The California State University
OFFICE OF THE CHANCELLOR

CSU Compliance Requirements for 2022 Title 24 Building Energy Efficiency Standards

CSU Compliance Requirements for 2022 Title 24 Building Energy Efficiency Standards

New and major renovation CSU buildings shall demonstrate compliance with Title 24 Energy Standards utilizing the performance-based approach (Section 141 – Performance Approach: Energy Budgets). One of the energy analysis software programs approved by the California Energy Commission shall be utilized for this compliance. The Prescriptive approach to Title 24 is not acceptable.

Title 24 calculations are required at Preliminary, 50% CD, and 95% CD design phase submittals for the overall building (all building elements), as well as by each of the three building elements including (1) envelope, (2) indoor lighting, and (3) mechanical & domestic hot water. The results of these calculations shall be included as a summary in a table form as part of the Basis of Design Report submittal. Certificate of Compliance forms shall also be included in the final Construction Document package. Several of these forms are required to be placed on the plans.

The Performance Certificate of Compliance energy use summary shall indicate that overall and component energy usage meet the CSU goals listed in the table below:

Component	CSU Target Percent Better than Standard (excluding process)
Overall	TDV Total ≥ 10%
Envelope Only	TDV Efficiency ≥ 0%
Indoor Lighting Only	TDV Efficiency ≥ 0%
Mechanical and Domestic Hot Water Only	TDV Efficiency ≥ 0%

TDV Efficiency is defined as an hourly energy cost metric for electricity and natural gas in place of a flat energy value throughout the day and does not include Solar PV and Batteries. TDV Total is an hourly energy cost metric for electricity and natural gas in place of a flat energy value throughout the day and includes Solar PV and Batteries.

Per the 2022 Title 24 Building Energy Efficiency Standards, the Standard Design must be modeled with Solar PV and Batteries, and the Proposed Design TDV Total Compliance is compared to the Standard Design that includes PV and Batteries.

The percentages above do not include “process” energy usage as defined by the Energy Standard. A “≥0%” target means that the component can perform no worse than the prescriptive minimum required by Title 24.

If overall or any building elements fall short of the percentages indicated in the table above, building components must be redesigned until the “Percent Better than Standard” value is greater or equal to the above percentages.

The example below is for EnergyPro v9.1, but any other CEC-certified program may be used. The Modeled Percent Better than Standard column in the table below has been extracted from the Performance Certificate of Compliance energy use summary NRCC-PRF-01-E for a recent building project.

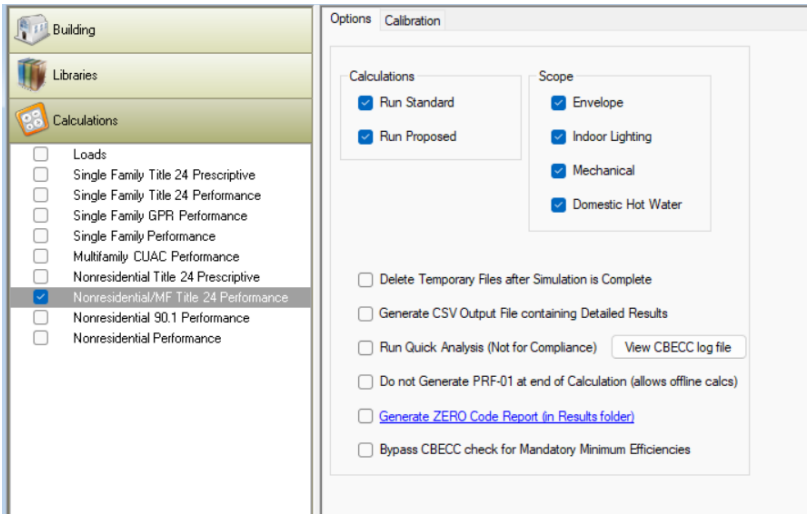
Sample Project Table Summary

Component	CSU Target Percent Better than Standard (excluding process)	Modeled Percent Better than Standard (excluding process)	Comment
Overall	≥ 10%	12.1%	Overall building (TDV Total) complies with CSU target of a minimum compliance margin ≥ 10%.
Envelope only	≥ 0%	4.1%	Building Envelope (TDV Efficiency) complies with CSU target of a minimum compliance margin of ≥ 0%.
Indoor Lighting only	≥ 0%	9.8%	Indoor Lighting (TDV Efficiency) systems complies with CSU target of a minimum compliance margin of ≥ 0%
Mechanical & Domestic Hot Water	≥ 0%	0.6%	Mechanical & Domestic Hot Water systems (TDV Efficiency) comply with CSU target of a minimum compliance margin of ≥ 0%

In this example, the whole building meets the 10% overall building energy target and the envelope, indoor lighting, mechanical & domestic hot water each individually meet the ≥0% target for each discipline. So, the building does comply with CSU goals.

The “Overall” analysis includes all building elements. This is accomplished in EnergyPro by marking the check boxes for all disciplines under Options in the Calculations Options window, as shown in Figure 1 below. The Calculations Options display can be accessed by clicking on Calculations in the lower left-hand corner, clicking on the applicable simulation type “Nonresidential/MF Title-24 Performance,” and then select the Options tab.

Figure 1. EnergyPro Calculation Options Screen – All Disciplines Modeled



The program is executed, and the results can be seen by viewing the Performance Report on page 4 of the NRCC- PRF-01-E form, as shown in Figure 2. In this example, the building modeled with all disciplines has a margin of compliance of 12.1% excluding process − see the "TOTAL COMPLIANCE" line in the Annual TDV Energy Use Summary. The building does comply with a target Percent better than the Standard of ≥10%.

Figure 2. Performance Certificate of Compliance TDV Summary – All Disciplines Modeled

C2. TDV ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft^2 - yr)			
COMPLIES[2]			
Energy Component	**Standard Design (TDV)**	**Proposed Design (TDV)**	**Compliance Margin (TDV)[1]**
Space Heating	10.89	42.27	-31.38
Space Cooling	121.19	94.68	26.51
Indoor Fans	123.47	115.39	8.08
Heat Rejection	0	2.22	-2.22
Pumps & Misc.	0	11.09	-11.09
Domestic Hot Water	61.47	45.12	16.35
Indoor Lighting	69.41	62.58	6.83
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**386.43**	**373.35**	**13.08 (3.4%)**
Photovoltaics	-111.03	-131.36	20.33
Batteries	-0.01	---	-0.01
TOTAL COMPLIANCE	**275.39**	**241.99**	**33.4 (12.1%)**
[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*			

We must also test the performance of each discipline. First, check the envelope. To do this, check only the Envelope checkbox in the Calculation Options window, as shown in Figure 3. Uncheck the Lighting, Mechanical, and Domestic Hot Water components.

Figure 3. EnergyPro Calculation Options Screen – Envelope Only

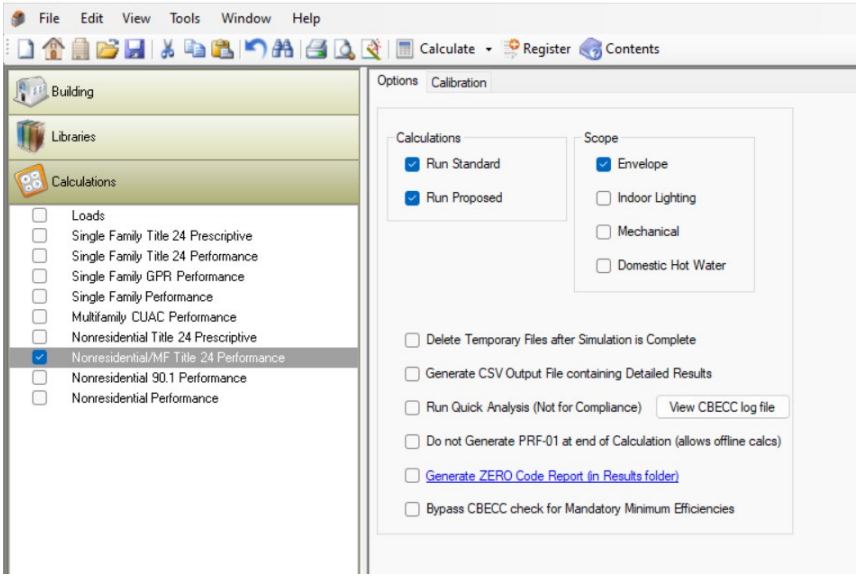


Figure 4 shows Table C2 of NRCC-PRF-01-E results. The envelope alone does comply by 4.1%, exceeding the ≥0% target. Thus, the envelope does meet the CSU minimum Title 24 requirements.

Figure 4. Performance Certificate of Compliance TDV Summary – Envelope Only

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD	NRCC-PRF-E
Nonresidential Performance Compliance Method	(Page 4 of 14)

C2. TDV ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft² - yr)

COMPLIES²

Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV)¹
Space Heating	10.86	10.54	0.32
Space Cooling	122.7	108.76	13.94
Indoor Fans	123.93	124.69	-0.76
Heat Rejection	0	0	0
Pumps & Misc.	0	0	0
Domestic Hot Water	0	0	0
Indoor Lighting	69.41	69.43	-0.02
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**326.9**	**313.42**	**13.48 (4.1%)**

Then check the lighting. To do this, check only the Indoor Lighting checkbox in the Calculation Options window, as shown in Figure 5.

Figure 5. EnergyPro Calculation Options Screen – Lighting Only

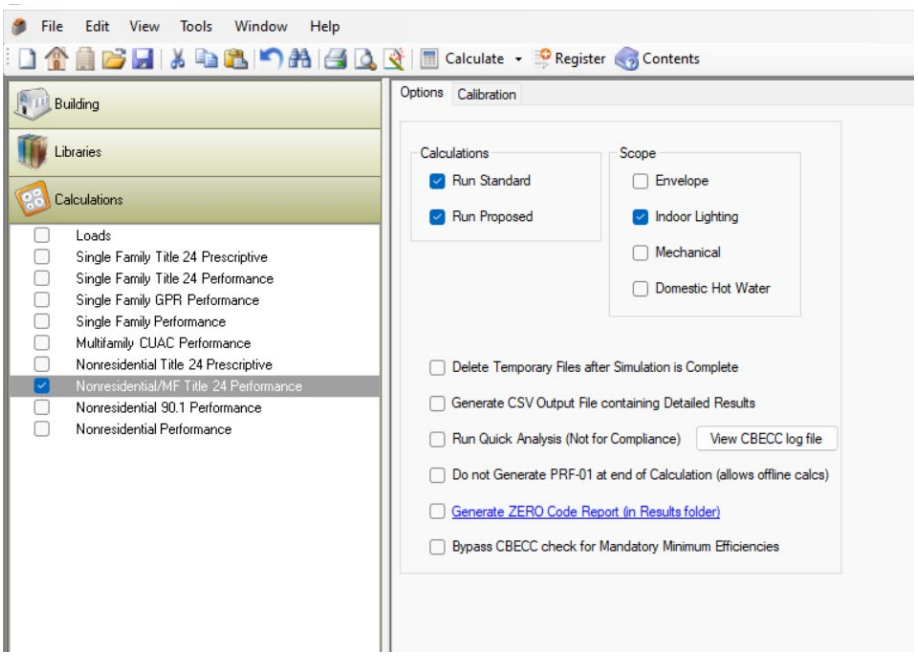


Figure 6 shows Table C2 of NRCC-PRF-01-E results. The lighting alone complies by 9.8% (6.8 TDV), exceeding the ≥ 0% target for indoor lighting. So, the lighting design meets the CSU target.

Figure 6. Performance Certificate of Compliance TDV Summary – Lighting Only

C2. TDV ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft^2 - yr)			
COMPLIES^2			
Energy Component	**Standard Design (TDV)**	**Proposed Design (TDV)**	**Compliance Margin (TDV)^1**
Space Heating	10.86	10.74	0.12
Space Cooling	122.7	107.86	14.84
Indoor Fans	123.93	124.43	-0.5
Heat Rejection	0	0	0
Pumps & Misc.	0	0	0
Domestic Hot Water	0	0	0
Indoor Lighting	69.41	62.58	6.83

Finally, the mechanical & domestic hot water systems must comply. To do this, check only the Mechanical and Domestic Hot Water checkbox in the Calculation Options window, as shown in Figure 7.

Figure 7. EnergyPro Calculation Options Screen – Mechanical Only

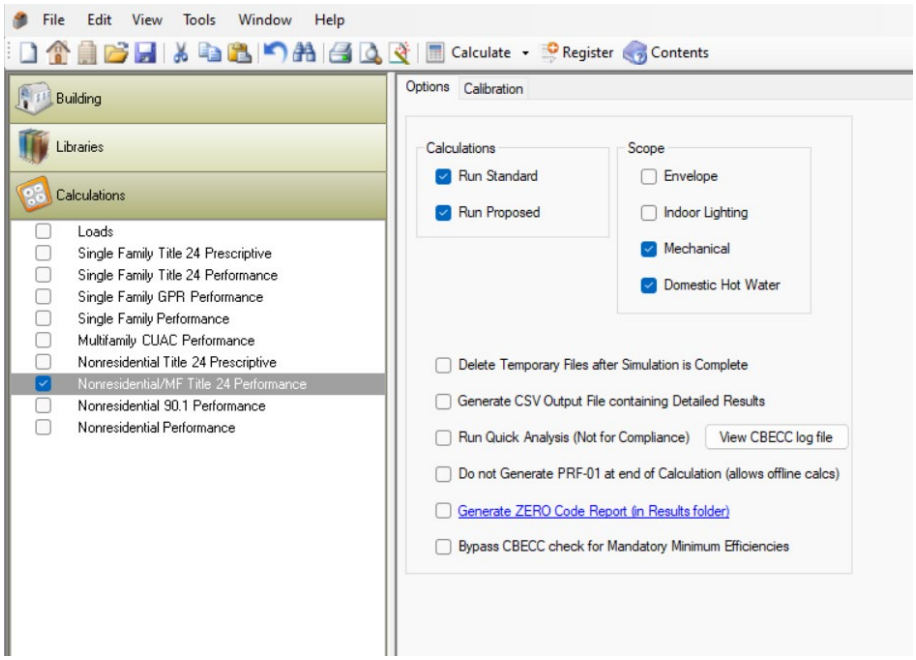


Figure 8 shows the NRCC-PRF-01-E results. The mechanical & domestic hot water systems alone beat Title 24 by 0.6% and thus complies with the CSU target of ≥ 0%.

Figure 8. Performance Certificate of Compliance TDV Summary – Mechanical Only

C2. TDV ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft^2 - yr)			
COMPLIES[2]			
Energy Component	**Standard Design (TDV)**	**Proposed Design (TDV)**	**Compliance Margin (TDV)[1]**
Space Heating	10.79	42.36	-31.57
Space Cooling	106.08	93.86	12.22
Indoor Fans	123.82	104.46	19.36
Heat Rejection	0	2.13	-2.13
Pumps & Misc.	0	11.88	-11.88
Domestic Hot Water	61.47	45.12	16.35
Indoor Lighting	62.58	62.58	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**364.74**	**362.39**	**2.35 (0.6%)**

In this example, the whole building meets the ≥10% CSU overall building energy target, and the envelope, lighting, and mechanical & domestic hot water systems each individually meet the ≥ 0% target for each discipline. So, the building does comply with CSU goals.