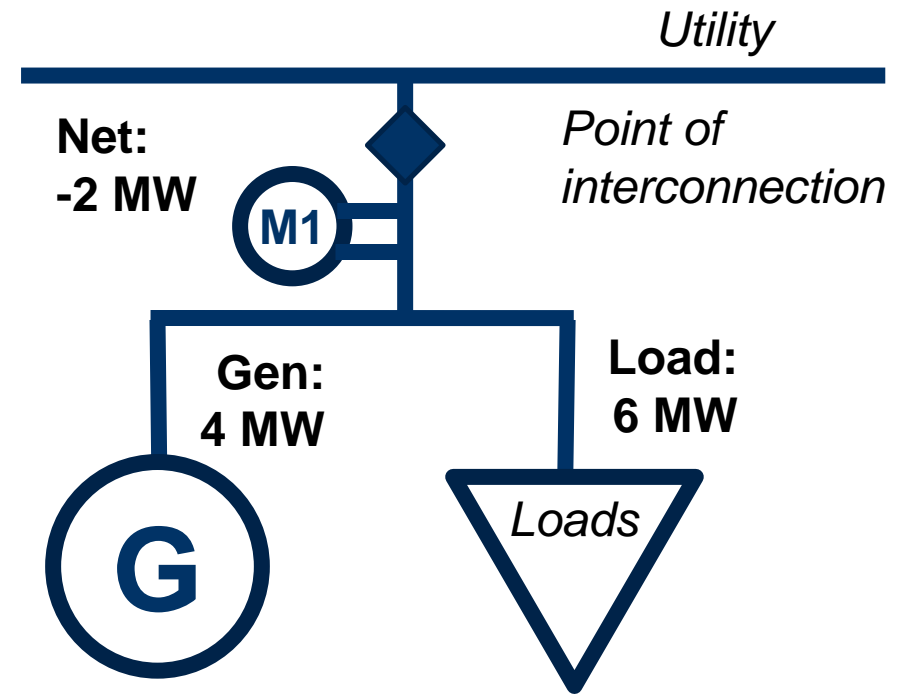




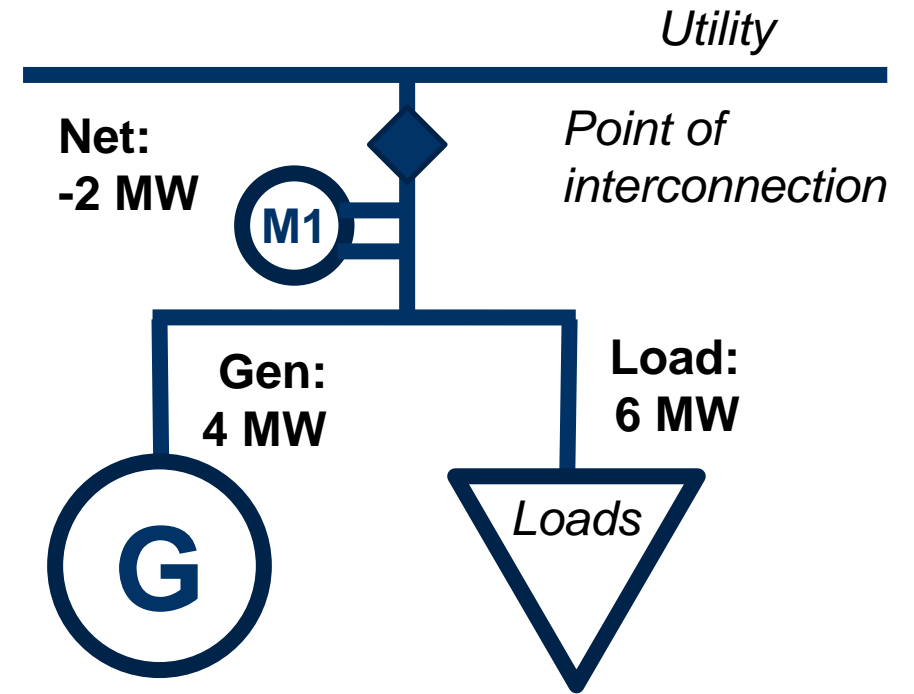
Straw Proposal for Energy Compensation for Curtailed MWh from Sites with Wholesale DER and Load: Integrated Approach

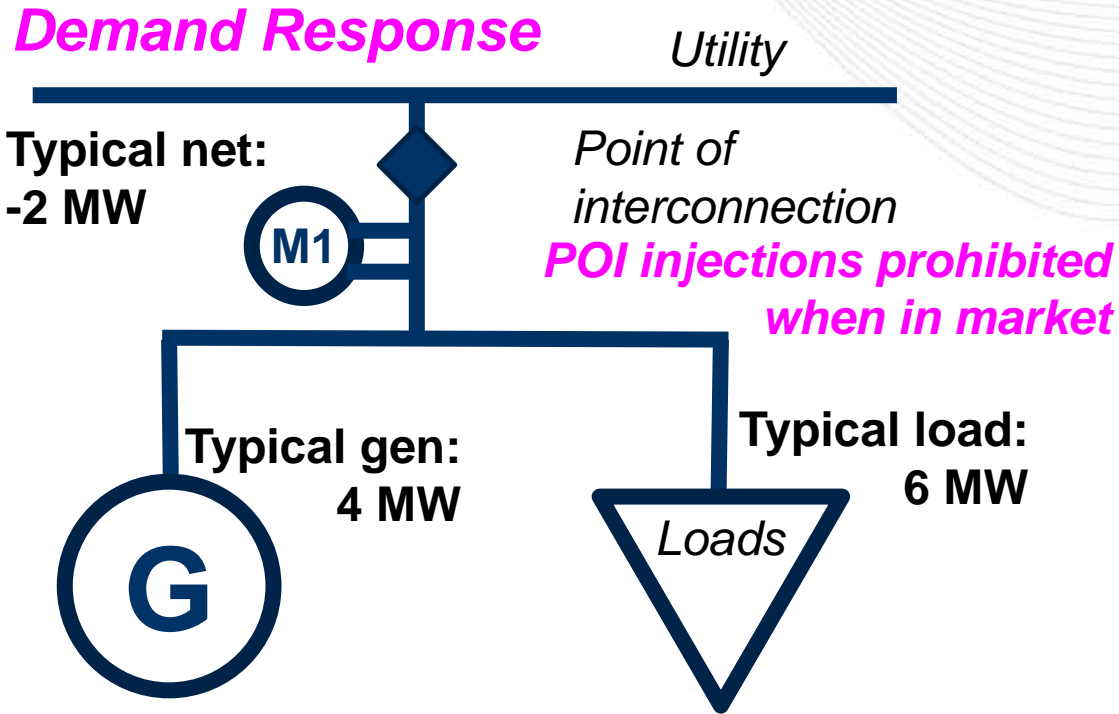
Andrew Levitt, Senior Market
Strategist, Emerging Markets
Distributed Energy Resources
Subcommittee
March 2, 2017

- Actual gross load—e.g., 6MW in the example at right.
- Actual curtailment—decrease in actual gross load. AKA direct reduction in end-use load, by turning it off or down, etc.
- Gross generation—e.g., 4MW in example at right.
- Net load—sum of load and gen at POI.
- W-DER Load Offsets—gross load that is netted by gross generation. AKA: end-use load that is fed from the W-DER and not from the grid.
- Injection—net excess generation that flows past a Point Of Interconnection meter.
- Customer Baseline = CBL = measure of what net load would have been if customer did not reduce load due at PJM direction. Roughly = typical net load.



- Note 1: Capacity market considerations excluded. Assume all Generation MW are Energy-only for status quo and straw proposal examples.
- Note 2: POI meter for these slides is Gen convention: positive = outflow.



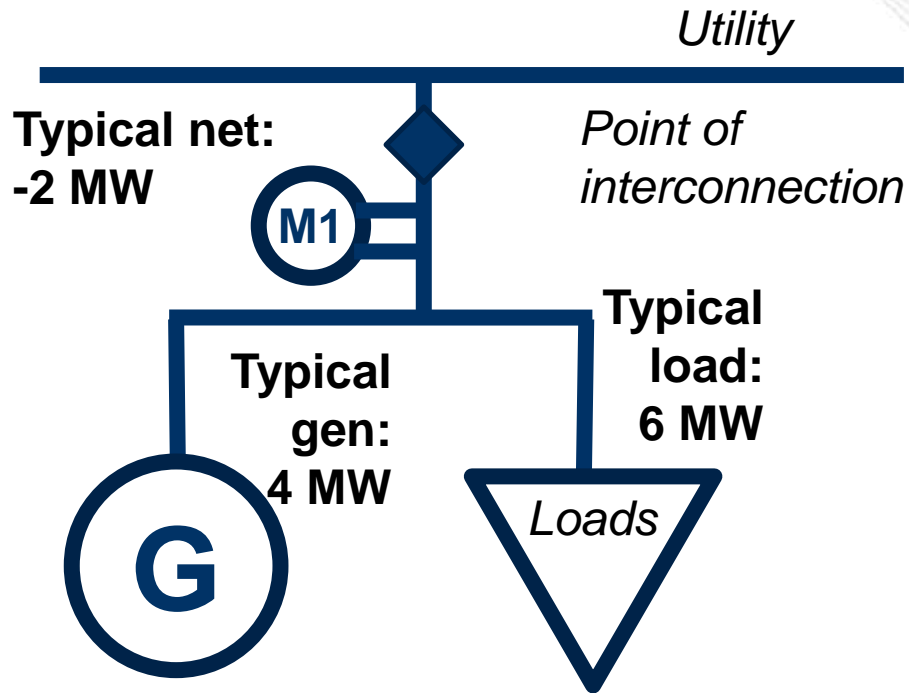


- **Injections:** not allowed when in market.
- In DR: any reduction in net load vs “typical” (i.e., Customer Baseline) is compensated at LMP. Thus, all else equal:
 - **Actual curtailment** vs. typical load is compensated at LMP. Customer keeps benefit of buying less.
 - An **increase in DER load offset** vs. typical is compensated at LMP, **provided it is solely in response to PJM direction.** Customer keeps benefit of buying less.

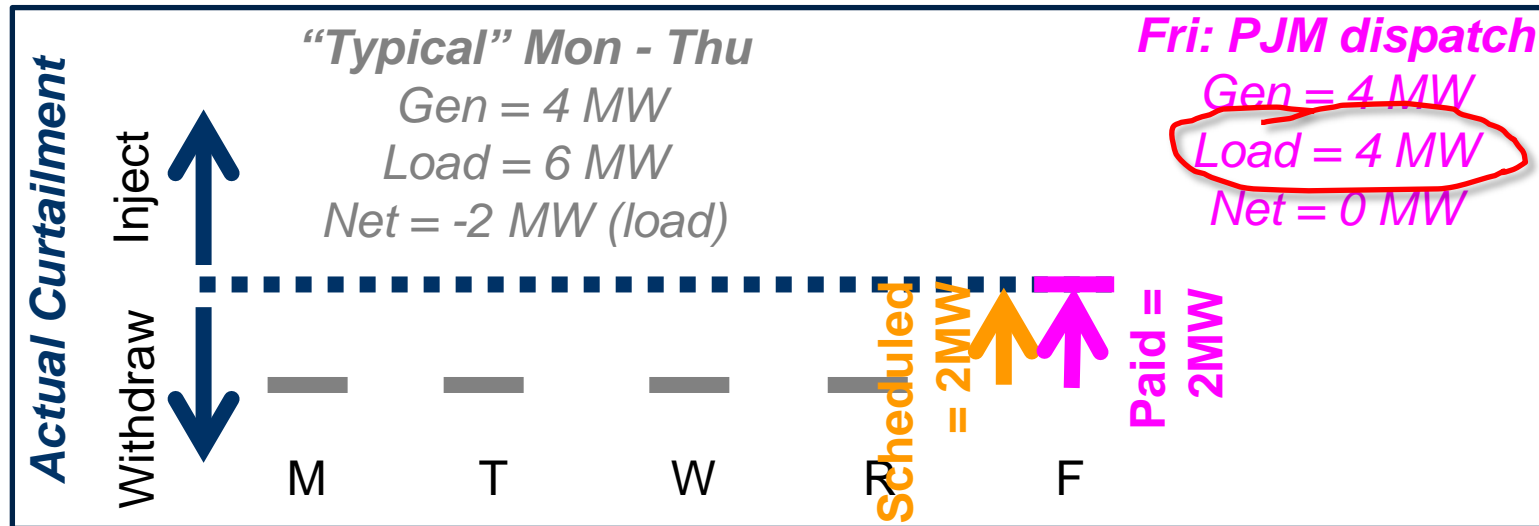
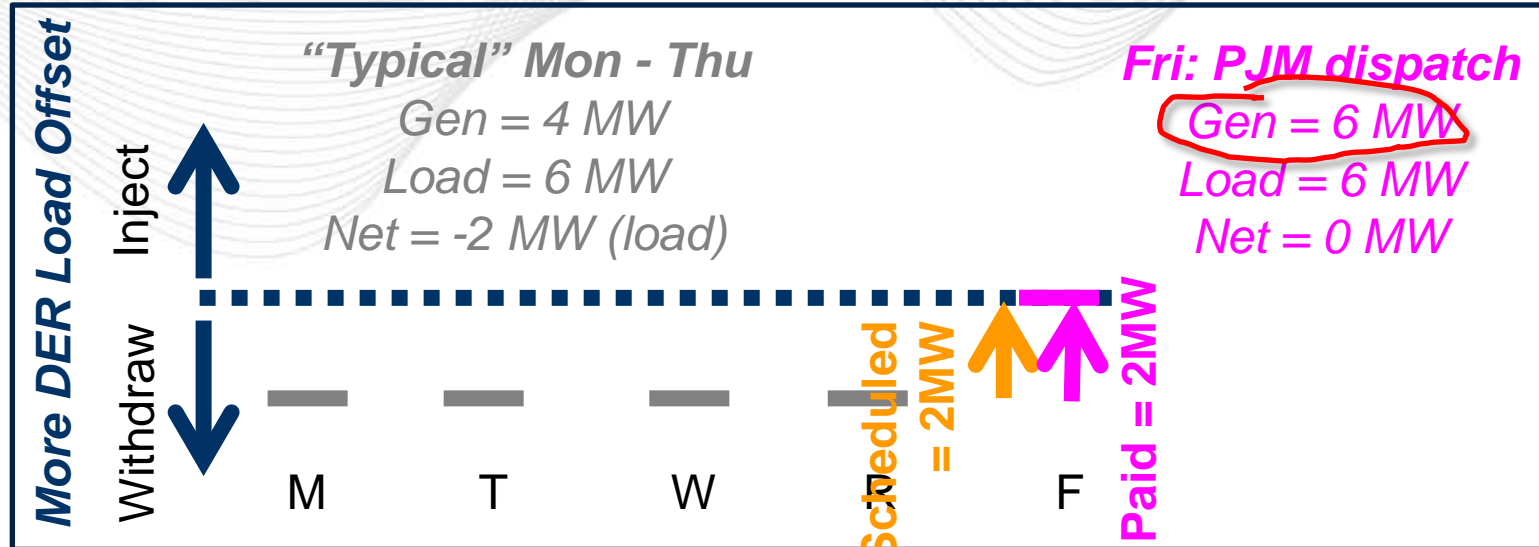
All else equal for the hour with 2 MW net Customer Baseline: - - - - -

- Gen increase by 2 MW will result in net flow of 0 MWh. PJM pays 2 MWh*LMP. Customer buys less at retail by 2 MWh.
- Load curtailment of 2 MW will result in net flow of 0 MWh. PJM pays 2 MWh*LMP. Customer buys less at retail by 2 MWh.

Status Quo Example: Demand Response



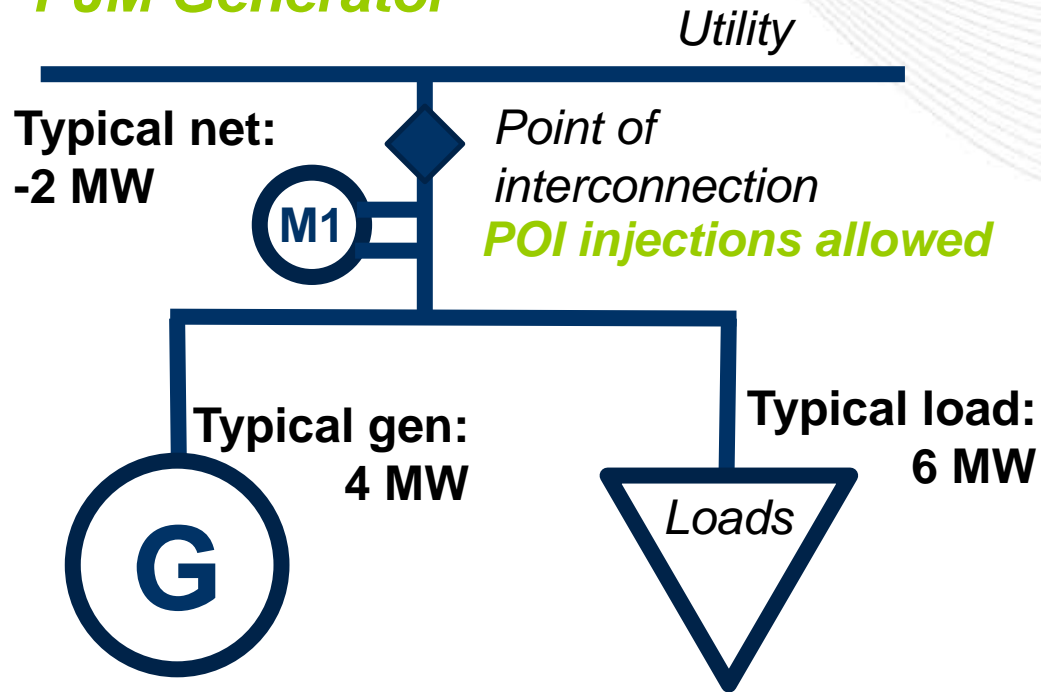
All else equal, for the hour...





Status Quo: "Net Excess" PJM Generator behind a customer meter

PJM Generator

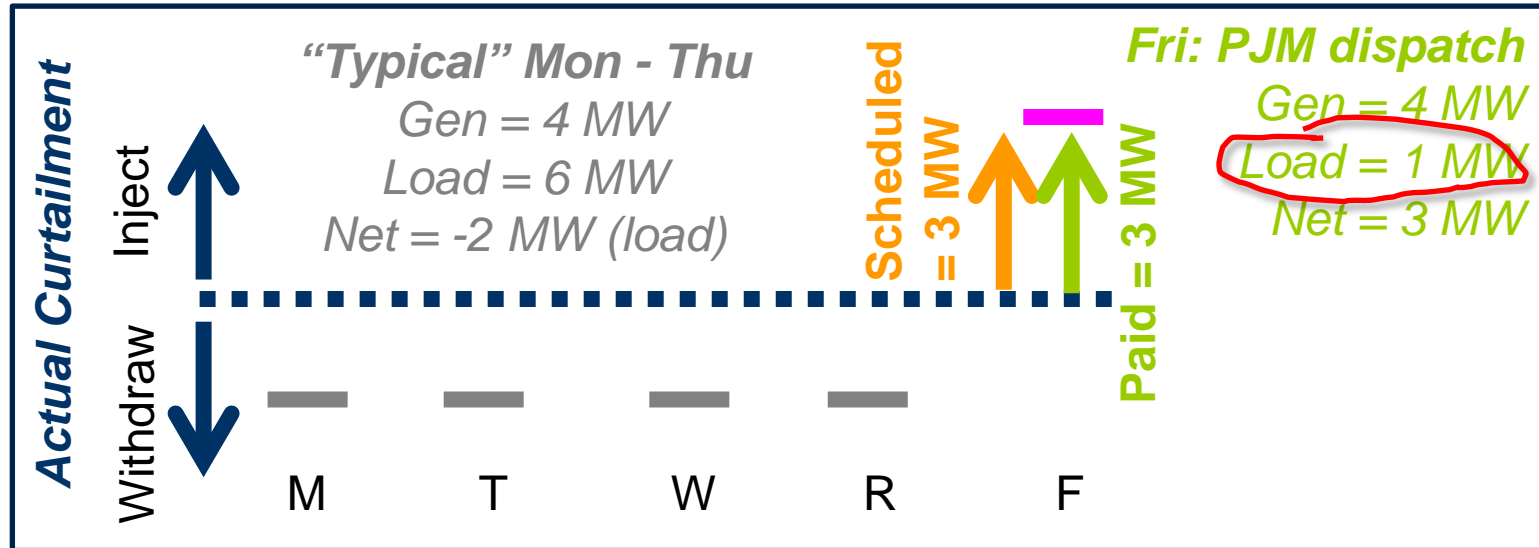
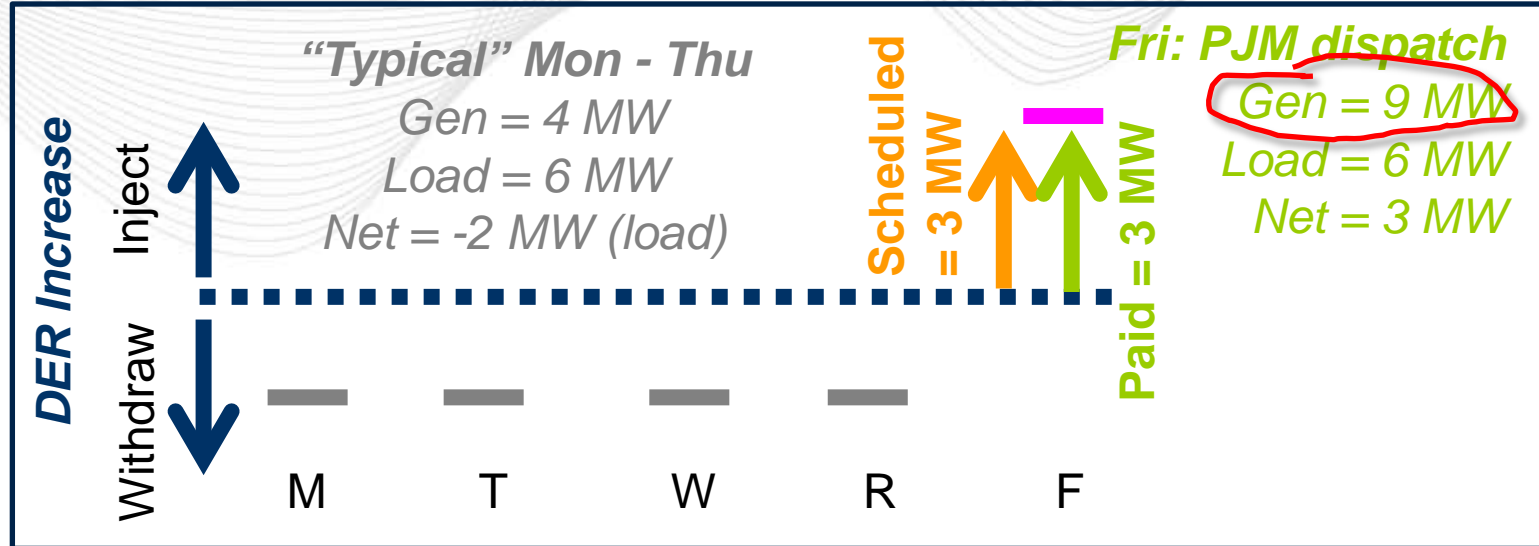
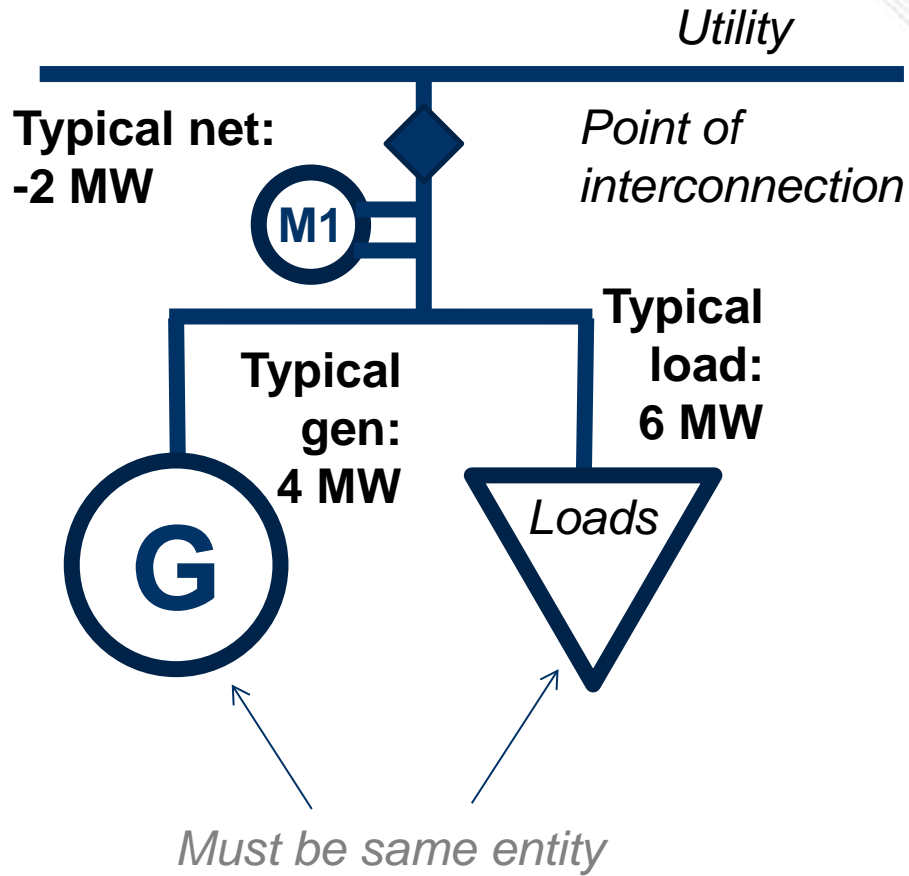


- **Injections:** metered at POI and compensated at LMP.
- **Actual curtailment** vs. typical is not compensated by PJM, except to the extent that injections are increased. Customer keeps benefit of buying less.
- **DER load offset** is not compensated. Customer keeps benefit of buying less.

All else equal for the hour with 2 MW typical net load: - - - - -

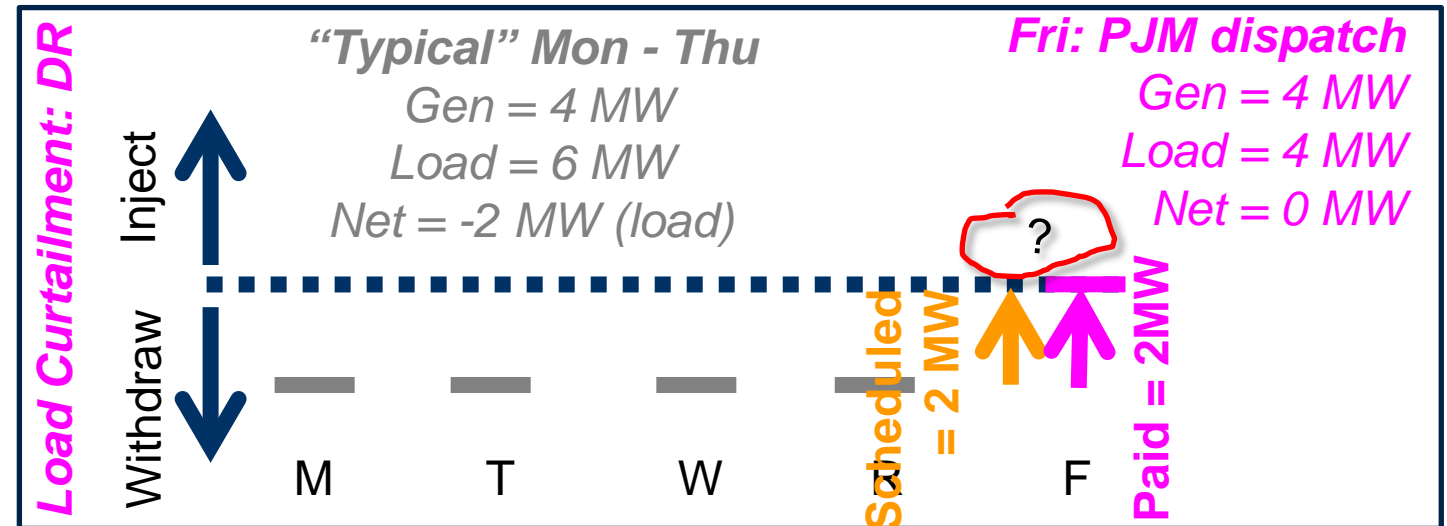
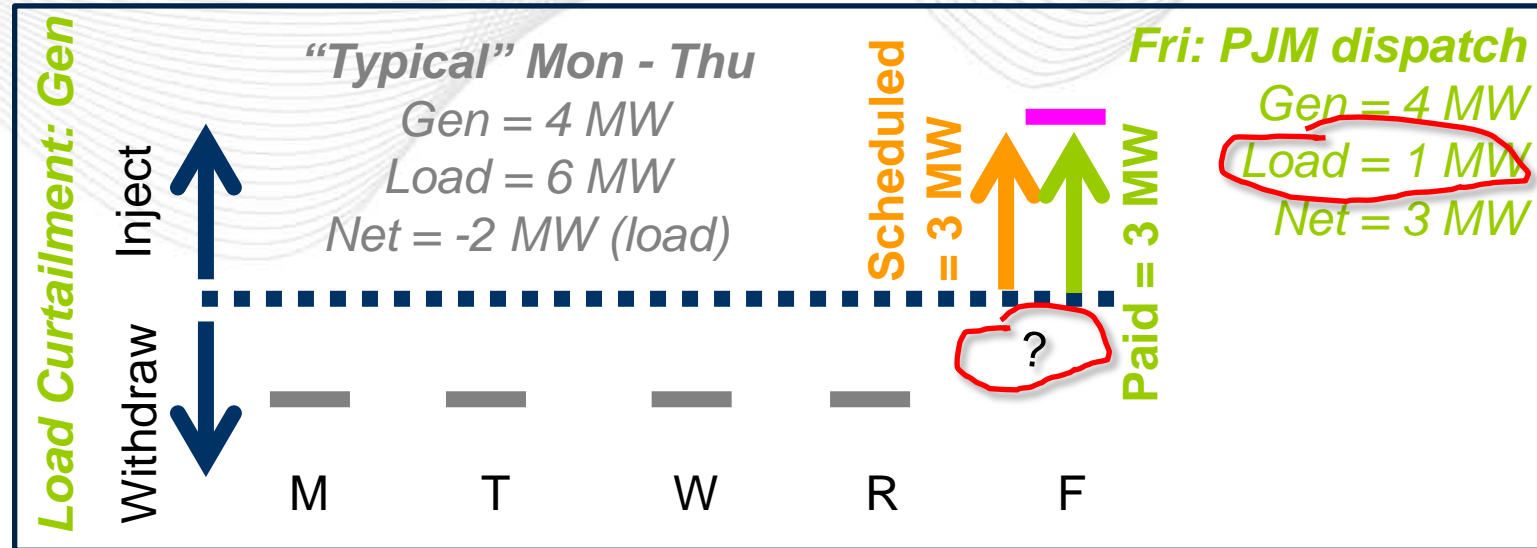
- Gen increase by 5 MW will result in net outflow of 3 MWh (Gen). PJM pays 3*LMP. Customer buys less at retail by 2 MWh.
- Load curtailment of 5 MW will result in net outflow of 3 MWh (Gen). PJM pays 3*LMP. Customer buys less at retail by 2 MWh.

Status Quo Example: Net Excess Generation



	<i>Injections</i>		<i>Load drop vs. CBL: Curtailment</i>		<i>Load drop vs. CBL: DER Load Offset</i>	
	<i>Paid</i>	<i>Scheduled</i>	<i>Paid</i>	<i>Scheduled</i>	<i>Paid</i>	<i>Scheduled</i>
Gen	LMP	Net at POI	None	None	None	None
DR	N/A	N/A	LMP	Δ vs. CBL	LMP	Δ vs. CBL

- No recognition of Δ vs. CBL for Actual Curtailments at Gen sites that are usually loads, even though such curtailments could be recognized at ordinary load sites.
- No Injections from DR sites even when technically capable and have been studied for interconnection.

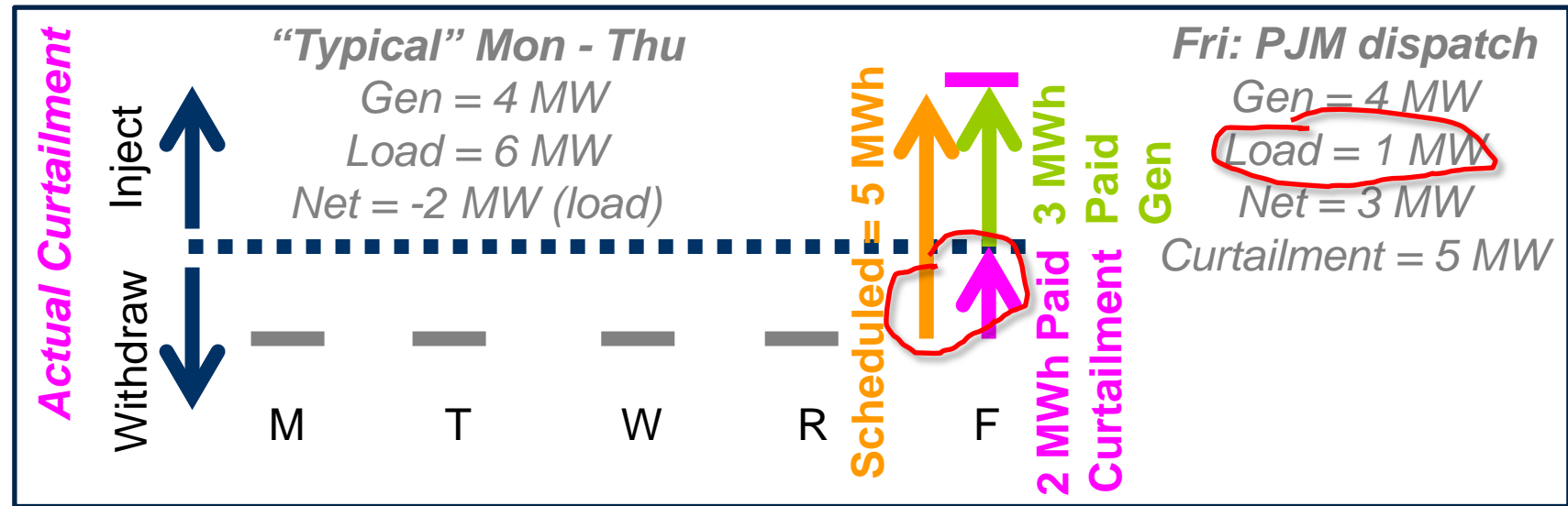
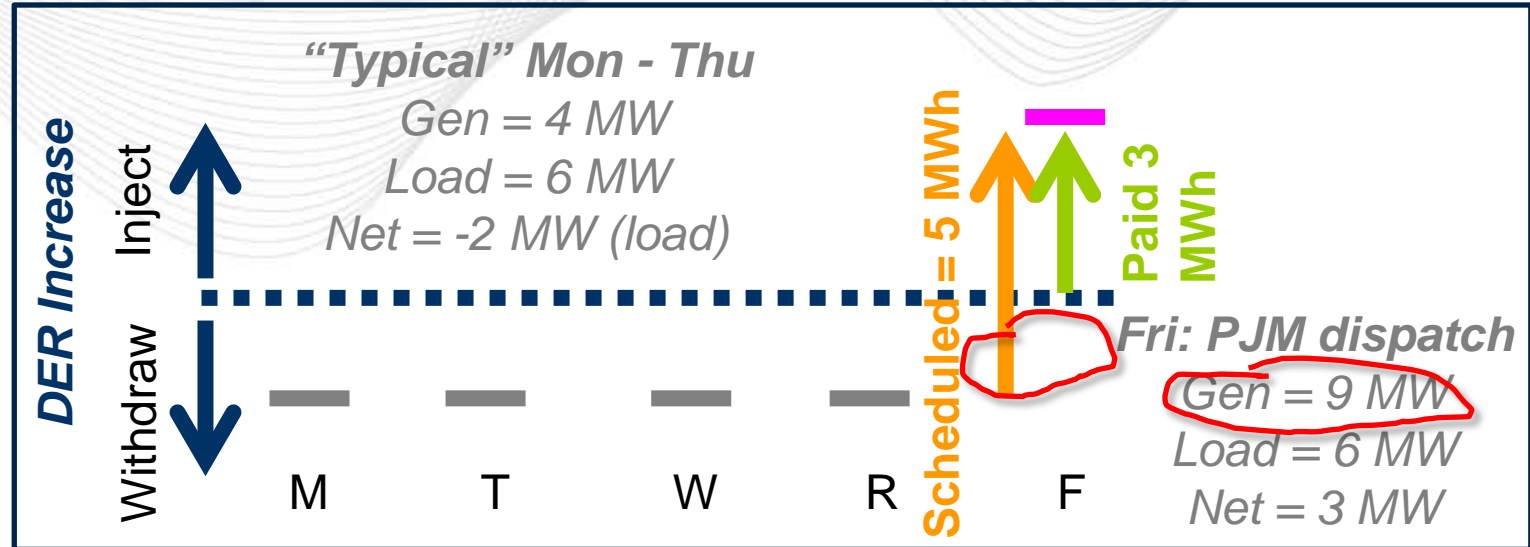
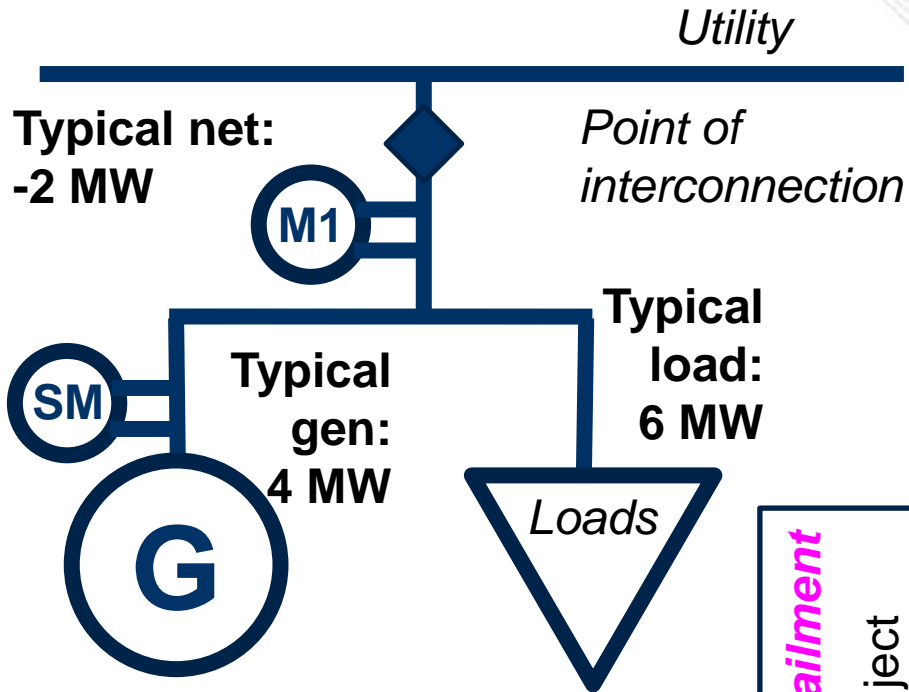




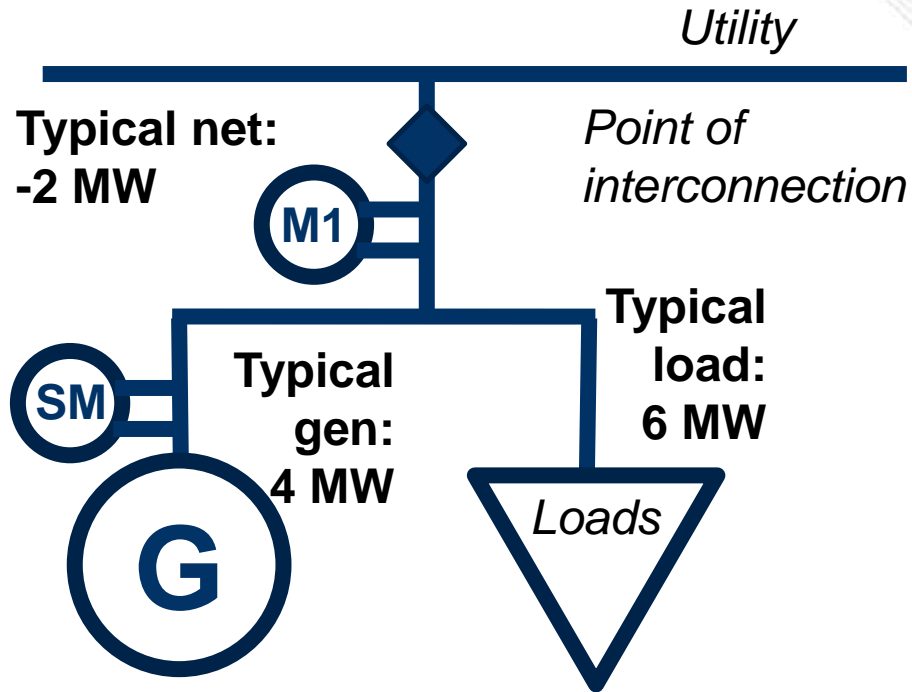
Curtailment Straw Proposal v2

1. All Wholesale DER sites are compensated for net excess generation at LMP at the Point Of Interconnection as per status quo for Generators.
2. Sites that are ~always net exporters are not eligible for additional compensation for curtailments—those curtailments simply increase exports, which are paid LMP.
3. Sites that are usually net loads, but when called by PJM offset that load...
 - ...exclusively with the DER generator, are not compensated by PJM—they keep the retail benefit of purchasing less MWh. **As-per status quo for Generators.**
 - By **actually curtailing** load (e.g., turning off loads), with or without simultaneous DER action, are eligible for compensation for solely the **actually curtailed** quantity, up to the Customer Baseline. **The CBL and settlement of the actual curtailed quantity would be similar to the status quo for Demand Response.** The load that is offset from the DER would NOT be eligible for compensation.
 - The settlement for the actual curtailment quantity follows the normal Demand Response process (e.g., not through the energy market per se)
4. The site is scheduled and dispatched as a single integrated entity, including actual curtailments, DER load offsets, and net excess injections.

Curtailment Straw Proposal v2 Example: W-DER



Curtailment Straw Proposal v2 Method



- Customer Baseline = Status Quo DR using [M1]
 - TBD adjustment to hours leading up to dispatch
- Gross Load = Meter [M1] + Meter [SM]
- Gross Load Baseline = Status Quo DR using Gross Load = [M1+SM]
- “Actual Curtailment” Quantity = [Gross Load Baseline] – [Gross Load Actual]
- Curtailment compensation = MIN([Actual Curtailment],[Customer Baseline])