



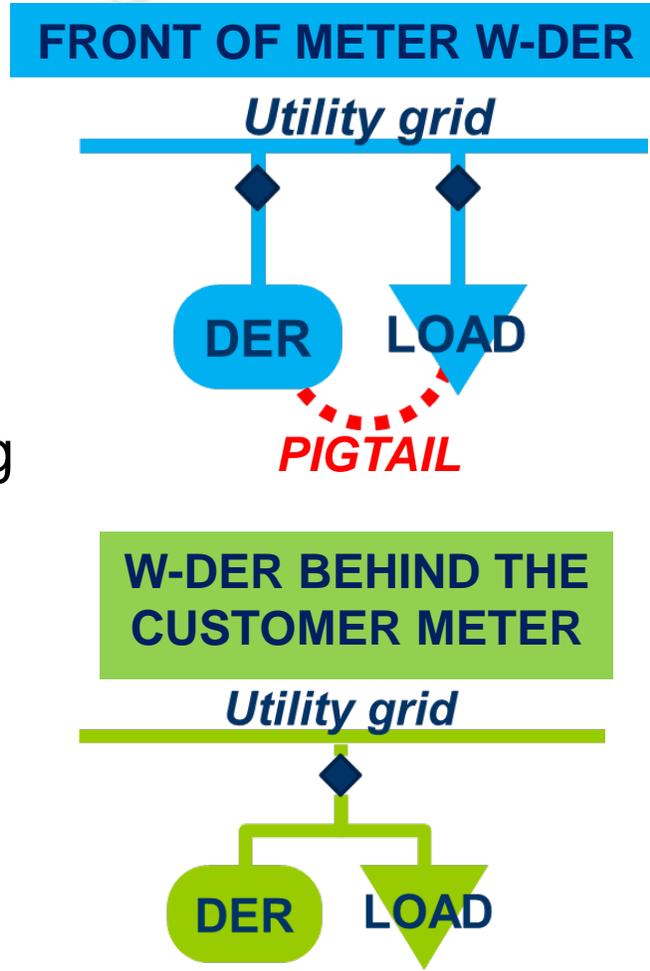
Distributed Energy Resources Subcommittee: Education Session

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A. BASIC DEFINITIONS

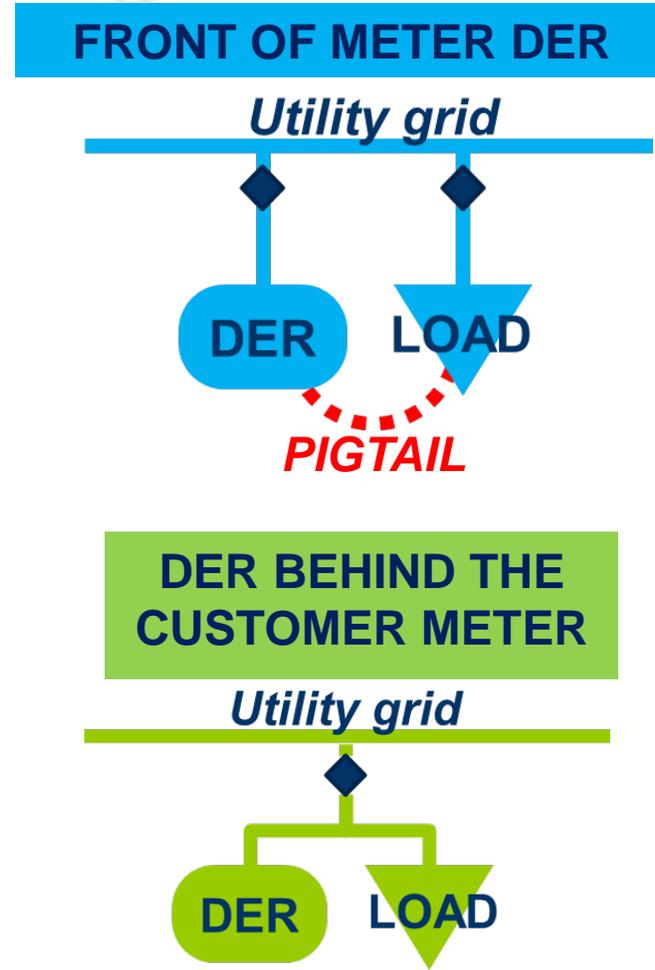
1. PJM working definition for the purposes of DERS: Distributed Energy Resource is **“a generation or electric energy storage resource connected at distribution voltages and/or connected behind a load meter”**.
 - Note: excludes reductions from load devices, which are covered under existing Demand Response rules.
2. W-DER = site with DER that participates in wholesale markets using PJM proposed “W-DER” rules. Participation is voluntary.



1. Proposed rules are esp. applicable for DER that inject, interact w/ retail customers, have multiple fuels, and/or are $\ll 100$ kW.
2. Substantial status quo of DER selling in PJM as Generators and as Demand Response.
3. Proposed rules can include both Front Of The Meter and Behind The Customer Meter DER.

Examples of DER under consideration:

- A. Cogenerator behind a customer meter selling excess power.
- B. Aggregation of a group of < 100 kW residential batteries that sometimes inject power.
- C. Front of meter solar+storage that can provide backup power to an adjacent retail load.



B. STATUS QUO DR

- PJM Demand Response: rules by which retail customers can participate in wholesale markets
- DR resources can sell Capacity, Energy, Regulation, and Synchronous Reserves
- DER in DR cannot inject past the applicable meter.
- DER in DR do not go through PJM interconnection queue.
- Settlement and implementation are generally zonal.

1. PJM Queue: no
2. Measurement: generally: deltas in meter readings vs. a baseline or vs. Peak Load Contribution
3. Aggregation: across distribution utility
4. Resource registration confirmation: EDC and often LSE
5. Marketer: Curtailment Service Provider which can be a third party, the distribution utility, the Load Serving Entity, or the owner.
6. Metering: generally use existing utility retail meter, w/o telemetry
7. Framework: unique “Demand Response” rules
- ...
11. EDC coordination: Via TO coordination meetings and PJM Emergency Procedures page.

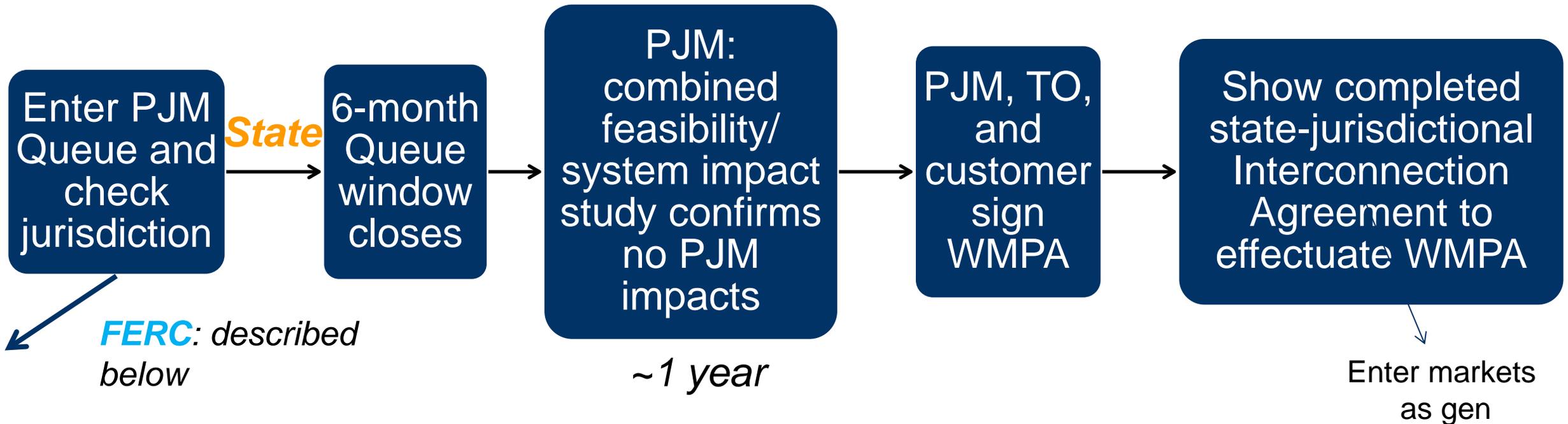
B'. STATUS QUO GENERATION

- Must come through PJM queue.
- Expected to inject.
- Can sell energy, Capacity, Regulation, Synchronous Reserves.
- Implementation and settlements are nodal (sometimes “composite nodal”)
- Generators can and are sometimes located “Behind The Customer Meter”, in which case scheduling and settlements are on the “net” of the generation and load.

1. PJM Queue: yes
2. Measurement: direct meter readings at the point of interconnection
3. Aggregation: at substation
4. Resource registration confirmation: NA
5. Marketer: generally owner, can be a third party
6. Metering: Meter that meets PJM spec; SCADA that meets TO spec. Telemetry generally required
7. Framework: unique Generation rules
- ...
11. EDC coordination: by telephone via TO or via market seller

C. Status Quo: PJM Queue and Wholesale DER Interconnection Process

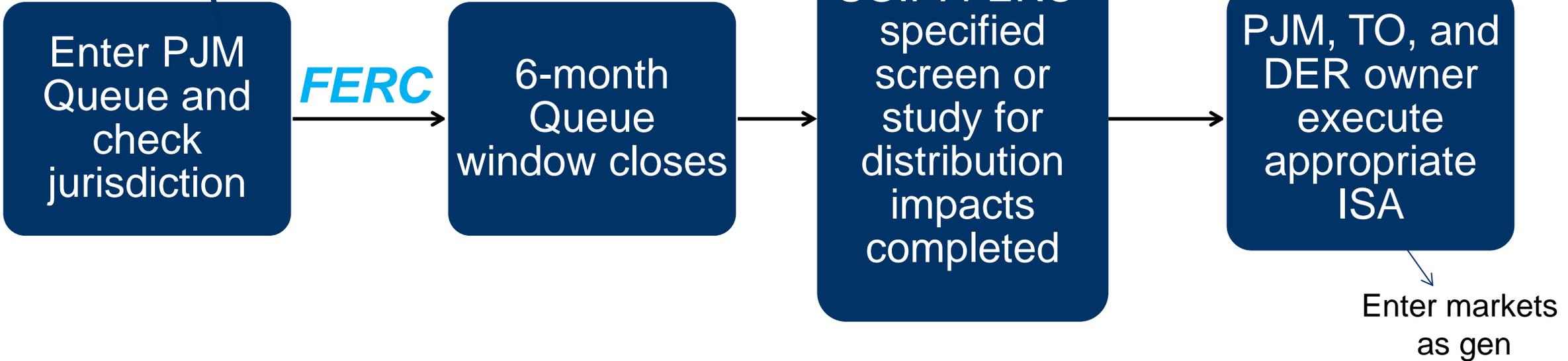
EDC interconnection study of distribution under state jurisdiction



Applicable to DER: a) ≤20 MW; b) no impact on PJM-modeled facilities; c) Interconnected to a TO-affiliated EDC

State:
prior slides

Attachment Y (Energy-only): $\leq 2\text{MW}$ Synchronous, $\leq 5\text{MW}$ inverter (screen)
Attachment BB (Energy-only): $\leq 10\text{kW}$ inverter (screen)
Attachment N: Capacity or if fail screens (study)



Applicable to DER: a) ≤ 20 MW; b) no impact on PJM-modeled facilities; c) Interconnected to a TO-affiliated EDC

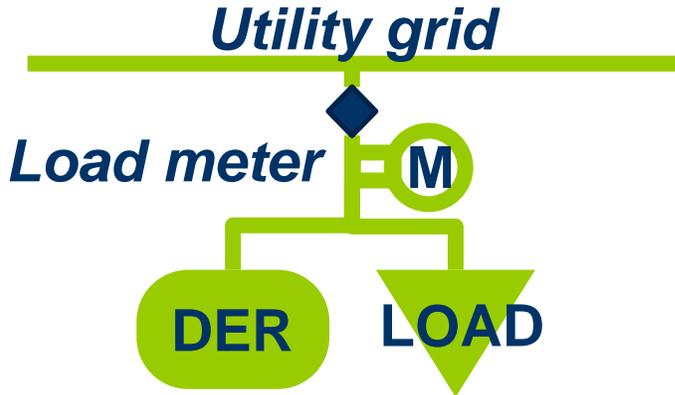
D. Advanced Definitions



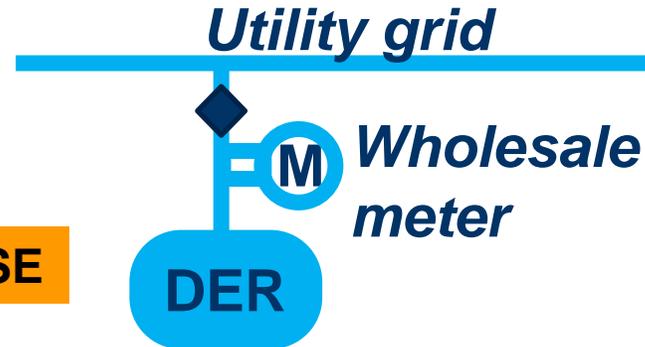
"Behind The Meter" vs. "Front of The Meter" vs. "PJM Demand Response"

ACCOUNTING DISTINCTION

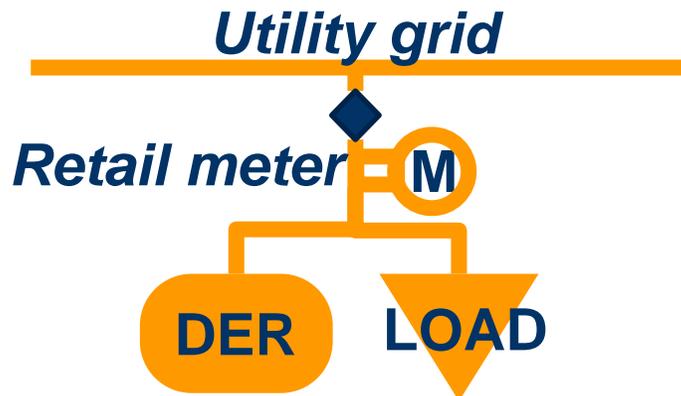
BEHIND THE METER



FRONT OF THE METER



PJM DEMAND RESPONSE

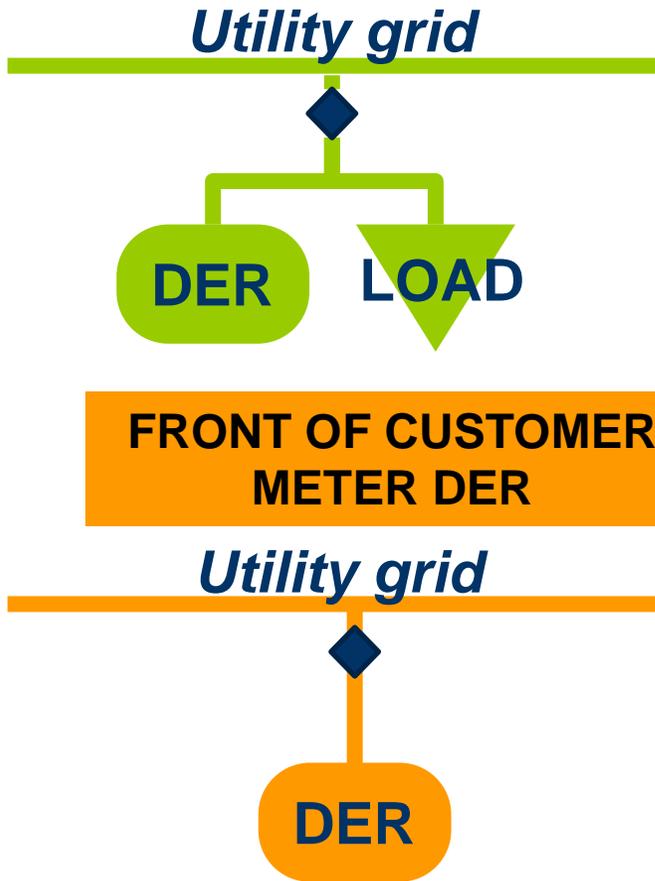


BEHIND THE METER: Activity is accounted for by PJM solely as changes in load. No PJM payments. Excludes PJM Demand Response.

FRONT OF THE METER: Activity accounted for by PJM as Generation. Receives PJM payments. Excludes PJM Demand Response.

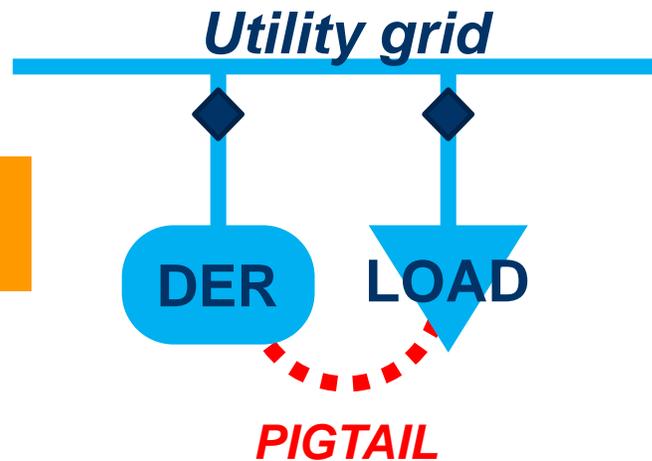
PJM DEMAND RESPONSE: Load reductions that are also paid by PJM. Activity is accounted as both changes in load and Demand Response.

BEHIND THE CUSTOMER METER DER



PHYSICAL DISTINCTION

FRONT OF CUSTOMER METER DER W/ PIGTAIL



BEHIND THE CUSTOMER METER DER: load and DER share the same connection to the utility grid.

FRONT OF CUSTOMER METER DER: DER w/ no relationship with any ordinary retail load.

FRONT OF CUSTOMER METER DER WITH PIGTAIL: load and DER have separate connections to the utility grid (but are sited together and might be connected via switching).

PHYSICAL DISTINCTION

Physical distinction relative to POI

- **Withdrawal reduction:** Power output from a DER that reduces power withdrawn from the grid at a customer point of interconnection.
- **Injection:** Power output from a DER that flows onto a utility past a point of interconnection.
- **Curtailment:** Increase in net power outflow (or reduction in net power inflow) from a site due to intentional reduction or curtailment of end-use loads.

Classification as “injection” and “withdrawal reduction” depends on the POI—in some cases, one can identify one POI between generator<>EDC, and another POI EDC<>TO. In these cases, one should specify the POI by reference when discussing injections vs. withdrawal reductions

ACCOUNTING DISTINCTION

"Generation" vs. Load offset"

Accounting distinction relative to metering and data processing configurations

- **Load offset:** Energy from a DER that reduces billings to load. Includes PJM Demand Response.
- **Generation:** Energy from a DER that results in a PJM payment to a seller.
 - Energy accounted for as Generation does not reduce any load billings, wholesale or retail.

Retail load = end use load. "Retail load offset" reduces billings to retail load (and, by extension, to wholesale load as well). Wholesale load = load for resale, i.e., LSE load. "Wholesale load offset" only reduces billings to wholesale load (not to end-use load). E.g., muni generators, PURPA units on bilateral avoided cost contracts.

E. Wholesale DER Principles

- Safe and reliable grid operation, with special recognition of the central role of the distribution grid
- Open access to wholesale markets
- Efficient use of assets
- Compatibility with retail regulations and jurisdictional boundaries
- Comparability of DER rules with existing rules for wholesale generation and demand response
- Awareness of FERC DER NOPR
- Appropriate accounting

F. Phasing and Work Plan

- DER rules encompass substantial manual and tariff language additions and changes.
- Rules for all markets to be developed as part of initial DER filing.
- Ancillary Services tackled first (essentially wrapped up), followed by energy (largely stable) and then capacity (just started).
- Rules for non-wholesale DER are teed up.
- FERC filing targeted in 2018

