California Energy Commission
August 17, 2026 Business Meeting
Backup Materials for Approval of KUBO Group (KUBO)'s Exceptional Method for Analyzing the Design of a Heated Greenhouse in Santa Maria, California

The following backup materials for the above-referenced agenda item are available as described below:

1. Proposed Order, attached below.
2. Recommendation of the Executive Director on KUBO's Exceptional Method for Analyzing the Design of a Heated Greenhouse in Santa Maria, California, attached below.
3. Staff Memorandum, attached below.
4. California Environmental Quality Act (CEQA) analysis, attached below.

For the complete record, please visit: Docket Number 26-BSTD-01 at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=26-BSTD-01.

To stay informed about this project and receive documents as they are filed, please subscribe to the proceeding Topic, which can be accessed here: California Natural Resources Agency (govdelivery.com) at https://public.govdelivery.com/accounts/CNRA/signup/31895. The Topic sends out email notifications and direct links when documents are filed in the proceeding docket.

CALIFORNIA ENERGY COMMISSION

In the Matter of Approval of KUBO Group (KUBO)'s Exceptional Method for Analyzing the Design of a Heated Greenhouse in Santa Maria, California
Docket No.: 26-BSTD-01

PROPOSED ORDER Approving KUBO's Exceptional Method for Analyzing the Design of a Heated Greenhouse in Santa Maria, California

ORDER NO: [YY-MMDD]-xx

BACKGROUND

The California Energy Commission (CEC) adopted the 2025 Energy Code (California Code of Regulations, Title 24, Part 1, Chapter 10, and Part 6) on September 11, 2024, with the effective date of January 1, 2026. Section 10-109(e) of the 2025 Energy Code states that, "The Commission may approve an exceptional method that analyzes a design, material, or device that cannot be adequately modeled using the public domain computer programs. Applications for approval of exceptional methods shall include all information needed to verify the method's accuracy." Applications under Section 10-109(e) are subject to the procedures specified in Section 10-110 and general application requirements in Section 10-109(b).

On June 24, 2026, the KUBO Group (KUBO) submitted an application to the CEC for an exceptional method that analyzed the performance of a conditioned greenhouse project in Santa Maria, California demonstrating that the design meets or exceeds the equivalent Section 120.6(h) mandatory requirements for nonopaque envelopes of the 2025 Energy Code. The Exceptional Method uses the SIOM 3.2.0 software with the Meteonorm weather file to model a heated greenhouse project in Santa Maria, California. KUBO proposed the exceptional method because the California Building Energy Code Compliance (CBECC) software does not model conditioned greenhouses. CBECC is the public domain compliance software developed and approved by the CEC to demonstrate performance compliance with the residential, nonresidential, and multifamily regulations in the Energy Code.

STAFF RECOMMENDATION

CEC staff and the Executive Director have considered the application from KUBO for CEC approval of KUBO's Exceptional Method that analyzes the design of the specified conditioned greenhouse project in Santa Maria, California. CEC staff and the Executive Director have confirmed that:

1) The proposed design conditioned greenhouse project cannot be adequately modeled by any of the public domain computer programs used to demonstrate compliance with the 2025 Energy Code,
2) The proposed Exceptional Method accurately models the performance of KUBO's design for the specified conditioned greenhouse in Santa Maria, California, and
3) The proposed Exceptional Method for analyzing KUBO's design as applied to the Santa Maria project described in the application accurately demonstrates a modest reduction of the energy budget compared to the mandatory requirements for nonopaque envelopes in conditioned greenhouses in the 2025 Energy Code.

CEC staff has considered the application of the California Environmental Quality Act (CEQA) to the proposed action and concluded that the action is not a project, as defined under CEQA or, in the alternative, if it is a project, it is exempt from CEQA pursuant to the common-sense exemption and recommends the CEC confirm this determination.

Staff recommends approval and finalization of the Exceptional Method that accurately analyzes the design of the applicable conditioned greenhouse in Santa Maria, California.

ENERGY COMMISSION FINDINGS

Based on the entirety of the record, and in accordance with Section 10-109(e) of the 2025 Energy Code, the CEC finds that:

1. On June 24, 2026, the KUBO Group submitted to the CEC an application for CEC approval KUBO's Exceptional Method to analyze the design of a conditioned greenhouse project in Santa Maria, California.
2. CEC staff reviewed the application and supporting documentation. Staff's analysis found that:
    a. KUBO's conditioned greenhouse design cannot be adequately modeled by any of the public domain computer programs used to demonstrate compliance with the 2025 Energy Code, since the approved calculation methods do not address the mandatory requirements for nonopaque envelopes in conditioned greenhouses;
    b. The proposed Exceptional Method accurately models KUBO's design for a conditioned greenhouse in Santa Maria, and
    c. The proposed Exceptional Method for analyzing KUBO's design as applied to the Santa Maria project described in the application accurately demonstrates a modest reduction of the energy budget compared to the mandatory requirements for nonopaque envelopes in conditioned greenhouses of the 2025 Energy Code.
3. On June 24, 2026, the CEC provided an initial copy of the application and a draft memorandum summarizing the findings from staff's review of KUBO's application to interested persons and provided an opportunity for public comment. No comments were received by the close of the comment period on July 24, 2026. A public notice was posted to Docket Number 26-BSTD-01

(https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=26-BSTD-01).

4. Staff finds that the proposed action is not a project, as defined, under the California Environmental Quality Act (CEQA) or, in the alternative, if it is a project, it is exempt from CEQA pursuant to the common-sense exemption and recommends the CEC confirm this determination.
5. The Executive Director reviewed the staff analysis and, on August 7, 2026, submitted a recommendation to the CEC that the Commission approve the application for CEC approval of KUBO's Exceptional Method to analyze the design of a conditioned greenhouse project in Santa Maria, California.

CONCLUSION AND ORDER

The CEC has considered the application materials, staff's analysis, and the Executive Director's recommendations. No written or oral comments were received, and no staff responses were required.

Therefore, the CEC concludes the following in accordance with Section 10-109(e) of the 2025 Energy Code:

1) The Exceptional Method accurately analyzes the design of a conditioned greenhouse project in Santa Maria, California. The Exceptional Method for analyzing KUBO's design as applied to the Santa Maria project described in the application accurately demonstrates a modest reduction of the energy budget compared to the mandatory requirements for nonopaque envelopes in conditioned greenhouses of the 2025 Energy Code.
2) Approval of this application is not a project, as defined, subject to the California Environmental Quality Act (CEQA) and, alternatively, if it is a project, it is exempt pursuant to the common-sense exemption under section 15061(b)(3) of the CEQA Guidelines; and,
3) The CEC delegates the authority and directs the Executive Director to take, on behalf of the CEC, all actions reasonably necessary to carry out the above direction.

IT IS SO ORDERED.

APPROVED AND ADOPTED this [xth] day of [MM YYYY], by the following vote:

AYE:
NAY:
ABSENT:
ABSTAIN:

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly approved and adopted by the affirmative vote of the CEC at a meeting held on [MM DD, YYYY].

Kim Todd
Secretariat

California ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

MEMORANDUM

TO: California Energy Commission

FROM: Drew Bohan
Executive Director
California Energy Commission
715 P Street
Sacramento, California 95814

SUBJECT: CEC EXECUTIVE DIRECTOR RECOMMENDATION TO APPROVE KUBO'S EXCEPTIONAL METHOD FOR ANALYZING THE DESIGN OF A HEATED GREENHOUSE IN SANTA MARIA, CALIFORNIA

DATE: August 7, 2026

BACKGROUND

The California Energy Commission (CEC) adopted the 2025 Energy Code (California Code of Regulations, Title 24, Part 1, Chapter 10, and Part 6) on September 11, 2024, with the effective date of January 1, 2026. Section 10-109(e) of the 2025 Energy Code states that, "The Commission may approve an exceptional method that analyzes a design, material, or device that cannot be adequately modeled using the public domain computer programs. Applications for approval of exceptional methods shall include all information needed to verify the method's accuracy." Applications under Section 10-109(e) are subject to the procedures specified in Section 10-110 and general application requirements in Section 10-109(b).

The 2025 Energy Code defines a "conditioned greenhouse" as "a greenhouse that is provided with wood heating, mechanical heating that has a capacity exceeding 10 Btu/hr-ft^2, or mechanical cooling that has a capacity exceeding 5 Btu/hr-ft^2." Section 120.6(h) of the 2025 Energy Code includes mandatory requirements for nonopaque envelopes in conditioned greenhouses of "two or more glazings separated by either air or gas fill."

The Warren-Alquist Act, Public Resources Code sections 25000 et seq., 25402.1(b), requires the CEC to establish a process for certifying calculation methods for demonstrating compliance with the Energy Code. California Building Energy Code Compliance software (CBECC) is a public domain alternative calculation method for demonstrating performance compliance with the provisions of the 2025 Energy Code[1]. The Alternative Calculation Method (ACM) manual identifies the modeling rules used within CBECC[2]. Rules for modeling conditioned greenhouses are not included in the ACM.

On June 24, 2026, the KUBO Group (KUBO) submitted an application to the CEC for an exceptional method to analyze the design of a conditioned greenhouse project in Santa Maria, California demonstrating that the design meets or

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[1] https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-energy-code-compliance-software

[2] Bucaneg, Haile, Nikhil Kapur, and RJ Wichert, P.E. 2025. 2025 Nonresidential And Multifamily Alternative Calculation Method Reference Manual. California Energy Commission, Building Standards Branch.CEC-400-2025-007-CMF. https://www.energy.ca.gov/publications/2025/2025-nonresidential-and-multifamily-alternative-calculation-method-reference

exceeds the equivalent Section 120.6(h) mandatory requirements for nonopaque envelopes of the 2025 Energy Code. The Exceptional Method uses the SIOM 3.2.0 software with the Meteonorm weather file to model a heated greenhouse project in Santa Maria. KUBO proposed the exceptional method because CBECC does not model conditioned greenhouses. CBECC is the public domain compliance software developed and approved by the CEC to demonstrate performance compliance with the residential, nonresidential, and multifamily regulations in the Energy Code.

CEC staff reviewed the application and supporting documentation. Staff provided their findings and recommendation for approval in the attached memorandum titled "Exceptional Method Application: Method for analyzing performance of KUBO's heated greenhouse project in Climate Zone 5." The CEC considered the Exceptional Method at its August 17, 2026, Business Meeting.

SEQUENCE OF EVALUATION

- On June 24, 2026, KUBO submitted an exceptional method application to the CEC for the Commission's approval of an exceptional method to analyze the design of a conditioned greenhouse project in Santa Maria, California.
- On June 24, 2026, pursuant to Title 24, Part 1, Sections 10-109(b), 10-109(e) and 10-110, a public notice was posted to docket number 26-BSTD-01.[3] The notice provided an opportunity for public comment through July 24, 2026 on a draft staff memorandum titled "Exceptional Method Application: Method for analyzing performance of KUBO's heated greenhouse project in Climate Zone 5," which provided the findings from staff's evaluation of KUBO's Exceptional Method application. No comments were received.
- Staff found the following:
    - KUBO's greenhouse design cannot be adequately modeled by any of the public domain computer programs used to demonstrate compliance with the 2025 Energy Code, since the approved calculation methods do not address the mandatory requirements for nonopaque envelopes in conditioned greenhouses;
    - The proposed Exceptional Method accurately models KUBO's design for a conditioned greenhouse in Santa Maria, and
    - The proposed Exceptional Method for analyzing KUBO's design as applied to the Santa Maria project described in the application accurately demonstrates a modest reduction of the energy budget compared to the mandatory requirements for nonopaque envelopes in conditioned greenhouses of the 2025 Energy Code.

CONCLUSION AND RECOMMENDATION

Pursuant to the 2025 Energy Code, Section 10-109(e), I recommend the CEC approve KUBO's proposed Exceptional Method that analyzes the design of a conditioned greenhouse project in Santa Maria, California.

Drew Bohan
Executive Director
California Energy Commission

Date: August 7, 2026

[3] Available at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=26-BSTD-01

California ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

MEMORANDUM

TO: 2025 Energy Code Compliance Option Applications (26-BSTD-01)

FROM: California Energy Commission

SUBJECT: Exceptional Method Application: Method for analyzing performance of KUBO's heated greenhouse project in Climate Zone 5

DATE: August 7, 2026

INTRODUCTION

The California Energy Commission (CEC) adopted the 2025 Energy Code (California Code of Regulations, Title 24, Part 1, Chapter 10, and Part 6) on September 11, 2024, with the effective date of January 1, 2026. Section 10-109(e) of the 2025 Energy Code states that, "The Commission may approve an exceptional method that analyzes a design, material, or device that cannot be adequately modeled using the public domain computer programs. Applications for approval of exceptional methods shall include all information needed to verify the method's accuracy." Applications under Section 10-109(e) are subject to the procedures specified in Section 10-110 and general application requirements in 10-109(b).

On June 24, 2026, the KUBO Group (KUBO) submitted an application to the CEC for an exceptional method to analyze the performance of a conditioned greenhouse project in Santa Maria, California. The exceptional method uses the SIOM 3.2.0 software with the Meteonorm weather file to model a heated greenhouse project in Santa Maria. KUBO proposed the exceptional method because California Building Energy Code Compliance (CBECC) does not model conditioned greenhouses. CBECC is the public domain compliance software developed and approved by the CEC to demonstrate performance compliance with the residential, nonresidential, and multifamily regulations in the Energy Code.

Staff reviewed KUBO's application and determined that it included all the information needed to verify the method's accuracy in accordance with Section 10-109(b), Section 10-109(e), and Section 10-110.

On June 24, 2026, CEC staff provided a draft memorandum summarizing staff's review of KUBO's application to interested persons and provided an opportunity for public comment. No comments were received by the close of the comment period on July 24, 2026. This staff memorandum summarizes CEC staff's review of KUBO's application and recommends approval and finalization of the proposed Exceptional Method used to analyze the design of a conditioned greenhouse project in Santa Maria, California.

BACKGROUND

The 2025 Energy Code defines a "conditioned greenhouse" as "a greenhouse that is provided with wood heating, mechanical heating that has a capacity exceeding 10 Btu/hr-ft^2, or mechanical cooling that has a capacity exceeding 5 Btu/hr-ft^2." Section 120.6(h) of the 2025 Energy Code includes mandatory requirements for nonopaque envelopes in conditioned greenhouses of "two or more glazings separated by either air or gas fill."

The 2025 Energy Code metrics used to determine compliance are Long-term System Cost (LSC) and Source Energy, defined by section 10-102 as follows:

- **Long-term System Cost (LSC)** is the CEC-projected present value of costs to California's energy system over a period of 30 years. LSC does not represent a prediction of individual utility bills.

- **Source Energy** is defined as the long run hourly marginal source energy of fossil fuels that are combusted as a result of building energy consumption either directly at the building site or caused to be consumed to meet the electrical demand of the building considering the long-term effects of CEC-projected energy resource procurement. For a given hour, the value in that hour for each forecasted year is averaged to establish a lifetime average source energy.

The 2025 Energy Code considers 16 geographic areas, called Climate Zones (CZs), across California, for which the CEC has established typical weather data, prescriptive packages, and energy budgets. These Climate Zones are defined by ZIP code and are listed in Reference Joint Appendix JA2.

The Warren-Alquist Act, Public Resources Code sections 25000 et seq., 25402.1(b), requires the CEC to establish a process for certifying calculation methods for demonstrating compliance with the Energy Code. California Building Energy Code Compliance software (CBECC), is a public domain alternative calculation method for demonstrating performance compliance with the provisions of the 2025 Energy Code[4]. The Alternative Calculation Method (ACM) manual[5] identifies the modeling rules used within CBECC. Rules for modeling conditioned greenhouses are not included in the ACM.

On June 24, 2026, KUBO submitted an application to the CEC for an exceptional method to analyze the performance of a conditioned greenhouse project in Santa Maria, California, which is in Climate Zone 5. KUBO has been developing and building greenhouse projects around the world for nearly 80 years. They specialize in semi-closed greenhouses called Ultra-Clima®. In moderate climates like Santa Maria, CA, these greenhouses use single glazing coupled with advanced greenhouse climate control systems that automate screens, which provide shading and insulation. KUBO's application included:

- Cover letter
- Report – Greenhouse energy performance – single versus double glazing – Tomato production near Santa Maria, CA, USA (May 29, 2026) (referred to in this memorandum as "KUBO report")
- Product sheets for four screens:
    - Obscura 10070
    - XL(S-10) Ultra Revolux
    - Luxous 1147
    - Obscura 9950
- Screen and glass properties exported from the SIOM 3.2.0 software

ANALYSIS

In this draft memorandum, CEC staff summarizes their analysis of the application submitted by KUBO that demonstrates that the SIOM 3.2.0 software using the Meteonorm weather file accurately models KUBO's project in Santa Maria. Staff finds that:

- KUBO's greenhouse design cannot be adequately modeled by any of the public domain computer programs used to demonstrate compliance with the 2025 Energy Code, since the approved calculation methods do not address the mandatory requirements for conditioned greenhouses;
- The SIOM 3.2.0 software using the Meteonorm weather file adequately models KUBO's design for a conditioned greenhouse in Santa Maria; and

[4] https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-energy-code-compliance-software

[5] https://www.energy.ca.gov/publications/2025/2025-nonresidential-and-multifamily-alternative-calculation-method-reference

- Modeling KUBO's project using the SIOM 3.2.0 software with the Meteonorm weather file indicates that the project will use ~1% less Long-term System Cost and Source Energy from electricity consumption, and ~4% less Long-term System Cost and Source Energy from natural gas consumption than a conditioned greenhouse meeting the mandatory envelope requirements for conditioned greenhouses specified in Section 120.6(h) of the 2025 Energy Code.

SOFTWARE

California Building Energy Code Compliance (CBECC) is the public domain compliance software developed by the CEC to demonstrate performance compliance with the residential, nonresidential, and multifamily regulations in the Energy Code. The Alternative Calculation Method (ACM) manuals[6] specify the modeling rules used within the compliance software. The Nonresidential and Multifamily ACM does not currently include rules for modeling conditioned greenhouses. Therefore, KUBO's project cannot be adequately modeled by any of the current 2025 Energy Code approved calculation methods.

TNO, an independent non-for-profit research organization, was founded in 1932 and established by law as the Netherlands Organization for Applied Scientific Research. TNO developed SIOM (Systems Integration and Optimization Model) for greenhouse construction companies to simulate a complete growing year of a crop at any location[7]. Section 4.5 of the KUBO report describes the analytical capabilities of the SIOM software, which has been extensively validated in the literature[8,9,10]. The SIOM database includes performance characteristics for different greenhouse construction approaches, as well as heating, ventilation, cooling and irrigation techniques (see Figure 1).

[6] 2025 Nonresidential and Multifamily Alternative Calculation Method Reference Manual - https://www.energy.ca.gov/publications/2025/2025-nonresidential-and-multifamily-alternative-calculation-method-reference

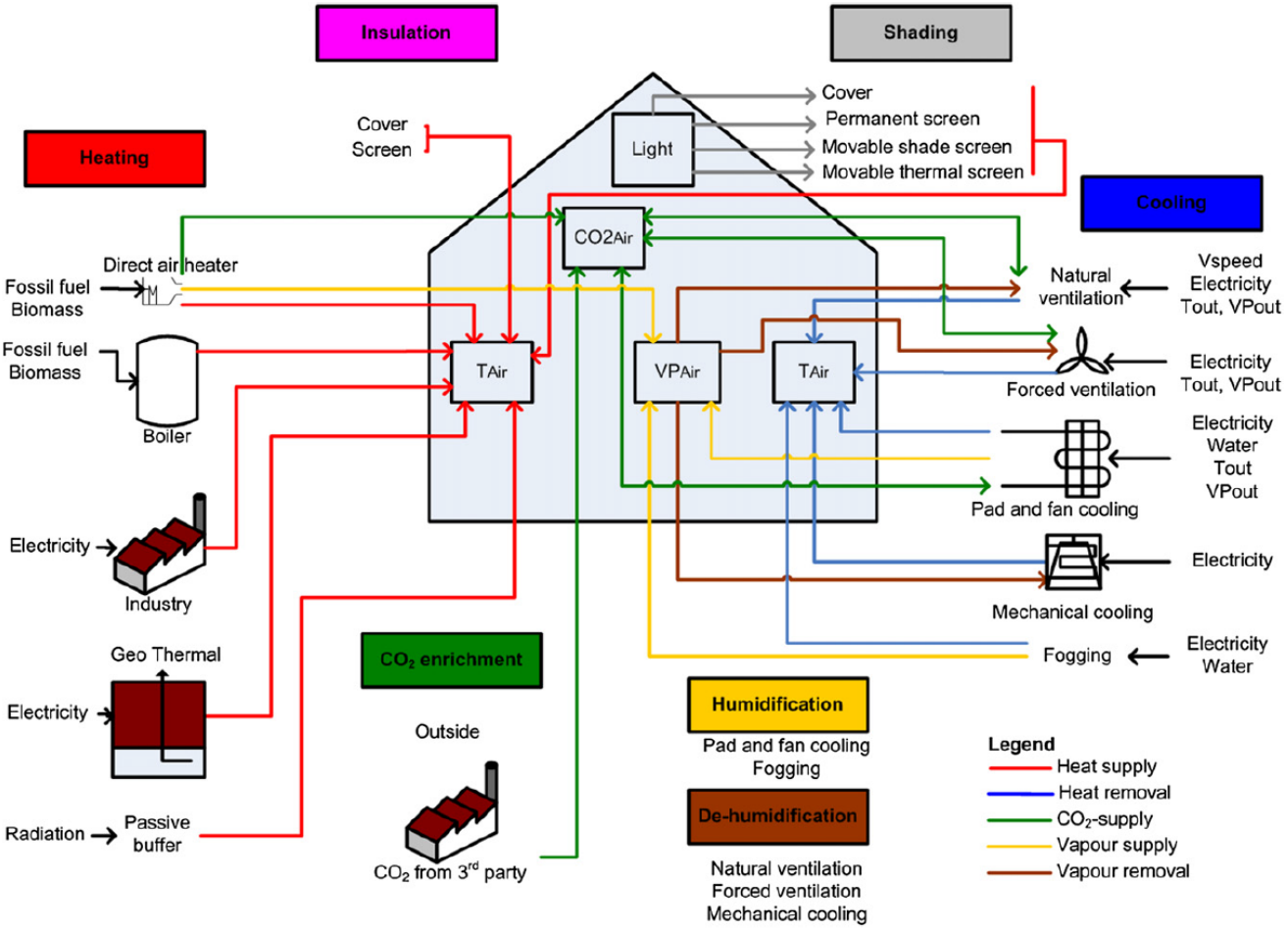
[7] https://www.tno.nl/en/sustainable/energy-built-environment/greenhouse-horticulture/siom-systems-integration-greenhouse/

[8] Vanthoor, B.H.E., C. Stanghellinin, E.J. van Henten, P.H.B. de Visser, 2011, A methodology for model-based greenhouse design: Part 1, a greenhouse climate model for a broad range of designs and climates. Biosystems Engineering 110 (2011) 363-377.

[9] Vanthoor, B.H.E., P.H.B. de Visser, C. Stanghellinin, E.J. van Henten, 2011, A methodology for model-based greenhouse design: Part 2, description and validation of a tomato yield model. Biosystems Engineering 110 (2011) 378-395.

[10] Vanthoor, B.H.E., E.J. van Henten, C. Stanghellinin, P.H.B. de Visser, 2011, A methodology for model-based greenhouse design: Part 3, sensitivity analysis of a combined greenhouse climate-crop yield model. Biosystems Engineering 110 (2011) 396-412.

Figure 1. Selected functions and design elements included in SIOM.



Note: Colored boxes indicate functions. Text blocks and pictures indicate design elements. Arrows represent energy and mass fluxes.

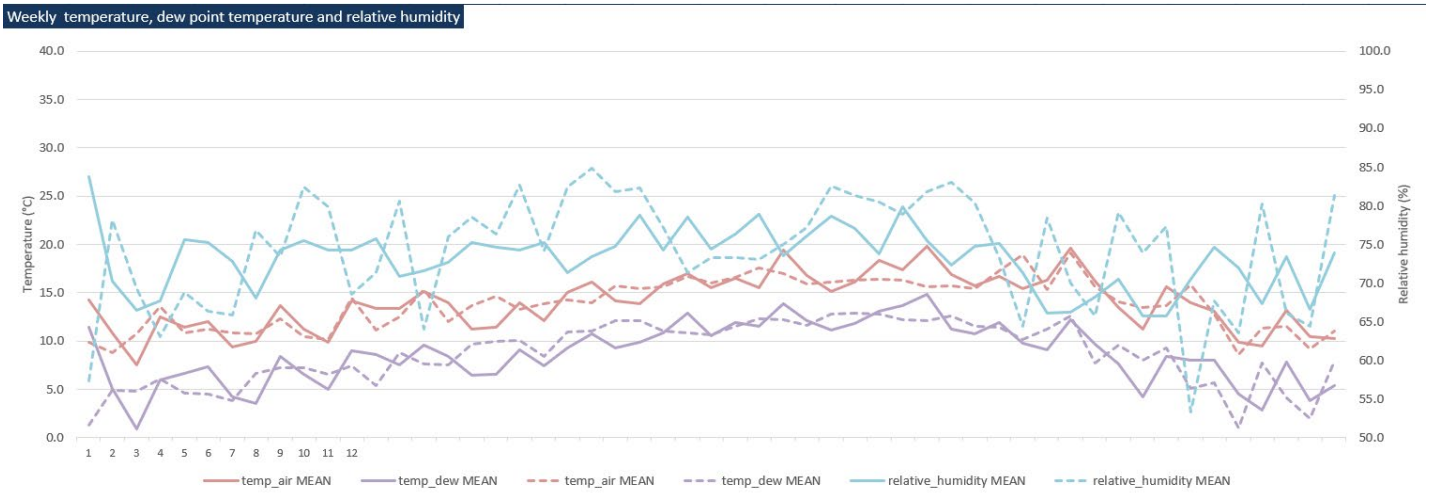
Source: Vanthoor, B.H.E., C. Stanghellinin, E.J. van Henten, P.H.B. de Visser, 2011, A methodology for model-based greenhouse design: Part 1, a greenhouse climate model for a broad range of designs and climates. Biosystems Engineering 110 (2011) 363-377.

WEATHER

CBECC contains Typical Meteorological Year (TMY) weather files for each of California's 16 Climate Zones. Santa Maria is in Climate Zone 5, using airport-based weather data. SIOM, however, relies on Meteonorm weather data and does not allow users to upload custom weather files. Because the project site is near the ocean, Meteonorm adjusts conditions by increasing wind speeds and modifying seasonal temperatures. SIOM also lacks hourly wet-bulb outputs, so wet-bulb values were calculated from temperature and relative humidity.

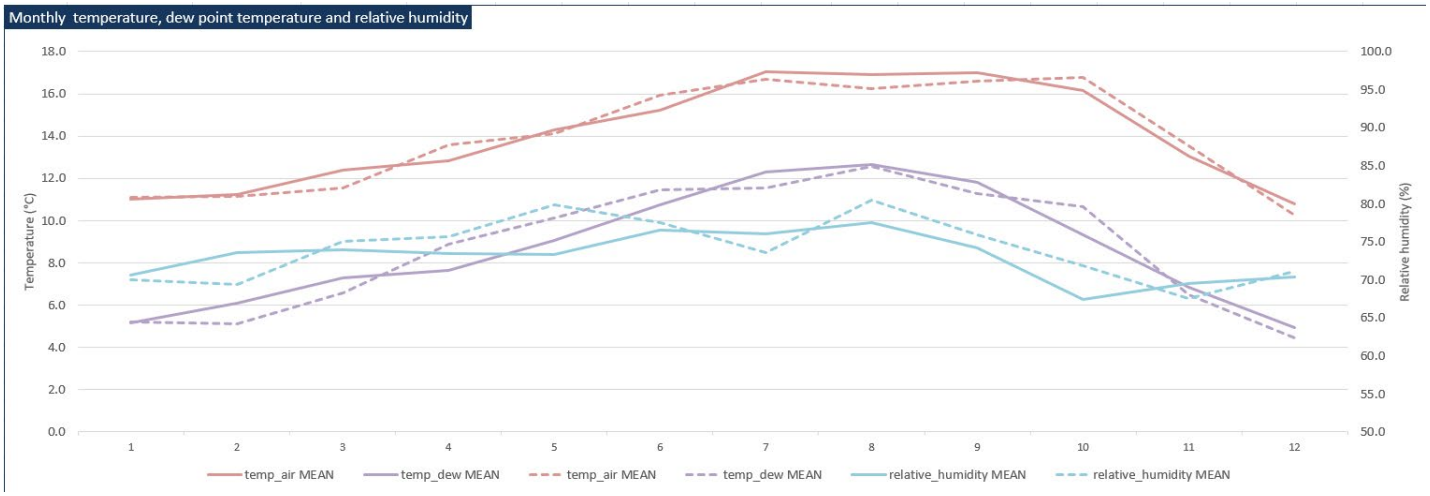
When comparing the CEC's 2025 TMY for Climate Zone 5 to Meteonorm's Santa Maria data, air temperature, relative humidity, and solar incidence correlate well, though weekly variations are larger than monthly ones. Wind speed correlates poorly, which is expected due to natural variability and the differing data sources. Temperature differences between datasets are small, and relative humidity generally aligns within 5% except in select months. Overall, staff conclude that Meteonorm provides sufficiently representative weather data for the project location.

Figure 2. Comparison of weekly average temperature, dew point temperature and relative humidity for the CEC and Meteonorm weather files for Santa Maria, CA



Note: Solid lines – Meteonorm. Dashed lines – CEC.

Figure 3. Comparison of monthly average temperature, dew point temperature and relative humidity for the CEC and Meteonorm weather files for Santa Maria, CA



Note: Solid lines – Meteonorm. Dashed lines – CEC.

Table 1. Comparison of mean, maximum, minimum air temperature for Metenorm and CEC CZ5 weather files

	METEO	**CEC**		**METEO**	**CEC**		**METEO**	**CEC**	
MONTH	MEAN	MEAN	Delta	MIN	MIN	Delta	MAX	MAX	Delta
1	11.00	11.09	-0.09	-0.35	0.60	-0.95	25.90	26.70	-0.80
2	11.22	11.13	0.09	0.02	1.10	-1.08	27.22	25.30	1.92
3	12.41	11.56	0.84	2.33	2.20	0.13	29.12	27.20	1.92
4	12.85	13.61	-0.76	2.08	2.20	-0.12	29.35	31.10	-1.75
5	14.28	14.13	0.15	5.01	5.60	-0.59	29.55	28.30	1.25

6	15.21	15.93	-0.71	7.28	7.20	0.08	27.92	27.20	0.72
7	17.03	16.69	0.34	10.09	10.00	0.09	32.06	26.70	5.36
8	16.91	16.24	0.67	9.98	8.90	1.08	28.66	27.20	1.46
9	16.98	16.61	0.37	8.88	7.80	1.08	31.14	37.20	-6.06
10	16.15	16.79	-0.64	5.86	5.60	0.26	34.01	35.00	-0.99
11	13.05	13.53	-0.48	1.81	1.10	0.71	30.97	28.00	2.97
12	10.80	10.26	0.54	-1.00	-1.70	0.70	27.34	25.60	1.74
MAX			0.84			1.08			5.36
MIN			-0.76			-1.08			-6.06

Table 2. Comparison of mean, maximum, minimum relative humidity for Metenorm and CEC CZ5 weather files

	METEO	**CEC**		**METEO**	**CEC**		**METEO**	**CEC**	
MONTH	MEAN	MEAN	Delta (%)	MIN	MIN	Delta (%)	MAX	MAX	Delta (%)
1	70.63	70.07	1%	28.10	23	18%	100	100	0%
2	73.57	69.37	6%	31.58	21	34%	100	100	0%
3	73.90	75.02	-2%	32.45	16	51%	100	100	0%
4	73.46	75.71	-3%	33.24	22	34%	100	100	0%
5	73.39	79.81	-9%	39.45	21	47%	100	100	0%
6	76.57	77.49	-1%	43.60	35	20%	100	100	0%
7	76.08	73.53	3%	37.03	31	16%	100	94	6%
8	77.49	80.48	-4%	38.60	38	2%	100	100	0%
9	74.16	75.92	-2%	33.13	9	73%	100	100	0%
10	67.44	71.84	-7%	25.58	12	53%	100	100	0%
11	69.54	67.59	3%	24.80	9	64%	100	100	0%
12	70.35	71.08	-1%	24.71	14	43%	100	100	0%

Table 3. Correlation coefficient of Meteonorm and CEC CZ5 weather files

MONTH	**TEMP_AIR**	**RELATIVE_HUMIDITY**	**GHI**	**DNI**	**DHI**	**WIND_SPEED**

1	0.54	0.47	0.93	0.73	0.79	0.00
2	0.53	0.39	0.84	0.57	0.76	0.06
3	0.67	0.45	0.83	0.54	0.77	0.08
4	0.70	0.62	0.92	0.63	0.74	0.18
5	0.66	0.66	0.91	0.63	0.77	0.39
6	0.75	0.66	0.93	0.68	0.67	0.18
7	0.71	0.66	0.93	0.65	0.72	0.33
8	0.73	0.74	0.95	0.63	0.71	0.30
9	0.58	0.48	0.93	0.67	0.68	0.24
10	0.48	0.45	0.93	0.75	0.77	0.31
11	0.62	0.39	0.92	0.71	0.78	0.23
12	0.65	0.38	0.89	0.72	0.84	0.08

Table 4. Hours in CEC CZ5 weather file where air temperature exceeds Meteonorm maximum of 34.0 degrees Celsius

MONTH	WEEK	DAY	HOUR	TEMP_AIR
9	40	25	10	34.4
9	40	25	11	35.0
9	40	26	9	34.4
9	40	26	10	37.2
9	40	26	11	37.2
9	40	26	12	36.6
9	40	26	14	34.4
9	40	27	10	36.0
10	40	1	9	34.4
10	42	17	11	34.4
10	42	17	12	35.0
10	42	17	13	35.0

GREENHOUSE CHARACTERISTICS

The KUBO report includes the dimensions of the modeled greenhouse (Section 3.1), temperature and relative humidity targets for the greenhouse (Section 3.2), and characteristics of the elements, glazing and screens, modeled that contribute to insulation and shading (Section 3.3). The KUBO report describes four scenarios:

- Single glazing without screens,
- Single glazing with screens (mid), which represents a moderate energy efficiency target,
- Single glazing with screens (high), which represents an aggressive energy efficiency target, and
- Double glazing, which is the mandatory requirement in Section 120.6(h) the 2025 Energy Code for conditioned greenhouses.

This memorandum focuses on comparing the "Single glazing with screens (high)" scenario with the double-glazing scenario.

The "Single glazing with screens (high)" scenario uses the Svensson (XL)S-10 Ultra Revolux and Obscura 10070 screens. These screens have maximum energy saving rating of 47% and 70%[11], respectively. The document titled "Screen Material Property (SIOM ID 222, 211, 701, and 702) includes screen properties used in SIOM. The single glazing is clear float, tempered low-iron greenhouse glass with a light transmission of 91% or higher and a nominal thickness of approximately 4 mm (within a tolerance range of 3.8 mm to 4.2 mm). Section 4.3 describes the glazing properties used in SIOM, see the document titled "Covering Material Properties in SIOM".

Section 3.4 of the KUBO report details additional elements modeled for heating, ventilation, humidification and dehumidification, as well as carbon dioxide dosing. The greenhouse uses a boiler for heating and carbon dioxide generation, a padwall[12] for humidification, and air handling units for air circulation.

Given the mild climate in Santa Maria, CA, the greenhouse will not include active cooling or artificial lighting.

THERMAL SCREEN AUTOMATION

Section 4.4. of the KUBO report describes the operational strategy of the advanced greenhouse climate control system modeled. Systems capable of implementing the described control strategies include Priva[13], Hoogendoorn[14] and Ridder[15]. At a high level, these advanced greenhouse climate control systems are optimizing between exposing the plants to solar radiation for fresh weight production and minimizing energy use for heating and cooling.

Carbon dioxide is supplemented when outside air temperatures are unfavorable, and the greenhouse primarily depends on air recirculation. In general, carbon dioxide dosing primarily happens in Santa Maria from September through May. Dosing is paused when:

- The windows are open for natural ventilation, or
- The padwall system is active, or
- Carbon dioxide production for fossil fuels is too expensive or inefficient.

RESULTS

Sections 5, 6, and 7 present the detailed SIOM results for the single glazing with screens (mid), single glazing with screens (high) and double-glazing scenarios. Section 1.3 summarizes the resource use results. Table 5 compares the Long-term System Cost and the Source Energy for the single glazing with screens (high) and double-glazing scenarios. The results demonstrate that the SIOM 3.2.0 software using the Meteonorm weather file accurately models KUBO's

[11] Energy saving rating per NEN 2675+C1:2018, which specifies measurement methods for the determination of the transmission and light diffusion of sun light greenhouse and screen materials. https://www.nen.nl/en/nen-2675-c1-2018-en-251294

[12] A padwall is an evaporative cooling system used in greenhouses to reduce temperatures by up to 40°F. These units improve air circulation, creating a stable and productive environment for plants.

[13] https://adeptag.com/products/priva-control-solutions/

[14] https://adeptag.com/products/hoogendoorn-control-solutions/

[15] https://ridder.com/process-automation

design for a conditioned greenhouse in Santa Maria. Further the results demonstrate that the single glazing with screens (high) modestly outperforms the double-glazing scenario.

Table 5. Comparison of Long-term System Cost and Source Energy use for single glazing with screens (high) and double glazing scenarios.

	Single glazing with screens (high)	Double glazing	Savings for single glazing with screens (high) vs. double glazing
Long-term System Cost – Natural gas	298	312	14 (4.5%)
Long-term System Cost – Electricity	47	47.5	0.5 (1%)
Source Energy – Natural gas	475	497	22 (4.4%)
Source Energy – Electricity	12.6	12.8	0.2 (1.6%)

Units of Long-term System Cost are $/m^2-year; Source Energy are kBtu/m^2-year

RECOMMENDATION

In accordance with Section 10-109(e) of the 2025 Energy Code, staff finds that the SIOM 3.2.0 software using the Meteonorm weather file accurately models KUBO's project in Santa Maria. Staff finds that:

- KUBO's greenhouse design cannot be adequately modeled by any of the public domain computer programs used to demonstrate compliance with the 2025 Energy Code, since the approved calculation methods do not address the mandatory requirements for nonopaque envelopes in conditioned greenhouses;
- The SIOM 3.2.0 software using the Meteonorm weather file accurately models KUBO's design for a conditioned greenhouse in Santa Maria; and
- Modeling KUBO's project using the SIOM 3.2.0 software with the Metenorm weather file indicates that the project will use ~1% less Long-term System Cost and Source Energy from electricity consumption, and ~4% less Long-term System Cost and Source Energy from natural gas consumption than a conditioned greenhouse meeting the mandatory envelope requirements for conditioned greenhouses specified in Section 120.6(h) of the 2025 Energy Code.

Staff recommends approval and finalization of KUBO's Exceptional Method used to analyze the design of a conditioned greenhouse in Santa Maria, California.

Based on the analysis, staff further recommends that the design of the conditioned greenhouse in Santa Maria, California, as described in KUBO's application[16], complies with the 2025 Energy Code Section 120.6(h) requirement:

- Glass specification: Clear float, tempered low-iron greenhouse glass with a light transmission of 91% or higher and a nominal thickness of approximately 4 mm (within a tolerance range of 3.8 mm to 4.2 mm)
- Thermal screen specification submitted to the enforcement agency:
    - Screen 1: Minimum energy -saving performance of 47% or higher per NEN 2675
    - Screen 2: Minimum energy -saving performance of 50% or higher per NEN 2675
- Installation of an advanced greenhouse control system capable of implementing the described control strategies (e.g., Priva, Hoogendoorn, Ridder

[16] https://efiling.energy.ca.gov/GetDocument.aspx?tn=270977&DocumentContentId=108532

California ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

MEMORANDUM

TO: Docket 26-BSTD-01

FROM: Will Vicent, Deputy Director, Building Standards

SUBJECT: Basis for finding that the action of approving KUBO's Exceptional Method Application submitted pursuant to Section 10-109(e) of the 2025 Energy Code is not a project or is otherwise exempt from the California Environmental Quality Act under the Common-Sense Exemption.

DATE: August 7, 2026

I. California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) Public Resources Code (PRC) sections 21000 *et seq.*, see also CEQA Guidelines, California Code of Regulations (CCR), Title 14, sections 15000 *et seq*.) requires that state agencies consider the environmental impact of certain discretionary decisions. CEQA allows certain projects to be exempted from its requirements. Of relevance here, and discussed further below, is the Common-Sense Exemption (CCR, Title 14, section 15061(b)(3)).

II. Exceptional Methods for Energy Code Compliance (Title 24, Section 10-109(e))

The California Energy Commission (CEC) adopts and regularly updates regulations for new construction, additions, and alterations to residential and nonresidential buildings, which are contained in California Code of Regulations, Parts 1 and 6 (the California Energy Code). These regulations go through an extensive public process and are adopted at a CEC business meeting before going into effect.

Part 1 of the Energy Code includes administrative regulations for implementation. In certain circumstances, interested parties or the CEC may identify Exceptional Methods that meet the minimum requirements of the Energy Code, but that require additional regulatory action to ensure compliance and consistency with the Energy Code. In these situations, section 10-109(e) of the 2025 Energy Code states that, "The Commission may approve an exceptional method that analyzes a design, material, or device that cannot be adequately modeled using the public domain computer programs. Applications for approval of exceptional methods shall include all information needed to verify the method's accuracy."

III. The Proposed Action

On June 24, 2026, KUBO submitted an application for CEC approval of KUBO's Exceptional Method for the specified project design that demonstrates compliance with mandatory requirements for nonopaque envelopes in conditioned greenhouses as provided by the 2025 Energy Code. The application included documentation that analyzed the performance of a conditioned greenhouse project in Santa Maria, demonstrating that the design meets or exceeds the equivalent requirements of Section 120.6(h). The application was available for public comment through July 24, 2026. No comments were received.

CEC staff reviewed the application submitted on June 24, 2026, including supporting analysis, and all written comments submitted. CEC staff's analysis confirmed that:

1) KUBO's conditioned greenhouse design for the specified project in Santa Maria, CA cannot be adequately modeled by any of the public domain computer programs used to demonstrate compliance with the 2025 Energy Code,
2) The proposed Exceptional Method adequately models the performance of KUBO's design for the specified conditioned greenhouse in Santa Maria, California,, and
3) The proposed Exceptional Method for analyzing KUBO's design, as applied to the Santa Maria project described in the application, accurately demonstrates a modest reduction of the energy budget compared to the mandatory requirements for nonopaque envelopes in conditioned greenhouses in the 2025 Energy Code.

Therefore, CEC staff and the Executive Director recommended that the CEC approve KUBO's proposed Exceptional Method that analyzes the design of a conditioned greenhouse project in Santa Maria, California, consistent with Section 10-109(e). The CEC is considering making findings regarding KUBO's application to be approved as an Exceptional Method at the CEC's August 17, 2026, Business Meeting.

IV. CEC findings regarding KUBO's Application are not a CEQA project

A "project" under CEQA is defined as the "whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment" (CCR, Title 14, section 15378(a)).The CEC's findings regarding KUBO's application do not constitute a "project" under CEQA since it is not an activity that may cause a direct or reasonably foreseeable indirect physical change to the environment.

In its findings approving KUBO's application to establish an Exceptional Method, the CEC does not change the minimum requirements of the 2025 Energy Code. Instead, the CEC is approving a voluntary exceptional method that analyzes a design that is otherwise not able to be modeled by any current software program used to demonstrate compliance with the Energy Code, but still guarantees, at least, the same performance as already required by the regulations. The CEC's actions in approving an application on its own do not amount to actions that may cause a direct or reasonably foreseeable indirect physical change to the environment, as provided by the CEQA definition for a "project" (CCR, Title 14, section 15378(a)). Accordingly, the CEC's actions are not a "project" for purposes of CEQA.

V. If CEC's findings regarding KUBO's Exceptional Method were considered a project, they are exempt from CEQA under the Common-Sense Exemption

Even if considered a project under CEQA, the CEC's approved findings in accordance with section 10-109(e) are exempt from CEQA under the Common-Sense Exemption. The Common-Sense Exemption states that, "Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA" (CCR, Title 14, section 15061(b)(3)). A "significant effect on the environment" is defined as a "substantial, or a potentially substantial, adverse change" in the environment, and does not include an economic change by itself (Public Resources Code, section 21068; CCR, Title 14, section 15382).

The Common-Sense Exemption would apply as it can be seen with certainty that there is no possibility that the CEC's findings regarding KUBO's application will have a significant effect on the environment (CCR, Title 14, sections 15061(b)(3) and 15061(a)). As discussed above, the findings regarding this application confirm that KUBO's Exceptional Method accurately analyzes a design that meets, or exceeds, the energy budget performance for mandatory requirements of nonopaque envelopes in conditioned greenhouses as specified by the 2025 Energy Code. It does not require any particular project or design to engage in any activity that was not already evaluated during the 2025 Energy Code rulemaking, which published an initial study and negative declaration for the 2025 Energy Code as a whole. For these reasons, the CEC's approval of KUBO's application for an Exceptional Method is not subject to CEQA under the Common-Sense Exemption, section 15061(b)(3).

VI. Conclusion

As provided above, CEC approval of KUBO's Exceptional Method application for the specified project design that demonstrates compliance with mandatory requirements for nonopaque envelopes in conditioned greenhouses as provided by the 2025 Energy Code is not subject to CEQA because the CEC's findings do not meet the definition of a "project" as it is not an activity that has the potential for resulting in either a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment. Even if it is a project, it is exempt from CEQA pursuant to the Common-Sense Exemption (CCR, Title 14, section 15061(b)(3)) because it can be seen with certainty that there is no possibility that the activity will have a significant effect on the environment.