

# Clean Coalition

## Unleashing Local Dispatchable Solar San Diego Energy District 2020 Virtual Symposium

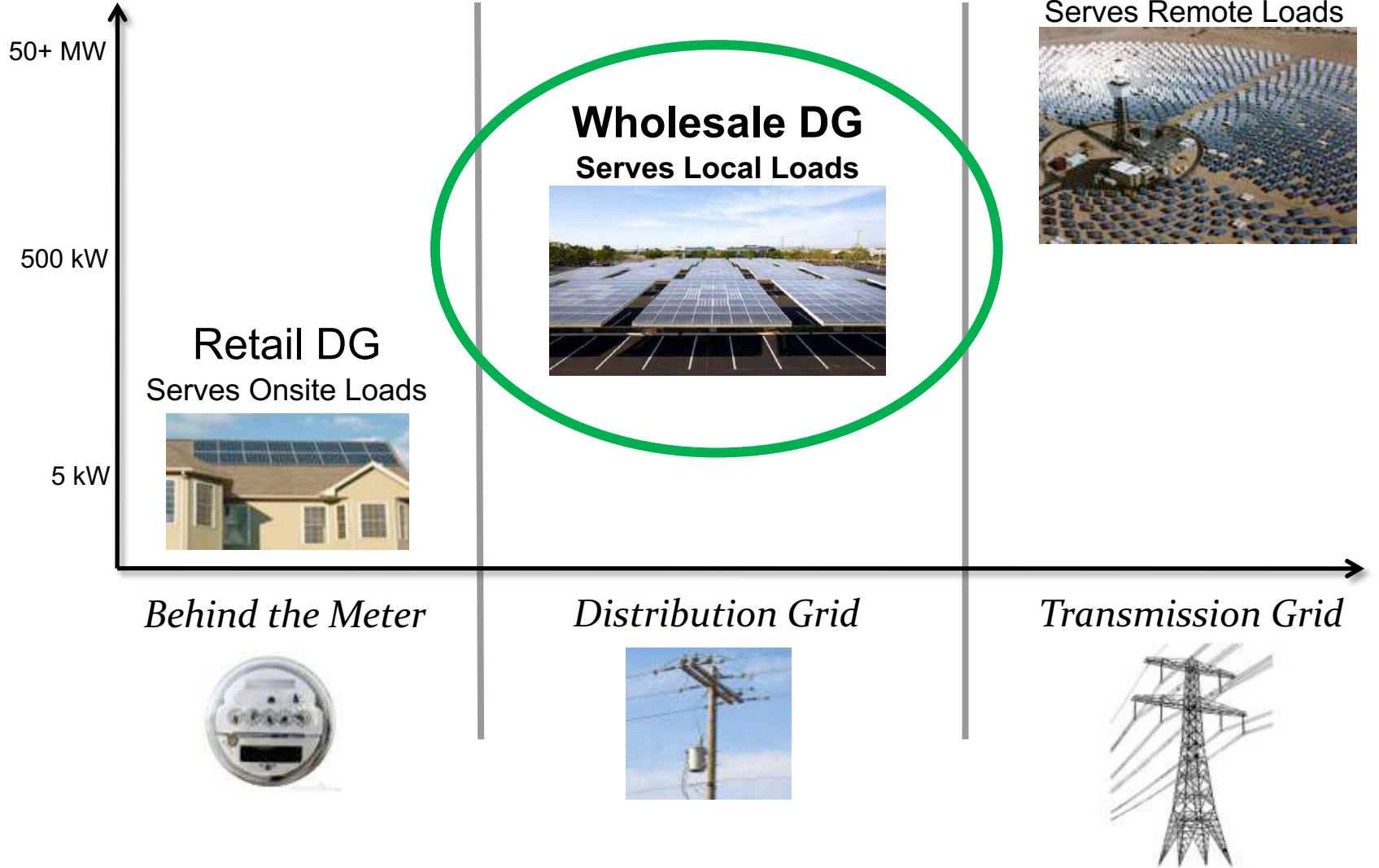


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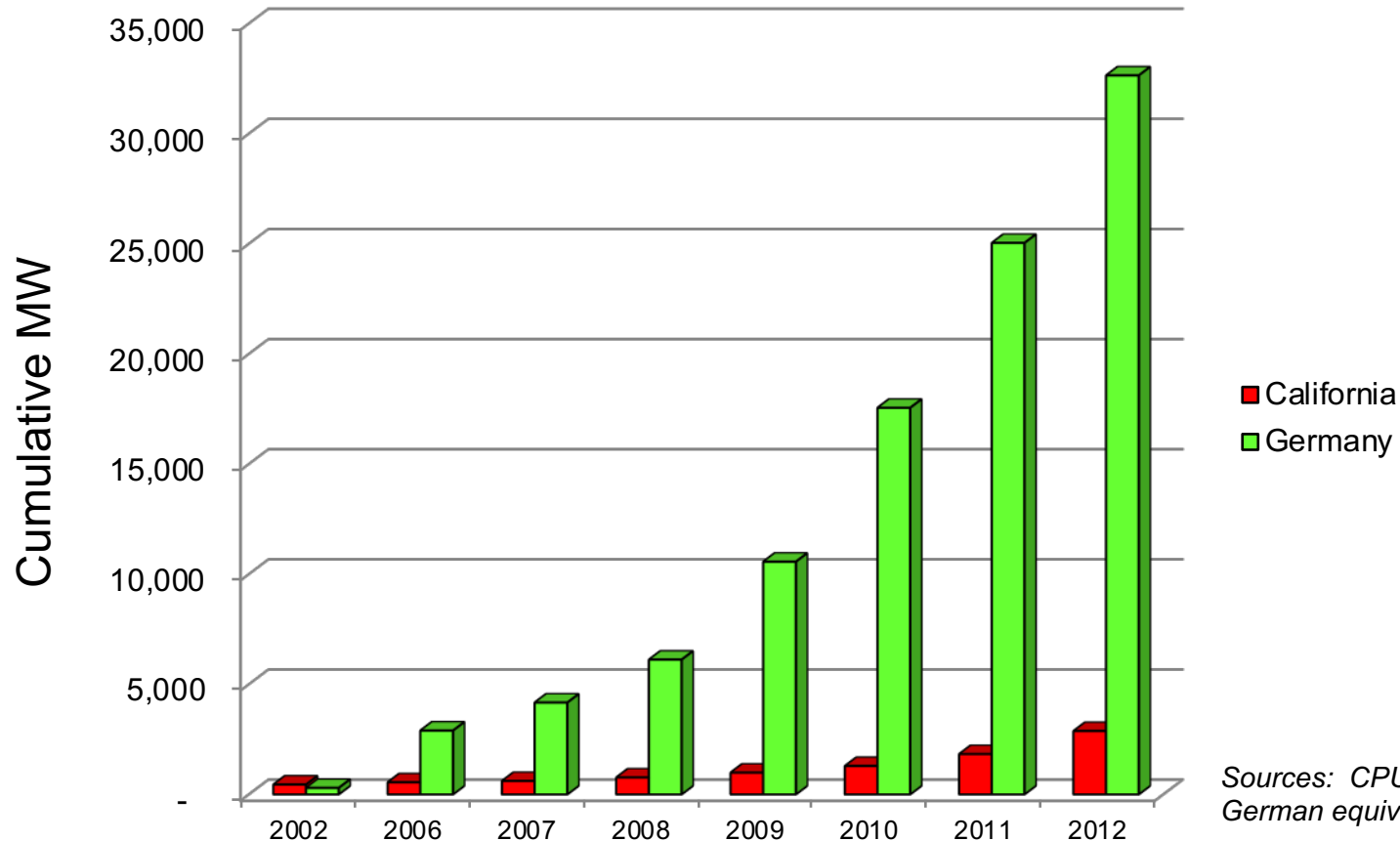
- Solar siting opportunities in any urban & suburban areas will predominantly be on built-environments like rooftops, parking lots, and parking structures
  - Planning will be greatly informed by surveying associated solar siting potential.
  - Hence, the Clean Coalition conducted a Solar Siting Survey (SSS) for the City of San Diego.
- Achieving 25% local renewables will require unleashing Wholesale Distributed Generation (WDG)
  - Only proven approach is a Feed-In Tariff (FIT).
  - Hence, the Clean Coalition designed a FIT for the City of San Diego.
- Achieving renewables-driven resilience will require high penetrations of local renewables that are dispatchable
  - Hence, the FIT includes a mechanism for ensuring that energy storage is deployed in a manner that makes renewable energy available whenever needed, not just when the sun is shining or wind is blowing etc.

Wholesale Distributed Generation (WDG)  
is the market segment that is primed to  
truly unleash local solar.

*Project Size*



## Solar Markets: Germany vs California (2002-2012)



Sources: CPUC, CEC, SEIA and German equivalents.

Germany deployed over 10 times more solar than California in the decade from 2002 — despite California having 70% better solar resource.

**Solar Siting Survey (SSS)**  
for  
**City of San Diego**

## SSS is performed manually through a multi-step process:

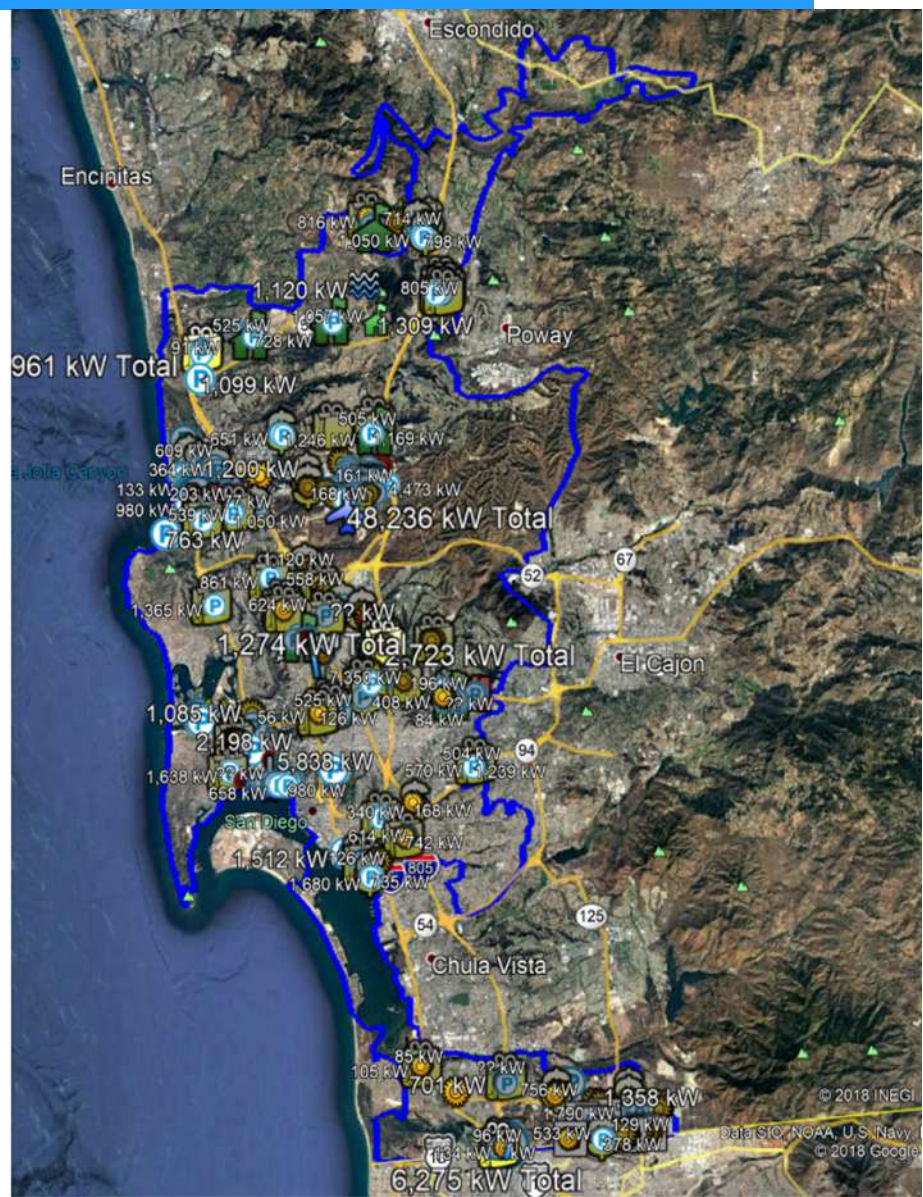
- **Set** a minimum project size for the SSS.
- **Scan** the target region via Google Earth Pro for prospective solar sites on built-environments (rooftops, parking lots, and parking structures) that meet the minimum project size.
- **Measure** the usable surface area and eliminate obvious portions that are not viable due to setbacks, obstructions, and/or shading.
- **Assess** the probable solar generation density against the minimum project size threshold (1 MWac for this SSS).
- Where sensible, **aggregate** campus-type structures that are likely to have common ownership into a single site (examples being parking lots and rooftops in a shopping center, industrial park, or school campus).
- **Capture** the details, including the interconnection hosting capacity.
- **Map** the results.

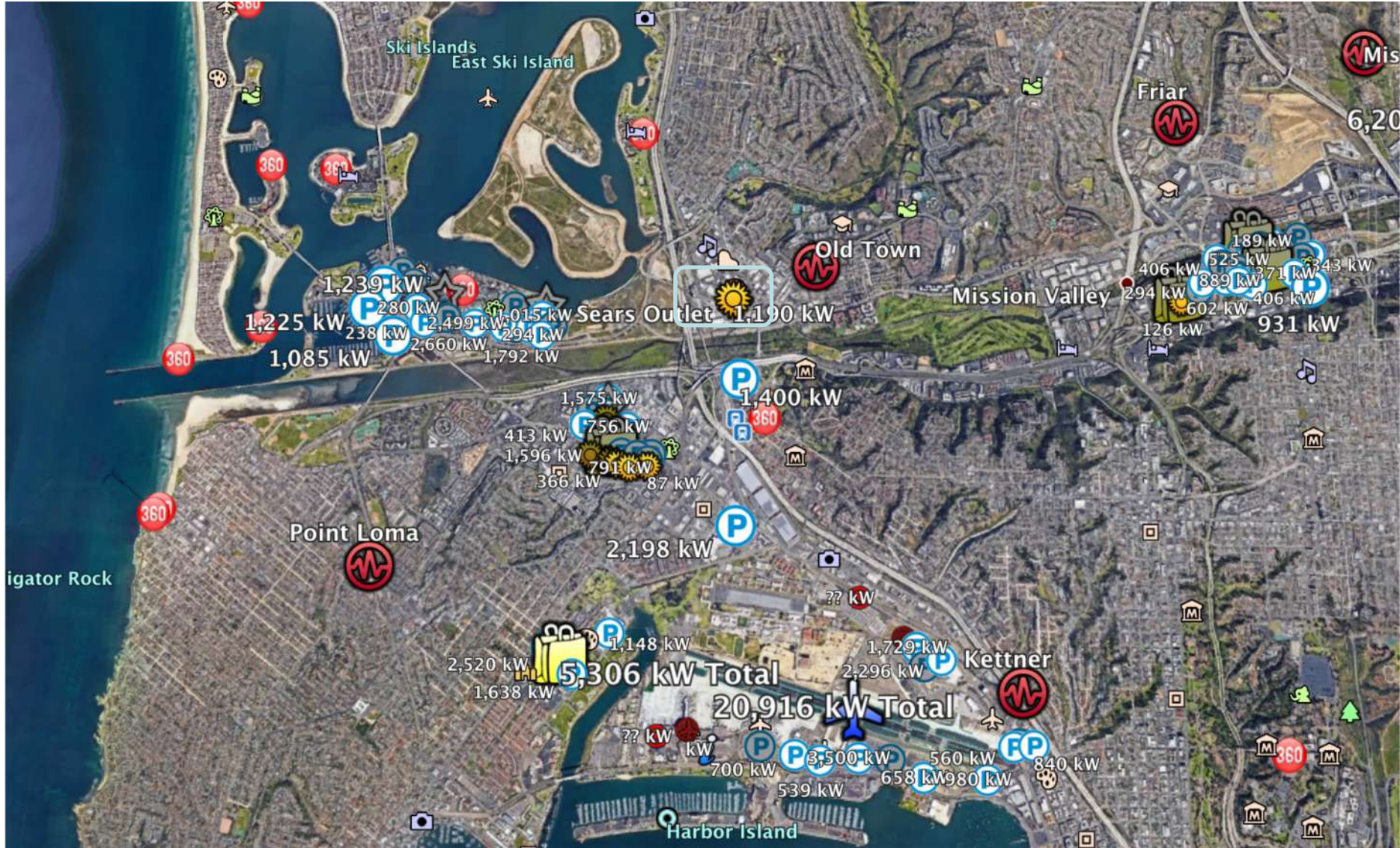
- Over 490 MW of technical solar siting potential was found on built environments that can support projects sized at least 1 MW.
- 75% of the potential is in parking lots and parking structures.
- Extrapolations to lower minimum project sizes:
  - Total potential doubles to 1 GW if project limit set at 500 kW.
  - Total potential doubles again to 2 GW if project limit set at 100 kW.

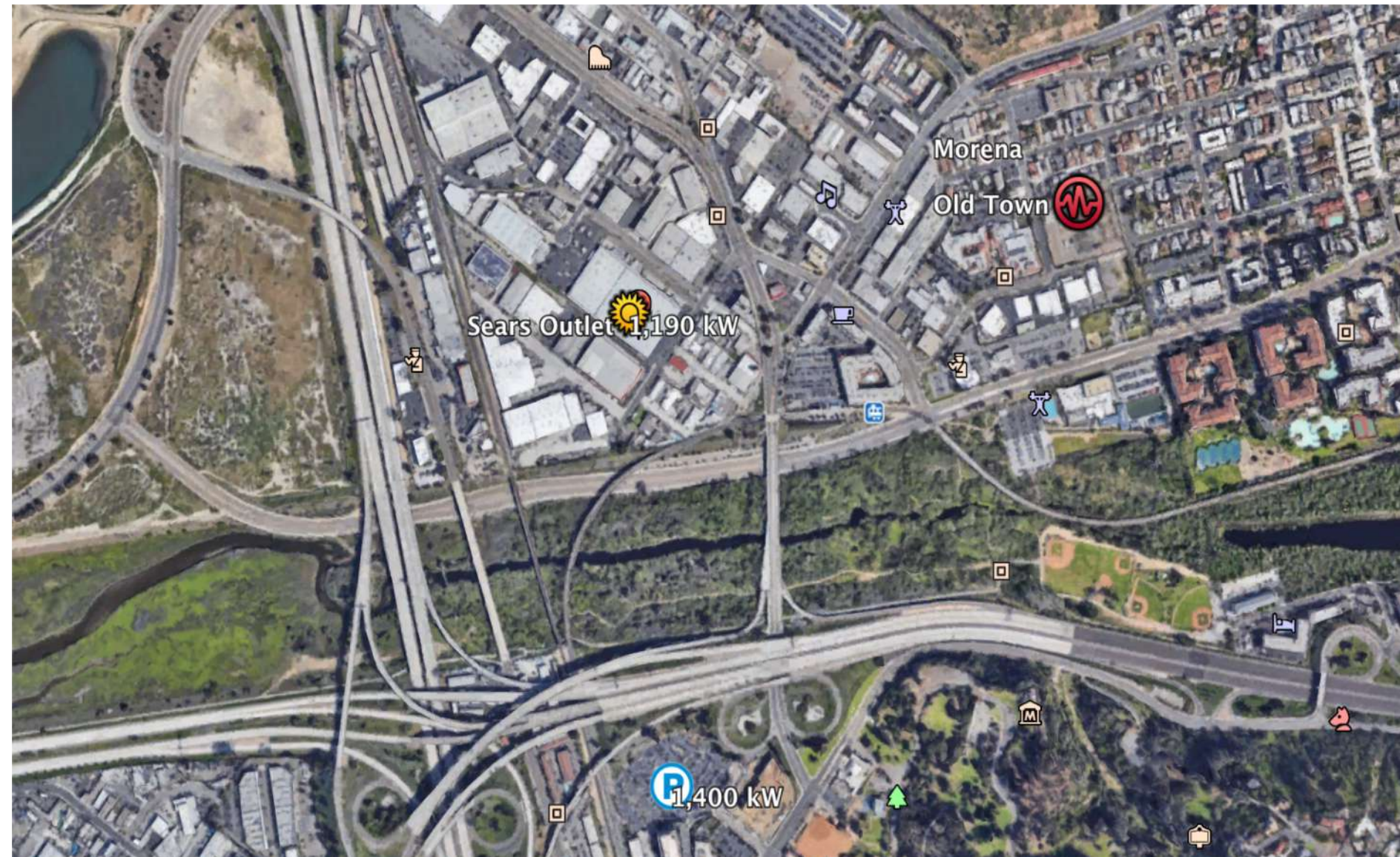


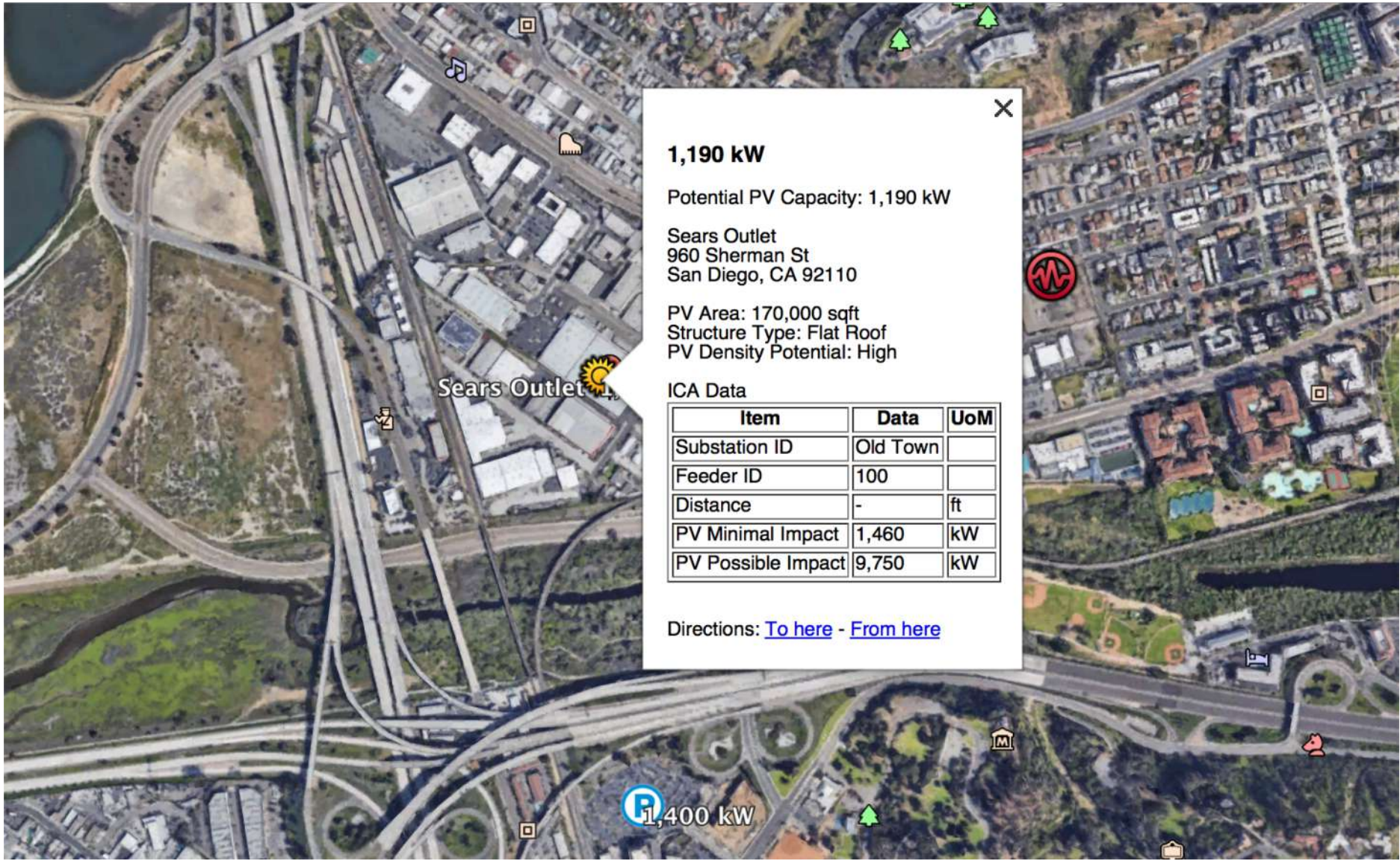
Over 490 MW of Solar Siting Potential identified

- Sites >1 MW
- On built-environments









**1,190 kW**

Potential PV Capacity: 1,190 kW

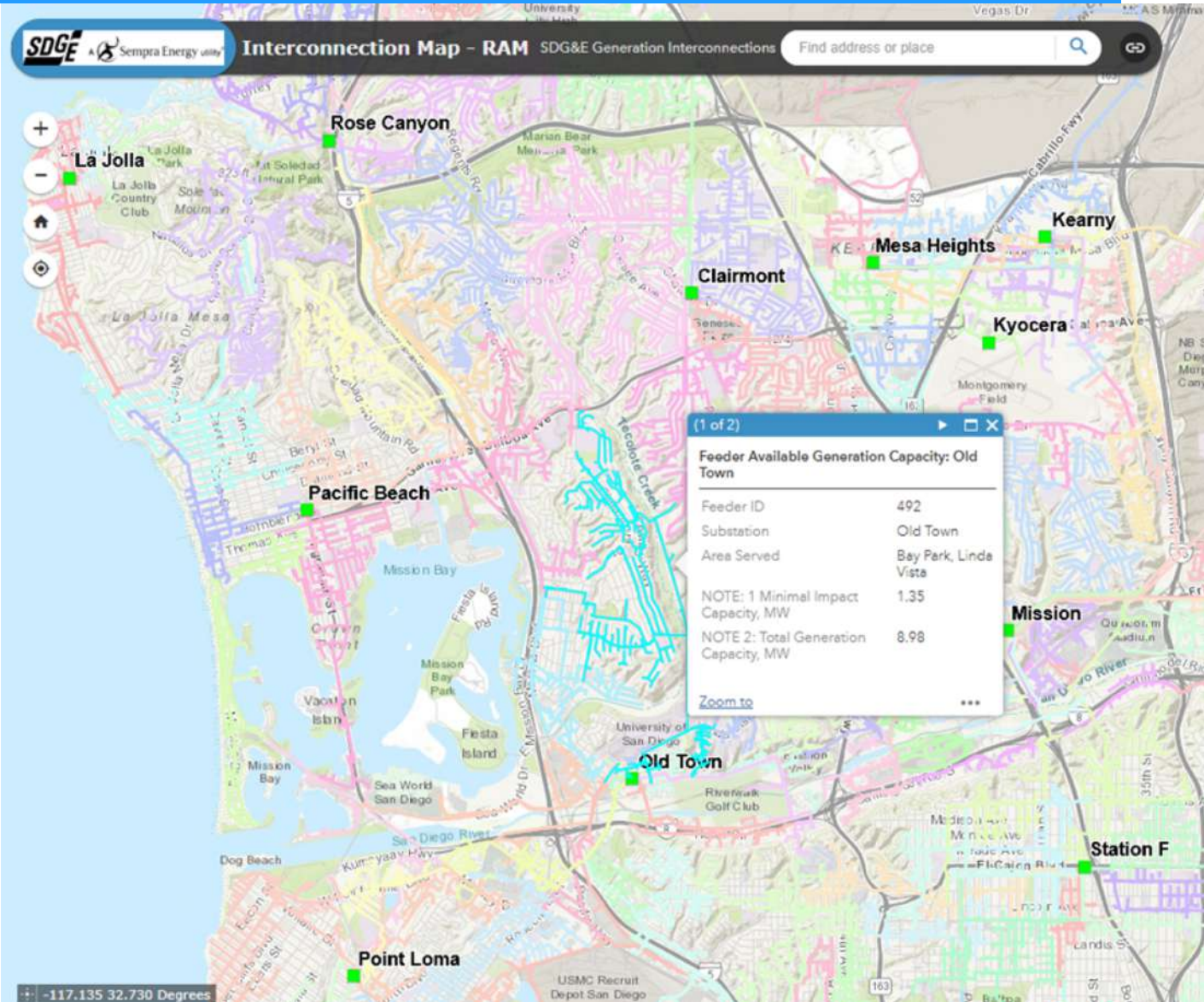
Sears Outlet  
960 Sherman St  
San Diego, CA 92110

PV Area: 170,000 sqft  
Structure Type: Flat Roof  
PV Density Potential: High

ICA Data

Item	Data	UoM
Substation ID	Old Town	
Feeder ID	100	
Distance	-	ft
PV Minimal Impact	1,460	kW
PV Possible Impact	9,750	kW

Directions: [To here](#) - [From here](#)



# SD substation & feeder hosting capacities

PV Sites		ICA	
Substation Name	Substation Survey Siting Potential [MW]	Substation Minimal Impact [MW]	Substation Possible Impact [MW]
Feeder ID	Feeder Survey Siting Potential [MW]	PV Feeder Minimal Impact [MW]	PV Feeder Possible Impact [MW]
<b>Artesian</b>	6.52	1.23	8.18
1104	3.36	0.88	5.27
1100	1.39	1.23	8.18
1102	1.76	1.23	8.17
<b>Bernardo</b>	22.98	1.75	11.65
534	2.95	1.75	11.65
537	4.33	1.46	9.75
292	1.79	1.27	8.47
543	7.48	1.49	9.90
540	0.00	1.44	9.60
577	3.86	1.48	9.90
575	2.58	1.50	10.00
<b>Border</b>	52.59	1.46	9.76
533	30.61	1.35	8.99
534	5.63	1.03	6.87
535	5.01	1.41	9.40
1160	11.34	1.46	9.76
<b>Chicarita</b>	3.51	1.08	7.19
500	2.43	1.04	6.91
910	1.09	1.08	7.19
<b>Chollas West</b>	6.14	1.23	8.19
164	6.14	1.23	8.19
<b>Clairmont</b>	8.55	1.32	8.77
274	6.92	1.17	7.78
277	0.74	1.27	8.47
279	0.89	1.32	8.77
<b>Division</b>	3.67	1.50	10.00
48	3.67	1.50	10.00

# Feed-In Tariff for City of San Diego

FITs are unparalleled in unleashing  
cost-effective, commercial-scale renewables



- Standardized and guaranteed contract between the solar or solar+storage facility and the Load Serving Entity (LSE) with a long-term, predefined rate paid for energy produced

FIT project



Utility customer

100% of the renewable energy generation is purchased by SDGE at FIT rate

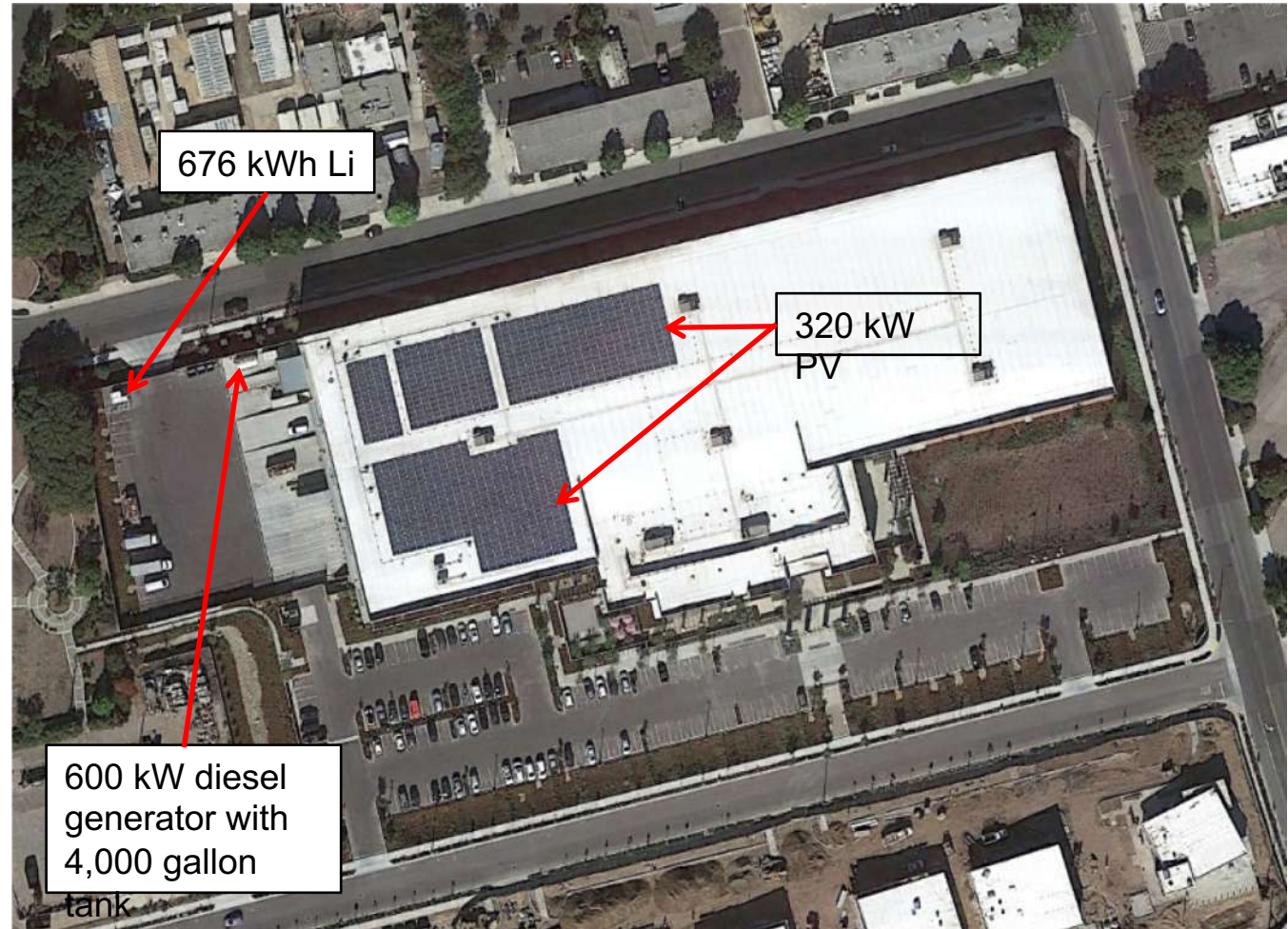


100% of customer energy usage is purchased based on a normal retail rate

- ✔ FITs offer clear guidance to the market through predefined terms and prices, thereby allowing project developers to qualify their planned projects before undertaking significant investment in siting, interconnection, etc.
- ✔ A clear, predictable purchase offer — and a simple, standardized contract for use between a LSE and energy generators — streamline the development of clean local energy. Not only does this approach nearly eliminate speculative projects, but it also drives down renewable energy development costs.
- ✔ FITs secure projects that will be built immediately and proven to deliver power within 12 to 18 months.
- ✔ Avoid limitations associated with Net Energy Metering (NEM).
- ✔ Avoid issues associated with solicitation processes.

# Direct Relief is a Solar Microgrid showcase

- Resilience is required:
  - **320 kW PV**
  - **676 kWh Storage**
  - 600 kW diesel generator
  - 4000 gallons of diesel fuel
- PV annual generation designed to cover annual consumption.
- Storage designed to time-shift the generation to more valuable times, and provide Resilience.
- Genset provides “back-up to the back-up”.
- Direct Relief Microgrid requirement is that the critical loads are operational indefinitely, even through local disasters that causes long-term interruptions to normal electricity service.



Microgrid only serves  
Direct Relief needs:

- 70% of roof and 100% of massive parking area solar potential is unused.
- Additional storage not able to be considered due to policy prohibitions around exporting energy from a battery to the grid – even though the energy is 100% stored solar.

Ready to do way more:

- 1,133 kW in total solar siting potential, 427 kW more rooftop and 386 kW in parking lots.
- Existing switch gear is already sized for the expansion and is just awaiting the policy innovation!



- ▶ A 50 MW FIT will provide roughly 1.1% of the City of San Diego's annual electric load

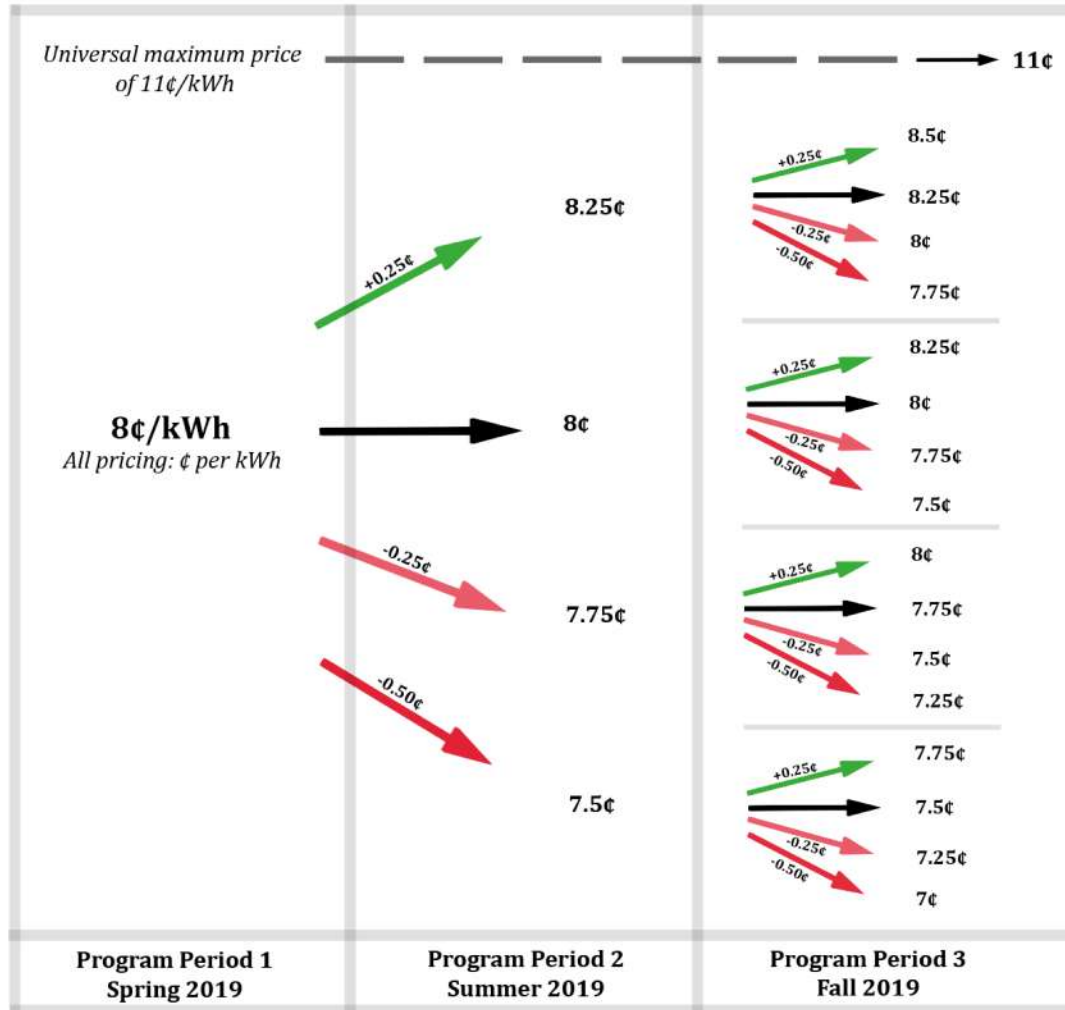
<b>FIT capacity</b>	<b>Annual energy production from each kW of FIT capacity</b>	<b>Annual energy deliveries through FIT</b>	<b>Annual LSE energy sales</b>	<b>Percent of total LSE retail sales</b>
50 MW	1,900 kWh	95,000,000 kWh	8,500,000 MWh	1.1%

- ▶ Annual production of 1,900 kWh/kWac of FIT capacity is based on solar resource analysis for the City of San Diego, as we expect PV to be the dominant FIT technology

<b>Location</b>	<b>Solar resource quality (kWh/m<sup>2</sup>/day)</b>	<b>System type</b>	<b>Annual energy production (kWh/kWac/year)</b>
San Diego	5.00-5.50	Fixed rooftop installation	1900
San Diego	5.00-5.50	Single-axis tracking installation	2371

# SD FIT Market Responsive Pricing (MRP)

Once baseline pricing is set for the initial FIT tranche, MRP governs baseline pricing, which can never exceed a universal maximum of 11¢/kWh.



- The concept of pricing adders is simple
  - A Load Serving Entity (LSE) identifies the characteristics it would like to see in its FIT projects and then creates adders to its baseline FIT price to incentivize projects with these characteristics.
  
- The Clean Coalition recommends the LSE implement four pricing adders:
  - Built-environment adder at 20%
    - Rooftops, parking lots, parking structures, etc.
  - Small project adder at either 10% or 20%
    - 10% for projects larger than 100 kW and less than or equal to 350 kW.
    - 20% for projects less than or equal to 100 kW.
  - Community benefit adder at 5%
    - Tax-exempt and/or within Communities of Concern.
  - Dispatchability adder at 15¢/kWh
    - Eligible for guaranteed daily dispatchable renewable energy at 2-4 hours of nameplate renewable energy FIT project.

# Dispatchable Energy Capacity Services (DECS)

## Load Serving Entity (LSE)

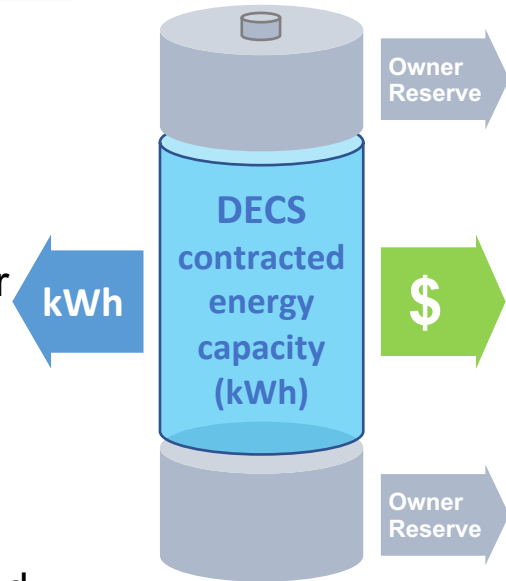
- LSE contracts for dispatchable daily cycling of energy capacity (kWh), at a fixed \$/kWh fee, used or not.
- LSE optimizes fully flexible energy capacity, dispatching for any purpose, which could be based on time of day, day of week, season, event, and/or other optimizations over the DECS contract period.
- Initial DECS contracts are priced at Cost of Service (COS) while subsequent DECS contract pricing is adjusted for market response.

## Three COS components:

1. Net Cost of Energy (NCOE).
2. Capital expenditure ("capex").
3. Operating expenditure ("opex").

## Storage Asset Owner

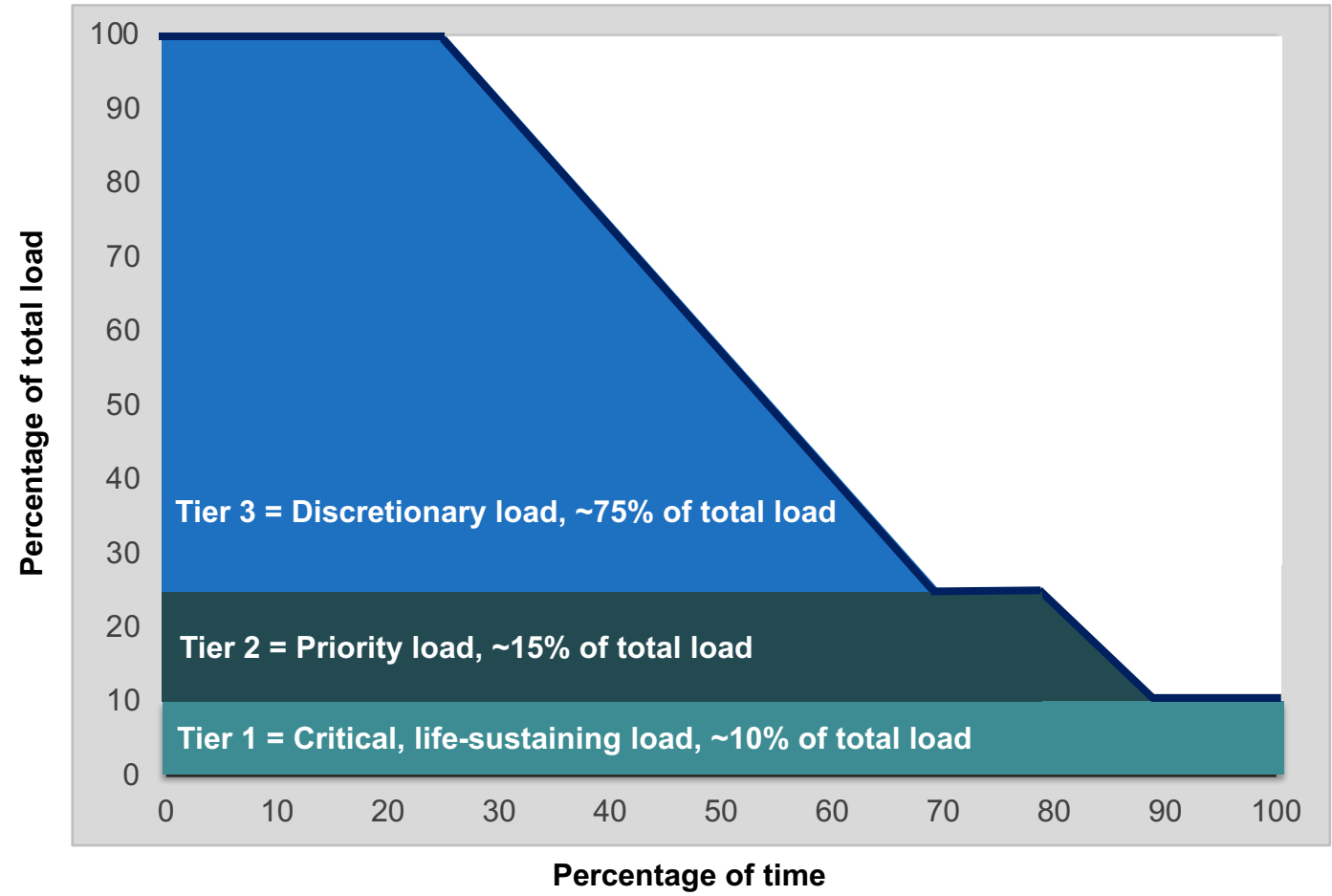
- Owner retains discretion over any capacity not under DECS contract.
- Owner earns guaranteed \$/kWh payments for the DECS-contracted energy capacity.
- Owner retains discretion over any capacity not under DECS contract.



DECS offers a single bankable revenue stream for energy storage owners and a fully flexible & dispatchable energy source for LSEs available daily.



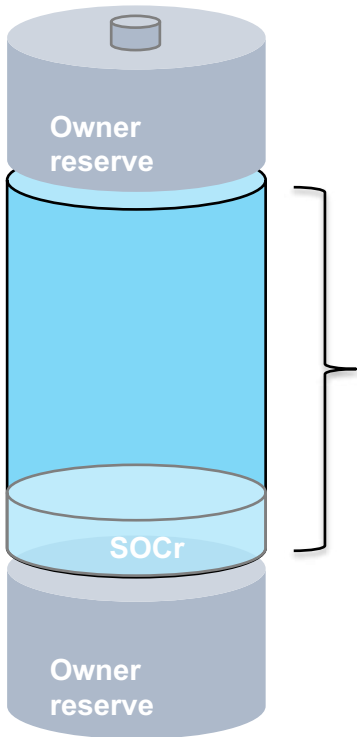
# Percentage of time online for Tier 1, 2, and 3 loads for net zero solar + 2 hours of storage microgrid at UCSB



Top owner reserve is often in place to absorb BESS degradation over time, while still delivering the contracted daily cycling energy capacity.

SOCr = the minimum state-of-charge (SOC) that is reserved for provisioning resilience. The SOCr can be dynamic and/or resized to between 0% and 100% of the contracted BESS energy capacity. A lower SOCr facilitates BESS operations that optimize daily economic performance while a larger SOCr facilitates the provisioning of higher resilience.

Bottom owner reserve is often required to meet BESS warranty requirements that are imposed by BESS vendors.



Contracted BESS energy capacity (kWh) that must be available for daily cycling over the contract duration for achieving specified economic & resilience performance.