

## How Title 24 Is Keeping California Connected To The Grid

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Authors have pondered the question of whether, given the declining costs of batteries, solar plus battery systems could eventually replace the electric utility. For example, the Rocky Mountain Institute found that some customers in Hawaii may already be better off disconnecting from the grid and relying on solar plus battery systems.[1] Moreover, California consumers will be at that point within 5 to 15 years.[2] Analysts have written about a looming “utility death spiral,” in which improved solar technologies, combined with declining solar prices and subsidies, could cause some consumers to abandon the grid.[3] This would shift the cost of grid maintenance to a smaller group of customers, causing prices to rise for those customers, which could prompt some of them to switch to solar, thereby concentrating the cost of grid maintenance onto still fewer customers, and so on.[4] In contrast, Forbes’ analysts have taken the position that the utility death spiral is far-fetched, conceptually, and that the outlook for utilities has been improving.[5]



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What has not been discussed is whether residential customers can disconnect from the grid, legally. This article begins to answer the question for residential customers in single-family dwellings under California law, by examining Title 24’s construction regulations, finding that grid interconnection is required under the current 2013 energy code. The recently adopted 2016 standards, which will be effective on Jan. 1, 2017, maintain these same grid interconnection requirements. Thus, unless solar and battery makers are able to change the regulation through an adoption cycle supplement or errata, solar plus battery installations must remain grid connected for the next few years. The looming utility death spiral, if any, is postponed.

### California's Solar Photovoltaic Policy

California has a policy of promoting solar photovoltaic systems (PV), but the systems must comply with Title 24 and solar plus battery systems must be interconnected to the grid. California has, by far, the most installed solar PV systems in the U.S.[6] As a general matter, the California government promotes the adoption of solar PV systems and seeks to limit obstacles to their use.[7] However, the systems must comply with applicable law, including Title 24 of the California Code of Regulations.[8]

### ***Most Sections Of Title 24 Explicitly Permit Off-Grid PV Systems***

The following parts of Title 24 explicitly govern installation of solar energy systems: (1) the building code; (2) the residential code; (3) the electrical code; (4) the mechanical code; (5) the energy code; and

(6) the fire code.

The California electrical code provides: “Solar photovoltaic systems covered by this article may be interactive with other electric power production sources or stand-alone, with or without electrical energy storage such as batteries.”[9] A stand-alone system is, “[a] photovoltaic system that supplies power independently of an electrical production and distribution network.”[10] For a stand-alone system, the “premises wiring system shall be adequate to meet the requirements of this code for a similar installation connected to a service.”[11] Moreover, “[e]nergy storage or backup power supplies are not required.”[12] Thus, the electrical code does not require grid interconnection.

Other than the energy code, the other parts of Title 24 all refer to the electrical code, either directly or indirectly. The residential code and the building code directly incorporate the electrical code.[13] The fire code requires: (1) compliance with the building code (as stated, the building code incorporates to the electrical code); (2) compliance with the California electrical code; and (3) a construction permit.[14] The California mechanical code allows the permitting authority to adopt the uniform solar energy and hydroponics code, which explicitly allows stand-alone systems, provided they comply with the electrical code for a similar installation connected to a service.[15] Thus, other than the energy code, the other parts of Title 24 allow off-grid solar plus battery systems and will continue to do under the new regulations.

### ***The Energy Code Requires Grid Interconnection.***

Title 24’s barrier to disconnection from the grid is in Section 110.10 of the energy code, which reads, in relevant part:

**(c) Interconnection Pathways.** 1. The construction documents shall indicate a location for inverters and metering equipment and a pathway for routing of conduit from the solar zone to the point of interconnection with the electrical service. For single-family residences the point of interconnection will be the main service panel.[16]

One could argue that “interconnection with the electrical service” does not necessarily mean connection to a utility. The energy code does not define “interconnection” or “electric service.”[17] If terms are not defined, the energy code incorporates by reference, the California building code. [18] However, the terms are not defined there, either.[19] The 2016 energy code incorporates the definitions from the electrical code, as well. There, “[i]nterconnected electric power production sources” includes “a utility supply or an on-site electric power source(s).”[20] Such power sources may include photovoltaic and generators, but not “[e]nergy storage systems such as batteries, flywheels or superconducting magnetic storage equipment ...”[21] Thus, under the electrical code’s definition, “interconnection” may be broader than just connection to a utility. Unfortunately for the emerging solar plus battery industry, it does not include batteries.

Solar plus battery proponents would next argue that the “electrical service” could be the solar panels. However, Section 110.10 of the energy code requires routing of conduit between the solar zone and the point of interconnection with the electrical service, meaning the solar zone was not contemplated as the “electrical service.” Perhaps a solar plus battery plus generator would be allowed. However, the section’s requirement of metering equipment indicates the authors contemplated grid connection.

Solar plus battery proponents could argue the requirement of interconnection is a “minimum” which their customers are allowed to exceed with more energy efficient off-grid technologies.[22] For example, if a house relies exclusively on solar and batteries, that would seem to be an increase in energy efficiency over

a grid-dependent system. However, looking to the context of the section, it is entitled, “Mandatory Requirements for Solar Ready Buildings.”[23] It is also readily apparent that, when the authors wanted to indicate a minimum standard, they did so. For example, “[t]he solar zone shall ... have a total area of no less than 250-square-feet.”[24]

In contrast, certain figures, expressly, are not minimums. For example, “[a]ll sections of the solar zone located on steep-sloped roofs shall be oriented between 100 degrees and 270 degrees of true north.”[25] Here, if the authors wanted to allow an off-grid system where the solar panels were the “electrical service,” they could have done so, but they did not. Since the energy code, by its terms, applies to all residential and non-residential buildings, the solar plus battery industry cannot argue an exemption by virtue going off-grid.[26]

## **Conclusion.**

The California energy code’s requirement of interconnection in residential installations imposes a significant barrier to adoption and implementation of solar plus battery technologies. Under the current and up-and-coming regulatory frameworks, grid defection and the utility death spiral should not occur in California in the near future. However, there are opportunities for interim change through adoption cycle supplements.

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[1] Rocky Mountain Institute, Homer Energy, and Cohreznick Think Energy, The Economics of Grid Defection, The Rocky Mountain Institute, Feb. 2014, at 37.

[2]Id.

[3] Peter Kind, Disruptive Challenges: Financial Implications and Strategic Responses to Changing Retail Electric Business, EDISON ELECTRIC INSTITUTE, January 2013.

[4] Id.

[5] William Pentland, Disruption Detailed: The Utility Death Spiral Myth, Forbes/Energy, Nov. 25, 2015, at <http://www.forbes.com/sites/williampentland/2015/11/25/disruption-derailed-the-utility-death-spiral-myth/>; William Pentland, Why the Utility ‘Death Spiral’ is Dead Wrong, Forbes/Energy, April 6, 2014, at <http://www.forbes.com/sites/williampentland/2014/04/06/why-the-utility-death-spiral-is-dead-wrong/>.

[6] Solar Energy Industries Association, Solar Industry Data: Solar Industry Breaks 20 GW Barrier – Grows 34% Over 2013, at <http://www.seia.org/research-resources/solar-industry-data> as of Dec. 14, 2015.

[7] See 2014 Cal. Assem. Bill 2188 (Expedited Solar Permitting Act); “California Solar Initiative: Annual

Program Assessment,” California Public Utilities Commission, June 2015.

[8] Cal. Gov’t. Code § 65850.5(f) (Deering 2016).

[9] Cal. Code Regs. tit. 24 Elec. Code, Art. 690.1. (The electrical code is will be updated in 2016, but this provision will stay the same.)

[10] Id., Art. 690.2. (The 2016 version of electrical code is unchanged in this regard.)

[11] Id., Art. 690.10. (Unchanged in 2016 version.)

[12] Id., Art. 690.10(E). (In the 2016 version, this is at Art. 690.10(D).

[13] Cal. Code Regs. tit. 24 Residential Code, § R331, July 1, 2015, update, stating “Solar photovoltaic power systems shall be installed in accordance with Sections R331.2 through R331.4 of the California Electrical Code;” See also Cal. Building Code, Ch. 13.

[14] Cal. Code Regs. tit. 24 Fire Code, § 605.11. (2016 fire code requires compliance with the electrical, building, and residential codes.)

[15] Cal. Code Regs. tit. 24 Mechanical Code § 1501.1, 2015 (adopted for 2016); Uniform Solar Energy and Hydroponics Code §§ 912.7, 914.1.

[16] Cal. Code Regs. tit. 24, Energy Code, § 110.10(c) (2013). The 2016 standards are the same. (See 2016 Building Energy Efficiency Standards For Residential and Nonresidential Buildings, at <http://www.energy.ca.gov/title24/2016standards/>.)

[17] Id., § 10-102. The 2016 standards are the same.

[18] Id., § 100.1(b). The 2016 standards incorporate the definitions of the administrative code, the building code, the residential building code, the electrical code, the mechanical code, and the plumbing code.

[19] Cal. Code Regs. tit. 24 Building Code, § 202.

[20] Cal. Code Regs. tit. 24 Elec. Code, Art. 705.1. (Unchanged in 2016 version.)

[21] Id., Art. 705.2. (Unchanged in 2016 version.)

[22] See Cal. Pub. Res. § 25402(a)(1), (b) (Deering 2016).

[23] Cal. Code Regs. tit. 24 Energy Code, § 110.10.

[24] Id., § 110.10(b)(1)(A).

[25] Id., § 110.10(b)(2).

[26] See id., § 10-101.