

The IECC, ERI and PV

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Issues to Discuss

- What are the impacts of the introduction of PV trade-offs on:
 - ERI scores?
 - The number of homes built with PV?
- How are code advocates and homebuilders responding?
- What should be proposed for adoption in the IECC and state/local codes to change how renewables are treated?

Foundational Issues

- What is the purpose of energy codes?
 - To reduce the lifetime cost and environmental impact of housing
 - To assure minimum standards of quality in all cases
- What principles should we be guided by?
 - Markets generally fail on environmental issues, so codes need to harness market forces to drive correct decisions by builders



Flexibility to meet a societal target is a good thing! But...

...flexibility to make a clearly erroneous decision is not helpful

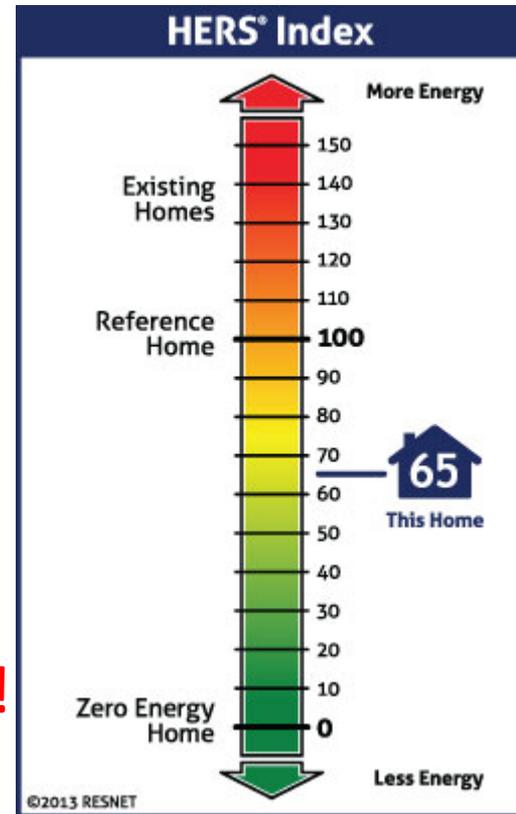
- Solar often has little no incremental cost for a builder, but higher lifetime costs to the buyer
 - consumers benefit more in the long-term from homes with higher efficiency, because
 - The total cost to save a kWh with efficiency beyond the prescriptive IECC is lower than the cost of a kWh of solar production
- Small amounts of solar are nearly indistinguishable from efficiency, but large amounts are not as valuable
- Eventually, solar may be limited by the amount that can be utilized by the grid, but incremental efficiency is always beneficial

Background Information

- Some 300,000 residential solar installations in 2015 according to SEIA.
 - This figure does not distinguish new homes from retrofits
 - This number is growing rapidly, so without changes to the IECC solar may become a threat to efficiency in the near future
- Solar financing or leasing gives solar an unfair competitive advantage compared to efficiency
 - Solar is also more visible and understandable, which also makes for a non-level playing field
- **Solar and efficiency shouldn't be competitors:**
 - An optimal approach requires more of both
 - the solution is **improving EE finance and visibility** and determining how to most appropriately combine solar and efficiency

The ERI path

- Well-regulated tradeoff paths have been very popular with builders, and tend to lead to greater energy savings in the long run
- Major builders have embraced ERI in part because it provides third-party information—like an mpg label—that helps them sell homes
 - The rating helps make efficiency visible!
- The ERI path is generally a lot more stringent than the prescriptive path



What does the 2015 code say about PV tradeoffs?

- It is not clear!
- On one hand, the direct wording of the code can be argued to exclude PV
 - This argument is weakened by the inclusion of language defining the zero point of the ERI scale: you can't get to zero on efficiency alone
- On the other hand, the adoption of the code, and subsequent ICC actions, suggest that the HERS score was and still is recognized not only to be *ONE* possible ERI method but to be the *preferred* one.

What does the RESNET Standard say about PV tradeoffs?

- It clearly permits them, without limit. The HERS Index scales to a net-zero energy home achieving a score of 0.
- NRDC believes that this is the right approach for **ratings**
 - because it encourages competition among builders for lower environmental impacts and utility costs; and
 - It can create markets for retrofits of efficiency as well as solar
- But that does not mean that the **codes** should allow unlimited tradeoffs
- NRDC has opposed unlimited PV tradeoffs consistently in California's energy code

What is wrong with unlimited tradeoffs in a code?

- The levels of ERI in the 2015 IECC were based on analysis of **only efficiency upgrades, without accounting for solar**
 - They reduced ERI scores by about 15 points compared to the 2012/5 code's prescriptive paths
- A medium sized solar installation is worth ~35 points
 - ...potentially erasing all of the gains achieved in the code since 2009, ***and more***

In the long term, we expect essentially all homes to have solar

- This is a good thing. Solar will get even cheaper and even easier to install.
 - However, that means that failure to install solar now is better than failing to install efficiency now
 - On the other hand, more use of solar in new construction may be necessary to realize this success of PV, so some level of tradeoff is warranted
 - ***But not at the expense of efficiency!***

A way forward

- We propose that the best way forward is to **allow limited PV tradeoffs** in the code
 - ...with the limitation chosen such that homes have to “do better” than the prescriptive path on efficiency alone
 - This is the approach that has been taken by Vermont and Massachusetts, based on analysis
- NRDC will propose a limit that starts with the ERIs in public comment #2 (next slide) and subtracts ~3 points that are now available from efficient hot water SYSTEMS

Straw Man Code Change

R406.4.1 Renewable energy. The use of *renewable energy* is allowed to meet the values listed in Table R406.4 if the ERI for the proposed residential building without *renewable energy* is less than or equal to the appropriate value listed in Table R406.4.1.

Table R406.4.1 Maximum Energy Rating Index

NOTE: these numbers are subject to small changes as a result of water heating system savings varying by climate zone

| <u>Climate Zone</u> | <u>Energy Rating Index</u> |
|---------------------|----------------------------|
| <u>1</u> | <u>56</u> |
| <u>2</u> | <u>56</u> |
| <u>3</u> | <u>56</u> |
| <u>4</u> | <u>60</u> |
| <u>5</u> | <u>60</u> |
| <u>6</u> | <u>59</u> |
| <u>7</u> | <u>57</u> |
| <u>8</u> | <u>57</u> |

Reasons to support this proposal

- All-or-nothing solutions to the problem are likely to be inconsistent over time and from state to state
- The ERI numbers in this proposal are virtually impossible to meet without meeting the 2015 envelope, and had the support of some major insulation suppliers in 2013 for that reason
- The straw proposal encourages PV as one way of going beyond the prescriptive levels or of compensating for lots of windows
- It allows either the primary ERI table (the table currently in the IECC) or the proposed new backup table (suggested on the last slide), or both, to be lowered in 2021, 2024,...while retaining the **key principle of allowing only limited tradeoffs**