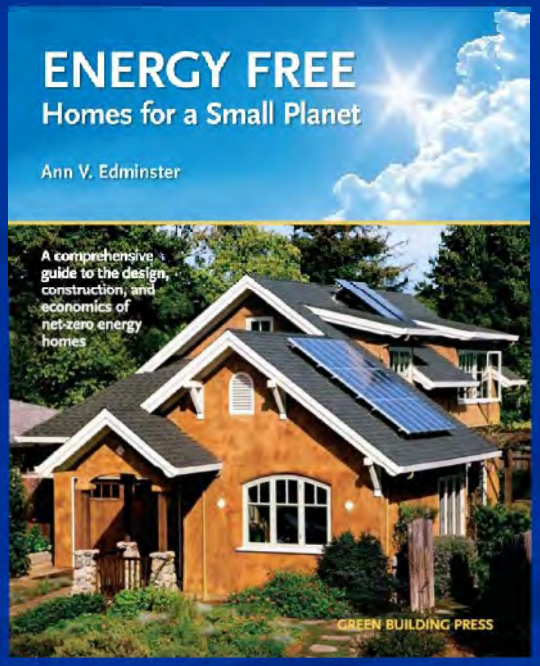
Choosing a net-zero energy definition

Ponderings provoked by ►



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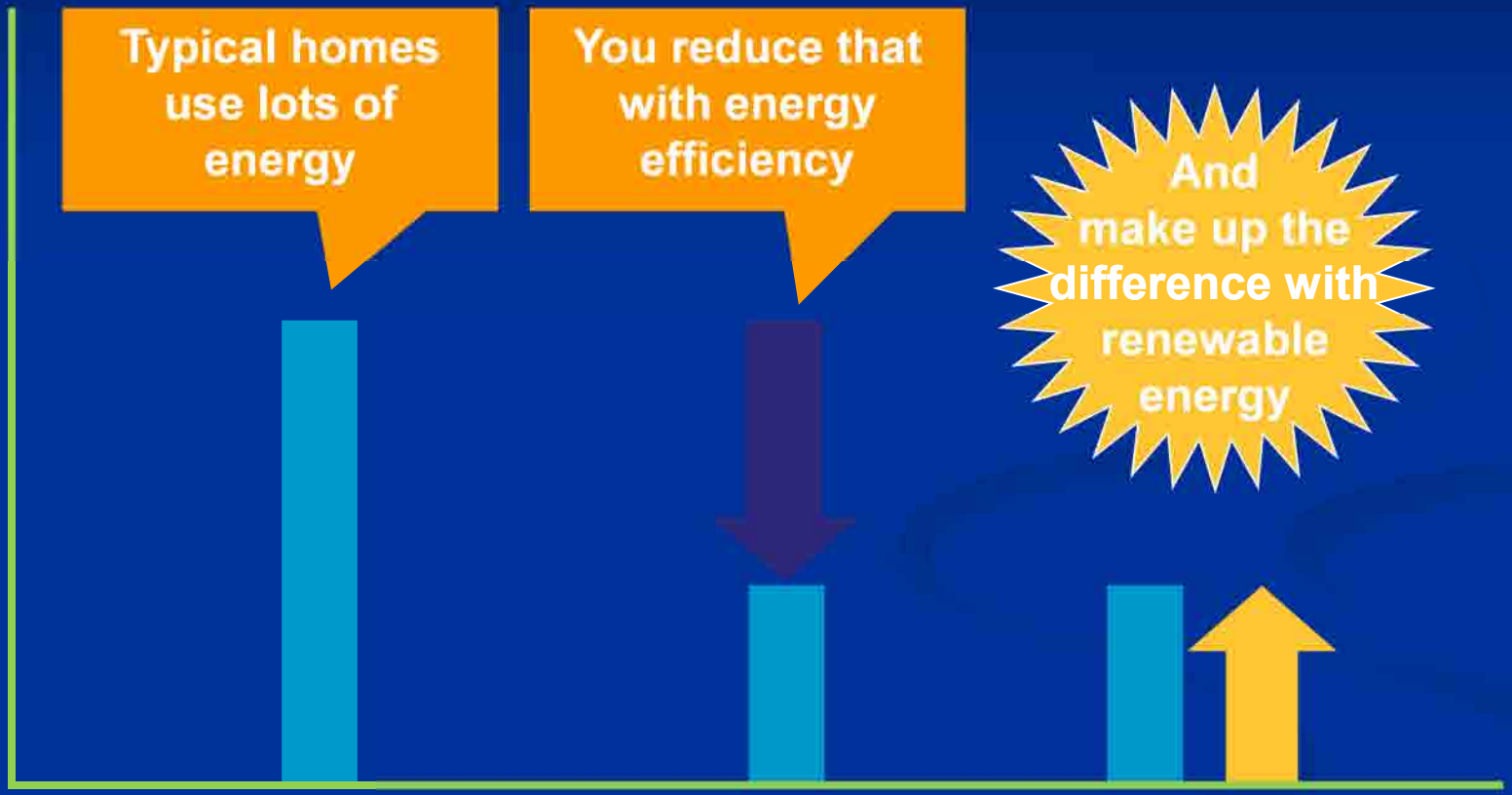
Net-zero means ...



So where's the confusion already?!

Net-zero is defined … let me count the ways:

NREL defines net-zero 4 ways:

- Energy use at the site
- Energy use at the source
- Energy cost to the buyer
- Emissions associated with energy used and produced by the home

And still more ways:

Other definitions:

- **Electrical** energy **cost**
- Peak electric demand

What constituents of energy use do we include?

- Embodied energy of the home itself?
- How many facets of household energy? Courtesy of Ray Cole, et al:
  - Operating energy
  - Personal transportation
  - Consumables – food, clothing, etc.
  - Durable goods –furniture, vehicles, etc.
  - Vacations

Renewables location also factors into it:

- Onsite sources
  - Within the building footprint
  - Outside the building footprint
- Offsite sources
  - Imported to and used onsite – biomass, wood pellets, ethanol, biodiesel
  - Offsets or credits purchased for renewable power produced elsewhere (RECs)

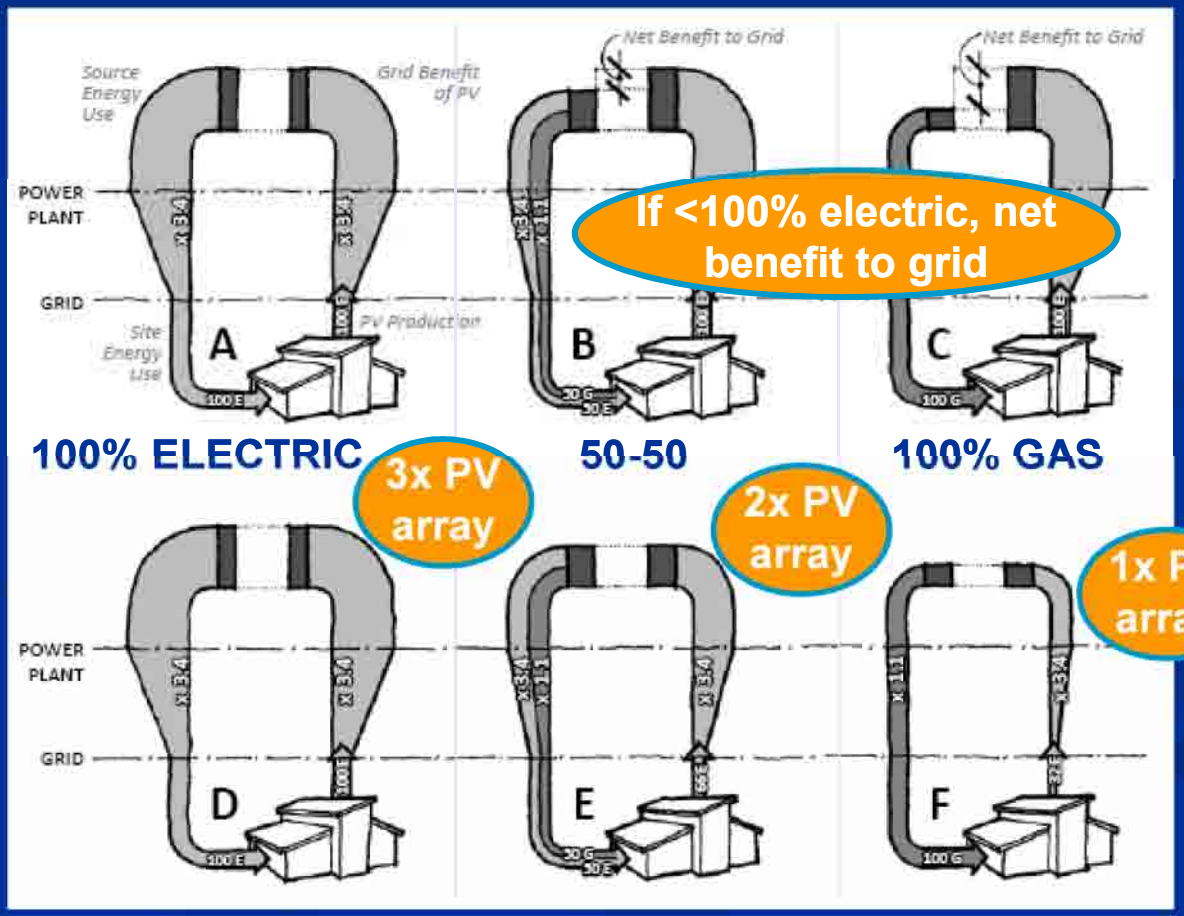
What are the implications?

Why definitions (and fuel mixes) matter

Take SITE vs. SOURCE …

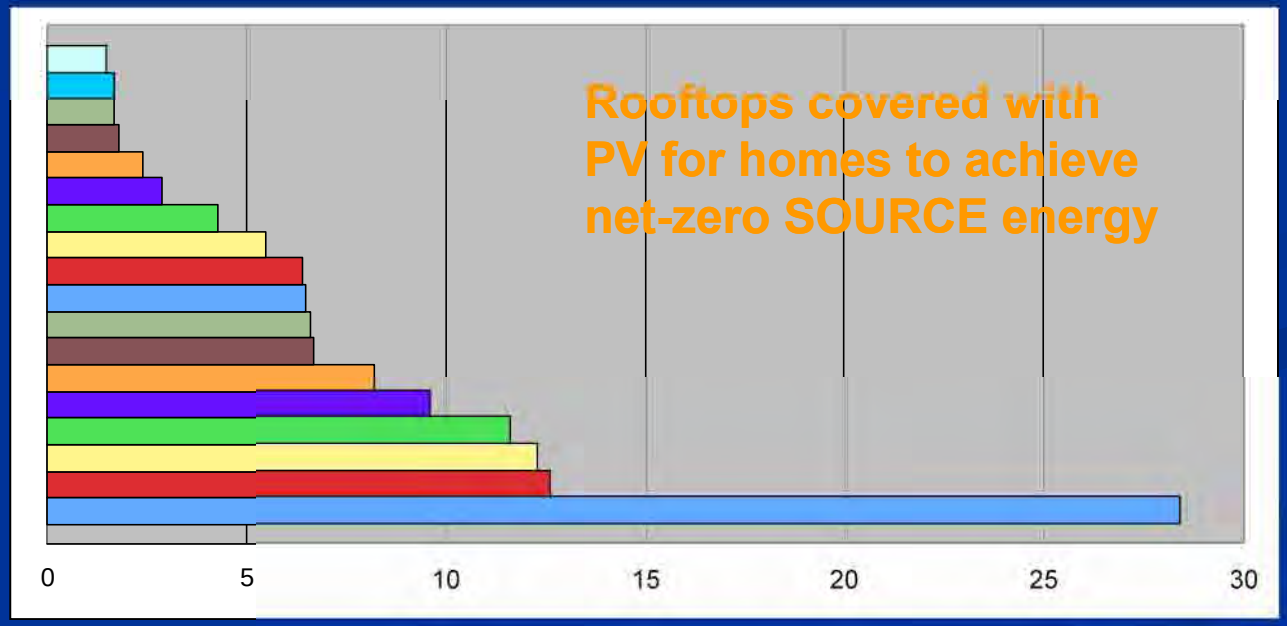
Net-zero SITE energy

Net-zero SOURCE energy



PV is the majority solution

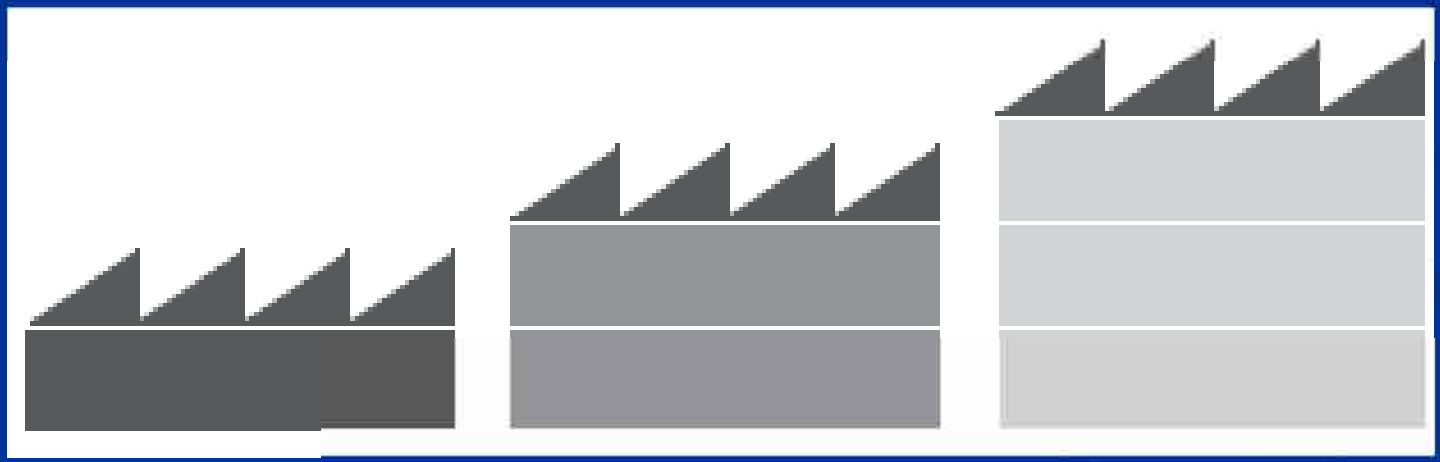
Will you have enough roof space?



And would you believe: 371 roofs!?

Even more challenging:

Multi-story, multi-family



A 1-story building has 3x as much space for solar *per floor* as a 3-story building

What drives choice of definition?

- Context
  - Priorities
  - Constraints

Priorities

Implications of definition chosen

To offset or compensate for:	Choose net zero:	Relative amount of renewable energy production needed:
Power bill	Energy **cost**	Probably the least, unless you have high peak electric usage … but this is very uncertain and will fluctuate over time
Industrial production associated with power use	**Source** energy	*Typically* more than NZE cost
Actual on-site power use	**Site** energy	More than NZE source (or equal to NZE site, if project is all-electric)
Emissions associated with power use	Energy **emissions**	May be more *or* less than NZE source or site; depends mostly on fuel mix and how grid-supplied electricity is generated

Constraints

- Utility would pay for no more than you purchased in a year
  - Fixed, effective Jan. 2011?!
- Utility would not allow “virtual net metering”
  - Fixed, courtesy of Solara & others
- Are there **other constraints that have not yet been addressed?**

Fossil fuel-free?

- Natural gas is increasingly scarce
- BUT source : site ratio of gas is better than electricity
- Home design implications
  - Cooking
  - “Fire features”
- All-electric requires the highest level of energy production, whether site or source

QUESTIONS:

Should we work toward consensus on a definition?

- Are there competing interests – public vs. private perspectives?
- Should one perspective trump others?
- Does a consensus definition get us closer to our carbon reduction goals?
- How should we work toward a consensus, if in fact we should?