On-Site Generator (DER) participation as Economic DR resource

Demand Response Subcommittee
February 27, 2019

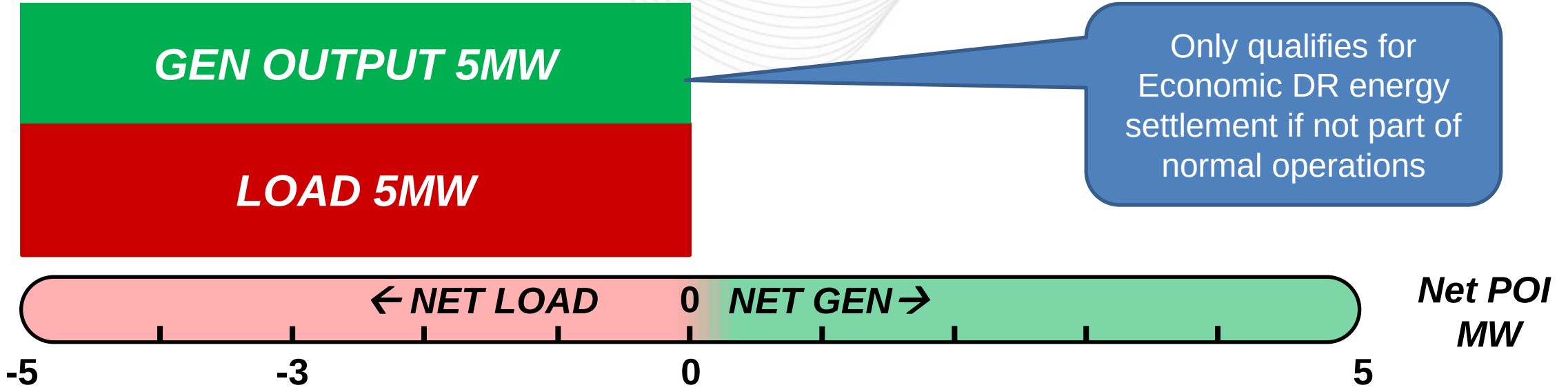
On-Site Generator

- CSP must accurately complete DR Hub information (see following slides) for On-Site Generator
  - This information is captured for each location before it is registered as Economic DR or Emergency/Pre-emergency DR
  - Only load reductions from generator output that would not have otherwise been operating are eligible for Economic DR energy settlements.
  - Only generators expected to be used for DR (Economic or Emergency/Pre-Emergency) need to be input into DR Hub.
- CSP may only submit registration if CSP has all appropriate environmental permits. By virtue of submitting a registration, CSP represents that CSP has validated that customer has all appropriate environmental permits.
  - Necessary permits must be in place before effective date on registration – if the CSP has not received the necessary permits prior to indicated effective date, then CSP must terminate such registration before effective date.

On-Site Generator

	DR Source	Example	Participation as Economic DR energy Resource
1.	On-site Generator	On-site backup generator – does not run except for emergency to supply power or for routine testing. Historic output shows only used during routine test .	Yes. Normal operational generator test do not qualify. Only time test would qualify is if test is NOT scheduled and then unit is used to support RT or DA instructions.
2.	On-site Generator	On-site generator that operates for routine testing and a limited number of hours to shaves peaks (~10 potential PLC days per year).	Yes – PJM needs to verify operating pattern. PJM will work with CSP to determine implementation (typically do not need cost information)
2.	On-site Generator	Cogen/CH&P (Central Heat and Power). Unit runs as part of normal production process and output will remain comparable whether or not there is participation in PJM economic DR .	No.
3.	On-site Generator	Cogen/CH&P or unit that frequently operates historically to reduce electricity cost but will operate for more hours or higher MW per hour because of PJM economic DR revenue.	Maybe – can only participate if PJM can accurately quantify the incremental load reductions. PJM may need marginal cost and retail rate.
5.	On-site Generator	Unit(s) that have interconnection agreement (ISA/WMPA) to inject power.	Maybe – can only participate if PJM can accurately quantify the incremental load reductions and must also consider whether or not unit would operate just for injection. PJM will need marginal cost and retail rate.

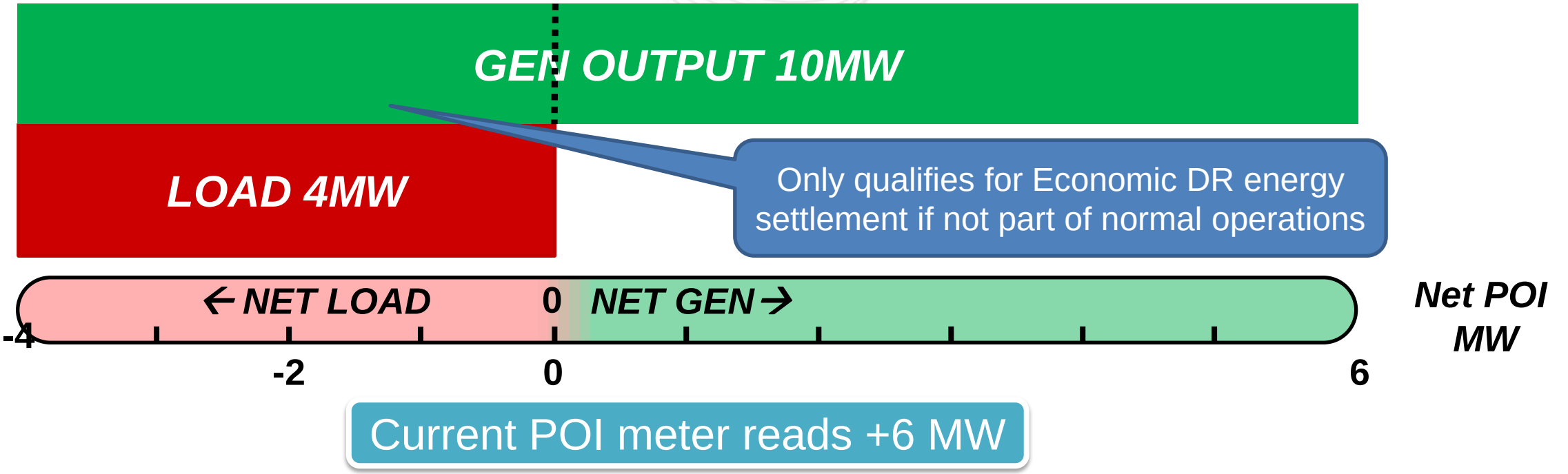
Scenario 1: Generator used to reduce all load for the wholesale market as DR



Current POI meter reads 0 MW

May be eligible for 5 MW of energy payment for DR resource load reduction

Scenario 2: Generator used to reduce load and inject



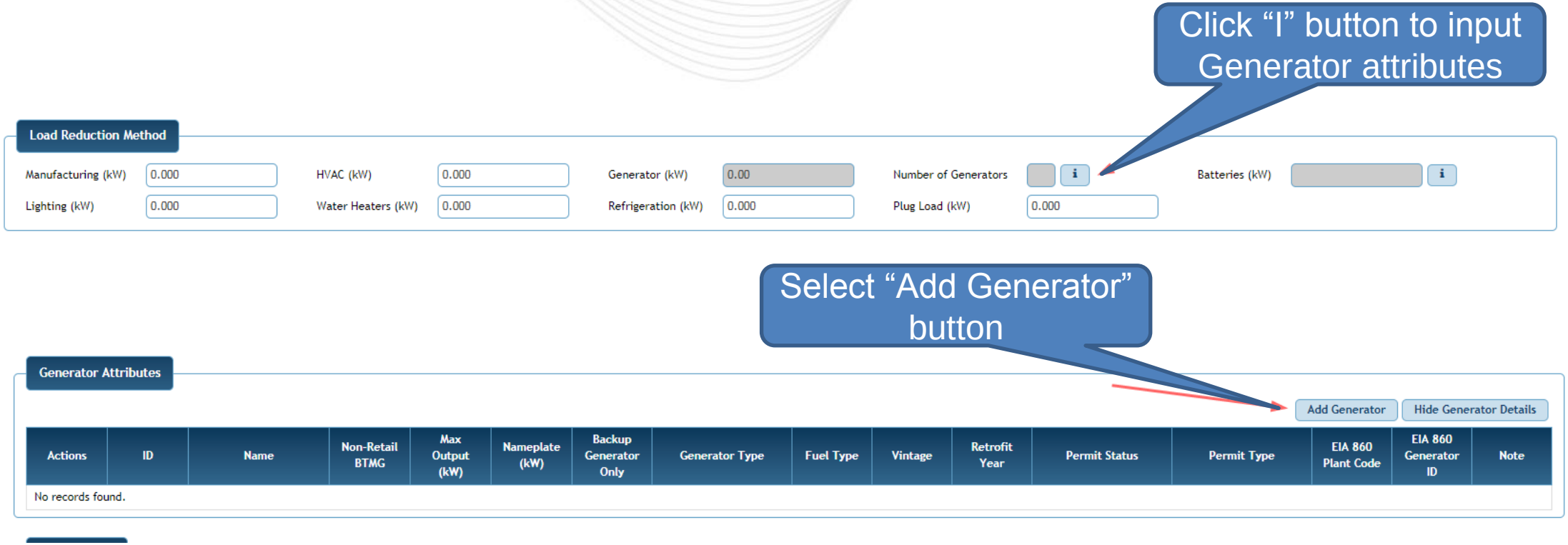
Paid for 6 MW as Gen resource, may not be eligible for DR revenue if operated for export

Process to administer On-Site Generator PJM approval

- DR Hub | Registration
  - CSP to Select CBL and conduct RRMSE test
  - If On-Site Generator will be solely used for economic DR (Backup = Yes, in DR Hub) and would not have otherwise operated then it can participate as economic (you do not need to do anything else)
  - For "Incremental Generator" (Backup Only = No, in DR Hub), CSP must Submit CBL review (even if CBL passes RRMSE test)
    - Select "Other" for reason and include comment "On-Site Generator = Incremental Generation "
    - CSP should email dsr_ops@pjm.com 1 year of historic generator output
      - » If only operates on limited basis (routine testing + <10 days for summer peak shaving) then may not need to provide cost/retail rate
      - » If operates frequently then may need to provide marginal costs and retail rate for same period of time.
    - If multiple generators, we will need to discuss best way to provide the historic data
  - PJM will review the registration and approve if incremental load reductions can be quantified, otherwise registration will be denied or possibly participate with max base load CBL.

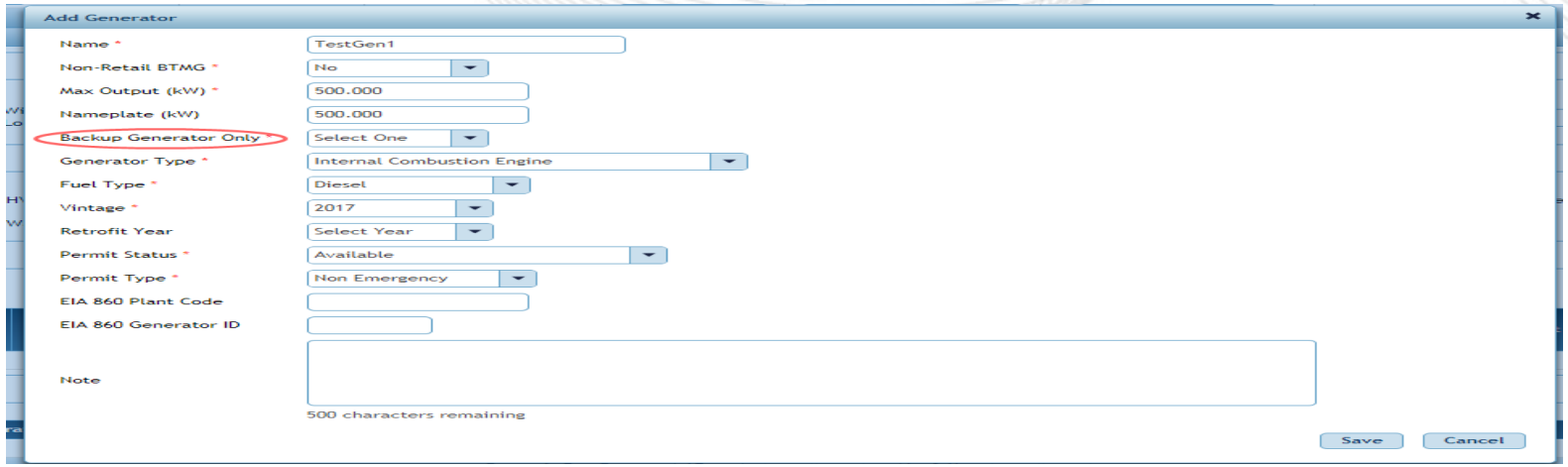
Please email dsr_ops@pjm.com if you have questions or would like to discuss associated details.

Process to administer On-Site Generation PJM approval

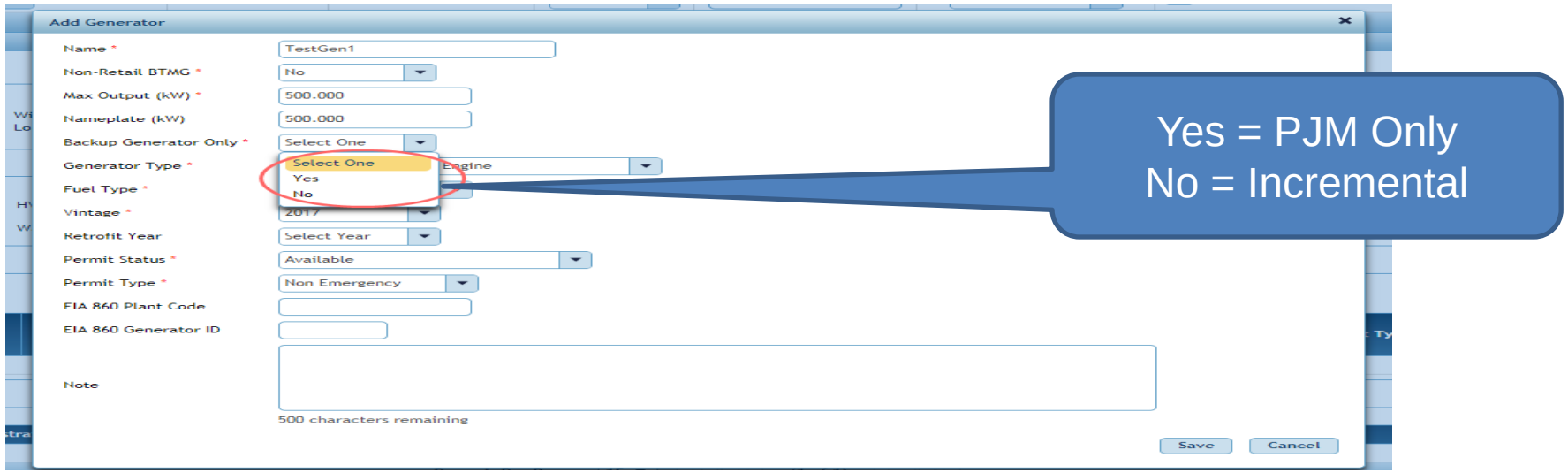


Process to administer On-Site Generator PJM approval

- Fill out Generator Dialog box, especially note the 'Backup Generator Only' selection:



- Select 'Yes' for 'PJM Only' generator, or 'No' for 'Incremental' generator – then click Save:



Incremental Generator supporting information

			Required	May be required if generator operates frequently		
regID	date	HE	Gen Output MW	Cost to run CHP with heat/steam recovery for other purposes	Cost to run CHP without heat/steam recovery	Retail rate*
123456	8/1/2018	1	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	2	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	3	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	4	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	5	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	6	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	7	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	8	4	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	9	5	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	10	5	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	11	5	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	12	5	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	13	5	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	14	5	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	15	4	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	16	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	17	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	18	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	19	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	20	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	21	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	22	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	23	3	$ 30.00	$ 90.00	$ 60.00
123456	8/1/2018	24	3	$ 30.00	$ 90.00	$ 60.00

* Retail rate should include all avoided retail electricity costs supply+delivery (energy and demand based charges)

Cost and retail rates may be required based on frequency of historic generator output

Cost to run CHP with heat recovery represents cost offset by heat recovery benefit .

Cost to ramp up CHP without heat recovery represents estimate marginal cost to operate the generator.

PJM/CSP will need to work through details based on specific application

Retail rate includes all supply and delivery charges

DR with injection rights - registration requirements
Load reductions operate as a DR, Injections operate as a generator

- At the time of registration CSP will notify PJM if the generator is interconnected to allow injections onto the transmission and distribution system.
  - The CSP will designate as: “none”, “ISA”, “WMPA”, “NEM”, “PURPA QF” or other.
- If the existing (registered) DR generator gets interconnected, the CSP will notify PJM as soon as possible and will request CBL review if generator will participate as an Economic DR resource in the energy market
  - Load reductions done in order to inject power onto the grid are typically (but not always) considered part of normal operations and therefore not eligible for Economic DR settlements
- If On-Site Generator has ISA or WMPA then CSP will also provide:
  - the PJM reference to the generator and the amount of injection rights;
  - Ensure appropriate telemetry is in place at the point of interconnection and the On-Site Generator, and as outlined in Manual 14D;
  - Manage the DR offers to reduce load and/or Generation offers to inject power in the wholesale markets based on the actual generator capability. CSP will make sure that the total offer amount for the 2 modelled resources will not exceed the capability for the generator. All regulation offers will be made through the DR modelled resource or as otherwise approved by PJM.
    - Technically, 2 different members may manage but this requires close coordination.

These new requirements were approved through the DERS (see M11, M14D)

Draft Transition plan for CSP to provide new information

- CSP should collect injection status and associated information now.
  - CSP should have information on file by 6/1/19
- CSP should email PJM at 'dsr_ops@pjm.com' with any locations that have WMPA/ISA before 6/1/19.
  - CSP must manage Economic DR offers to total generator capability and follow energy offer process
  - May only participate as Economic DR in energy market after evaluation by PJM to avoid ineligible settlements (see later slides on details).
  - Ensure appropriate telemetry is in place
- PJM will update DR Hub with new fields by 6/1/19
- CSP should update location information in DR Hub for injection status and associated information by 6/30/19

PJM will not delay the current Load Management registration process for this new information

How to determine incremental output for On-Site Generator

- Generator without injection rights – retail cost < marginal cost, only reason generator operates is because of Economic DR wholesale market revenue.
  - Must be able to accurately estimate retail cost for each hour
    - includes all avoided retail cost (generation, transmission, distribution, based on energy and/or demand type charges)
  - Historic output should correlate with retail cost and marginal cost
- Generator with injection rights (WMPA, ISA) – Typically, only eligible for Economic DR energy revenue in hours when generator does not inject power unless:
  - PJM and CSP finalize below before PJM will consider Economic DR settlements in same hour as injection,
  - Required gen revenue (Total Gen output * marginal cost) – Gen Export Revenue (Gen Export output * LMP) – implied retail savings (Gen load reduction MWs * retail rate) < $0
    - If Generator is also a Capacity Resource (“front of the meter”) for injection and is dispatched by PJM then Economic DR is not eligible for same interval.

Example

regID	date	HE	Gen Output MW	Cost to run CHP with heat/steam recovery for other purposes	Cost to run CHP without heat/steam recovery	Retail rate*	Load	Meter read (Net Load)	CBL	Load reduction	Eligible for Economic DR settlement?
123456	8/1/2018	1	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	2	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	3	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	4	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	5	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	6	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	7	3	$ 30.00	$ 65.00	$ 60.00	10	7	7	0	yes
123456	8/1/2018	8	4	$ 30.00	$ 65.00	$ 60.00	10	6	7	1	yes
123456	8/1/2018	9	5	$ 30.00	$ 65.00	$ 60.00	10	5	7	2	yes
123456	8/1/2018	10	5	$ 30.00	$ 65.00	$ 80.00	10	5	7	2	no
123456	8/1/2018	11	5	$ 30.00	$ 65.00	$ 80.00	10	5	7	2	no
123456	8/1/2018	12	5	$ 30.00	$ 65.00	$ 80.00	10	5	7	2	no
123456	8/1/2018	13	5	$ 30.00	$ 65.00	$ 80.00	10	5	7	2	no
123456	8/1/2018	14	5	$ 30.00	$ 65.00	$ 80.00	10	5	7	2	no
123456	8/1/2018	15	4	$ 30.00	$ 65.00	$ 80.00	10	6	7	1	no
123456	8/1/2018	16	3	$ 30.00	$ 65.00	$ 80.00	10	7	7	0	no
123456	8/1/2018	17	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	18	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	19	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	20	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	21	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	22	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	23	3	$ 30.00	$ 65.00	$ 60.00					
123456	8/1/2018	24	3	$ 30.00	$ 65.00	$ 60.00					

Retail Cost < Generator Marginal Cost, only generate power to receive wholesale revenue. Otherwise, would buy power at retail for lower cost than producing power

Retail Cost > Generator Marginal Cost, cheaper to generate power than buy retail power and therefore part of normal operations

DER with injection capability offer process

Day Ahead Market

1. Generator is offered to DA Market for Injection as a Unit (required if has Capacity Resource commitment or optional otherwise).
2. Generator is offered to DA Market for load reduction as DR (optional)
3. If Unit's DA offer is cleared then the Economic DR resource will not be settled for same hours or incur BOR. CSP must notify PJM of this situation and then PJM will ensure there is no settlement for such time period. If Unit's DA offer did not clear then cleared Economic DR resource will be settled.

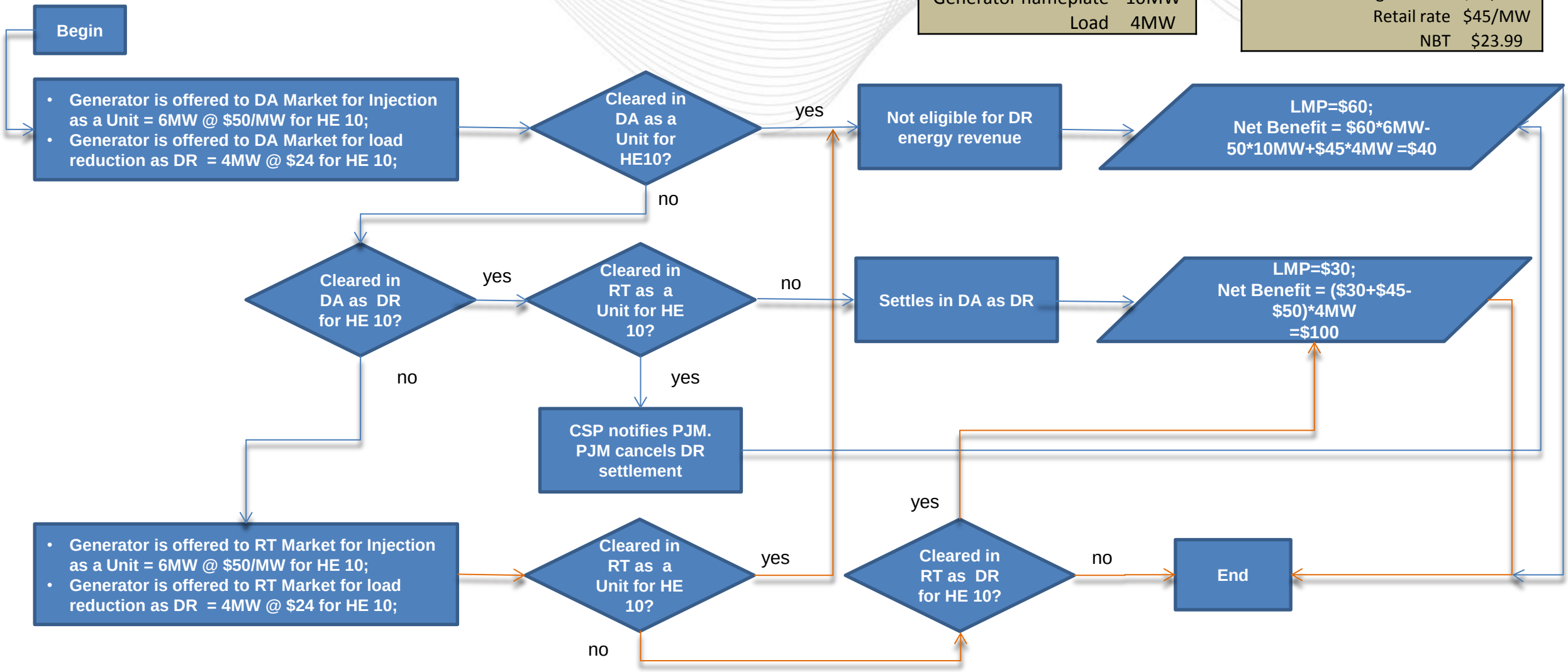
Real Time Market

1. If Unit cleared in DA market, then wait for PJM dispatch of gen unit. No Economic DR activity (DA or RT) for the same hours.
2. If Unit did not clear in DA market, and Economic DR did clear in DA market then perform the load reduction in RT market. Typically (but not always), Economic DR settlements are not eligible if generator exports in RT market as a Unit in the same hour unless PJM able to quantify as outlined on prior slide.
3. If Unit did not clear in DA market, and Economic DR did not clear in DA market than Economic DR settlement are eligible when dispatched by PJM and generator does not export in RT market as a Unit in the same hour unless PJM able to quantify as outlined on prior slide.

DER with injection capability - Example

Generator nameplate	10MW
Load	4MW

Cost to run generator	$50/MW
Retail rate	$45/MW
NBT	$23.99



FAQ

- Q: Why do we need to deal with marginal cost? Should the CBL already reflect expected net load?
  - A: Generator output that impacts net load can change sporadically when it is used to reduce retail electricity cost. The CBL may or may not capture these sporadic changes and therefore may not accurately predict future net load. If generator consistently only operates historically when marginal cost are less than the retail rate, then CBL work to quantify the load reductions.
- Q: If location will only participate in Load Management (Emergency/Pre-Emergency DR) do I need to do anything?
  - Yes, please input all the Generator information at the location level but you do not need to do anything additional when you register (you do not need to provide historic output and cost information and can use the standard CBL).
- Q: If location will only participate as Economic DR in the Ancillary Service markets and will not participate in the energy markets do I need to do anything?
  - Yes, please input all the Generator information at the location level. Select the max base load CBL and request PJM to review the CBL. Include note that this registration will only participate in Ancillary Service markets.
- Q: Is a battery considered a generator?
  - A: yes, all same rules apply.