

1.1 FAQ

1. Who is Gridwell Consulting?

Gridwell Consulting is a boutique California consulting firm that provides expert analysis and strategic advice to companies that operate or transact in the wholesale energy market. This includes evaluation and development of high voltage transmission, conventional power plants, and new resource technologies. Gridwell provides top-of-the-line analytics that accurately model how resources, including battery storage, can optimally participate in the California energy and capacity markets. Our consultants additionally represent the Western Power Trading Forum, a non-profit, member-backed company, at the California ISO and FERC, on all policy initiatives. Our comprehensive knowledge of both market rules and policy processes enable us to provide high value-added insights and strategic advice to wholesale energy market participants.

2. What is the difference between a hybrid storage resource and a hybrid solar or co-located solar resource?

A hybrid storage resource is a fully integrated BESS and gas turbine engine. The BESS literally makes the combustion turbine a more flexible plant. A hybrid solar resource or co-located solar resource with storage are non-integrated facilities that either use the same interconnection or potentially operate by the solar powering the storage resource, prior to or instead of, producing output onto the grid.

3. What resources have already been hybridized and are there plans for more?

SCE has hybridized two LM6000 peaking plants—Center Peaker (Norwalk, CA) and Grapeland Peaker (Rancho Cucamonga, CA)—and has made public that they are actively analyzing the customer value of additional Hybrid EGT® upgrades at its three remaining GE LM6000 peakers--Mira Loma Peaker (Ontario, CA), Barre Peaker (Stanton, CA) and McGrath Peaker (Oxnard, CA). In addition, Stanton Energy Reliability Center has commenced construction activities for two LM6000s Hybrid EGTs in Stanton, CA, with an expected COD in 2020.

4. Why not just build more Battery Energy Storage Systems (BESS)?

Gridwell Consulting does not believe that Hybrid EGT®s are a replacement for building additional BESS. Both standalone BESS and Hybrid EGT® are options that will help California meet its GHG and Renewable Energy goals. Hybridizing existing peaking plants is particularly beneficial when the original facility is not only needed for local reliability, but also the local area has been demonstrated to need very long duration capacity.

The California ISO has found that while some areas only need intermittent emergency resources (with a duration of 4 hours or less), some local areas are more prone to disruptions

and need capacity that can produce energy for 12 hours during emergency conditions. There is therefore a BESS/Hybrid duration efficiency point where it is vastly less expensive and only creates small amounts of incremental emissions for a peaking plant to be hybridized, compared to sufficient BESS to be installed to meet the local reliability needs.

Additionally, a Hybrid EGT frequently can be implemented at a lower initial cost than standalone BESS for comparable functionality because the site typically already exists and has interconnection capability. It also offers the ability to be added onto and have standalone BESS structure as well as the hybrid system over time.

5. Does the BESS portion of the Hybrid EGT® count as resource adequacy capacity?

Yes. For example, consider the SCE Hybrid EGT® resources with a 4.3 MWh BESS provided an incremental resource adequacy value of 1.075 MWs, independent of the 50-MW peakers.¹

6. Does the BESS portion of the Hybrid EGT® count toward the storage target?

Yes. In June 2018 the CPUC granted cost recovery for SCE's two Hybrid EGT® projects and determined that the Hybrid EGT® should count toward the procurement target.²

7. Does it make sense to hybridize LM6000 peaker plants located in disadvantaged communities³?

While Gridwell Consulting believes that hybridizing should be looked at on a case-by-case basis, generally, there could be significant benefits to hybridizing resources in disadvantaged communities. A Hybrid EGT® has the potential to only use its BESS and still provide valuable operating reserves, frequency response, and voltage support to the grid, all at zero emissions. Indeed, SCE has forecast that the retrofit of their peakers at Center and Grapeland as Hybrid EGTs will reduce annual emissions by more than 60%, compared to the peaker emissions prior to hybridizing. Hybridizing, rather than simply retiring the resource, should be a win-win for most disadvantaged communities that are in constrained load pockets, because it maintains local property taxes, jobs and emergency capacity where they are most needed. Total emissions of both criteria pollutants and GHG from a Hybrid EGT compared to a combustion turbine used as a peaker are forecasted to be reduced by as much as 90%.

8. How does the California ISO model Hybrid EGT® resources?

The California ISO treats Hybrid EGT® resources like any other thermal resource. The California ISO can fully model all BESS enhancements within the energy market optimization, including the 0-MW Pmin. Any start-up costs can either be included in the energy bid, or as a transition cost under the multistage generating model.

¹ Decision 18-06-009; June 21, 2018: Finding of Fact at 11 and 14.

² *ibid*

³ <http://www.cpuc.ca.gov/discom/>

9. What is often over-looked as a benefit of hybrid storage technology?

Increased renewable capacity has both economic and reliability impacts on the grid. Large and often unexpected swings in solar and wind production can negatively affect grid reliability in a variety of ways, including the grid's ability to maintain normal frequency. For example, the immediate effect of over-generation is higher-than-normal system frequency (typically 60 Hz, +/- ~ .02 Hz) and higher-than-normal balancing authority area control error. The more severe effects of over-generation include grid facility overloads, potential generator damage and placing a balancing authority area at risk of non-compliance with NERC's control performance standard 1 (CPS1) and NERC standard BAL-001-1.

The California ISO has had significant issues maintaining compliance with NERC's frequency response standards and this is a known challenge going forward. Hybrid EGT®s are able to provide frequency response and fast frequency response services without having to put additional emissions on the grid.

10. Can the same technology be used for combined-cycle resources?

Yes. But there will be significant differences in how the resource can operate. Further research and subsequent modeling is needed to understand the potential benefits.

11. How can I learn more?

To learn more about RESOLVE, go to: [CPUC IRP RESOLVE MODEL with 2017 IEPR](#).

To learn more about Wellhead, go to: <http://wellhead.com/wphome/wps-advantage/>.

To learn more about California ISO market enhancements, go to: [California ISO Stakeholder Processes](#).

12. Still have questions?

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