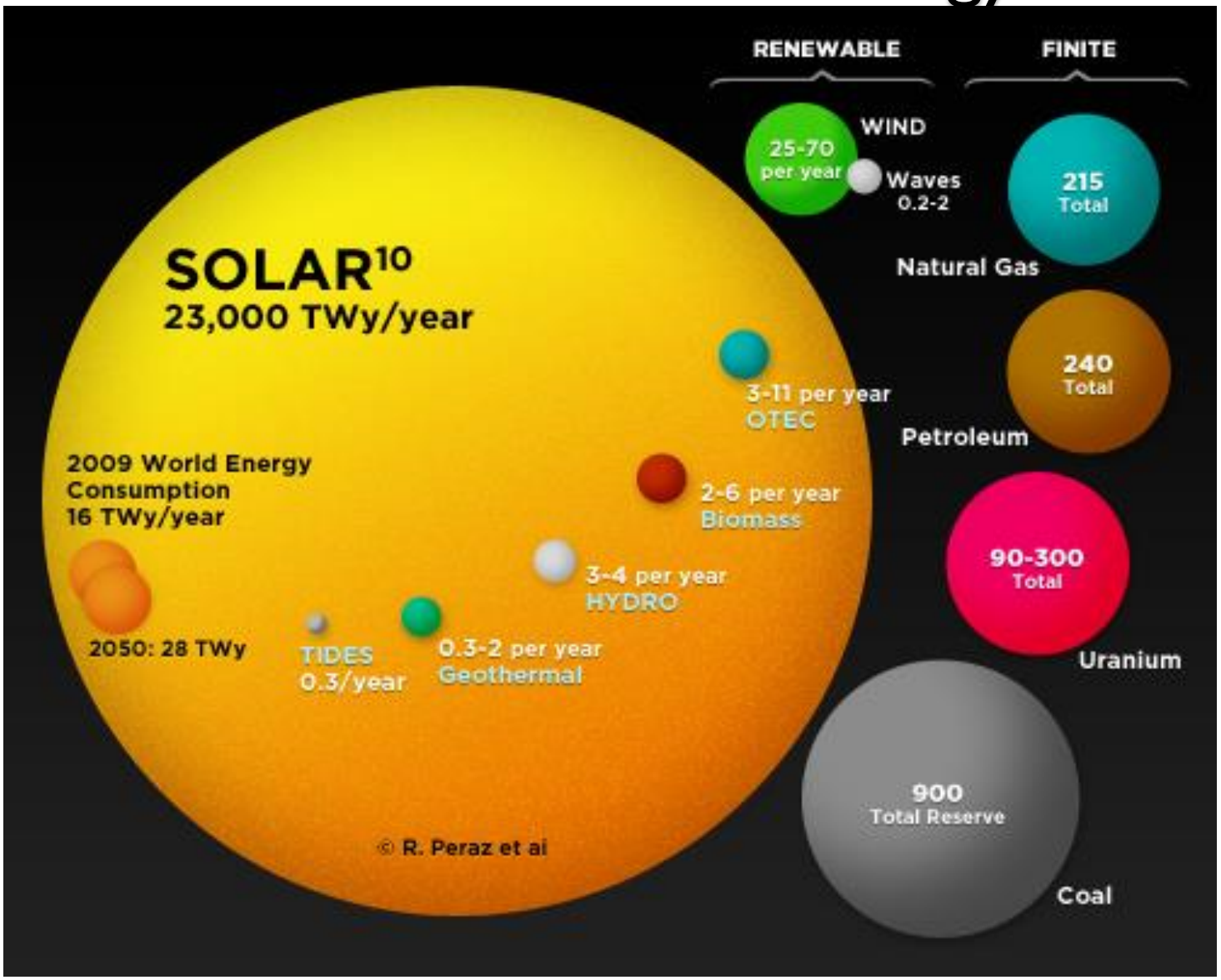
The program boils down to two basic strategies:

- #1 Reduce Energy Load SIGNIFICANTLY.
- #2 Source as much of that energy load as possible from local, renewable, carbon neutral sources.

So, where do we find this cheap, clean, local, renewable energy?

- Free BTUs from the ground
- Free BTUs from the air
- Free BTUs from sunlight
- Free BTUs from wind
- Free BTUs from the forest*
  - *What does it cost to grow a tree in your forest?

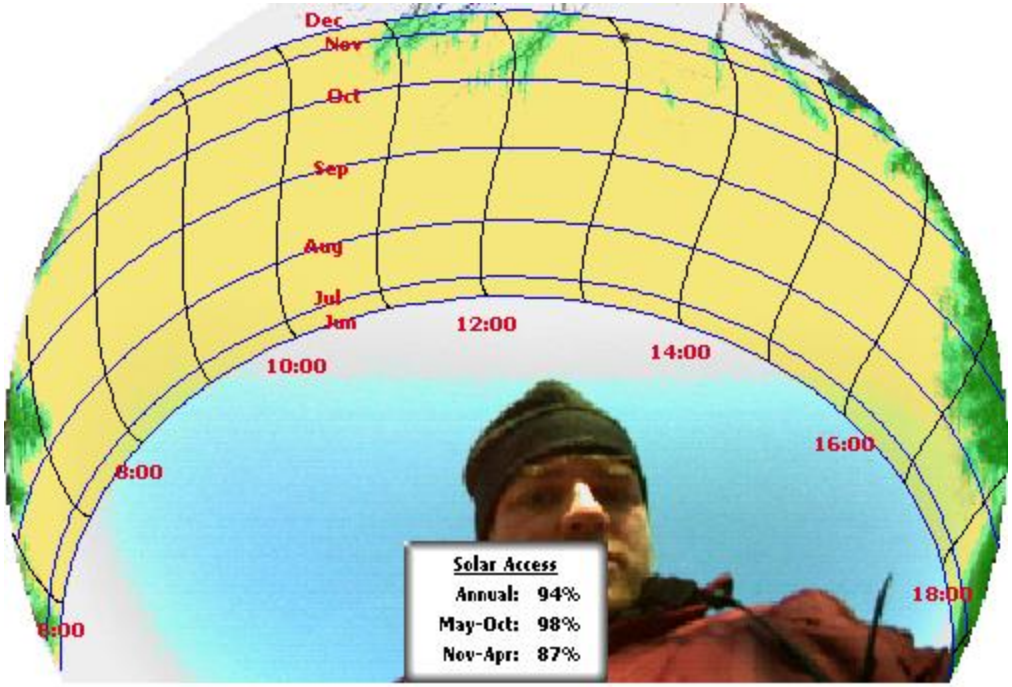
There is a lot of clean energy around..



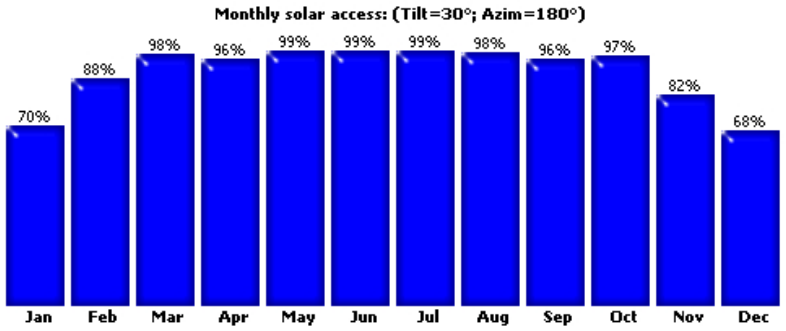
First, conduct an Energy Audit on the home

Insulate to R40 walls, R60 ceilings

Solar Access



Data by Solmetric SunEye™ -- www.solmetric.com



Data by Solmetric SunEye™ -- www.solmetric.com

Deep Energy Reduction Analysis: Menomonie Duplex

- Heating/Cooling Load Before Insulation: 50 MMBtu/annually Per Unit
- Heating/Cooling Load After Insulation:35.6 MMBtu/annually Per Unit

  Offset from the Earth: 20.6MMBtu/annually

  Offset from the Sun: 15 MMBtu/annually

- Heat/Cooling: 80% of total BTUs in the geo-thermal system are free from the ground
- Water Heating: The Solar Hot Water System meets 71% of the water heating load annually

SO

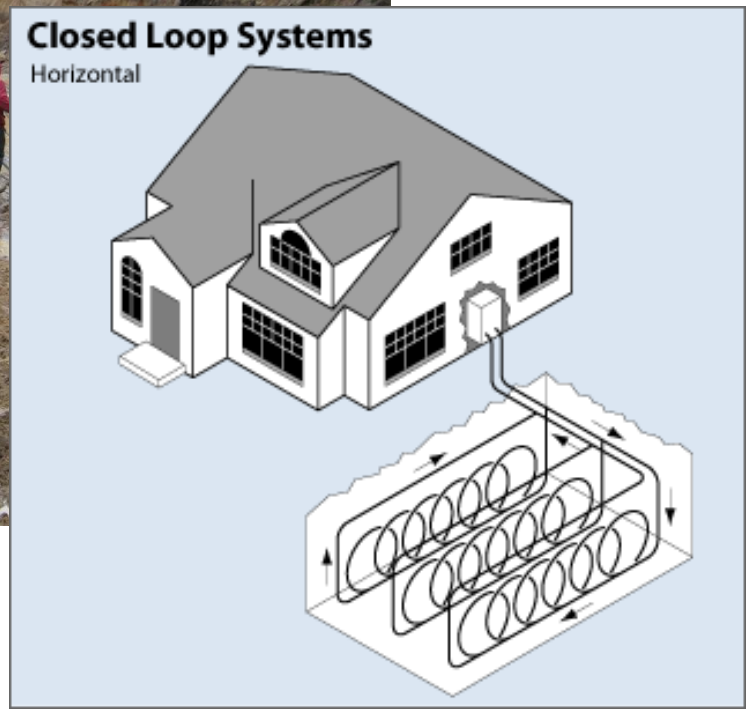
- Annual Solar Electric Net -Energy gain on bi-directional meter:
  - Estimated Heating and cooling load for entire house: 9,610 kW/Hours annually
  - Estimated back-up Hot water load for entire house: 2,480 kW/Hours annually.
- TOTAL: kW/Hours annually 12,090

- An 10.9 kW PV system will produce 13,197 kW/Hours annually at this location = net gain of 1,107 kW/Hours.

Install Solar Domestic Hot Water for Free, Clean BTUs from the Sun

Install Solar Electric PV for more Free, Clean BTUs from the Sun

Install Geothermal for more Free, Clean BTUs from the Ground



Does it work?

yes

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Billing Summary

Residential

Previous Balance 06/25	$0.00
No Payment Through 09/02	$0.00
Balance As Of 09/02	$0.00
Total	$354.62 CR

Averages for Billing Period	This Year	Last Year
Average Temperature	74*	67
Electric/kwh per Day	0.4	0.0
Cost per Day	$5.21 CR	$0.00

a few other free BTU harvesters

Boyceville Before

Boyceville After

Net Mortgage

- Home purchase and Deep Retrofit:$150,000
  - 30 year, fixed rate mortgage at 4.5% would be a mortgage of $760 per month
  - Deduct $200 of Energy Expense per month from budget (This deal only gets better over time)
  - The "net mortgage" comes to $560, an affordable monthly mortgage payment for a four bedroom, two bath home.

How can you help?

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By reducing dependence on non-local resources.

How can you help?

- PACE or other long-term financing that allows Deep Retrofits to pay for themselves
- Building codes and Development Regulations that support Tiny Houses, Micro-grids, Distributed Generation, Community /Cooperative Solar
- Ordinances that support natural and edible landscapes, both residential (fruit tree boulevards, small livestock, Permaculture yards) and in the Commons: Edible Parks, Community Gardens, Urban Forests
- Support Community Based and Cooperative Business models based on Local Resources and local markets
- Support (?) for housing appraisals capturing the financial value of installed residential renewable technologies (see Net Mortgage)

How can you help?

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Finally, we will need new (and old) skills and new (and old) knowledge for a real New Age: an age of limited resources but of unlimited potential for happiness and meaningful life.