**Economics, Modeling, and Whole-Building Metrics Subcommittee**

**Member Proposal (with two options for consideration)**

**Proponent:** Ian Finlayson, Committee Chair

**Members Submitting:** Gayathri Vijayakumar & Rob Salcido

**2024 International Energy Conservation Code [RE Project]**

**Option 1: Vote on this first, if it fails, vote on Option 2.**

**Revise as follows:**

|  |  |  |
| --- | --- | --- |
| **TABLE R406.5 MAXIMUM ENERGY RATING INDEX** | | |
| **CLIMATE ZONE** | **ENERGY RATING INDEX NOT INCLUDING OPP** | **ENERGY RATING INDEX WITH OPP** |
| 0-1 | 51 | ~~40~~  27 |
| 2 | 51 | ~~40~~  26 |
| 3 | 50 | ~~40~~  24 |
| 4 | 53 | ~~40~~  32 |
| 5 | 54 | ~~40~~  37 |
| 6 | 53 | ~~40~~  39 |
| 7 | 52 | ~~40~~  43 |
| 8 | 52 | ~~40~~  43 |

**Option 2: If this option below also fails, SC should withdraw the Proposal (no need to send to Main)**

**Revise as follows:**

|  |  |  |
| --- | --- | --- |
| **TABLE R406.5 MAXIMUM ENERGY RATING INDEX** | | |
| **CLIMATE ZONE** | **ENERGY RATING INDEX NOT INCLUDING OPP** | **ENERGY RATING INDEX WITH OPP** |
| 0-1 | 51 | ~~40~~  35 |
| 2 | 51 | ~~40~~  34 |
| 3 | 50 | ~~40~~  33 |
| 4 | 53 | 40 |
| 5 | 54 | ~~40~~  43 |
| 6 | 53 | ~~40~~  43 |
| 7 | 52 | ~~40~~  46 |
| 8 | 52 | ~~40~~  46 |

**Reason:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Climate Zone** | **Developed Using PNNL SF Prototypes** | **Building Type** | **R406 Target ERI  without OPP \*** | **1 kW PV Target ERI with OPP** | **2 kW PV Target ERI with OPP** | **3 kW PV Target ERI with OPP** | **4 kW PV Target ERI with OPP** |
| CZ 1 | R406 ERI Home - 51 | Single Family | 51 | 43 | 35 | 27 | 19 |
| CZ 2 | R406 ERI Home - 51 | Single Family | 51 | 42 | 34 | 26 | 18 |
| CZ 3 | R406 ERI Home - 50 | Single Family | 50 | 42 | 33 | 24 | 15 |
| CZ 4 | R406 ERI Home - 53 | Single Family | 53 | 47 | 40 | 32 | 25 |
| CZ 5 | R406 ERI Home - 54 | Single Family | 54 | 49 | 43 | 37 | 32 |
| CZ 6 | R406 ERI Home - 53 | Single Family | 53 | 48 | 43 | 39 | 35 |
| CZ 7 & 8 | R406 ERI Home - 52 | Single Family | 52 | 49 | 46 | 43 | 40 |

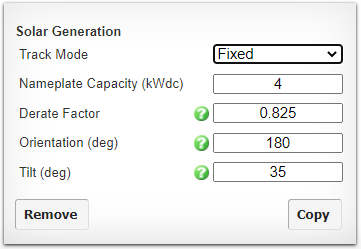
\* R406 ERI "not including OPP" targets in IECC 2024 Public Comment Draft #1

The ERI with OPP targets in Public Comment Draft #1 (40 in every climate zone) were placeholders and not based on any form of analysis. The purpose of this proposal is to update the ERI with OPP targets based on simulation analysis via Residential Energy Services Network (RESNET) Accredited Rating Software (Ekotrope).  PNNL analyzed the single-family prototypes (2376 sq ft) in the Ekotrope Rating software across all system types, foundation types and 19 representative cities based on a national scale analysis. According to NAHB, 2021 fourth quarter Census Quarterly Starts show a median single-family home is 2,338 square feet. Using prototype models that meet the ERI without OPP targets in Public Comment Draft #1 as the baseline, PNNL modeled onsite PV systems (1 kW, 2 kW and 4 kW) to calculate ERI with OPP potential targets based on system size. The modeled PV systems were oriented due south and tilted equal to the site latitude. The results are summarized in the table above.

The decision to propose 2 kW ERI with OPP scores for Table R406.5 was based in part on the fact that a 2 kW size system fits almost any rooftop.  However, based on LBNL and PNNL research, the median size residential PV system in the U.S. in 2021 was 7 kW, with most systems – those within the 20th to 80th percentile – between 4 and 10 kW.

The proposed ERI with OPP targets represent an easy score for a home to meet utilizing onsite PV.

PV specs from Ekotrope - varied capacity (1, 2 or 4) and adjusted tilt to match latitude:



Real Examples for context: CZ5 house with 1500 ft2 footprint, and around 2,700 ft2 of CFA. 30 panels, 7.14 kW, produces ~9,400 kWh/yr (Net-zero for electric, still uses gas for heat/DHW)

A picture containing grass, outdoor

Description automatically generated

Another CZ5 home, with 1384 ft2 CFA…24 panels, ~5 kW.

A picture containing text

Description automatically generated A picture containing grass, outdoor, sky, building

Description automatically generated

**Cost Impact:**

Because the ERI with OPP targets in Public Comment Draft #1 are only placeholders, there is no basis for comparing cost between this proposal and Public Comment Draft #1. Compared to the placeholder targets, the proposed targets are less stringent in four climate zones, more stringent in three climate zones, and the same in one climate zone.

**Bibliography:**

PV System Sizes - Lawrence Berkeley National Laboratory

<https://emp.lbl.gov/sites/default/files/2_tracking_the_sun_2022_report.pdf>