

Memorandum

To: Commissioners

Date: February 7, 2020

Telephone: (916) 654-6560

From: **Dee Anne Ross**
Efficiency Division
California Energy Commission
1516 Ninth Street
Sacramento CA 95814-5512

Subject: **RIGHT-ENERGY TITLE 24 VERSION 2019.1.1 SUMMARY OF RESIDENTIAL ACM TESTS**

Right-Energy Title 24 Version 2019.1.1 is a residential alternative calculation method (ACM) for complying with the 2019 Building Energy Efficiency Standards.

The 2019 Residential ACM Approval Manual CEC-400-2018-023-CMF (December 2018), specifies the requirements for approving vendor software. Section 3.3 is a checklist for compliance submittals. The vendor provided all required items to staff.

Appendix A of the Approval Manual includes the details of the certification tests required. The purpose of ACM testing is to demonstrate that software successfully integrates the compliance manager into the software. A test data set with specific description and details of the tests, inputs, and a spreadsheet of compliance results is provided as back-up materials for this business meeting agenda item.

Staff evaluated the input files and compared the test results as documented in the test data set to ensure compliance with all applicable requirements.

Staff reviewed and tested Right-Energy Title 24 Version 2019.1.1 to ensure it meets the requirements, specifications, and criteria for building energy models set forth in the 2019 ACM Approval Manual.

Summary of Residential ACM Tests (EDR total)

Comparison Date: 1/24/2020
 Comparison Author: Matthew Newburg
 Candidate Software: CBECC-Res 2019_1_1_1572
 Reference Software: CBECC-Res 2019_1_1_1572
 Type of Software: Candidate
 Single Family: Yes
 Multi Family: No
 Newly Constructed: Yes
 Additions Alterations: No
 Units for Summary: EDR total
 Tolerance: 0.04

Test	Pass/ Fail	Average Proposed	Average Standard EDR	Description
		EDR	EDR	
V04	Pass	23.70	25.21	Proposed Design in All Zones for Prototype P2100ft2
V05	Pass	22.33	24.18	Proposed Design in All Zones for Prototype P2700ft2
V07	Pass	24.80	25.90	Common Measures in Zone 12 for Prototype P2100ft2
V08	Pass	25.48	26.18	Water Heating in Zone 12 for Prototype P2100ft2
V11	Pass	28.56	28.64	Source Energy in Zone 12 for Prototype P2100ft2
V17	Pass	31.57	32.98	Proposed Design All Electric in All Zones for Prototype P2100ft2
V18	Pass	29.61	31.29	Proposed Design All Electric in All Zones for Prototype P2700ft2
V20	Pass	22.29	25.90	PV in Zone 12 for Prototype P2100ft2
V21	Pass	17.20	27.87	PV, Battery and Target EDR in Zone 12 for Prototype P2100ft2
V22	Pass	23.25	25.90	Verified and Buried Ducts in Zone 12 for Prototype P2100ft2

Run Date	Project Path/File	Climate Zone	Cond Flr Area	Pass/Fail	EDR	
					Efficiency Margin	EDR Total Margin
1/21/20	C:\CBECC-Res 2019\V04R01-CM\V04R01.ribd19		1	2100 PASS	0.6	0.6
1/21/20	C:\CBECC-Res 2019\V04R02-CM\V04R02.ribd19		2	2100 PASS	1	1
1/21/20	C:\CBECC-Res 2019\V04R03-CM\V04R03.ribd19		3	2100 PASS	1.1	1
1/21/20	C:\CBECC-Res 2019\V04R04-CM\V04R04.ribd19		4	2100 PASS	0.9	0.8
1/21/20	C:\CBECC-Res 2019\V04R05-CM\V04R05.ribd19		5	2100 PASS	1.1	1
1/21/20	C:\CBECC-Res 2019\V04R06-CM\V04R06.ribd19		6	2100 PASS	1.4	1.4
1/21/20	C:\CBECC-Res 2019\V04R07-CM\V04R07.ribd19		7	2100 PASS	0.6	0.6
1/21/20	C:\CBECC-Res 2019\V04R08-CM\V04R08.ribd19		8	2100 PASS	1.6	1.6
1/21/20	C:\CBECC-Res 2019\V04R09-CM\V04R09.ribd19		9	2100 PASS	2	2
1/21/20	C:\CBECC-Res 2019\V04R10-CM\V04R10.ribd19		10	2100 PASS	1.8	1.8
1/21/20	C:\CBECC-Res 2019\V04R11-CM\V04R11.ribd19		11	2100 PASS	2.2	2.2
1/21/20	C:\CBECC-Res 2019\V04R12-CM\V04R12.ribd19		12	2100 PASS	2	2
1/21/20	C:\CBECC-Res 2019\V04R13-CM\V04R13.ribd19		13	2100 PASS	1.9	1.9
1/21/20	C:\CBECC-Res 2019\V04R14-CM\V04R14.ribd19		14	2100 PASS	2.7	2.6
1/21/20	C:\CBECC-Res 2019\V04R15-CM\V04R15.ribd19		15	2100 PASS	1.8	1.8
1/21/20	C:\CBECC-Res 2019\V04R16-CM\V04R16.ribd19		16	2100 PASS	2	1.9
1/21/20	C:\CBECC-Res 2019\V05R01-CM\V05R01.ribd19		1	2700 PASS	0.7	0.7
1/21/20	C:\CBECC-Res 2019\V05R02-CM\V05R02.ribd19		2	2700 PASS	1.9	1.9
1/21/20	C:\CBECC-Res 2019\V05R03-CM\V05R03.ribd19		3	2700 PASS	1.1	1.1
1/21/20	C:\CBECC-Res 2019\V05R04-CM\V05R04.ribd19		4	2700 PASS	3.3	3.2
1/21/20	C:\CBECC-Res 2019\V05R05-CM\V05R05.ribd19		5	2700 PASS	1.1	1.1
1/21/20	C:\CBECC-Res 2019\V05R06-CM\V05R06.ribd19		6	2700 PASS	1.4	1.4
1/21/20	C:\CBECC-Res 2019\V05R07-CM\V05R07.ribd19		7	2700 PASS	0.8	0.8
1/21/20	C:\CBECC-Res 2019\V05R08-CM\V05R08.ribd19		8	2700 PASS	1.6	1.5
1/21/20	C:\CBECC-Res 2019\V05R09-CM\V05R09.ribd19		9	2700 PASS	2.2	2.1
1/21/20	C:\CBECC-Res 2019\V05R10-CM\V05R10.ribd19		10	2700 PASS	2.1	2
1/21/20	C:\CBECC-Res 2019\V05R11-CM\V05R11.ribd19		11	2700 PASS	2.3	2.3
1/21/20	C:\CBECC-Res 2019\V05R12-CM\V05R12.ribd19		12	2700 PASS	2.1	2
1/21/20	C:\CBECC-Res 2019\V05R13-CM\V05R13.ribd19		13	2700 PASS	2.3	2.3
1/21/20	C:\CBECC-Res 2019\V05R14-CM\V05R14.ribd19		14	2700 PASS	2.8	2.8
1/21/20	C:\CBECC-Res 2019\V05R15-CM\V05R15.ribd19		15	2700 PASS	2.2	2.2

Run Date	Project Path/File	Climate Zone	Cond Flr Area	Pass/Fail	EDR	
					Efficiency Margin	EDR Total Margin
1/21/20	C:\CBECC-Res 2019\V05R16-CM\V05R16.ribd19	16	2700	PASS	2.3	2.2
1/21/20	C:\CBECC-Res 2019\V07\V07R01-CM\V07R01.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V07\V07R02-CM\V07R02.ribd19	12	2100	FAIL	-0.3	-0.3
1/21/20	C:\CBECC-Res 2019\V07\V07R03-CM\V07R03.ribd19	12	2100	FAIL	-0.9	-0.9
1/21/20	C:\CBECC-Res 2019\V07\V07R04-CM\V07R04.ribd19	12	2100	FAIL	-1.6	-1.6
1/21/20	C:\CBECC-Res 2019\V07\V07R05-CM\V07R05.ribd19	12	2100	PASS	3.2	3.1
1/21/20	C:\CBECC-Res 2019\V07\V07R06-CM\V07R06.ribd19	12	2100	PASS	2.9	2.9
1/21/20	C:\CBECC-Res 2019\V07\V07R07-CM\V07R07.ribd19	12	2100	PASS	1.2	1.2
1/21/20	C:\CBECC-Res 2019\V07\V07R08-CM\V07R08.ribd19	12	2100	PASS	2.3	2.3
1/21/20	C:\CBECC-Res 2019\V07\V07R09-CM\V07R09.ribd19	12	2100	FAIL	-0.1	-0.1
1/21/20	C:\CBECC-Res 2019\V07\V07R10-CM\V07R10.ribd19	12	2100	PASS	2.4	2.4
1/21/20	C:\CBECC-Res 2019\V08\V08R01-CM\V08R01.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V08\V08R02-CM\V08R02.ribd19	12	2100	PASS	2	1.9
1/21/20	C:\CBECC-Res 2019\V08\V08R03-CM\V08R03.ribd19	12	2100	PASS	2.7	2.7
1/21/20	C:\CBECC-Res 2019\V08\V08R04-CM\V08R04.ribd19	12	2100	PASS	0.2	0.1
1/21/20	C:\CBECC-Res 2019\V08\V08R05-CM\V08R05.ribd19	12	2100	PASS	3.2	3.2
1/21/20	C:\CBECC-Res 2019\V08\V08R06-CM\V08R06.ribd19	12	2100	FAIL	-1	-1
1/21/20	C:\CBECC-Res 2019\V08\V08R07-CM\V08R07.ribd19	12	2100	FAIL	-6.8	-6.8
1/21/20	C:\CBECC-Res 2019\V08\V08R08-CM\V08R08.ribd19	12	2100	PASS	3.4	3.3
1/21/20	C:\CBECC-Res 2019\V08\V08R09-CM\V08R09.ribd19	12	2100	PASS	0.8	0.8
1/21/20	C:\CBECC-Res 2019\V08\V08R10-CM\V08R10.ribd19	12	2100	PASS	0.8	0.8
1/21/20	C:\CBECC-Res 2019\V09\V09R06-CM\V09R06.ribd19	12	2100	FAIL	-0.5	-0.5
1/21/20	C:\CBECC-Res 2019\V09\V09R07-CM\V09R07.ribd19	12	2100	FAIL	-1.7	-1.7
1/21/20	C:\CBECC-Res 2019\V09\V09R07-CM\V09R07.ribd19	12	2100	FAIL	2	2
1/21/20	C:\CBECC-Res 2019\V09\V09R07-CM\V09R07.ribd19	12	2100	FAIL	-1.7	-1.7
1/21/20	C:\CBECC-Res 2019\V09\V09R07-CM\V09R07.ribd19	12	2100	FAIL	1.3	1.3
1/21/20	C:\CBECC-Res 2019\V09\V09R07-CM\V09R07.ribd19	12	2100	FAIL	-0.4	-0.4
1/21/20	C:\CBECC-Res 2019\V11\V11R01-CM\V11R01.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V11\V11R02-CM\V11R02.ribd19	12	2100	PASS	1.8	1.7
1/21/20	C:\CBECC-Res 2019\V11\V11R03-CM\V11R03.ribd19	12	2100	FAIL	-8	-7.9
1/21/20	C:\CBECC-Res 2019\V11\V11R04-CM\V11R04.ribd19	12	2100	FAIL	-6	-5.8

Run Date	Project Path/File	Climate Zone	Cond Flr Area	Pass/Fail	EDR	
					Efficiency Margin	EDR Total Margin
1/21/20	C:\CBECC-Res 2019\V11\V11R05-CM\V11R05.ribd19	12	2100	PASS	1.9	1.9
1/21/20	C:\CBECC-Res 2019\V11\V11R06-CM\V11R06.ribd19	12	2100	PASS	1.8	1.8
1/21/20	C:\CBECC-Res 2019\V11\V11R07-CM\V11R07.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V11\V11R08-CM\V11R08.ribd19	12	2100	PASS	1.6	1.6
1/21/20	C:\CBECC-Res 2019\V11\V11R09-CM\V11R09.ribd19	12	2100	PASS	1.8	1.8
1/21/20	C:\CBECC-Res 2019\V11\V11R10-CM\V11R10.ribd19	12	2100	PASS	1.7	1.7
1/21/20	C:\CBECC-Res 2019\V17\V17R01-CM\V17R01.ribd19	1	2100	PASS	1	1
1/21/20	C:\CBECC-Res 2019\V17\V17R02-CM\V17R02.ribd19	2	2100	PASS	0.5	0.4
1/21/20	C:\CBECC-Res 2019\V17\V17R03-CM\V17R03.ribd19	3	2100	PASS	1	0.9
1/21/20	C:\CBECC-Res 2019\V17\V17R04-CM\V17R04.ribd19	4	2100	PASS	1.2	1.2
1/21/20	C:\CBECC-Res 2019\V17\V17R05-CM\V17R05.ribd19	5	2100	PASS	1.2	1.1
1/21/20	C:\CBECC-Res 2019\V17\V17R06-CM\V17R06.ribd19	6	2100	PASS	1	1
1/21/20	C:\CBECC-Res 2019\V17\V17R07-CM\V17R07.ribd19	7	2100	PASS	0.4	0.5
1/21/20	C:\CBECC-Res 2019\V17\V17R08-CM\V17R08.ribd19	8	2100	PASS	1.6	1.5
1/21/20	C:\CBECC-Res 2019\V17\V17R09-CM\V17R09.ribd19	9	2100	PASS	1.8	1.8
1/21/20	C:\CBECC-Res 2019\V17\V17R10-CM\V17R10.ribd19	10	2100	PASS	1.7	1.7
1/21/20	C:\CBECC-Res 2019\V17\V17R11-CM\V17R11.ribd19	11	2100	PASS	1.9	1.9
1/21/20	C:\CBECC-Res 2019\V17\V17R12-CM\V17R12.ribd19	12	2100	PASS	1.7	1.7
1/21/20	C:\CBECC-Res 2019\V17\V17R13-CM\V17R13.ribd19	13	2100	PASS	1.9	1.8
1/21/20	C:\CBECC-Res 2019\V17\V17R14-CM\V17R14.ribd19	14	2100	PASS	2.2	2.3
1/21/20	C:\CBECC-Res 2019\V17\V17R15-CM\V17R15.ribd19	15	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V17\V17R16-CM\V17R16.ribd19	16	2100	PASS	1.8	1.7
1/21/20	C:\CBECC-Res 2019\V18\V18R01-CM\V18R01.ribd19	1	2700	PASS	1.1	1.1
1/21/20	C:\CBECC-Res 2019\V18\V18R02-CM\V18R02.ribd19	2	2700	PASS	1.4	1.4
1/21/20	C:\CBECC-Res 2019\V18\V18R03-CM\V18R03.ribd19	3	2700	PASS	1.1	1.1
1/21/20	C:\CBECC-Res 2019\V18\V18R04-CM\V18R04.ribd19	4	2700	PASS	1	1
1/21/20	C:\CBECC-Res 2019\V18\V18R05-CM\V18R05.ribd19	5	2700	PASS	1.2	1.3
1/21/20	C:\CBECC-Res 2019\V18\V18R06-CM\V18R06.ribd19	6	2700	PASS	1.2	1.2
1/21/20	C:\CBECC-Res 2019\V18\V18R07-CM\V18R07.ribd19	7	2700	PASS	0.6	0.6
1/21/20	C:\CBECC-Res 2019\V18\V18R08-CM\V18R08.ribd19	8	2700	PASS	1.6	1.5
1/21/20	C:\CBECC-Res 2019\V18\V18R09-CM\V18R09.ribd19	9	2700	PASS	2.1	2.1

Run Date	Project Path/File	Climate Zone	Cond Flr Area	Pass/Fail	EDR	
					Efficiency Margin	EDR Total Margin
1/21/20	C:\CBECC-Res 2019\V18\V18R10-CM\V18R10.ribd19	10	2700	PASS	2	2.1
1/21/20	C:\CBECC-Res 2019\V18\V18R11-CM\V18R11.ribd19	11	2700	PASS	2.3	2.2
1/21/20	C:\CBECC-Res 2019\V18\V18R12-CM\V18R12.ribd19	12	2700	PASS	1.9	1.9
1/21/20	C:\CBECC-Res 2019\V18\V18R13-CM\V18R13.ribd19	13	2700	PASS	2.3	2.2
1/21/20	C:\CBECC-Res 2019\V18\V18R14-CM\V18R14.ribd19	14	2700	PASS	2.7	2.7
1/21/20	C:\CBECC-Res 2019\V18\V18R15-CM\V18R15.ribd19	15	2700	PASS	2.3	2.4
1/21/20	C:\CBECC-Res 2019\V18\V18R16-CM\V18R16.ribd19	16	2700	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V20\V20R01-CM\V20R01.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V20\V20R02-CM\V20R02.ribd19	12	2100	PASS	2	1.7
1/21/20	C:\CBECC-Res 2019\V20\V20R03-CM\V20R03.ribd19	12	2100	FAIL	2	-2.9
1/21/20	C:\CBECC-Res 2019\V20\V20R04-CM\V20R04.ribd19	12	2100	PASS	2	2.4
1/21/20	C:\CBECC-Res 2019\V20\V20R05-CM\V20R05.ribd19	12	2100	PASS	2	10.5
1/21/20	C:\CBECC-Res 2019\V20\V20R06-CM\V20R06.ribd19	12	2100	PASS	2	13
1/21/20	C:\CBECC-Res 2019\V20\V20R07-CM\V20R07.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V20\V20R08-CM\V20R08.ribd19	12	2100	PASS	2	1.8
1/21/20	C:\CBECC-Res 2019\V20\V20R09-CM\V20R09.ribd19	12	2100	PASS	2	1.8
1/21/20	C:\CBECC-Res 2019\V20\V20R10-CM\V20R10.ribd19	12	2100	PASS	2	3.8
1/21/20	C:\CBECC-Res 2019\V21\V21R01-CM\V21R01.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V21\V21R02-CM\V21R02.ribd19	12	2100	FAIL	2	-2.9
1/21/20	C:\CBECC-Res 2019\V21\V21R03-CM\V21R03.ribd19	12	2100	FAIL	2	-4.1
1/21/20	C:\CBECC-Res 2019\V21\V21R04-CM\V21R04.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V21\V21R05-CM\V21R05.ribd19	12	2100	PASS	2	20.5
1/21/20	C:\CBECC-Res 2019\V21\V21R06-CM\V21R06.ribd19	12	2100	PASS	2	30.7
1/21/20	C:\CBECC-Res 2019\V21\V21R07-CM\V21R07.ribd19	12	2100	PASS	2	32.7
1/21/20	C:\CBECC-Res 2019\V21\V21R08-CM\V21R08.ribd19	12	2100	PASS	5.3	20.5
1/21/20	C:\CBECC-Res 2019\V21\V21R09-CM\V21R09.ribd19	12	2100	FAIL	2.8	-9
1/21/20	C:\CBECC-Res 2019\V21\V21R10-CM\V21R10.ribd19	12	2100	PASS	5.3	25.9
1/21/20	C:\CBECC-Res 2019\V22\V22R01-CM\V22R01.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V22\V22R02-CM\V22R02.ribd19	12	2100	PASS	2	2
1/21/20	C:\CBECC-Res 2019\V22\V22R03-CM\V22R03.ribd19	12	2100	PASS	2.7	2.7
1/21/20	C:\CBECC-Res 2019\V22\V22R04-CM\V22R04.ribd19	12	2100	PASS	3.2	3.2

Run Date	Project Path/File	Climate Zone	Cond Flr Area	Pass/Fail	EDR	
					Efficiency Margin	EDR Total Margin
1/21/20	C:\CBECC-Res 2019\V22\V22R05-CM\V22R05.ribd19	12	2100	PASS	2.7	2.7
1/21/20	C:\CBECC-Res 2019\V22\V22R06-CM\V22R06.ribd19	12	2100	PASS	3.4	3.4
1/21/20	C:\CBECC-Res 2019\V22\V22R07-CM\V22R07.ribd19	12	2100	PASS	3.4	3.4
1/21/20	C:\CBECC-Res 2019\V22\V22R08-CM\V22R08.ribd19	12	2100	PASS	3.4	3.4
1/21/20	C:\CBECC-Res 2019\V22\V22R09-CM\V22R09.ribd19	12	2100	PASS	3.6	3.5
1/21/20	C:\CBECC-Res 2019\V22\V22R10-CM\V22R10.ribd19	12	2100	PASS	0.2	0.2

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

**2019 BUILDING ENERGY EFFICIENCY
STANDARDS, CALIFORNIA CODE OF
REGULATIONS, TITLE 24, PARTS 1
AND 6**

Docket No. 19-BSTD-01

**RESOLUTION OF THE ENERGY COMMISSION
APPROVING 2019 RESIDENTIAL COMPLIANCE SOFTWARE
RIGHT-ENERGY VERSION 2019.1.1**

WHEREAS, the Warren-Alquist State Energy Resources Conservation and Development Act,¹ requires the California Energy Commission (CEC) to, among other things, establish a process for certifying calculation methods for demonstrating compliance with its building energy efficiency standards; and

WHEREAS, as allowed by the *2019 Building Energy Efficiency Standards* (Standards),² sections 10-109 and 10-110, an application was submitted to approve Right-Energy 2019.1.1 as an alternative calculation method; and

WHEREAS, as described in the Right-Energy Summary of Residential Alternative Calculation Method (ACM) Tests presented to the CEC along with this proposed resolution, staff of the CEC reviewed and tested Right-Energy 2019.1.1 to ensure it meets the requirements, specifications, and criteria for building energy models set forth in the 2019 ACM Approval Manual, CEC-400-2018-023-CMF (December 2018); and

THEREFORE, the CEC approves Right-Energy 2019.1.1, pursuant to Standards section 10-109, for estimating energy consumed by residential buildings as specified in Public Resources Code section 25402.1, subdivision (a), and for demonstrating compliance with the performance-based residential provisions of the

2019 Building Energy Efficiency Standards, California Code of Regulations, Title 24, Parts 1 and 6; and

¹ Public Resources Code section 25402.1, subd. (b).

² California Code of Regulations, Title 24, Part 1, Chapter 10.

THEREFORE, the CEC directs the executive director to take, on behalf of the CEC, all actions reasonably necessary to implement this resolution, as follows:

- To post information on the CEC's public website as to how to obtain Right-Energy 2019.1.1.
- To ensure that Right-Energy 2019.1.1, a Residential Alternative Calculation Method (ACM), is maintained and revised to accurately estimate the energy use of single-family residential buildings.
- To review and approve updates to vender software, consistent with Section 1 of the 2019 ACM Approval Manual.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of an Order duly and regularly adopted at a meeting of the CEC held on February 20, 2020.

AYE:

NAY:

ABSENT:

ABSTAIN:

Cody Goldthrite
Secretariat