

Is Grid Defection Legal In California?

By: Molly L. Zohn, Klinedinst PC

I. Executive Summary

Solar-plus-battery technologies are taking off, as battery makers and solar technology companies team up to break new ground. Numerous authors have written about the possibility that energy from solar-plus-battery installations could become less expensive than purchasing energy from utilities. In that case, some authors have predicted grid defection, including defection on a massive scale, which could bring about the demise of electric utilities. However, no one has answered the question of whether going “off-grid” using solar-plus-battery technology is legal. This article answers that question for single family homes in California, the state with the largest number of solar photovoltaic installations, finding that current building code regulations require interconnection. However, those building codes, revised every three years, are currently in a revision period, providing a critical window of opportunity for potential change. Even if that regulation is changed, vaguely stated standards for reliability and safety could pose an additional barrier.

II. Introduction

Authors have pondered the question of whether, given the declining cost of batteries, solar-plus-battery systems could eventually replace the electric utility. Some authors have found that a subset of customers in Hawaii may already be better off disconnecting from the grid and relying on solar-plus-battery systems; moreover, California is not far behind.¹ Analysts have written about a looming “utility death spiral,” in which improved solar technologies, combined with declining solar prices and subsidies, could cause consumers to abandon the grid en masse.² In contrast, Forbes has taken the position that the utility death spiral is farfetched, conceptually, and that the outlook for utilities has been improving.³

What has not been discussed is whether residential customers can disconnect from the grid, legally. This article analyzes this question for residential customers in single family dwellings under California law. The answer is that grid defection is not allowed. That said, it is

¹ Rocky Mountain Institute, Homer Energy, and Cohreznick Think Energy, *The Economics of Grid Defection*, THE ROCKY MOUNTAIN INSTITUTE, Feb. 2014, at 37.

² Peter Kind, *Disruptive Challenges: Financial Implications and Strategic Responses to Changing Retail Electric Business*, EDISON ELECTRIC INSTITUTE, Jan. 2013.

³ 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, Apr. 6, 2014, at <http://www.forbes.com/sites/williampentland/2014/04/06/why-the-utility-death-spiral-is-dead-wrong/>.

certainly done in some California communities.⁴ As the adoption of solar-plus-battery systems becomes more widespread, industry actors are likely to take a more careful look at existing regulations.

III. California Has A Policy Of Promoting Solar Photovoltaic (“PV”) Systems, But The Systems Must Comply With The State’s Law and Regulations.

California has, by far, the most installed solar PV systems in the United States.⁵ As a general matter, the California government promotes the adoption of Solar PV Systems and seeks to limit obstacles to their use.⁶ However, adoption in the residential setting requires compliance with housing, electric, building, and energy codes, along with other bodies of law in order to ensure the safety and reliability of the systems.⁷ While some codes are expressly permissive of solar-plus-battery configurations, others require or assume interconnection with the grid. Of course, until all applicable laws allow residential customers to disconnect, they must remain connected.

Under current law, residential Solar PV Systems in California must meet: (1) the requirements of Title 24 of the California Code of Regulations, including but not limited to the California Electrical Code; (2) applicable health and safety standards and requirements of state and local permitting authorities; (3) any applicable rules of the California Public Utilities Commission (“CPUC”) regarding safety and reliability; and (4) the safety and performance standards of the Institute of Electrical and Electronics Engineers, and accredited testing laboratories, such as Underwriters Laboratories.⁸

⁴ EPRI, Palo Alto, CA, and California Energy Commission, *California Renewable Technology Market and Benefits Assessment*, Publication No. 1001193, 6-1 (2001) (estimating the total deployment of off-grid Solar PV Systems at about 6 to 8 MW in 2001).

⁵ 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.

⁶ See 2014 Cal. Assem. Bill 2188 (Expedited Solar Permitting Act); “California Solar Initiative: Annual Program Assessment,” California Public Utilities Commission, June 2015.

⁷ CAL. GOV’T. CODE § 65850.5(f) (Deering 2016).

⁸ CAL. GOV’T. CODE § 65850.5(f) (Deering 2016). The safety standards of the Institute of Electrical and Electronics Engineers and accredited testing laboratories such as Underwriters Laboratories is not discussed herein because it sounds in a guideline, not a fully specified requirement, as opposed to the California Electrical Code and CPUC standards for safety. In addition, there may be other areas of law that could affect whether, in a particular situation, an off-grid system would be legal. For example, California Civil Code section 1940.9 presumes that the tenant’s dwelling has an electric meter and California Civil Code section 1941.1(a)(4)(5) provides that a dwelling is untenable if it does not have heating facilities and electrical lighting that conformed with applicable law at the time of their installation and are well functioning. Such issues are beyond the scope of this article, however.

A. The California Code of Regulations Requires Interconnection With the Electric Utility Grid.

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. With the exception of the Energy Code, the others are expressly permissive of off-grid systems.

1. The California Energy Code Requires Interconnection With The Grid for Residential Installations.

Section 110.10 of the Energy Code 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.⁹

a. “Interconnection with the electrical service” means connection with a utility grid.

The key question is: does “interconnection with the electrical service” mean connection to a utility? The Energy Code does not define “interconnection” or “electric service.”¹⁰ If terms are not defined, the Energy Code incorporates by reference, the California Building Code.¹¹ However, the terms are not defined there, either.¹² In that case, the Definitions instruct the user to either look to Webster’s Third New International Dictionary of the English Language or the context, as applicable.¹³ Looking to the context of the Energy Code as part of Title 24, one could argue the authors of Title 24 probably intended to use words in the same way from one part to the next. Thus, the California Electric Code definition of “interconnection” should be borrowed. There, “[i]nterconnected electric power production sources” includes “a utility supply or an on-site electric power source(s).”¹⁴ Such power sources may include photovoltaic and generators, but not “[e]nergy storage systems such as batteries, flywheels, or superconducting magnetic storage equipment...”¹⁵ Thus, under the Electric Code’s definition, “interconnection” may be broader than just connection to a utility, but does not include batteries. It could be

⁹ CAL. CODE REGS. tit. 24, Energy Code, § 110.10(c).

¹⁰ *Id.*, § 10-102.

¹¹ *Id.*, § 100.1(b).

¹² CAL. CODE REGS. tit. 24 Building Code, § 202.

¹³ CAL. CODE REGS. tit. 24 Energy Code, § 100.1(b).

¹⁴ CAL. CODE REGS. tit. 24 Elec. Code, Art. 705.1.

¹⁵ *Id.*, Art. 705.2

argued that solar-plus-battery systems, in conjunction with a generator, could satisfy the Energy Code.

However, looking to the context of Section 110.10 of the Energy Code, the section requires metering equipment. Thus, the context indicates the authors contemplated grid interconnection.

- b. Section 110.10 is not a minimum, from which “upper end” deviation would be allowed.

Solar and battery advocates would argue the requirement of interconnection is a “minimum” which their customers are allowed to exceed with more energy efficient off-grid technologies. This argument could have some traction. After all, the California Energy Commission was tasked with adopting regulations for *minimum* standards of building design and construction to increase energy efficiency.¹⁶ However, builders may exceed the minimum standards. If a house relies exclusively on solar and batteries, that would seem to be an increase in energy efficiency over a grid-dependent system.

The utilities would, of course, disagree and are likely to have the more persuasive argument here, as well. The Definitions and Rules of Construction of the Energy Code state that “shall” means “mandatory” and “may” means “permissive.”¹⁷ The section requiring interconnection is entitled, “Mandatory Requirements for Solar Ready Buildings.”¹⁸ Looking, once more to the context, it is 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;”¹⁹ and “the main electrical service panel shall have a minimum busbar rating of 200 amps.”²⁰ 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.”²¹ Here, if the authors wanted to allow an off-grid system where the solar panels were the “electrical service,” they could have done so. 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.²²

Utilities would likely also argue that an off-grid system is not necessarily more energy efficient because those systems frequently require back-up generators. Those could be difficult

¹⁶ CAL. PUB. RES. § 25402(a)(1), (b) (Deering 2016).

¹⁷ CAL. CODE REGS. tit. 24 Energy Code, § 100.1(a)(3).

¹⁸ *Id.*, § 110.10.

¹⁹ *Id.*, § 110.10(b)(1)(A).

²⁰ *Id.*, § 110.10(e)(1).

²¹ *Id.*, § 110.10(b)(2).

²² *See id.*, § 10-101.

to monitor in terms of efficiency and overall usage. Thus, the Energy Code's section 110.10 is likely to be construed as prohibiting off-grid installations. However, that appears to be the only Title 24 barrier to installation.

2. The California Electric Code and Other Parts Of Title 24 Allow Off-Grid Systems.

The California Electric 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."²³ A stand-alone system is, "[a] photovoltaic system that supplies power independently of an electrical production and distribution network."²⁴ 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. The wiring on the supply side of the building or structure disconnecting means shall comply with this Code except as modified by 690.10(A) through (E)."²⁵ Moreover, "[e]nergy storage or backup power supplies are not required."²⁶

The California Residential Code and the California Building Code simply refer to the Electrical Code.²⁷ The California Fire Code requires adoption in compliance with the California Building Code and California Electrical Code and states a construction permit is required to install the system.²⁸ 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 Electric Code for a similar installation connected to a service.²⁹

Although one could argue that the California Electric Code's explicitly permissive language indicates that off-grid residential systems are allowed, solar installers and permitting authorities must adhere to all of the codes, not just choose the most permissive one(s). Thus, the interconnection requirement of the Energy Code would need to be amended for residential users to go off-grid. Fortunately for the solar-plus-battery industry, a rulemaking is now underway to develop the 2016 Energy Code and presents a window of opportunity to amend this section.

²³ CAL. CODE REGS. tit. 24 Elec. Code, Art. 690.1.

²⁴ *Id.*, Art. 690.2.

²⁵ *Id.*, Art. 690.10.

²⁶ *Id.*, Art. 690.10(E).

²⁷ CAL. CODE REGS. tit. 24 Residential Code, § R331, Jul. 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.

²⁸ CAL. CODE REGS. tit. 24 Fire Code, § 605.11.

²⁹ CAL. CODE REGS. tit. 24 Mechanical Code § 1501.1, 2015 Uniform Solar Energy and Hydroponics Code §§ 912.7, 914.1.

B. State and Local Permitting Authorities May Not Introduce Barriers To Installation of Solar PV Systems.

Pursuant to California's AB 2188, adopted on September 21, 2014, the state government required local governments to enact ordinances, by September 30, 2015, regarding the installation of Solar PV Systems.³⁰ Local agencies are prohibited from adopting ordinances that create unreasonable barriers to the installation of solar energy systems.³¹ Instead, local regulations concerning Solar PV Systems must be tailored to specific adverse impacts on public health or safety and permitting authorities may only review permit applications to determine whether they meet all health and safety requirements of local, state, and federal law.³² Each local government is required to have a checklist of requirements for Solar PV Systems that would substantially follow the checklists and standard plans in the California Solar Permitting Guidebook adopted by the Governor's Office of Planning and Research.³³ When a local government denies a Solar PV permit, it must make a written finding, based on substantial evidence, that the proposed installation would have a "specific, adverse impact upon [] public health or safety, and there is no feasible method to satisfactorily mitigate or avoid the specific adverse impact."³⁴

The California Solar Permitting Guidebook states that if the system is not utility interactive, it may go through the standard process, not the expedited process.³⁵ However, it contains one statement indicating that connection may be required: "For solar PV installations, during the local agency project approval process the permit applicant should also contact the local utility provider to request permission to connect the solar installation to the local distribution grid. The solar PV system cannot be 'turned on' until approval is granted by both the local agency and the local utility."³⁶ While this statement could be interpreted as a requirement that the system be connected, the word, "should" and the context indicates this is a recommendation for those customers who intend to connect.

³⁰ 2014 Cal. Assem. Bill 2188(3) (Expedited Solar Permitting Act); CAL. GOV. CODE § 65850.5(g)(1) (Deering 2016); CAL. HEALTH & SAFETY CODE § 17959.1.

³¹ 2014 Cal. Assem. Bill 2188(3) (Expedited Solar Permitting Act); CAL. GOV. CODE § 65850.5(a) (Deering 2016).

³² 2014 Cal. Assem. Bill 2188(3) (Expedited Solar Permitting Act); CAL. GOV. CODE § 65850.5(b) (Deering 2016).

³³ 2014 Cal. Assem. Bill 2188(3) (Expedited Solar Permitting Act); CAL. GOV. CODE § 65850.5(g)(1)-(2) (Deering 2016).

³⁴ 2014 Cal. Assem. Bill 2188(3) (Expedited Solar Permitting Act); CAL. GOV. CODE § 65850.5(c) (Deering 2016).

³⁵ SOLAR PERMITTING TASK FORCE, GOVERNOR'S OFFICE OF PLANNING AND RESEARCH, CALIFORNIA SOLAR PERMITTING GUIDEBOOK: IMPROVING PERMIT REVIEW AND APPROVAL FOR SMALL SOLAR SYSTEMS 12 (Spring 2015).

³⁶ *Id.*

C. CPUC Regulations Regarding Safety and Reliability Could Impact Off-Grid Systems.

As stated, solar energy systems must meet applicable rules of the CPUC regarding safety and reliability.³⁷ However, there are no CPUC regulations that specifically pertain to the safety or reliability off-grid residential solar PV systems. The law in this area is not yet sufficiently developed. However, one may examine other CPUC regulations concerning reliability to draw analogies. For example, there are regulations requiring load serving entities to maintain adequate resources to meet demand.³⁸ However, customer generation located on a customer's site does not render the customer a load serving entity if the customer is not physically interconnected to the electrical transmission or distribution grid.³⁹ Thus, those particular regulations regarding adequate resources do not apply. There are also regulations pertaining to unplanned emergencies and outages due to generation or transmission problems. However, these regulations would not translate well into an off-grid residential setting because they describe priorities given to different classes of customers, how quickly power must be restored to various percentages of customers, and communications between utilities and customers regarding expected duration of outages.⁴⁰ Ultimately, this author believes it is more likely that California state law will adopt the standards for reliability of the North American Electric Reliability Corporation ("NERC"), in particular, the one day in ten year loss of load expectation in the development of resource adequacy.⁴¹ Although the technology for battery storage is improving, it is unclear if such systems can, economically, meet this standard for very many customers at this time, or even in the next several years. Theoretically, solar and battery could be combined with a generator or other system components to make up for a series of cloudy days, heavy usage, or other conditions. This may be a solution to achieving sufficient reliability.

IV. Conclusion.

The most significant barriers to off-grid residential PV systems at this point are: (1) the California Energy Code's requirement of interconnection in residential installations; and (2) undefined reliability standards that, once defined, may be difficult for solar-plus-battery technologies to satisfy. Under the current regulatory framework, grid defection and the utility death spiral should not occur in California.

On the other hand, given the strong policy preferences of the United States and California governments to foster the development of solar technologies, and the express permissiveness in

³⁷ 2014 Cal. Assem. Bill 2188(3) (Expedited Solar Permitting Act); CAL. GOV. CODE § 65850.5(f) (Deering 2016).

³⁸ CAL. PUB. UTIL. CODE § 380 (Deering 2016).

³⁹ CAL. PUB. UTIL. CODE § 380(k)(3)(B) (Deering 2016).

⁴⁰ STANDARD FOR OPERATION, RELIABILITY, AND SAFETY DURING EMERGENCIES AND DISASTERS, Cal. Pub. Util. Comm. General Order No. 166, Jul. 23, 1998 (revised in Cal. Pub. Util. Comm. Decision D.005-022, May 4, 2000).

⁴¹ North American Electric Reliability Corporation, Standard BAL-502-RFA-02.

the Electrical Code of solar plus battery systems, it is possible the Energy Code will be amended and reliability standards further defined.