CIDER 25

6th Conference on the Integration of Distributed Energy Resources

Learnings from Queensland's DERMS Deployment (for DOE)

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Presentation #1109

cigre Australia

ERGON ENERGY NETWORK | **energex**

Part of Energy Queensland

DSO Use Cases

- Emergency Response
  - Emergency Backstop (MSL)
  - Emergency Load Shedding (LOR)
- Operating Limits
  - **Dynamic Operating Envelopes (DOE)**
- Demand Flexibility
  - Controlled load tariffs
  - Demand Response
  - Dynamic Pricing

Communication Pathways

- SCADA (DNP3)
- Ripple Control (AFLC)
- **SEP2 (CSIP-AUS)**
- Others

DMS or DERMS?

Expected Response Times

- < 1 min (Real Time)

- > 1 min (Near Real Time)

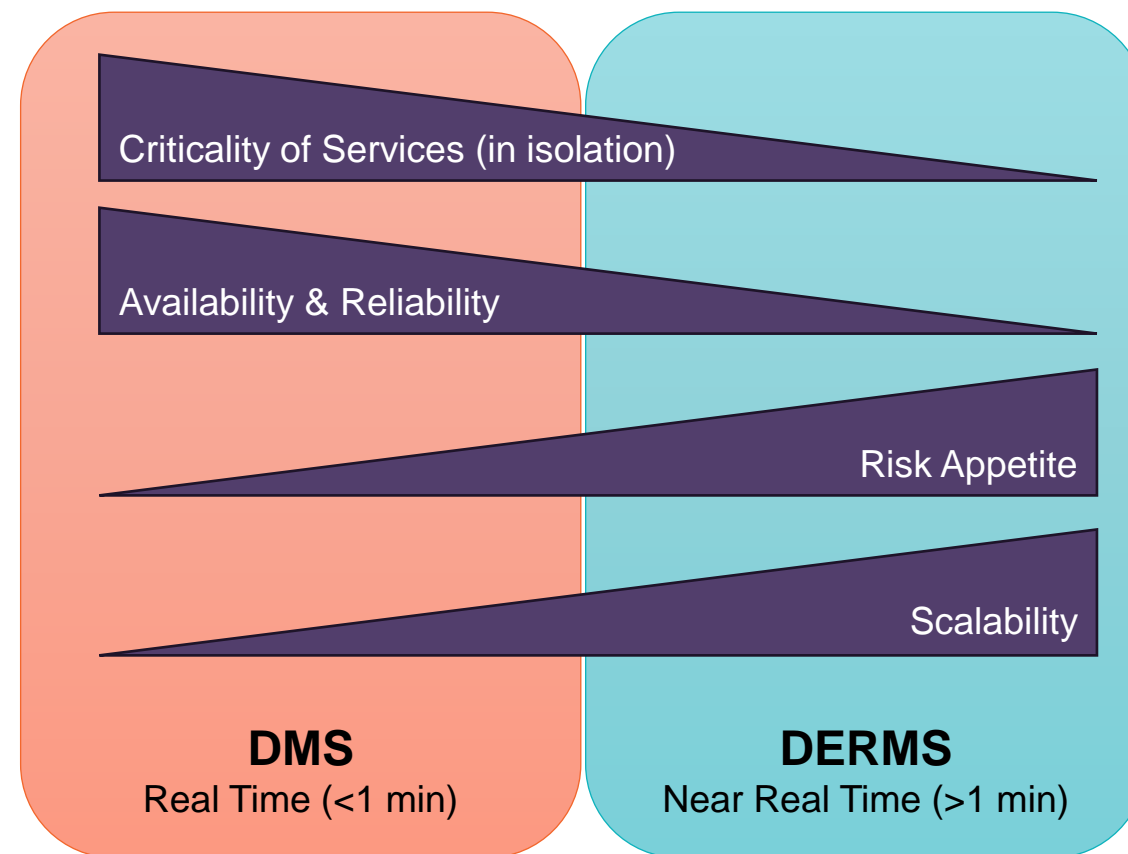**System Sizes**
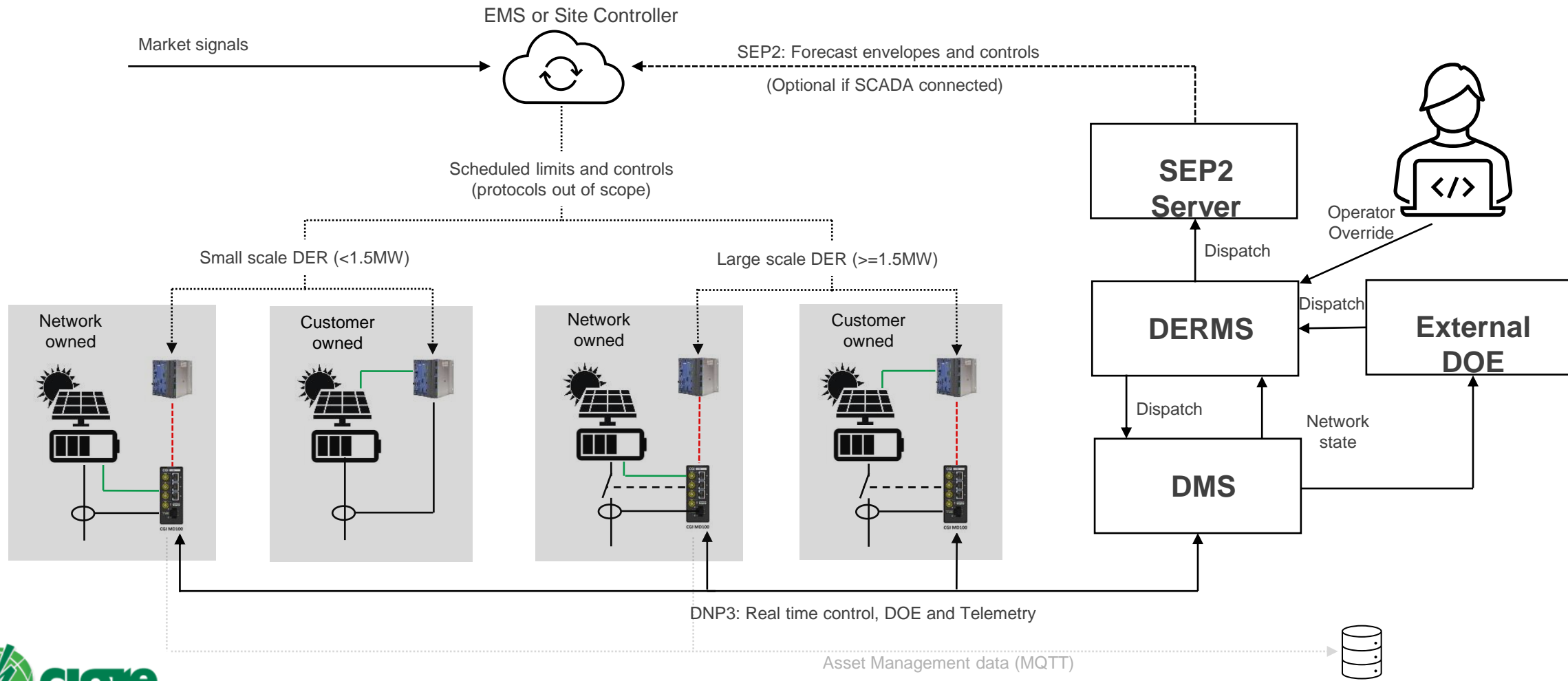
- LV Connected
    - 0 – 30 kVA   or   >30 kVA to 200 kVA
    - >200 kVA to 1500 kVA   or   >1500 kVA to <5000 kVA

- MV Connected
    - Class A1 (≤ 1.5 MVA)
    - Class A2 (>1.5 MVA & <5 MVA) or Class B (≥ 5 MVA)

Other Considerations

- Forecasting Requirements

- Impacts of non-compliance

Criticality of Services (in isolation)

Availability & Reliability

Risk Appetite

Scalability

DMS
Real Time (<1 min)
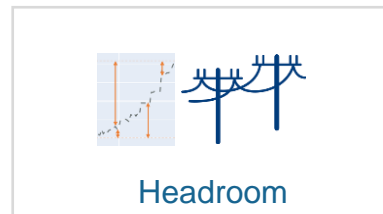
DERMS
Near Real Time (>1 min)

DMS or DERMS?

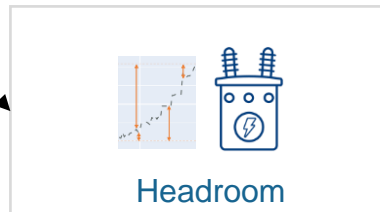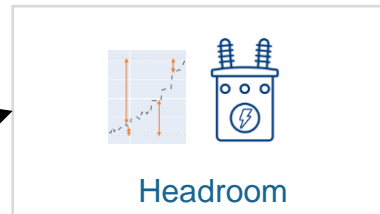# Operating Limits

Separate the calculation of constraints (headroom) from envelope allocation.
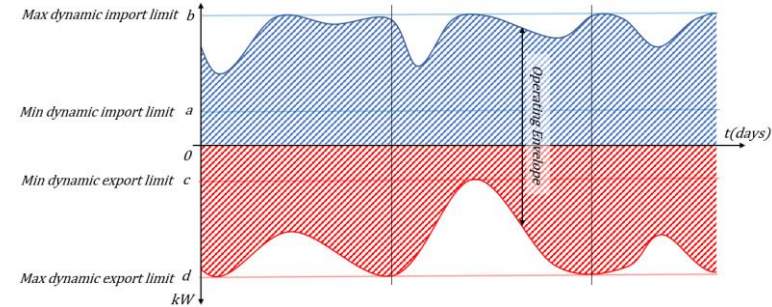
- Feeder Rating
- Voltage Limits

- Transformer Rating
  Voltage Limits

Headroom

Headroom

Headroom

Operating Envelope

Operating Envelope

Operating Envelope

Operating Envelope

Max dynamic import limit b
Min dynamic import limit a
0 $t(days)$
Min dynamic export limit c
Max dynamic export limit d
kW
Operating Envelope

Headroom Allocation

Envelope Allocation

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Calculation & Allocation

Separate the calculation of NRT and forecast controls.

Allow for multiple sources of input for all calculations, with a worst-case fallback option.

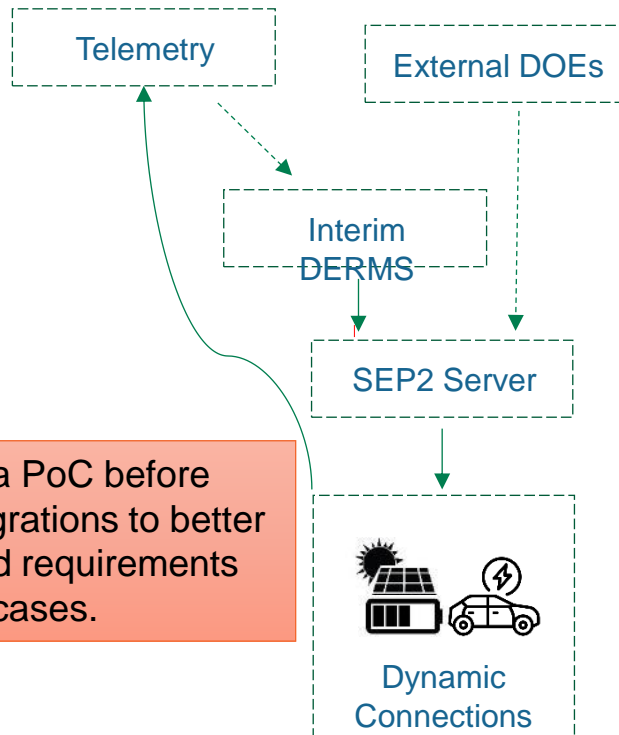|	NRT	Scheduled (Forecast)
Headroom	1,2,3	3
Envelope	1,3	3

1. **Operator**
2. **External** (if available)
   - A. **State Estimation**
   - B. **Model Free**
3. **Internal**
   - A. **Telemetry**
   - B. **Curves**

Clear understanding of the timing of additional steps that are independent of calculation source for consistent implementation (e.g. Ramping and Tapering applied at the end)
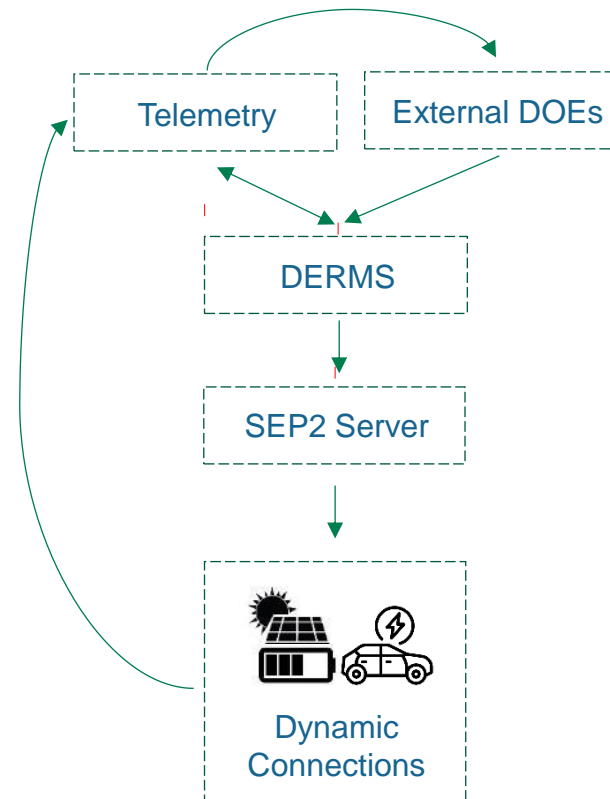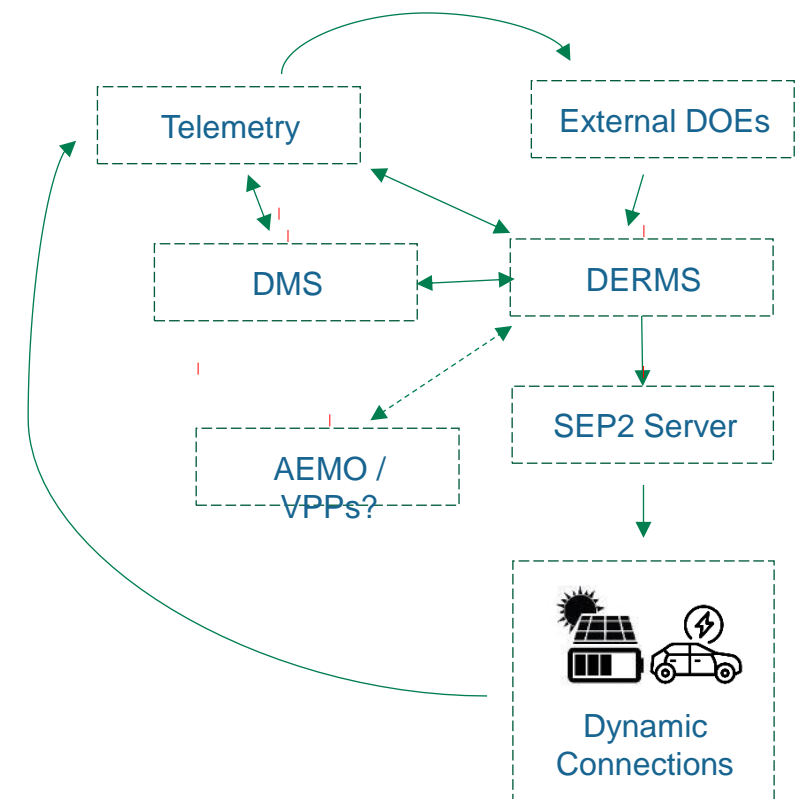
Staged Implementation

PoC (Tranche 0)

Telemetry → Interim DERMS → SEP2 Server → Dynamic Connections
External DOEs

DERMS (Tranche 1)

Telemetry ↔ External DOEs → DERMS → SEP2 Server → Dynamic Connections

Future DERMS (Tranche 2/3)

Telemetry ↔ External DOEs, DMS ↔ DERMS, AEMO / VPPs?, SEP2 Server → Dynamic Connections

Start with a PoC before doing integrations to better understand requirements and edge cases.

Don't let perfect be the enemy of good, focus on MVP for each stage

Environments & Integrations

Corporate Cloud

DMZ

OTE

Public Internet

DMZ

- DSSE DOE
- Model Free DOE
- SEP2 Server
- Short Term Forecasts
- Telemetry
- Kafka Event Streaming
- Dynamic Connections
- Weather Data

mirror

- Kafka Event Streaming
- SEP2 Adaptor
- DMS
- DERMS
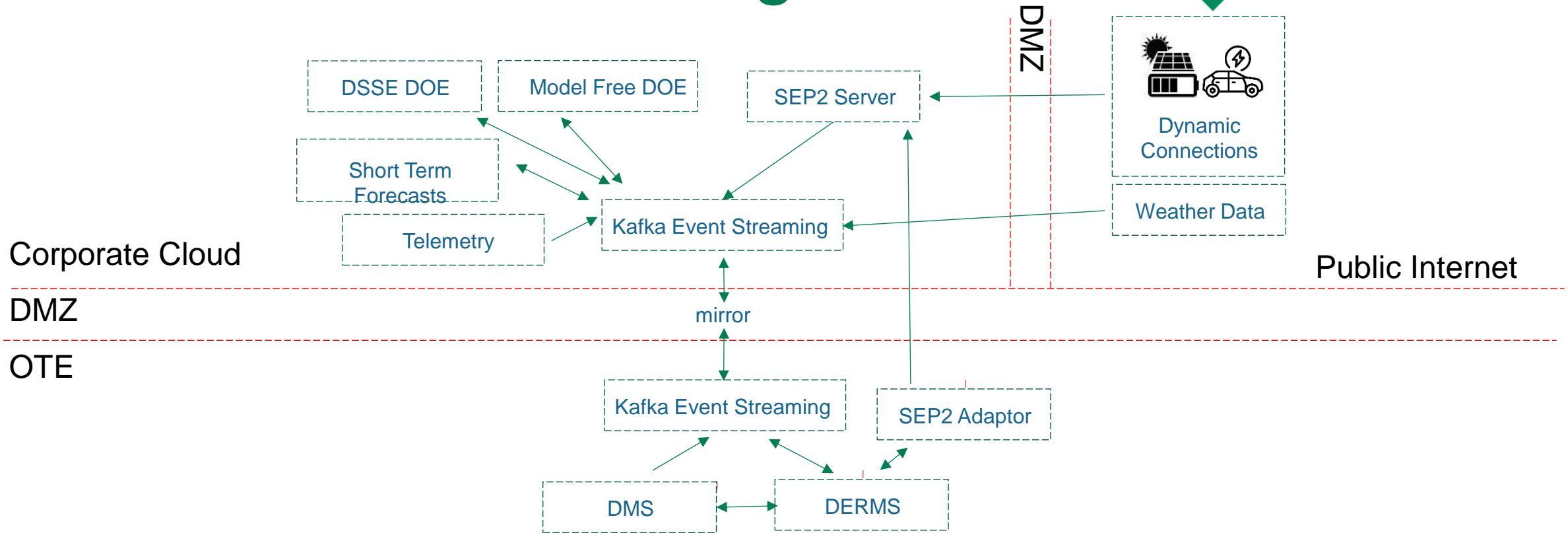
Make integrations as agnostic as possible (flexibility to change calculation methodologies and data sources)
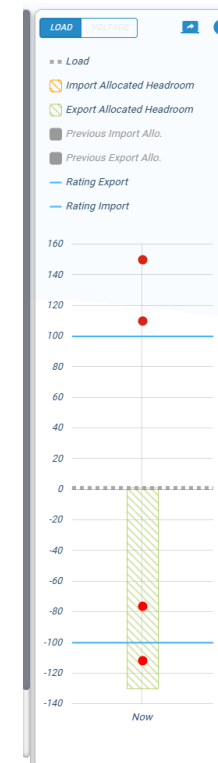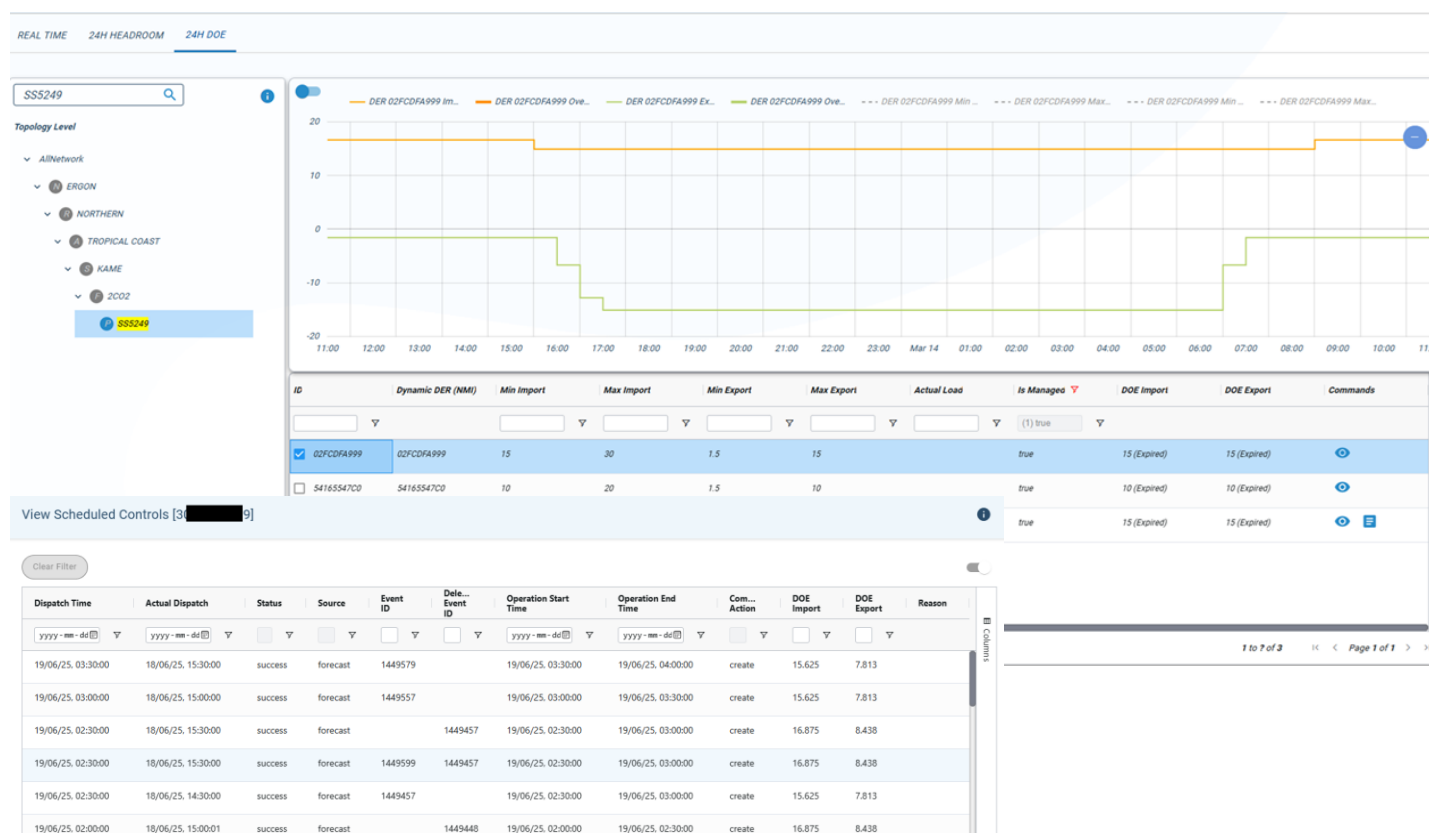
Configuration Data

- Network Model / Topology
    - Customer → Transformer → Feeder
    - Ratings at each node (Thermal and Voltage)
    - Mappings to Curves
    - Mappings to Telemetry (consistent IDs across all interfaces)
- Customer Info
    - Min/Max Import and Export Limits
- SEP2 Utility Server Adaptor Info
    - SEP2 Identifier (LFDI) for NMI
    - Program Enrolment and Poll Rates

- Other Settings
    - Voltage Limits
    - Ramp Rates
    - Time to Live (TTL) for stale telemetry
- Curves / Profiles
    - Seasonal, Regional etc.

Having good data is always going to a be a problem!
Have strict data validation rules and monitoring.

GUI Design

Worked with vendor to develop various GUI elements.