



CSU

The California State University

OFFICE OF THE CHANCELLOR



CSU Compliance Requirements for 2016 and 2019 Title 24 Building Energy Efficiency Standards

Rev: 3/21/19

CSU Compliance Requirements for 2016 and 2019 Title 24 Building Energy Efficiency Standards

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 each design phase submittal 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 as part of 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	≥ 10%
Envelope Only	≥ 0%
Indoor Lighting Only	≥ 0%
Mechanical and Domestic Hot Water Only	≥ 0%

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

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

The example shown below is for EnergyPro v7.2.4.0 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.

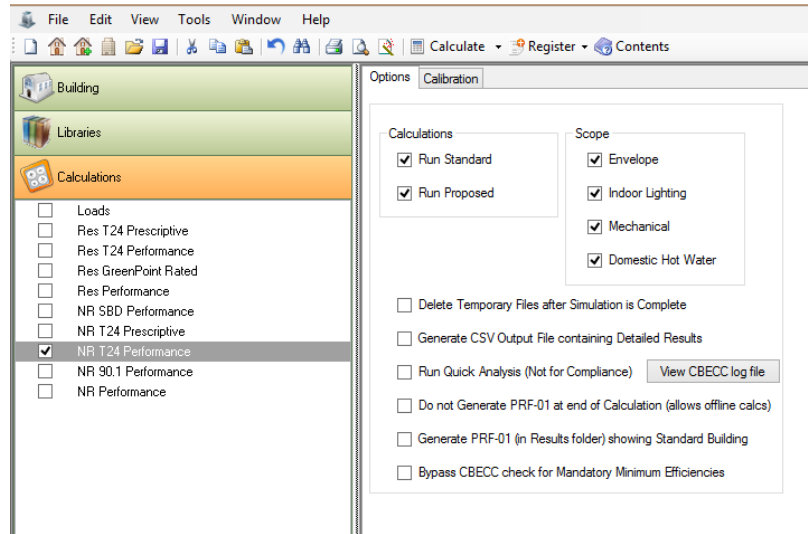
Sample Project Table Summary

Component	CSU Target Percent Better than Standard (excluding process)	Modeled Percent Better than Standard (excluding process)	Comment
Overall	≥ 10%	15.8%	Overall building complies with CSU target of a minimum compliance margin ≥ 10%.
Envelope only	≥ 0%	2.5%	Building Envelope complies with CSU target of a minimum compliance margin of ≥ 0%.
Indoor Lighting only	≥ 0%	6.5%	Indoor Lighting systems complies with CSU target of a minimum compliance margin of ≥ 0%
Mechanical & Domestic Hot Water	≥ 0%	5.9%	Mechanical & Domestic Hot Water systems comply with CSU target of a minimum compliance margin of ≥ 0%

In this example, the building as a whole 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 “NR T24 Performance,” and then selecting 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 1 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 22.5% excluding process – see the “Percent Better than Standard” line in the Annual TDV Energy Use Summary. The building does comply with a target Percent better than Standard of $\geq 10\%$.

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

Project Name:	Santa Ana College-Johnson Center	NRCC-PRF-01-E	Page 1 of 56
Project Address:	1530 W 17th St Santa Ana 92706	Calculation Date/Time:	14:12, Tue, Feb 05, 2019
Compliance Scope:	NewComplete	Input File Name:	7411_Johnson Center_05_16_2018 Official Model.cibd16x

A. PROJECT GENERAL INFORMATION					
1.	Project Location (city)	Santa Ana	8.	Standards Version	Compliance2016
2.	CA Zip Code	92706	9.	Compliance Software (version)	EnergyPro 7.2
3.	Climate Zone	8	10.	Weather File	SANTA-ANA_722977_CZ2010.epw
4.	Total Conditioned Floor Area in Scope	56,679 ft ²	11.	Building Orientation (deg)	(N) 0 deg
5.	Total Unconditioned Floor Area	1,473 ft ²	12.	Permitted Scope of Work	NewComplete
6.	Total # of Stories (Habitable Above Grade)	2	13.	Building Type(s)	Nonresidential
7.	Total # of dwelling units	0	14.	Gas Type	NaturalGas

B. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft ² -yr)					§ 140.1
BUILDING COMPLIES					
1. Energy Component	2. Standard Design (TDV)	3. Proposed Design (TDV)	4. Compliance Margin (TDV)	5. Percent Better than Standard	
Space Heating	16.35	11.83	4.52	27.6%	
Space Cooling	75.96	51.34	24.62	32.4%	
Indoor Fans	29.47	20.38	9.09	30.8%	
Heat Rejection	--	1.41	-1.41	--	
Pumps & Misc.	1.55	19.67	-18.12	-1169.0%	
Domestic Hot Water	2.68	1.90	0.78	29.1%	
Indoor Lighting	41.80	23.56	18.24	43.6%	
COMPLIANCE TOTAL	167.81	130.09	37.72	22.5%	
Receptacle	79.69	79.69	0.0	0.0%	
Process	3.60	3.60	0.0	0.0%	
Other Ltg	--	--	--	--	
Process Motors	1.16	1.16	0.0	0.0%	
TOTAL	252.26	214.54	37.7	15.0%	

We must also test the performance of each discipline. First, check the envelope. To do this, check only the Envelope check-box 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

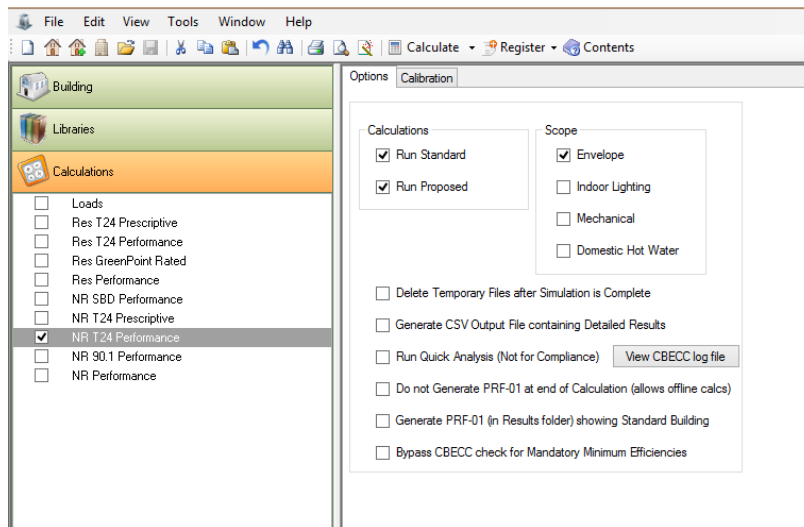


Figure 4 shows the NRCC-PRF-01-E results. The envelope alone does comply by 2.5% exceeding the $\geq 0\%$ target. Thus, the envelope does meet the CSU minimum Title 24 requirements.

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

CSU Office of the Chancellor
 CSU Compliance Requirements for 2016 and 2019
 Title 24 Building Energy Efficiency Standards

Project Name:	Santa Ana College-Johnson Center	NRCC-PRF-01-E	Page 1 of 14
Project Address:	1530 W 17th St Santa Ana 92706	Calculation Date/Time:	14:27, Tue, Feb 05, 2019
Compliance Scope:	NewEnvelope	Input File Name:	7411_Johnson Center_05_16_2018 Official Model.cibd16x

A. PROJECT GENERAL INFORMATION					
1.	Project Location (city)	Santa Ana	8.	Standards Version	Compliance2016
2.	CA Zip Code	92706	9.	Compliance Software (version)	EnergyPro 7.2
3.	Climate Zone	8	10.	Weather File	SANTA-ANA_722977_CZ2010.epw
4.	Total Conditioned Floor Area in Scope	56,679 ft ²	11.	Building Orientation (deg)	(N) 0 deg
5.	Total Unconditioned Floor Area	1,473 ft ²	12.	Permitted Scope of Work	NewEnvelope
6.	Total # of Stories (Habitable Above Grade)	2	13.	Building Type(s)	Nonresidential
7.	Total # of dwelling units	0	14.	Gas Type	NaturalGas

B. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft ² -yr)					§ 140.1
BUILDING COMPLIES					
1. Energy Component	2. Standard Design (TDV)	3. Proposed Design (TDV)	4. Compliance Margin (TDV)	5. Percent Better than Standard	
Space Heating	16.40	12.67	3.73	22.7%	
Space Cooling	75.77	72.21	3.56	4.7%	
Indoor Fans	22.75	22.12	0.63	2.8%	
Heat Rejection	--	--	--	--	
Pumps & Misc.	1.55	1.68	-0.13	-8.4%	
Domestic Hot Water	--	--	--	--	
Indoor Lighting	41.40	45.17	-3.77	-9.1%	
COMPLIANCE TOTAL	157.87	153.85	4.02	2.5%	
Receptacle	78.53	78.53	0.0	0.0%	
Process	3.60	3.60	0.0	0.0%	
Other Ltg	--	--	--	--	
Process Motors	--	--	--	--	
TOTAL	240.00	235.98	4.0	1.7%	

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

Figure 5. EnergyPro Calculation Options Screen – Lighting Only

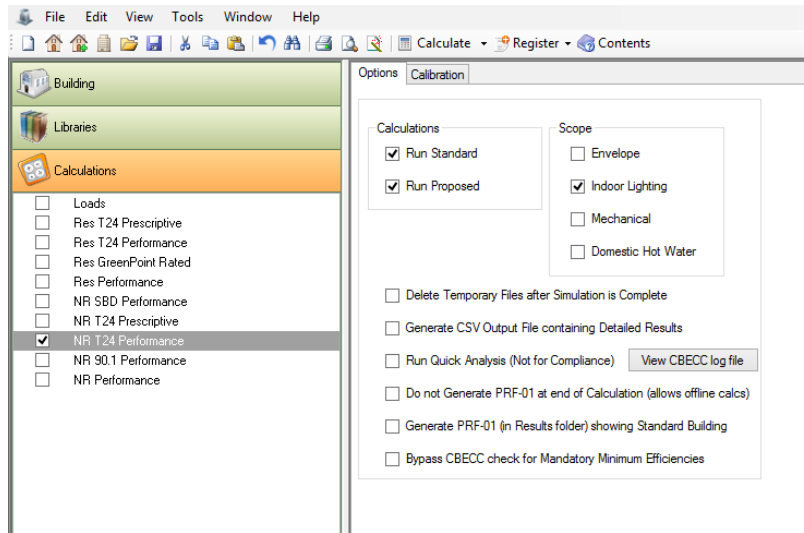


Figure 6 shows the NRCC-PRF-01-E results. The lighting alone complies by 6.5%, exceeding the $\geq 0\%$ target for indoor lighting. So, the lighting design meets the CSU target.

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

PERFORMANCE CERTIFICATE OF COMPLIANCE			(Part 2 of 3)	PERF-1-C
Project Name <i>Nonresidential Sample Building</i>				Date 6/25/2009
ANNUAL TDV ENERGY USE SUMMARY (kBtu/sqft-yr)				
Energy Component	Standard Design	Proposed Design	Compliance Margin	
Space Heating	5.60	6.55	-0.95	
Space Cooling	96.07	93.28	2.79	
Indoor Fans	36.58	35.64	0.94	
Heat Rejection	0.00	0.00	0.00	
Pumps & Misc.	0.00	0.00	0.00	
Domestic Hot Water	0.00	0.00	0.00	
Lighting	56.30	40.91	15.39	
Receptacle	85.31	85.31	0.00	
Process	0.00	0.00	0.00	
TOTALS	279.86	261.69	18.17	
Percent better than Standard		6.5 %	(6.5 % excluding process)	

Finally, let's test mechanical & domestic hot water systems. To do this, check only the Mechanical and Domestic Hot Water check-box in the Calculation Options window as shown in Figure 7.

Figure 7. EnergyPro Calculation Options Screen – Mechanical Only

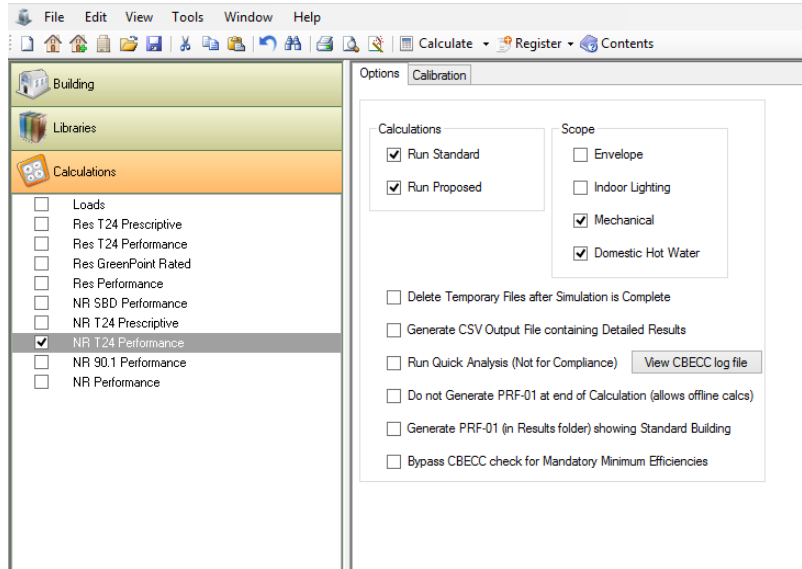


Figure 8 shows the NRCC-PRF-01-E results. The mechanical & domestic hot water systems alone beat Title 24 by 5.9% and thus complies with the CSU target of $\geq 0\%$.

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

Project Name: Santa Ana College-Johnson Center		NRCC-PRF-01-E		Page 1 of 33	
Project Address: 1530 W 17th St Santa Ana 92706		Calculation Date/Time: 14:38, Tue, Feb 05, 2019			
Compliance Scope: NewMechanical		Input File Name: 7411_Johnson Center_05_16_2018 Official Model.cibd16x			
A. PROJECT GENERAL INFORMATION					
1.	Project Location (city)	Santa Ana	8.	Standards Version	Compliance2016
2.	CA Zip Code	92706	9.	Compliance Software (version)	EnergyPro 7.2
3.	Climate Zone	8	10.	Weather File	SANTA-ANA_722977_CZ2010.epw
4.	Total Conditioned Floor Area in Scope	56,679 ft ²	11.	Building Orientation (deg)	(N) 0 deg
5.	Total Unconditioned Floor Area	1,473 ft ²	12.	Permitted Scope of Work	NewMechanical
6.	Total # of Stories (Habitable Above Grade)	2	13.	Building Type(s)	Nonresidential
7.	Total # of dwelling units	0	14.	Gas Type	NaturalGas
B. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft²-yr)					\$ 140.1
BUILDING COMPLIES					
1. Energy Component	2. Standard Design (TDV)	3. Proposed Design (TDV)	4. Compliance Margin (TDV)	5. Percent Better than Standard	
Space Heating	12.62	10.64	1.98	15.7%	
Space Cooling	72.41	53.48	18.93	26.1%	
Indoor Fans	28.91	21.01	7.90	27.3%	
Heat Rejection	--	1.48	-1.48	--	
Pumps & Misc.	1.68	20.04	-18.36	-1092.9%	
Domestic Hot Water	2.68	1.90	0.78	29.1%	
Indoor Lighting	45.57	45.57	--	0.0%	
COMPLIANCE TOTAL	163.87	154.12	9.75	5.9%	
Receptacle	79.69	79.69	0.0	0.0%	
Process	3.60	3.60	0.0	0.0%	
Other Ltg	--	--	--	--	
Process Motors	1.16	1.16	0.0	0.0%	
TOTAL	248.32	238.57	9.8	3.9%	

In this example, the building as a whole meets the $\geq 10\%$ CSU overall building energy target, and the envelope,

lighting, and HVAC each individually meet the $\geq 0\%$ target for each discipline. So, the building does comply with CSU goals.