Rulemaking No.: 20-11-003 .

Exhibit No.: PES-2

Witnesses David Meyers

Commissioner Marybel Batjer

ALJ Brian Stevens

OPENING PHASE 2 PREPARED TESTIMONY OF POLARIS ENERGY SERVICES

Rulemaking 20-11-003
2021 Extreme Weather Event Reliable Electric Service

September 1, 2021

R.20-11-003 (Extreme Weather)
OPENING PHASE 2 PREPARED TESTIMONY OF
POLARIS ENERGY SERVICES

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I.
EXECUTIVE SUMMARY

Polaris Energy Services (Polaris) is the leader in agricultural demand response (DR) and load management. Polaris manages a network of 500+ irrigation and water conveyance pumps connected in the field to Polaris Pump Automation Controllers (PAC) gateways and third-party irrigation management systems--that represent more than 70 MW of peak demand. Polaris aggregates irrigation pumping load in the Baseload Interruptible (BIP) and Capacity Bidding (CBP) programs and manages customers' participation in Peak Day Pricing (PDP)/Critical Peak Pricing (CPP). In 2020, Polaris delivered 83% of enrolled/nominated load during 85 hours across 23 distinct DR events.

Polaris is the largest developer of AutoDR projects in California, by megawatts deployed and incentives paid and completed a three-year, $2.8 Million research and development project funded by the California Energy Commission (CEC) to develop *'Technologies and Strategies for Agricultural Load Management to Meet Decarbonization Goals'* and won the CEC's California Energy Visionary Awards, Best in Dynamic Buildings and Grid, in 2020. The project included deep qualitative and quantitative analysis to develop program and market designs and recommendations for improving program execution. A Transactive Energy (dynamic pricing) pilot was conducted that achieved shift of two thirds of afternoon ramp hour load from participating irrigation pumps. Based on the success of that pilot, Polaris was awarded a $2.8 Million follow-on grant by the CEC in 2021 to deploy systems for load shift and DR across 200 – 300 additional service points representing 25 – 40 MW of peak load.

Rulemaking (R.) 20-11-003 is the Order Instituting Rulemaking (OIR) to Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of an Extreme Weather Event in 2021. On December 21, 2020, Assigned Commissioner Batjer issued an Assigned Commissioner's Scoping Memo and Ruling (Scoping Memo).

On January 11, 2021, Polaris submitted the Opening Prepared Testimony of Polaris Energy Services wherein Polaris provided its Proposal to modify DR programs, specifically the CBP and BIP. Polaris testified that if the Commission adopts Polaris's proposal then agricultural DR will be able to reach more of its potential in California.[1] On February 10, 2021, ALJ Stevens issued a Ruling which received this Testimony into evidence as Exhibit (Ex.) PES-1.

On August 10, 2021, Assigned Commissioner Batjer issued an Amended Scoping Memo and Ruling for Phase 2 (Amended Scoping Memo). The Amended Scoping Memo states that "[a]ll proposals submitted by parties, but addressed in the Phase 1 decision, may be considered in this Phase. If a party recommends such a proposal, it shall refer to the proposal in its Opening Testimony or Opening Brief."[2] The Amended Scoping Memo also states that Phase 2 of this proceeding will examine additional supply and demand side resources and changes to current requirements needed to meet Governor Newsom's emergency proclamation which include modifications to existing supply-side demand response programs and new demand response programs or pilots.[3] On August 16, 2021, ALJ Stevens issued a Ruling Issuing Developed Staff Concepts Proposal Document and Seeking Comment in Opening Testimony Due September 1, 2021.

Polaris's initial proposal was not considered in the Phase 1 decision and as such, Polaris again requests approval of the proposals set forth in Ex. PES-1. In addition, below Polaris sets forth an Agricultural AutoDR Demand Flexibility pilot to be made available to customers on irrigation pumping tariffs in investor-owned utility (IOU) service territories. Polaris recommends that the Commission adopt both of these proposals.

[1] Ex. PES-1, at p. 7.
[2] Amended Scoping Memo, at p. 6.
[3] *Id.*, at pp. 4-5.

II.
BACKGROUND

As testified to in Ex. PES-1, there are numerous benefits to agricultural pumping and DR. To begin with:

> Agricultural pumping has more shed and shift potential that can be built more quickly at lower costs than other sectors,[4] especially residential space cooling and electric vehicle (EV) changing that are receiving a lot of attention in this proceeding. Agricultural pumping has proven highly reliable in demand response events and is beneficial because of its mostly binary operating profile (pumps are either on or off), large loads controlled by a relatively small number of decision makers and lower weather sensitivity compared to cooling loads.[5]

The following tables, both cited in Ex. PES-1 demonstrate these benefits:

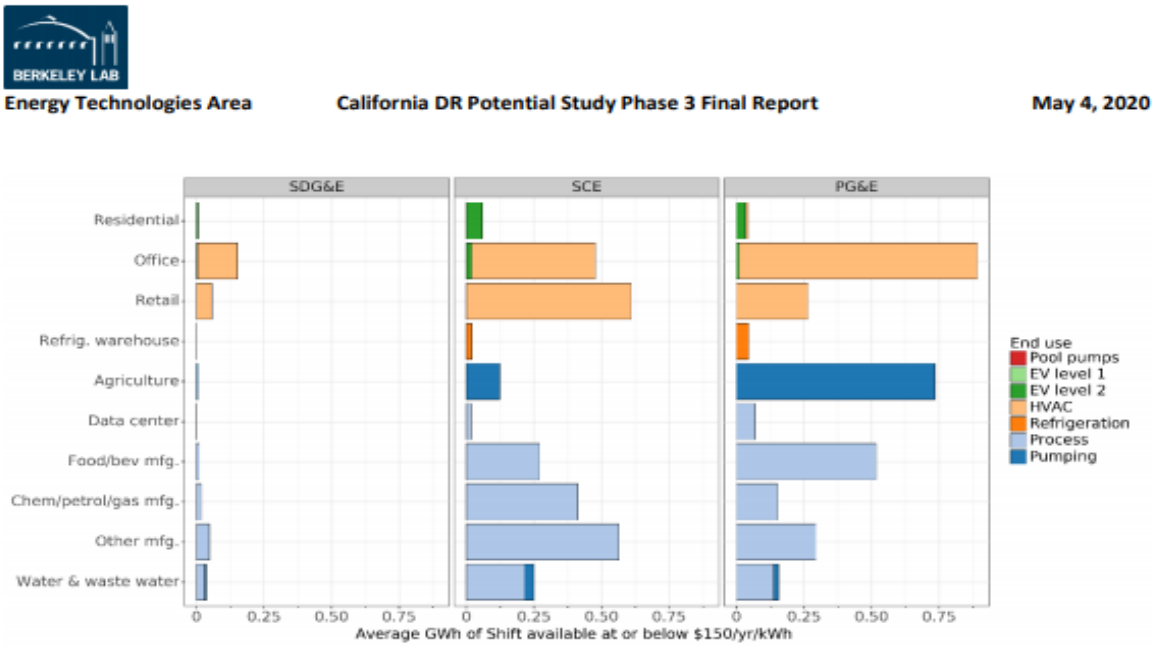

Figure 3-9. The Shift resource available in forecast year 2030 at the BTM battery price referent ($150/yr/kWh), disaggregated by utility service territory, building type, and end use.

[4] *See*, LNBL DR Potential Study Phase 3.
[5] Ex. PES-1, at p. 2, lines 12-18.

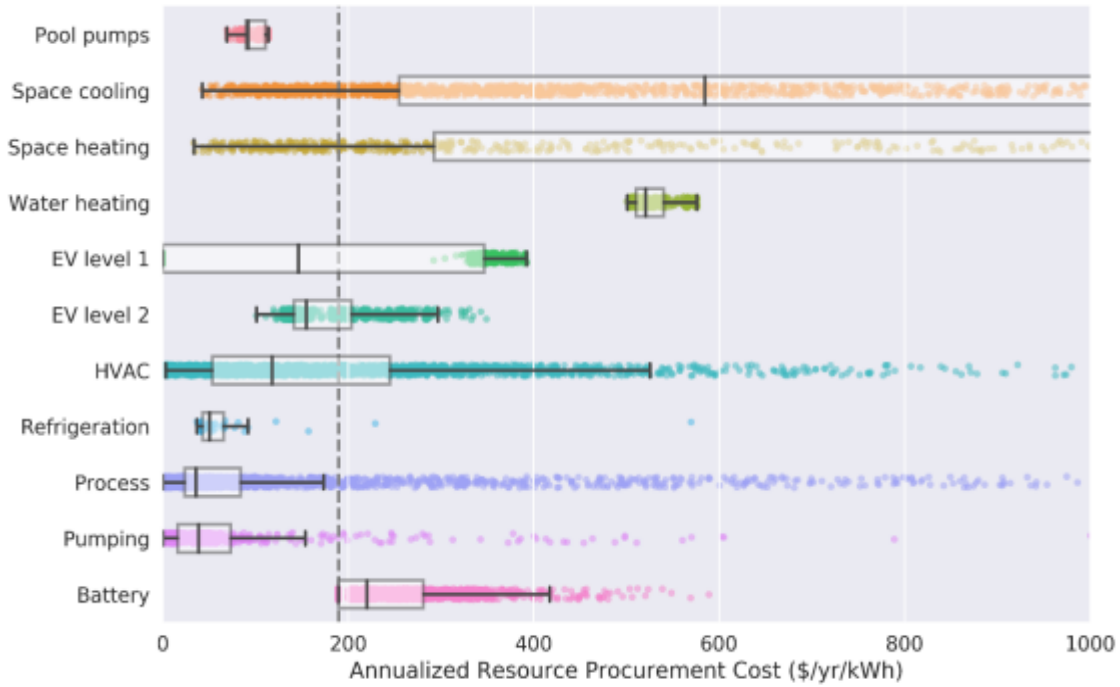

Figure 3-17. Installed costs, circa 2015, for Shift-enabling technologies, by end use, for a typical site in each customer cluster modeled in DR-Path. The minimum battery cost is shown as a vertical dashed line for reference. Box plots show the interquartile range (IQR, middle 50 percent of cluster costs), and whiskers show points beyond the IQR that are within 1.5 times the magnitude of the IQR.

Polaris identified in Ex. PES-1 the problems and obstacles for agricultural DR which include but are not limited to the following:

- TOU conflicts which will reduce agricultural DR participation starting in 2021;
- As to the CBP Baseline, forecasting is required when operations are not known which can disincentivize participation;
- BIP penalty risk compared to potential incentives has reduced the portfolio by 1/3; and
- Existing problems with AutoDR incentive calculations that limit and slow enrollments.[6]

The initial Phase 1 Proposal that Polaris set forth sought to remedy these issues. In addition, Polaris has performed additional evaluations and sets forth the Phase 2

[6] Ex. PES-1, at p. 4, lines 4-17.

proposal below. Both of Polaris's proposals should be adopted by the Commission to solve existing problems and obstacles for agricultural DR.

III.
POLARIS'S PROPOSALS TO MODIFY EXISTING DR PROGRAMS

In Ex. PES-1, Polaris set forth a CBP Proposal.[7] In this proposal, Polaris argued that CBP should offer a Firm Service Level (FSL) baseline option for customers on pumping tariffs.[8] Polaris recommended the following modifications to the CBP rules and systems:

- Bidding should be made on the same time frame and same energy price structure and rules for adjusting during the delivery month;
- Capacity bid should be the FSL for the aggregation;
- Monthly compensation should be made on the monthly capacity rate multiplied by the Monthly Average Program-hour Demand, instead of the capacity nomination;
- Event compensation should be Monthly Average Program-hour Demand multiplied by event hours less excess energy which is then multiplied by strike price;
- As to events, the number, duration, notification, etc. should be the same as current; and
- Excess energy charge should be the strike price multiplied by the kilowatt-hours in excess of the FSL consumed during event(s).[9]

Ex. PES-1 also included the following table:

[7] Ex. PES-1, at pp. 4-6.
[8] *Id.*, at p. 4.
[9] *Id.*, at pp. 4-5.

CBP FSL Baseline for Agricultural DR Model

1 KILOWATT PUMP	May	June	July	August	September	October	Total	Comments
Bid ($/MWh)	$600	$600	$600	$600	$600	$600		CBP Bid per existing rules - test scenarios by changing the number in B2
Event hours	2	2	10	20	10	0	44	Test scenarios by changing these
Capacity rate ($/kW)	$3.18	$3.88	$16.30	$22.54	$13.90	$2.27	$62.07	CBP Tariff
Monthly Average Program Hour Demand	25%	28%	30%	29%	19%	14%		Average usage during 1-9 PM program hours, adjusted for expected TOU response
Excess energy (hrs)	0	0	2	4	2	0	8	Test scenarios by changing these
Cap Pmt ($)	$0.80	$1.09	$4.84	$6.52	$2.58	$0.32	$16.16	Calculated from cap rate and MAPD
Energy Pmt ($)	$1.20	$1.20	$4.80	$9.60	$4.80	$0.00	$24.16	
Total Pmt ($)	$2.00	$2.29	$9.64	$16.12	$7.38	$0.32	$40.32	
Penalty	$0.00	$0.00	$1.20	$2.40	$1.20	$0.00	$4.80	Calculated from bid, excess energy hours, penalty %
% Capacity delivered	100%	100%	80%	80%	80%	100%	**82%**	Calculated from excess energy hours and event hours
% Capacity Payment earned	100%	100%	75%	63%	53%	100%	**70%**	Payment earned as % of potential capacity payment

2018 - 2020 MAPrD	34%	38%	40%	39%	25%	19%		Polaris CBP portfolio program hour usage as % of peak load
TOU Adjustment to program hour usage	74%							Derate of program hour load w/shift of 5-8 usage evenly across remaining 21 hours
MAPrD Adjusted for TOU Response	25%	28%	30%	29%	19%	14%		Expected MAPrD

The rebuttal by Pacific Gas & Electric (PG&E) to Polaris's CBP Proposal cited a DR Agricultural Study as the vehicle to test alternative performance measures.[10] Polaris recommended that PG&E move forward with a pilot that can deliver grid value while collecting data for future program design, rather than proceeding with the study. Therefore, despite the urgency of this proceeding and the Commission's clear preference for proposals that can deliver load reductions this year and next, PG&E's solution to this problem, a study rather than a pilot, will not deliver a single kilowatt of load before 2023, at the earliest. Polaris's CBP Proposal was carefully limited to modifications that could be implemented with minimal operational and system enhancements. With more time to implement modifications for 2022 than was available for 2021, Polaris asks that the Commission reconsider its proposals for program modifications in that light.

Polaris similarly supports the proposal by the DR Coalition[11] regarding BIP penalties.[12] This proposal was not adopted in D.21-03-056 and despite increased incentives, the risk/reward balance had the expected impact on our BIP portfolio. To prevent further attrition, the Commission should reconsider this proposal.

Polaris agrees with other DR aggregators and technology providers that Emergency Load Reduction Program (ELRP) was deeply flawed by not offering a predictable revenue stream—capacity payment or other—that would incentivize companies to recruit, implement and manage a new program.[13] However, Polaris supports the proposal <u>with</u> the understanding that the IOUs intend that participants be eligible for AutoDR incentives. AutoDR has been the prime motivating factor for

[10] Pacific Gas and Electric Company Emergency Reliability OIR Rebuttal Testimony (PG&E Rebuttal Testimony), submitted on January 19, 2021, at p. 4-2, lines 14-22.
[11] The DR Coalition are comprised of the California Efficiency + Demand Management Council, Google LLC, Leapfrog Power, Inc., NRG Energy, Inc., OhmConnect Inc., Oracle, Tesla, Voltus, Inc., and Willdan.
[12] Opening Prepared Testimony of the DR Coalition (Ex. DR Coalition-01), submitted on January 11, 2021, at p. 23, lines 3-16.
[13] Ex. DR Coalition-01, at p. 12, line 17 to p. 13, line 21.

agricultural sector customers to engage in DR and provides a predictable incentive to technology providers to recruit and enable new customers. The Commission should modify the ELRP program to be eligible for AutoDR incentives.

IV.
POLARIS'S PROPOSALS FOR NEW DR PROGRAMS OR PILOTS

In its response to the Scoping Memo, Polaris limited its proposals to minor program modifications that could be implemented in a matter of months, though it had already completed California Energy Commission (CEC)-funded research demonstrating that strong, clear price signals coupled with load automation can deliver orders of magnitude more load than the existing array of time-of-use (TOU) prices and DR programs. Since then, Commission staff have delivered the UNIDE framework and asked for proposals that align with that vision.[14] Therefore, Polaris proposes to implement an Agricultural AutoDR Demand Flexibility pilot to be made available to customers on irrigation pumping tariffs in IOU service territories.

The concept for the pilot builds on the UNIDE framework as elaborated in the *Forward Looking Vision: Advanced DERs & Demand Flexibility* presentation by the DR Section of the Energy Division on May 25, 2021. That framework incorporates approaches developed and tested by TeMix in its RATES pilot in the Southern California Edison (SCE) territory and adapted and tested for irrigation pumping loads by Polaris in its Transactive Energy Pilot in the PG&E service territory.

The challenges identified by the Commission staff in achieving DR and Demand Flexibility are magnified in the irrigation pumping sector, especially "Challenges in CAISO market integration, measurement & verification" and "Administratively & technically complex, inefficient, high transaction costs" and are documented extensively in the report for EPC-16-045.

This pilot will include automation of these loads to receive dynamic price signals and implementation of an experimental rate that incorporates dynamic energy and

[14] Forward Looking Vision: Advanced DERs & Demand Flexibility Management, dated May 25, 2021 and which can be found here: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/demand-response/demand-response-workshops/advanced-der---demand-flexibility-management/slides-unide-workshop_gupta.pdf

capacity charges in hourly prices. Customers who successfully respond to the price signals and shift load out of expensive hours--typically the ramp hours--will enjoy bill savings.

The UNIDE approach provides a roadmap to address these issues and is supported by the results of EPC-16-045, which documents how providing irrigation pumping customers with a single, simple price signal rather than complex TOU rates coupled with an array of DR options elicits significantly more load shift and provides significantly greater value to customers. One elegant solution 'kills many birds with one stone:'

- Aligns frequent load shift and operational (behavior) modification that is needed for decarbonization with occasional load shed that is needed to maintain reliability.
- Eliminates the rigid program enrollment and management process that absorbs a large slice of the demand flexibility pie and serves as a disincentive to participation.
- Eliminates the vagaries, complexities, and inefficiencies of trying to hammer the square demand-side peg into the round supply-side hole, including ill-fitting counterfactual baselines, commitment timelines (enrollment and nomination) that do not align with customer planning horizons, and CAISO/IOU settlement processes.

Irrigation pumping is a particularly good sector in which to begin this journey.

- There is inherent, untapped flexibility in operations for up to 100% of peak load behind a meter, compared to a portion of load for most other sectors (e.g., 25% for a commercial building).
- The reasons that the load has not responded at high rates to TOU signals and DR programs can largely be addressed by this approach.
- The sector is under significant financial pressure and in the midst of technology adoption that align with responsiveness to energy price signals.

Pilot Scope and Potential at Scale

Polaris proposes to make the experimental rate optional for all customers taking service on irrigation pumping tariffs in IOU service territories with the exception of customers of Valley Clean Energy (VCE) and community choice aggregators (CCAs) that opt in to the pilot separately proposed by VCE, if that pilot is approved by the Commission.

Based on data presented on the Transactive Energy Pilot conducted under Electric Program Investment Charge (EPIC) project EPC-16-045, agricultural customers were able to shift 67% of ramp hour load (4 – 9 p.m.) in the first year of participation and irrigation shift potential is estimated to be 74% of ramp hour load across California. Shift potential is based on analysis of weekly load profiles for 1,200 service points to identify how many hours of pump run time could be shifted from the ramp without changing the total weekly run time (which is how irrigations schedules are typically denominated). Using this methodology, there is approximately 196,000 MWh of annual shift potential across irrigation pumps in California. This calculation yields 39% less potential than LBNL's estimate, potentially due to the introduction of granular operational constraints.

Ag Load Shift Potential	
1	KW
8,760	Hrs/Year
22%	Load Factor
1,927	Operating Hrs/Yr
13%	5 Hrs in shift window (16-21)
74%	Operational Shift Potential
178	Shift Hrs/Yr
1,100	Peak MW
196,093	MW-h Shift/Yr
1,000	MW/GW
196	GWh Shift Total From Ramp Hours (16-21)
0.537	GWh Shift/Day
0.875	GWh Shift/Day (LBL P. 21)

Tariff Design

Polaris supports the UNIDE Tariff which is a two-part tariff: a subscription part and a dynamic part. This tariff is also known as a Subscription Transactive Tariff (STT). This pilot would implement the dynamic part of the tariff. The subscription part of the UNIDE Tariff is a fixed monthly bill for a specific hourly kWh load shape for the month. The fixed monthly bill and the hourly load shape will vary by month, based on the customer's projected needs. If the customer uses more or less than the subscribed kWhs in any hour then the customer's bill is charged or credited for the difference in kWh times a dynamic hourly $/kWh price determined by the dynamic part of the tariff.

The dynamic part is hourly or sub-hourly prices for electric energy. This description considers only hourly prices. The dynamic hourly price is a bundled energy price to buy electric energy at the customer's location. The otherwise applicable tariff for an agricultural customer is complex, as it involves a:

1. Customer Charge ($/meter per day)
2. Meter Charge ($/meter per day)
3. Summer/Winter Demand Charge ($/kw per month)
4. TOU Total Energy Charge ($/kWh)
5. Additional options such as Peak Day Pricing, Net Energy Metering, Demand Charge Rate Limiter and DR programs.

The goal of the UNIDE Tariff is to simplify the dynamic part of the Tariff to only an energy price so that customers can more easily manage or automatically manage their electricity use (and self-generation) to save money while also reducing costs to the LSE.

TeMix will use a tariff design worksheet to develop and calibrate the simple curves or formulas that will set the hourly dynamic energy price for each hour as a function of:

1. The CASIO hourly Locational Marginal Price
2. The load on the local distribution grid or circuit
3. The hourly total and net load placed on the wholesale grid
4. All fixed and variable costs of energy including resource adequacy (RA)
5. All fixed and variable costs of distribution

6. Other costs

The tariff formulas will be calibrated to fully recover projected total costs. The variability of the tariff prices will be adjusted to provide a strong signal for customers to shift load from high price hours to low price hours while reducing the energy, distribution, and RA costs to the LSEs.

The hourly prices will be updated based on the grid supply and demand as affected by weather and other factors. The hourly prices will be published when the CAISO publishes its Day-ahead prices for the 24 hours of the next day. The customer bill for each hour will be the Day-ahead hourly price times and the actual hourly kWh meter reading.

Projections of hourly prices may be provided a week-ahead. The prices may be nonbinding or binding, at the option of the LSE. In the case of binding week-ahead prices, the customers could be offered the opportunity to lock in prices for scheduled kWh of energy in each hour.

Pilot Execution

A qualified program implementer should be contracted to execute the pilot including marketing, incentive management and measurement and verification.

Regulatory Considerations

From EPIC research, it is clear that automation incentives have been the gateway to attract agricultural customers to DR programs and enable them to occasionally change irrigation schedules for large numbers of geographically dispersed loads. Automation incentives should be allocated to customers that opt in to this tariff, including supplemental incentives for loads that have received AutoDR incentives for DR program participation. The need for additional incentives is the difference between the level of automation required for occasional DR curtailments and that required for daily implementation and changing of schedules based on dynamic prices.

It is important that IOU research and pilot plans not preclude execution of this pilot, which aligns with the policy frameworks of the CPUC and CEC. Testimony submitted by PG&E in its General Rate Case on Commercial & Industrial (C&I) Real

Time Pricing (RTP) anticipates research on agricultural pricing but no pilots. Assessing customer interest without pilots is a fundamentally flawed approach. It is through work with early adopters and demonstration of results to the customer segment at large that customers can see a path to incorporate grid responsiveness with their operational requirements and economic benefit.

> "As explained in Chapter 2, SCE's RTP program has been in operation for 33 years. Given SCE's long experience with this structure, it might be possible to learn enough from further benchmarking with SCE, in addition to the Ag rate design and preferences research, to not need to conduct a Pilot. Preliminary rate design preferences research could assess Ag customer interest in a rate structure similar to SCE's RTP, versus PDP and potentially other dynamic rate structures including PG&E's C&I RTP Pilot rate structure."[15]

The filing proposes implementation of its pilots in 2023 with a duration of 24 months, which means that dynamic pricing for irrigation pumping would not even be considered until the 2026 season and, given that no pilots are planned in that time, it is likely that more years would pass before dynamic pricing is deployed at scale. This is out of sync with the urgency of the state's decarbonization efforts and reliability requirements.

The filing also disregards the extensive research that has already been conducted under CEC's EPIC program and declines to capitalize on progress that has already been made with tariff design and technology that are in place and ready to execute a large-scale pilot.

V.
CONCLUSION

Polaris respectfully requests that the Commission give weight to the proposals contained in Ex. PES-1 and Ex. PES-2. These proposals align with the state's ambitious policy goals and assess the rigorous research and deep experience on which they are based.

[15] Pacific Gas and Electric Company 2020 General Rate Case Phase II Commercial & Industrial Real Time Pricing Pilot and Research for Other Customer Classes Supplemental Testimony, submitted in Application (A.) 19-11-019, on March 29, 2021, at p. 1-40, lines 1-8.

1

APPENDIX A

STATEMENT OF QUALIFICATIONS

David Meyers

STATEMENT OF QUALIFICATIONS OF DAVID MEYERS

Q1 *Please state your name and business address.*

A1 My name is David Meyers, and my business address is Polaris Energy Services (Polaris), 411 Woodbridge Street, San Luis Obispo, Ca 93401.

Q2 *Briefly describe your present employment.*

A2 I am the Chief Executive Officer (CEO) of Polaris. My detailed resume is attached.

Q3 *Please summarize your professional and educational background.*

A3 I hold a Masters degrees in maritime management and computer information systems. I worked as a naval officer, merchant mariner, management consultant and, for the last 12 years, as an executive in energy technology companies focusing on demand response and energy management. My detailed resume is attached.

Q4 *Have you previously testified on behalf of Polaris, before the California Public Utilities Commission?*

A4 Yes. I previously testified in this proceeding (R.20-11-003) to sponsor the Opening Prepared Testimony of Polaris Energy Services (Exhibit PES-1) which was submitted on January 11, 2021 and received into evidence on February 10, 2021.

Q5 *What is the purpose of your testimony?*

A5 The purpose of my testimony is to sponsor Exhibit PES-2, the Opening Phase 2 Prepared Testimony of Polaris Energy Services in R.20-11-003 (Extreme Weather).

Q6 *Was Exhibit PES-2 prepared by you?*

A6 Yes.

Q7 *Are the statements made in your testimony true and correct to the best of your knowledge and belief?*

A7 Yes.

Q8 *To the extent that Exhibit PES-2 contains expressions of opinion, do they represent your best professional judgment?*

A8 Yes.

Q9 *Do you adopt Exhibit PES-2 as your sworn testimony in R.20-11-003 (Extreme Weather)?*

A9 Yes.

Q8 *Does this conclude your statement of qualifications?*

A8 Yes, it does.