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**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Revisit Net
Energy Metering Tariffs Pursuant to Decision
16-01-044, and to Address Other Issues
Related to Net Energy Metering.

R.20-08-020
(Filed August 27, 2020)

**JOINT OPENING BRIEF OF PACIFIC GAS AND ELECTRIC COMPANY (U 39-E),
SAN DIEGO GAS & ELECTRIC COMPANY (U 902-E), AND SOUTHERN
CALIFORNIA EDISON COMPANY (U 338-E)**

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Dated: August 31, 2021

TABLE OF CONTENTS

	Page
I. EXECUTIVE SUMMARY AND LEGAL FRAMEWORK.....	1
A. California’s NEM Program Is Increasing Costs for Vulnerable Customers and In Need of Reform	1
B. The Joint Utilities’ Proposed Reform Tariff Meets the Commission’s and State’s Objectives.....	3
C. The Legal Framework for Net Energy Metering Programs	5
1. Federal Law Background: NEM Customers Must Be Energy Consumers to Avoid Federal Jurisdiction	6
2. California’s Implementation of Federal Law in its NEM Program	9
3. AB 327 – the Ratepayer Reform Act	18
II. ISSUE 2: WHAT INFORMATION FROM THE NET ENERGY METERING 2.0 LOOKBACK STUDY SHOULD INFORM THE SUCCESSOR AND HOW SHOULD THE COMMISSION APPLY THOSE FINDINGS IN ITS CONSIDERATION?	21
A. The Lookback Study Should be an Evidentiary Pillar for NEM Reform	21
1. The Lookback Study Shows that Nonparticipants Bear a Substantial Portion of NEM Costs Such that the Current Tariff Transfers Wealth from the Less-Advantaged	23
2. Payback Periods Are Far Shorter than Legacy Periods	25
3. The Study Supports the Need for Consumer Protection	25
4. Parties in This Proceeding Confirm the Lookback Study’s Analysis	26
B. The Commission Should Weigh the Lookback Study with Results from Other Studies Concerning California.....	28
1. E3’s Cost Shift analyses show a substantial cost shift.....	28
2. Commission’s Affordability White Paper	30
3. Next 10 and the Energy Institute at UC Berkeley’s Haas School of Business	30
C. Experience from Other States Reinforces that NEM Reform is Needed, Can Succeed and Should be Considered	31
1. Other states have successfully implemented NEM Reform	34
2. Based on Several Trends, Solar Adoption Will Remain Strong Even with Reform	39

TABLE OF CONTENTS **(continued)**

	Page
III. ISSUE 3: WHAT METHOD SHOULD THE COMMISSION USE TO ANALYZE THE PROGRAM ELEMENTS IDENTIFIED IN ISSUE 4 AND THE RESULTING PROPOSALS, WHILE ENSURING THE PROPOSALS COMPLY WITH THE GUIDING PRINCIPLES?	52
A. The Standard Practice Manual Cost-Effectiveness Tests Should Be Used to Guide the Commission’s Analysis.....	52
1. Although the TRC Test Was Identified as the “Primary” Test for Cost-Effectiveness, It Is Not Informative for the Purpose of this Proceeding.....	53
2. Like the TRC, the PAC Test Also Is Uninformative	55
3. The RIM and PCT Are Best Suited to Inform the Commission’s Analysis.....	55
4. The Societal Cost Test (SCT) Should Not Inform the Commission’s Analysis	57
5. The Joint Utilities’ Reform Tariff Scores on the PCT and RIM.....	59
B. Ensuring the Proposals Comply with the Guiding Principles.....	60
IV. ISSUE 4: WHAT PROGRAM ELEMENTS OR SPECIFIC FEATURES SHOULD THE COMMISSION INCLUDE IN A SUCCESSOR TO THE CURRENT NET ENERGY METERING TARIFF	61
A. Cost-Based Default Residential and Commercial Rates for NEM Customers Support Guiding Principles (a), (b), (c), (e), (f), and (g)	62
B. A Value/Benefits-Based ECR Divorced from Retail Rates Achieves Guiding Principles (a), (b), (d), (e), (f), and (g) Because Retail Rates Far Exceed the Value of Exports from NEM-Eligible Renewable Generating Facilities.....	63
1. It is Undisputed that Reducing Export Compensation to a Value-Based Rate Will Incentivize Paired Storage, Providing Benefits to All Customers and the Grid	64
2. Reducing Export Compensation to a Value-Based Rate Will Not Hinder the Renewable Customer-Sited Generation Industry’s Ability to Grow in a Sustainable Manner	65
C. TOU Netting and Monthly True Up Will Provide Accurate Price Signals and Support the State’s GHG Reduction Goals in Furtherance of Guiding Principles (a), (b), (c), (d), (e), (f), and (g)	66

TABLE OF CONTENTS
(continued)

	Page
1. The Joint Utilities' Reform Tariff Net Billing Structure Will Achieve AB 327's Mandates and the Support the State's GHG-Reduction Goals.....	67
2. The Joint Utilities' Reform Tariff Net Billing Structure Promotes Consumer Protection.....	69
D. The Grid Benefits Charge Is in Furtherance of Guiding Principles (a), (b), (c), (d), (e), (f) and (g).....	69
E. Dynamic Load Management Capabilities Advance Guiding Principles (a), (b), (c), (d), (e), (f), and (g).....	71
F. Low-Income Considerations: The Commission Should Adopt the Joint Utilities' Reform Tariff in Furtherance of Guiding Principle (a).	73
1. The Joint Utility Proposal Prioritizes Ending the Wealth Transfer	73
2. The Joint Utility Proposal Will Narrow the Adoption Gap	75
3. Some Parties' Low-Income Approaches are Without Merit.....	78
V. ISSUE 5: WHICH OF THE ANALYZED PROPOSALS SHOULD THE COMMISSION ADOPT AS A SUCCESSOR TO THE CURRENT NET ENERGY METERING TARIFF AND WHY? WHAT SHOULD THE TIMELINE BE FOR IMPLEMENTATION?	82
A. The Joint Utilities' Proposal Should Be Adopted as It Is Best Aligned with the Guiding Principles.....	82
1. Guiding Principle (a): A successor to the net energy metering tariff shall comply with the statutory requirements of Public Utilities Code Section 2827.1	82
2. Guiding Principle (b): A successor to the net energy metering tariff should ensure equity among customers.	87
3. Guiding Principle (c): A successor to the net energy metering tariff should enhance consumer protection measures for customer-generators providing net energy metering services.	88
4. Guiding Principle (d): A successor to the net energy metering tariff should fairly consider all technologies that meet the definition of renewable electrical generation facility in Public Utilities Code Section 2827.1.....	88

TABLE OF CONTENTS
(continued)

	Page
5. Guiding Principle (e): A successor to the net energy metering tariff should be coordinated with the Commission and California’s energy policies, including but not limited to, Senate Bill 100 (2018, DeLeon), the Integrated Resource Planning process, Title 24 Building Energy Efficiency Standards, and California Executive Order B-55-18.....	88
6. Guiding Principle (f): A successor to the net energy metering tariff should be transparent, understandable to all customers and should be uniform, to the extent possible, across all utilities.	89
7. Guiding Principle (g): A successor to the net energy metering tariff should maximize the value of customer-sited renewable generation to all customers and to the electrical system.....	90
8. Guiding Principle (h): A successor to the net energy metering tariff should consider competitive neutrality amongst Load Serving Entities.	90
B. The Joint Utilities’ Proposal Is Aligned with the Commission’s Rate Design Principles	91
C. Other Reform Party Proposals Have Merits but Are Inferior to the Joint Utilities’ Proposed Reform Tariff.....	92
1. The Reform Tariff Is More Effective in Addressing the Cost Shift than the Cal Advocates Proposal	92
2. The Reform Tariff Is Less Complicated than TURN’s Proposal	93
3. The Reform Tariff’s Approach to ECR is Better than NRDC’s Proposal.....	94
4. The Reform Tariff is Superior to Sierra Club’s Proposal	94
D. The Solar Industry Representative’s Proposals Do Not Comport with Law or Policy	95
1. The Solar Industry Representatives’ Proposals Perpetuate the Cost Shift in Violation of AB 327.....	95
2. Oversizing and Community Solar Proposals are Unlawful for Net Metering Billing Arrangements	100
E. Timeline and Implementation Issues	101
1. Timing.....	101
2. Marketing, Education and Outreach	105

TABLE OF CONTENTS
(continued)

	Page
3. Consumer Protection.....	106
4. Revenue Allocation and Cost Recovery	112
VI. ISSUE 6: OTHER ISSUES THAT MAY ARISE RELATED TO CURRENT NET ENERGY METERING TARIFFS AND SUB-TARIFFS	115
A. Virtual NEM Tariffs Should Be Reformed In Alignment with Other NEM Tariffs.....	115
1. Existing Virtual Tariffs	115
2. Reform of the Virtual Tariffs Must Comply with Public Utilities Code Section 2827.1	117
3. The Joint Utilities’ Proposed Reforms to the Virtual Tariffs Align with Their Proposed Reform Tariff and Advance Consumer Protection	117
4. Reform of the Virtual Tariffs Is Appropriate.....	119
5. Ivy Energy’s Criticisms of the Joint Utilities’ Proposed Virtual Tariff Reforms Are Unavailing.....	120
6. Net Energy Metering Aggregation Should Not Be Treated Differently	121
B. The Joint Utilities’ VODE Tariff Proposal Should Be Adopted as an Alternative Option for Future Implementation	122
VII. CONCLUSION.....	124
APPENDIX OF ACRONYMS	A - 1

TABLE OF AUTHORITIES

Page(s)

Federal Authorities

Federal Cases

<i>Am. Paper Inst. v. Am. Elec. Power Serv. Corp.</i> , (1983) 461 U.S. 402	7
<i>Californians for Renewable Energy v. Cal. Pub. Util. Comm.</i> , (9 th Cir. 2019) 922 F.3d 929	97
<i>Nat’l Ass’n of Regulatory Util. Comm’rs v. FERC</i> , (D.C. Cir. 2007) 475 F.3d 1277	8

Federal Statutes

16 U.S.C. § 2621(a)	9
16 U.S.C. § 2621(d)(11)	9
16 U.S.C. § 796(17)(C)	6
16 U.S.C. § 796(18)(B)	6
16 U.S.C. § 824(b)(1)	6
16 U.S.C. § 824a – 3(b)	6
18 C.F.R. § 292.101(6)	7
18 C.F.R. § 292.201	6
18 C.F.R. § 292.203	6
18 C.F.R. § 292.303(c)(1)	7
18 C.F.R. § 292.304(d)	6
18 C.F.R. § 292.306(a)	7

FERC Decisions

<i>MidAmerican Energy Company</i> , 94 FERC ¶ 61,340 (2001)	7
<i>Sun Edison LLC</i> , 129 FERC ¶ 61,146 (2009)	9
FERC Stats. & Regs. § 31,160 (2004) Order No. 2003-A	8, 10
FERC Stats. & Regs. § 31,171 (2005) Order No. 2003-B	8
FERC Stats. & Regs. § 31,190 (2005) Order No. 2003-C	8
FERC Order No. 69, FERC Stats & Regs P 61,150, 45 Fed. Reg 12214 (1980)	97

Table of Authorities
(continued)

Page(s)

California Authorities

State Cases

<i>Alford v. Pierno</i> , (1972) 27 Cal.App.3d 682	20
<i>City of Los Angeles v. Pac. Tel & Tel. Co.</i> , (1958) 164 Cal.App.2d 253	20
<i>Cossack v. City of Los Angeles</i> , (1974) 11 Cal.3d 726	19
<i>Estate of Jacobs</i> , (1943) 61 Cal.App.2d 152	20
<i>Johnstone v. Richardson</i> , (1951) 103 Cal.App.2d 41	20
<i>Khajavi v. Feather River Anesthesia Medical Group</i> , (2000) 84 Cal.App.4 th 32	19, 20
<i>Mannheim v. Superior Court</i> , (1970) 3 Cal.3d 678	20
<i>Parris v. Zolin</i> , (1996) 12 Cal.4 th 839	19
<i>People v. Carter</i> , (1996) 48 Cal.App.4 th 1536	20
<i>People v. Crus</i> , (1996) 13 Cal.4 th 764	19
<i>People v. Knowles</i> , (1950) 35 Cal.2d 175	19
<i>Select Base Materials v. Board of Equal</i> , (1959) 51 Cal.2d 640	19
<i>Williams v. Sup. Ct.</i> , (1993) 5 Cal.4 th 337	19

Statutes and Regulations

Assembly Bill 327.....	<i>passim</i>
Assembly Bill 920.....	14, 15, 16
Assembly Bill 1070.....	108

Table of Authorities
(continued)

	Page(s)
Cal. Corp. Code § 5110 <i>et seq</i>	82
Cal. Corp. Code § 7110 <i>et seq</i>	82
Public Resource Code § 25782(a).....	12
Public Utilities Code § 451	68
Public Utilities Code § 2827	10, 11, 14, 117
Public Utilities Code § 2827(b)	11
Public Utilities Code § 2827(b)(4)(A)	11
Public Utilities Code § 2827(b)(4)(B)(i).....	11
Public Utilities Code § 2827(b)(4)(C)(ii)	11
Public Utilities Code § 2827(b)(6).....	14
Public Utilities Code § 2827(b)(7).....	15
Public Utilities Code § 2827(b)(8).....	15
Public Utilities Code § 2827(b)(9).....	15
Public Utilities Code § 2827(c)(4)(D)	117
Public Utilities Code § 2827(h)	15, 117
Public Utilities Code § 2827(h)(4).....	117
Public Utilities Code § 2827(h)(4)(D)	122
Public Utilities Code § 2827(h)(6)(A)	18, 97
Public Utilities Code § 2827(h)(6)(B)	18, 97
Public Utilities Code § 2827.1	<i>passim</i>
Public Utilities Code § 2827.1(b)	1, 18, 54, 56
Public Utilities Code § 2827.1(b)(1).....	18
Public Utilities Code § 2827.1(b)(2).....	18
Public Utilities Code § 2827.1(b)(3).....	18
Public Utilities Code § 2827.1(b)(4).....	18
Public Utilities Code § 2827.1(b)(5).....	18
Senate Bill 1	98
Senate Bill 43	19
Senate Bill 100	60, 88
Senate Bill 489	16

Table of Authorities
(continued)

	Page(s)
Senate Bill 594	116, 122
Senate Bill 656	10, 11

Other Authority

California Executive Order B-55-18 (Sept. 9, 2018)	60, 88, 89
----------------------------------------------------------	------------

California Public Utilities Commission

Decisions

D.02-03-057	11
D.06-01-024	12
D.06-07-028	12
D.08-10-036	117
D.09-08-026	52, 56
D.11-06-016	13, 16, 17
D.11-07-031	117
D.14-03-041	13
D.14-11-001	13
D.15-07-001	89, 91, 112
D.16-01-044	110
D.18-09-044	21, 22, 107, 111
D.19-05-019	53, 55, 56, 57, 59, 99
D.19-10-040	22
D.20-04-010	96, 99
D.21-02-007	1, 19, 20, 60, 73, 107, 112

Resolutions

Resolution E-4610 (Issued Sept. 20, 2013)	122
Resolution E-5077 (Issued June 30, 2020)	98

Table of Authorities
(continued)

Page(s)

Rulemaking

R.12-11-005 (Nov. 8, 2012).....	13
R.14-07-002 (July 10, 2014).....	69, 107, 111
R.20-08-020 (Aug. 27, 2020).....	3

Rules of Practice and Procedure

Rule 1.8(d)	125
Rule 13.12	xii
Rule 13.10	3, 53, 66

Other Authority

Joint Assigned Commissioner’s Scoping Memo and Administrative Law Judge Ruling Directing Comments on Proposed Guiding Principles (Nov. 19, 2020)	xii, 21, 22, 28
-----------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------

CITATION KEY

All record evidence is cited in accordance with the following conventions:

Citation to the record transcript: “[witness surname, if applicable], T. [page number(s)]: [line number(s)] (date).” *E.g.*, Tierney, T. 210:22-211:2 (July 27, 2021).

Citations to Prepared Testimony identified as exhibits in this case shall use the party initials and exhibit numbers assigned by the ALJ. Cite as follows: Ex. [party abbreviation] [exhibit number] ([witness surname]) [page:line number(s) and/or footnote number]. *E.g.*, Ex. IOU-2 (Morien) 47:17-21 and n. 136. Note that the cited page numbers omit any associated initials. Citation to witness panels will show only the lead witness surname, followed by “et al.”

Citation to Other Record Exhibits: other items identified as exhibits will use the party initials and exhibit number assigned by the ALJ. *E.g.*, “Ex. [party abbreviation] [exhibit number], [exhibit title, if referenced ([date], if any)] [page number(s) if applicable]. *E.g.*, PCF-15, Net-Energy Metering 2.0 Lookback Study (“Lookback Study”) (Jan. 21, 2021), pp. 32-33.

SUMMARY OF RECOMMENDATIONS

Pursuant to Commission Rule of Practice and Procedure (“Rule”) 13.12, PG&E, SCE and SDG&E (the “Joint Utilities”) provide the following summary of their recommendations in this proceeding. Organized by the issues set forth in the November 19, 2020 Scoping Memo, the Joint Utilities recommend that the Commission:

Issue 2:

- Use the Lookback Study, other studies concerning California’s NEM program, and the experience of other states that have reformed their NEM programs to inform its analysis in this proceeding, all of which reflect the need for reform.

Issue 3:

- Analyze the parties’ proposals using the CPUC’s Standard Practice Manual, and in particular, the Participant Cost Test and Rate Impact Measure Test results, as they are the most informative in the context of this proceeding and are best suited to ensure compliance with the Guiding Principles.

Issues 4 and 5:

- Reform California’s NEM program for new NEM customers through adoption of the Joint Utilities’ proposal, which includes:
 - A cost-based residential default rate for residential customers, including time-of-use rates for three periods: on-peak, off-peak and super off-peak for the summer and winter seasons.
 - A net billing structure, in which all energy delivered to the customer is billed at the retail rate, and all energy exported to the grid is compensated at an export compensation rate (ECR) set at the avoided cost based on a one-year forward estimate in different time periods.
 - A grid benefits charge (GBC) based on solar system size and updated annually, designed to recover distribution, transmission and non-bypassable charges (NBCs) that might otherwise be avoided by solar customers.
 - The netting of a customer’s consumption and exports on an instantaneous basis during hourly time-of-use (TOU) periods, with monthly true-ups.
- Include as part of the Reform Tariff, the utilities’ proposed Income Qualified Discount (IQD) to reduce the GBC for income qualified customers, in conjunction with export compensation at the full (non-discounted) avoided cost.
- Adopt our pilot called the “Savings Through Ongoing Renewable Energy (“STORE”)” program that would cover the costs of behind-the-meter storage for income qualified customers.
- Require NEM customers’ facilities be equipped with dynamic load management capabilities and cybersecurity configurations to (i) allow the customer to permit the utility to control the facility for purposes of curtailment and dispatch and (ii) protect the grid from cyber-attack.
- Transition to the Reform Tariff promptly after the final decision, allowing a buffer period (three months for residential; five months for non-residential)

- for customers in the contracting process at the time of final decision.
- Adopt our consumer protection proposal, which includes, among other things: (i) updates to the California Solar Consumer Protection Guide and other materials; (ii) update the current Consumer Protection Guide by November 1, 2021; and (iii) a robust plan of marketing, education and outreach (ME&O).
- Provide for the utilities to recover the subsidies emerging from the Income Qualified Discount proposal and the STORE Program, as well as the costs for implementation and ME&O, through the appropriate balancing and memorandum accounts.

Issue 6:

- Reform virtual NEM (or VNEM) and NEM aggregation (or NEMA) tariffs such that exports are compensated at avoided costs.
- Adopt the Joint Utilities' proposed Value of Distributed Energy (VODE) tariff option, for future customer use cases requiring a dual-meter option to provide information to facilitate more advanced uses of distributed generation such as demand response or microgrid participation.

* * *

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I. EXECUTIVE SUMMARY AND LEGAL FRAMEWORK

**A. California’s NEM Program Is Increasing Costs for Vulnerable Customers
and In Need of Reform**

The California Public Utilities Commission (“CPUC” or “Commission”) faces the challenge of reforming California’s 25-year old net energy metering (NEM) program to achieve the objectives in Public Utilities Code section 2827.1(b). Those objectives include ensuring that:

- “customer-sited renewable distributed generation continues to grow sustainably,”
- “the standard contract or tariff made available to eligible customer-generators is based on the costs and benefits of the renewable electrical generation facility,”
- and
- “the total benefits of the standard contract or tariff to all customers and the electrical system are approximately equal to the total costs.”¹

In addition, pursuant to Guiding Principle (b), adopted by Decision (D.) 21-02-007, the Commission is to promote equity among customers. These are the four most important objectives in this proceeding.

Stated more plainly, these key objectives are to ensure that (i) rooftop solar continues to grow sustainably, (ii) the reform tariff reflects true costs and benefits, (iii) the cost shift is ended, and (iv) the tariff provides equitable benefits to lower-income customers. The written and oral

¹ Pub. Util. C. § 2827.1(b).

testimony presented in this proceeding reflect a broad consensus that reform is needed to achieve those objectives. The Joint Utilities, consumer advocates, labor interests and environmental groups share common ground in a collective call for reform.

The most important factor driving the consensus is the massive cost shift created by the existing NEM program. That is, the costs that customers without solar pay to subsidize customers who do have solar is **\$3.4 billion per year and growing**. Even worse, without reform, that number climbs to **\$10.7 billion by 2030**. For individual customers, this massive cost shift amounts to a current bill increase of approximately \$245 per year for non-participating customers in SDG&E's service area, where rooftop solar penetration is the highest (this cost becomes \$555 annually by 2030).²

Customers with solar typically on average have higher incomes than those who do not. Tragically, this means that the wealth transfer described above goes disproportionately from those with lesser means to more wealthy customers.³ TURN describes the state's NEM policy as a "Reverse Robin Hood." We agree. The success of the solar rooftop industry will continue in California without this subsidy between income groups. Reform of the tariff needs to happen now -- coming out of this proceeding -- not gradually over the next decade, as some parties suggest, to ensure that all customers are able to afford electricity into the foreseeable future.

To fix the tariff, the Commission needs to first stop the cost shift. To stop the cost shift, its source must be the focus. The cost shift is driven by two major defects of the current NEM program: (a) the ability of solar customers to avoid paying their share of the cost to provide them with service and (b) the fact that solar customers' exports to the grid are compensated at the full retail rate — a rate much higher than the price the utility pays for other power supply.⁴

² Ex. IOU-01 (Peterman) 2:16-20.

³ Ex. PCF-15, Net-Energy Metering 2.0 Lookback Study ("Lookback Study") (Jan. 21, 2021), pp. 32-33.

⁴ Ex. IOU-02 (Peterman) 1:12-15.

Furthermore, the economics of going solar are profoundly out of balance. Current NEM customers enjoy very short payback periods on their solar investment (as little as 3-5 years), but are able to remain on the NEM rate for 20 years.⁵ This is a mere tenth of the estimated 35-year useful life represented by a major solar manufacturer.⁶ As even Solar Energy Industry Association /Vote Solar (SEIA/VS) witness Beach testified: “the balance between participants and non-participants needs to be reset.”⁷

In addition to the cost shift, the current NEM program is also problematic for other reasons. When subsidy programs like NEM unreasonably increase rates, they disincentivize customers from adopting technologies that promote electrification, which in turn frustrates the state’s environmental and energy policy goals.⁸ The current tariff also fails to provide sufficient price signals to promote energy storage.⁹ In short, the current NEM tariffs are neither just nor reasonable. They hurt vulnerable customers and, counterintuitively, they hurt the environment too.

B. The Joint Utilities’ Proposed Reform Tariff Meets the Commission’s and State’s Objectives

The Joint Utilities’ proposal is designed to achieve the needed “reset” to ensure the objectives set forth above are met. The essential elements of our proposed Reform Tariff are:

⁵ Energy+Environmental Economics, “Cost-effectiveness of NEM Successor Rate Proposals under Rulemaking 20-08-020: A Comparative Analysis,” p. 34 (June 15, 2021) (referred to hereinafter as the “E3 Comparative Analysis”). Pursuant to Commission Rule 13.10, the Joint Utilities request that the Commission take Official Notice of the E3 Comparative Analysis, which was prepared at the Commission’s request and is available on the Commission’s website (at [nemrevisit \(ca.gov\)](http://nemrevisit.ca.gov)) through the following link: <https://willdan.app.box.com/s/3jpsc3lbt0f5erje7f4bkqkk96uahp>. (accessed Aug. 24, 2021).

⁶ Sunrun, Inc., *Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934*, dated February 25, 2021 (Sunrun Form 10-K), p. 27 of which official notice was taken by the August 30, 2021 ALJ ruling.

⁷ Beach, T. 1283:2-4 (Aug. 4, 2021).

⁸ Ex. IOU-01 (Peterman) 15:24-16:31.

⁹ *Id.*

1. A cost-based default rate for residential customers, including time-of-use rates for three periods: on-peak, off-peak and super off-peak¹⁰ for the summer and winter seasons.
2. A net billing structure, in which all energy delivered to the customer is billed at the retail rate, and all energy exported to the grid is compensated at the export compensation rate (ECR). The ECR is set at the avoided cost based on a one-year forward estimate in different time periods.
3. A grid benefits charge (GBC) for residential customers and non-residential customers based on solar system size and updated annually, with the GBC designed to recover distribution, transmission and non-bypassable charges (NBCs) that might otherwise be avoided by solar customers.
4. The netting of a customer's consumption and exports by separating imported and exported meter data during hourly time-of-use (TOU) periods, with monthly true-ups.

For income qualified customers, the Joint Utilities' proposal includes:

- an Income Qualified Discount (IQD) to reduce the GBC;
- export compensation at the full (non-discounted) avoided cost; and
- our pilot called the "Savings Through Ongoing Renewable Energy (STORE) program that would cover the costs of behind-the-meter storage, which can provide bill savings for customers and grid benefits due to the utility's dispatch control.

The Joint Utilities also propose requiring certain dynamic load management capabilities for both PV solar and energy storage systems that would (i) permit the customer to allow the utility to control the facility for purposes of curtailment and dispatch; and (2) protect against cyberattack.

These rate design and program elements are intended to work together to reduce the NEM cost shift from participating to non-participating customers, support a value proposition for new solar customers (in particular for income qualified customers) and encourage solar-paired storage adoption.

¹⁰ TOU periods listed for SDG&E. For PG&E, TOU periods are on-peak, part-peak and off-peak. For SCE, TOU periods are on-peak, mid-peak, off-peak and super off-peak.

Our tariff addresses four key objectives outlined above. The Reform Tariff is based on costs to serve, pays customers for the power they supply to the grid at the same rates the utilities would pay other suppliers, collects from customers their fair share of the cost of using the grid, and promotes equity for income qualified customers. Importantly, the Reform Tariff will foster solar adoption as customers on the Reform Tariff will continue to see a bill savings (for SDG&E approximately \$70 per month for standalone solar and \$130 per month for solar plus storage¹¹). Bill savings are described by the Public Advocates Office as the “most widespread reason that customers adopt rooftop solar.”¹²

The proposed Reform Tariff strikes the appropriate balance between the competing requirements of Public Utilities Code Section 2827.1. For all the above reasons, as detailed further herein, we encourage the Commission to reform the NEM program expeditiously and to do so through adoption of the Joint Utilities’ proposed Reform Tariff.

C. The Legal Framework for Net Energy Metering Programs

The NEM program is shaped by federal and state law including, but not limited to, the Guiding Principles and policy mandates set forth in Public Utilities Code Section 2827.1. Reform of the NEM program therefore must be considered in the context of the law, including the limits that federal and state law impose on the program.

There are five aspects of federal and state law that are especially pertinent to the NEM reforms posed to the Commission. In summary:

- NEM reform must abide by federal law requiring that NEM customers be net energy consumers to avoid implicating federal jurisdiction.
- California’s implementation of NEM overcompensates customers as compared to what would be allowed under federal law, reflecting areas ripe for reform.
- To avoid federal jurisdiction NEM systems should not be sized to exceed onsite load.

¹¹ Morien, T. 609:16-610:3 (July 29, 2021).

¹² Ex. PAO-02 (Gutierrez) 3-16:21 – 3-17:5 and n. 72.

- Payment for annual excess energy exports does not conflict with the net consumer requirement, but such compensation does not render monthly exports RPS eligible for meeting the utilities’ respective procurement targets.
- AB 327, the Ratepayer Reform Act provides policy directives that, based on rules of statutory construction, must be read in harmony, and require elimination of the cost shift.

Each of these legal issues is detailed below, providing additional context and history to the NEM program and parameters for reform.

1. Federal Law Background: NEM Customers Must Be Energy Consumers to Avoid Federal Jurisdiction

Under Section 201(b)(1) of the Federal Power Act (FPA), the Federal Energy Regulatory Commission (FERC) has jurisdiction over wholesale transactions that occur in interstate commerce, meaning transactions in which energy and capacity are sold to the utility and intended for resale by the utility to its retail customers.¹³

In 1978, Congress enacted the Public Utility Regulatory Policies Act of 1978 (PURPA) “to encourage the development of cogeneration and small power production facilities, and thus to reduce American dependence on fossil fuels” by creating a new category of generators known as Qualifying Facilities (QFs).¹⁴ QFs are smaller generating facilities that typically generate less than 20 MW of energy, capacity, or both.

To overcome some utilities’ reluctance to purchase from new types of generators, PURPA imposed a “must sell” obligation on QFs and a corresponding “must purchase” obligation on utilities, which required utilities to buy energy, capacity or both from QFs and compensate the QFs at a just and reasonable avoided cost rate.¹⁵ As a general matter, “avoided cost” is the “incremental cost[] to an electric utility of electric energy or capacity or both which,

¹³ 16 U.S.C. § 824(b)(1).

¹⁴ 18 C.F.R. §§ 292.201 & 292.203; 16 U.S.C. §§ 796(17)(C) & 18(B) (defining the requirements for being a QF).

¹⁵ 16 U.S.C. § 824a-3(b); 18 C.F.R. § 292.304(d).

but for the purchase from the [QF], such utility would generate itself or purchase from another source.”¹⁶ Consistent with these reciprocal obligations, the QF has a right to interconnect with its host utility but the state regulatory authority may require the QF to pay interconnection-related fees.¹⁷

In 2001, FERC heard a petition for declaratory relief brought by MidAmerican Energy Company (MidAmerican) claiming that Iowa’s NEM statute, as implemented, was preempted by and violated PURPA because it required MidAmerican to offer net billing arrangements to certain customer-sited generating facilities for their energy at the retail rate, which far exceeded the avoided cost compensation to which QFs are entitled.¹⁸ FERC’s decision disclaimed jurisdiction over NEM on the ground that such arrangements do not constitute wholesale power sales, but rather are billing arrangements because the NEM customer’s system is not designed to produce a net sale.¹⁹ FERC made clear, however, that when net sales do occur during a billing period, the compensation to the customer must comply with the FPA if the customer is not a QF, or with PURPA’s avoided cost rate requirement if the customer is a QF.²⁰ If there are no net sales, only net consumption, the customer generator’s exports are not wholesale power transactions.

FERC concluded that such netting arrangements were permissible on a normal monthly billing cycle for retail customers.²¹ As for MidAmerican’s argument that Iowa’s NEM statute would require it to pay for all power generated by the customer generator at the retail rate, FERC stated: “This is not how NEM billing works.”²²

¹⁶ 18 C.F.R. § 292.101(6).

¹⁷ See *Am Paper Institute, Inc. v. Am. Elec. Power Serv. Corp.*, 461 U.S. 402, 418 (1983); 18 C.F.R. §§ 292.303(c)(1) & 292.306(a).

¹⁸ *MidAmerican Energy Co.*, 94 FERC ¶ 61340, 62261 (2001).

¹⁹ *Id.* at ¶ 62262.

²⁰ *Id.* at ¶ 62263.

²¹ *Id.* at ¶ 62264.

²² *Id.* at ¶ 62262.

FERC may have made such a statement because it may not have appreciated how Iowa (and other states) implemented net metering. Or, it may have been that FERC's decision was premised on federal law, which does not provide utility customers with a right to offset the entire bill by self-serving load or to be compensated at retail for exports. PURPA defines NEM as an **energy for energy** transaction between an **energy consumer** -- not an energy producer/seller -- and the utility, meaning that PURPA merely permits energy supplied by the onsite generator to be used to offset energy delivered by the utility.²³ PURPA's "energy for energy" definition suggests that *federal law* provides no right to offset more than the generation component of the bill given that NEM generators are net consumers, not net producers, and do not supply transmission, distribution, ancillary or other services. However, that is not how states have implemented NEM; instead, states have broadened the benefit to incentivize the installation of NEM eligible onsite generating facilities.

FERC's Order 2003-A affirmed that NEM customers must be net consumers, not net producers. FERC explained:

*Net metering allows a retail electric customer to produce and sell power onto the Transmission System without being subject to the Commission's jurisdiction. A participant in a net metering program must be a net consumer of electricity -- but for portions of the day or portions of the billing cycle, it may produce more electricity than it can use itself. This electricity is sent back onto the Transmission System to be consumed by other end-users. Since the program participant is still a net consumer of electricity, it receives an electric bill at the end of the billing cycle that is reduced by the amount of energy it sold back to the utility. Essentially, the electric meter "runs backwards" during the portion of the billing cycle when the load produces more power than it needs and runs normally when the load takes electricity off the system.*²⁴

²³ See 16 U.S.C. 2621(d)(11) ("The term "net metering service" means service to an electric consumer under which the **electric energy generated by that electric consumer** from an eligible on-site generating facility and delivered to the local distribution facilities may be **used to offset electric energy provided by the electric utility** to the electric consumer during the applicable billing period.") (emphasis added).

²⁴ *Standardization of Generator Interconnection Agreements and Procedures*, Order No. 2003-A, FERC Stats. & Regs. ¶ 31,160 a p. 744, order on reh'g, Order No. 2003-B, FERC Stats. & Regs. ¶ 31,171 (2004), order on reh'g, Order No. 2003-C, FERC Stats. & Regs. ¶ 31,190 (2005), aff'd sub nom. *NARUC v. FERC*, 475 F.3d 1277 (D.C. Cir. 2007) (emphasis added).

In 2009, in *Sun Edison LLC*, 129 FERC ¶ 61146 (2009), FERC reiterated that its jurisdiction begins and ends based upon whether the customer is a net consumer or net seller, stating:

Where there is no net sale over a billing period, the Commission has not viewed its jurisdiction as being implicated; that is, the Commission does not assert jurisdiction when the end-use customer that is also the owner of the generator receives a credit against its retail power purchases from the selling utility. Only if the end-use customer participating in the net metering program produces more energy than it needs over the applicable billing period, and thus is considered to have made a net sale of energy to a utility over the applicable billing period, has the Commission asserted jurisdiction.²⁵

2. California’s Implementation of Federal Law in its NEM Program

In 2005, Congress passed the Energy Policy Act of 2005, which added new “states-must-consider” standards to PURPA, which included a mandate that state legislatures must consider offering NEM to utility customers.²⁶ By then, however, California was far ahead, having pioneered net metering, passing its first net metering law in 1996.

a. California’s NEM Subsidy Overcompensates Adopters Compared to Federal Law

California’s current program provides benefits to adopters in excess of those afforded under federal law and that are driving the cost shift. These benefits arise in at least two ways and reflect areas that are ripe for reform.

First, California’s program is not energy for energy, meaning that the customer does not only offset their utility service with a credit to the generation component of the bill. Instead, the credit applies to all components of the bill. As a result, the customer does not pay non-generation-related charges.

Second, California divorced the monthly “billing period” from the annual “netting period” to provide a larger subsidy to customer-sited renewables. A NEM customer’s excess energy exports during the monthly netting period are paid at the full retail rate to the extent they

²⁵ *Sun Edison LLC*, 129 FERC ¶ 61146, 61620 (2009).

²⁶ 16 USCS § 2621(a), (d)(11) (commonly referred to as PURPA § 111(d)).

offset imports. And, excess energy that cannot be offset against imports is “rolled over” to the next monthly billing cycle, thereby enabling the customer to receive the retail rate value for the excess energy in future months. Only at the end of the 12-month billing cycle is a true up performed. And only if at that time the customer proved to be a net seller, instead of a net consumer, is the customer paid a wholesale rate for their excess energy exports. This contrasts with FERC’s *MidAmerican*, Order 2003-A, and *Sun Edison* rulings, which, if applied literally and it is assumed that the NEM customer’s resource is a QF (as is nearly always the case) would require *any* compensation for excess energy *after* a monthly billing period ends to be set at an avoided cost rate.

In sum, California’s implementation of NEM allows NEM customers to not only avoid non-generation related charges, but also to pay less for the electricity they import by virtue of the compensation they receive for exports. Given the regulatory compact guaranteeing the utility will earn a rate of return on its capital investments, which the utility collects through retail rates, the utility must collect the delta between what NEM customers owe and what they pay from other customers. The shift of costs to non-NEM customers is the NEM subsidy.

b. California’s NEM Statutes and Decisions Have Never Deviated from FERC’s Jurisdictional Net Consumer Requirement

California’s NEM statutes were carefully crafted to comport with FERC’s “net consumer” requirement so to avoid invoking federal jurisdiction, and the Commission has been steadfast in its interpretation of the law to prohibit oversizing of NEM systems. As such, NEM reform is subject to these confines.

Section 2827²⁷ was added to the Public Utilities Code in 1995 through the enactment of Senate Bill (SB) 656. Since the 1995 addition of Section 2827 to the Public Utilities Code, the

²⁷ Hereinafter, unless otherwise noted, all “Section” references are to the California Public Utilities Code.

definition of an eligible customer-generator has required that the NEM system be “intended primarily to offset part or all of the customer’s own electrical requirements.”²⁸

Section 2827 of the Public Utilities Code defines an “[e]ligible customer-generator” [as] a . . . customer of an electric utility, who uses a renewable electrical generation facility, or a combination of those facilities. . . that is located on the customer’s . . . premises, and is interconnected and operates in parallel with the electrical grid, and **is intended primarily to offset part or all of the customer’s own electrical requirements.**”²⁹

The Legislative analysis of SB 656 demonstrates that this language was intended to allow utility customers to receive NEM benefits for renewable generating systems that are installed “to offset the customer’s own electricity use, rather than to produce excess power for sale to the utility.”³⁰ For this reason, in D.02-03-057, the Commission noted that SB 656’s purpose was to provide an incentive to customers installing systems to “supply their own load.”³¹ While NEM’s scope has expanded over the years to include larger and different types of generators, its fundamental structure has remained the same: to incentivize customers to offset their electricity use from the grid with onsite renewable generation at a retail rate.³²

The Commission has been unwavering in its interpretation of Section 2827’s requirement that NEM eligible systems be “intended primarily to offset part or all of the customer’s own electrical requirements.” The Commission has repeatedly understood this to require NEM systems to be “sized to meet but not exceed the customer’s annual onsite load.” The

²⁸ Section 2827(b) in Ch. 369, Statutes of 1995.

²⁹ Section 2827(b)(4)(A) (emphasis added); *see also* 2827(b)(4)(B)(i), (C)(ii).

³⁰ Analysis by Assembly Member Diane Martinez (“According to the author, this bill provides equitable rate treatment for small, residential solar systems that are designed primarily to offset the customer’s own electricity use, rather than to produce power for sale to the utility.”); SB 656 Bill Analyses, dated June 12, 1995 at p.2 (“The systems are primarily designed to offset the customer’s own electricity use.”) available at http://www.leginfo.ca.gov/pub/95-96/bill/sen/sb_0651-0700/sb_656_cfa_950609_122709_asm_comm.html (accessed Aug. 24, 2021).

³¹ D.02-03-057 at p. 2.

³² *Id.*

Commission’s understanding is consistent with statutory and legislative intent, federal law, and other Commission programs.

Notably, when the Commission first adopted the California Solar Initiative (CSI) in 2006, it construed the net metering statutes as “not requir[ing] the utilities to purchase solar production that exceeds the customer’s annual electric consumption.”³³ The Commission also acknowledged the existence of federal jurisdictional issues with utility purchases of excess generation from oversized systems.³⁴ Thus, for CSI and Self-Generation Incentive Program (SGIP) incentives, the Commission “reduce[d] eligible system size to 100% of historic peak load, beginning with SGIP applications received on or after the effective date of this decision.”³⁵

Later in 2006, the Commission considered the issue again in D.06-07-028. In that decision, the Commission grappled with whether to adopt a staff proposal to revise the system size requirement for CSI and SGIP incentives from 100% of peak load to 100% of annual historical usage, based on the previous 12 months usage data, and left the details to the program handbook.³⁶ In D.06-07-028, the Commission explained its decision six months earlier in D.06-01-024, stating that because “**the Commission wanted to avoid paying incentives to oversized systems[,] []** it reasoned it was not prudent to pay incentives for capacity exceeding the on-site peak load. Capacity above peak load requirements might result in surplus power that would go unused and would not be eligible to receive net energy metering credits. Therefore, in D.06-01-024, the Commission reduced eligible system size for solar facilities to 100% of historic peak load. . . .”³⁷ To ensure that customers receiving net energy metering credits were not penalized

³³ D.06-01-024 at p. 15.

³⁴ *Id.*

³⁵ *Id.*

³⁶ D.06-07-028 at pp. 2-6, FOF 1, 2; *see also* Senate Bill (SB) 1 (adding Section 25782(a) to the Public Resources Code to codify virtually the same NEM sizing requirement for CSI); Section 2.2.4 and 2.2.5 of the CSI Program Handbook.

³⁷ *Id.* at p. 2.

on an annual basis by the sizing restriction, the Commission increased the system cap from 100% of peak load to 100% of annual historical usage for SGIP and CSI projects.³⁸

The decision that most thoroughly and directly addressed the question solely with respect to NEM – D.11-06-016 – was issued on June 20, 2011.³⁹ In D.11-06-016, the Commission held that “NEM customers are required to size their systems to be no larger than onsite load.”⁴⁰ But the exact details of how the size limits should be calculated and administered were addressed long before D.11-06-016 in the two 2006 decisions, which calculated it based on 100 percent of the customers’ historic annual onsite load.

Two 2014 decisions affirmed that the sizing restriction ensures NEM customers remain net consumers. First, in D.14-03-041 the Commission discussed the eligibility of modified systems to qualify for the 20-year transition period for NEM 1.0 customers. It ordered that modified or repaired system are eligible for the remainder of the transition period post the modification or repair, “as long as the modifications or repairs do not increase the system’s generation by more than the greater of 10 percent of the system’s capacity at the time the customer completes all application requirements to receive permission to operate (marking the beginning of the system’s specific 20-year transition period) or 1 kilowatt, not to exceed a total generation capacity of 1 megawatt, and are **sized to meet but not exceed the customer’s annual onsite load.**”⁴¹ Second, in D.14-11-001, the Commission again reiterated its long-standing interpretation that “[b]y statute, the NEM tariff is awarded only for those systems sized to the customer’s historical or expected load.”⁴²

In addition to this long line of Commission decisions starting in 2002, the most recent revision of the NEM statute, AB 327, which was enacted in 2013, explicitly altered the 1 MW

³⁸ *Id.* at pp. 2-5, FOF 1, 2.

³⁹ Application (A.)10-03-001, filed March 1, 2010.

⁴⁰ D.11-06-016 at p. 34; p. 53, *see also* p. 65 COL 25.

⁴¹ D.14-03-041 at p. 39, Ordering Paragraph (OP) 3.

⁴² D.14-11-001 at p. 17 (Nov. 6, 2014 in R.12-11-005) (emphasis added.)

cap for NEM systems, but retained the “customer’s electrical requirements” limitation on generation. Given that the Legislature explicitly changed one of the sizing requirements but not the other, it is reasonable to conclude that the Legislature chose to maintain the status quo with respect to the ratio of system size to annual electricity use.

Had the Legislature altered the sized-to-load requirement, making NEM customers net sellers, instead of net consumers, it would have resulted in federal jurisdiction over the NEM program that would have prevented customers from being able to receive compensation for exports at a rate other than a wholesale avoided cost rate.

c. The Ability to Earn Net Surplus Compensation for Annual Excess Energy Exports Did Not Alter the State’s Strict Adherence to the Net Consumer Requirement and Does Not Treat NEM Customers’ Monthly Exports as RPS Eligible

Underscoring the limits that reform can take, the net consumer requirement has remained unchanged even though California’s treatment of excess energy exports has changed. And even though, as discussed below, NEM customers now receive net surplus compensation for annual excess energy exports, monthly exports that offset imports do not count towards the Joint Utilities’ RPS procurement requirements.

Until 2009, Section 2827 provided that at the annual true up, the customer was not eligible to receive compensation for any surplus kilowatt hours (kW) that exceeded the customer’s load over that 12-month period. Thus, for the first **14 years** of the program, the Legislature expressly limited the economic impact of the NEM systems to offsetting a customer’s load. In 2009, the Legislature enacted AB 920, which allowed eligible customers to be compensated for net surplus energy produced over the 12-month period.

Nothing in the statutory changes indicate any intent by the Legislature to deviate from the system sizing limitation.⁴³ To the contrary, AB 920’s statutory change reflected an intent to

⁴³ See, e.g. Section 2827(b)(6)(“‘Net energy metering’ means measuring the difference between the electricity supplied through the electric grid and the electricity generated by an eligible customer-

encourage customers to continue energy efficiency efforts, even though generation is sized to load, by allowing customers installing up to the maximum size limits already in the statute to receive compensation for excess kilowatt hours.

In fact, excerpts from an AB 920 bill analysis explain how the provisions of AB 920 would be implemented:

Because **net-metering is based on sizing the generation to meet a customer-generator's own load**, the customers [have] no incentive to build larger solar energy systems. Net-metering also eliminates the normal financial reward a customer-generator receives for conserving electricity – a lower electricity bill. If the customer generator has already installed sufficient generation to zero out their electricity bill, they would not receive any additional benefit for reducing their own electricity usage.⁴⁴

...

If the customer's future electricity usage is less than the usage at the time of installation the customer will be under a net-metered tariff that gives the customer a bill credit valued at the retail rate of electricity for any excess the customer produces during the year, but at the end of the year if bill credits exceed the total electricity the customer consumed from the utility the customer will be a net surplus producer and the utility would then owe the customer money for the net surplus electricity.⁴⁵

generator and fed back to the electric grid over a 12-month period as described in subdivisions (c) and (h)."); Section 2827(b) (7) ("Net surplus customer-generator" means an eligible customer-generator that generates more electricity during a 12-month period than is supplied by the electric utility to the eligible customer-generator during the same 12-month period); Section 2827(b)(8) ("Net surplus electricity" means all electricity generated by an eligible customer-generator measured in kilowatt hours over a 12-month period that exceeds the amount of electricity consumed by that eligible customer-generator,"); Section 2827(b)(9) ("Net surplus electricity compensation" means a per kilowatt hour rate offered by the electric utility to the net surplus customer-generator for net surplus electricity that is set by the ratemaking authority pursuant to subdivision (h)."); Section 2827(h) ("For eligible customer-generators, the net energy metering calculation shall be made by measuring the difference between the electricity supplied to the eligible customer-generator and the electricity generated by the eligible customer generator and fed back to the electric grid over a 12-month period.")

⁴⁴ AB 920 Assembly Floor Analysis dated April 20, 2009, p. D, available at http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_0901-0950/ab_920_cfa_20090417_084828_asm_comm.html

⁴⁵ *Id.* at p. E.

Another excerpt from the same bill analysis expressly rejects the notion that AB 920 altered the sizing restriction for the CSI program, which is governed by the same sizing restriction, stating:

To be eligible for CSI rebates the system must still be sized to actual or projected load of the customer-generator at the time the solar energy system is installed. **This means that customers cannot intentionally oversize a solar energy system** and receive a CSI rebate.⁴⁶

Bill analysis for a later revision of the NEM statute, Senate Bill (SB) 489, confirms that both size limits on NEM projects remained in place after the passage of AB 920, stating: “This bill: . . . 2. Retains current requirements . . . [and] limits the generation from the project to primarily offset on-site electricity demand. . . .”⁴⁷

Consistent with FERC’s decision disclaiming jurisdiction over NEM monthly billing arrangements for monthly exports, in D.11-06-016, when adopting a net surplus compensation (NSC) rate pursuant to AB 920, the Commission expressly addressed the NEM sizing limits and affirmed that **“NEM customers are required to size their systems to be no larger than onsite load and for most NEM customers, there is little or no net surplus generation over a 12-month period.”**⁴⁸

With respect to NSC payments, the decision summarized the utilities’ argument as follows:

[T]he NSC scheme established by AB 920 is intended to address random, modest, inadvertent net exports and that NEM customers must adhere to this existing NEM system sizing limit, which has been a long-standing prerequisite for NEM participation, in order to qualify for NSC payments. The utilities contend that since the statute for net surplus compensation retains the system sizing limit language, customers cannot oversize their solar or wind electrical generating facilities to create additional revenue. Moreover, the utilities note that other compensation mechanisms exist for

⁴⁶ *Id.* at p. E (emphasis added.)

⁴⁷ SB 489 Bill Analysis dated August 30, 2011, p.4 available at http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0451-0500/sb_489_cfa_20110830_101610_sen_floor.html. (accessed Aug. 24, 2021).

⁴⁸ D.11-06-016 at p. 34 (emphasis added.)

customers who want to generate electricity to sell to the utility, such as feed-in tariffs. CALSEIA/EC agree with the utilities, suggesting that customers who oversize their systems would not qualify for NEM, and therefore would be ineligible for NSC.⁴⁹

The Commission responded to that argument, stating:

We agree with the utilities that **nothing in AB 920 alters the existing NEM system sizing language** and that to be eligible for NSC, a system must meet the definition of an eligible customer-generator within Section 2827(b)(4), **including that it be intended primarily to offset part or all of the customer's own electrical requirements. Systems that are sized larger than the customer's electrical requirements would not be eligible for NEM and therefore, are not eligible for NSC either.**⁵⁰

As a result, the utilities could continue to lawfully compensate customers at a retail, as opposed to wholesale avoided cost, rate for **monthly exports**. To comply with the Commission's obligations under PURPA, however, the Commission required utilities to compensate customer QFs for NSC for "random, modest, inadvertent net exports" on an annual basis at the CAISO⁵¹ wholesale hourly day-ahead market price known as the Default Load Aggregation Point (DLAP) price, which reflects the cost the utility avoids in procuring power when net surplus generators are likely to produce excess power.⁵²

The Commission's NSC rules comport with federal law's net consumer requirement in that monthly NEM exports are not regarded as supply with reliability attributes that satisfy the Renewables Portfolio Standard (RPS) procurement targets. Instead, only the amount of energy

⁴⁹ D.11-06-016 at p. 53.

⁵⁰ D.11-06-016 at p. 53, *see also* p. 65, COL 25 ("Systems sized larger than the NEM customer's electrical requirements would not be eligible for NEM and, therefore, are not eligible for NSC.") (emphasis added.)

⁵¹ California Independent System Operator Corporation.

⁵² *Id.* at p. 1, and p. 62 COL 1. The DLAP is described in Section 27.2 ff of the CAISO FERC Tariff, and the bulk of CAISO load is scheduled and settled at DLAPs, which comprise a set of individual pricing nodes for the largest load serving entities.

compensated at the end of the year at the wholesale NSC rate counts towards the IOUs' respective RPS procurement targets and can generate Renewable Energy Credits (RECs).⁵³

3. AB 327 – the Ratepayer Reform Act

In September 2013, the Legislature passed Assembly Bill (AB) 327 (codified at Public Utilities Code § 2827.1), a rate reform bill that, among other things, required the Commission to develop a new standard contract or successor tariff to the then-operative NEM tariff (referred to as NEM 1.0). AB 327 eliminated the program size and megawatt caps but did not alter the net consumer requirement that systems, even those larger than 1 MW, must be sized to onsite load.⁵⁴ AB 327, however, gives the Commission the discretion to eliminate NEM and implement an entirely different program.⁵⁵ The statutory policy parameters for any program the Commission implements include that the standard contract or tariff must be based on a cost benefit analysis, ensuring that the benefits to all customers approximately equal total costs, and also ensuring that customer-sited renewable generation continues to grow sustainably.⁵⁶

With respect to the cost benefit analysis, AB 327 requires the new standard contract or tariff to be (1) based on the costs and benefits of the renewable electrical generation facility; and (2) ensure that the benefits of the new standard contract or tariff to all customers and the system approximately equal its total costs.⁵⁷ The Commission has already found in this proceeding in its

⁵³ Section 2827(h)(6)(B) (“Upon adoption of the net surplus electricity compensation rate by the ratemaking authority, the net surplus electricity purchased by the electric utility shall count toward the electric utility's renewables portfolio standard annual procurement targets for the purposes of paragraph (1) of subdivision (b) of Section 399.15, or for a local publicly owned electric utility, the renewables portfolio standard annual procurement targets established pursuant to Section 399.30.”); see also Section 2827(h)(6)(A) (governing Renewable Energy Credits (RECs) stating, “Upon adoption of the net surplus electricity compensation rate by the ratemaking authority, any renewable energy credit, as defined in Section 399.12, for net surplus electricity purchased by the electric utility shall belong to the electric utility. Any renewable energy credit associated with electricity generated by the eligible customer-generator that is utilized by the eligible customer-generator shall remain the property of the eligible customer-generator.”)

⁵⁴ Section 2827.1(b)(5)

⁵⁵ Section 2827.1(b) (stating the standard contract or tariff “may include net energy metering”, meaning NEM is permissive, not mandated.)

⁵⁶ Section 2827.1(b)(1)-(4).

⁵⁷ Section 2827.1(b)(1)-(4).

decision on the Guiding Principles that AB 327 “addresses costs shifts.”⁵⁸ As discussed below, the rules of statutory construction demand this interpretation. Moreover, such a construction is not controversial or subject to meaningful dispute in this proceeding. Even CALSSA’s witness Heavner conceded at hearings that these are ratepayer indifference principles, albeit ones less absolute than others, such as those in Senate Bill 43.⁵⁹

These ratepayer indifference principles require the Commission to address the cost shift by ensuring that the actual costs and benefits to the system and all customers are balanced against the directive that the Commission ensure that customer-sited generation continues to grow “sustainably.”⁶⁰

As to the sustainability requirement, the parties have presented competing interpretations of its meaning. The longstanding rules of statutory construction under California law require the Commission to first look to the plain language of the statute. “The fundamental task of statutory construction is to ‘ascertain the intent of the lawmakers so as to effectuate the purpose of the law. In order to determine this intent, we begin by examining the [plain] language of the statute’ [because] [i]t is well settled that the ‘statutory language . . . is the best indicator of legislative intent.’”⁶¹ The word “sustainably” is not ambiguous. “Sustainable” means as “pertaining to a

⁵⁸ D.21-02-007, p. 39, FOF 31; p. 32 (“AB 327 addresses cost shifts.”)

⁵⁹ Heavner, T. 1039:17-1040:8 (Aug. 2, 2021).

⁶⁰ Even CALSSA’s Witness, Brad Heavner conceded that AB 327 has similar, albeit not as absolute, ratepayer indifference principles as SB 43. Reading the sections in this manner harmonizes them, which is what is required by the rules of statutory construction.

⁶¹ *Khajavi v. Feather River Anesthesia Medical Group* (2000) 84 Cal. App. 4th 32, 45 (quoting and citing *People v. Crus* (1996) 13 Cal.4th 764, 774-75; *Williams v. Sup. Ct.* (1993) 5 Cal.4th 337, 350 (quotation omitted)); see also *Cossack v. City of Los Angeles* (1974) 11 Cal.3d 726, 732; *Select Base Materials v. Board of Equal.* (1959) 51 Cal.2d 640, 645; *People v. Knowles* (1950) 35 Cal.2d 175, 182.

In relying on the statute’s text as the best indicator of legislative intent, “[w]henver possible a construction must be adopted which will give effect to all provisions of the statute” (*Khajavi, supra*, 84 Cal.App.4th at p. 46 (quoting *Parris v. Zolin* (1996) 12 Cal.4th 839, 845).), which requires that the words are read in context, keeping in mind the nature and obvious purpose of the statute, so that the statute is interpreted in a manner that promotes rather than defeats the

system that maintains its own viability.”⁶² Thus, the phrase “ensures that customer-sited renewable distributed generation continues to grow sustainably” means that the Commission’s successor tariff must require the customer-sited DG industry grows in a way that maintains its own viability. In other words, the growth should be self-sufficient and not dependent upon a cost shift.

The Commission should reject CALSSA and SEIA/VS’s interpretations to the contrary. For instance, CALSSA, SEIA, and Vote Solar have asked the Commission to transform its statutory mandate to “ensure that customer-sited renewable distributed generation continues to grow sustainably” to a mandate that it ensure that the growth of customer-sited renewable distributed generation is sustained.⁶³ That interpretation turns the rules of statutory construction, not to mention the English language, on their head. To change “sustainably” to “sustained” -- which means “maintained at length without interruption or weakening”⁶⁴ -- is the opposite of what the statutory language plainly states. Indeed, such a change would put the statutory provisions, which also require the Commission to address cost shifts,⁶⁵ at war with one another,

objective and policy of the law. *Johnstone v. Richardson* (1951) 103 Cal.App.2d 41, 46; *City of Los Angeles v. Pacific Tel. & Tel. Co.* (1958) 164 Cal.App.2d 253, 256. Statutes or statutory sections relating to the same subject must be construed together and harmonized whenever possible. *Mannheim v. Superior Court* (1970) 3 Cal.3d 678, 687. Statutes are not to be construed in a manner that “renders their provisions essentially nugatory or ineffective, particularly when that interpretation would frustrate the underlying legislative purpose.” *Khajavi, supra*, 84 Cal.App.4th at p. 46 (quoting *People v. Carter* (1996) 48 Cal.App.4th 1536, 1540). Finally, in ascertaining legislative intent, the courts should consider not only the words used, but also should take into account other matters, such as the object in view, the evils to be remedied, the history of the times, legislation upon the same subject, public policy and contemporaneous construction. *Alford v. Pierno* (1972) 27 Cal.App.3d 682, 688; *Estate of Jacobs* (1943) 61 Cal.App.2d 152.

⁶² Dictionary.com definition of “sustainable,” available at: <https://www.dictionary.com/browse/sustainable?s=t>; see also Merriam Webster’s Online Dictionary definition of “Sustained,” available at: <https://www.merriam-webster.com/dictionary/sustained> (accessed Aug. 24, 2021).

⁶³ See e.g., *SEIA/Vote Solar Opening Comments on Guiding Principles PD*, pp. 2-5; *CALSSA Opening Comments on Guiding Principles PD*, pp. 11-12.

⁶⁴ See Merriam Webster’s Online Dictionary definition of “Sustained,” available at: <https://www.merriam-webster.com/dictionary/sustained> (accessed Aug. 24, 2021).

⁶⁵ D.21-02-007, p. 39, FOF 31; p. 32 (“AB 327 addresses cost shifts.”).

as opposed to in harmony. Moreover, such an interpretation is clearly oppositional to and irreconcilable with the rate reform purpose of the entire statute.

CALSSA and SEIA/VS have asked the Commission to investigate legislative history materials to support their tortured interpretation of the statute. The rules of statutory construction elevate the text of the statute over speculation of legislative intent. There is no justification to resort to inferior indicators of legislative intent, such as legislative history materials, when the plain language of the statute is unambiguous, as is the case here. Nor is this view inconsistent with at least one industry representative's – CALSSA's Witness Heavner's -- assertion at hearings that CALSSA's focus is on a "fair marketplace in which companies are able to survive and do business."⁶⁶

II. ISSUE 2: WHAT INFORMATION FROM THE NET ENERGY METERING 2.0 LOOKBACK STUDY SHOULD INFORM THE SUCCESSOR AND HOW SHOULD THE COMMISSION APPLY THOSE FINDINGS IN ITS CONSIDERATION?

The Commission intended the Lookback study to be an important resource to inform its determination of how to reform NEM. We address in the sections below the useful information contained in the Lookback Study for this proceeding, other resources from California, and experiences from outside California that inform the issues implicated by the Lookback Study.

A. The Lookback Study Should be an Evidentiary Pillar for NEM Reform

The Order Instituting this Rulemaking,⁶⁷ and this proceeding's Scoping Memo,⁶⁸ require the Commission to consider the "Lookback" study in adopting a successor to the current NEM tariff, often referred to as NEM 2.0. Decision 18-09-044 authorized the Commission's Energy Division to select, through a request for proposal process managed by SDG&E, a consultant to

⁶⁶ Heavner, T. 1064:25-1065:7 (Aug. 3, 2021).

⁶⁷ OIR at p. 7, n. 7.

⁶⁸ *Joint Assigned Comm'r's Scoping Memo and Administrative Law Judge's Ruling Directing Comments on Proposed Guiding Principles* ("Scoping Memo") (Nov. 19, 2020) at 2.

measure and evaluate NEM 2.0.⁶⁹ The Commission provided for stakeholder input into the research plan for the study.⁷⁰ The Commission retained Verdant Associates, LLC, (“Verdant”), with the assistance of Energy and Environmental Economics, Inc. (“E3”) and Itron, Inc., to review the Joint Utilities’ NEM 2.0 tariffs. The ALJ’s January 21, 2021 ruling in this proceeding⁷¹ attached Verdant’s final report: *Net Energy Metering 2.0 Lookback Study* (January 21, 2021) (“Lookback Study”), and provided parties with the opportunity to respond to the Lookback Study and to reply to responses on February 4 and 16, 2021, respectively.

In sum, the Lookback Study was undertaken at the Commission’s direction and under Commission staff supervision, with a robust budget, and substantial stakeholder input, by a firm with appropriate experience and expertise. As such, it must be taken seriously and its findings given substantial weight.⁷²

As stated in the Lookback Study (at 2), and consistent with the Commission’s charge, its objectives are to examine the impacts of NEM 2.0 and to compare how different metrics have changed following the transition from NEM 1.0 to NEM 2.0.

⁶⁹ D.18-09-044, pp. 44-46 NS P. 59 (Ordering Paragraph (“OP”) 13). This decision (*id.* at 40, 44) named the retrospective evaluation “lookback” and authorized \$2 million in funding for the study to be shared proportionately among the Joint Utilities (*id.*, p.69, OP 13 and at pp. 45-46).

⁷⁰ D.19-10-040 modified the process in D.18-09-044 to receive and address stakeholder input into the draft research plan for the lookback evaluation of the net energy metering 2.0 tariff.

⁷¹ *Email Ruling Presenting Final Verdant Study and Instructing Parties to Respond*. The Lookback Study was also published in a draft for comment. The draft was released August 14, 2020. Stakeholder comments were requested no later than September 8th. Comments on the draft were submitted by Aurora Solar, Cal Advocates, CALSSA, Foundation Windpower, LLC, GRID Alternatives, the Joint Utilities, California Wind Energy Association (CalWEA), TURN, Vote Solar, and SEIA. The Lookback Study included a matrix summarizing the comments and the Study’s response to the comments. Ex. PCF-15, Lookback Study (January 21, 2021), Appendix B, at pp. 104-140.

⁷² The ALJ’s ruling asked parties to address, *inter alia*, “how should the Commission apply those [Lookback Study] findings in its consideration.” The Joint IOU response (February 4, 2021) stated” “the Commission should: (1) evaluate the ... [Lookback Study] in the context of all evidence and argument in the proceeding, and (2) consider whether and to what extent the ... [Lookback Study] should be given weight in the Commission’s final determination of the issues herein.”

1. The Lookback Study Shows that Nonparticipants Bear a Substantial Portion of NEM Costs Such that the Current Tariff Transfers Wealth from the Less-Advantaged

The Lookback Study supports the following fundamental conclusions concerning the impacts of NEM 2.0 that warrant thorough reform:

a. NEM 2.0 Unfairly Benefits Wealthier Participating Customers at the Substantial Expense of Less-advantaged Non-participant Customers

The Lookback Study concludes that NEM 2.0 offers significant financial benefits to participating customers at the expense of non-participating customers; existing NEM 2.0 installations will increase bills paid by non-participant customers by \$13 billion.⁷³ The Lookback Study also demonstrates that the beneficiaries are wealthier, on average, than non-participants.⁷⁴ The demographic analysis in the Lookback Study, when combined with the study's findings that NEM 2.0 is not cost effective for non-participants, demonstrates a wealth transfer from lower-income to higher-income customers.⁷⁵ Moreover, the Lookback Study suggests that NEM 2.0 systems increase overall costs of meeting California's energy goals by \$1.5 billion.⁷⁶

b. The Lookback Study's Cost Effectiveness Themes Confirm the Urgency and Importance of NEM Reform

Ratepayer impact is a crucial metric. The Lookback Study states (at 79) that:

The [Ratepayer Impact Measure] RIM benefit-cost ratios are less than 1.0 which

⁷³ Ex. PCF-15, Lookback Study (Jan. 21, 2021) Table 5-1 at p. 79. Note that these are levelized values. In nominal dollars, the impact on rates is likely over \$20 billion.

⁷⁴ Ex. PCF-15, Lookback Study (Jan. 21, 2021) at pp. 32-39. "In general, we observed that a higher fraction of NEM systems have been installed in more affluent ZIP codes with higher percentages of homeownership than California's population on average." *Id.* at p. 39.

⁷⁵ Ex. PCF-15, Lookback Study (Jan. 21, 2021) at p. 4 ("NEM 2.0 projects overall are not cost-effective from the perspective of ratepayers."); *id.* at p. 5 (Table 1-2, which shows that solar and solar paired with storage have benefit/cost ratios lower than 1.0 for each utility under both the Total Resource Cost (TRC) test and the Ratepayer Impact Measure (RIM) test), and *id.* at p. 39 ("In general, we observed that a higher fraction of NEM systems have been installed in more affluent ZIP codes with higher percentages of homeownership than California's population on average). *See also* Ex. IOU-02 (Tierney) 17:2-18:18.

⁷⁶ Ex. PCF-15, Lookback Study (Jan. 21, 2021), Table 5.1 at p. 79.

indicates that customers' utility rates are likely to increase due to the change in revenues from the program. The NPV [net present value] of RIM costs exceed the RIM benefits by approximately \$13,000 m.

This suggests that the Commission has an opportunity to reduce substantially the NEM cost shift and improve the RIM score of the program while still maintaining a reasonable value proposition for prospective NEM customers as indicated by the Participant Cost Test ("PCT"). In this regard, the Lookback Study notes (at 13):

On average, customer-sited renewables taking service under a NEM 2.0 tariff have a RIM benefit-cost ratio less than 1, indicating that the NEM 2.0 program may result in an increase in rates for ratepayers.

This suggests that the RIM and PCT tests are important to consider, because the Total Resource Cost ("TRC") fails to evaluate the impact on ratepayers. Even so, NEM fails the TRC test and has negative distributional impacts on most customers, in particular, lower income customers.

c. Certain Rate Design Elements Can Improve Alignment with Cost of Service

The Lookback Study found that both NEM 2.0 and NEM 1.0 received RIM cost effectiveness scores below one, with NEM 2.0 having slightly worse scores.⁷⁷ While the study did not re-evaluate NEM 1.0 and instead used results from 2013, this result - especially noting that the RIM is significantly below 1.0 - indicates that the modest reforms established in NEM 2.0 (including the requirement to pay some NBCs and take service on a time-of-use ("TOU") rate) were insufficient to meaningfully reduce cost shift impacts to non-participants. Based on this, the Commission should conclude that NEM 2.0 does not meet the requirements of AB 327. The Lookback Study calls for fundamental, durable, and stable measures of reform, the costs or consequences of which cannot be avoided by changes in customer behavior and the like. For example, changing only export compensation would not be a durable solution, because parties can avoid exports by smaller system sizing and/or storage adoption.

Durable and stable reform must be premised on sound rate design. The Lookback Study highlights that nonresidential rates, which include more complex rate designs, limit cost shifting

⁷⁷ *Id.*, Table 1-6 at p. 12.

by limiting the ability of customers to reduce bills beyond the value of the distributed resource: the study notes that customer classes with fixed/demand charges have better alignment with cost.⁷⁸ NEM adoption by customer classes where rates generally contain a fixed charge, demand charge, or similar, provides greater benefits and less rate impact (higher RIM) while maintaining a reasonable value proposition for prospective customers as indicated by the PCT.

2. Payback Periods Are Far Shorter than Legacy Periods

The time over which a customer can expect to recoup the investment in solar is an important consideration when deciding the period of time the customer is eligible to stay on the terms of that tariff (i.e., the legacy period). The Lookback Study's estimated payback times are far less than the NEM 2.0 20-year legacy period, let alone the estimated 35-year estimated useful life represented by a major solar manufacturer.⁷⁹ The study suggests a payback period of 10.2 years for PG&E's residential NEM 2.0 customers, 10.8 years for SCE's and 7.9 for SDG&E's.⁸⁰ E3's January 28, 2021 Whitepaper shows a payback period of 4.1 years using SDG&E's rate, indicating that payback times may be far lower for more recent installations.⁸¹ Nonetheless, current NEM customers receive a subsidy for 20 years, shifting costs the entire time.

3. The Study Supports the Need for Consumer Protection

The Lookback Study indicates that consumer protection is an important consideration in NEM reform. For example, the study's Table 5-9 (at 94) compares CARE versus non-CARE

⁷⁸ *Id.* at p. 13.

⁷⁹ Sunrun, Inc., *Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934*, dated February 25, 2021 (Sunrun Form 10-K), p. 27 of which official notice was taken by the August 30, 2021 ALJ ruling.

⁸⁰ Ex. PCF-15, Lookback Study (Jan. 21, 2021), at p. 85, Table 5-5. Ex. IOU-01 (Tierney) 31:3-10 and Table II-2 suggests a much shorter payback period of 3-4 years for NEM 2.0 solar-only customers.

⁸¹ The Commission engaged Energy and Environmental Economics, Inc. ("E3") to support and facilitate the development of proposals for a reformed NEM tariff in this proceeding that will comply with California legislation, including Assembly Bill 327. E3, *Alternative Ratemaking Mechanisms for Distributed Energy Resources in California* (Jan. 28, 2021) at 25. Under the subsequent E3 Comparative Analysis, which used the 2021 ACC in its calculations, the payback period for SDG&E is 3.2 years.

payback periods. The 17-year payback period for CARE customers implicates equity and consumer protection, as the CARE payback is inequitable relative to payback periods for non-CARE customers. The study also suggests that the Commission's current consumer protection approach may not capture all consumer protection issues in the solar industry. Currently the Commission tends to treat solar providers as a small construction business – like one that might do business with a residence to install a new roof or a swimming pool. However, the Lookback Study indicates that 70% of the customer cost of solar is shouldered through financing.⁸² Further, the study does not appear to address a lease scenario. The evidence suggests that leases and power purchase agreements (“PPAs”) comprise a substantial portion of new NEM installations, which reinforces that the Commission is dealing with the financial services business model, and should direct consumer protection efforts accordingly.

4. Parties in This Proceeding Confirm the Lookback Study's Analysis

a. Cal Advocates

In its prepared testimony, Cal Advocates highlights that NEM is creating a large and growing cost shift.⁸³ Cal Advocates estimates that the cost burden generated by NEM 1.0 and NEM 2.0 will be ~\$3.4 billion in 2021.⁸⁴ Further, Cal Advocates calculates that if no reform is made to current NEM policy, the cost shift will grow to \$6.9 billion per year by 2030 (in 2021 dollars).⁸⁵

Cal Advocates' NEM cost shift methodology is like that of the Joint Utilities. The methodology calculates customer bill savings minus avoided costs provided by the 2021 Avoided Cost Calculator. Both calculations estimate a near-term NEM cost shift of ~\$3.4 billion

⁸² Ex. PCF-15, Lookback Study (Jan. 21, 2021), at pp. 75, 82-83, and Figure 5-1. It is not clear whether the cited Figure captures interest only or includes payment of principal. In any event, that number is substantial, and is likely understated because it appears not to capture lease arrangements.

⁸³ Ex. PAO-01 (Gutierrez et al.) 2-17:1.

⁸⁴ Ex. PAO-01 (Gutierrez et al.) 2-17:15-16.

⁸⁵ Ex. PAO-01 (Gutierrez et al.) 2-18:12-14.

as well as highlight a large and growing cost shift in the future.⁸⁶

b. The Utility Reform Network

TURN concludes its review of the Lookback Study as follows:

The Lookback Study highlights the massive cost shift associated with both the NEM 1.0 and NEM 2.0 tariffs. In the year 2020, the single year NEM 1.0 cost shift was estimated to be \$1.093 billion (in \$2012). The net present value of the NEM 2.0 cost shift over 20 years was estimated to be over \$13 billion. By the end of 2019, there were 616,308 NEM 1.0 systems and 413,982 NEM 2.0 systems interconnected on the grid. Combining this information with data presented above, the single year cost shift per NEM 1.0 customer in 2020 equals \$1,600 and the 20-year present value cost shift per NEM 2.0 customer equals \$31,402. These cost shifts are substantial and unsustainable. Since the Lookback Study relied on the 2020 Avoided Cost Calculator (ACC) to determine the benefits to all customers, a recalculation of the NEM 2.0 cost shift using 2021 ACC values would yield a significantly larger total cost shift and cost shift per customer.⁸⁷

c. Natural Resources Defense Council

NRDC also identifies important informative aspects of the Lookback Study for this proceeding:

At a minimum, the following takeaways should be drawn from the Lookback Study:

- NEM 2.0 is not cost-effective from the perspective of non-participants and leads to a significant cost burden on these customers.
- Forward looking cost-effectiveness analysis on NEM 2.0 shows that the tariff will place even greater economic burdens on non-participants if the current policy does not change.

NEM customers are disproportionately wealthy. Achieving equity in distributed generation adoption requires intentional policy action because the current market forces have failed to deliver proportionate benefits to lower-income customers.⁸⁸

⁸⁶ Ex. IOU-01 (Pierce et al.) 82:20-83:2.

⁸⁷ Ex. TRN-01 (Chait) 9:15-24, citations omitted.

⁸⁸ Ex. NRD-01 (Chhabra) 2:10-17.

B. The Commission Should Weigh the Lookback Study with Results from Other Studies Concerning California

The Commission has other resources available it may reference in deciding how to reform the NEM tariff, introduced in testimony and as the proper subjects of official notice as matters in the Commission's records in this or related proceedings. Other studies have highlighted that the current NEM tariffs create a cost-shift between participating and non-participating customers. While inputs and methodologies can vary from analysis to analysis, the overall trend shows that the cost shift from current NEM customers is significant and unsustainable.

1. E3's Cost Shift analyses show a substantial cost shift⁸⁹

• E3 White Paper dated January 28, 2021

In its white paper developed for the Commission as part of this proceeding, E3 highlights how a cost shift is created by the NEM tariff.⁹⁰ E3 describes that the NEM tariffs allow NEM customers to benefit from being compensated at inflated volumetric electricity rates. These volumetric rates include, among other things, fixed costs incurred by the utilities and are substantially higher than the marginal cost of energy. E3 also highlights that rooftop solar maximum output does not coincide with system peak demand, weakening the argument for an inflated compensation structure for this resource. In the white paper, E3 states, there is "substantial misalignment between costs and value under the current compensation structure. This results in an increase in costs to be recovered from non-participating customers."⁹¹

• E3 Comparative Analysis Dated May 28, 2021

E3 completed a comparative analysis of various proposals in this docket⁹² and the impact of the current NEM 2.0 to serve as a guide for the Commission and parties in this proceeding.

⁸⁹ See Ex. IOU-01 (Pierce, et al.) 80:18-82:1.

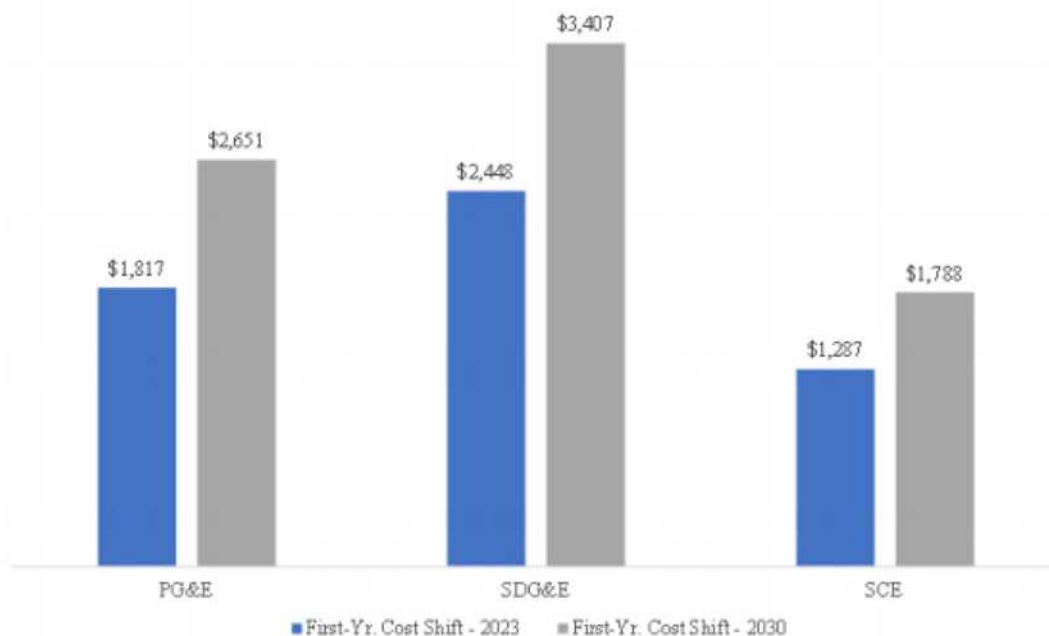
⁹⁰ See n. 81, *supra*.

⁹¹ E3, *Alternative Ratemaking Mechanisms for Distributed Energy Resources in California; Successor Tariff Options Compliant with AB 327* (Jan. 28, 2021) at 14.

⁹² Pursuant to the Scoping Memo, p. 4, parties submitted proposals for NEM tariff reform on March 15, 2021.

As part of that analysis, using standardized assumptions, E3 calculated the first-year cost shift for each proposal as well as NEM 2.0. The first-year cost shift is defined in the analysis as the dollar value of utility costs shifted from participants to nonparticipants in the first year after interconnection. **Figure III-24⁹³** below highlights E3’s calculated first year cost shift to non-participating customers in years 2023 and in 2030. Critically, E3’s analysis used the latest version of the avoided cost calculator, which showed much lower values for NEM qualifying solar than the version of the avoided cost calculator used in the NEM 2.0 Lookback Study.

**Figure III-24 (Ex. IOU-01 (Pierce, et al.) 80:1-3) - E3 NEM Cost Shift Per Customer
Non-CARE, Solar Only First-Year Cost Shift**



Source: E3’s “Cost-Effectiveness of NEM Successor Rate Proposals under Rulemaking 20-08-020 – A Comparative Analysis”. Results reflect minor modeling revisions made by E3 in its June 15, 2021 report pages 53 and 57.

See also Ex. IOU-01 (Pierce, et al.) 80:18-81:3.

⁹³ The figures and tables included in this brief preserve the numbering and labeling used in the testimony from which they are obtained.

2. Commission's Affordability White Paper

As noted above, the Lookback Study found that NEM 2.0 solar installed through 2019 would cause a net present value of \$13 billion in cost shifts over their lifetime.⁹⁴ The Lookback Study results were the basis for the following conclusions in the Commission's February 2021 report on rates and affordability, which points to a cost shift between participating and non-participating customers. The Commission's White Paper highlighted:

- NEM 2.0 is not an effective tariff on a system level illustrated by the results of the Commission's Total Resource Cost test.
- NEM customers are overcompensated relative to value of the energy and grid benefits produced.
- NEM 2.0 shifts costs to non-participating customers and leads to increases in non-participating customers' bills highlighted by the Commission's Rate Impact Measure test.
- NEM subsidies are "disproportionately paid by younger, less wealthy, and more disadvantaged ratepayers, many of whom are renters."⁹⁵

The expert testimony of Susan Tierney, Ph.D., details how the current NEM tariff structure exacerbates the affordability issue.⁹⁶

3. Next 10 and the Energy Institute at UC Berkeley's Haas School of Business

Next 10 and the Energy Institute at UC Berkeley's Haas School of Business recently co-authored a paper that examines how Californians pay for electricity. The authors highlight that behind the meter solar shifts the burden of fixed cost recovery onto customers that have not adopted rooftop solar systems. The paper shows residential customers with photovoltaic (PV)

⁹⁴ Ex. PCF-15, Lookback Study (Jan. 21, 2021), at p. 79. Translated to an annual impact, this would be over \$1 billion in cost shifting per year, consistent with the Joint IOU estimate for NEM 2.0 installations of the same vintage. Ex. IOU-01 (Pierce et al.) 81, n. 128.

⁹⁵ California Public Utility Commission, *Utility Costs and Affordability of the Grid of the Future: An Evaluation of Electric Costs, Rates, and Equity Issues pursuant to P.U. Code Section 913.1* (February 2021) at 27-29.

⁹⁶ Ex. IOU-01 (Tierney) 49:6-52:15.

systems are generally credited at the retail electricity rate for every kWh of solar electricity they generate. This produces a generous subsidy because residential rates significantly exceed social marginal cost and include fixed cost recovery. The growing gap between the retail rate and marginal cost reflects costs that are not avoided by NEM customers but rather shifted to non-participating customers when a household adopts rooftop solar. Although the paper does not estimate a total statewide cost shift, it does estimate the average significant annual bill impact for non-participating customers.⁹⁷

C. Experience from Other States Reinforces that NEM Reform is Needed, Can Succeed and Should be Considered

Experience with NEM in other states is substantial and reinforces the Lookback Study's findings concerning the cost shift and inequities attending NEM. The Joint Utilities presented the prepared testimony of Susan Tierney, Ph.D., who placed California's NEM program in a national context, and described how the experience with NEM in other states reinforces that NEM creates a substantial cost shift, and that effective reform can succeed in creating fairness while maintaining a sustainable market for rooftop solar.⁹⁸

Starting decades ago, many states implemented net energy metering to promote the adoption of customer-sited electricity generation. Eventually, forty states, the District of Columbia and many U.S. territories instituted a NEM tariff. As in California, these tariffs typically pay the customer for excess energy the customer does not use and exports to the grid. Often, the compensation was based on the customer's full retail rate, which is inherently more than the value of any energy exported. Cost shifts associated with NEM programs designed to

⁹⁷ Next 10 and Energy Institute at Haas, UC Berkeley *Designing Electricity Rates for An Equitable Energy Transition* (Feb. 23, 2021), <https://www.next10.org/sites/default/files/2021-02/Next10-electricity-rates-v2.pdf>, accessed August 26, 2021. The paper highlights the largest impacts are seen in SDG&E's service territory and are calculated to be ~\$230 per year for non-CARE customers and over \$120 per year for CARE customers. *See also* Ex. IOU-01 (Pierce et al.) 83:3-14.

⁹⁸ Ex. IOU-01 (Tierney) 22-57. Dr. Tierney has vast experience in electricity policy as an academic, consultant and in state and federal government. Her last government position was Assistant Secretary for Policy at the U.S. Department of Energy. Her qualifications are found at Ex. IOU-01, A-17 to A-18.

spur adoption for a nascent market are typically relatively small when penetration rates for NEM-supported rooftop solar installations are relatively low.⁹⁹

Since enacting NEM in 1996, California has surpassed every other state in the deployment of rooftop solar by customers on NEM tariffs. NEM helped California move rooftop solar from a novelty to a norm. California's NEM program has more installed distributed generation capacity than any other state: Over 10 GW of rooftop PV as of the start of 2021. Ninety percent of that capacity has been interconnected to the distribution systems of the Joint Utilities. California also has the highest percentage of residential rooftop PV installation of any state, except for Hawaii. Finally, one in every three solar-industry jobs in the U.S. exists in California. And yet, California has not significantly changed the structure of its NEM compensation arrangements in 25 years.¹⁰⁰

In the past half-decade, other states experiencing relatively high penetration rates for NEM-supported rooftop solar have received regulators' approval to reform their NEM tariffs to address increasing cost shifts borne by non-participating customers. These reforms were controversial in Arizona, Hawaii, and Nevada, for example, in part related to the potential effect of NEM tariff reforms on existing NEM customers and on additional adoption of rooftop solar by other customers. Despite these controversies, residential customers continued to adopt solar equipment even after the successor tariffs went into effect even though the tariff modifications

⁹⁹ Ex. IOU-01 (Tierney) 22:4-16; 24:17-26:2. Under public utility regulation principles in most states, including California, the local utility is granted the exclusive right to provide delivery service to retail electricity customers in a given area in return for undertaking the obligation to plan for and serve existing and anticipated electric demand in that area. The utility is entitled to compensation for its reasonable expenses and investment to provide such service, plus a reasonable return on the investment. Under this regulated public utility model, regulators establish a revenue requirement for the utility's operations, and rates are designed to recover such revenue requirements. In such a ratemaking framework, any costs not compensated in rates by one subset of customers will need to be recovered from and paid by other customers. *Id.* at p. 22, n. 44.

¹⁰⁰ Ex. IOU-01 (Tierney) 22:17-23:4. Dr. Tierney details the penetration of rooftop PV nationally, and in California. Ex. IOU-01 (Tierney) 26:3-28:13. For example, residential NEM customers in California have installed 6.7 GW of rooftop solar capacity, 41% of the national total, and these households account for 9% of all households in the state. *Id.*, 26:7-27:2 and Figure II-8.

led to longer payback periods.¹⁰¹

Several trends have enabled continued growth in solar adoption:

- continued declines in the installed costs of PV systems;¹⁰²
- continued declines in the cost of residential storage systems, providing an attractive combination when paired with solar, especially where NEM tariff reforms provide price signals for the timing of injections of power into the local grid;¹⁰³
- customers' interest in managing their electricity bills and installing back-up electricity supply at their own home;¹⁰⁴ and
- the maturation of the solar industry over the past decades.¹⁰⁵

With so many trends underway – prices dropping for both residential solar and storage systems, electricity prices likely to go up, increasing reliance on electric appliances and equipment, extreme weather events on the rise, and growing concern for climate change and local air pollution – many households will be motivated to add BTM systems even if there are reforms to the current NEM tariff.¹⁰⁶ These and other trends account for a positive outlook for the ability of the industry to deliver attractive value propositions to customers after tariff reforms.

¹⁰¹ Ex. IOU-01 (Tierney) 23:5-11.

¹⁰² Dr. Tierney demonstrates that, in the 25 years since California adopted its NEM program, the installed costs of new solar PV systems have declined substantially. Ex. IOU-01 (Tierney) 36:8-39:4. Continued decreases in the installed cost of PV systems are anticipated to result from many factors, as explained in a recent National Renewable Energy Laboratory (NREL) Q2/Q3 2020 Solar Industry Update and shown in D. Feldman and R. Margolis, “Q2/Q3 2020 Solar Industry Update,” NREL (December 8, 2020), pp. 53-54. Ex. IOU-01 (Tierney) 38:1-4 and n. 64. Also see Ex. IOU-01 at 39, Figure II-13, “Solar PV: Indicative Cost Reductions by Type of Cost.”

¹⁰³ Although estimates of levelized cost of solar vary, the cost of new rooftop solar has dropped from a range of approximately \$320-\$530 per MWh a decade ago to approximately \$150-\$190 per MWh in 2019 (The cost of utility-scale solar installations has dropped even further, to around \$50-\$75 per MWh as of 2019). Ex. IOU-01 (Tierney) 36:10-37:2, and Figures II-11a and II-12b, at 37-38.

¹⁰⁴ Ex. IOU-01 (Tierney) 23:17-18.

¹⁰⁵ Ex. IOU-01 (Tierney) 23:19.

¹⁰⁶ Ex. IOU-01 (Tierney) 44:12-16.

1. Other states have successfully implemented NEM Reform

Some utilities in other states, including some with much lower rooftop-solar penetration rates than the Joint Utilities, have already addressed such cost shifts (and overly generous compensation to participating NEM customers) by adopting successor tariffs. Notably, reforms have been adopted in Arizona (for APS), Hawaii (for Hawaii Electric Companies, or HECO), Nevada (for NV Energy), New York (National Grid), and South Carolina (for Duke Energy).¹⁰⁷ Other states that have undertaken NEM reform did so in large part to address the kinds of cost shifts that were analyzed in the Lookback Study.

When discussions began around 2013 to reform HECO's NEM tariff, for example, the utility estimated the annual cost shift per non-participating customer to be \$31/customer.¹⁰⁸ The Hawaii Public Utilities Commission approved the implementation of alternative tariff options in 2015 and then again in 2018. Notably, at the time that Hawaiian regulators approved changes in NEM tariffs, the penetration rates were relatively high (e.g., in 2015, net-metered

¹⁰⁷ See Ex. IOU-01 (Tierney) 32, n. 55 (On May 19, 2021, the South Carolina Public Service Commission approved the settlement proposal for Solar Choice Metering Tariffs (Docket 2020-264-E/2020-265-E) submitted by Duke Energy Carolinas, Duke Energy Progress, North Carolina Sustainable Energy Association, Southern Environmental Law Center on behalf of South Carolina Coastal Conservation League, Southern Alliance for Clean Energy, and Upstate Forever; and Vote Solar. See: <https://dms.psc.sc.gov/Attachments/Matter/f7ef21b9-d3c3-464c-9e71-f498d50e168a>, accessed August 26, 2021.)

The February 2021 study, "Review of Net Metering Reforms Across Select U.S. Jurisdiction" prepared by the North Carolina Clean Energy Technology Center at the request of the Joint Utilities (NCCETC Study), examined the rates of other California utilities (i.e., LADWP, PacifiCorp and SMUD) that had not undergone NEM tariff reforms. See Ex. IOU-01 (Tierney) 31:13-32:14. The NCCETC Study is Appendix B to Ex. IOU-01. See *id.*, (Tierney) 27:6-28:3 and n. 49.

¹⁰⁸ Hawaiian Electric Companies propose plan to sustainably increase rooftop solar, Hawaii News Now, January 20, 2015 <https://www.hawaiinewsnow.com/story/27896485/hawaiian-electric-companies-propose-plan-to-sustainably-increase-rooftop-solar/>; Sherilyn Wee and Makena Coffman, "PV Growth in Hawaii?" University of Hawaii Economic Research Organization, October 13, 2014, <https://uhero.hawaii.edu/pv-growth-in-hawaii/>

residential PV penetration rates for the four electric utilities in Hawaii ranged from 10.5% to 18%, compared to 7.7% for SDG&E and 5.3% for PG&E at the time).¹⁰⁹

In the 2020 South Carolina Public Service Commission (PSC) proceeding in which Duke Energy Carolinas proposed a successor tariff to its NEM program, Duke estimated a cost shift of \$35-\$40 per month per NEM solar customer (and then compared it to the cost-shift estimate of \$45 per month per NEM solar customer that had been prepared by E3).¹¹⁰ As explained in Ex. IOU-01 (Tierney) 29:1-30:4 and Table II-1, the customer participation rate for NEM in South Carolina was 1.4% at the time that, in 2021, the South Carolina PSC approved a settlement agreement (to which Vote Solar was a signatory) to reform the NEM tariff and to greatly reduce the cost shift.¹¹¹

Warranting even stronger reform than in South Carolina, the Joint Utilities' NEM program has much-higher participation rates, especially among residential customers: As of the end of 2020, 10.6%, 8.4% and 15.4% of PG&E's, SCE's and SDG&E's residential customers are on NEM rates.¹¹² These penetration rates approach those of Hawaii's utilities at the time the regulators determined there needed to be meaningful reforms in the NEM program. While NEM might initially have had minimal cost shift impact when penetration rates were low in California, that is no longer the case for the Joint Utilities.¹¹³

Although the details of NEM successor tariffs in other states have varied (*see* Ex. IOU-01 (Tierney), **Table II-3**, at 33, reproduced below), all of them implicitly or explicitly addressed

¹⁰⁹ Ex. IOU-02 (Tierney) 15:17-16:3; Galen Barbose, "Putting the Potential Rate Impacts of Distributed Solar into Context," Energy Analysis and Environmental Impacts Division Lawrence Berkeley National Laboratory, January 2017, p. 10, <https://www.osti.gov/servlets/purl/1469160/>, accessed August 26, 2021.

¹¹⁰ Direct Testimony of Brian Horii on Behalf of the South Carolina Office of Regulatory Staff, Docket No. 2019-182-E in re: SC Energy Freedom Act-Net Energy Metering, page 13:18-19, <https://dms.psc.sc.gov/Attachments/Matter/877d4dcb-257a-4031-be67-71b292e2262e>, <https://dms.psc.sc.gov/Attachments/Matter/877d4dcb-257a-4031-be67-71b292e2262e> (accessed Aug. 24, 2021).

¹¹¹ Ex. IOU-02 (Tierney) 16:4-10.

¹¹² *See* Ex. IOU-01 (Tierney) Table II-1, at 30.

¹¹³ Ex. IOU-02 (Tierney) 16:11-17.

cost shifts and attempted through their reforms to better align the interests of participating customers, non-participating customers and the system as a whole. For example, the Hawaii Commission concluded in 2014 that the:

... distributed solar PV industry in Hawaii will, out of necessity due to their accomplishments thus far, have to migrate to a new business model, not unlike what is expected for the [Hawaiian Electric] ... Companies as a result of disruptive technologies. The distributed solar business model will need to shift from a customer-value proposition predicated upon customers avoiding the grid financially - but relying upon it physically and thereby creating circuit and system technical challenges to a new model where the customer-value proposition is predicated upon how distributed solar PV benefits both individual customers and the overall electric system, and hopefully becomes a key contributor to Hawaii's grid modernization.¹¹⁴

Table II-3 (Ex. IOU-01 (Tierney) 33)

NEM Successor Tariffs in Selected States with NEM Reforms

APS, HECO, NV Energy, National Grid, Duke Energy Carolinas

Utility	(A) Netting Interval	(B) Export Credit Rate	(C) Net Excess Generation	(D) Additional Fees	(E) Low- and Moderate- Income Provisions	(F) Treatment of Legacy NEM Customers
AZ: Arizona Public Service (APS)	Instantaneous	NEM shifting to net billing. Export comp is phasing down to avoided cost; current rate is \$0.1045/kWh	Carries forward indefinitely or paid out	DG Grid Access Fee or On-Peak Demand Charge	N/A	Existing customers are grandfathered for 20 years after interconnection date
CA: LADWP	Monthly	NEM: Export comp at retail rate	Carries forward indefinitely	None for NEM, but all customers have a "power access" charge based on the customer's maximum monthly kWh use	Leases rooftop space for utility-owned solar panels; SGIP available to LADWP customers on a SoCalGas account	No NEM rate reform, so all NEM customers may continue service on NEM
CA: PacifiCorp	Instantaneous	Net billing: export comp at time-varying: On-Peak: \$0.0486/kWh Off-Peak: \$0.0370/kWh	Carries forward, but expires at end of annual period	Basic monthly charge for facilities (\$7.53)	N/A	NEM customers grandfathered to 2040
CA: SMUD	Monthly	NEM with export comp at retail rate (mandatory TOU rate as of 2018)	Carries forward indefinitely or paid out at special rate	System Infrastructure Fixed Charge: \$22.25	N/A	No NEM rate reform although under discussion
HI: HECO Utilities (Customer Grid Supply Plus (CGS+) incl grid control)	Instantaneous	Net billing: \$0.1008/kWh to \$0.2080/kWh (varies by island, with periodic updates)	Carries forward and reconciled at export rate at end of annual period	Residential minimum bill (\$25) which can't be offset	N/A	NEM customers remain on legacy NEM
HI: HECO Utilities (Smart Export – solar paired with storage)	Instantaneous	Net billing: \$0.11/kWh to \$0.2079/kWh (varies by island; no comp for exports during 9am-4pm)	Carries forward but expires at end of monthly billing period	Residential minimum bill (\$25) which can't be offset	N/A	NEM customers remain on legacy NEM
NV: NV Energy	Monthly	NEM, but with gradual step-down of retail rate for net excess generation	Carries forward indefinitely	None	N/A (but under development/ proposal)	NEM customers are grandfathered
NY: National Grid (Mass Mkt – for smaller systems)	Monthly	NEM: Retail rate	Carries forward indefinitely	Customer Benefit Contribution, at \$1.15/kW but not to address cost shift	Multiple state programs for low-income customers	No NEM rate reform, so all NEM customers may continue on NEM
NY: National Grid (Value of Distributed Energy Resources)	Hourly	Value of DER rate (with periodic update of the elements and payment levels in the value stack)	Carries forward indefinitely	50% of Customer Benefit Contribution, at \$1.15/kW but not to address cost shift	Multiple state programs for low-income customers	VDER customers may stay on rate
SC: Duke Energy (now approved)	Monthly, by time-of-use period	Time-varying: Critical Peak: \$0.25/kWh On-Peak: \$0.1517-\$0.1584/kWh Off-Peak: \$0.0876-\$0.0953/kWh; Super Off-Peak: \$0.0603-\$0.0699/kWh	Credited at avoided cost rate	Minimum Bill, increased Basic Facilities Charge, Non-Bypassable Charge, Grid Access Fee	N/A	Existing customers are grandfathered until 2025 or 2029 (tied to when they installed their rooftop PV)

¹¹⁴ Hawaii Public Utilities Commission, Order No. 32053, Docket No. 2011-0206, pp. 49-50, [Order-No.-32053.pdf \(hawaii.gov\)](#) as quoted in the NCCETC Study (Ex. IOU-01, Appendix B, B-20, n. 35).

In approving NEM successor tariffs, state regulators in Arizona, Hawaii, Nevada, New York, and South Carolina, have approved rate mechanisms (such as a grid access charge; modification of the pricing of exports and net surplus compensation; the frequency of netting periods; and treatment of legacy customers on early NEM rate plans) like those included in the Joint Utilities' proposal.¹¹⁵

Note that in May 2021 and at the direction of the Hawaii Commission, HECO submitted a proposal to shift to a permanent successor to the previously approved NEM reform tariff and to transition existing NEM (called in Hawaii, Distributed Energy Resources (DER)) customers to the permanent tariff.¹¹⁶ A central element of the proposal is to include three time-varying periods (off-peak, midday and on-peak) for compensating customers for exports to the grid, to

¹¹⁵ Ex. IOU-01 (Tierney) 34:1-4 and n. 58. For example, Hawaii and Arizona have tied export compensation to avoided costs: Hawaii has closed full NEM service to new applicants of HECO and replaced full NEM service with three other tariff options:

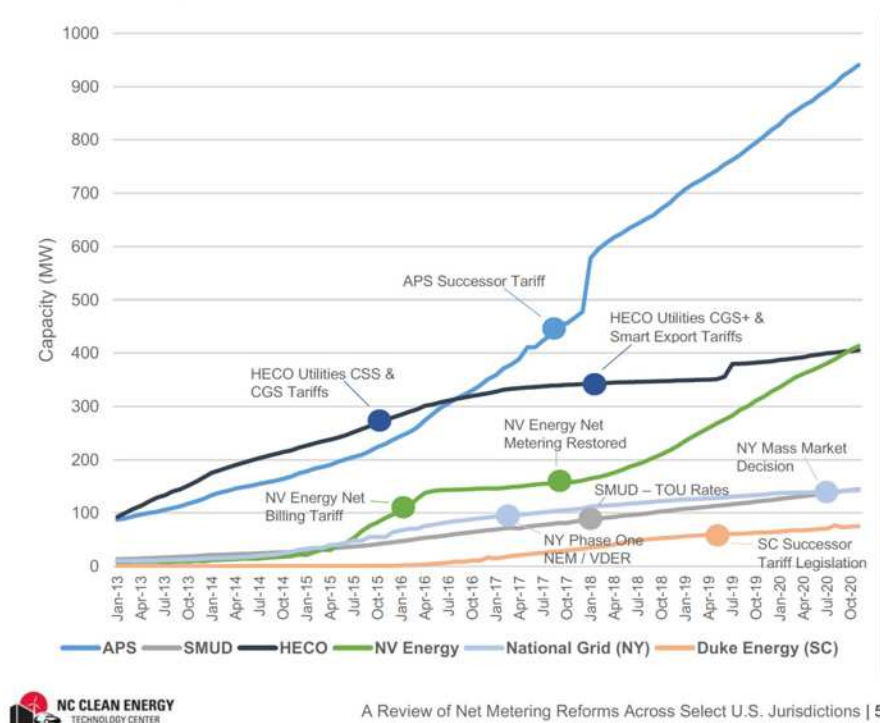
- ... the customer self-supply (CSS) option, the customer grid-supply (CGS) option, and a time-of-use (TOU) tariff program similar to NEM, but at a reduced credit rate....The CGS option is functionally similar to NEM. Customers export excess energy to the grid and receive a credit. The difference between NEM and CGS is that the CGS credit is set to approximate the relative value of the energy to the system and the credit does not need to be tied to retail rates. The net effect of the proposed CGS tariff is to reduce the solar credit that customers receive for self-generation from 30 cents/kilowatt-hour (kWh) under traditional net metering to ~15 cents/kWh, which is closer to HECO's avoided cost compared to the least cost alternative generation resource. In addition, the minimum residential customer bill was increased from \$17 to \$25.
- As of December 2016, Arizona replaced its NEM program with a net billing program. In net billing, a distributed generation system owner consumes self-generated electricity in real time that displaces retail rate utility electricity; however, excess generation exported to the grid is valued at a non-retail, predetermined avoided cost rate. Each utility will determine its specific avoided cost rate. Net billing is similar to NEM, but a net billing arrangement does not allow excess generation to be credited to the distributed generation owner's future utility bills; the excess generation is "sold" to the grid at the predetermined rate and that credit is applied to the billing cycle.
- A.C. Orrell, J.S. Homer and Y. Tang, "*Distributed Generation Valuation and Compensation*," Pacific Northwest National Laboratory, February 2018 at pp. 14-15 (citations omitted). Found at: <https://www.districtenergy.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=0103ebf1-2ac9-7285-b49d-e615368725b2&forceDialog=0>.

¹¹⁶ Ex. IOU-01 (Tierney) 34:5-7 and n. 59 (citing Hawaiian Electric letter to the Hawaii PUC, Hawaiian Electric's DER Program Track Final Proposal, Docket No. 2019-0323 (Instituting a Proceeding to Investigate Distributed Energy Resource Policies) (May 3, 2021).

set export compensation for the average marginal cost of generation in 2021 for each time period, to update the rate every two years, to offer options for the utility to control the timing of exports, and to transition existing NEM customers to the new tariff in seven years. In offering this proposal, HECO explained that “time variant compensation is designed to provide price signals to motivate customers to export energy when it is most valuable to the grid, and therefore the most valuable to customers.”¹¹⁷

As shown in **Figure II-10**, solar PV capacity has continued to increase in the states with reformed NEM tariffs, even with longer payback periods (see **Figure II-11a** following **Figure II-10**). Although the rate of adoption tended to initially slow after implementation of successor tariffs, the markets continue to demonstrate growth in cumulative capacity.¹¹⁸

Figure II-10 (Ex. IOU-01 (Tierney) 35 and Appendix B at B-6, Figure 1)
Residential Solar Net-Metered Capacity Over Time
(Pre- and Post-NEM Reforms)



¹¹⁷ Hawaiian Electric letter to the Hawaii PUC, Hawaiian Electric’s DER Program Track Final Proposal, Docket No. 2019-0323 (Instituting a Proceeding to Investigate Distributed Energy Resource Policies) (May 3, 2021), pp. 1-2; Ex. IOU-01 (Tierney) 34:5-35:2.

¹¹⁸ Ex. IOU-01 (Tierney) 35:3-7; NCCETC Study (Ex. IOU-01, Appendix B, Table 3, p. B-6).

Moreover, the NCCETC Study cited by Dr. Tierney (Ex. IOU-01, Appendix B) shows that the payback periods for NEM customers after reform should still encourage adoption:

Table II-4 (Ex. IOU-01 (Tierney) 36:1)
Estimated Simple Payback Periods for Customers After Modification of NEM Tariffs by their Utilities

Utility	Payback Period Estimate Using Energy Sage System Cost Data	Payback Period Estimate Using Tracking the Sun System Cost Data
APS	9.6	14.4
HECO	6.0 - 9.0	6.0 - 9.06
NV Energy	11.6	19.5
National Grid NY	11.3	18.5
LADWP	6.6 - 7.1	8.9 - 9.6
SMUD	12.9	17.3
Duke SC	19.3	n/a
	Payback for Standalone Solar	
PG&E	4	
SCE	4	
SDG&E	3	
Notes: *		
Cost data for Hawaii is unavailable from EnergySage and Tracking the Sun. The Hawaii analysis uses average system cost data from SolarReviews. Tracking the Sun does not include cost data for South Carolina.		
Sources:		
For the Joint Utilities: Table 2 of Attachment A to the 3-15-2021 Joint Proposal of PG&E, SDG&E and SCE in Docket R.20-08-020; For the other utilities: NCCETC Study, Table 2.		

2. Based on Several Trends, Solar Adoption Will Remain Strong Even with Reform

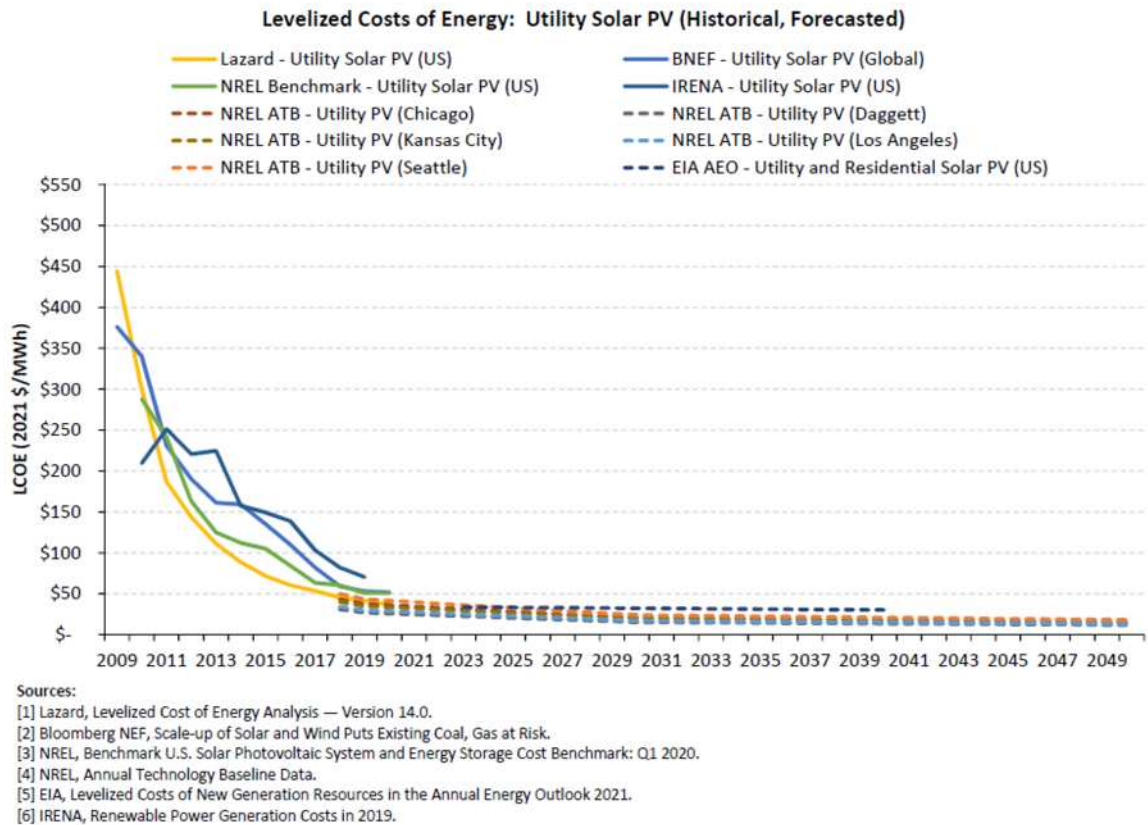
Trends in the solar market and industry and in consumer preferences will enable the Commission to reform NEM 2.0 and will ensure *sustainable* growth in deployment of behind-the-meter renewable generation as required by AB 327. Even SEIA, the Solar Energy Industry Association, points to key drivers of continued growth: a now-strong national presence, a healthy maturation of the industry and an outlook affected by declining PV costs, climate policies, customer demand, and new product offerings.¹¹⁹

¹¹⁹ Ex. IOU-01 (Tierney) 36:1-7 (citing <https://www.seia.org/solar-industry-research-data>, accessed Aug. 26, 2021).

**Trend 1: Solar costs have declined substantially since the adoption of NEM
and are expected to continue to go down in the future**

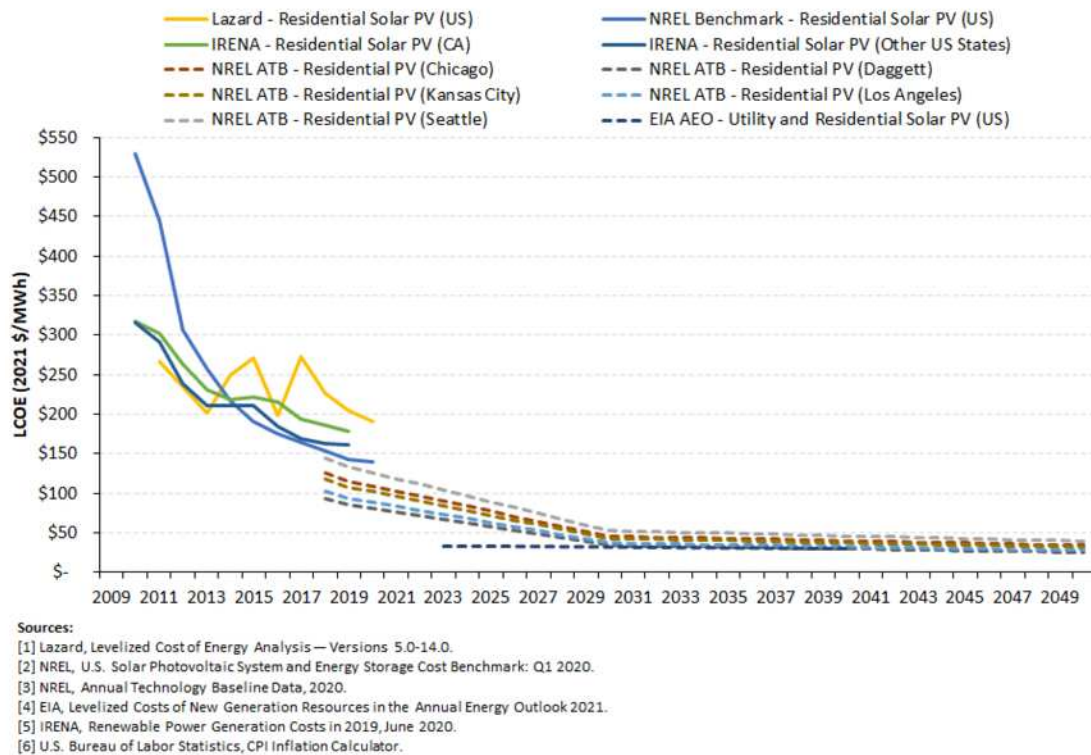
In the 25 years since California adopted its NEM program, the installed costs of new solar PV systems have declined substantially. Although estimates of levelized cost of solar vary, the cost of new rooftop solar has dropped from a range of approximately \$320-\$530 per MWh a decade ago to approximately \$150-\$190 per MWh in 2019. (The cost of utility-scale solar installations has dropped even further, to around \$50-\$75 per MWh as of 2019.) Industry analysts expect costs to continue to drop, although at a slower rate in upcoming years (*Figure II-11a* and *Figure II-12b* show the historical actual and estimates of future levelized cost of energy for utility-scale solar PV and residential solar PV systems, respectively).¹²⁰

**Figure II-11a (Ex. IOU-01 (Tierney) 37)
Levelized Costs of Energy: Utility Solar PV (Historical, Forecasted)**



¹²⁰ Ex. IOU-01 (Tierney) 36:8-37:6.

Figure II-12b (Ex. IOU-01 (Tierney) 38)
Levelized Costs of Energy: Residential Solar PV (Historical, Forecasted)



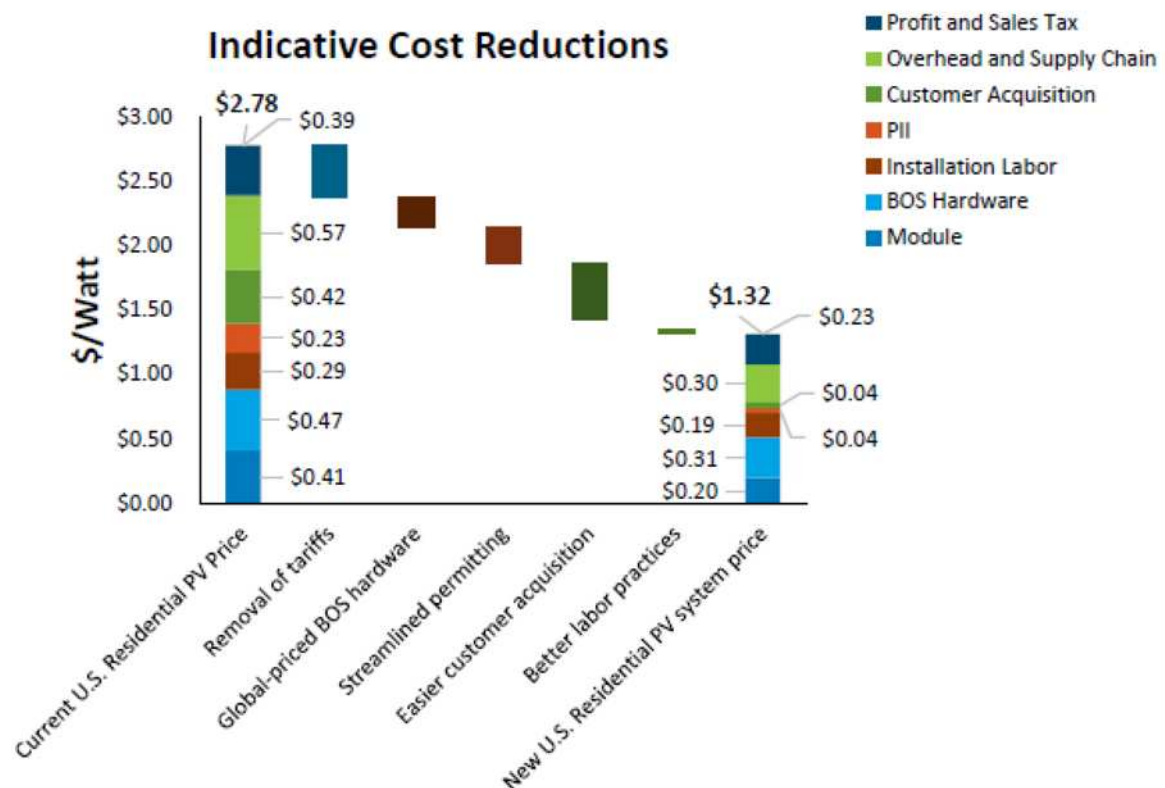
Such continued decreases in the installed cost of PV systems are anticipated to result from many factors, as explained in a recent National Renewable Energy Laboratory (NREL) Q2/Q3 2020 Solar Industry Update and shown in the below **Figure II-13**: “Solar PV: Indicative Cost Reductions by Type of Cost”.¹²¹ These factors include: removal of tariffs; reduction in hardware that translates to lower supply chain, profit, and sales tax costs; streamlined permitting (and interconnection); easier customer acquisition; better labor practices.¹²² Recent installer surveys indicate cost breakdowns that closely match NREL’s national averages, except for labor

¹²¹ Ex. IOU-01 (Tierney) 38:1-4 and n. 63 (citing David Feldman and Robert Margolis, “Q2/Q3 2020 Solar Industry Update,” NREL (Dec. 8, 2020), <https://www.nrel.gov/docs/fy21osti/78625.pdf>, accessed August 26, 2021).

¹²² Ex. IOU-01 (Tierney) 38:4-6 and n. 64 (citing David Feldman and Robert Margolis, “Q2/Q3 2020 Solar Industry Update,” NREL (Dec. 8, 2020), pp. 53-54).

costs (which came out as a higher percentage) and customer acquisition costs (which came out as a lower percentage).¹²³ Also, doing business during the COVID-19 pandemic motivated many solar companies to shift to online marketing and sales, which lowers customer-acquisition costs compared to traditional sales models.¹²⁴

Figure II-13 (Ex. IOU-01 (Tierney) 39)
Solar PV: Indicative Cost Reductions by Type of Cost¹²⁵



¹²³ Ex. IOU-01 (Tierney) 38:6-39:1 and n. 65 (citing EnergySage, “Solar Installer Survey: 2020 Results,” (Mar. 2021), p. 13, <https://www.energysage.com/data/#reports>, accessed August 26, 2021).

¹²⁴ Ex. IOU-01 (Tierney) 39:1-3, and n. 66 (citing EnergySage, “Solar Installer Survey: 2020 Results,” (Mar. 2021), <https://www.energysage.com/data/#reports>, accessed August 26, 2021). Technology makes it relatively cheap and easy to shift operations online; it’s still possible to close deals this way and a digital-centric strategy could be better for business in the long run than the historical dependence on face-to-face sales. Ex. IOU-01 (Tierney) 38:1-39:4.

¹²⁵ Ex. IOU-01 39, Figure II-13 and n. 69 (citing NREL Q2/Q3 Solar Industry Update).

Trend 2: Residential storage has experienced cost declines and offers a powerful combination when paired with solar

In the 25 years since California adopted its NEM program, the installed costs of residential and other small-scale storage have also declined, in large part due to technology improvements in lithium-ion batteries. These price trends have boosted the attractiveness of storage as a new service and product offering in conjunction with on-site solar, even for residential consumers. Consumers report they are interested in solar for cost savings and storage in large part for resilience and back-up power supply, providing a potentially powerful combination.¹²⁶ As of 2020, 242 MW of such storage are located in the service territories of the Joint Utilities.¹²⁷

Lithium-ion batteries – the most common technology used in small-scale storage systems¹²⁸ – have shown cost reductions in recent years. Massachusetts Institute of Technology (MIT) researchers recently estimated that the real price of these batteries dropped 97% since

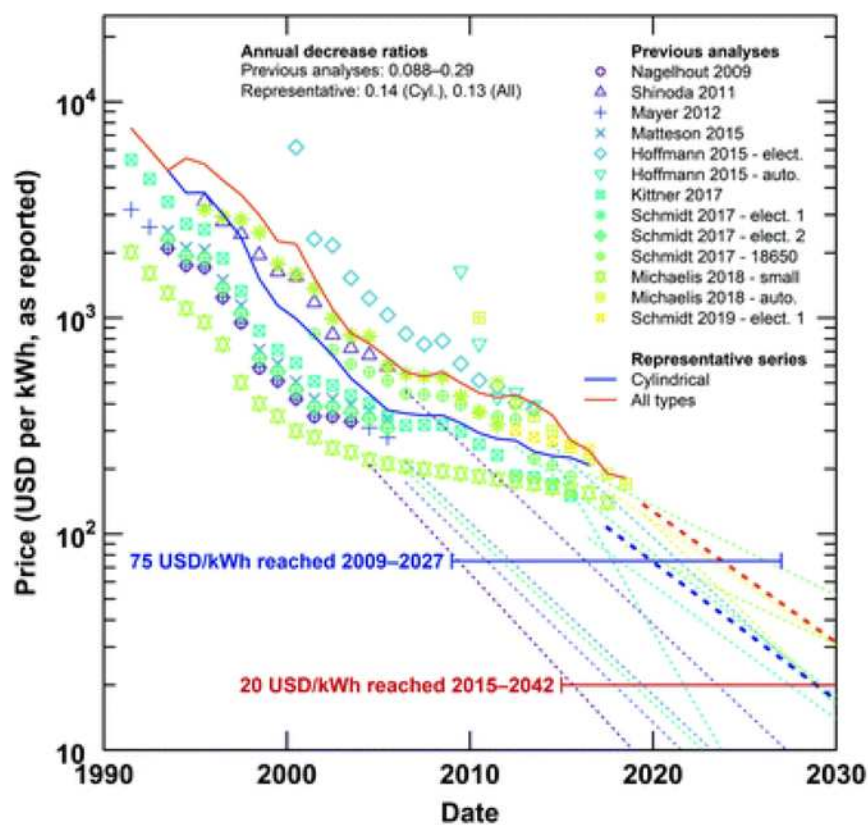
¹²⁶ Ex. IOU-01 (Tierney) 40:3-8 (citing Pew Research Center, “More U.S. homeowners say they are considering home solar panels, December 17, 2019, <https://www.pewresearch.org/fact-tank/2019/12/17/more-u-s-homeowners-say-they-are-considering-home-solar-panels/> and https://www.pewresearch.org/wp-content/uploads/2019/12/Ft_19.12.17_SolarPanels_TOPLINE-1.pdf; Insight, “Going Solar Isn’t All About Saving Money for Low-Income Consumers,” Energy Policy Institute at the University of Chicago, January 15, 2020, <https://epic.uchicago.edu/insights/going-solar-isnt-all-about-saving-money-for-low-income-consumers/>; Michele Lerner, “Solar panel use heats up as installation costs fall,” The Washington Post, May 27, 2021, https://www.washingtonpost.com/realestate/solar-panel-use-heats-up-as-installation-costs-fall/2021/05/26/b55a2ea4-8825-11eb-8a8b-5cf82c3dffe4_story.html?utm_source=rss&utm_medium=referral&utm_campaign=wp_homepage; Provoke Insights, “What Motivates Consumers to Purchase Solar Power?” 2017, <https://www.prnewswire.com/news-releases/what-motivates-consumers-to-purchase-solar-power-300556134.html>; J. Farrell, “Energy Democracy in 4 Powerful Steps,” Institute for Local Self-Reliance, March 1, 2017, <https://ilsr.org/energy-democracy-in-4-steps/>.

¹²⁷ Ex. IOU-01 (Tierney) 40:3-9, source data: EIA, 861 datafile on net metering customers by utility, <https://www.eia.gov/electricity/data/eia861/>, accessed August 26, 2021.

¹²⁸ Ex. IOU-01 (Tierney) 40, n. 72 (“Lithium-ion batteries are widely available and mass-produced globally although manufacturing is concentrated in Asia. They are modular and can be installed in multiple scales ranging from a few kilowatts at residential scale to hundreds of megawatts for bulk system applications. Li-ion batteries can provide high power for short-duration applications (e.g., frequency regulation) and up to (and sometimes more than) four hours of energy capacity for longer-duration applications (e.g., transmission or distribution network investment deferral).” BloombergNEF and the Business Council for Sustainable Energy, “Sustainable Energy in America 2021 Factbook,” page 86, <https://bcse.org/factbook/>, accessed August 26, 2021.).

1991, with a 13% average annual improvement in the price per energy capacity between 1992 and 2016.¹²⁹ **Figure II-14** (Ex. “Price Decreases in Lithium-Ion Batteries: Historical and Projected” (from the MIT study)) below summarizes cost trends from other research studies for the period since 1991, when such lithium-ion batteries began to enter the market. The two take-aways from this complicated figure are that (a) lithium-ion battery prices have declined significantly over the past three decades, and (b) the authors’ “simple projections” of future cost declines suggest a nearly “30 year range for reaching 20 USD kWh [*i.e.*, from a few years ago through 2042].”¹³⁰

Figure II-14 (Ex. IOU-01 (Tierney) 41)
Price Decreases in Lithium-Ion Batteries: Historical and Projected



Zeigler/Trancik Study (2021)

¹²⁹ Ex. IOU-01 (Tierney) 40:10-41:1 and n. 73 (citing Micah Ziegler and Jessika Trancik, “Re-examining rates of lithium-ion battery technology improvement and cost decline, Energy & Environmental Science, 2021 (hereafter, the “Ziegler/Trancik Study”), <https://pubs.rsc.org/en/content/articlepdf/2021/ee/d0ee02681f?page=search>, accessed August 26, 2021. The researchers analyzed 90 different studies of cost and performance of lithium-ion batteries and harmonized the data so as to develop an overall picture of price trends.).

¹³⁰ Ex. IOU-01 (Tierney) 40:10-41:7 (citing Ziegler/Trancik Study).

Other market analysts also anticipate future cost reductions, although at a slower pace than in the past three decades: “BloombergNEF forecast[s] battery costs falling under US\$100/kWh in 2024 and hitting around US\$60/kWh by 2030 ... Likewise, Bernstein analysts have projected 2024 as the year that mainstream electric vehicles reach cost parity with gas and diesel vehicles, while electric vehicle leaders in the sector may reach the same point by 2022 or 2023.”¹³¹

The most recent versions of Lazard’s Levelized Cost of Storage include estimates for different storage use cases, including one for behind-the-meter residential PV paired with storage. The cost ranges for that use case in recent years show overall improvement in the level and range of costs:

Table II-5 (Ex. IOU-01 (Tierney) 42:16-10)
Unsubsidized Levelized Cost of Storage (LCOS) – Low/High Cost Range Estimates Behind the Meter Residential (PV + Storage) - Energy (\$/MWh)

Year	2018	2019	2020
Version of the Lazard LCOS Analysis (Version #)	4.0	5.0	6.0
Low End of Price Range (\$/MWh)	\$476	\$457	\$406
High End of Price Range (\$/MWh)	\$735	\$663	\$506
Notes re: capital cost assumptions: Lazard LCOS 4.0: range of \$2,961/kW-\$3,270/kW Lazard LCOS 5.0: \$2,875/kW Lazard LCOS 6.0: \$2,675/kW Source: Lazard LCOS 4.0 for 2018 prices (page 11) - (Lithium battery), https://www.lazard.com/media/450774/lazards-levelized-cost-of-storage-version-40-vfinal.pdf . Lazard LCOS 5.0 for 2019 prices (page 4), https://www.lazard.com/media/451087/lazards-levelized-cost-of-storage-version-50-vf.pdf . Lazard LCOS 6.0 for 2020 prices (page 6), https://www.lazard.com/media/451566/lazards-levelized-cost-of-storage-version-60-vf2.pdf			

Storage contributes to the value proposition in several ways that may be increasingly accessible as the combined cost of solar-paired storage decline. Solar-paired storage is even more attractive when combined with rate design that provides time-differentiated rates for

¹³¹ Ex. IOU-01 (Tierney) 42:1-5. Kip Keen, “As battery costs plummet, lithium-ion innovation hits limits, experts say” (May 14, 2020), <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/as-battery-costs-plummet-lithium-ion-innovation-hits-limits-experts-say-58613238>, accessed Aug. 25, 2021.)

consumption, with other policies and programs creating incentives for adoption, and in light of the functionalities afforded by the combination of the two technologies.¹³²

Trend 3: Valuing customer choice and preferences

Electricity consumers have always wanted and expected reliable and affordable power. They now also want the electric system to provide a more resilient and safe supply, clean and sustainable power, and equitable access to electricity.¹³³ Residential electricity consumers report many reasons for choosing solar, either as a stand-alone installation or combined with storage. For solar, the principal motivation for household adopters is to save money on and/or manage their electricity bills (with secondary factors such as taking advantage of the declining cost of solar, helping the environment, becoming independent of the grid, etc.).¹³⁴

Trend 4: Resiliency as an adoption driver

The same motivations for adopting solar also tend to drive households' adoption of storage, along with one other significant factor: ensuring access to electricity during power

¹³² Ex. IOU-01 (Tierney) 42:11-43:2.

¹³³ National Academies of Sciences, Engineering and Medicine, "The Future of Electric Power in the United States," 2021, pages 18-19, <https://www.nap.edu/download/25968>.

¹³⁴ Ex. IOU-01 (Tierney) 43:3-11 (citing Pew Research Center, "More U.S. homeowners say they are considering home solar panels (Dec. 17, 2019), <https://www.pewresearch.org/fact-tank/2019/12/17/more-u-s-homeowners-say-they-are-considering-home-solar-panels/>, and https://www.pewresearch.org/wp-content/uploads/2019/12/Ft_19.12.17_SolarPanels_TOPLINE-1.pdf; Insight, "Going Solar Isn't All About Saving Money for Low-Income Consumers," Energy Policy Institute at the University of Chicago (Jan. 15, 2020), <https://epic.uchicago.edu/insights/going-solar-isnt-all-about-saving-money-for-low-income-consumers/>; Michele Lerner, "Solar panel use heats up as installation costs fall," The Washington Post (May 27, 2021), https://www.washingtonpost.com/realestate/solar-panel-use-heats-up-as-installation-costs-fall/2021/05/26/b55a2ea4-8825-11eb-8a8b-5cf82c3dffe4_story.html?utm_source=rss&utm_medium=referral&utm_campaign=wp_homepage; Provoke Insights, "What Motivates Consumers to Purchase Solar Power?" (Nov. 15, 2017), <https://www.prnewswire.com/news-releases/what-motivates-consumers-to-purchase-solar-power-300556134.html>; and, J. Farrell, "Energy Democracy in 4 Powerful Steps," Institute for Local Self-Reliance (Mar. 1, 2017), <https://ilsr.org/energy-democracy-in-4-steps/>). (Links accessed August 26, 2021.)

outages.¹³⁵

Of the various factors, resilience reigns supreme. 65% of installers say that resilience – having backup power in the event of a major storm event or power outage – is the primary driver of consumer interest in storage, a sizable increase from 2019. Interestingly, while a fifth of installers cited financial benefits to consumers as the primary driver for storage in 2019, only 8% of respondents rated financial savings as the primary driver of storage interest in 2020. The same study found that storage interest is on the rise. From the climate change driven wildfire-related outages and public safety power shutoff (PSPS) events on the West Coast to the millions of outages due to Hurricane Isaias on the East Coast, 2020 provided many reasons for homeowners to seek resilience. As a result, consumer interest in energy storage surged nationwide to nearly half of all customers in 2020, according to survey respondents. This trend is clear in states like California (51% interest) and hurricane-impacted North Carolina (55% interest).¹³⁶

Trend 5: The solar industry has matured since the early decades of the NEM program

Several solar industry trends that were not present 25 years ago will help drive continued adoption of behind-the-meter programs: a now-strong national presence, a healthy maturation of the industry and an outlook affected by declining PV costs, climate policies, customer demand, and new product offerings. Large solar companies and smaller solar installers are positioned to continue to meet customer demand for rooftop solar through a variety of product and service offerings.¹³⁷

¹³⁵ Ex. IOU-01 (Tierney) 43, n. 78 (citing “Consumer preference on EnergySage confirms this trend: after asking to receive storage quotes on EnergySage, 69 percent of consumers say they’re interested in storage for backup power,” EnergySage, Solar Marketplace Intel Report (May 2021), <https://www.energysage.com/data/>; and, Terance Harper, “Four reasons residential solar + storage installations are surging in the U.S.,” Solar Builder (Jan. 25, 2021), <https://solarbuildermag.com/training/four-reasons-residential-solar-storage-installations-are-surging-in-the-u-s/>). (Links accessed Aug. 26, 2021.)

¹³⁶ Ex. IOU-01 (Tierney) 43:13-44:11 and n. 79-80 (citing EnergySage, “Solar Installer Survey: 2020 Results,” (Mar. 2021), <https://www.energysage.com/data/>, accessed August 26, 2021.).

¹³⁷ Ex. IOU-01 (Tierney) 44:19-23.

Recent public communications from the solar industry, through SEIA, point to a number of drivers of continued growth in the market for rooftop solar: a now-strong national presence, a healthy maturation of the industry and an outlook affected by declining PV costs, climate policies, customer demand, and new product offerings.¹³⁸

The statements below are quoted from the SEIA website:¹³⁹

- **“Solar industry Growing at a Record Pace”**

- “Solar energy in the United States is booming: Along with our partners at Wood Mackenzie Power & Renewables and The Solar Foundation, SEIA tracks trends and trajectories in the solar industry that demonstrate the diverse and sustained growth of solar across the country.”

- **“Massive Growth Since 2000 Sets the Stage for the Solar+ Decade”**

- “In the last decade alone, solar has experienced an average annual growth rate of 42%. Thanks to strong federal policies like the solar Investment Tax Credit, rapidly declining costs, and increasing demand across the private and public sector for clean electricity, there are now more than 97 gigawatts (GW) of solar capacity installed nationwide, enough to power nearly 18 million homes.”

- **“Solar’s Share of New Capacity has Grown Rapidly”**

- “Solar has ranked first or second in new electric capacity additions in each of the last 8 years. In 2020, 43% of all new electric capacity added to the grid came from solar, the largest such share in history and the second year in a row that solar added the most generating capacity to the grid. Solar’s increasing competitiveness against other technologies has allowed it to quickly increase its share of total U.S. electrical generation - from just 0.1% in 2010 to over 3% today.”

- **“Growth in Solar is Led by Falling Prices”**

- “The cost to install solar has dropped by more than 70% over the last decade, leading the industry to expand into new markets and deploy thousands of systems nationwide. Prices as of Q4 2020 are at their lowest levels in history across all market segments. An average-sized residential system has dropped from a pre-incentive price of \$40,000 in 2010 to

¹³⁸ Ex. IOU-01 (Tierney) 44:24-46:25. The statements quoted below are from the SEIA website: <https://www.seia.org/solar-industry-research-data>, accessed April 1, 2021.

¹³⁹ *Id.*

roughly \$20,000 today, while recent utility-scale prices range from \$16/MWh - \$35/MWh, competitive with all other forms of generation.”

- **“Solar PV Growth Forecast”**

- “Despite obstacles posed by the pandemic, the U.S. solar market set a new annual record with 19.2 GW installed in 2020. With an historic utility-scale pipeline and recovering demand in the residential and non-residential segments, the industry is set for a series of record years until 2024, when the [federal investment tax credit] is scheduled to fully step down. Barring new policy developments at the state and federal levels, industry growth through the end of the decade is premised on continued price declines and growing demand from utilities, states, corporations, and distributed solar customers. Over the next 10 years, 324 GW will be installed, 3 times the amount installed through 2020.”

- **“Storage is Increasingly Paired with All Forms of Solar”**

- “Homeowners and businesses are increasingly demanding solar systems that are paired with battery storage. While this pairing is still relatively new, the growth over the next five years is expected to be significant. By 2025, nearly 25% of all behind-the-meter solar systems will be paired with storage, compared to under 6% in 2020.”

As the above quotations show, the solar industry is bullish about its future. We are too.

The reform we are advocating in this proceeding will help make that future sustainable.

Other information similarly points to a positive outlook for the growth in the solar market, nationally and in California. First, from a policy point of view, the California market for renewables, including customer-sited PV and other distributed generation, offers significant opportunities for growth. These include the state’s requirements to reach carbon neutrality by 2045, to rely on electrification over time as the power sector continues to reduce its GHG emissions and to gain efficiencies from substituting electric end uses for appliances, vehicles, and equipment that currently rely on fossil fuels, and to mandate rooftop solar on new buildings.¹⁴⁰

Second, major solar companies anticipate growth in customer adoption of solar and other DERs considering several trends. In a recent presentation to investors, Sunrun, for example, lists

¹⁴⁰ Ex. IOU-01 (Tierney) 46:26-32. *See, id.*, (Peterman) 4:10-12, 13:15-14:1 and Figure I-4.

the following factors as driving growth and increased opportunity for financial returns: “Increasing retail utility rates; Deteriorating grid reliability; Declining solar and battery costs; Climate change; Home electrification; Electric vehicle penetration; Virtual power plants. Sunrun integrates solar, storage, electrification and virtual power plants into a smart solution for each home and community.”¹⁴¹

As another example, SunPower, in its March 2021 investor presentation, anticipates substantial market growth through combining solar and storage, offering smart energy home management services, and shifting from sales of equipment to establishing long-term (“long-tail”) relationships with customers through power purchase agreements and other leasing/financing mechanisms.¹⁴² Similarly, Sunnova points to the important role of “creating shareholder value by growing high quality, long-term contracted revenues” and “selling more services to new customers, and upselling additional services to existing customers,” while also reducing costs and developing and managing grid and microgrid services.¹⁴³

Figure II-15 below shows information about the market value of several major solar companies (*i.e.*, Sunrun, SunPower, Sunnova) that provide post-2016 products and services in California and elsewhere. These companies’ recent financial statements indicate their diverse product offerings (solar and solar paired with storage) through customers’ upfront purchase of equipment or through lease and power purchase agreements with customers. The latter product offerings tend to require a lot of upfront investment by the company, which may account for some near-term losses by big players that offer financing as well as installations.¹⁴⁴ But even

¹⁴¹ Ex. IOU-01 (Tierney) 46:33-47:4 (citing Sunrun Investor Presentation (Mar. 2021) p. 6).

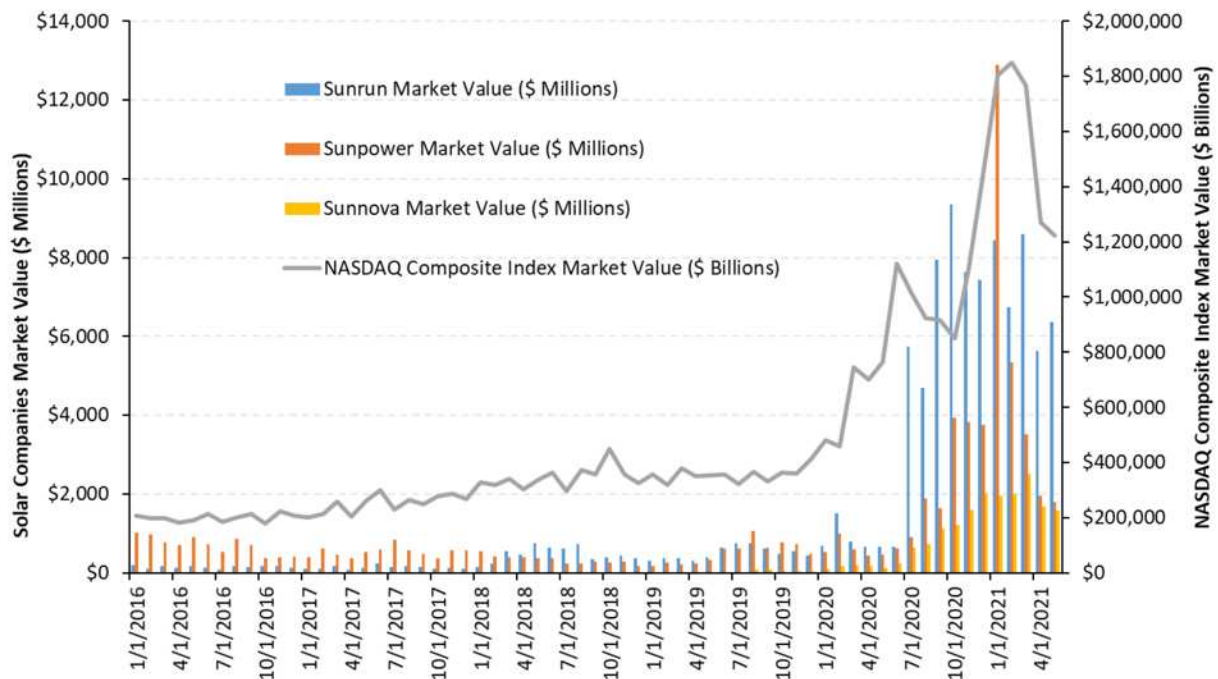
¹⁴² Ex. IOU-01 (Tierney) 47:5-9, *citing*, SunPower, Investor Presentation (Mar. 25, 2021) accessed August 26, 2021.

¹⁴³ Ex. IOU-01 (Tierney) 47:10-13, *citing*, Sunnova, Fourth Quarter and 2020 Full Year Earnings presentation (February 24, 2021), https://s23.q4cdn.com/546214306/files/doc_financials/2020/q4/Sunnova-Q4-2020-Earnings-Slide-Deck-FINAL.pdf, accessed August 26, 2021.

¹⁴⁴ Peter Eavis and Ivan Penn, “Home Solar Is Growing, but Big Installers Are Still Losing Money,” New York Times, January 4, 2021, updated May 28, 2021, <https://www.nytimes.com/2021/01/04/business/energy-environment/rooftop-solar-installers.html>.

with disclosures to investors about various risks that might affect each company's business, investors have shown overall confidence in these companies' performance over the past five years and their opportunities in the future (note that the overall trend in tech stocks, as reflected in the NASDAQ composite index has shown trends similar to these major solar companies, including net substantial gains since 5 years ago).¹⁴⁵

Figure II-15 (Ex. IOU-01 (Tierney) 48)
Market Value of Selected Major Solar Companies in the California Market
(Monthly, January 2016 through May 2021)



Sources:

[1] Yahoo Finance.

[2] Utility Dive, "Sunrun closes \$3.2B Vivint Solar acquisition," October 8, 2020.

These three solar companies represent a subset of the companies involved in the distributed generation/rooftop solar market in California; the market also includes small companies that install solar systems. The cost trends in solar and solar paired with storage

¹⁴⁵ Ex. IOU-01 (Tierney) 47:14-48:5.

installations will tend to support households' continued adoption of new solar installations through small companies focused on markets in local communities, as well as large solar companies with a national presence.¹⁴⁶ That outlook aligns well with the major factors that are driving continued demand for and deployment of rooftop solar in the state (as explained at Ex. IOU-01 (Peterman) 8:9-14:1).

III. ISSUE 3: WHAT METHOD SHOULD THE COMMISSION USE TO ANALYZE THE PROGRAM ELEMENTS IDENTIFIED IN ISSUE 4 AND THE RESULTING PROPOSALS, WHILE ENSURING THE PROPOSALS COMPLY WITH THE GUIDING PRINCIPLES?

In addition to analyzing the program elements in light of evidence from the Lookback Study, the other studies, and the experience in other states as described in Section II above, the Commission should look to its own Standard Practice Manual to consider cost effectiveness, and to how the reform proposals align with the Guiding Principles.

A. The Standard Practice Manual Cost-Effectiveness Tests Should Be Used to Guide the Commission's Analysis

In D.09-08-026 the Commission adopted a methodology for assessing the costs and benefits of distributed generation for the "primary purpose" of assuring that the state's support for distributed generation projects "is evaluated in an economically sound manner."¹⁴⁷ That methodology, as adopted in 2009, required analysis of distributed generation programs using three cost-benefit tests detailed in the California Standard Practice Manual: the Participant Cost Test (PCT), the Total Resource Cost (TRC) test, and the Program Administrator Cost (PAC) test, each of which incorporates inputs from the Commission-approved avoided cost calculator.¹⁴⁸

Since 2009, the methodology for evaluating the cost-effectiveness of distributed energy resources has been refined, but with the same purpose: "to better enable the Commission to meet

¹⁴⁶ Ex. IOU-01 (Tierney) 48:5-49:3, *citing*, Peter Eavis and Ivan Penn, "Home Solar Is Growing, but Big Installers Are Still Losing Money," *New York Times* (Jan. 4, 2021, updated May 28, 2021), <https://www.nytimes.com/2021/01/04/business/energy-environment/rooftop-solar-installers.html>, accessed August 26, 2021; Ex. CSA-06, Joint IOUs Data Response to CALSSA 11.5 and 11.5 Revised (July 14, 2021), pp. 1-2.

¹⁴⁷ D.09-08-026 at p. 2.

¹⁴⁸ *Id.* at p. 3 and pp. 68-69, OP 1.

the State’s environmental policies in a *consistent and cost-effective manner*.”¹⁴⁹ As relevant to this proceeding, in D.19-05-019, the Commission (1) identified the TRC test as the primary test of cost-effectiveness for all distributed energy resources, and (2) “simultaneously” recognized the importance of the PAC and the Ratepayer Impact Measure (RIM) cost-effectiveness tests, requiring discussion of those considerations in all relevant proceedings.

The Commission therefore has found all four cost-effectiveness tests set forth in the SPM as important for evaluating distributed energy resources.¹⁵⁰ As explained in the SPM, these tests should not be used individually or in isolation; each test has relative strengths and weaknesses and these tradeoffs must be considered when assessing demand side policy.¹⁵¹ These tests, which the Commission has carefully developed and adopted, should therefore guide the Commission’s analysis of the parties’ proposals in this proceeding alongside the legislative direction of AB 327. As the Lookback Study demonstrates, the Standard Practice Manual tests provide critical information about what it means to support sustainable growth and the balancing of costs and benefits for all customers and the electric grid.

1. Although the TRC Test Was Identified as the “Primary” Test for Cost-Effectiveness, It Is Not Informative for the Purpose of this Proceeding

Although the Commission has identified the TRC test as the primary test of cost-effectiveness, it provides little insight in comparing the parties’ proposals for a reform tariff. As SEIA witness Thomas Beach acknowledged in his opening testimony, “the TRC is not impacted directly by the net metering tariff under which solar customers take service.”¹⁵² NRDC witness

¹⁴⁹ D.19-05-019, p. 2, emphasis added.

¹⁵⁰ Pursuant to Commission Rule 13.10, the Joint Utilities request that the Commission take official notice of the California Standard Practice Manual, dated October 2001 (the “SPM”). The SPM is available on the Commission’s website at the following link: https://www.cpuc.ca.gov/-/media/cpuc-website/files/uploadedfiles/cpuc_public_website/content/utilities_and_industries/energy_-_electricity_and_natural_gas/cpuc-standard-practice-manual.pdf.

¹⁵¹ SPM, p. 6.

¹⁵² Ex. SVS-03 (Beach) 14:15-16.

Mohit Chhabra similarly explained: “The TRC of the distributed generator is independent of the NEM tariff and cannot be applied to compare the relative merits of different tariffs.”¹⁵³

The TRC test compares the net costs of the program as a resource option (including both the participants’ and the utility’s costs) with the avoided supply costs (including the relevant avoided transmission, distribution, generation and capacity costs).¹⁵⁴ The weakness of the TRC test for the matter at hand is that any bill savings and incentives are treated as transfer payments; in other words the participant benefits and associated ratepayer costs cancel out.¹⁵⁵

Consequently, the TRC test does not provide meaningful information to enable the Commission to evaluate the costs and benefits of a tariff to all customers, as required by Public Utilities Code section 2827.1(b). Likewise, the TRC test does not provide any insight to ensuring equity among customers. The lack of insight to be gained from the TRC test is reflected by the results of the E3 cost-effectiveness analysis (as updated on June 15, 2021), showing identical TRC results across all proposals addressing customer-sited solar.¹⁵⁶

The value of the TRC test therefore is its ability to indicate whether a demand-side program is cost-effective to the grid relative to other resource options.¹⁵⁷ A benefit-cost ratio above one indicates that the program is beneficial on a total resource cost basis, i.e., beneficial to those investing in the program (utilities and its ratepayers), as well as the program participants.¹⁵⁸ Studies performed for this proceeding have shown that residential standalone rooftop solar fails this test. Results from the Lookback Study, E3’s cost-effectiveness analysis

¹⁵³ Ex. NRD-01 (Chhabra) 8:25-26. *See also* Ex. TRN-01 (Chait) 13:9-11 (“[t]he key elements of tariff design, including any incentives, various approaches to export compensation, netting, self-consumption, and grid charges, are not quantified in the TRC results.”).

¹⁵⁴ SPM, p. 18.

¹⁵⁵ *Id.*

¹⁵⁶ E3 Comparative Analysis, p. 5.

¹⁵⁷ SPM, p. 21.

¹⁵⁸ SPM, p. 19.

and TURN's cost-effectiveness analysis all show the same result: residential PV is not cost-effective from a TRC perspective.¹⁵⁹

2. Like the TRC, the PAC Test Also Is Uninformative

The PAC test measures the benefits and costs of a program to the Program Administrator. The PAC does not account for the costs spent by participants, and like the TRC, revenue shifts are treated as transfer payments such that bill savings/lost revenues that drive the cost shift to non-participants are not captured.¹⁶⁰ The PAC test thus provides no information for evaluating the design of a specific program or tariff. Indeed, E3's Comparative Analysis completely omits PAC test scores, substantiating that the PAC test is of no use to the Commission in this proceeding.¹⁶¹

3. The RIM and PCT Are Best Suited to Inform the Commission's Analysis

The RIM and PCT are complementary tests essential to understanding (1) the rate and bill impacts of Commission policies on non-participating customers, on the one hand, and (2) participant customer economics, on the other hand.

The RIM "measures what happens to rates due to changes in utility revenues and operating costs caused by the program."¹⁶² The RIM compares the utility's costs, incentives paid to the participant, and decreased customer revenues attributable to the program with the avoided supply cost "benefit," including the relevant avoided transmission, distribution, generation, and capacity costs. A RIM benefit-cost ratio above one indicates that the program is likely to result in

¹⁵⁹ Ex. PCF-15, Lookback Study (January 21, 2021), pp. 6-7; E3 Comparative Analysis, p. 5; Ex. TRN-01 (Chait) 13:16-22, 63:9-14, and 66:1-9.

¹⁶⁰ SPM, pp. 23-24.

¹⁶¹ E3 Comparative Analysis, p. 7 (listing E3's model output metrics, excluding any reference to the PAC). *See also* Ex. TRN-01 (Chait) 3:25-26 ("The Program Administrator Cost (PAC) test is not useful in evaluating the cost-effectiveness of successor tariff options.")

¹⁶² D.19-05-019, p. 9.

lower rates.¹⁶³ The Commission has recognized the value of the RIM, requiring the review and consideration of RIM test results in all distributed energy resources proceedings.¹⁶⁴

The PCT measures the quantifiable benefits and costs to the customer due to participation in a program by comparing the out-of-pocket costs to a participating customer with the benefit received by the customer. Benefits include reduction in the customer's utility bill, any incentive paid to the customer by the utility or other third parties, and any tax credit received. A PCT benefit-cost ratio above one indicates that the program is beneficial to participating customers, meaning the present value of the financial benefits realized through bill savings, incentives, and tax credits exceed the out-of-pocket costs.¹⁶⁵ In other words, "[t]he Participant [Cost] Test measures the economic viability of a DG facility to the developer or customer installing the facility and can assist the Commission in determining the level of incentive needed to promote the investment."¹⁶⁶ As the Commission has previously concluded, it "should require the use of the Participant [Cost] Test to help identify 'free riders,' that is, those DG projects that would be profitable for DG customers absent all or some portion of existing incentives."¹⁶⁷

The RIM test, therefore, provides the context of how customer adoption of rooftop solar impacts non-participants, and the PCT qualitatively assesses customer interest in renewable DG. These are the tests that will help the Commission, in choosing a reform tariff that ensures: (i) that customer-sited renewable distributed generation continues to grow sustainably, (ii) that the reform tariff is based on the costs and benefits of the renewable electrical generation facility, and (iii) equity among customers.¹⁶⁸ As witness Chhabra testified, a score of 1.0 would be the most advantageous for both nonparticipants and participants "as it relates to equity on rate impact."¹⁶⁹

¹⁶³ SPM, pp. 13-14.

¹⁶⁴ D.19-05-019, p. 24.

¹⁶⁵ SPM, pp. 8-9.

¹⁶⁶ D.09-08-026, p. 62 FOF 6.

¹⁶⁷ D.09-08-026, p. 65 COL 5.

¹⁶⁸ Pub. Util. Code § 2827.1(b).

¹⁶⁹ Chhabra, T. 1819:12-17 (Aug. 6, 2021).

The PCT and RIM scores for NEM participants and non-participants, respectively, under the current NEM program as reflected in the Lookback Study and the E3 Comparative Analysis, demonstrate that the subsidy provided under the NEM program is resulting in free riders at the expense of non-participants.

4. The Societal Cost Test (SCT) Should Not Inform the Commission's Analysis

The solar parties advocate for the use of the SCT in this proceeding. However, given the stage of the development of the SCT and the way in which the Solar Parties manipulate the SCT, it cannot be reliably used to evaluate the parties' proposals at this time.

In the Integrated Resources Planning (IRP) proceeding, the Commission adopted three SCT elements "for informational purposes" and "as an opportunity to test and evaluate the details of the three SCT elements" adopted.¹⁷⁰ These three elements are 1) a societal discount rate, 2) a social cost of carbon (SCC) in place of the adopted GHG Adder in the ACC, and 3) air quality co-benefits. In adopting this test, the Commission stressed the importance of having a common resource valuation method so that these societal benefits could be applied with an even hand to all resource types, thus ensuring a least-cost pathway to meeting California's energy policy goals.¹⁷¹ As the Commission explained: it "will use the results of the evaluation to determine the final details of the three elements and how best to evolve cost-effectiveness tests toward the universal framework of the Common Resource Valuation Method."¹⁷² This work has not been completed. Application of SCT therefore would be premature.

Even worse, the solar parties deviate from Commission-approved SCT values in a flawed analysis. Consider the following:

- SEIA/VS's social cost of carbon analysis deviates from guidance in D.19-05-019 by not using Commission-approved SCC values used by the US EPA and developed as

¹⁷⁰ D.19-05-019, p. 29.

¹⁷¹ *Id.*, pp. 29-30.

¹⁷² *Id.*, p. 30.

part of the Interagency Working Group tasked with estimating these values for the federal government.¹⁷³

- SEIA/VS incorporates reduced out-of-state methane leakage as a societal benefit despite that the ACC already incorporates avoided methane leakage. After correcting several miscalculations in SEIA/VS analysis the benefit of reduced out of state methane leakage is negligible.¹⁷⁴
- SEIA/VS quantifies air quality benefits using a draft analysis from the IDER proceeding instead of the interim air quality adder adopted in D.19-050-19.¹⁷⁵

The Solar Parties' deviation from the Commission-approved SCT values underscores why use of an SCT is inappropriate at this juncture—a reliable cost-effectiveness analysis cannot be performed without firmly established underlying variables as will be established through the IRP proceeding.

Moreover, as SEIA/VS admit, many of these societal benefits can be achieved with any type of renewable generation, not just small-scale distributed generation. As stated in witness Beach's opening testimony: "From this perspective, 100% of distributed customer-sited renewables provide the same societal benefits as the same quantity of utility-scale-renewables."¹⁷⁶ But SEIA/VS's quantitative discussion fails to take such comparability into account. Any societal benefits of DG should be compared to other renewable generation options to determine whether there are incremental benefits of DG. This is the reason the Commission declined to adopt a SCT for use in demand-side proceedings, and instead ordered the study in the

¹⁷³ Ex. IOU-02 (Wray) 30:4-9.

¹⁷⁴ Moreover, as even SEIA/VS's counsel indicated, out-of-state methane leakage has nothing to do with NEM. T. 395:21-23 (July 28, 2021).

¹⁷⁵ See Ex. IOU-02 (Wray) 29:13-33:7 (critiquing SEIA/VS SCT analysis).

¹⁷⁶ Ex. SVS-03 (Beach) 23:13-14. See also Ex. SVS-03 (Beach) Attachment RTB-3, p. 1 ("These additional utility-scale renewable resources will provide significant societal benefits by displacing fossil generation, and so would the DERs that avoid them. Both types of renewable resources should be attributed with the same societal benefits that result from the reduction in natural gas-fired generation produced by either type of resource.").

IRP proceeding, which is the proper venue to perform an apples-to-apples analysis of different resource options.¹⁷⁷

5. The Joint Utilities’ Reform Tariff Scores on the PCT and RIM

E3’s Comparative Analysis is instructive because it illustrates how parties propose to address, or fail to address, cost inequities of NEM 2.0. As discussed elsewhere, we are focused on reducing cost burdens to non-participating and income-qualified customers, and on incentivizing storage paired systems, which can provide better alignment between grid and customer benefits. These principles are borne out in comparing cost-effectiveness results from the participant (represented by the PCT) and non-participant (represented by the RIM) results for each of these scenarios, shown in *Table III-12* below.

Table III-12 (Ex. IOU-01 (Wray) 96)

E3 Cost-Effectiveness Results for Joint Utility Proposal in 2023

Metric/Utility	PG&E		SDG&E		SCE	
	PCT	RIM	PCT	RIM	PCT	RIM
NEM 2.0 Non-CARE Res Solar	3.28	0.11	4.49	0.09	2.74	0.21
Proposed Non-CARE Res Solar	0.58	0.61	1.47	0.26	0.75	0.76
Proposed CARE Res Solar	0.93	0.38	1.60	0.24	0.89	0.64
Proposed Non-CARE Res Solar + Storage	0.85	0.58	1.62	0.39	1.20	0.68

The status quo NEM 2.0 tariff shows a large imbalance between the PCT (participant benefits) and the RIM (non-participant costs). Our proposal shows lower PCT scores for solar alone, but these are offset by higher RIM scores compared with NEM 2.0. Additionally, both CARE solar and Non-CARE solar + storage each score higher under the PCT than for the non-CARE solar alone. Our Reform Tariff proposal intentionally tries to drive these outcomes towards reducing cost shift, encouraging income-qualified participation in customer technology and incenting the growth of residential storage.

¹⁷⁷ See D.19-05-019, p. 32. (“A defining feature of integrated resource planning is the fair and unbiased consideration of both demand and supply side resources as potential solutions for meeting system or societal needs.”).

B. Ensuring the Proposals Comply with the Guiding Principles

Early on in this proceeding, the Commission adopted eight Guiding Principles to help focus and direct the Commission's analysis of the parties' proposals. Those principles are as follows:

- (a) A successor to the net energy metering tariff should comply with the statutory requirements of Public Utilities Code Section 2827.1;
- (b) A successor to the net energy metering tariff should ensure equity among customers;
- (c) A successor to the net energy metering tariff should enhance consumer protection measures for customer-generators providing net energy metering services;
- (d) A successor to the net energy metering tariff should fairly consider all technologies that meet the definition of renewable electrical generation facility in Public Utilities Code Section 2827.1;
- (e) A successor to the net energy metering tariff should be coordinated with the Commission and California's energy policies, including but not limited to, Senate Bill 100 (2018, DeLeon), the Integrated Resource Planning process, Title 24 Building Energy Efficiency Standards, and California Executive Order B-55-18;
- (f) A successor to the net energy metering tariff should be transparent and understandable to all customers and should be uniform, to the extent possible, across all utilities;
- (g) A successor to the net energy metering tariff should maximize the value of customer-sited renewable generation to all customers and to the electrical system; and
- (h) A successor to the net energy metering tariff should consider competitive neutrality amongst Load Serving Entities.¹⁷⁸

As discussed above, the PCT and RIM tests will inform the Commission's analysis to ensure compliance with the Guiding Principles. Proposals that eliminate or minimize the cost-shift, as opposed to allowing it to perpetuate, while still incentivizing adoption of customer-sited

¹⁷⁸ D.21-02-007, pp. 45-46, OP 1.

distributed generation will best meet the Guiding Principles. Ensuring compliance with the Guiding Principles therefore requires striking the balance of eliminating the cost shift to non-participating customers, while allowing the onsite renewable generating facility industry to continue to grow in a self-sustaining manner, and providing equitable benefits to lower-income customers. As discussed in detail in Sections IV and V.A. below, the Joint Utilities' proposed Reform Tariff best complies with the guidelines.

IV. ISSUE 4: WHAT PROGRAM ELEMENTS OR SPECIFIC FEATURES SHOULD THE COMMISSION INCLUDE IN A SUCCESSOR TO THE CURRENT NET ENERGY METERING TARIFF

The Joint Utilities recommend that the Commission adopt the Reform Tariff's specific program elements¹⁷⁹ because they achieve the statutory objectives (Guiding Principle (a)) and the Commission's other Guiding Principles. Specifically, the Commission should adopt (1) a cost-based default rate for residential NEM solar customers, (2) a value-based Export Compensation Rate (ECR) that is decoupled from the retail rate, (3) an instantaneous time-of-use (TOU) netting and monthly true up procedure, and (4) a grid benefits charge (GBC) for all NEM customers that is based upon the system size. For income qualified customers, the Joint Utilities' proposal includes: an Income Qualified Discount (IQD) to reduce the GBC; export compensation at the full (non-discounted) avoided cost; and our pilot STORE program that would cover the costs of behind-the-meter storage for qualifying customers. The Joint Utilities also propose requiring certain dynamic load management capabilities for both PV solar and energy storage systems that would (i) permit the customer to allow the utility to control the facility for purposes of curtailment and dispatch; and (2) protect against cyberattack. Each of these elements is detailed below and placed in context of the Guiding Principles that such elements support.

¹⁷⁹ Unless otherwise noted, the evidentiary support for the below sections is in Ex. IOU-01 at 98-162.

A. Cost-Based Default Residential and Commercial Rates for NEM Customers Support Guiding Principles (a), (b), (c), (e), (f), and (g)¹⁸⁰

The current NEM framework's cost shift, which all parties agree exists and only disagree with respect to degree, is caused by NEM customers' ability to bypass virtually all volumetric rates. The current NEM program's bypass of volumetric rates and resulting wealth transfer is misaligned with virtually all four of the Commission's core rate design principles: (1) cost of service, (2) affordable energy, (3) conservation, and (4) customer acceptance.

Ratepayer indifference is essential to bring the program into alignment with rate design principles, rectify the cost shift, provide subsidy transparency, and reflect accurate pricing so that cost drivers are directly connected with cost recovery. To that end, the Joint Utilities propose that new Reform Tariff customers be enrolled on rates with cost based, non-tiered TOU differentials and fixed charges. The proposed default resident rates for Reform Tariff customers are described in detail in the Joint Utilities' opening testimony.¹⁸¹ Multi-part rate designs are "intended to reflect the cost realities of an increasingly decarbonized bulk power grid that is composed largely of fixed costs and decreasing variable costs."¹⁸² Such designs, connecting cost drivers with cost recovery, are more important than ever as California moves towards its decarbonization goals.

The Joint Utilities' testimony demonstrates that their respective proposed default rates for NEM customers¹⁸³ will not only ensure that participating customers take service on a rate that is closer to their cost of service, thereby lowering the cost shift to non-participants, but also encourage electrification through lower volumetric rates. This default rate design structure, which better reflects the cost to serve NEM customers, is one step on the path toward realizing the state's electrification goals, and will help the Commission satisfy AB 327's policy mandates.

¹⁸⁰ Unless otherwise noted, the evidence supporting this section is in Ex. IOU-01 (Morien) 106-108.

¹⁸¹ Ex. IOU-01 at 110-123.

¹⁸² Ex. IOU-01 (Morien) 106, fn. 175 (citing CPUC "*Alternative Ratemaking Mechanisms for Distributed Energy Resources in California*," (Jan. 28, 2021) at p. 33.)

¹⁸³ See Ex. IOU-01 at 110-122 for the IOU-specific default rate components.

B. A Value/Benefits-Based ECR Divorced from Retail Rates Achieves Guiding Principles (a), (b), (d), (e), (f), and (g) Because Retail Rates Far Exceed the Value of Exports from NEM-Eligible Renewable Generating Facilities¹⁸⁴

As noted in the legal framework section, neither federal law nor AB 327 require the Commission to continue to compensate NEM customers for exports at the retail rate, which bears zero resemblance to, and in fact far exceeds, the value of the energy NEM customers export. The Joint Utilities propose that the Commission compensate NEM customers for exports at avoided cost using the value established by the most current version of the Avoided Cost Calculator (ACC), with time-of-export (TOE) periods that match the TOU periods of the underlying tariff. This proposed ECR ensures that NEM customers are paid the fair rate for the time of day at which they export and is technology neutral.¹⁸⁵ To avoid overcompensation because the ACC does not fully consider marginal costs or rate design methodologies, after calculating the ECR, the rate will be capped not to exceed the IOUs' volumetric retail commodity rate in each TOE period. Currently, CARE customers receive lower export compensation because they pay a lower retail rate. The Joint Utilities' Reform Tariff proposal rectifies this imbalance by using the same ECR for non-CARE and CARE customers.

As discussed in subsections (1) and (2) below, compensating exports at a cost commensurate with their actual value will benefit all customers, the state, and the grid and ensure that non-participating customers are not charged unjust and unreasonable rates for generation exported to the grid. The approach of compensating exports according to their actual value is neither novel nor untested. To the contrary, it is common among jurisdictions that have replaced net metering, including several California municipal utilities, two small multi-jurisdictional utilities subject to CPUC regulation, as well as in Nevada, where the solar industry has continued to thrive.¹⁸⁶

¹⁸⁴ Unless otherwise noted, the evidentiary support for the below sections is in Ex. IOU-01 (Kerrigan) 123-130.

¹⁸⁵ The Joint Utilities propose to annually update the ECR with the current version of the ACC by Tier 1 Advice Letter.

¹⁸⁶ Ex. IOU-01 (Kerrigan) 123:7-124:1.

Finally, numerous parties, including TURN, NRDC, the Public Advocates Office (Cal Advocates), Sierra Club, and CCSA, support using the most current version of the ACC to calculate the appropriate compensation for NEM customer exports.¹⁸⁷ Even parties representing the solar industry, including CALSSA and SEIA/VS, propose a gradual decline in export compensation. The solar parties admit that reducing export compensation will incentivize paired storage,¹⁸⁸ which provides greater value to the grid in furtherance of the state’s environmental policy goals.¹⁸⁹

1. It is Undisputed that Reducing Export Compensation to a Value-Based Rate Will Incentivize Paired Storage, Providing Benefits to All Customers and the Grid¹⁹⁰

It is undisputed that reducing export compensation will naturally and necessarily incentivize NEM customers to install paired storage and that incentivizing paired storage is a valuable policy the Commission should pursue.¹⁹¹ Paired storage provides a private benefit to the customer who owns the system, and can provide grid benefits when coupled with the right price signals, and particularly if the storage is dispatchable. For example, paired storage can help manage the problems created by overgeneration (since behind-the-meter solar cannot be curtailed), in that such excess energy can be stored—instead of going to waste—to meet load at

¹⁸⁷ Ex. TRN-01 (Chait) 45:12-17; Ex. NRDC-01 (Chhabra) 15:10-11; Ex. SLC-01 (Vespa) 3:20-4:5; Ex. CCS-01 (Smithwood) 29:20-21; Ex. PAO-01 (Gutierrez et al.) 2-20:9-17.

¹⁸⁸ Ex. IOU-02 Appendix B on page B-16, SEIA/VS Witness Beach Response to Data Request Question 9 (stating that “the proposed gradual decline in the export rate, which encourages the use of storage to increase on-site use of the solar output.”); Ex. CSA-02 (Heavner/Plaisted) 2:10-12, (stating that “all proposals that reduce export compensation encourage energy storage.”)

¹⁸⁹ Ex. SVS-04 (Beach) at p. ii (rebuttal testimony stating, “These paired solar-storage systems also provide much greater value to the grid than solar alone, including much-needed new capacity to meet summer peak demands.”)

¹⁹⁰ Unless otherwise noted, the evidentiary support for the below sections is in Ex. IOU-01 (Kerrigan) 126-127.

¹⁹¹ See, e.g., Ex. IOU-02 Appendix B at B-16, SEIA/VS Witness Beach Response to Data Request Question 9 (identifying “the proposed gradual decline in the export rate, which encourages the use of storage to increase on-site use of the solar output” as one element that would encourage storage adoption); Ex. CSA-02 (Heavner/Plaisted) 2:10-12, (stating that “all proposals that reduce export compensation encourage energy storage.”)

its peak later in the day.¹⁹² Today, we rely upon fossil fuels, like gas fired generation, to integrate renewables. Paired storage will reduce our dependency upon those carbon emitting resources.

NEM customers will also realize private benefits from their onsite storage. Storage allows the customer to use energy generated by their panels during low-value midday hours later in the day when the sun is not shining and energy prices are at their highest, shortening the system payback period. That benefit, however, is realized only when the NEM program can send the right price signals, which is precisely what the Joint Utility proposal will do. In this regard, the Joint Utility ECR proposal presents a “win-win” for the state, its policy goals, the customer-generator, and the grid.

2. Reducing Export Compensation to a Value-Based Rate Will Not Hinder the Renewable Customer-Sited Generation Industry’s Ability to Grow in a Sustainable Manner

Reducing export compensation in the manner proposed by the Joint Utilities will not hinder the ability of the customer-sited renewable generating industry to continue to grow in a self-sustaining manner. As SEIA/VS witness Gallagher conceded at hearings, the export compensation rate Nevada provides to its NEM customers is between six and seven cents and the retail rate is between nine and eleven cents, and the solar market is continuing to grow and sustain itself in that state.¹⁹³ Thus, there is substantial evidence to conclude the Joint Utilities proposed ECR will produce the same outcome for the industry, while rectifying the cost shift as required by AB 327. Moreover, as discussed above, the Joint Utilities’ proposed ECR will send price signals that will incentivize paired storage, opening new opportunities in the market, and reducing payback time under the Joint Utilities’ proposal by four to six years, depending upon the utility.

¹⁹² Ex. IOU-02 (Morien) 103:13-104:6.

¹⁹³ Gallagher, T. 1462:3-1464:20 (Aug. 5, 2021).

The Title 24 mandate that all new single-family homes and multifamily dwellings up to three stories high must include solar power,¹⁹⁴ will also support the continued growth of the solar industry. In addition, Title 24 will support the paired solar industry due to a unanimous vote of the California Energy Commission (CEC) on August 11, 2021 to update the Title 24 mandate in 2022 to require solar with paired storage for all new commercial buildings, such as hotels, grocery stores, theaters, restaurants, medical buildings, grocery stores, auditoriums and convention centers, as well as high rise residential buildings.¹⁹⁵ Pursuant to Commission Rule 13.10, the Commission can take official notice of that vote, as well as the fact that the proposal will be taken up by the Building Standards Commission in December. The Building Standards Commission, consistent with past practice, is likely to adopt this CEC proposal.

These mandates support the solar and paired storage industry such that it is neither necessary nor reasonable to perpetuate the massive wealth transfer to ensure self-sustaining growth of customer-sited renewables.

C. TOU Netting and Monthly True Up Will Provide Accurate Price Signals and Support the State's GHG Reduction Goals in Furtherance of Guiding Principles (a), (b), (c), (d), (e), (f), and (g))¹⁹⁶

¹⁹⁴ Pursuant to Commission Rule 13.10, the Commission can take official notice that as of January 1, 2020, California's Building Energy Efficiency Standards, Title 24, Part 6, of the California Code of Regulations governing California Building Standards, requires that all new residential buildings three stories and under that are built in the state to have solar panels.

¹⁹⁵ See the CEC's Summary of the Proposed Update for the 2022 Energy Code, available at, https://www.energy.ca.gov/sites/default/files/2021-08/CEC_2022_EnergyCodeUpdateSummary_ADA.pdf, see also CEC Press Release Announcing Its Adoption of the 2022 Building Energy Efficiency Standards (Energy Code) for 2022, including the paired storage mandate, available at <https://www.energy.ca.gov/news/2021-08/energy-commission-adopts-updated-building-standards-improve-efficiency-reduce-0> (stating that it is expanding solar photovoltaic (PV) system and battery storage standards to make clean energy available onsite and complement the state's progress toward a 100 percent clean electricity grid.)

¹⁹⁶ Unless otherwise noted, the evidentiary support for this section is in Ex. IOU-01 (Morien) 131-135.

1. The Joint Utilities' Reform Tariff Net Billing Structure Will Achieve AB 327's Mandates and the Support the State's GHG-Reduction Goals

The Joint Utilities' proposed billing structure more closely resembles the NEM program contemplated under federal law. The proposed structure: (1) allows customers to install systems to primarily offset their historical annual onsite load, (2) collects the full retail rate for all energy the utility delivers to a NEM customer on meter Channel 1/Channel A, and (3) pays NEM customers the ECR for exports to the grid on Channel 2/Channel B, but only up to the amount the customer imports. As noted above, the Joint Utilities' proposal is that the TOE periods match the TOU periods of the underlying tariff so that NEM customers are paid the fair rate for the time of day at which they export. As a result, export compensation during a TOU/TOE period will only offset grid consumption during the same TOU/TOE period.

Exports exceeding the kWh imported within a TOU period will be compensated at the net surplus compensation (NSC) rate, which is already a cost-based rate. Value from NSC can be carried forward from prior billing cycles. The dollar value of those credits would be carried over for up to one year (*i.e.*, interconnection anniversary) to avoid the issuance of monthly customer refunds. Customers will be trued-up monthly, as opposed to annually, which is consistent with the federal law approach to using the monthly billing period to determine the amount of net exports that should be compensated at the avoided cost rate so that NEM customers receive appropriate price signals and remain net consumers, as opposed to net sellers/exporters.

The current NEM structure, by contrast, creates unintended consequences that undermine California's GHG goals. For instance, current NEM customers' billing arrangement allows the NEM customers on a TOU rate to use credit from energy generated during the day (typically an off-peak or mid-peak time period) to offset the bill for consumption in the high-cost evening hours, when the sun is not shining and solar customers are not generating energy. The same is true of credits carried over from less costly months to more costly months. For example, customers who over-generate and are net exporters in March and April, when generation costs are relatively low, are able to carry those credits forward and offset consumption in August and

September, when the cost of energy is high. Thus, the current billing arrangement that allows banking of credits generated during the day to offset nettable charges from consumption at a later date, creates a mismatch in value. Allowing this policy to continue, will disincentivize customers from shifting load out of the on-peak period. It also requires non-participating customers to pay more for energy exports than they are worth, creating consumer protection and equity problems.¹⁹⁷ Moreover, any unjust or unreasonable charge demanded or received for a product or commodity is unlawful.¹⁹⁸

California has important and ambitious GHG reduction goals. If they are to be realized, the Commission must think about the value of customer-sited renewable generating facilities temporally and must appropriately value the exports from systems that do not have paired storage. The data provided in Ex. IOU-01 proves that during the day, when there is already excess solar generation on the grid, incremental BTM solar exports do not add meaningful value, as compared to exports during the peak evening hours. However, the utilities are forced to curtail utility scale solar because BTM solar cannot be curtailed. As a result, NEM customers are using the grid as their free battery, overgeneration from other renewable sources is wasted, and the energy NEM customers use during the peak afternoon and evening hours is less clean. This framework does not further the state's goals. Rather, this framework frustrates them.

By contrast, TOU netting prevents using export compensation credits from one TOU period to offset consumption from the grid during a different TOU period. This benefits the grid because customers will be incentivized to offset consumption in the evening by installing paired storage. TOU netting may also incentivize customers to load shift or engage in Demand Response activity by encouraging conservation during periods of high demand because they have no carry over credits to minimize their bill. Further, the solar industry has supported this TOU

¹⁹⁷ See also, Cal. Pub. Util. Code §451 (“All charges demanded or received by any public utility, or by any two or more public utilities, for any product or commodity furnished or to be furnished or any service rendered or to be rendered shall be just and reasonable. Every unjust or unreasonable charge demanded or received for such product or commodity or service is unlawful.”)

¹⁹⁸ *Id.*

netting policy in the Duke South Carolina settlement, indicating there should be little issue to implementing it here.¹⁹⁹

2. The Joint Utilities' Reform Tariff Net Billing Structure Promotes Consumer Protection²⁰⁰

In addition to satisfying the AB 327 mandates and promoting the state's GHG reduction policies, the Joint Utilities' netting structure promotes consumer protection. These consumer protection aspects of the Joint Utilities' Reform Tariff are detailed in Section V.E.3. below.

D. The Grid Benefits Charge Is in Furtherance of Guiding Principles (a), (b), (c), (d), (e), (f) and (g)²⁰¹

Many parties, including the Joint Utilities, TURN, NRDC, and Cal Advocates, agree that a GBC is essential to prevent NEM customers' avoidance of volumetric rates, one of the primary cause of the cost shift.²⁰² Even parties representing the solar industry have made statements indicating that a GBC is a preferred cost shift mitigation mechanism.²⁰³ Finally, as discussed in

¹⁹⁹ Ex. IOU-02 (Tierney) 43:3-13.

²⁰⁰ Ex. IOU-01 (Morien) at 130:15-135:9, see also Ex. IOU-02 (Morien) 55:16-56:17.

²⁰¹ Unless otherwise stated, the evidence supporting this section is in Ex. IOU-01 (Morien) at 135-148.

²⁰² Ex. PAO-01 at 3-23:16-20 ("As demonstrated in the prior section, setting the ECR at avoided costs only reduces the successor tariff's cost burden relative to the current NEM structure by 36.9%. This is because changing the ECR only addresses the cost burden generated by net exports. Consequently, there are still significantly large cost burdens remaining even with net billing. In fact, even with net billing, NEM customers are underpaying the costs they impose on the system."); Ex. NRD-01 (Chhabra) 18:3-7 (supporting Cal Advocates' GBC and stating, "Because electric rates recoup all costs of service through volumetric rates, and the costs to generate electricity are a small fraction of total rates, NEM customers will not pay their share of the cost of service if they avoid all bill payments on self-consumption of distributed generation. A grid benefit charge (GBC) will ensure that NEM customers pay their share of the cost of service."); TRN-02 (Chait) 13 (proposing its NUS and explaining "This charge is designed to recover the amount of non-generation costs that would be paid by the participating customer but for the operation of the BTM resource. Unless these costs are collected through a separate charge, the unrecovered amounts would be shifted to all customers including non-participants.").

²⁰³ Ex. IOU-02 (Kerrigan) 67:6-14 (citing R.14-07-002 Hearing Transcript, Vol. 3, pp. 498-499 during which Mr. Beach testified that a grid charge is the "least objectionable" of the reform mechanisms.).

Ex. IOU-02, several jurisdictions have adopted GBCs as part of their NEM program reform efforts.²⁰⁴

Under the federal legal framework discussed above, the appropriate offset should only be for the generation (bundled competitive generation and RPS compliance) component of the bill. When NEM customers avoid paying volumetric rates, they not only avoid paying the generation component of the bill, but also avoid paying all other aspects of the bill, such as grid services (transmission, distribution, and cost allocation mechanism), policy mandates (CARE, program subsidies for energy efficiency programs, public purpose programs, the Wildfire Fund, Nuclear Decommissioning, etc.), and the costs of utility-provided customer services. As a consequence, non-participating customers pay all of these costs on their own behalf, as well as on behalf of NEM customers.

The GBC paired with the ECR and the TOU netting procedure will ensure that the utility will collect those costs, net of avoided costs established by the current ACC, so that they are not absorbed by other customers. This charge will also incentivize customers to install paired storage, which will maximize the value of their systems by achieving maximum bill savings and other private benefits.

Fixed cost recovery through the GBC will be especially important as solar paired with storage becomes more prevalent. In particular, solar paired storage customers will likely be able to reduce imports and at the same time export little generation such that reducing export compensation rates does little to reduce the cost shift for such customers.²⁰⁵ Accordingly, all the components of the Joint Utilities' Reform Tariff are necessary to work together to achieve AB 327's policy mandates regardless of whether the system is solar only or paired with storage. If the Commission does not adopt all the proposed Reform Tariff components as a package, it is likely to find itself again revisiting these same issues as upward rate pressure increases.

²⁰⁴ Ex. IOU-02 (Tierney) 66:6-67:5.

²⁰⁵ Ex. IOU-01 (Morien) 100:4-16.

A GBC is appropriate and necessary given that the evidence shows that NEM customers, like all customers, rely on the utility transmission and distribution grid nearly every hour of every day. As a practical matter, and as TURN and other reform parties agree,²⁰⁶ BTM solar, absent paired storage, does not decrease the need for the distribution or transmission system and resiliency, reliability, and safety upgrades to that infrastructure. The utility must also continue to pay generation legacy costs, as well as procure new generation to instantly meet NEM customer demand should their systems be, for whatever reason, unavailable to serve all or part of their load. Thus, it is reasonable to recover generation costs through the GBC even though NEM customers generate some power to serve some of their load some of the time.

In fact, the Commission assesses standby and departing load charges for analogous customer groups. It is reasonable for the Commission to assess a similar charge here to achieve the ratepayer indifference principles set forth in AB 327. The Joint Utilities also contend that the proposed components and design are reasonable to impose now, even though they are likely to need some refinement over time in the utilities' General Rate Cases (GRCs) to ensure that ratepayer indifference principles are realized.

E. Dynamic Load Management Capabilities Advance Guiding Principles (a), (b), (c), (d), (e), (f), and (g)²⁰⁷

To maximize the benefits of the new tariff, the Commission should require that NEM customers' facilities are equipped with dynamic load management capabilities and cybersecurity configurations. Such measures serve two functions: (1) to allow the customer to permit the utility to control the facility for purposes of curtailment and dispatch; and (2) to protect against cyberattack.

No party has produced evidence contesting the substantive benefits of such capabilities, that the capabilities exist and can be implemented, or that they are essential to ensure that the

²⁰⁶ Ex. NRD-02 (Chhabra) 20-26; TRN-02 (Chait) 16; TRN-03 (Chait) 50:16-21; PAO-02 (Rounds) 3-9:12 - 3-10:14.

²⁰⁷ Unless otherwise noted, the evidence supporting this section is in Ex. IOU-01 (Smith) at 160-162.

facilities provide real and meaningful benefits to the system in furtherance of safety, reliability, resiliency, and the state's energy and environmental policy goals. Rather, the only challenge has been based upon an incorrect procedural argument that the issue is being considered elsewhere.²⁰⁸ The Commission should reject that unsupported argument because the proceeding in which such matters are in scope is only considering theoretical capabilities. Here, the Joint Utilities are requesting Commission approval to require specific operations as part of the NEM program. It is obvious that this is the appropriate proceeding for the Commission to make decisions about what specific tariff requirements should be imposed on NEM customers and their facilities.

To that end, the Joint Utilities propose that the Reform Tariff require all new NEM customers facilities, as well as any inverter replacements and upgrades to existing facilities, to be compliant with the IEEE 2030.5 networking standard in the manner described in the Common Smart Inverter Profile (CSIP), in accordance with Rule 21, which enables utility management of the end user energy environment, including demand response, load control, time of day pricing, management of distributed generation, electric vehicles, and other functions. To ensure customer-sited NEM resources have the potential to provide grid support and be able to respond to grid needs nimbly and effectively, they must have certain communications capabilities. It is necessary for systems to have plug-and-play, interoperable communications that support the management and dispatch of the unit in accordance with a schedule so the utility can manage the customer-sited resources at scale across multiple vendors. Rule 21 should require that the communication systems pass a utility test for compliance and functionality. Requiring uniformity for those communication capabilities for all devices increases the likelihood that the utility can effectively coordinate and control these devices so their capabilities and value are fully realized in furtherance of the system and the state's policy goals.

²⁰⁸ Ex. CSA-01 (Heavner/Plaisted) 77:1-7.

Unmanaged and unsecure DER connected to the grid represents a major threat vector to the future grid. Attacks on key inverters could result in the grid shutting down. For example, SDG&E will soon have over 1.5 GW of distributed nameplate capacity within its service territory. A coordinated attack that trips these systems offline would most likely crash the grid and lead to widespread outages. Worse, injecting destructive commands into these devices could cause persistent energy shortfalls for months or years, as increasing dependence is placed on these resources.

Neither the utility nor non-participating customers should bear the costs of remediating operational deficiencies of NEM customers' systems. Instead, consistent with supply-side resources, distributed generation facilities should be responsible for maintaining their own systems and ensuring that they function properly and provide benefits to the system and the environment including cybersecurity. The default IEEE 2030.5/CSIP requires the generator/seller to absorb the cost of the information sharing at no additional cost to utilities and their customers. The same standard should be applied to all new NEM customers and existing NEM customers when they upgrade or repair their systems.

F. Low-Income Considerations: The Commission Should Adopt the Joint Utilities' Reform Tariff in Furtherance of Guiding Principle (a).

Guiding Principle (a) calls for ensuring equity among customers.²⁰⁹ The Joint Utility proposal does just that; better, we believe, than any other proposal in this proceeding. Our proposal addresses about both equity problems lower-income customers face. First is the tremendous wealth transfer currently taking place from less-advantaged customers to wealthier customers. Second is the "adoption gap, reflecting the slower rate by which lower income customer are installing rooftop solar and storage.

1. The Joint Utility Proposal Prioritizes Ending the Wealth Transfer

Many participants in this matter -- particularly those aligned with the solar industry -- focus on the latter objective (the adoption rate), without meaningfully addressing the wealth

²⁰⁹ D.21-02-007.

transfer. This skewed focus coincides with such parties' economic interests. But to ignore the wealth transfer continues the substantial harm that is impacting lower income communities under the current NEM design.²¹⁰ So long as rooftop solar fails to be cost effective from a TRC perspective, let alone RIM, any progress on the latter objective simply further undermines the more important goal of equity between non-participants.

To do the greatest good for lower-income customers, the Joint Utility proposal focuses first and foremost on ending the cost-shift. Absent meaningful progress on this objective, nothing else in this proceeding done in the name of equity will matter. Providing this realignment -- where participating customers carry their own costs -- will enable a stronger lower-income community that will be better positioned to participate in a reformed tariff. As Witness Wright explained:

[I]f we look at the entirety of the [Joint Utilities'] proposal, it is first to eliminate a cost shift, and that cost shift today is impacting many low-income customers that are nonparticipating NEM customers. It's increasing the bill for those customers.

And then in our proposal is a tariff that would work well with existing low-income programs such as the DAC-SASH, the Disadvantaged Community-SASH program, the Disadvantaged Communities-Green Tariff program, the Disadvantaged Communities-Community Solar Program. That tariff works well with those existing programs to help low-income customers.

In addition to that, the Joint Utilities are proposing a program, the Savings Through Ongoing Renewable Energy, or STORE, program, which would provide

²¹⁰

The costs that customers without solar absorb to subsidize customers with solar is now \$3.4 billion per year and growing. Without reform, that number climbs to \$10.7 billion annually by 2030. For individual customers, this cost shift amounts to a current bill increase of approximately \$245 per year for non-participating customers in SDG&E's territory, where rooftop solar penetration is the highest (this cost becomes \$555 annually by 2030). Ex. IOU-01 (Peterman) 2:16-20. For CARE customers in SDG&E's service territory, the annual cost shift is \$150, annually. *Id.*, (Kerrigan) 73, Table III-9. The current NEM cost shift is now over 2.4 times the amount of the annual electric CARE subsidy provided to income-qualified customers. In SDG&E's service territory, the NEM cost shift is now nearly 5 times the amount of the annual electric CARE subsidy to customers. Even worse, while the NEM cost shift is multiples above the CARE subsidy, the number of customers in need of assistance through the CARE program is significantly higher than the number of NEM customers. *Id.*, (Peterman) 3:4-9.

batteries to a subset of those customers so in its entirety, the combination of those would help with that gap.²¹¹

2. The Joint Utility Proposal Will Narrow the Adoption Gap

With respect to the aspects of the Joint Utilities' proposal specific to lower-income customers, the Joint Utilities have taken care to make it as accessible as possible to lower-income customers and to narrow the adoption gap through two main elements of the proposal. These are the transitional discounts provided to income qualified customers and our STORE program. Each is discussed below.

a. Transitional Discounts

The Joint Utilities propose a transitional tariff discount for CARE/FERA-enrolled customers, called the Income Qualified Discount or IQD.²¹² The IQD provides a discount on the Grid Benefits Charge (GBC) and guarantees that income qualified customers will pay only a nominal amount toward the costs underlying the GBC. The IQD would be applied in conjunction with programs for which a customer might qualify, including the California Alternate Rates for Energy (CARE), Family Electric Rate Assistance (FERA) and Medical Baseline programs, and would operate alongside any existing applicable solar incentive programs such as DAC SASH. The Joint Utilities propose the GBC for customers receiving the IQD be reduced to \$1.50 per kW-AC for qualifying customers. This would be a nearly 90% discount to the GBC illustrated for SDG&E.

(1) Transitional Period and Eligibility

The IQD would be available to CARE and FERA-enrolled customers who receive permission to operate (PTO) within the first three years from the date of implementation of the successor tariff. One year prior to the expiration of the IQD, we propose that the Commission hold a workshop to examine the success of the Reform Tariff programs in providing access to solar for income qualified customers. The workshop should assess adoption among qualifying

²¹¹ Wright, T. 1891:7 to 1891:28 (Aug. 9, 2021).

²¹² Ex. IOU-01 (Wright) 169:1 *et seq.*

customers before and after tariff reform, prices of solar to determine whether continuing the subsidy is necessary, and cost shift of the program.

Based on this and other relevant information, the Commission could then determine whether to extend the IQD or propose adjustments. If no action is taken by the Commission three years after the successor tariff is implemented, we propose the IQD would expire for all new successor tariff income qualifying customers. Income qualified customers who took service on the successor tariff with the IQD and remain eligible for the discount would continue to receive the discounted GBC rate for a period equal to their forecasted simple payback period for each utility. For example, if PG&E customers have a forecasted payback period of 10 years, then customers would be entitled to the IQD for 10 years from their PTO date.

(2) Funding and Cost Recovery

Using the total eligible population for the IQD, the Joint Utilities estimate a total subsidy of \$376 million for all three utilities over the discount period. We propose that these costs be recovered from all customers. The determination of cost allocation and recovery will be determined in each utility's General Rate Case (GRC) Phase 2 proceeding to evaluate the unique rate design priorities and rate level pressures faced by each utility. Cost recovery for the IQD is discussed further in Section V.E.4.a. of this brief.

b. The STORE Program

The Joint Utilities' STORE program is described at length in opening testimony.²¹³ The STORE program, which stands for Savings Through Ongoing Renewable Energy, is a behind-the-meter storage incentive for income qualified customers, meaning those on CARE/FERA.

The STORE program would purchase batteries for income qualified customers, resulting in a significant reduction in payback for their system, as well as grid benefits through limited utility dispatch. With respect to reduced payback, we estimate that payback periods for customers participating in the STORE program would be reduced by four to six years, depending

²¹³ Ex. IOU-01 (Wright) 170:10 *et seq.*

on the utility.²¹⁴ This would bring payback in the range of seven to eight years for these customers.²¹⁵ With respect to utility dispatch, the STORE program features limited utility dispatch of the storage device, which is intended to promote the transition to a cleaner grid while creating a net benefit for all ratepayers and participants.²¹⁶

The STORE program aims to achieve three key goals: 1) offer income qualified customers the opportunity for long-term energy bill savings; 2) engage income qualified communities early in the adoption curve of behind-the-meter storage technologies; and 3) create grid benefits for all customers through utility dispatch during crucial times.²¹⁷

(1) Program Design

The STORE pilot program would provide a battery for eligible customers through either: (i) contracting with an installer/manufacture to purchase a large quantity of batteries at a discount potentially through a competitive process; or (ii) providing a direct subsidy to customers or the installers working with those customers similar to the existing Self-Generation Incentive Program (SGIP).²¹⁸ The route for deployment would be selected by each utility, and could involve a Request for Proposals for others to participate in or manage the process.²¹⁹

In development of details for the program design, the Joint Utilities propose to work with stakeholders through CPUC workshops. As part of these workshops, the participants would advise on the principles for the utility-dispatch program. A key principle for this program would be to ensure that customers who received a storage system through the STORE program realize material bill savings from the storage system.

Another aspect to address through the workshops is prioritization of customers. For example, the stakeholder process might identify a priority and eligibility qualification for

²¹⁴ Ex. IOU-01 (Wright) 172, Table V-38.

²¹⁵ Ex. IOU-01 (Wright) 172, Table V-38.

²¹⁶ Ex. IOU-01 (Wright) 172:10-11.

²¹⁷ Ex. IOU-01 (Wright) 173:19-22.

²¹⁸ Ex. IOU-01 (Wright) 173:23-174:4.

²¹⁹ Ex. IOU-01 (Wright) 177:1-6.

Medical Baseline and Life Support Customers in High Fire Threat Districts and High Fire Risk Areas (HFTD/HFRA). Another example of prioritization may be for tribal communities in high fire threat areas, also an area of alignment with the CPUC’s ESJ goals.²²⁰

(2) Funding and Cost Recovery

The STORE program will be funded with cost shift savings realized by the reform of the NEM program. For the first three years after the Reform Tariff is in place, ten percent of the cost shift savings that exist because of transitioning new customers to the successor tariff would be allocated to a fund earmarked for STORE. With this funding approach, the Joint Utilities calculate the levels of funding and customers served shown in the table below.²²¹

STORE Program: Estimated Costs and Benefiting Customers

Year	Total Benefiting Customers	Annual STORE Budget (millions)
2023	3,582	\$47
2024	8,452	110
2025	13,323	173
Total	25,357	330

While program funds would be collected over a period of three years, funds collected but not spent in those first years could be spent up to six years after the implementation of the successor tariff. We propose that the CPUC review program spending a year before the end of the program to consider changes to the program if funding is underspent (e.g., increase the portion of funding for electrical upgrades, targeting new construction, reallocation to low-income electrification efforts, etc.). Cost recovery for the STORE program is discussed further in Section V.E.4.b. of this brief.

3. Some Parties’ Low-Income Approaches are Without Merit

a. Grid Alternatives, Vote Solar and Sierra Club

As the Joint Utilities explained in rebuttal testimony, there are several flaws in the Grid/Vote Solar/Sierra Club proposal (hereafter “Grid” proposal), which proposes to set export

²²⁰ Ex. IOU-01 (Wright) 173:10-174:14.

²²¹ Ex. IOU-01 (Wright) 178, Table V-40.

compensation at a time-varying rate equal to the current default TOU rate offered by the utility in 2021 for customers with incomes at or below 80% of area median income (AMI).²²²

First, export compensation should not be set at the 2021 TOU retail rate. NEM customers receive export compensation that is 8 times the value that the utilities could procure the same power in the market. Thus, the Grid proposal would vastly overcompensate for generation, creating a significant cost shift for non-participants, including, of course, other low-income customers.²²³

Another flaw is that the Grid proposal would lock in not only the 2021 rates but the TOU periods as well. This would likely result in mismatches between some customers' underlying rates and the export compensation rates. The idea of freezing TOU periods is a dangerous policy. It would also be confusing for customers.²²⁴

The Joint Utilities also oppose the Grid proposal to increase eligibility for receiving their proposed low-income discount to anyone at or below 80 percent AMI.²²⁵ The record in this proceeding is insufficient to establish a qualification level at anything other than CARE/FERA. Adopting a different definition of income qualified for NEM but not for rates generally would create customer confusion. Furthermore, whereas the CARE/FERA eligibility requirements are standardized across a given utility's service area, different requirements based on local median income to establish eligibility for NEM income qualified treatment could likewise be confusing for customers. A customer could be in a situation where they may qualify for the special NEM Tariff treatment and not for CARE, or vice versa, and have to navigate understanding the differences in eligibility requirements to understand their billing. As explained by Joint Utility Witness Wright to ALJ Hymes:

²²² Ex. IOU-02 (Wright) 104:10 *et seq.*

²²³ Ex. IOU-02 (Wright) 104:21-105:3.

²²⁴ Ex. IOU-02 (Wright) 105:8-11.

²²⁵ Ex. IOU-02 (Wright) 105:12-21.

The CARE/FERA is an established program within the utilities, which is tracked by the utilities.... [W]e conduct post-enrollment verifications for CARE and FERA.

It is also something that once the customers are on CARE and FERA,...we know who the customers are. We're able to market to those customers and provide them to a greater range of services.

Some of the concerns we had about using area median income was that we didn't have as much research on whether that was whether that approach was right and what percentage. So should it be 60 percent? Should it be 80 percent?

And then also if there was some type of qualification like area median income that was different from CARE/FERA. CARE/FERA is something that customers understand today and the utilities have worked to make sure that it's transparent and something they understand as a discount on their bill.

We wanted to steer clear from another type of eligibility that may be different that could cause confusion. So for instance a customer could be on area median income with NEM, but they would also be on CARE/FERA. And perhaps they may end up qualifying for the area median income but not CARE/FERA. And it could cause greater confusion for customers.

So the Joint Utilities have felt that by staying this course of CARE/FERA eligibility, it will help the customers in the long-run. And help with the understandability and transparency of the program.²²⁶

Grid also proposed that solar installations located in disadvantaged communities that are owned by a non-profit, a cooperative corporation, or state/local government retain NEM 2.0, called "Policy B."²²⁷ The written proposal is nearly identical to CALSSA's proposal (discussed in the next section), with the additional requirement that eligible projects be located in a disadvantaged community. All the problems with CALSSA's proposal apply equally to the Grid "Policy B."

Further, Grid witness Campbell contradicted Grid's written proposal under cross examination. Contrary to Grid's written testimony (requiring solar installations qualifying for Policy B to be located in ESJ communities), witness Campbell claimed in cross examination that

²²⁶ Wright), T. 1909:22 to 1911:4 (Aug. 9, 2021).

²²⁷ Ex. GRD-01 (Campbell) 21:8-17.

Grid’s proposal was to allow any project *anywhere* in the utilities’ service territory to retain NEM 2.0, so long as the member-owners of the non-profit or cooperative that owned the project were members of an environmental justice community.²²⁸ As evident in the confusion and flaws in Grid’s own presentation, there is no basis for its adoption.

b. California Solar and Storage Association (CALSSA)

CALSSA proposes various exceptions to its NEM revisions; all of which should be rejected. CALSSA proposes to maintain NEM 2.0 for low-income customers in single family homes and apartment buildings in low- and moderate-income census tracts; and properties eligible for the MASH and SOMAH programs. CALSSA also proposes that credits for exports for CARE and FERA NEM customers be set at the undiscounted retail rate.²²⁹ This suite of proposals shares common elements with the Grid proposal described above including (i) compensation that exceeds both its value to the grid and compensation for the same generation from non-income qualified NEM facilities and (ii) expansion of eligibility beyond the CPUC’s existing low-income designations. Thus, the CALSSA proposal is flawed for the same reasons described above for the Grid proposal.

CALSSA also proposes that projects “owned by the community” be allowed to retain NEM 2.0. Specifically, any system “owned by a California cooperative corporation, as defined by the California Corporations Code, a nonprofit organization, or certain public entities: the state, a county, a city, or a California community college district” would retain current NEM 2.0 rules.²³⁰ While this is purported to provide additional opportunities for low income customers, the proposal has nothing in it to ensure that this program benefits low income customers. Rather, this proposal is likely to create unintended incentives for ownership of solar installations to be held by entities still eligible for NEM 2.0 rules. For example, it seems possible that a home-

²²⁸ Campbell, T. 1016:3-1017:22 and 1024:26-1025:3 (Aug. 2, 2021).

²²⁹ Ex. CSA-01 (Heavner/Plaisted), 22:12-23:14.

²³⁰ Ex. CSA-01 (Heavner/Plaisted), 27:21-28:5.

owners association, which are often established as non-profits, would be an eligible organization under CALSSA's proposal.²³¹

V. ISSUE 5: WHICH OF THE ANALYZED PROPOSALS SHOULD THE COMMISSION ADOPT AS A SUCCESSOR TO THE CURRENT NET ENERGY METERING TARIFF AND WHY? WHAT SHOULD THE TIMELINE BE FOR IMPLEMENTATION?

The Commission should adopt the Joint Utilities' Reform Tariff. It is the proposal that is most consistent with the Commission's Guiding Principles. Respectfully, we believe that our proposal is superior to the proposals advanced by and testimony provided by other reform-minded parties such as Cal Advocates, TURN, CUE and NRDC. While reasonable minds may differ regarding which of these parties' meaningful reforms is best, the Commission should reject any proposal, such as those of the solar industry, that do not genuinely propose reform

A. The Joint Utilities' Proposal Should Be Adopted as It Is Best Aligned with the Guiding Principles

The Joint Utilities set forth in the sections below the Guiding Principles and how our proposal is aligned with each.

1. Guiding Principle (a): A successor to the net energy metering tariff shall comply with the statutory requirements of Public Utilities Code Section 2827.1

Guiding Principle (a) is the most wide-ranging of the Guiding Principles, calling for compliance with each of the requirements of Public Utilities Code Section 2827.1. Each of these requirements is paraphrased below and discussed.

Section 2827.1: (1) Ensure that customer-sited renewable distributed generation continues to grow sustainably. The meaning of "continues to grow sustainably" is discussed in Section I.C.3., above. In summary, it calls for the customer-sited DG industry to grow in a way that maintains its own viability, not dependent upon a cost shift. The Joint Utilities' proposal is aligned with this requirement. Our proposal would be implemented in the context of favorable behind-the-meter renewable market conditions, would allow customers to continue to realize bill

²³¹ See e.g., Cal. Corp. C. § 5110 *et seq.* (nonprofit public benefit corporations) and § 7110 *et seq.* (nonprofit mutual benefit corporations).

reductions through the installation of behind-the-meter solar and solar-paired storage, and would prevent unsustainable increases in the cost shift to non-participants. For instance, numerous renewable-energy and distributed-generation policies have been implemented in California in the 25 years since NEM was instituted in the state.²³² Almost all new residential buildings, for example, will be required to have rooftop solar. Likewise, the market for solar has matured in that period as well. We see much-broader customer awareness of solar, much-lower costs of rooftop PV and residential battery storage, and more providers are in the market with a wide variety of service offerings.²³³ Other states that have reformed their distributed-energy tariffs have continued to experience growth in customer adoption of rooftop solar.²³⁴ New distributed generation customers will continue to see bill reductions under the Joint Utilities' Reform Tariff proposal.²³⁵ Without reform, the existing NEM2.0 subsidy would increase from \$3.4 billion annually to \$10.7 billion annually in 2030 with annual bill impacts to non-CARE non-participating customers of \$505 for PG&E, \$555 for SDG&E, and \$385 for SCE.²³⁶ The Reform Tariff would mitigate these bill impacts by limiting cost shift to (1) existing NEM 1.0 and NEM 2.0 customers and (2) low-income discounts and programs.

Section 2827.1: (1, continued) Specific alternatives designed for growth among residential customers in disadvantaged communities. Other parties' proposals may attempt to promote larger growth among residential customers in disadvantaged communities, but they do so at a cost to these same communities by deepening the cost shift. Our proposal does not. Moreover, there are many elements of the Reform Tariff that provide specific options for households in low-income and other disadvantaged communities. As explained at Section IV.F. above, and in our opening testimony, the proposal spares lower income customers from bearing

²³² Ex. IOU-01 (Peterman) 1:1-4:23, 10:7-13:14, 20:7-16 and Figure 1-3 at 11.

²³³ Ex. IOU-01 (Tierney) 22:17-23:21, 44:17-49:5, 53:10-54:4.

²³⁴ Ex. IOU-01 (Tierney) 31:11-36:1.

²³⁵ Ex. IOU-01 (Morien) 99:9-103:11.

²³⁶ Ex. IOU-01 (Pierce et al.) 68:5-74:1.

increasing cost shifts that will occur absent reform.²³⁷ Our testimony also discusses the proposed discount on the Grid Benefits Charge for income qualified customers that adopt solar, and the proposal that they receive export compensation at the full (non-discounted) avoided cost available to other Reform Tariff customers.²³⁸ This provides an improved value proposition for income qualified customers relative to other customers. This section also discusses the Joint Utilities' proposed STORE pilot, which offers low-income customers the opportunity to install behind-the-meter storage which can be subject to the utility's dispatch control, making the value proposition for solar paired with storage relatively attractive with an improved payback compared to solar alone.²³⁹ This proposed pilot will help these customers manage their electricity bills and take advantage of exporting power when it is most valuable to the system. Another proposal for disadvantaged residential customers, the revised VNEM tariff, is applicable to low-income housing, with the credits allocated on an even basis to all customers on the VNEM arrangement.²⁴⁰ Overall, the proposed Reform Tariff should be understood in the context of other existing programs that cater to lower income customers, such as Solar on Multifamily Affordable Housing (SOMAH) program, the DAC-Single Family Solar Homes (DAC-SASH) program, the DAC-Green Tariff program, and the Community Solar Green Tariff program. The SOMAH and DAC- SASH programs include up-front incentive funding to lower the costs to participating customers.²⁴¹

Section 2827.1: (2) Establish terms of service and billing rules. Each utility proposes to modify its billing systems and other processes in numerous ways (e.g., interconnection process, bill calculation) to enable the proposed terms of service and billing.²⁴² Such

²³⁷ Ex. IOU-01 (Morien) 98:11-16; *id.*, (Wright) Section V, *passim*.

²³⁸ Ex. IOU-01 (Wright) 164:18-19:1 and Table V-35; *id.*, 169:1-170:9.

²³⁹ Ex. IOU-01 (Wright) 165:1-166:1, 170:10-179:5.

²⁴⁰ Ex. IOU-01 (Kerrigan) 157:10-162:14.

²⁴¹ Ex. IOU-01 (Wright) 167:3-168:18.

²⁴² Ex. IOU-01 (McCutchan et al.) 181:10-186:1.

modifications will achieve the objectives of this section. Furthermore, the Joint Utilities provide implementation steps they will each take between a Commission order in this proceeding and the placement of customers fully on to the Reform Tariff in order to transition to these new service and billing rules.²⁴³

Section 2827.1: (3) & (4) Ensure that the standard tariff made available to eligible customer-generators is based on the costs and benefits of the renewable facility, and that the total benefits of the standard tariff to all customers and the system are approximately equal to the total costs. The Joint Utilities' proposal would eliminate the cost shift for all new distributed generation solar only customers, except for low-income customers who would be eligible for a discount on their GBC.²⁴⁴

- The proposed tariff is cost based, with export compensation tied to the value of electricity supplied to the grid.²⁴⁵ This is accomplished in the new default residential tariff by the combination of the new Grid Benefits Charge, the compensation for exports at avoided costs and net surplus compensation at wholesale market prices, the time-of-use (TOU) rates combined with the instantaneous netting within each TOU period and the monthly true-up of credits.²⁴⁶
- Customers that newly adopt rooftop solar and other distributed generation technologies would pay their share of the costs of maintaining a reliable electric system that depend on when they are purchasing power from the grid and when they are using it to absorb the power they export to others.²⁴⁷

²⁴³ Ex. IOU-01 (McCutchan et al.) 180:22-186:1.

²⁴⁴ Ex. IOU-01 (Morien) 100:5-6, *id.*, (Wright) 169:2-4.

²⁴⁵ Ex. IOU-01 (Kerrigan et al.) 123:1-135:9.

²⁴⁶ Ex. IOU-01 (Morien) 100:5-8.

²⁴⁷ Ex. IOU-01 (Morien) 137:14-21.

- The proposal's incentives for customers to install storage better align rooftop solar customers' interests with those of the system and its other customers.²⁴⁸
- The proposal's reliance on 1-year forward time-differentiated avoided costs (rather than long-term avoided costs), updated annually, as the basis for compensating exports, more closely aligns with a reasonable approximation of (a) the value of exports to the system over the course of a day and a season, and (b) the character of system benefits as they change from one year to the next.²⁴⁹
- Similarly, the annual updating of the Grid Benefits Charge will keep it current with system costs.²⁵⁰

Section 2827.1: (5) Allow projects greater than 1 MW that do not significantly impact the distribution grid to be built to the size of the onsite load. The Joint Utilities proposed no changes to the treatment of installations over 1 MW from NEM 2.0. However, we note that the one proposal to expand the eligibility of projects greater than 1 MW in this proceeding makes no attempt to limit the size of the projects to onsite load as the statute requires, and does not address distribution grid impacts.²⁵¹

Section 2827.1: (6) Establish a transition period. The proposal maintains existing NEM 1.0 and 2.0 legacy periods. These customers would be required to take service on the Reform Tariff at the end of their legacy period.²⁵² The Joint Utilities have provided detailed implementation steps they will take between a Commission order and the placement of customers fully on to the Reform Tariff, and which are also discussed in Section V.E.1. below.²⁵³

²⁴⁸ Ex. IOU-01 (Morien) 103:13-25-104:1-6.

²⁴⁹ Ex. IOU-01 (Kerrigan) 125:8-11 and 129:12-14, 20-23.

²⁵⁰ Ex. IOU-01 (Morien) 148:2-9.

²⁵¹ See, Ex. CCS-01 (Smithwood), *passim*.

²⁵² Ex. IOU-01 (Morien) 110:3-9.

²⁵³ Ex. IOU-01 (McCutchan et al.) 180:22-186:1.

Section 2827.1: (7) The Commission shall determine which rates and tariffs are applicable to customer generators only during a rulemaking proceeding... and shall ensure customer generators' rates are just and reasonable. This provision is satisfied by the current Rulemaking, which is designed to achieve what the provision requires. That is, the Commission will determine through this Rulemaking what tariff structure will yield just and reasonable rates for customer generators as well as other customers.

2. Guiding Principle (b): A successor to the net energy metering tariff should ensure equity among customers.

As detailed in Section IV.F. above, the Joint Utilities' proposal provides equitable treatment for participating and non-participating customers:

- The Joint Utility proposal focuses first and foremost on ending the cost-shift.
- The standardized compensation for exports, set at the time-differentiated avoided cost, ensures equal compensation for the same generation within different time periods, whether supplied by a behind-the-meter resource or a grid-connected resource.^{[254](#)}
- Export compensation is the same for customers on low-income discount programs such as CARE and customers that are not on low-income discount programs, although there is a transitional discount available for CARE/FERA-enrolled customers, called the IQD (income qualified discount).^{[255](#)}
- The Grid Benefits Charge provides for the collection of unavoidable and NBCs from customers adopting behind-the-meter generation.^{[256](#)}

^{[254](#)} Ex. IOU-01 (Kerrigan, et al.) 123:1-135:9.

^{[255](#)} Ex. IOU-01 (Wright) 169:1-170:3.

^{[256](#)} Ex. IOU-01 (Morien) 135:10-144:10.

3. Guiding Principle (c): A successor to the net energy metering tariff should enhance consumer protection measures for customer-generators providing net energy metering services.

The Joint Utilities' proposal includes a number of consumer protection elements including continuation and updating of customer education materials, greater transparency regarding the costs of providing various aspects of utility service and the value of exports to the grid.²⁵⁷ The consumer protection elements of the Joint Utilities' proposal is set forth in detail in Section V.E., below.

4. Guiding Principle (d): A successor to the net energy metering tariff should fairly consider all technologies that meet the definition of renewable electrical generation facility in Public Utilities Code Section 2827.1

The Joint Utilities' proposal is neutral with regard to different behind-the-meter generation sources.²⁵⁸

5. Guiding Principle (e): A successor to the net energy metering tariff should be coordinated with the Commission and California's energy policies, including but not limited to, Senate Bill 100 (2018, DeLeon), the Integrated Resource Planning process, Title 24 Building Energy Efficiency Standards, and California Executive Order B-55-18.

The Joint Utilities' proposal aligns well with and supports California's and the Commission's energy policies.²⁵⁹

- SB 100: The proposal promotes decarbonization at least cost by proposing compensation for behind-the-meter renewables based on the utility's ACC values. The proposal also promotes stable retail rates, another goal of SB 100.
- IRP: The overall tariff design is informed by utility ACC values, including aligning compensation for exports at avoided costs, which are informed by the IRP process.²⁶⁰

²⁵⁷ *E.g.*, Ex. IOU-01 (Morien) 130:15-135:9 (monthly true ups); *id.*, (McCutchan et al.) 186:10-197:9.

²⁵⁸ Ex. IOU-01 (Tierney) 208:28-29.

²⁵⁹ *See, e.g.*, Ex. IOU-01 (Peterman) 1:21-4:4 (describes how the current NEM structure conflicts with or thwarts state policy); *id.*, 8:9-10:6 (California's NEM program has exceeded its goals); *id.*, (Tierney) 55:22-61:6 (state policy supports reform now).

²⁶⁰ Ex. IOU-01 (Kerrigan) 123:1-130:14.

- Title 24: The proposal provides a reasonable value proposition for rooftop solar, consistent with Title 24 mandate for rooftop solar on new home construction where cost effective. On new buildings where solar PV systems will be required, and on existing buildings, the proposal will create incentives for paired storage, thus aligning the availability of supply from customers to the grid to times when such supply is most valuable to the energy system.²⁶¹
- Executive Order B-55-18: The proposal supports California’s carbon-neutrality goals through a design that supports the continued growth of rooftop solar, enabling customers to recover the cost of their investment(s) over the life of the system, without compromising other sustainability efforts such as electrification and affordability of utility service.²⁶² The proposal addresses the cost shift, which makes electricity more expensive for everyone, and thus risks making electrification of buildings and transportation less attractive.²⁶³
- The proposal aligns with the Commission’s principles for designing just and reasonable rates -- that they be based on the cost of service, affordable, support conservation, and be acceptable to customers (D.15-07-001).²⁶⁴

6. Guiding Principle (f): A successor to the net energy metering tariff should be transparent, understandable to all customers and should be uniform, to the extent possible, across all utilities.

The Joint Utilities have developed a proposal with common elements across the utilities’ tariffs, where possible.

- The design of the proposed Reform Tariff is more transparent and understandable to customers in that it sends more direct and clear price signals to customers about the continued need to pay for grid services and public programs (through the Grid

²⁶¹ Ex. IOU-01 (Peterman) 18:17-20:4; *id.*, (Morien) 98:11-18, 100:4-104:6.

²⁶² Ex. IOU-01 (Morien) 104:7-105:8.

²⁶³ *E.g.*, Ex. IOU-01 (Peterman) 1:3-14, 15:32-16:3.

²⁶⁴ Ex. IOU-01 (Morien) 106:1-108:12.

Benefits Charge).²⁶⁵ The Reform Tariff also improves transparency regarding the value of solar exports by having standardized export rates (based on ACC values). This will be easier for customers to understand than the current NEM 2.0 structure under which the value of solar exports is tied to the customers' retail rate, with a complex adjustment for NBCs.²⁶⁶

- The Joint Utilities' optional Value of Distributed Energy (VODE) tariff proposal, described in Section IV.B. below, provides greater transparency for customers regarding their overall consumption (including solar generation which serves on site load).²⁶⁷

7. Guiding Principle (g): A successor to the net energy metering tariff should maximize the value of customer-sited renewable generation to all customers and to the electrical system.

Importantly, this Guiding Principle calls for maximizing the value of the generation not to the customer-generator, but instead to “all customers and to the electrical system.”

Our proposal appropriately prices exports from customer-sited systems at ACC values, thus assuring that the customer generator receives compensation tied to the value of the resource to the system and non-participating customers do not overcompensate customer generators (which would be a transfer of value from non-participants to new solar adopters).²⁶⁸

8. Guiding Principle (h): A successor to the net energy metering tariff should consider competitive neutrality amongst Load Serving Entities.

The proposal splits the export compensation rate into two parts: “commodity” and “system” components, and has separate GBC charges for bundled and unbundled customers. This feature is designed to ensure competitive neutrality among load serving entities.²⁶⁹

²⁶⁵ Ex. IOU-01 (Morien) 131:7-135:9.

²⁶⁶ Ex. IOU-01 (Kerrigan) 123:1-130:14.

²⁶⁷ Ex. IOU-01 (Kerrigan) 149:1-152:3.

²⁶⁸ Ex. IOU-01 (Kerrigan, et al.) 123:1-135:9.

²⁶⁹ Ex. IOU-01 (Kerrigan) 128:11-129:9.

B. The Joint Utilities' Proposal Is Aligned with the Commission's Rate Design Principles

The Joint Utilities' proposal aligns well with the Commission's 10 ratemaking principles for residential rate design (D.15-07-001):

1. Low Income and medical baseline customers should have access to enough electricity to ensure basic needs (such as health and comfort) are met at an affordable cost.²⁷⁰
2. Rates should be based on marginal cost.²⁷¹
3. Rates should be based on cost-causation principles.²⁷²
4. Rates should encourage conservation and energy efficiency.²⁷³
5. Rates should encourage reduction of both coincident and non-coincident peak demand.²⁷⁴
6. Rates should be stable and understandable and provide customer choice.²⁷⁵
7. Rates should generally avoid cross-subsidies, unless the cross-subsidies appropriately support explicit state policy goals.²⁷⁶
8. Incentives should be explicit and transparent.²⁷⁷
9. Rates should encourage economically efficient decision making.²⁷⁸
10. Transitions to new rate structures should emphasize customer education and outreach that enhances customer understanding and acceptance of new rates, and minimizes and appropriately considers the bill impacts associated with such transitions.²⁷⁹

²⁷⁰ Ex. IOU-01 (Wright) 163:22-179:5 (Income Qualified Discount and STORE programs).

²⁷¹ Ex. IOU-01 (Wray) 93:4-95:13; *id.* (Kerrigan) 125:1-127:10.

²⁷² Ex. IOU-01 (Morien) 108:8-12.

²⁷³ Ex. IOU-01 (Peterman) 19:14-22, *id.*, (Morien) 134:8-12.

²⁷⁴ Ex. IOU-01 (Peterman) 17:9-11, 19:14-22, *id.*, (Morien) 134:23-24.

²⁷⁵ Ex. IOU-01 (Morien) 108:8-12.

²⁷⁶ Ex. IOU-01 (Peterman) 20:16-20, (Morien) 100:13-16, 108:8-12.

²⁷⁷ Ex. IOU-01 (Morien) 106:2-8, 108:8-12.

²⁷⁸ Ex. IOU-01 (Kerrigan) 111:26-112:6, (Morien) 114:28-115:10, (Thomas) 120:19-121:2.

²⁷⁹ Ex. IOU-01 (McCutchan et al.) 186:1-197:9.

C. Other Reform Party Proposals Have Merits but Are Inferior to the Joint Utilities' Proposed Reform Tariff²⁸⁰

Several other parties proposing to reform the current NEM program make well-intentioned and meritorious proposals. In particular, the Joint Utilities appreciate the proposals and testimony provided by Cal Advocates, TURN, CUE and NRDC. Despite many positive aspects of their proposals, the Commission should select the Joint Utilities' Reform Tariff over those proposals. None of the other reform party proposals do enough to remedy the cost shift and, in some cases, complicate implementation and create customer confusion.

1. The Reform Tariff Is More Effective in Addressing the Cost Shift than the Cal Advocates Proposal²⁸¹

Cal Advocates proposes to (1) transition new customers to a reform tariff as soon as possible, (2) subsidize and incentivize paired storage at some level, and (3) focus on low income customers. Their proposal, however, only reduces the 2030 annual cost shift by 51%, as compared to the Reform Tariff, which virtually eliminates the cost shift associated with standalone solar (~97% for SCE).²⁸² The Reform Tariff is more effective in reducing the cost shift primarily because of the Utilities' proposed ECR and GBC.

The Reform Tariff ECR is based on a solar export weighting of the 1-year levelized ACC avoided costs in each TOU period. This method provides a more accurate representation of the value of exported energy when compared to methods that use solar profile weighting or a simple average within the TOU period. Additionally, export weighting based on recorded exported energy allows the weighting factors and, by extension, the ECR, to gradually adjust as customer preferences transition from standalone solar to paired storage systems.

Cal Advocates also proposes a monthly GBC based on installed system capacity to recover transmission and distribution service, and NBCs. The Reform Tariff GBC, by contrast, is more effective at mitigating the cost shift because it includes recovery of generation costs, which

²⁸⁰ Unless otherwise noted, the evidence supporting this section is in Ex. IOU-02 at 78-82.

²⁸¹ See Ex. IOU-02 (Thomas) 79:14-80:18.

²⁸² Ex. IOU-02 (Thomas) 79:19-21.

the IOUs do incur on behalf of NEM customers despite the existence of onsite generating facilities designed to primarily serve onsite load. Specifically, generation capacity costs for ramp and peak and energy costs are generally not avoided by standalone solar systems.

2. The Reform Tariff Is Less Complicated than TURN's Proposal²⁸³

TURN's Market Transition Credit, and non-bypassable, unavoidable, and shared (NUS) costs recovery have merit, but the Reform Tariff offers greater transparency and ultimately a better customer experience. TURN proposes to use the hourly day-ahead market price (scaled up to include costs associated with ancillary services and losses) for the energy value portion of the ECR with the balance based on the most current ACC values for transmission, distribution, and generation capacity.²⁸⁴ While this approach has the advantage of aligning export compensation with periods of extreme grid conditions, a day ahead notice may not be received in a sufficient amount of time to drive behavioral changes outside of the normal daily pattern. To implement and make TURN's proposal effective, the IOUs would have to implement significant and potentially costly system enhancements and process changes to receive day-ahead market prices, calculate the day ahead rates, and communicate the next day's prices to customers such that an action can be taken in response. The IOUs, however, would deliver the bill sometime later, diminishing the effect of a day-ahead price signal.

The Reform Tariff, by contrast, uses export compensation rates that are set and adjusted on a similar frequency to all other rates on a customer's bill. The Utilities use the 1-year levelized ACC avoided costs as the basis for the export compensation rate. The Reform Tariff export compensation rates are then reduced to TOU period specific rates – a format familiar to most customers on TOU pricing schedules. Customers can see the ECR far in advance and use it to plan an initial purchase or develop new behavioral patterns that provide consistent load reductions or shifts.

²⁸³ See Ex. IOU-02 (Thomas) 80:19-81:16.

²⁸⁴ Ex. IOU-02 (Thomas) 80:22-24.

3. The Reform Tariff's Approach to ECR is Better than NRDC's Proposal²⁸⁵

Overall NRDC's proposal takes incremental steps towards reducing the current cost shift associated with the NEM 2.0 structure. NRDC's proposals for net billing, a market transition credit (MTC), NBC recovery, and an equity fund make progress towards bringing greater equity and access to solar compensation and adoption. However, NRDC's proposal for export compensation diminishes some of the potential gains obtained through other elements of the proposal, such as NRDC's proposal to use a three year ACC average, updated on a two year cycle, and locked in for ten year vintages for its ECR.²⁸⁶ By contrast, the Reform Tariff's ECR is more effective at mitigating the cost shift because the compensation level is set by annual adjustments to the ACC and provides no legacy treatment. In addition, vintaging complicates implementation, creates potential billing operational problems, as well as customer confusion. To add to the complexity, NRDC's proposed ECR has 8,760 different export rates over the years of NRDC's proposal because exports are compensated uniquely in each hour.²⁸⁷ Finally, NRDC's proposal does not include operating assumptions for storage.²⁸⁸

4. The Reform Tariff is Superior to Sierra Club's Proposal²⁸⁹

Conceptually, we agree with Sierra Club's proposal that all Reform Tariff customers take service on an electrification rate because electrification rates provide a cost-based foundation for a net billing tariff. Sierra Club's suggestion, however, that SDG&E and PG&E align their fixed charges with SCE's demonstrates a misunderstanding of the cost-based drivers and authorized rate levels that establish the relationship between fixed and volumetric charges. For the reasons explained in Ex. IOU-02,²⁹⁰ Sierra Club's proposal to artificially set the fixed charges for PG&E

²⁸⁵ See Ex. IOU-02 (Thomas) 81:17-82:8.

²⁸⁶ Ex. NRD-01 (Chhabra) 14-15.

²⁸⁷ Chhabra, T. 1765:14-17 (Aug. 6, 2021).

²⁸⁸ Chhabra, T. 1781:15-17 (Aug. 6, 2021).

²⁸⁹ See Ex. IOU-02 (Thomas) 82:9-83:16.

²⁹⁰ *Id.*

and SDG&E to the same levels as SCE's PRIME, which reflects a settled position and lower revenue requirements,²⁹¹ will have the effect of muting the electrification pricing signal Sierra Club agrees is an advantage to solar and non-solar customers.²⁹² The result of Sierra Club's error in this regard is that its proposal will still shift more than \$1,000 per new customer to non-participating customers in 2030, which is approximately three times the cost shift produced by the Reform Tariff. Unfortunately, in this regard, Sierra Club's proposal is no different than the proposals made by parties representing the solar industry.²⁹³ The Commission should favor the Reform Tariff's cost-based rate to provide a strong and accurate pricing signal to encourage future electrification.

D. The Solar Industry Representative's Proposals Do Not Comport with Law or Policy

For the reasons discussed below, the Commission should summarily deny the proposals made by the parties representing the solar industry because their proposals conflict with federal and state law, including AB 327, as well as the state's environmental policies.

1. The Solar Industry Representatives' Proposals Perpetuate the Cost Shift in Violation of AB 327

Every objective study, including the E3 study commissioned by the CPUC, concludes that the NEM cost shift is real and substantial. As discussed above in Section II.A. and B., Joint Utilities and other reform parties have produced copious testimony on the degree of the cost shift and its impact on nonparticipating customers, equity principles, consumer protection, and the state's environmental policy goals. The existence of a massive wealth transfer caused by the current NEM 1.0 and 2.0 programs is simply a fact. It is not subject to reasonable debate.

Although the solar parties acknowledge a cost shift exists, their proposals do not meaningfully eliminate, let alone, mitigate it. The lens through which every aspect of their proposals is presented makes the private benefits to NEM customers paramount to the costs to

²⁹¹ See Ex. IOU-02 (Thomas) 83, n. 204 for a TOU-D-PRIME explanation.

²⁹² Ex. SCL-02 (Camp) 4:10-15, 16:17-28.

²⁹³ See, Ex. IOU-02 (Pierce) 84:11-16 and 85: Figure IV-4.

nonparticipants or the value of the NEM facilities to the grid²⁹⁴ and make unsupported arguments to attempt to transform purely private benefits into public ones.²⁹⁵ For instance, SEIA/VS witness Beach attempts to turn a private benefit of residential solar+storage into a system resiliency benefit using arguments the Commission rejected in D.20-04-010. The Commission previously found that SEIA/VS failed to show the benefits SEIA/VS purported to be public are actually participant benefits that are not an avoided cost.²⁹⁶ SEIA/VS offered no additional evidence in this proceeding to overcome that finding.

The solar parties advance many similarly specious arguments to inflate the societal benefits of NEM systems. They attempt to make a mutually exclusive false choice between utility scale solar and customer-sited renewable generating facilities when research shows both play an important role in achieving California’s environmental policy goals.²⁹⁷ They also make inflated claims regarding the NEM program’s contribution to transmission upgrade deferrals, an argument the Commission and CAISO rejected.²⁹⁸

²⁹⁴ Ex. IOU-02 (Morien) 56:18-57:19.

²⁹⁵ See, e.g., Beach, T., 1335:16-1344:26 (Aug. 4, 2021).

²⁹⁶ D.20-04-010, pp. 67-70.

²⁹⁷ Ex. IOU-02 (Tierney) 116:11-118:12.

²⁹⁸ Ex. IOU-07, R.14-08-013, et al., Reply Comments of the ... [CAISO] (Aug. 23, 2019), pp. 3-5 (stating, “Although the review focused on projects that were primarily load driven, SEIA erroneously attributes project cancellations only to recent decreases in load forecasts, which it in turn erroneously assumes to be solely driven by growth in DERs. However, the impact of DERs is more nuanced, and the transmission project cancellations were driven by a number of factors. For example, the growth in DERs, particularly behind-the-meter solar, have a pronounced impact on the transmission grid as flow patterns change from traditional patterns and frequency throughout each day. In other words, the effects of solar behind-the-meter generation tend to have a one-time effect of pushing demand down in the middle of the afternoon and moving the daily peak load to later in the day, when additional solar generation no longer reduces demand. . . . However, the CAISO agrees that a specific DER portfolio could avoid the need for new transmission and avoided costs ought to be considered on a case-by-case basis. The transmission planning process routinely explores whether DERs might serve alternatives to transmission solutions. By meeting specific reliability or economic needs, a tailored portfolio of DERs can provide value in eliminating the need for specific transmission projects on a case-by-case basis. The CAISO conducts a detailed evaluation of proposed DER portfolios to ensure they have the resource output or load reduction necessary to meet the identified reliability or economic

The solar parties also attempt to create a false equivalence between NEM customers, who by law must be net consumers, and RPS generators, who are net sellers who sell their generation to the utility at wholesale. As discussed in the legal framework discussion above (in Section I.C.2.c.) and in Rebuttal Testimony,²⁹⁹ the argument is incorrect as a matter of law and fact. The Ninth Circuit recently held that when calculating avoided cost, “only that where a utility uses energy from a QF to meet a state’s RPS, the avoided cost must be based on sources that the utility could rely upon to meet RPS.”³⁰⁰ California law excludes monthly NEM exports from satisfying RPS requirements.³⁰¹ Likewise, FERC has made it clear that an avoided cost rate need not include capacity costs (as distinct from energy costs) where the QF does not displace the utility need for additional capacity and the QF does not offer energy of sufficient reliability and with sufficient legally enforceable deliverability guarantees to permit the purchasing electric utility to forgo capital investments.³⁰² NEM customers do not supply capacity to any IOU and the energy customers provide through the NEM program does not have sufficient legally enforceable guarantees of deliverability because customers are not legally required to provide the utility with any energy. Again, under federal law, they must be net consumers, not net suppliers. Only NSC eligible exports at the end of the annual period qualify for RPS and even then, the utility cannot know in advance how much surplus energy the NEM customer will provide.

Finally, the solar parties make similar apples to oranges comparisons to energy efficiency and electric vehicle (EV) charging to inflate the societal benefits of NEM. The facts are that energy efficiency upgrades produce certain load reduction; NEM facilities do not, which means

objectives and meet all applicable reliability criteria, including power quality and transfer considerations such as capacity deliverability, reactive power, and voltage support. Simple energy production (i.e., MWh) is not the sole determinant for transmission need or investment Therefore, any avoided transmission costs from DERs are inherently project, location, and need specific.”) (citations omitted).

²⁹⁹ Ex. IOU-02 (Tierney) 123:11-124:19.

³⁰⁰ *CARE v. Cal. Pub. Util. Comm.*, 922 F.3d 929, 937 (9th Cir. 2019).

³⁰¹ See, e.g., Section 2827(h)(6)(A), (B) (making monthly exports ineligible for RPS credit or RECs and only providing RPS credit and RECs for net sales at the end of the annual netting period).

³⁰² FERC Order No. 69, 45 Fed. Reg. at 12216 (May 21, 1980).

the utility must continue to make system upgrades and power purchases on behalf of NEM customers to meet their load when their systems are not operating.³⁰³ Customers that install energy efficiency upgrades also neither export to the grid nor avoid large portions of their bill.³⁰⁴ With regard to electric vehicle charging, the solar industry representatives claim electric vehicle drivers avoid costs, but neglect to mention that the Legislature, through the Road Repair and Accountability Act of 2017,³⁰⁵ assessed a fee to electric vehicle drivers to cover infrastructure costs.³⁰⁶

The ACC incorporates the true and quantifiable societal benefits. The current ACC is the 2021 ACC this Commission adopted in Resolution E-5077. SEIA/VS and CALSSA, however, refused to analyze their proposals using the operative ACC.³⁰⁷ As a result, their cost effectiveness calculations, which are essential to helping the Commission rectify the cost shift, as is required by AB 327, are overstated under the TRC and RIM tests, which these parties' proposals fail under the 2021 ACC. Moreover, the parties representing the solar industry promote a self-serving, modified societal cost test (SCT) that includes nonexistent benefits that are unsupported by both law and fact in that they thwart the Commission-approved cost

³⁰³ Ex. IOU-02 (Tierney) 124:14-125:13.

³⁰⁴ *Id.* at 125-130.

³⁰⁵ S.B. 1, 2017 California Legislature, 2017 Reg. Sess. (California 2017).

³⁰⁶ Ex. IOU-02 (Thomas) 130:18-132:2. Recognizing the initial annual fee on EV drivers did not provide parity with the payments made by Internal Combustion Engine (ICE) drivers, the Act also commissioned a study to evaluate and propose a long-term measure that would ensure infrastructure costs are paid equally regardless of vehicle type. *Id.* The study conducted by the University of California Davis ultimately proposed a road user charge that equitably assesses a charge for infrastructure costs across all vehicle fuel types. *See* Assessing Alternatives to California's Electric Vehicle Registration Fee; <https://escholarship.org/uc/item/62f72449>.

³⁰⁷ Ex. IOU-02, Attachment B, B-2 (CALSSA Response to Joint IOU DR Question 1); Beach, T., 1360:26-1363:2, Ex. IOU-02 Attachment B, B-14 (SEIA/VS response to DR Question 3).

effectiveness tests, deviate from Commission regulations and precedent, and double count benefits already taken into account in the ACC.³⁰⁸

Likewise, CALSSA's witness Heavner's testimony at hearings shows that CALSSA simultaneously advances contradictory positions based upon what is most advantageous at the time. At hearings, Mr. Heavner argued that a benefit to cost ratio of 1.0 from a participant perspective is too narrow a margin upon which the CEC can predicate its Title 24 mandate, yet CALSSA asks the Commission to require non-participating customers to continue to bear costs of the program that do not come close to a 1.0 TRC score, much less RIM.³⁰⁹ The Commission should reject these incompatible positions as unprincipled.

In addition, the parties representing the solar industry adopt an incorrect interpretation of AB 327's sustainable growth requirement that is incompatible with AB 327's ratepayer indifference provisions. Their position is that the Commission must sustain current and past adoption rates,³¹⁰ which would prevent the Commission from meaningfully addressing the cost shift, which AB 327 requires it to do. Incredibly, they seem to argue that legislation written in 2013 requires the Commission to maintain specific growth rates achieved well after the legislation required reform to originally be implemented. To that end, and in contrast to their optimism about the solar market (as discussed above in Section II.C.2. Trend 5), SEIA/VS and CALSSA make unsubstantiated claims regarding the purported current decline in the non-residential solar market. The Joint Utilities' rebuttal testimony proves that the 25% reduction claim made by CALSSA is incorrect.³¹¹ The Joint Utilities' analysis shows that while non-residential market adoption is lower in 2020 than its peak in 2017, it is consistent with 2016 and

³⁰⁸ See e.g., Ex. IOU-02 (Wray) 30:1-36:13 (discussing the deviations from Commission guidance in D.19-05-019 regarding the social cost of carbon and air quality benefits, D.20-04-010 regarding out-of-state methane leakage, and attributing incremental GHG reduction value, land conservation and use, beyond that already accounted for in the ACC.)

³⁰⁹ Heavner, T. 1084:13-1085:2 (Aug. 3, 2021).

³¹⁰ Heavner, T., 1121: 21-24 (Aug. 3, 2021) (testifying that the intent of CALSSA's proposal is to sustain the rate of customer adoption).

³¹¹ Ex. IOU-02 (Kerrigan) 88:3-92:11.

2018 adoption, and nearly double of that in 2015. As CALSSA knows, the 25% reduction figure is based upon incomplete data. The Joint Utilities provided them with the updated data showing that adoption rates have remained stable.³¹² CALSSA did not correct this testimony in errata and, at hearings, in response to questioning by the Administrative Law Judge, Mr. Heavner persisted in his incorrect claims.³¹³

Finally, the solar parties advance the concept of “gradualism” to delay reform. The Legislature passed AB 327 in 2013. SEIA/VS and CALSSA’s dilatory proposals would perpetuate the problem AB 327 mandates the Commission reform for 27 years after the bill’s enactment. Their true timeline for implementing AB 327’s policy mandates is never, which is unconscionable given the ongoing and growing transfer of wealth caused by the existing NEM tariffs. The Commission should therefore deny these proposals.

2. Oversizing and Community Solar Proposals are Unlawful for Net Metering Billing Arrangements

Both SEIA/VS and Sierra Club propose that the Commission allow customers to size systems larger than historical annual onsite load in anticipation of potential future electric load growth. As discussed at length in the legal section, such proposals are unlawful under AB 327. Oversizing would violate California’s net metering statutes, well settled Commission precedent dating back to 2002, and federal law, all of which require systems to be sized to historic onsite load so that the NEM customer is a net consumer, not a net seller or exporter. Such proposals would also increase the cost shift. If customers want to oversize, the law requires them to sell all power exported to the utility grid at wholesale. Because customers cannot take service on the NEM tariff if they want to be net sellers, the Commission must reject proposals to oversize or that deviate from the net consumer requirement (such as CCSA’s community solar

³¹² *Id.*

³¹³ Heavner, T. 1216:2-28 (Aug. 3, 2021).

proposal).³¹⁴ In addition, the Joint Utilities’ rebuttal testimony proves allowing oversizing would conflict with public policy not only because of the cost shift, but also because of the risks to system reliability and safety.³¹⁵

E. Timeline and Implementation Issues

This portion of our brief is organized as follows. Section 1 addresses timing requirements for the tariff. Section 2 addresses ME&O activities to support customer understanding of the Reform Tariff. Section 3 discusses consumer protection considerations and Section 4 addresses revenue allocation and cost recovery.

1. Timing

To get ready for implementation of the Reform Tariff, changes to utility billing systems, and customer outreach and education will be required in advance of rollout. These will take time to implement the new tariff successfully and fairly. But they should take no more time than is necessary due to the crushing imperative of ending the cost shift.

The Joint Utilities anticipate that the requisite changes to each utility’s billing systems and supporting platforms to bill customers on our proposed Reform Tariff, or on any other NEM proposal of similar complexity, will take 12-24 months following the issuance of a final decision.³¹⁶ Specific timelines to fully implement a successor tariff may vary by each utility due

³¹⁴ CCSA’s community solar proposal makes no attempt to link the project size (1 to 5 MW) to load, or even to a customer site. The proposal is subscription-based, with eligibility extended to all customers in a utility service territory. Fifty percent of subscribers must be residential or small commercial customers, and subscription size is limited to “12 months of historic usage,” or, if that information is unavailable, an estimate of load. See CCS-01 (Smithwood) 19:20-22:11. Even more troubling is the CSSA netting proposal. Credits from monthly netting “would be rolled over indefinitely until utilized However, if a customer leaves utility service, all credits on that customer’s account would be forfeited.” *Id.*, 21:1-8, 21:19-23. Allowing indefinite rollover and the developer to pocket forfeited credits does not avoid the legal issue attending net exports.

³¹⁵ Ex. IOU-02 (Chacon) 69:5-74:21.

³¹⁶ Ex. IOU-01 (Molnar et al.) 181:13-15.

to a variety of factors.³¹⁷ This, or similar, timing will be necessary for successful implementation of all party proposals that effect meaningful reform.

Despite the need for this time in transition, the Commission needs to effect a cut-over to the new tariff earlier than full implementation. The reason for this is the significant cost shift that is locked in for each additional month that customers remain able to take service on the current NEM 2.0 Tariff, particularly if new NEM 2.0 customers are allowed the same 20-year “Legacy Treatment” allowed for existing NEM 2.0 customers. Remarkably, each month of additional customer interconnections permitted under the current NEM 2.0 tariff in 2022 will add approximately \$935 million over a 20-year period to the total NEM cost shift from participant to non-participant customers.³¹⁸

a. Transition Date and “Buffer Period”

Because each month of delayed implementation of the NEM successor tariff effects a wealth transfer of nearly one billion dollars, NEM 2.0 eligibility for new distributed generation customers should end as soon as possible. Therefore, the Joint Utilities recommend that the Commission set a deadline after which no new DG customers will be able to take service under NEM 2.0, and that this deadline occur as soon as possible after a final decision that clarifies the NEM successor tariff. An expedient transition to the successor tariff would not only to eliminate further cost shift from NEM 2.0, but it would also manage the “gold rush” of new customer interconnections that could occur if customers hurry to take service on NEM 2.0.

Thus, the Joint Utilities propose that within 30 days of the final decision, the utilities would file an information-only Tier 1 advice letter to provide details of the Reform Tariff as directed in the final decision. This advice letter will summarize how the NEM tariff will be structured and provide information regarding pricing as well as the export compensation rate. The level of information provided in the advice letter should be sufficient to allow customers and

³¹⁷ Ex. IOU-01 (Molnar et al.) 181:15-26.

³¹⁸ Ex. IOU-01 (Molnar et al.) 182:6-9.

vendors to plan for the Reform Tariff. Thirty days after the initial advice letter (i.e., 60 days after the final decision), the utilities would file a supplemental advice letter, also Tier 1, containing rate factors based on the applicable revenue requirements and associated tariff sheets.

To enable this filing structure and timing, the Joint Utilities urge the Commission to provide details in its final decision regarding specific aspects of the adopted reform tariff. Elements such as netting, export compensation, GBC structure and composition, eligibility, and legacy treatment. Other parties, such as SEIA/VS, have put forward a more bureaucratic advice letter process that appears designed to delay the onset of NEM reform.³¹⁹ Unlike others' proposals, the Joint Utilities' proposal would provide quick and reasonable clarity.

Customers should be transitioned to the Reform Tariff promptly after the final decision adopting a new tariff. However, we also understand that this needs to be done in a way that reduces possible adverse impacts to prospective distributed generation customers that could result from too abrupt a change from NEM 2.0 to the Reform Tariff, specifically for those who are already in the process of purchasing solar. For those customers who are in the contracting process near or right after the final decision, the Joint Utilities recommend that they be provided sufficient time to submit a valid interconnection application. Specifically, we recommend a "buffer period" of three months (90 days) from the final decision for residential customers and five months (150 days) for non-residential customers to submit valid interconnection applications to qualify for service under NEM 2.0.³²⁰ After these dates, no new customers would be allowed to request service on the NEM 2.0 tariff.

The Joint Utilities recommend that the interconnection application submittal date be chosen as the milestone customers must reach before the deadline because it is the point at which the utilities first receive formal notification of a customer's intent to take service on NEM.

³¹⁹ Ex. IOU-02 (Molnar) 100:4-6; Ex. SVS-03 (Beach) 76:11-78:18.

³²⁰ In order to provide an orderly transition to the new tariff, the Joint Utilities also propose that customers would need to receive permission to operate within two years of the end of this buffer period to qualify for service under NEM 2.0, unless the applicant can show the delay was of no fault of the applicant.

In response to a question from ALJ Hymes regarding whether the contract signing date – not the interconnection submittal date – should be the milestone, Joint Utility witness Molnar expressed concern: “If the contract is coming the signed contract is coming before the Interconnection Application is submitted, we couldn't have the ability -- well, I don't know if we have the ability to do that. I'm not sure.”³²¹ Upon further reflection, using the contract date could pose significant problems. First, without independent visibility into contracting dates, it would be an invitation to fraud. Furthermore, the delays between contract signing and interconnection applications could create implementation problems when the utilities have moved on to the new tariff, only to have a customer demand service on the prior tariff significantly after the fact.

The Joint Utilities’ proposed timing will allow vendors sufficient transition time to revise sales materials, resources, and training for customers. The timing will also allow the utilities to update customer-facing educational resources and tools to reflect the structure of the next tariff.

There is no reason to delay any further. Plenty of advance work can be done now and the utilities are doing it. As Joint Utility witness McCutchan explained during hearings, the preparation for NEM reform has already begun:

SEIA/VS Counsel: Okay. Assuming that the Commission adopts the decision regarding the next successor tariff in say mid-December, when would the IOUs begin to put together the material for the various forms of communication that you have listed on pages 190 and 191 [of your opening testimony]?

Witness McCutchan: We have begun to prepare now for the communications.³²²

Later, McCutchan continued,

the utilities are doing preparation ahead of time so that we can hit the ground running when the final decision is issued. And a high degree of clarity in the final decision will facilitate rapid turnaround and adaptation and adjustment to the revised tariff.”³²³

³²¹ Molnar, T. 671:26-672:3 (July 29, 2021).

³²² McCutchan, T. 628:25-629:5 (July 29, 2021).

³²³ McCutchan, T. 634:28-635:6 (July 29, 2021).

b. Moving Customers to the Reform Tariff

Customers who interconnect after the transition date would take service and be billed on NEM 2.0 temporarily, and then be transitioned to the Reform Tariff once it is operationalized, according to the timing for full implementation described above. As an additional measure to control the cost shift, the Utilities propose that customers who apply for interconnection during the buffer period receive reduced NEM 2.0 treatment. That is, customers would receive NEM 2.0 treatment only long enough for a typical customer in that customer class to receive expected payback for their systems. This would be 3-7 years depending on the utility.

Customers submitting interconnection applications after this period will be temporarily billed under NEM 2.0 while the Reform Tariff is being implemented. Filing of Reform Tariff updates and implementation plans, stakeholder review, and Commission approval on details of the Reform Tariff would be required for customers to take service and be transitioned on the Reform Tariff once it is operationalized in utility billing systems.

The Joint Utilities propose that the operationalizing of NEM 3.0 be accomplished through Tier 2 filings, which is how NEM 2.0 updates were effected. As long as the final decision provides sufficient clarity on the Reform Tariff, the utilities should be able to file separate Tier 2 implementation plans within 90 days of the Final Decision.

2. Marketing, Education and Outreach

The Commission should adopt the Joint Utilities' proposal for marketing, education, and outreach (ME&O).³²⁴ No party offered a more detailed ME&O plan. Furthermore, no party provided responsive testimony or opposed our proposal.

Understandably, developing the details of many aspects of an ME&O plan will be an evolutionary process. The Joint Utilities' proposal anticipates this and accommodates for it. Rather than prescribe specific steps or activities that may need to be adjusted, the Joint Utilities' proposed ME&O plan describes key strategies to help raise customer and vendor understanding of the Reform Tariff. These strategies will consider the needs of specific customer segments,

³²⁴ Ex. IOU-01 (McCutchan et al.) 186 *et seq.*

including customers with non-English language needs. These strategies will also leverage multiple communication channels to ensure changes are communicated to as broad an audience as is practicable. The Joint Utilities' outreach plan also includes strategies to support vendors with the requisite information they will need to manage their sales and customer support activities.

As an illustration of the key changes that would need to be communicated through an ME&O plan, the Joint Utilities' testimony described the key changes included in our proposed Reform Tariff that would need to be addressed through ME&O activities. These included explaining:

- The shift from an annual to a monthly true-up and netting within TOU intervals;
- How seasonality in solar generation can impact customer bills throughout the year;
- New otherwise applicable rate requirements for NEM customers; and
- The monthly Grid Benefits Charge and what that charge covers (including the Income Qualified Discount).

Of course, as mentioned above the ME&O plan will need to be tailored to the specifics of the NEM Reform tariff adopted by the Commission. Through the advice letter and cost recovery process described below in subsection 4.c., the Joint Utilities' ME&O plan allows for the necessary flexibility to accommodate the tariff adopted by the Commission.

3. Consumer Protection

Consumer protection will be key to the success of the NEM Reform Tariff. Assigned Commissioner Guzman Aceves highlighted the importance of this issue on the first day of evidentiary hearings:

I did want to highlight...the guiding principle that states that the successor tariff should enhance consumer protections. I know that Judge Hymes directed your testimony to explain how the proposals meet that principle and all the Guiding Principles. So, of course, over these couple weeks I really would appreciate you drawing that out. I know

some of you had much more creative recommendations here than others. If others could respond to those, I think that's excellent also.³²⁵

The Guiding Principle referenced by Commissioner Guzman Aceves is Guiding Principle (c), which states, “A successor to the net energy metering tariff should enhance consumer protection measures for customer-generators providing net energy metering services.”³²⁶

Enhancing consumer protection is vital and, candidly, it will be challenging. In designing a new tariff, the Commission will need to ensure the design reflects cost-causation -- which can add tariff complexity – at the same time facilitating customer understanding, a critical component of consumer protection. Customer understanding will be important along a number of fronts: (i) assessing bill savings projections before they invest in solar; (ii) validating bill savings once they have gone solar; and (iii) understanding how their behavior or additional technologies will impact their overall electricity costs once they are on a NEM billing structure.

The importance of this customer understanding is reflected in R.14-07-002 on enhanced consumer protection measures, where misunderstanding of both projected and realized bill savings was identified as a consumer protection problem. Similarly, in D.18-09-044, the CPUC identified a key consumer protection issue raised by parties to the proceeding was “a lack of customer understanding of the factors impacting their actual bill savings, including changes in their energy usage and rate structures underlying the current NEM framework.”

Consumer protection is, of course, not new. The Joint Utilities support existing efforts by the CPUC, California State Licensing Board (CSLB), the Department of Financial Protection and Innovation (DFPI), community-based organizations, consumer advocacy groups, and solar industry stakeholders to promote greater consumer protection for solar customers. Thus, the Joint Utilities’ proposed consumer protection measures in this proceeding build upon the

³²⁵ Guzman Aceves, T. 5:18-6:2 (July 26, 2021).

³²⁶ D.21-02-007. As discussed elsewhere in this brief, the Joint Utilities’ proposal includes a number of elements to protect consumers and to achieve this enhanced level of customer understanding. See discussion at Section III.B.3.

measures already being implemented. Some of these requirements fall upon the vendors. Others fall upon the utilities.

For instance, legislation and CPUC directives require that solar vendors obtain signatures attesting customer review of a (i) “California Solar Consumer Protection Guide” developed by the CPUC and (ii) “CSLB Solar Disclosure Form” per AB 1070, Chapter 662, Statutes of 2017.³²⁷ Solar vendors are also required to use “Standardized Inputs and Assumptions for Calculating Estimated Electricity Bill Savings from Residential Solar Energy Systems” when providing bill savings estimates provided as part of the solar sales process.³²⁸ As part of the interconnection process, the vendors must submit signed copies of the disclosures, as well as submitting a valid CSLB license.³²⁹ In addition, the utilities must track complaints they receive related to solar providers and report those complaints to the CPUC.³³⁰

In addition to these existing measures, the Joint Utilities’ consumer protection proposal includes (i) updates to the California Solar Consumer Protection Guide and other applicable materials, (ii) building consumer protection into the core design elements of our NEM Reform Tariff, (iii) implementing robust ME&O, as well as (iv) stopping the cost shift.

There is no opposition to the Joint Utilities’ proposal.

a. Updates to Existing Consumer Protection Information

Once the design of the Reform Tariff is determined, consumer protection documentation will need to be updated to reflect changes. This documentation includes the California Solar Consumer Protection Guide and Standardized Inputs and Assumptions for solar bill savings estimates. However, not all such updates should await the adoption of a new tariff.

The Joint Utilities also propose that no later than November 1, 2021, the Commission would update the current Consumer Protection Guide to indicate changes to NEM may be

³²⁷ Ex. IOU-01 (McCutchan) 192: 6-13.

³²⁸ Ex. IOU-01 (McCutchan) 192:14-17.

³²⁹ Ex. IOU-01 (McCutchan) 192:18-22.

³³⁰ Ex. IOU-01 (McCutchan) 192:23-24.

instituted in 2022. By doing so, customers who may be considering solar would be aware that their bill savings may be different over time.

b. Key Design Elements of our Reform Tariff that Will Protect Consumers

As described further below, our proposal will provide greater transparency to customers and vendors, and will be easier to understand. These elements will reduce confusion about successor tariff billing and facilitate consumer protection.

(1) Monthly True-Ups

Under our Reform Tariff, we are proposing to change the true-up period from annual to monthly. This will reduce unexpectedly high bills some NEM customers face at the end of their annual period, which is a significant pain point for many customers. Hearing about high yearly true-up bills from peers may even dissuade some customers from going solar. In PG&E's service area, residential NEM customers are more likely to use PG&E's Payment Arrangement option, which provides customers a payment extension. Compared to customers who are not on NEM, the use of this option is about 70% higher among non-CARE NEM customers and 30% higher among NEM CARE customers, which suggests that some NEM customers have trouble paying their true-up bills.³³¹

As Joint Utility witness McCutchan explained in response to a question from ALJ Hymes:

ALJ Hymes: Do you, or rather do the IOUs believe that the true-up periods are a consumer protection issue?

Witness McCutchan: So I think they are in the sense that it sometimes takes a long time for somebody to get the signal that they are either still using a good bit of energy despite having the solar or maybe not maximizing when they are using energy. Because although we do show their accumulated charges as they go through -- in the monthly bills, because they don't show up in the line items that somebody actually pays, they can escape attention. And so I do believe it is a consumer protection [challenge].³³²

³³¹ Ex. IOU-01 (McCutchan) 194:1-195:1.

³³² McCutchan, T. 640:24 to 641:10 (July 29, 2021).

(2) Standardized Export Compensation

A clear standardized compensation rate for solar exports would simplify Reform Tariff billing and improve customers' ability to understand projected and realized bill savings. While customers often rely on analysis from vendors and installers to evaluate the overall cost-effectiveness of systems, many customers want to understand what drives bill savings in order to validate the projected savings before they purchase solar. Customers also often wish to verify that projected savings have in fact materialized after an investment in solar.

Under the current NEM 2.0 structure, estimating and validating bill savings is complicated and confusing for customers. Under NEM 2.0, the amount owed by customers at their annual true-up is in part a function of charges for consumption and credits for exports to the grid, valued at the customers' underlying rate. However, export credits cannot offset charges at true-up below the amount of the customers' total NBCs, which, in effect, changes the value of solar exports. If a customers' net imports from the grid are not coincident with the hours in which solar is generating, and the customer has a larger solar system that is creating significant export credits during the day, then the total amount owed at true-up can be a function of the NBCs, rather than the sum of export credits and consumption charges. This tariff structure was put in place by Decision 16-01-044 to ensure that a certain minimum of NBCs would be collected from NEM 2.0 customers. However, this structure has significantly complicated the overall bill savings a customer will experience and is very difficult for customers to understand.

Setting standardized export compensation rates (coupled with collection of NBCs through the Grid Benefits Charge) would ensure that customers pay a reasonable share of NBCs in a much simpler manner. It would make the value of solar exports more transparent and improve customer understanding of potential and realized bill savings under the Reform Tariff. Finally, having a clear price signal of the cost of energy consumed from the grid versus exported to the grid would provide more clarity on how load management behavior or technologies such as storage will affect overall bill savings.

(3) The Grid Benefits Charge

Making bills transparent and understandable is a key principle underlying consumer protection.³³³ Under the Joint Utilities' proposal, a default rate with a customer charge and Grid Benefits Charge makes the fact that solar customers still use the grid -- and must pay for grid services -- more transparent and understandable for customers, both before they invest in solar and in understanding their solar bills.

As discussed elsewhere in this brief, the Grid Benefits Charge addresses solar customers' use of the grid at night and at other times when their electric load exceeds their solar system's generation. Also, solar customers use the grid when their solar panels export excess generation to the grid to generate NEM credits. As Joint Utility witness McCutchan explained:

[T]here is an impression that customers believe that they are providing value to the grid that is commensurate with the retail rate credit.

And I think it's important for customers to get appropriate price signals that are more in line with cost causation.³³⁴

The Grid Benefits Charge is the most transparent and understandable way for customers to be charged for these services.

c. Robust ME&O

Empowering customers to understand NEM changes is a key component of consumer protection.³³⁵ To this end, we plan to conduct Marketing, Education, and Outreach activities to provide customers and vendors information on the next tariff. The Joint Utilities' ME&O program -- which is more robust than that offered by any other party in this proceeding -- is explained above.

³³³ See discussion above regarding R.14-07-002 and D.18-09-044.

³³⁴ McCutchan, T. 632:16-22 (July 29, 2021).

³³⁵ Ex. IOU-01 (McCutchan et al.) 187.

d. The Importance of Stopping the Cost Shift

Last, but not least, another important consumer protection issue that must be faced by the Commission in this proceeding is the cost shift. The Commission cannot fairly conclude that it has protected consumers without addressing and ending the cost shift.

As the Joint Utilities and many other parties have shown -- and virtually every other party in this proceeding has conceded -- there is a massive ongoing cost shift taking place, transferring wealth from our lower-income customers to our higher-income customers. Until this is fixed, any other consumer protection measures that the Commission may adopt should be considered insufficient and ineffectual.

4. Revenue Allocation and Cost Recovery

The Joint Utilities' proposal for revenue allocation and cost recovery that is presented in our opening testimony should be adopted.³³⁶ No party provided responsive testimony or opposed our proposal.

The Joint Utilities' cost allocation and recovery proposals are consistent with the Guiding Principles established through D.21-02-007 and the Rate Design Principles discussed in D.15-07-001.³³⁷ Specifically, the Joint Utilities address the new subsidies emerging from our Income Qualified Discount proposal and the STORE Program, as well as the costs for implementation and ME&O. In summary, the Joint Utilities' cost recovery and allocation proposal is set forth in the table below.

Revenue Allocation and Cost Recovery Summary

Element	Cost Recovery	Revenue Allocation	Manner
Income Qualified Discount	Two-way balancing accounts	Generation component to generation rates; delivery component to Public Purpose Program charges	Tier 1 advice filing after Reform Tariff adoption
STORE Program	One-way balancing accounts up to cap; separate application for costs over cap	To be determined after stakeholder process	Tier 2 advice filing after stakeholder process

³³⁶ Ex. IOU-01 (Thomas et al.) 197 *et seq.*

³³⁷ Ex. IOU-01 (Thomas et al.) 197-198.

Implementation and ME&O	Memorandum accounts	Distribution rates	Accounts created through Tier 1 advice filing; amounts resolved through future GRC Phase 1 filings or other application or proceeding
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The Joint Utilities' proposals for each of these elements is discussed further below.

a. The Income Qualified Discount

The Joint Utilities have proposed to use two-way balancing accounts to record and recover the revenue shortfall associated with the Income Qualified Discount.³³⁸ The generation portion of the discount will be allocated based on bundled generation marginal costs and recovered annually through bundled generation rates. The delivery portion will be allocated based on contribution to system revenues and recovered annually through the PPP charge rate component.

Two-way balancing account treatment is appropriate to recover the revenue shortfall since the amount of the discount as well as the criteria used to determine customer eligibility will have been set by the Commission when it issues the final decision on this matter. Additionally, the rate design is equitable to bundled and unbundled customers such that the revenue shortfall related to the services provided to each customer group are recovered from that customer group. The Joint Utilities propose to file a Tier 1 advice letter to establish any new balancing accounts or modifications to existing balancing accounts that would be necessary to record and recover the discount's revenue shortfall.

b. The STORE Program

The Joint Utilities have proposed the use of one-way balancing accounts to record the related costs of the STORE Program.³³⁹ After the program is better defined through the

³³⁸ Ex. IOU-01 (Thomas et al.) 199:21-22.

³³⁹ Ex. IOU-01 (Thomas et al.) 200:12 *et seq.*

stakeholder process described previously, each of the respective utilities will present a forecast of the total expenses and the related revenue requirement for the program in a Tier 2 advice letter filing.

Upon Commission approval of that advice letter, the actual expenses incurred up to the adopted amounts will be recorded to the one-way balancing account. Additionally, the utilities would be authorized to record -- into either a separate a memorandum account or a separate subaccount within the one-way balancing account -- any costs for the STORE Program in excess of the adopted amounts with such costs to be recovered only after the filing of an application, subject to a reasonableness review of those incremental costs above the originally authorized amount. Costs will be allocated based on contribution to system revenues or on a functional basis depending on how the program's attributes and costs are divided among the load serving entities offering the program.

This proposed one-way balancing account treatment is appropriate in situations like this where (1) the Utilities are performing necessary work to better serve its customers in the ordinary course of business, (2) the Utilities are able to develop a reasonable forecast for the cost of the work to be performed, and (3) parties will have an opportunity to review the proposed scope of the necessary work and the associated forecasted costs through the advice letter process before any costs are recorded to the balancing account.

c. Implementation and ME&O Costs

Prior to implementation of the NEM Reform Tariff, the Joint Utilities propose to file a Tier 1 advice letter, which would establish new memorandum accounts for implementation and ME&O costs.³⁴⁰ Memorandum accounts are appropriate in situations such as this when a utility is unable to make a forecast due to uncertainties surrounding the content and timing of the NEM reform tariff that will be implemented.

³⁴⁰ Ex. IOU-01 (Thomas et al.) 201:14-17.

Disposition of the balances in these accounts would be addressed for reasonableness in the utilities' respective future General Rate Case (GRC) proceedings, or another applicable application or proceeding. Typically, because the incremental activities associated with implementation and ME&O are the same in nature and purpose as standard customer care and implementation activities in the provision of electric service, these types of costs are normally presented and litigated in a GRC Phase 1. Nonetheless, it may be appropriate to present these costs for review in another application or proceeding depending on the circumstances facing the particular utility at that particular time.

Consistent with the treatment of implementation and ME&O costs for similar activities, the Joint Utilities propose that the costs associated with implementation, as well as ME&O, be allocated based on distribution marginal costs and recovered through distribution rates.

VI. ISSUE 6: OTHER ISSUES THAT MAY ARISE RELATED TO CURRENT NET ENERGY METERING TARIFFS AND SUB-TARIFFS

A. Virtual NEM Tariffs Should Be Reformed In Alignment with Other NEM Tariffs

Virtual NEM tariffs have contributed to the cost shift. Some parties were silent on how the Commission should address virtual tariffs while others advocate continuing such tariffs with little or no change.³⁴¹ The record supports reform of virtual tariffs in alignment with the reform of other NEM tariffs.

1. Existing Virtual Tariffs

There are four virtual tariffs, two that enable solar installations for income qualified customers, and two that are available for all customers. More specifically:

- Multifamily Affordable Solar Housing (MASH) Program is the virtual net metering program first developed to serve income qualified customer participants.
- Solar on Multifamily Affordable Housing (SOMAH) is the virtual net metering program for income qualified multi-family housing that receives an incentive through

³⁴¹ See e.g., Ex. IVY-01 (Detrio) 8:1-4.

the SOMAH program.

- Virtual NEM (NEMV) is the virtual net metering program for multi-tenant or multi-meter properties comprising a single project on contiguous and adjacent parcels.
- NEM Aggregation (NEMA) is the virtual net metering program originally designed for agricultural customers but open to any customer meeting the criteria of a single owner with multiple accounts on contiguous and adjacent parcels.

All four virtual tariffs share a common characteristic: they enable a multi-meter property owner with a generating facility to allocate credits to those meters (i.e., the “benefitting accounts”) based on electricity exported by the generating facility.

The virtual NEM tariffs (including under MASH and SOMAH) provide service to an arrangement of accounts: one generating account with no other load and several “benefitting accounts.” The generating account, and perhaps some benefitting accounts, and all the real estate is owned or under the control of a single customer. The benefitting accounts are typically tenants of that customer. All of the accounts in the entire arrangement must be on contiguous and adjacent parcels of land under the ownership or control of the single owner. There is no requirement in the current NEMV tariff for the arrangement to be in a single building, on a single parcel, or even on a single circuit.³⁴²

NEMA was created with agricultural customers in mind to accommodate their loads across multiple meters.³⁴³ The NEMA tariffs provide service to a single customer and also consist of an arrangement of a single generator account with benefitting accounts. As with NEMV, all accounts in the arrangement must be located on contiguous/adjacent parcels of land under ownership or sole control of the customer. Also like NEMV, there is no requirement that

³⁴² Ex. IOU-03, PG&E Electric Schedule NEMV, Sheets 1-2; Ex. IOU-04, PG&E Electric Schedule NEM2V, Sheets 1-2.

³⁴³ SB-594, Senate Floor Analysis (Aug. 30, 2012) pp. 4-5.

the arrangement be located in the same building, on a single parcel, or on the same circuit.³⁴⁴

2. Reform of the Virtual Tariffs Must Comply with Public Utilities Code Section 2827.1

NEMA tariffs were established by statute (Public Utilities Code Section 2827(h)(4)), and although the NEMV tariffs are not based on explicit statutory language, they were implemented within the framework of the legislatively authorized NEM program.³⁴⁵ Consequently, the requirements for these virtual tariffs as specified by Public Utilities Code Section 2827 no longer apply; rather any such tariff “shall be pursuant to Section 2827.1.”³⁴⁶ Thus, contrary to assertions made by the Agricultural Energy Consumers Association and the California Farm Bureau Federation (“AECA/CFBF”), reform of NEMA need not comply with the net energy metering calculation set forth in Section 2827(h).³⁴⁷ Specific terms in Section 2827 for the NEMA and other virtual tariffs persist only to the extent the Commission chooses to include them pursuant to AB 327. In particular, any NEMA or NEMV tariff that continues pursuant to AB 327 must be compliant with the terms of Section 2827.1, as does the NEM program in general.

3. The Joint Utilities’ Proposed Reforms to the Virtual Tariffs Align with Their Proposed Reform Tariff and Advance Consumer Protection

The Joint Utilities’ proposed modifications to the virtual tariffs are designed to achieve symmetry with the Reform Tariff proposal. As such, the primary modification to both the VNEM and NEMA tariffs proposed by the Joint Utilities is to value exports from the generating account at the avoided cost as proposed under the Reform Tariff, and to allocate the revenues from exported energy to benefiting accounts as a dollar credit. Benefitting accounts will continue to

³⁴⁴ Ex. IOU-05, PG&E Electric Schedule NEM, Sheets 6, 21-22; Ex. IOU-06, PG&E Electric Schedule NEM2, Sheets 6, 23-24. *See also* McCann, T. 1920:18-21 (Aug. 9, 2021) (confirming that NEMA accounts do not have to be all on the same electric circuit).

³⁴⁵ *See* D.08-10-036 and D.11.07-031.

³⁴⁶ Pub. Util. C. § 2827(c)(4)(D).

³⁴⁷ Ex. AEC-02 (McCann) 3:16-20.

take service on any tariff for which they qualify, and they will continue to be billed for actual metered usage under that tariff. Because the customer is allocated a dollar credit for exports compensated at avoided costs, there is no need for a Grid Benefits Charge.³⁴⁸

These same reforms would apply to income qualified virtual tariffs. However, the new income qualified virtual tariffs would have three differences: (i) the owner of the generating facility would be responsible for interconnection costs only if the generator exceeds one megawatt (whereas the owner of the generator under a non-income qualified virtual tariff is responsible for all interconnection costs); (ii) the income qualified tariff would maintain the current credit allocation rules of the SOMAH program; and (iii) income qualified customers on a virtual tariff, who do not have the benefit of the discounted grid benefits charge (since no GBC would apply), would still receive the same financial benefit either by applying the income qualified GBC credit or a functionally equivalent \$/kWh credit.³⁴⁹

By compensating eligible generators at avoided cost, the Joint Utilities' virtual tariff proposal ensures that beneficiaries of these tariffs are not unduly subsidized by other customers. Virtual crediting also advances consumer protection. The simplicity and clarity of the tariff provides customers/tenants on benefitting accounts with a clear value for their allocation from the renewable generator. This allows the customer/tenant to easily compare the value they receive from the allocation to the price they pay to the landlord for that allocation, whether increased rent or monthly payment. Likewise, the clarity of the credits replacing NEMA is a significant improvement over the complicating, and often confusing, billing NEMA customers experience today.³⁵⁰

³⁴⁸ Ex. IOU-01 (Kerrigan) 157:17-158:11.

³⁴⁹ Ex. IOU-01 (Kerrigan) 158:12-17; Kerrigan, T. 747:15-748:8 (July 30, 2021).

³⁵⁰ See Ex. IOU-01 (Kerrigan) 155:21-156:13 and n. 214 (explaining NEMA's complicated billing); Exs. IOU-05 and IOU-06, PG&E Electric Schedule NEM and NEM2, respectively, at Sheet 9 (describing load aggregation billing at ¶ e).

4. Reform of the Virtual Tariffs Is Appropriate

Some parties argue that virtual tariffs should remain unchanged, arguing that because the NEM 2.0 Lookback Study did not analyze virtual tariffs the Commission therefore should not consider modifying them.³⁵¹ The Lookback Study does not limit the Commission's authority and there is ample record to support reform of virtual arrangements without relying on specific findings of the Lookback Study.

First, virtual net metering arrangements have well-known similarities to single account NEM, and those similarities were included in the Lookback Study. Primarily, NEM, VNEM and NEMA currently credit customers for exports to the grid at retail rates, less certain NBCs. As the Lookback Study established, and as confirmed further by E3's Comparative Analysis using the 2021 ACC, the avoided cost of any energy produced is far less than the credit received by participating customers – whether NEM or virtual NEM.³⁵²

Second, virtual arrangements have some key differences from single account NEM amplifying the need for reform of the virtual tariffs. Consider:

- As referenced above, there is no requirement in either the NEMV or NEMA tariffs, or the statute, that the load served be within a set distance of the generator, or on the same utility circuit. Thus, unlike NEM, the distribution, or even the transmission grid, may be necessary to transport electricity to the benefitting accounts, where it is billed as if it had been generated behind the benefitting account meter.
- Virtual arrangements support a larger generator, as they are based on more than one account, thereby benefitting from economies of scale, costing less per kW installed than a NEM generator benefitting a single account. Consequently, the payback period for a virtual arrangement, all other things being equal, would be less.

³⁵¹ Ex. EWG-01 (Cook) 3:11-14; Ex. IVY-01 (Detrio) 5:19-25.

³⁵² Ex. IOU-02 (Kerrigan) 108:24-109:4.

- Billing costs for the virtual tariffs are over ten times the cost of simpler NEM billing arrangements.³⁵³

These similarities and differences between virtual net metering and standard NEM amply justify the need for reform of the virtual tariffs in a way that mirrors reform of the core tariff.

5. Ivy Energy's Criticisms of the Joint Utilities' Proposed Virtual Tariff Reforms Are Unavailing

Ivy Energy criticizes the Joint Utilities' proposal for combining NEMV and NEMA under a single tariff.³⁵⁴ The criticism lacks merit as, even under the current tariffs, a NEMA arrangement could qualify under NEM2V. Notably, NEMA and NEM2V have harmonious applicability requirements: a single customer generator intended to primarily offset multiple benefitting meters located on contiguous parcels.³⁵⁵

In support of an argument for little change to virtual NEM, Ivy Energy also argues that generators qualifying under virtual tariffs have a de minimis impact on the grid.³⁵⁶ Ivy presents data demonstrating that, under certain conditions, nearly all generation from a virtual NEM system could physically supply the load of benefitting meters, without any of it being exported to the grid.³⁵⁷ While this may be true in the cases that Ivy identifies, it does not appear this is true for virtual NEM customers in general. Only 31% of benefitting meters under PG&E virtual NEM arrangements are located behind the same service transformer.³⁵⁸

Moreover, even if all virtual NEM arrangements were configured such that they physically exported less energy beyond the service transformer than standard NEM, it would not

³⁵³ Ex. IOU-01 (Kerrigan) 156:16-157:9; Ex. IOU-02 (Kerrigan) 109:5-10.

³⁵⁴ Ex. IVY-02 (Detrio) 2:3-10.

³⁵⁵ Compare Ex. IOU-04, PG&E Electric Schedule NEM2V, Sheet 1 ("Applicability) and Sheet 2 (defining "Property") with Ex. IOU-06, PG&E Electric Schedule NEM2, Sheets 23-24 (describing load aggregation). See also Detrio, T. 837:28-838:5 (July 30, 2021) (stating her understanding that a generator arrangement with multiple meters on contiguous property would not be excluded from qualifying under NEM2V).

³⁵⁶ Ex. IVY-01 (Detrio) 2:23-3:17; Ex. IVY-02 (Detrio) 2:12-3:9.

³⁵⁷ *Id.*

³⁵⁸ Ex. IOU-02 (Kerrigan) 109:13-16.

minimize the need for change. Even AECA/CFBF appears to acknowledge that full retail rate compensation should not continue, at least not under NEMA.³⁵⁹ Per the 2021 ACC, the average value of a kWh from a solar profile in PG&E's service territory is \$0.046, far less than any retail rate credit. Of this, \$0.0017 and \$0.00207 are categorized as being from distribution capacity and T&D losses, respectively.³⁶⁰ The utility proposal still provides these values in our virtual crediting successor tariff, even though they may not be justified for many virtual NEM configurations that do not, in fact, serve the load of the benefitting meters.

6. Net Energy Metering Aggregation Should Not Be Treated Differently

AECA/CFBF attempts to minimize the need for change of NEMA but their testimony is based on inaccurate claims.

First, AECA/CFBF state that agricultural customers on NEMA tariffs pay full transmission, distribution and NBCs and that, as a result, "there are no material cross subsidies from other ratepayers to NEMA customers."³⁶¹ The fallacy in this statement is that not all NEMA arrangements are composed of only agricultural accounts. Further, even with a demand charge, not all transmission and distribution costs are recovered. In fact, the bill savings of currently available PG&E agricultural rates exceed the avoided cost as calculated by the 2021 ACC by a significant margin (whether near term or long term levelized average avoided costs are used), meaning agricultural NEMA customers do shift costs to other customers.³⁶²

Second, AECA/CFBF cite analysis other than the ACC to argue that NEMA customers' investments benefited other customers through avoided generation, transmission, and distribution investments.³⁶³ All of these benefits have been included and quantified in the 2021 ACC, and are

³⁵⁹ Ex. AEC-01 (McCann) 6:10-16.

³⁶⁰ Ex. IOU-02 (Kerrigan) 109:18-20.

³⁶¹ Ex. AEC-01 (McCann) 2:3-4.

³⁶² Ex. IOU-02 (Kerrigan) 110:5-15.

³⁶³ Ex. AEC-01 (McCann) 8:17-9:18, 15:8-16:12.

much less than the compensation NEMA customers currently receive.³⁶⁴ This is not the appropriate venue to relitigate the merits of avoided cost methodologies.

Third, AECA/CFBF notes that the Commission “recognized that non-residential NEM and NEMA customers do not impose a burden on non-NEM customers and could even be providing a large benefit” when supporting SB 594, the initial legislation that established the NEMA tariff.³⁶⁵ This support, however, was conditional on the very different circumstances in 2012, and is not a reason for other customers (including non-participating agricultural customers) to continue to subsidize NEM for participating agricultural customers. In fact, in SB 594 the Legislature ordered the Commission to ensure that NEMA would “not result in an increase in the expected revenue obligations of customers who are not eligible customer-generators.”³⁶⁶ Resolution E-4610, which implemented the provisions of SB594 to implement NEMA, found that NEMA would not increase the overall cost shift of the NEM program largely because NEM was capped. At the time, the logic was that any increased non-residential adoption from NEMA would displace residential adoption under the cap, which would potentially reduce the overall cost shift of the program.³⁶⁷ With the cap having been lifted several years ago, that logic no longer applies.

In sum, NEMA should be treated no differently than the other virtual tariffs. NEMA should be reformed as the Joint Utilities propose.

B. The Joint Utilities’ VODE Tariff Proposal Should Be Adopted as an Alternative Option for Future Implementation

The Joint Utilities proposed a Value of Distributed Energy (“VODE”) tariff in their opening testimony.³⁶⁸ No party criticized, much less even commented on, the VODE tariff proposal.

³⁶⁴ Ex. IOU-02 (Kerrigan) 111:3-4.

³⁶⁵ Ex. AEC-01 (McCann) 7:10-12.

³⁶⁶ Pub. Util. Code § 2827(h)(4)(D).

³⁶⁷ Resolution E-4610 (Sept. 19, 2013), pp. 3-4, 9.

³⁶⁸ Ex. IOU-01 (Kerrigan) 149:1-152:3.

The VODE tariff is designed to accommodate future use cases that may require a dual-meter option to facilitate more advanced uses of distributed generation such as demand response or microgrid participation. It also may be preferable to some customers due to its simplicity or the improved ability to monitor performance. The details of the VODE tariff are set forth in the Joint Utilities' opening testimony.³⁶⁹ In summary:

- This tariff would be available as an option for all residential and small commercial customers installing generation systems less than 1 MW in size.
- Participating customers would continue to install their generators behind their primary meter and would also install separate generation output meter. Output meter data would be combined with the primary meter data to determine the customer's gross usage and generation.
- Compensation from this tariff should be approximately equal to the estimated average compensation provided via the Reform Tariff to non-CARE customers.³⁷⁰

VODE has been recognized as simpler and more transparent for participating customers than other behind-the-meter generation compensation mechanisms. Under current NEM structures, customers do not have access to solar generation data through utility bills or customer education tools, because the utilities do not have access to metered solar generation data. Customers often want to see the full picture of their total usage, inclusive of what part of their onsite usage was met through solar generation. Customers often also want to understand what their bill would have been without solar, which utilities do not have the information to provide without metered solar generation data. The VODE structure provides greater visibility into total usage, coupled with solar generation, and the impact on overall electric costs, enabling customers to better manage costs through load management behaviors or technologies.³⁷¹

³⁶⁹ *Id.*

³⁷⁰ Ex. IOU-01 (Kerrigan) 149:1-150:11.

³⁷¹ Ex. IOU-01 (Kerrigan) 151:3-152:3.

The Joint Utilities do not propose that the VODE tariff would be available for customers on the same timeline as the core tariff. Rather, this option could be implemented at a later date as needed. For example, a utility could offer this option to meet customer demand or to facilitate a power sharing tariff or a demand response program. Given the absence of any comment or criticism from any party, the Commission should include the VODE tariff as an option for the utilities to implement in addition to the core tariff.

VII. CONCLUSION

For all the above reasons, the Joint Utilities recommend that the Commission adopt their proposed Reform Tariff as it is best suited to end the cost shift, meet the legislative mandates of Public Utilities Code Section 2827.1 and further the Commission's Guiding Principles.

Pursuant to Rule 1.8(d) of the Commission's Rules of Practice and Procedure, PG&E has been authorized by representatives of SDG&E and SCE to submit this filing on their behalf.

Respectfully Submitted,
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Dated: August 31, 2021

APPENDIX OF ACRONYMS

Acronym	Description
AB	Assembly Bill
ACC	Avoided cost calculator
AECA	Agricultural Energy Consumers Association
ALJ	Administrative Law Judge
AMI	Area median income
APS	Arizona Public Service
BTM	Behind the meter
CAISO	California Independent System Operator
Cal Advocates	The Public Advocates Office at the CPUC (also CalPA or PAO)
CalWEA	California Wind Energy Association
CALSSA	California Solar and Storage Association
CARE	California Alternate Energy Rates
CCSA	Coalition for Community Solar Access
CEC	California Energy Commission
CFBF	California Farm Bureau Foundation
CPUC	California Public Utilities Commission
CGS	Customer-grid supply
CSIP	Common Smart Inverter Profile
CSI	California Solar Initiative
CSLB	California State Licensing Board
CSS	Customer-self supply
CUE	California Utility Employees
DAC	Disadvantaged Communities
DFPI	Department of Financial Protection and Innovation
DG	Distributed Generation
DLAP	Default Load Aggregation Price
DER	Distributed energy resources
E3	Energy and Environmental Economics, Inc.
ECR	Export compensation rate
ESJ	Environmental and social justice
FERA	Family Electric Rate Assistance
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
GBC	Grid Benefits Charge
GHG	Greenhouse gas
GRC	General Rate Case
GT	Green tariff
GW	Gigawatt
HECO	Hawaii Electric Companies
HFRA	High Fire Risk Areas
HFTD	High Fire Threat Districts
IEEE	Institute of Electrical and Electronics Engineers

APPENDIX OF ACRONYMS (continued)

Acronym	Description
IDER	Integrated Distributed Energy Resources
IOU	Investor Owned Utilities
IQD	Income qualified discount
IRP	Integrated Resource Plan
kWh	Kilowatthour
kW	Kilowatt
LADWP	Los Angeles Department of Water and Power
MASH	Multifamily Affordable Solar Housing program
ME&O	Marketing, Education and Outreach
MIT	Massachusetts Institute of Technology
MTC	Market Transition Credit
MW	Megawatt
MWhs	Megawatthours
NBC	Non-bypassable charges
NCCETC	North Carolina Clean Energy Technology Center
NEM	Net Energy Metering
NEMA	Net Energy Metering Aggregation
NRDC	Natural Resources Defense Council
NREL	National Renewable Energy Laboratory
NSC	Net Surplus Compensation
NSHP	New Solar Homes Partnership
NUS	Non-bypassable, unavoidable, and shared
NV	Nevada
NY	New York
PAC	Program Administrator Cost
PCF	Protect our Communities Foundation
PCT	Participant cost test
PG&E	Pacific Gas and Electric Company
PPA	Power Purchase Agreement
PSPS	Public Safety Power Shutoff
PTO	Permission to operate
PURPA	Public Utility Regulatory Policies Act
PV	Photovoltaic
QF	Qualifying Facility
REC	Renewable Energy Credit
RIM	Ratepayer Impact Measure
RPS	Renewable Portfolio Standard
SASH	Single Family Solar Homes
SOMAH	Solar on Multifamily Affordable Housing
SB	Senate Bill
SCE	Southern California Edison Company
SCT	Societal Cost Test

APPENDIX OF ACRONYMS
(continued)

Acronym	Description
SDG&E	San Diego Gas & Electric Company
SEIA	Solar Energy Industry Association
SGIP	Self-Generation Incentive Program
SMUD	Sacramento Municipal Utility District
SPM	Standard Practice Manual
SOMAH	Solar on Multifamily Affordable Housing
STORE	Savings Through Ongoing Renewable Energy
T&D	Transmission and distribution
TOE	Time of export
TOU	Time of use
TRC	Total Resource Cost
TURN	The Utility Reform Network
UC	University of California
VNEM	Virtual Net Energy Metering
VODE	Value of Distributed Energy
VS	Vote Solar