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GENERAC®

DEBA & DSGS
Program Recommendations

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1 EXECUTIVE SUMMARY

Over the 2022 Legislative Session, California took a significant step in not only enabling further progress on distributed energy resources (DER) deployment, but also in recognizing the essential role DERs can play in addressing California's greatest reliability challenges. The California Energy Commission (CEC) has an opportunity to make ambitious and prudent investment decisions for reliability while fostering new DER programs across California. Generac Power Systems, Inc. (Generac) appreciates the opportunity to put forth recommendations intended to help advance the state's goals of decarbonization and clean, affordable, and reliable energy. In these comments, Generac summarizes four statewide program design proposals that are cost-effective, have high potential for positive near-term impact, and offer a realistic path to scale. Further, they have the potential to be self-sustaining over the long-term without ongoing reliance on the supplemental funding currently available to the CEC.

Meeting California's Reliability and Clean Energy Goals

Generac designed these program proposals with a focus on meeting the state's decarbonization and reliability goals, as expressed in SB 846 (*Dodd, 2022)*, AB 205 (*Committee on Budget, 2022)* and AB 209 (*Committee on Budget, 2022),* in a cost-effective and timely manner through the Distributed Electric Assets (DEBA) and the Demand Side Grid Support (DSGS) Programs. While Generac recognizes that the CEC is now considering program structures and eligibility criteria that may preclude some of these proposals[1], we urge the CEC to consider each of these as pathways that meet the legislative intent and can provide incremental and meaningful reliability benefits beyond existing programs within 2023.

AB 205 outlines the priorities for both the Distributed Electricity Backup Assets (DEBA) and the Demand Side Grid Support (DSGS) Programs, both intended to incentivize DERs as grid reliability support during extreme events. The Legislation identifies meeting reliability goals as top priority and expanded on advancing the state's loading order. AB 205, which was enacted as Public Resources Code sec. 25792, recognizes the prioritization of "feasible, cost-effective demand response and efficiency resources, then feasible, cost-effective renewable and zero-emission resources, and then feasible, cost-effective conventional resources".

The Legislature appropriated $295 Million and $700 Million over 5 years for the DSGS and DEBA Programs, respectively. Based on the Governor's proposed budget, $95M of the DSGS fund and $100M of the DEBA fund will be spent in the 2023-24 budget year. As a large portion of the budgets, especially the DSGS budget, are to be spent this year, it is crucial that the CEC sets strong precedents for these programs in line with their statutory intent and tied to real-world impact.

In creating the DEBA program, the Legislature specified that its purpose is to:

> "incentivize the construction of cleaner and more efficient distributed energy assets that would serve as on-call emergency supply or load reduction for the state's electrical grid during extreme events."

It went on to clarify that CEC could provide funding for:

> "Efficiency upgrades, maintenance, and capacity additions to existing power generators, consistent with subdivision (e)"; or "(2) Deployment of new zero- or low-emission technologies, including, but not limited to, fuel cells or energy storage, at existing or new facilities."

[1] Based on presentation materials and discussion from the Lead Commissioner Workshop on the Demand Side Grid Support Program and the Distributed Electricity Backup Assets Program on January 27. 2023.

We interpret this description of DEBA to indicate a focus on distribution-side assets, interconnected on the distribution grid and likely therefore owned by a utility commercial or residential customer, and that these assets can be either low-emission or zero-emission. These assets could either be load-modifying assets or assets, like energy storage or generators, that are capable of exporting power [even if not currently enabled by interconnection or market rules to export.]

AB 205 specifically created the DSGS program, and provides that its purpose is to:
"incentivize dispatchable customer load reduction and backup generation operation as on-call emergency supply and load reduction for the state's electrical grid during extreme events. . . The commission shall allocate moneys to develop a new statewide program that provides incentives to reduce customer net load during extreme events with upfront capacity commitments and for per-unit reductions in net load."

Most notably, the legislature modified the language of the DSGS program via AB 209, to specify that: "[e]ligible recipients may include all energy customers in the state, except those enrolled in demand response or emergency load reduction programs offered by entities under the jurisdiction of the Public Utilities Commission." Although the language allows for the addition of other "participation requirements or limitations," there is no ambiguity in the statutory intent of expanding eligibility to all customers that are not enrolled in existing programs. Given the immense potential that lies in the residential customer segment, this segment is a significant focus of this proposal.

The Public Resources Code also clearly lays out that individual entities or aggregators are eligible funding recipients, therefore making clear that third-party aggregation, and not only utility or LSE-run programs, should be encouraged by the CEC.

The Public Resources Code discusses both up-front capacity payments and "performance" payments (for "per-unit reductions in net-load") for the DSGS program but is silent on the incentive design for DEBA. We understand that the CEC is focused more on capacity payments for DEBA and hence our proposals focused on DEBA are designed as such. We discuss both capacity and performance (energy) payments for DSGS.

Generac's Unique Position

In accordance with these principles, Generac proposes statewide program designs that can provide customer-sited cost-effective, low or no-emission, and impactful reliability solutions within the year. This is uniquely enabled by Generac's varied offering of energy technologies and its existing market position. In tandem with a wide DER product offering, Generac brings the capability to aggregate and control these systems through cutting-edge distributed energy resource management system technology (DERMS). Aggregation technology itself can be an incredibly valuable resource in solving California's reliability risks in a cost-effective manner, and Generac is well-suited to bring those resources to bear. Further, Generac has a strong customer-base in California and deep expertise in customer programs and experience in the DER realm.

As such, Generac's recommendations draw out the value of DER assets through DERMS with an emphasis on customer experience and customer benefits. Many current demand response (DR) and Emergency Load Reduction (ELR) programs are administratively burdensome for both administrator and customer and thus have lower customer participation than they should. Customers, especially residential customers, are easily deterred by involved enrollment processes and confusing eligibility requirements. In order to truly unlock the potential of these assets for reliability, the CEC must prioritize customer experience and expand eligibility as intended. Consistent, easy-to-access, statewide customer programs can enable a meaningful and potentially crucial amount of grid support during extreme conditions. These programs could be deployed immediately to support the peak demand for electricity as soon as this year. In addition to system benefits, the CEC should recognize and capitalize on customer motivations for adopting DERs – namely, resiliency benefits. By building in program benefits, especially to disadvantaged

customers, the CEC can enable not only significant system-wide grid benefits but also equitable outcomes at the customer-level. These proposals also support the state's goals around home electrification by making heat pump water heaters more cost effective for customers, and ensuring that they can be used as a grid asset.

In this document, Generac recommends four program designs: (1) the Equity-Focused Resilience Bundle, (2) the ecobee Grid Resilience Offering, (3) the Water Heater Market Transformation, and (4) the C&I Battery Energy Storage System (BESS) Offering. These recommendations reflect program design principles that hew to the legislative intent; they are incremental, uniquely addressable by the CEC, cost-effective, have high potential for impact, and are scalable. Further, these programs offer positive and equitable benefits for customers and will empower them to participate in both protecting and decarbonizing California's grid.

Summary of Potential Impact

In developing the portfolio of programs proposed here, we sought to balance the need for scale, speed, equity, and replicability. We developed programs that address underserved markets, show benefits that the CEC is uniquely positioned to capture, leverage existing channels in new ways, and keep customer value at the center of their design. We believe these design elements are critical to rapidly and equitably scaling solutions to California resilience challenges.

The chart below outlines the expected MW by year and program, showing how the ecobee offer provides a large initial foundation of load relief, while the other offerings grow in the out years. We believe a balanced portfolio will be critical to ensure equitable distribution of benefits and a full range of services. Our portfolio includes and equity-focused resilience program, statewide default offerings for thermostat and water heaters, and C&I offerings for both existing generators and new batteries. This portfolio provides benefits across all customer types, builds resilience for vulnerable populations, helps CA residents better manage their rates, and puts enabling technology into homes and businesses that will lay the foundation for cost-effective electrification.

Figure 1. Expected MW Impact of Generac Proposed Programs[2]

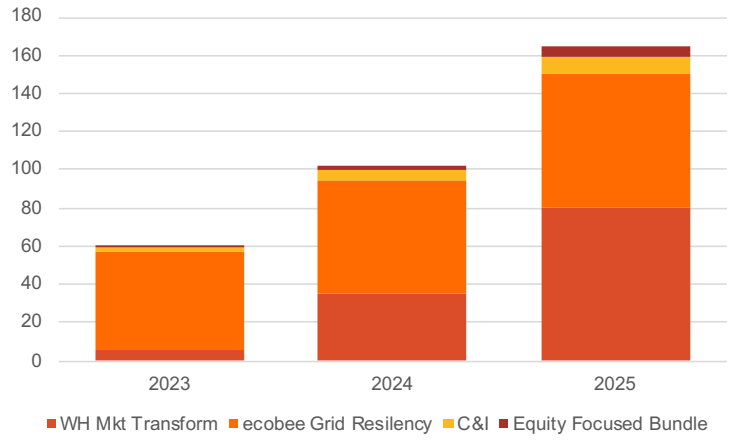


Figure 2 below shows our expectations for incentives required from the CEC, broken out by DEBA and DSGS and graphed against the expect MW impact. The DEBA incentives would be delivered at the time of enrollment of the assets, while DSGS incentives would be paid based on delivered MW. Our assumptions in our analysis are that incentives are paid for MW of flexibility delivered combining daily load shifting values and incrementally dispatched

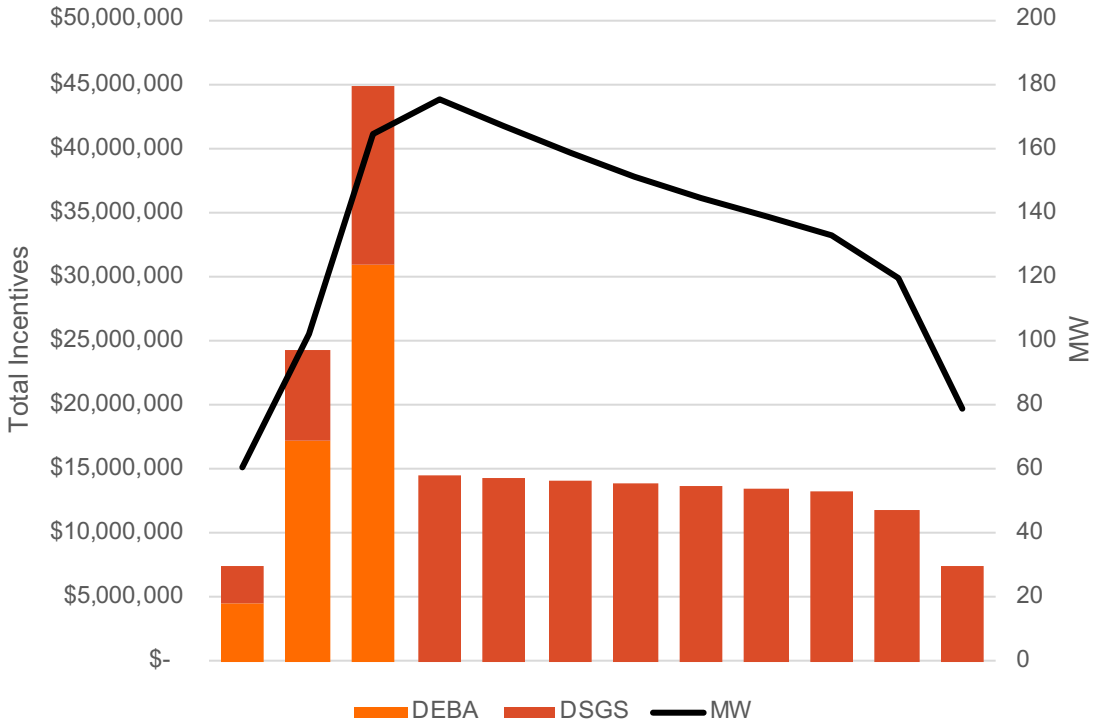
[2] MW impact for Figure 1 and all following figures are estimates; actual MW impact will depend on CEC funding availability and timing of such funding.

capacity during emergency events and that customers of both publicly-owned and investor-owned utilities would be eligible to receive said incentives. These figures show the potential of residential program offerings for these two programs to be a valuable grid asset for 2023.

These projected impacts represent significant statewide reliability benefits relative to benefits from existing Investor-Owned-Utility (IOU) emergency demand response programs. For example, PG&E estimates that their entire residential Emergency Load Reduction Program (ELRP) resulted in an average of 206 MW of load reduction on event days in the summer of 2022.[3] As shown above, Generac residential programs alone may be able to provide 60 – 160 MW of dispatchable load in the next three years.

The figure below shows the incentives required and MW impact would be if the CEC were to undertake a three-year enrollment period for all programs described in the document below (MW decline over time due to unenrollment and asset retirement).

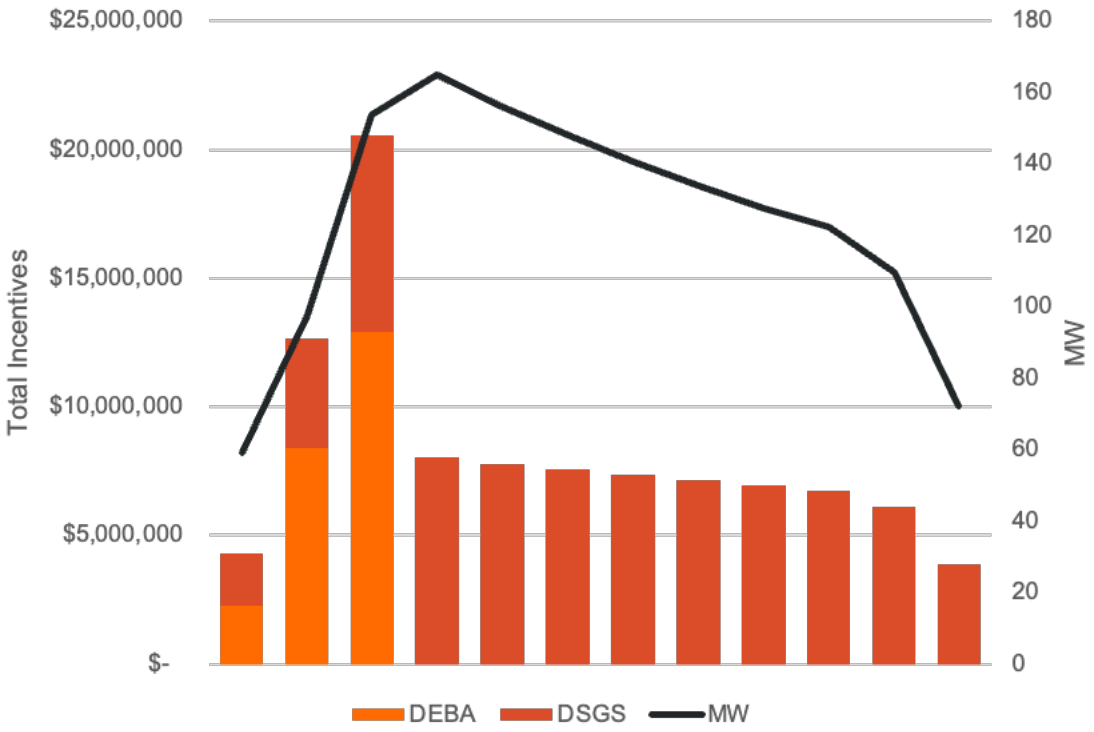
Figure 2. Generac Portfolio Level Incentives and MW by Year



While we believe a portfolio including both demand flexibility and energy storage will be critical for the state, recognizing uncertainty in SGIP funding and the cost of storage today, we also provide results for our portfolio excluding energy storage assets below.

[3] https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/demand-response/emergency-load-reduction-program/statestatewide_a6_elrp_baseline_evaluation_report_01172023.pdf

Figure 3. Generac Portfolio Level Incentives and MW by Year (Storage Excluded)



As currently drafted, these programs only look at what we believe could be captured feasibly during a three-year customer recruitment effort. If the CEC or other state agencies support scaling programs on a continuous basis, we are confident that these efforts would yield a substantial and sustainable growth path. For instance, we believe the Water Heater Market Transformation offering would continue to grow substantially beyond 2023. Even at low levels of electrification, Californians purchase approximately 300,000 electric water heaters a year, representing potentially 120-150 MW of flexible load. With expected building electrification efforts, and new CEC incentive programs for heat pump water heaters, this number could easily double or triple by 2035. Our Equity-Focused Bundle and C&I BESS offerings similarly assume ramp rates that grow over time and could lead to substantial cumulative impacts with more time. We welcome engagement from CEC staff and other state agency staff on how best to consider the long-run value of these interventions.

Company Background

Resilience is core to what Generac does as a company. As an American manufacturer providing distributed energy resources to customers for over 60 years, we understand that the reliability and resilience are a basic need of every household. Generac is a leading energy technology solutions company providing distributed energy resources and software solutions to address the rapidly evolving needs of communities, energy consumers, and utilities. Generac has a long history of providing resilience and energy management products across a variety of applications and maintains a leading position in the power equipment market in North America, with an expanding presence internationally.

With a commitment to sustainable, cleaner energy products, Generac recently formed our Energy Technology organization focused on supporting the next-generation grid with a comprehensive energy ecosystem. Generac offers a wide array of power products suitable as grid-tied distributed energy resources (DER) assets, controllable and dispatchable by way of the Concerto™ VPP/DERMS software platform. These products include but are not

limited to ecobee smart thermostats, PWRcell energy storage systems, load control switches, and CTA-2045 smart water heater modules, among several other smart energy solutions and more traditional backup power systems. Generac offers the technological capability to aggregate and control these diverse systems and products to allow our customers to access and maximize new revenue streams.

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2 PROPOSED PROGRAM #1: EQUITY-FOCUSED RESILIENCE BUNDLE

Program Description

To mitigate future power grid emergencies in California, it is critical to maximize consumer participation by empowering underserved communities to participate in their own resiliency and reliability initiatives. Generac's proposed ***Equity-Focused Resilience Bundle*** enables low- and middle- income (LMI) households to take charge of their energy futures by integrating **Whole Home Backup Systems** incentivized through low-cost enrollment and installation, significant LMI energy bill savings, and upfront rebates.

Application

- Emergency capacity
- Daily load shifting
- Energy arbitrage
- Homeowner resiliency

Scale & Timeline

- 2023: 1 MW
- 2024: 3 MW
- 2025: 5 MW

Indicative Costs

- DEBA: $6,000-$8,000/household*
- DSGS: $200-$1,000/kW-yr

**Cost range heavily influenced by SGIP update*

LMI customers are disproportionately affected by power outages and the public health impacts of fossil fuel use. Further, LMI customers have lower rates of home ownership and are often unable to participate in voluntary programs due to lack of discretionary income and access to low-cost credit. LMI customers who are renters are generally unable to make capital improvements to their homes. LMI customers are also often most susceptible to extreme heat, and include a high proportion of "medical baseline" customers for whom power outages can mean life or death. Our model looks to leverage a third-party ownership (TPO) model to provide a solution tailored to LMI customers using a combination of storage and load flexibility assets to enable a no-money down, savings on day-one solution that can work for homeowners and renters alike.

Our model assumes a realistic scale up for a hard-to-reach, but critically underserved segment. Working with community-based organizations and our finance partner, we would work to scale deployments in hard-to-reach segments, reaching **1,600 homes by 2025**, with each home offer approximately **3.5 kW** in load reduction over a 3-5 hour period. These load reductions would be achieved through a combination of energy storage, thermostats, and water heater controls.

Under this proposal, DEBA would provide an upfront incentive to LMI homes that have full flexibility retrofits installed, that include a home battery backup system, smart thermostat, smart water heater controller (where electric water heat is present), and smart breakers. Providing an integrated installation would lower first costs, provide a more seamless delivery for the customer and installer, maximize the flexibility (and bill savings) achievable for the home, and provide the ability to accommodate future electrification more easily without incurring upgrades.

We propose targeting low-income homes without solar for this program that could interconnect to grid, addressing an underserved segment even within the LMI segment, while also lowering first costs and increasing speed to market.

By empowering underserved communities, Generac expects that the California Energy Commission (CEC) can access an additional **1 MW** of demand response (DR) capacity resource in 2023 entirely within severely underserved communities – scaling quickly to **5 MW in 2025**. Generac's ***Equity Focused Resilience Bundle*** supports the CEC through a novel approach to Distributed Energy Resources (DERs) combined with cost saving measures made possible by Generac's unmatched roster of third-party partnerships.

Program Application

Generac's solution for California can deliver a robust portfolio of grid services, including all manner of emergency capacity, daily load shifting, energy arbitrage, and homeowner resiliency. These grid services will utilize Generac's grid-balancing software platform, Concerto™, a virtual power plant (VPP) and distributed energy resource management system (DERMS). Leveraging Concerto in combination with the Equity-focused Resilience Bundle will enable the sourcing of supply- and demand-side incremental capacity from California's largely underserved LMI market.

Generac will use the Concerto platform to optimize the performance of the Equity-Focused Resilience Bundle, thereby reliably maximizing the program's surplus capacity yield, while providing LMI households with whole-home backup power. While the battery will be optimized for grid support, Generac will ensure that sufficient battery capacity is reserved to serve the customer in case of an outage.

Generac's PWRcell is a complete but modular system that integrates with a customer's home and the electrical grid, automatically switching to battery power in periods of outage. When aggregated, the fleet of PWRcell battery energy storage systems (BESS) will act as a virtual power plant, enabling demand response programs to provide peak reduction and other applicable grid services to provide maximum value when grid tied.

In conjunction with the PWRcell BESS, PWRmanager operates as Generac's load management solution. PWRmanager optimizes battery life, provides customer-friendly controls, and dynamically shed loads to prevent inverter overloads. This solution gives LMI homeowners control of their loads while empowering California to maximize available capacity and energy reserves in support of grid stability.

Program Scale and Timeline

By enrolling LMI households through this program, the CEC can access approximately 1 MW of incremental capacity in 2023. Further expansion of the LMI program to 2025 will increase the available demand response capacity to 5 MW. Generac expects that roughly half of the proposed capacity may be dispatched on a daily basis while the remaining capacity would be available for peaking activity. We believe this is a realistic deployment schedule given the that it would take time to engage communities and scale outreach as well, also accounting for uncertainty around the CEC's timing and guidelines. A streamlined statewide effort may enable greater acceleration, so these estimates should be considered conservative.

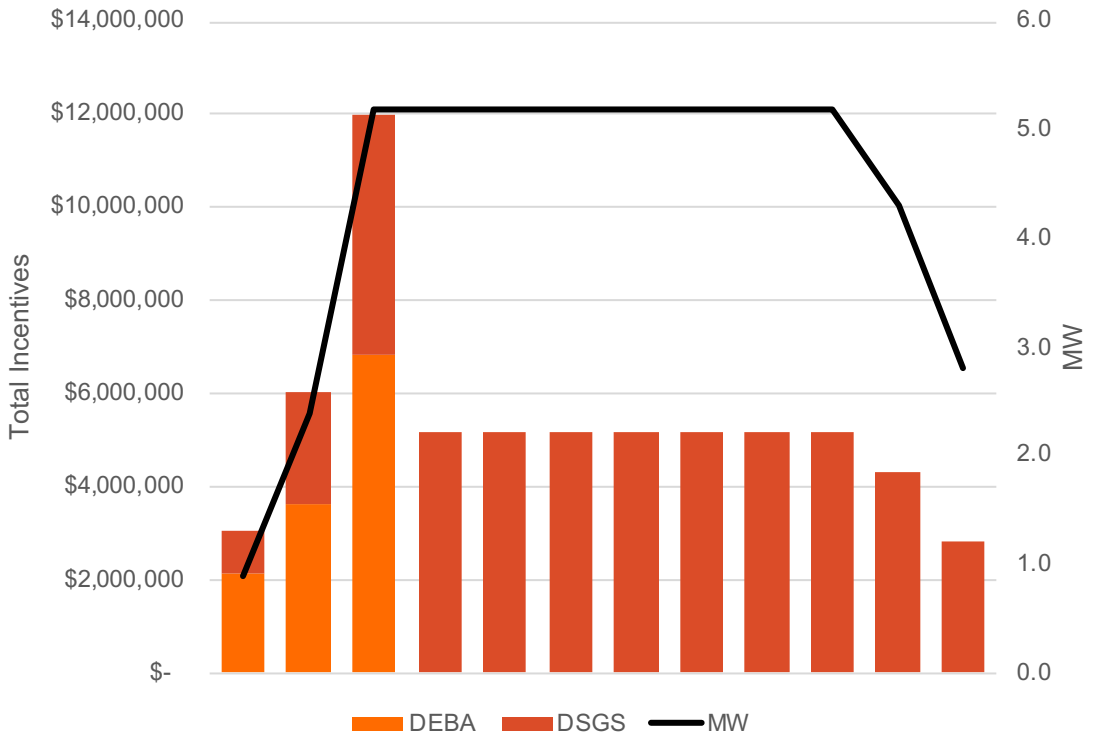
Recommended Funding Vehicle & Rationale (DEBA vs. DSGS)

Generac recommends its proposed Equity-Focused Resilience Bundle be funded through both the DEBA and DSGS programs. Generac's rationale is based on our understanding that DEBA is designed to fund energy infrastructure procurement and deployment (e.g., the purchase and installation of the PWRcell BESS and related hardware and software systems) while DSGS is designed to cover the ongoing remuneration of asset owners for use of their energy assets in accessing incremental capacity and energy for the grid. This offering should incorporate funding from both programs. The level of DEBA funding required would be highly dependent on the level and availability of SGIP funding.

We modeled incentives such that the customer could take on a lease for the storage at a level that would still result in substantial bill savings without having to provide a down payment on the installation. *The required incentives would vary considerably based on whether SGIP funding would be available for these customers.* If SGIP is available at its expected levels, we would require an incentive of approximately $6,000 per household upfront from DEBA and $200-$300 per kW-yr from DSGS on an ongoing basis over a ten-year period. If SGIP is not available, those values would could reach $8,000 from DEBA and ~$1,000 per kW-yr from DSGS. Given that we would be operating assets on a daily basis as well as for emergency dispatch, we propose measurement using a within-subjects design for load management, coupled with inverter data from the storage units.

The figure below outlines the incentive payments by year assuming no co-funding from SGIP.

Figure 4 - Equity Focused Bundle Incentives and MW by Year



While there are already battery incentive programs in place, they have been slow to scale and are not meeting the needs of underserved communities such as LMI, communities of color, renters, and multifamily households. Additionally, bespoke programs rolled out by utilities and CCAs have led to confusion and increased burden on installers, creating barriers to scale. By providing a clear program at the state level, the CEC could help to break down barriers and increase equitable outcomes from the DSGS and DEBA programs.

3 PROPOSED PROGRAM #2: ECOBEE GRID RESILIENCE OFFERING

Program Description

While utility demand response programs have been a positive force in developing demand flexibility in California, there are still **millions** of demand response capable devices not providing value to the grid because they cannot be "seen" or controlled. If millions of thermostats were controllable during a grid emergency, the state would not have needed the "amber alert" text message in September 2022. The following proposal builds on statewide efforts like the Flex Alert program to leverage available assets outside of utility demand response programs to automate ecobee smart thermostats with eco+ thermostat optimization software enabled during grid emergencies. We currently estimate that there are approximately **100,000** ecobee thermostats in the state capable of providing this service very cost effectively. We have demonstrated this model already in a pilot with SDG&E last summer[4].

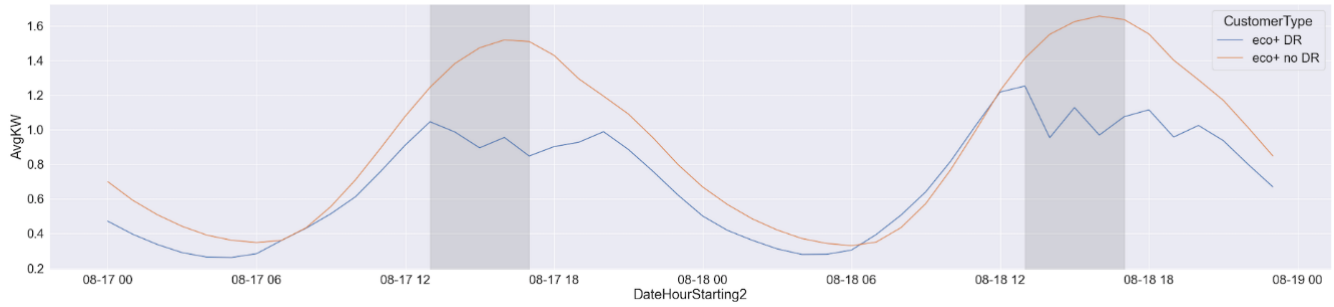
Application
- Emergency capacity

Scale & Timeline
- 2023: 50 MW
- 2024: 65 MW
- 2025: 80 MW

Indicative Costs
- DSGS: $30-$50 per kW-yr

Demand response with ecobee smart thermostats that are not otherwise enrolled in a utility demand response or ELRP program can deliver predictable and reliable load shed. The detailed telemetry data available from the devices offers transparency and visibility into actual impacts and results. Using a recent California grid emergency event as an example, the data presented in Figure 1 below shows that ecobee devices enrolled in utility DR programs delivered substantially more load reduction than those that were not enrolled in DR programs and merely relied on a behavioral response to the Flex Alert system.

Figure 5. ecobee customer HVAC runtime on August 17 & 18, 2020



Program Application

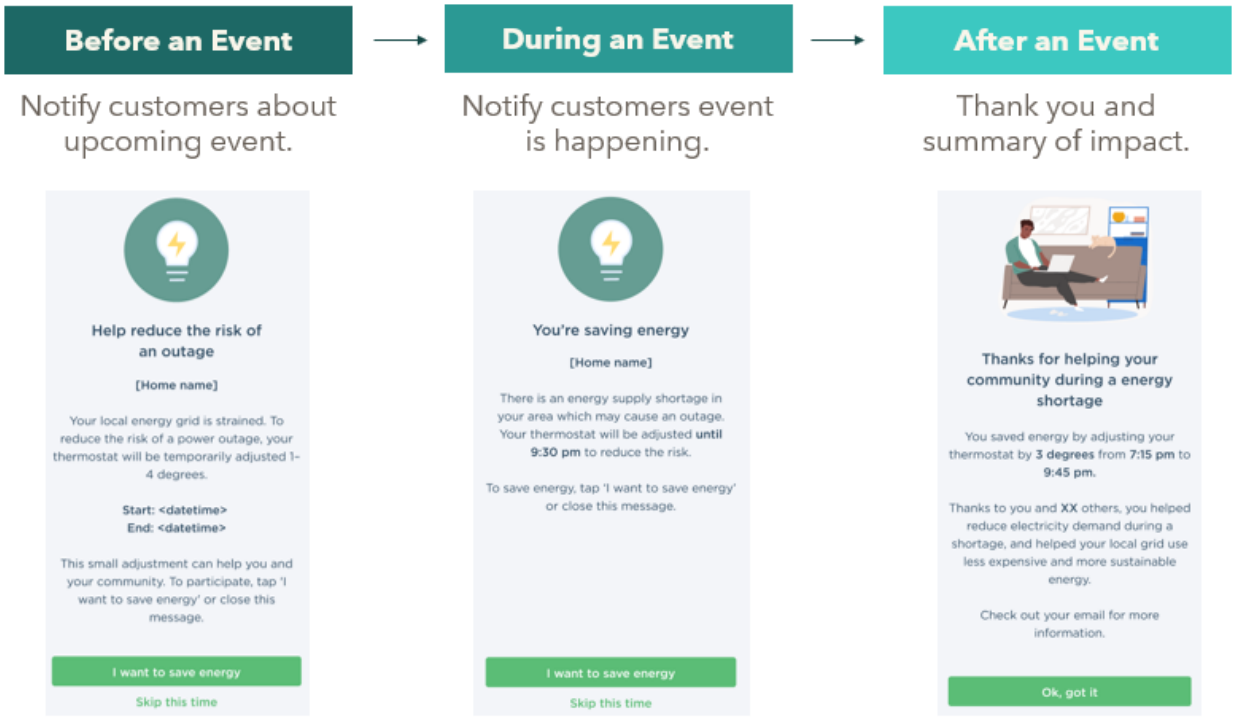
The simple nature of this program would allow any customer with an ecobee device *already in their home* to participate in grid emergency events.

ecobee's "Community Energy Savings" pilot with SDG&E validated our assumption on customers' response to a demand response event called by a third-party (not enrolled in a utility DR program). On the morning of September

[4] The SDG&E Pilot was approved in Phase 1 of the Emergency Reliability proceeding and was part of SDG&E's existing Bring Your Own DR program budget.

9, 2022, approximately 920 ecobee customers received notification from ecobee that there was a grid emergency and that their thermostat would be adjusted between 4-9 PM. Customers were able to opt-out of the event either through their eco+ mobile phone application or the ecobee device itself.

Figure 6. ecobee customer notifications on September 9, 2022

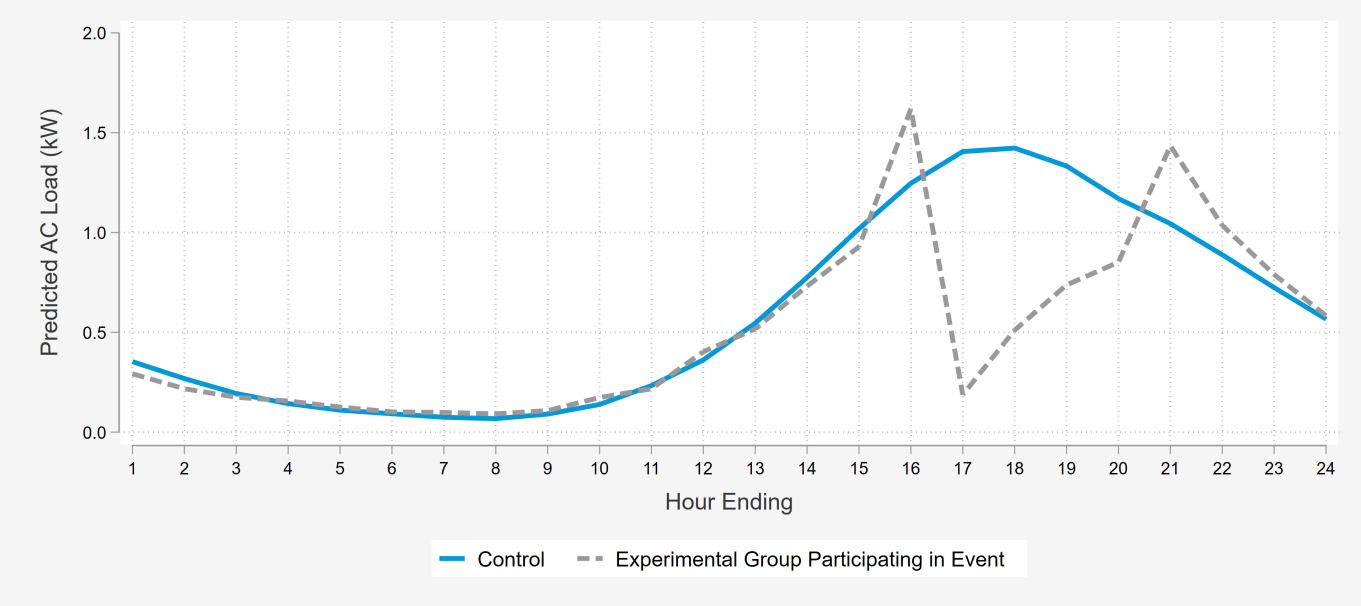


Results of the pilot show that **60% of customers** participated during the event and of that group **only 5% opted out** during the event. Neither SDG&E nor ecobee received a single customer complaint regarding this demand response event. Notably, SDG&E called a DR event through their Bring Your Own Thermostat Program (BYOT) at the same time as the event was called for the pilot participants and the load impact results were the same for ecobee devices enrolled in the BYOT program as the ecobee devices enrolled in the pilot. This result is significant because it means there are megawatts of untapped resources in California homes today that can be tapped during grid emergencies through customer friendly, voluntary emergency demand response strategies if the program design and funding allows for it.

Program Scale and Timeline

By enrolling all ecobee customers with eco+ thermostat optimization software enabled who are not already participating in an eligible POU, IOU, or CCA DR or ELRP program, the CEC can unleash a potent emergency resource capable of dispatching approximately **50 MW**. Limiting the availability of this solution to only POUs would significantly limit the impact, delivering only **4 MW**. Statewide implementation to include customers who are **not enrolled** in an IOU, POU, or CCA DR or ELRP program. A critical design element is that customers could participate without going through the standard CPUC mandated IOU market enrollment, "Share My Data" process. Currently "Share My Data" is the procedure by which customers allow their IOU to provide smart meter data to a 3rd party DR provider—this requirement has led to participation rates to as low as 3% in IOU programs. Instead, ecobee customers would authorize the use of their thermostat and data on a limited basis to ecobee directly. Importantly, owners of ecobee devices already accept terms which include the ability to be offered DR event participation. The CEC has the ability to capitalize on this pre-approval to significantly help grid reliability immediately.

Figure 7. Per device kW impacts of eco+ Community Energy Savings in California



This proposed program will provide concrete data regarding the timing and extent of expected (and realized) customer load reductions, providing certainty regarding the contributions of DR resources. This approach could reduce or eliminate the need for drastic measures such as rolling blackouts to preserve an adequate reserve margin.

Recommending Funding Vehicle & Rationale (DEBA vs. DSGS)

Generac recommends this program be run through DSGS, since these assets are already in service and DSGS funding will enable existing owners to enroll and receive incentives quickly. The program proposed would meet the statutory intent of DSGS in that it is:

1) cost-effective;
2) statewide;
3) consistent with the State's loading order; and
4) advances CA's reliability goals.

Our estimated costs for this offering would be $30-$50 per kw-yr from DSGS to cover administrative costs, cloud infrastructure, and customer support. Under this model, we assume the DSGS program would have the following parameters:

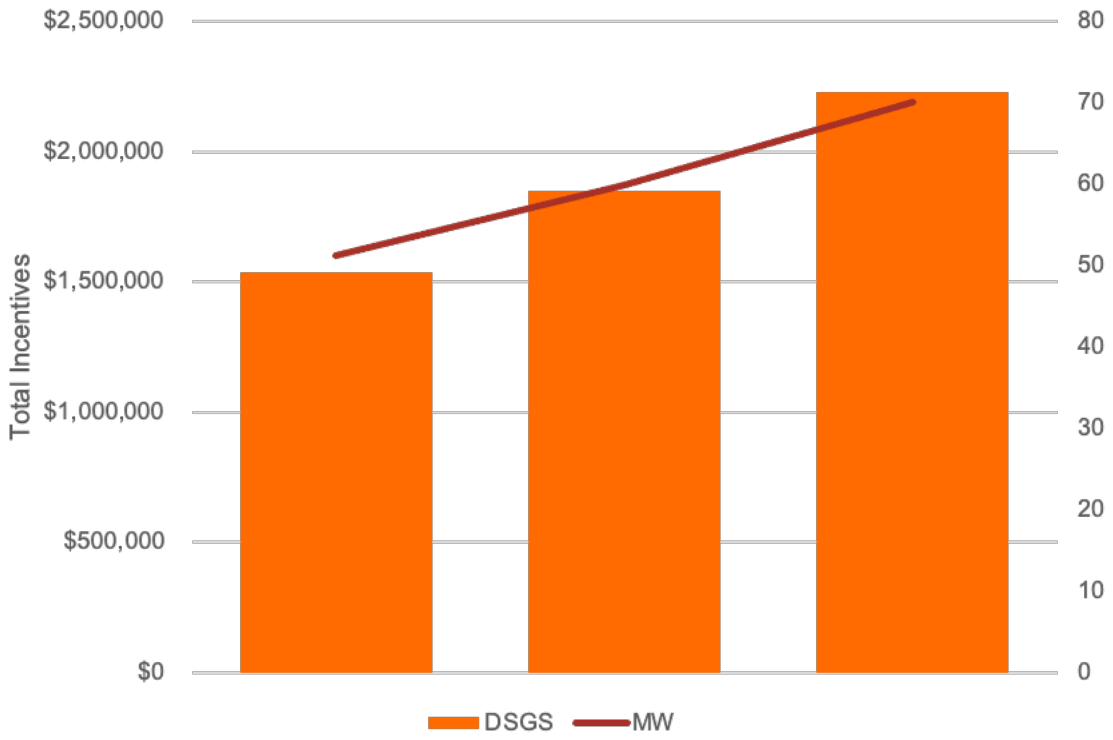
- Device telemetry data could be used to measure performance (common practice in the industry for measuring demand response events);
- Statewide implementation to include customers who are not enrolled in an IOU, POU, or CCA DR or ELRP program; and
- Customers could participate without going through the standard market enrollment process, as discussed above.

Assuming this structure, this offering would require no DEBA funding and relatively modest amounts of DSGS funding. The value of low-friction offerings through installed devices is that they are able to rapidly reach high levels

of scale so long as customer effort is kept to a minimum. If customers are required to go through existing ELRP programs, the scale will be nowhere close to what the grid needs to avoid blackouts this summer.

The figure below shows how these incentives would be distributed over the first three years. We urge the CEC to consider inclusion of this program design for DSGS. We are certain that we can work with the CPUC and the IOUs to ensure that customer duplication is avoided such that this program does not "cannibalize" existing DR or ELRP programs.

Figure 8. ecobee Incentives and MW by Year



4 PROPOSED PROGRAM #3: WATER HEATER MARKET TRANSFORMATION

Program Description

One of the primary barriers to the adoption of demand flexibility technologies is customer acquisition and installation costs. This particularly true for advanced water heater controls. There is growing consensus that water heaters are a tremendous opportunity to leverage thermal storage present in nearly every home to help support reliability, integrate renewables into the grid, and reduce customer energy costs[5]. While a versatile resource, downstream programs have struggled with high costs associated with retrofitting tanks. Our model seeks to move beyond the traditional rebate model by taking a market transformation approach to this problem. California agencies for years have discussed the incredible potential of controlling water heaters, but to date, no effective large-scale programs exist, because of the barriers discussed here.

Application

- Emergency capacity
- Daily load shifting
- Energy arbitrage

Scale & Timeline

- 2023: 1 MW
- 2024: 20 MW
- 2025: 45 MW

Indicative Costs

- DEBA: $100-$150/unit
- DSGS: $50-$80 per kW-yr

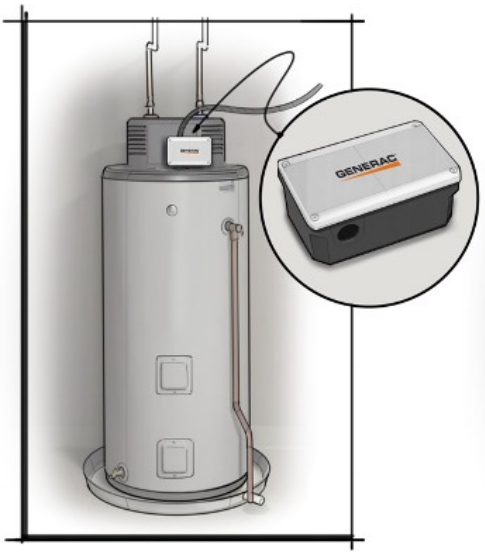
Generac is proposing a Water Heater Market Transformation program that removes such barriers completely by moving upstream to transform how electric water heaters are delivered to Californians. The need for flexible electric water heating is only increasing as California seeks to electrify end uses and regional demonstration have shown that large scale efforts can achieve cost-effective flexibility at scale[6].

Generac would coordinate with water heater manufacturers to deploy our low-cost controllers as a default on all the units sold in California, with the end goal being the conversion of water heaters into a network of dispatchable thermal energy storage devices that can contribute significant incremental capacity in support of California's grid. We have already explored this concept with all major manufacturers, and they have significant interest assuming the scale that CEC could provide to a program.

In addition to hardware, Generac brings its Concerto™ Virtual Power Plant (VPP) / Distributed Energy Resource Management System (DERMS) software platform. Generac's Concerto™ VPP/DERMS software enables the control, aggregation, and orchestration of grid-tied water heaters. Concerto can be deployed and operated in a stand-alone capacity – either by an agent of the CEC or directly by Generac – or as a fully integrated extension of extant utility distribution network management systems (e.g., EMS, ADMS, etc.).

[5] California Energy Commission, *Heat Pump Water Heater Electric Load Shifting - A Modeling Study* (2018): https://efiling.energy.ca.gov/GetDocument.aspx?tn=232168&DocumentContentId=64120
[6] Bonneville Power Administration, *CTA-2045 Water Heater Demonstration Report Including a Business Case for CTA-2045 Market Transformation* (2018) https://neea.org/img/documents/CTA2045-Water-Heater-Demonstration-report.pdf

All electric water heaters delivered in the state of California would ship with a communications device pre-installed at no additional cost to the customer. Water heaters would be retrofitted at the point of manufacture or at the distributor with an easily-installed Universal Communications Module (UCM). Generac's UCM is designed for interoperability with newer model water heaters equipped with CTA-2045 communications ports, specifically electric resistance and heat pump water heaters (ERWH and HPWHs). These controls utilize LTE-based wireless communications for unrivaled connectivity and reliability and are backed by one of the industry's most comprehensive hardware warranties. The devices will be automatically provisioned, providing smart controls to the customer and the grid without the need for customer information. If a customer wishes not to participate, they can simply unplug the device to opt-out or unenroll at a program website provided by a QR code on the device.



The UCM is compatible with the CTA-2045 (branded as Ecoport) standard, enabling it for use with any manufacturer's product that includes a corresponding UCM port. This is increasingly the default for efficient water heating equipment such as heat pump water heaters. For this program, Generac would contract with manufacturers to ensure that all units deployed in California were compatible and equipped with these controls. All within a compact and durable enclosure, the CTA-2045 module enables utility end customers to make their compatible devices smart grid ready without plumbing or electrical modification.

Unlike a smart device that is provisioned specifically for a customer, the UCM would not collect any customer data but would recognize its location upon receiving power. By default, Generac would set that UCM to intelligently optimize to the prevailing residential time of use rate for the given utility service area. The tank would thus provide bill savings to customers automatically while provide the grid with a regularly daily shift. Based on our previous experience, we expect approximately 0.25 kW over a 3-5 hour peak period for ERWH and 0.1 kW for HPWH. These units could then be further dispatched to 0.5 and 0.25 (ERWH and HPWH, respectively) during peak periods. In all cases, load could be managed to maintain thermal comfort using the CTA-2045 standards command set, which includes the ability to load up and shed at varying levels based on set point that can potentially factor in variables such as price or carbon.

Program Application

The benefit of water heater demand response is that, when deployed effectively, it is completely invisible to end customers. Water heaters are thermal storage devices that – when connected to software and intelligent controls – can be seamlessly managed continuously with no impact to the customer. Since 2017, Generac has managed multiple thermal energy storage programs on behalf of our utility clients – including one of the nation's largest aggregations of multifamily residential water heaters managed on behalf of Portland General Electric. Additionally, we provide our control hardware to many industry-leading water heater management providers, such as Shifted Energy in Hawaii.

Through the orchestration of the control units, water heaters can be directed to heat when electricity prices are least expensive. This results in substantially reduced demand at peak times as well as significant bill savings for customers. The controls will provide daily load shifting opportunities for the grid, representing an invaluable resource for managing capacity.

In making the control units available with each water heater sold, the state of California can bypass the traditional hurdles associated with customer engagement and program enrollment and realize a network of flexible, thermal

energy storage resources that can be dispatched instantly and at scale as needed. Upon installation, each controller will be accompanied with a sticker outlining the benefits of the program and instructions for opting out.

Generac expects to have 1 MW by end of 2023, with a total of 45 MW by the end of 2025. Roughly half of this capacity could be dispatched on a daily basis, with the rest available for peaking capacity. This assumption is based on a phased deployment over a period of three years with one major manufacturer. If we were to scale to all major manufacturers, the scale would increase approximately 150%. In all cases, scale could increase substantially beyond the third year. At current – relatively low – levels of electric water heater penetration in CA, we estimate that approximately 300,000 new water heaters will be installed per year. Given investments in efficient electric end uses through programs like the CEC's TECH and BUILD programs and the CPUC's new Market Transformation efforts, there is a great opportunity for DEBA and DSGS funding to provide synergistic value through these channels. At long term expected electrification levels for CA, we could expect a million electric water heaters per year being deployed. With a market transformation model outlined here, this could equate to roughly 200-300 MW of new demand flexibility being added each year at very low cost to the state.

Additionally, by providing a no-cost program upstream, bill savings benefits would accrue to all customers, including underserved communities such as LMI, renters, and multifamily customers. At scale, this would mean millions of dollars in bill savings to communities that need it most.

Recommending Funding Vehicle & Rationale (DEBA vs. DSGS)

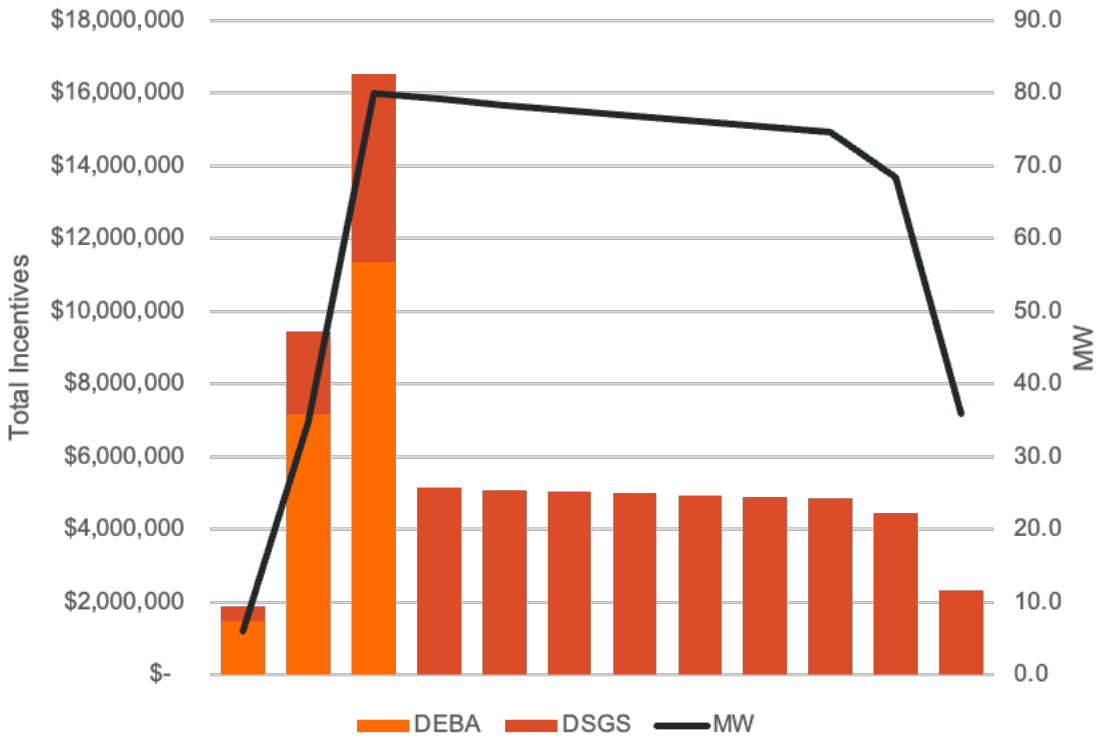
For this offering, we propose a mix of DEBA and DSGS incentives. DEBA would pay $100-150 for each new unit deployed to cover the cost of enabling hardware as well as deployment costs for the manufacturers/distributors to retrofit each unit upstream. DSGS would then pay $50-80 per kW-yr for aggregated capacity to cover administrative costs (for Generac and manufacturers), LTE communications, cloud infrastructure, and customer support. Under this model, we assume the DSGS program would have the following parameters:

- Device telemetry data could be used to measure performance (common practice in the industry for measuring demand response events);
- Statewide implementation to include customers who are not enrolled in an IOU, POU, or CCA DR program;
- Customers could participate without going through the standard market enrollment process (Share My Data process by which customers allow their IOU to provide smart meter data to a 3rd party DR provider limits participation rates to as low as 3%); and
- Ongoing DSGS revenue provided over the life of the asset (approximately 10-15 years).

Assuming this structure, this offering would provide highly scalable and cost-effective load shifting and emergency capacity across the state. However, without these design parameters, the program would be largely infeasible to scale quickly. Water heater deployment and distribution is done at the state or regional level and does not easily follow utility service districts. Likewise, water heater installers are ill-equipped to take on a complicated customer enrollment process when installing new water heaters, given the vast majority are emergency installs. By making the program a seamless, statewide offering, the CEC can leverage its position to achieve substantial scale that delivers value to customers and the grid.

The figure below shows how these incentives would be distributed over ten years with a three-year recruitment period.

Figure 9. Water Heater Incentives and MW by Year



Potential Program Expansion Opportunities

The program could be expanded to include any equipment that has a CTA-2045 communications port, such as advanced heat pumps, pool pumps, commercial HVAC/WH, and/or EV charging. This program could demonstrate what the potential value of including this (or a similar) standard into codes and standards.

5 PROPOSED PROGRAM #4: C&I RESILIENCE

Program Description

In addition to the three programs discussed above, Generac is in a strong position to offer a Commercial and Industrial (C&I) Resilience Program, using a combination of new Battery Energy Storage System (BESS) assets and existing natural gas backup generators (gensets). Given our relationships with existing generator owners, we believe we could scale to an additional 10 MW of capacity by 2025, roughly split between the two technologies.

Application
- Emergency capacity
- Daily load shifting
- Energy arbitrage
- Commercial resiliency

Scale & Timeline
- 2023: 2 MW
- 2024: 5 MW
- 2025: 9 MW

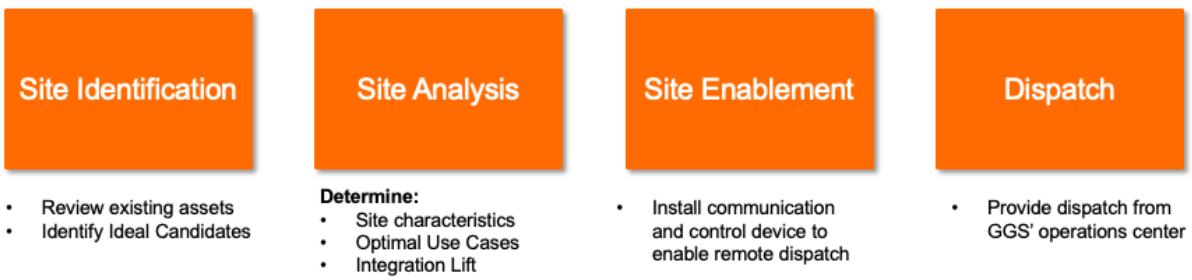
Indicative Costs
- DEBA: $20k-$500k/unit
- DSGS: $50-$250/kW-yr

The equipment will be Generac- or third party-sourced hardware, though to the extent possible we will leverage our existing dealer and installer network. There is a broad fleet of installed industrial natural gas generators in CA that, while carbon emitting, can provide an emergency backstop for reliability needs of the grid. We are not suggesting providing incentives to install new generator here, but simply to utilize these resources in a more effective way as a bridge as clean resources scale to meet need in the long term. For storage, C&I customers' needs vary by business and Generac can provide BESS solutions that range from 250 kWh to 1 MWh. A significant benefit of using C&I resources is the diversity in size and load profiles of installed resources, allowing for a higher degree of flexibility and availability of capacity.

Program Application

In order to stand up such a DR resource and deliver this incremental capacity, Generac will leverage our comprehensive ecosystem of partners and suppliers in the C&I sector. Generac has extensive experience in C&I generally, with deep expertise in customer acquisition, system design, and commissioning. Nearly 1 GW of C&I-scale assets have been installed to date by Generac in the state of California. While Generac's existing C&I fleet consists almost entirely of conventional fossil fuel-based generators, Generac's C&I customers are rapidly turning to cleaner alternatives, especially BESS. Primary drivers of C&I deployments revolve around the provision of both resiliency solutions (emergency back-up power) and energy savings solutions (based principally on demand charge mitigation and ToU rate arbitrage).

Generac has extensive experience aggregating C&I energy resources into VPPs with significant demand response capacity. Depending on the level of support that CEC requires in order to establish such a program, Generac can provide services in the following key areas:



Generac will work with the selected businesses to ensure that they are aware of the program rules and receive the

proper incentives for participation. With CEC's goals in mind, the enrollment will focus on rapid recruitment and activation of assets, including a maintenance plan to ensure optimal system performance for both customers and the CEC.

Generac proposes that performance of assets be measured at the aggregation level, with said performance tied to the aggregated nominated capacity figure. Due to the multitude of configuration scenarios at the site level, Generac initially proposes allowing a DR performance credit for the offsetting of load behind the meter (BTM), with an expansion to allow credits for energy exported to the grid by measuring performance off the BESS Inverter.

Generac will install Generac's Blue Pillar IoT product, or a suitable alternative, on teach asset to provide remote connectivity to the site (for the CEC, Generac, or another program operator) to dispatch the system at any time of day. The Blue Pillar product will provide the CEC with connectivity to the asset while giving the customer the ability to manage and monitor the equipment through a dedicated online portal. In addition, Generac has established a Network Operations Center (NOC) that can provide operational support by managing the dispatch of assets on behalf of the CEC, using our Concerto VPP platform to maximize the realized value of the fleet.

For existing generators, Generac will retrofit connectivity and controls to island C&I sites at times of system need. We would only enroll natural gas generators serving full site load. These units would only be used for emergency capacity.

BESS assets would be full interconnected and capable of injecting power into the grid, subject to interconnection agreements. These units would be capable of providing a full range of grid services, including daily load shifting, emergency capacity, resource adequacy, and ancillary services.

Recommending Funding Vehicle & Rationale (DEBA vs. DSGS)

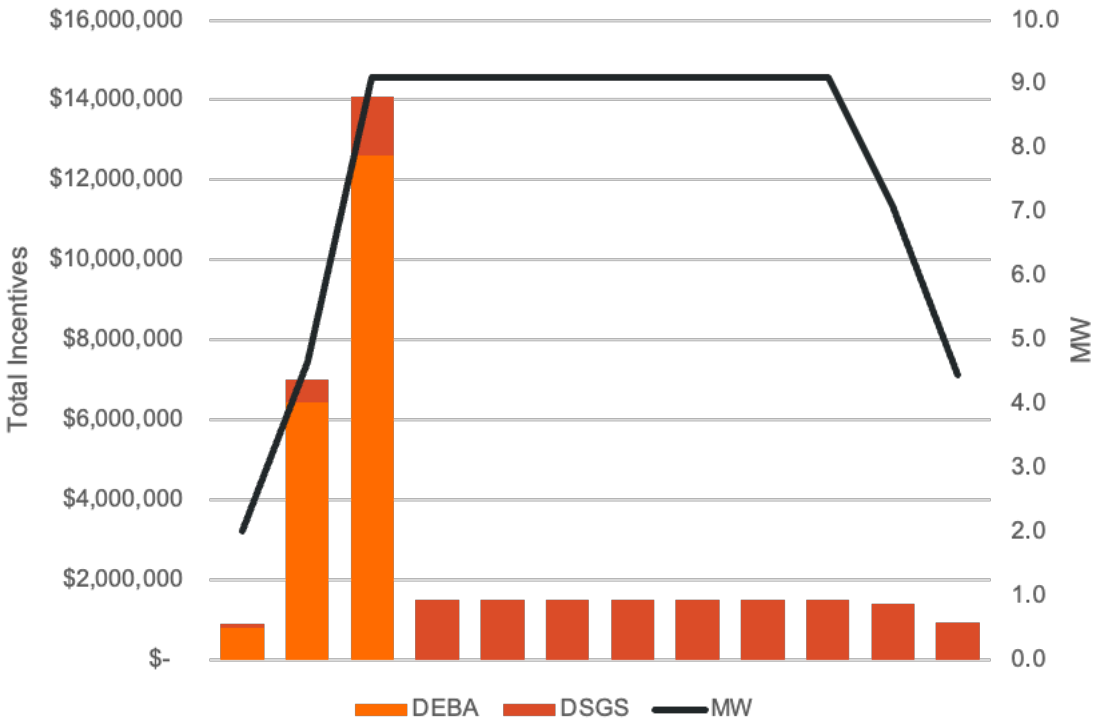
The proposed program would leverage both DEBA and DSGS funding. For BESS, DEBA incentives required could range significantly depending on the availability of SGIP funds. In absence of SGIP, we expect that the program would require $300-$600/kWh of usable installed capacity and $175-$300/kW-yr in capacity payments. Generators would require substantially less, though they of course would be providing much less value to system (emergency capacity only) and with the commensurate emissions. DEBA incentives would be required to cover the upfront cost of retrofitting generators with connectivity and controls, which we expect to range in cost from $15,000-$25,000 per unit. DSGS payments would need to be approximately $30-$60/kW-yr to cover incentives to the customer, fuel, and operational costs.

Under this model, we assume the DSGS program would have the following parameters:

- Device telemetry data could be used to measure performance (common practice in the industry for measuring demand response events);
- Statewide implementation to include customers who are not enrolled in an IOU, POU, or CCA DR program;
- Provide ongoing DSGS revenue over the life of the asset (approximately 10-15 years).

Under this structure, we expect the following schedule of incentives and MW over a ten-year period with a three-year enrollment period.

Figure 10. C&I Incentives and MW by Year



6 CONCLUSION

In developing the portfolio of programs proposed here, we sought to balance the need for scale, speed, equity, and replicability. We developed programs that address underserved markets, show benefits that the CEC is uniquely positioned to capture thanks to recent legislation and appropriations, leverage existing channels in new ways, and keep customer value at the center of their design. We believe these design elements are critical to rapidly and equitably scaling solutions to California resilience challenges.

In order to truly unlock the potential of these assets for reliability, the CEC must prioritize customer experience and expand eligibility as intended. Consistent, easy-to-access, statewide customer programs can enable a meaningful and potentially crucial amount of grid support during extreme conditions. These programs could be deployed immediately to support the peak demand for electricity by the end of the year. In addition to system benefits, the CEC should recognize and capitalize on customer motivations for adopting DERs – namely, resiliency benefits.

By building in program benefits, especially to disadvantaged customers, the CEC can enable not only significant system-wide grid benefits but also equitable outcomes at the customer-level. Our proposals also support the state's goals around home electrification by making heat pump water heaters more cost effective for customers, and ensuring that they can be used as a grid asset.

We appreciate the CEC's consideration of these program proposals and look forward to further conversations with Staff about how to move these from concept to reality, for the benefit of the grid and all Californians.