

Grid Integrated Resources

Energy Market Example

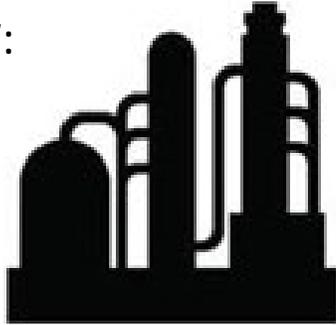
DERSC

January 31, 2018

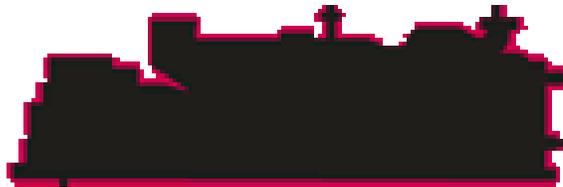
Sample Facility

Native Load 8MW:

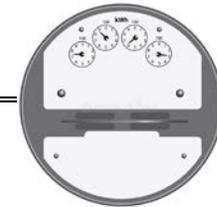
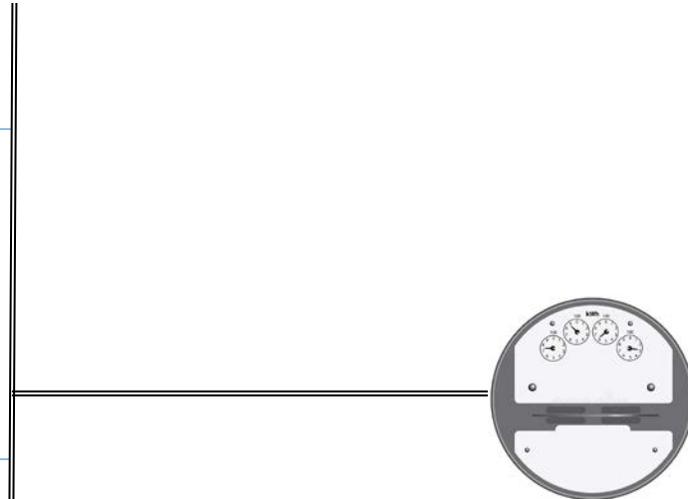
3MW Base
5MW Process



8MW CHP

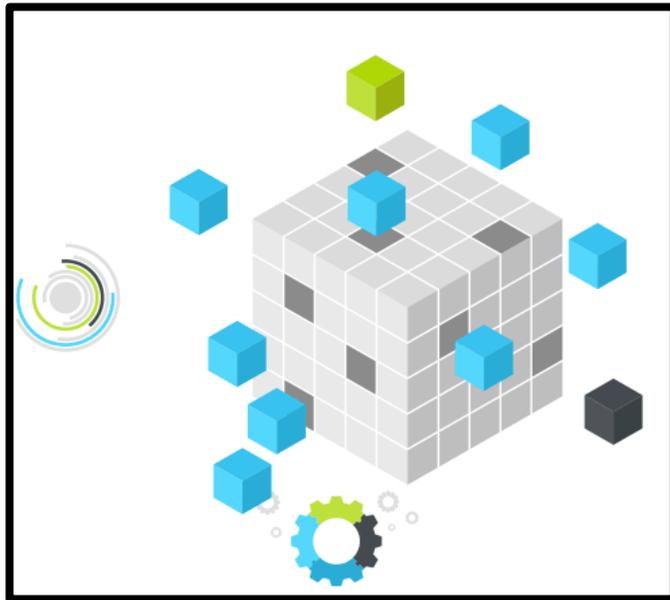


2MW Diesel

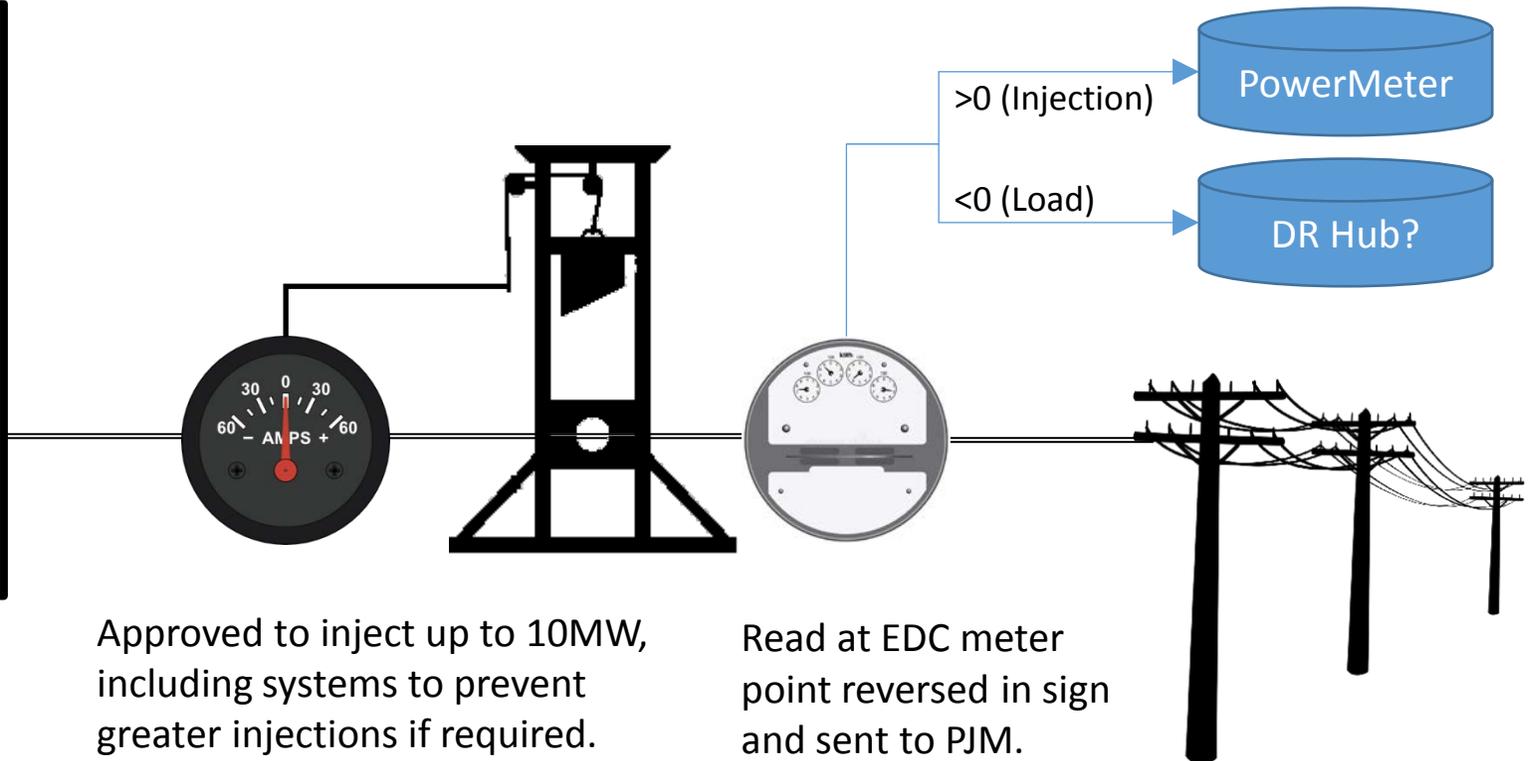


EDC Meter

Interconnection, Relays, Metering



GIR treated as single aggregated entity, so long as maximum net injection and other interconnection conditions respected.



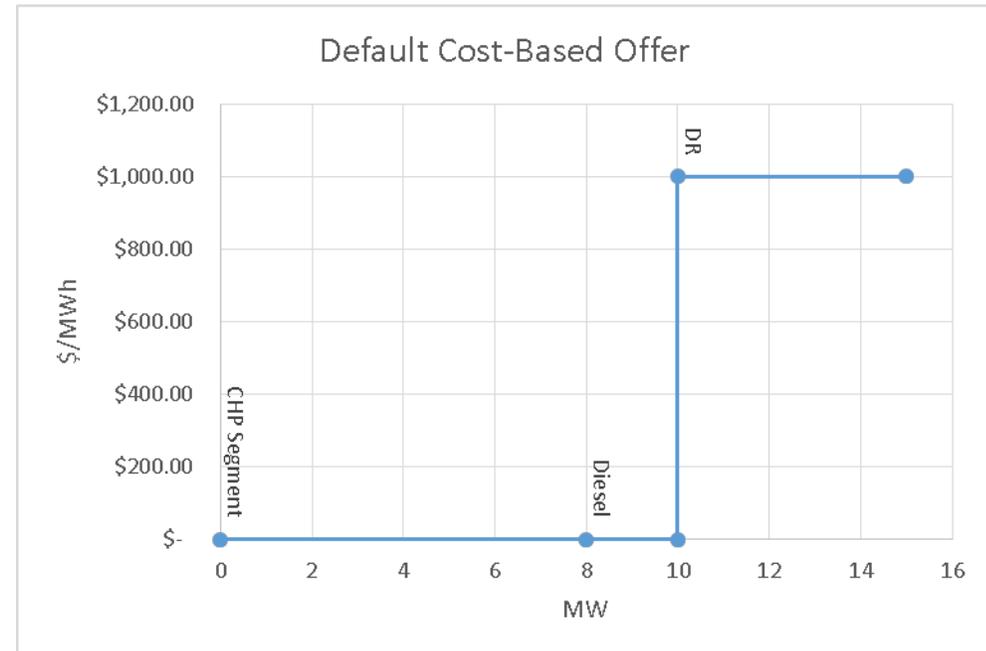
Approved to inject up to 10MW, including systems to prevent greater injections if required.

Read at EDC meter point reversed in sign and sent to PJM.

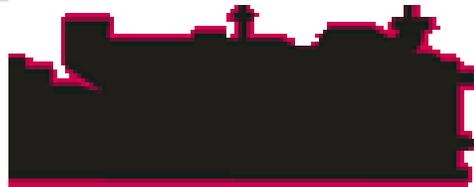
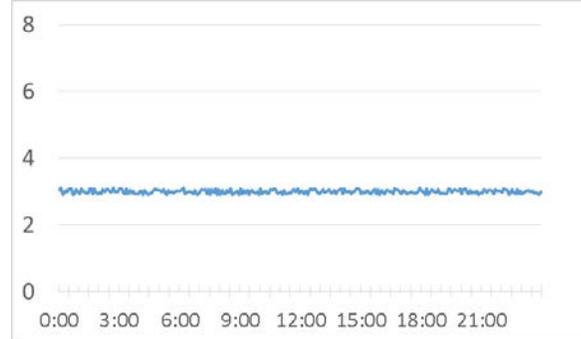
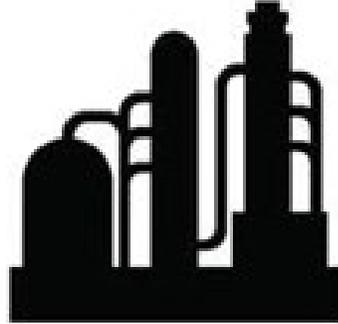
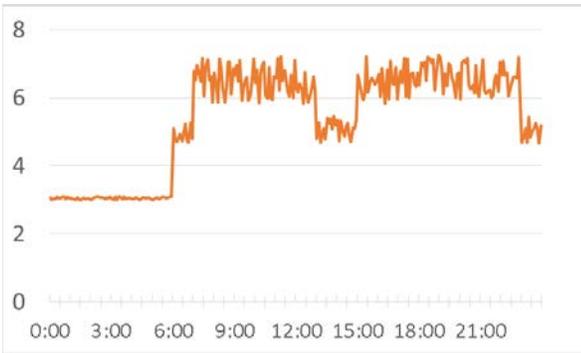
Cost Policy and Offer

Nominal Cost Policy

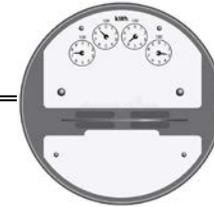
Offer Segment 1: 8MW, CHP
Offer Segment 2: 2MW, Diesel
Offer Segment 3: 5MW, DR



Daily Operations



Diesel Off



EDC Meter



Price Based Offer

Reasoning

3MW of CHP running as base to offset load, not eligible for market

5MW of CHP offered at \$90.00

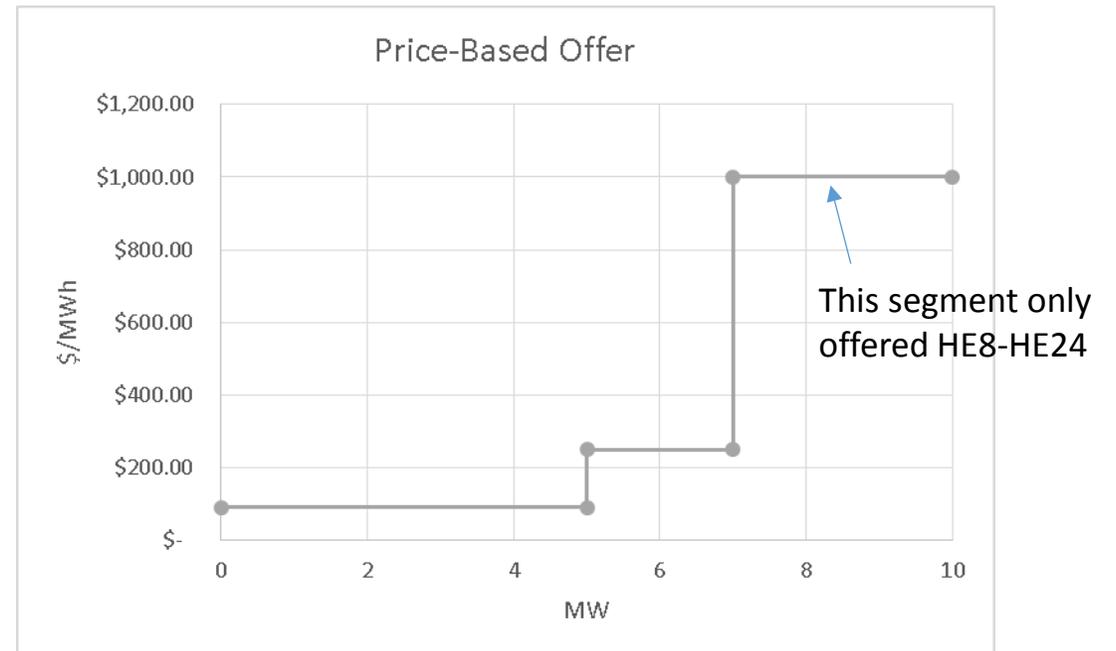
2MW of diesel offered at \$250.00

5MW of DR offered at \$1,000.00

during operating hours

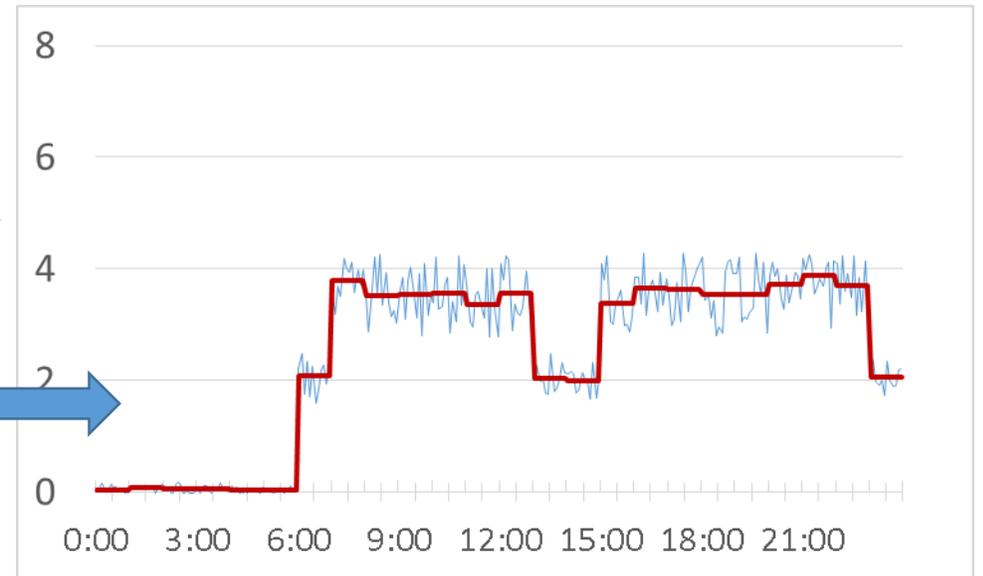
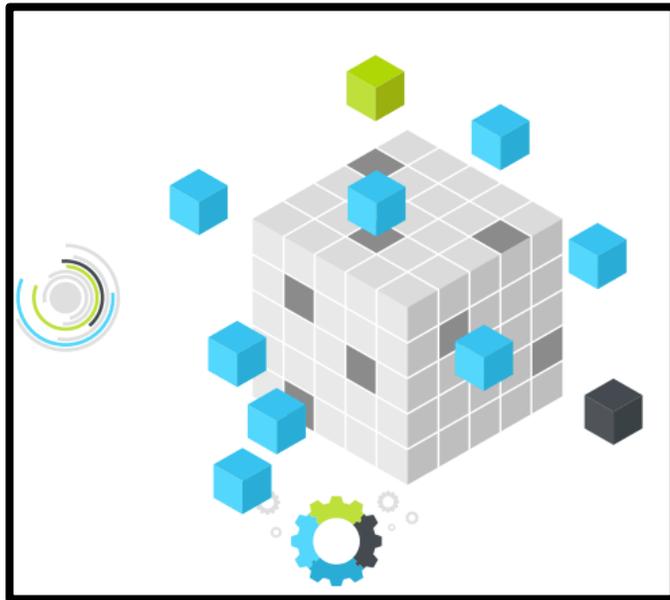


This is all “behind the scenes.” Only final offer curve visible to PJM/IMM



Remainder of example assumes site passes TPS test and is not mitigated. Price-Based offer used.

Compliance

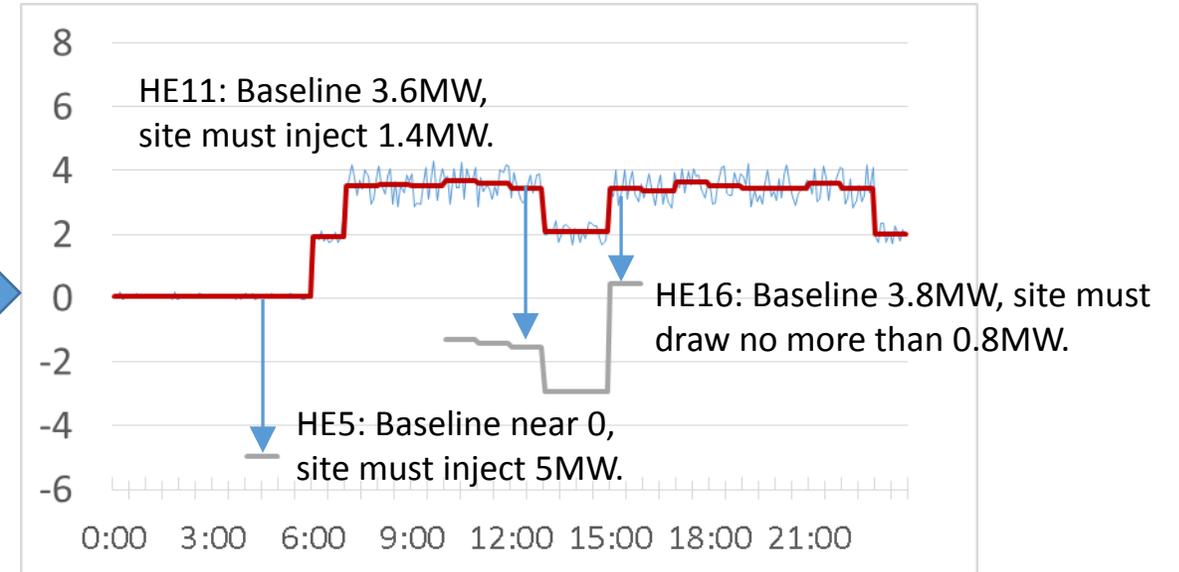
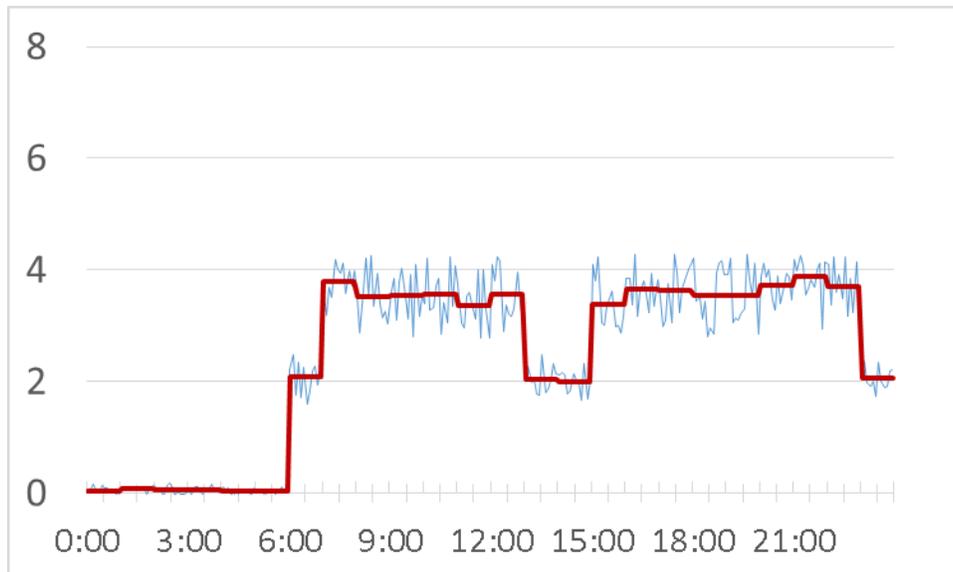


Compliance at EDC meter. GIR is only evaluated based on draw/injection at that point.

Retail load on historical operating days used to generate baseline

Compliance

GIR clears 5MW HE5 and HE11-15, and 3MW HE16



During each obligated hour, GIR must deliver a combination of reduced draw and injections so that committed energy is delivered.

Compliance Detail

	HE5	HE11	HE12	HE13	HE14	HE15	HE16
(A) Baseline	0 MW	3.6 MW	3.8 MW	2.1 MW	2.2 MW	3.7 MW	3.8 MW
(B) Total Obligation	5 MW	5 MW	5 MW	5 MW	5 MW	5 MW	3 MW
(C) DR Obligation (max(A,B))	0 MW	3.6 MW	3.8 MW	2.1 MW	2.2 MW	3.7 MW	3.8 MW
(D) Max. Allowed Load (A-C)	0 MW	0 MW	0 MW	0 MW	0 MW	0 MW	0.8 MW
(E) Injection Required (B-C)	5 MW	1.4 MW	1.2 MW	2.9 MW	2.8 MW	1.3 MW	0 MW
(F) Deadband (0.2C + 0.1E)*	500kw	860kW	880kW	710kW	720kW	870kW	760kW

DR Obligation (C, blue) settled when LMP passes net benefits test.

Injection obligation (E, green) settled at all times.

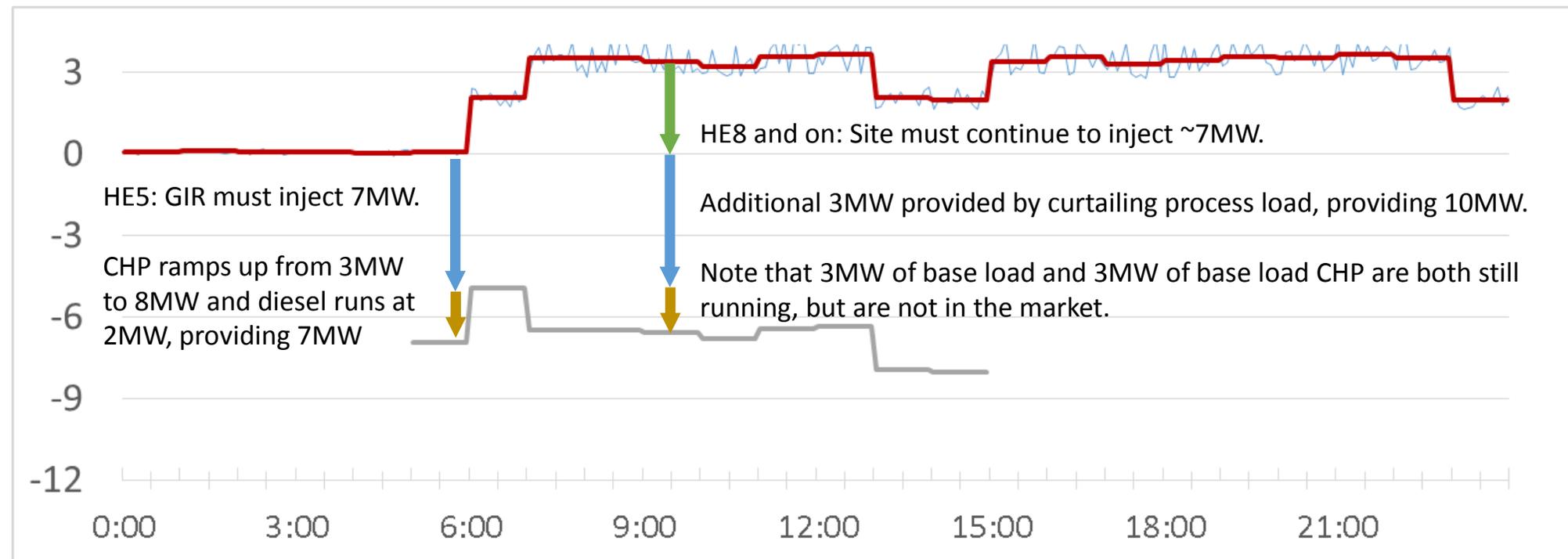


*The 5MW minimum BOR deadband still applies. Since values in this example are less than 5MW, that minimum would be used instead.

Compliance Example 2

LMPs exceed \$1,000/MWh from HE5 through HE15.

Result is GIR clears 7MW HE5 to HE7 and 10MW HE8 to HE15



Settlements

- DR delivered is portion of energy from baseline down to zero. Paid at full LMP when LMP exceeds Net Benefits Threshold, not compensated at other times.
- Injections are as metered. Paid at full LMP at all times.
- BOR deadband is 20% of DR obligation plus 10% of injection obligation, but no less than 5MW.
 - If total delivered energy is within deadband, GIR eligible for make whole payments just as any other energy resource.
 - If total delivered energy is outside of deadband, GIR liable for BOR charges.