Clean Coalition
Making Clean Local Energy Accessible Now

Valencia Gardens Energy Storage
A non-wires alternative to distribution infrastructure upgrades

The Valencia Gardens Energy Storage (VGES) project is located at a large public housing complex in San Francisco's Mission District that accommodates hundreds of underserved families and seniors within the Pacific Gas & Electric (PG&E) utility service territory. The Clean Coalition, along with its partners — PATHION, Inc., REP Energy, PG&E, and the California Independent System Operator (CAISO) — are developing an innovative project in San Francisco that will demonstrate the use of energy storage to defer grid upgrades. The VGES project will install 1096 kilowatt-hours (kWh) of energy storage, coupled with two 250-kilowatt (kW) inverters in front of the meter; the project will use a wholesale distribution tariff (WDT) wholesale interconnection and connect to the distribution grid. The energy storage is co-located on the same feeder with an existing 580 kW rooftop PV system (installed in 2011), located on a circuit with a peak load of 570 kW.

Source: EcoPlexus; Valencia Gardens complex

Non-wires alternatives (NWA) are a growing use-case for distributed energy resources (DER). NWA can provide electric utilities, distribution operators, and transmission operators with alternative solutions to traditional grid upgrades involving new poles and wires, which can be expensive to construct, own, and maintain. Furthermore, traditional poles and wires are a long-term investment that has a high risk of becoming a stranded asset, especially when used as a permanent, expensive solution to what could be a temporary problem on the grid. The table below summarizes typical issues that drive new grid infrastructure investment.

Table 1: Summary of utility issues, traditional solutions, and non-wires solutions

Utility issue	Traditional solution	Non-wires solution	Example project
Forecast transmission reliability needs are driven by load growth	New targeted local transmission infrastructure	Peak load mitigation, such as energy efficiency and rooftop PV	CAISO 2018 Transmission Planning Process canceled $2.6 billion in planned projects due to higher DER and energy efficiency than forecast[1]
Supplies of natural gas must be curtailed, limiting availability of peaker plants to serve peak loads	Install temporary diesel generators as a peaking resource until gas supply can be restored	Install energy storage projects to handle peak loads	In 2015, the California Public Utilities Commission (CPUC) approved 100 MW of energy storage projects in Southern California Edison

[1] http://www.caiso.com/Documents/BoardApproves2017-18TransmissionPlan_CRRRuleChanges.pdf

			(SCE) and San Diego Gas & Electric (SDG&E) territories[2]
Planned load growth of greater than 200 MW combined with plant retirement may lead to significant local capacity shortages	Build new transmission or gas peaker plant to serve region	Combine multiple DER solutions to reduce net load and provide locally generated power	SCE 2013 PRP program procured 260 MW from a mix of solar, demand response, energy storage, and energy efficiency[3]
Load growth forecasts predict exceeding capacity of local distribution planning area	Build a new substation for $1.2 billion	New York Public Services Commission authorizes procurement of 17 MW of customer-side DER and 52 MW of non-traditional utility-side projects	Brooklyn Queens Demand Management Program by Con Ed in 2014-2018 demonstrates substation deferral[4]
Load growth forecasts predict exceeding capacity of distribution substations or circuits	Upgrade substation and add or reconductor circuits	Meet capacity need with DER	CPUC 2018 IOU Distribution Deferral Opportunities Reports identify DER-based deferral options
Uncertain distribution circuit load forecast	Permanently upgrade substation and add or reconductor circuits	Temporarily contract for energy storage and demand response/load shift pending long-term need determination	In 2015, the CPUC approved 100 MW of energy storage projects in SCE and SDG&E territories[5]

DER NWA offer multi-use applications (MUA) and value stacking, which has the potential to drastically improve energy storage economics and lead to higher adoption rates. DER can provide multiple services (such as capacity and voltage regulation) at the same time, offering an alternative to conventional capacity investments in distribution, transmission, and generation. Stacking these values increases the cost-effectiveness of NWA, allowing DER to spread their costs across multiple value streams and thereby offer each component service at a lower bundled price. These services include:

- Local generation capacity, flexible capacity, and system capacity in the Resource Adequacy domain
- Frequency regulation, spinning reserve, non-spinning reserves, and flexible ramping products in the wholesale market

[2] "DER and the *Non-Wires Solutions* Opportunity," https://www.seia.org/sites/default/files/2018-05/SEIA-GridMod-Series-5_2018-May-Final.pdf

[3] Ibid

[4] Ibid

[5] "DER and the *Non-Wires Solutions* Opportunity," https://www.seia.org/sites/default/files/2018-05/SEIA-GridMod-Series-5_2018-May-Final.pdf

- Inertia, primary frequency response, voltage support, black start, and infrastructure deferral in the transmission domain
- Capacity, back-tie reliability services, voltage support, and microgrid resilience at the distribution level
- Backup power, demand charge management, self-consumption, time-of-use (TOU) management, and demand response participation in the customer domain

NWA are evaluated against conventional investments and prioritized based upon cost-effectiveness and assessment of DER sourcing and siting opportunities in the target need area.

Example 2019 distribution deferral opportunities need/rationale:	**Timeframe**	**Traditional cost**	**MW need**	**MWh**
• Driven by base demand • Sufficient Integrated Capacity Analysis (ICA) on all four circuits • DER sited to offload four circuits	2.5 years	$3,850,000	1.8	5.6
• Area is landlocked; difficult to build ties and offload • Sufficient ICA on both circuits • Driven by 800-home development with uncertainty	3 years	$3,900,000	5.7	22
• Driven by development of 250 new homes • DER sited to offload three circuits to defer circuit-level need • DER can be sited across seven circuits to defer substation need	3 years	$5,400,000	13	25
• Driven by housing, hospital, and commercial/industrial development • ICA limited by voltage constraints • DER sited at a single circuit	2 years	$3,800,000	5.2	60

While the renewable energy and DER industries have conducted extensive paper studies on the potential for DER to solve these issues, there are few demonstrations and proven use-cases. Of the demonstrations that already exist, many if not all are owned by the utilities that they serve, which offers little opportunity for third-party owners to participate in this growing market segment, and limits the commercial viability of such solutions.

Key innovations that will be demonstrated by VGES include:

- Utilizing energy storage to increase the PV hosting capacity of the distribution feeder branch by 33%, enabling the addition of 250 kW increased hosting capacity to a highly congested feeder in San Francisco's Mission District
- Third-party ownership of energy storage assets that provide services to PG&E and CAISO
- Interoperability of energy storage to participate in CAISO markets and potential future PG&E markets
- Contracting on-site energy storage to participate in multiple markets through optimization of scheduled battery allocation

- A market mechanism that advances the regulatory and interconnection frameworks so that they fully value and support the energy storage solution as demonstrated via this project, while also rewarding owners for the use of their property — directly analogous to the telecommunications industry leasing property space for mobile phone towers

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