

Networks Advisory Group

Meeting 3 Briefing Formation

Wednesday 3 March 2021 | 2.30 – 4.00pm AEDST



Agenda



Item	Lead	Timing
Welcome, Acknowledgement of Country and Safety Moment	John Theunissen	5 min
Project status, reflections from Meeting 2, and the focus for Meeting 3	John Theunissen	5 min
A closer look at the wholesale energy market operating models to be tested in EDGE and how they might work	Matt Armitage / Nick Regan	20 min
Examining the functions undertaken by the DNSP within the wholesale energy market operating models	John Theunissen / Jack San	20 min
Introducing the discussion topics	John Theunissen	5 min
Interactive session – Responding and enlarging the conversation	All – Facilitated by Nous	25 min
Reflections on the NAG so far and improvement opportunities	All	5 min
Wrap up and the look ahead	John Theunissen (AST)	5 min

Project Status, reflections on Meeting 2 and the focus for Meeting 3

Project Status

Current position

- DERMS Platform procurement approaching completion, EDGE Platform procurement well advanced
- Work on operating envelope algorithms and objective function well advanced.
- Work on Mondo forecasting, bidding and dispatch algorithms – Underway
- EDGE Market Platform specifications under development (data specs etc.)

Key upcoming activities

- Consumer advisory group meeting
- Public webinar – late March
- Commencement of Mondo customer acquisition activities
- Procurement of Transformer monitors
- Platform vendor on-boarding

Reflections/summarised outputs from Meeting 2



Reflections

- *Inclusion of the work being undertaken in the Evolve DER project in the presentations was well received, as was the ability to collaborate beyond the EDGE project*
- *There were more areas that could have been covered in the interactive session however it may be best to have a “less is more” approach to that segment in future*
- *There is a relatively broad range of views around the calculation and allocation of operating envelopes, and further work is needed within the industry to settle on uniform approaches, led by DEIP activity – which the EDGE trial can inform.*

Key outputs

- *An OE allocation method based on fairness is likely to be most accepted, although all of the three proposed methodologies within the trial were supported, with varying priorities*
- *Having a fail-safe mechanism for active DER operation (when things go wrong) was a perceived requirement, as well as a means to manage performance compliance*
- *Consideration should be given to having more than one allocation method under different operational arrangements (e.g. system security related, network reliability etc.)*
- *Multiple trading relationships / different measurement points and their impact on operating envelopes was briefly explored*
- *There needs to be further thought given as to how one treats unused capacity after Aggregator decisions are made*

Miro Board Outputs from Meeting 2



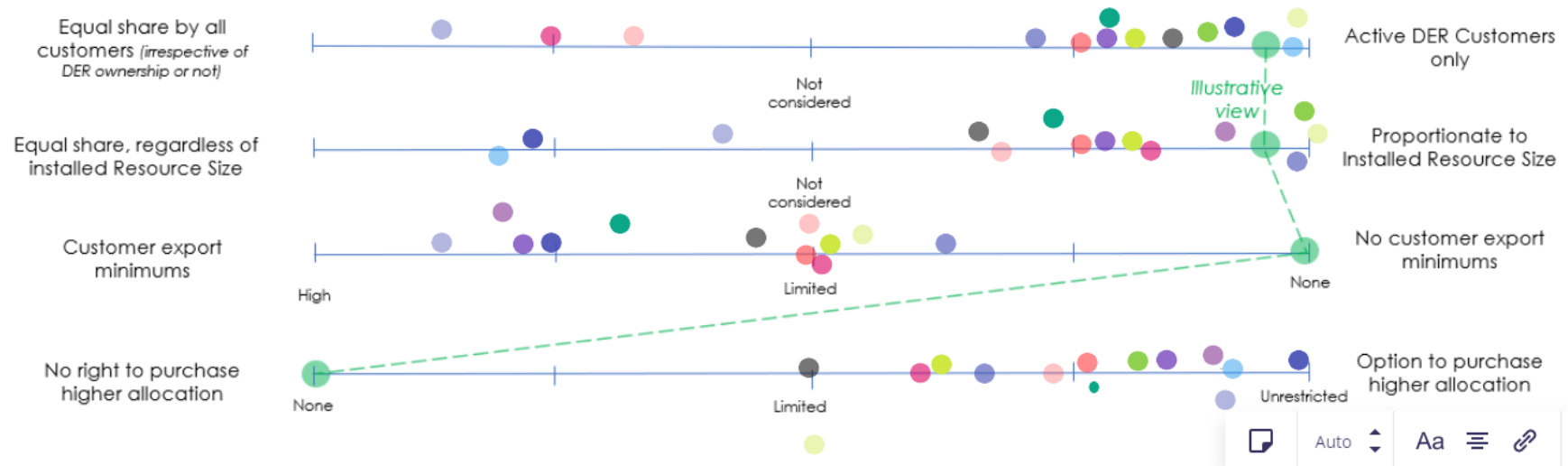
What factors should be considered regarding customer equity and fairness?

INSTRUCTIONS: Consider the four spectra of customer equity considerations below. Please drop a dot of your allocated colour along each spectrum indicating the weighting you would recommend for each of the considerations.



Regarding Customer Equity or Fairness.... *(Possible Views)*

Which factors should be considered, and your weighting?



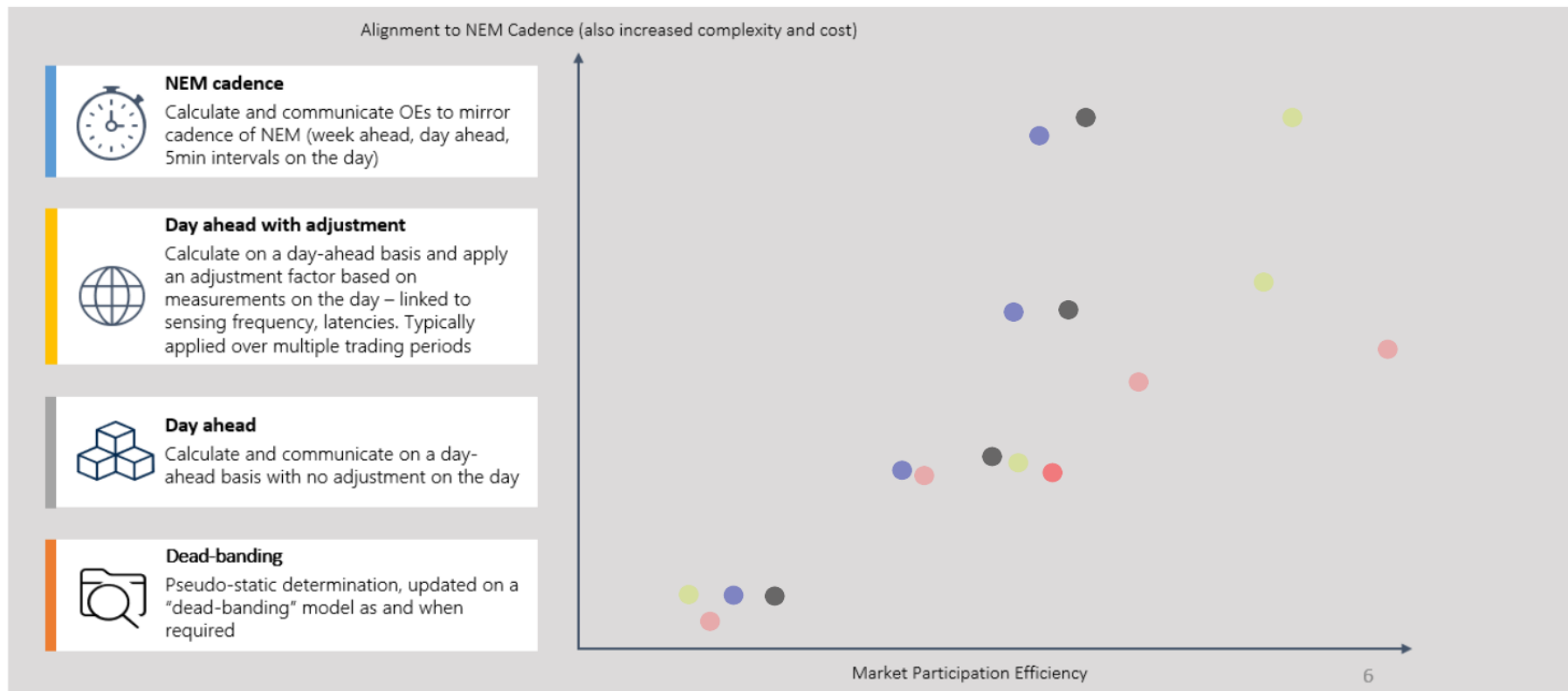
Miro Board Outputs from Meeting 2



How closely should the network OE architecture and rhythm mirror the wholesale market?



INSTRUCTIONS: Place a dot for each cadence type against the level of market participation efficiency. Please use the same colour for each of your four points.



**A closer look at the wholesale energy market
operating models to be tested in EDGE**

Market Operating Model principles





Roles & responsibilities in wholesale integration

AEMO

- NER 3.4: AEMO must establish a spot market
- NER 3.8.1: AEMO must operate a central dispatch process that considers networks constraints
- 3.8.10: AEMO must determine and represent network constraints in dispatch
- Glossary: Network constraint – a constraint on the transmission or distribution network
- **EDGE testing alternative approach to consider distribution constraints in dispatch**

AusNet as DSO

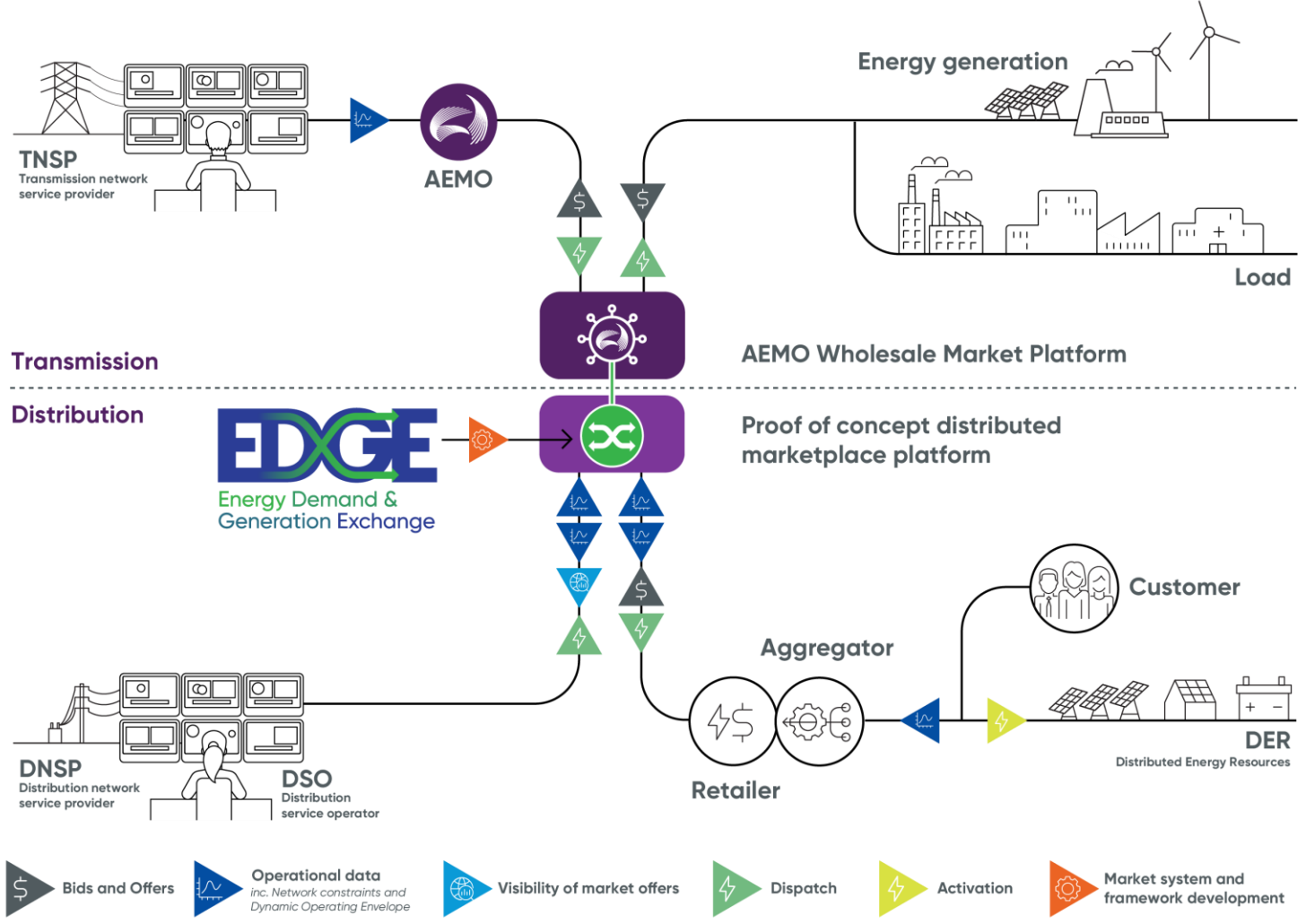
- **Responsible for distribution system operation within secure limits**
- Calculates and communicates limits (operating envelopes or constraints) to ensure power flows remain within secure limits
- In all models for consideration of Dx limits in dispatch, DSO retains control of operating their system to remain within secure limits

Wholesale integration

Key functions:

- **DER dispatchability**
 - How VPPs participate in wholesale dispatch

- **Dx Networks Limits**
 - How Dx limits are considered in w/s dispatch
 - Represented by Operating Envelopes





Wholesale Integration: Two key functions - a spectrum of approaches for each

1. DER Dispatchability

Low cost/low visibility
Increasing system risks

Higher cost/visibility
High system operability

Today

- Non-scheduled/exempt
- Invisible to AEMO

VPP Demos

- Forecasts
- Visibility

- Scheduled 'lite'
- Price taking
- Scheduled
- Price setting ability

2. How to consider Dx limits in dispatch

Low cost/complexity
Low system efficiency*

High cost/complexity
High system efficiency

Static export limits
(Today)

- Operating Envelopes - Basic
- Operating Envelopes - Bid Optimised
- Nodal constraints

Fully decentralised models – OPF or DDL
(may not be highest cost)

Only move up the spectrum when sufficient net benefit

* System efficiency = network and market efficiency



DER Dispatchability: how DER fleets could participate in wholesale dispatch process

Boffer characteristic	Step 1: Schedule 'life'	Step 2: Scheduled	Step 3: Flexible trader
Definition of kW / measurement point	Aggregated connection point flows	Aggregated connection point flows	Test options under Flexible Trader model where aggregator is FRMP at CP for controllable DER (only change is measurement point)
Frequency of boffer	Continuous	Continuous	
NMIs in boffer	All NMIs in registered cap	All NMIs in registered cap	
Energy fixed loading	Rebid aggregated CP flows every 5 mins	Submit Boffers in price bands May use EFL in some intervals	
Bi-directional bidding	N/A – EFL could be +ve/-ve	Yes	
Price setting ability	None	Yes	

	Max Avail	ROC Up	ROC Down	Fixed	Pasa	Band 10 \$14953.50	Band 9 \$1495.35	Band 8 \$298.07	Band 7 \$144.55	Band 6 \$94.71	Band 5 \$84.74	Band 4 \$78.76	Band 3 \$68.79	Band 2 \$0.00	Band 1 -\$996.90
04:30	0	120	120		245	0	0	0	0	0	0	245	245	245	245
05:00	0	120	120		245	0	0	0	0	0	0	245	245	245	245
05:30	0	120	120		245	0	0	0	0	0	0	245	245	245	245
06:00	0	120	120		245	0	0	0	0	0	0	245	245	245	245
06:30	0	120	120		245	0	0	0	0	0	0	245	245	245	245
07:00	0	120	120		245	0	0	0	0	0	0	245	245	245	245
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09:00	0	120	120		245	0	0	0	0	0	0	245	245	245	245
09:30	0	120	120		245	0	0	0	0	0	0	245	245	245	245
10:00	0	120	120		245	0	0	0	0	0	0	245	245	245	245

Operating Envelope consideration in wholesale dispatch process



Operating Models to be Tested

- 1 Operating Envelope (Basic Model)**
- Operating envelopes for voltage and thermal constraints (optimised on forecast info only) sent from AusNet to Aggregator
 - Aggregator bids made with knowledge of operating envelope
 - AEMO performs bid validation; compares to wholesale clearing price; conducts wholesale dispatch; AusNet performs OE compliance assessment

Hypothesis Simple and lowest cost to implement
 Unused network capacity where resource forecast deviate from dispatch

- 2 Operating Envelope (Bid Optimised)** *As above, but*
- Operating envelopes adjusted for Aggregator offers and preferences

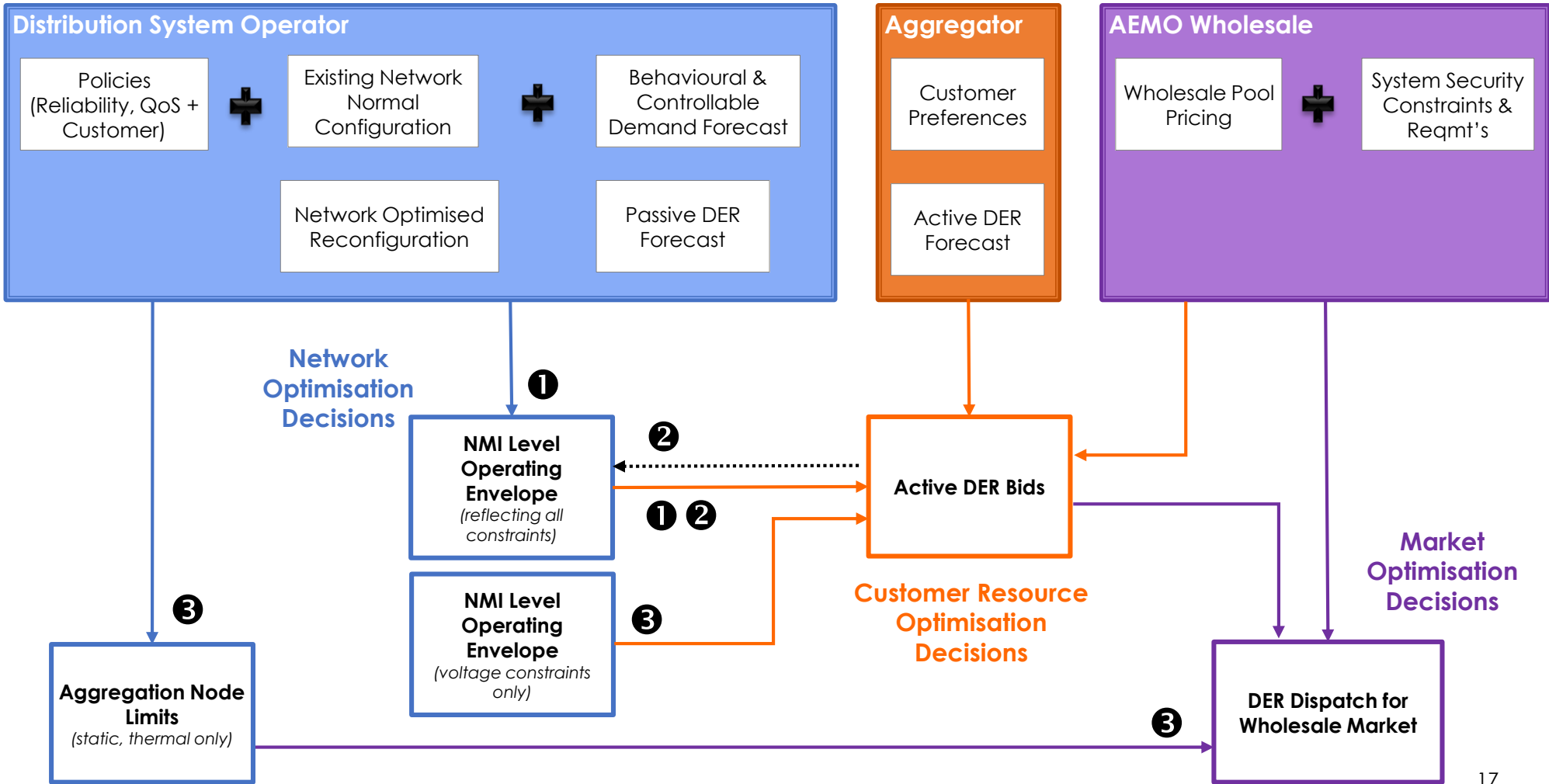
Hypothesis Increased market value by prioritising capacity to maximise economic value
 Increased complexity and integration between market-network platforms

- 3 Static Nodal Constraints Model** *As above, but*
- NMI Operating envelopes have regard only to voltage constraints
 - AusNet communicates nodal thermal constraints (for collection of NMIs) to AEMO
 - AEMO economic dispatch considers thermal constraints provided by AusNet (SCED)

Hypothesis Closer alignment of local market to wholesale market architecture
 Increased comparative complexity to perform security constrained dispatch

**Functions undertaken by the DNSP within the
wholesale energy market operating models**

Segmented functions and optimisation within the wholesale energy market operating models

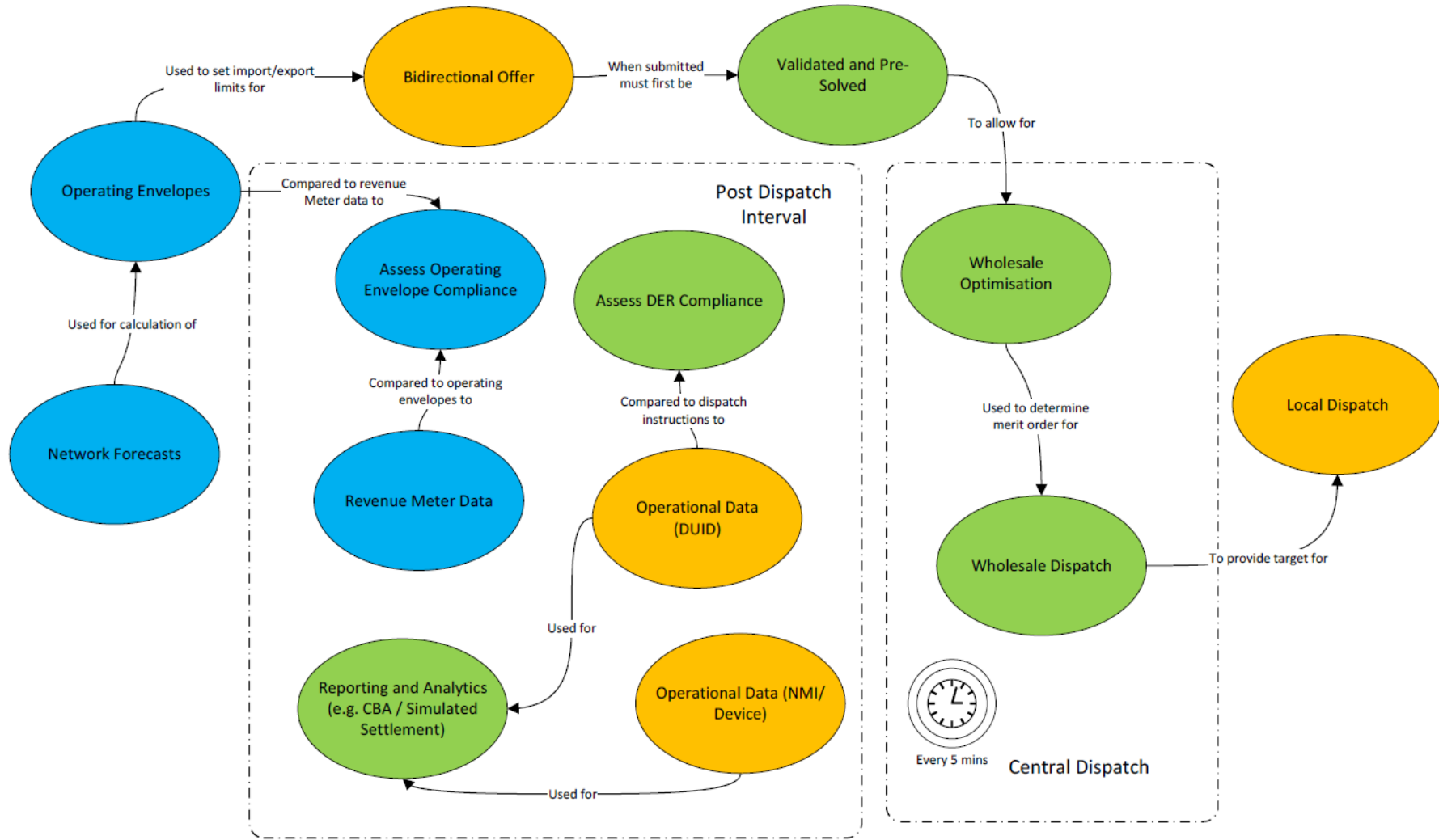
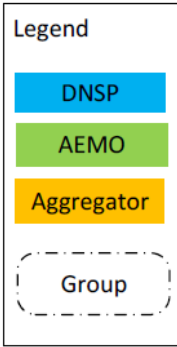


1 'Basic' Envelope option

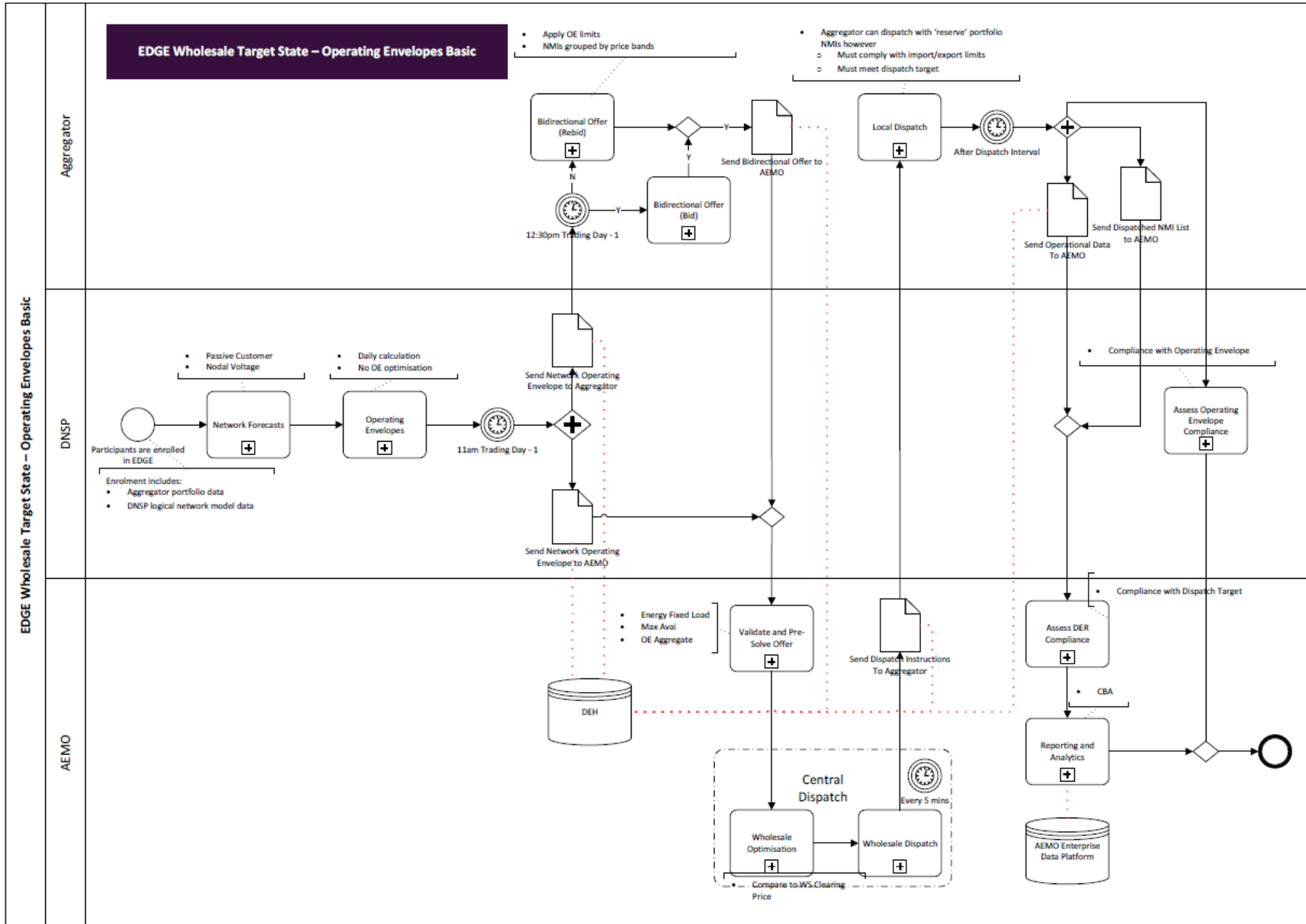
2 'Bid Optimised' Envelope option

3 'Static Nodal' option

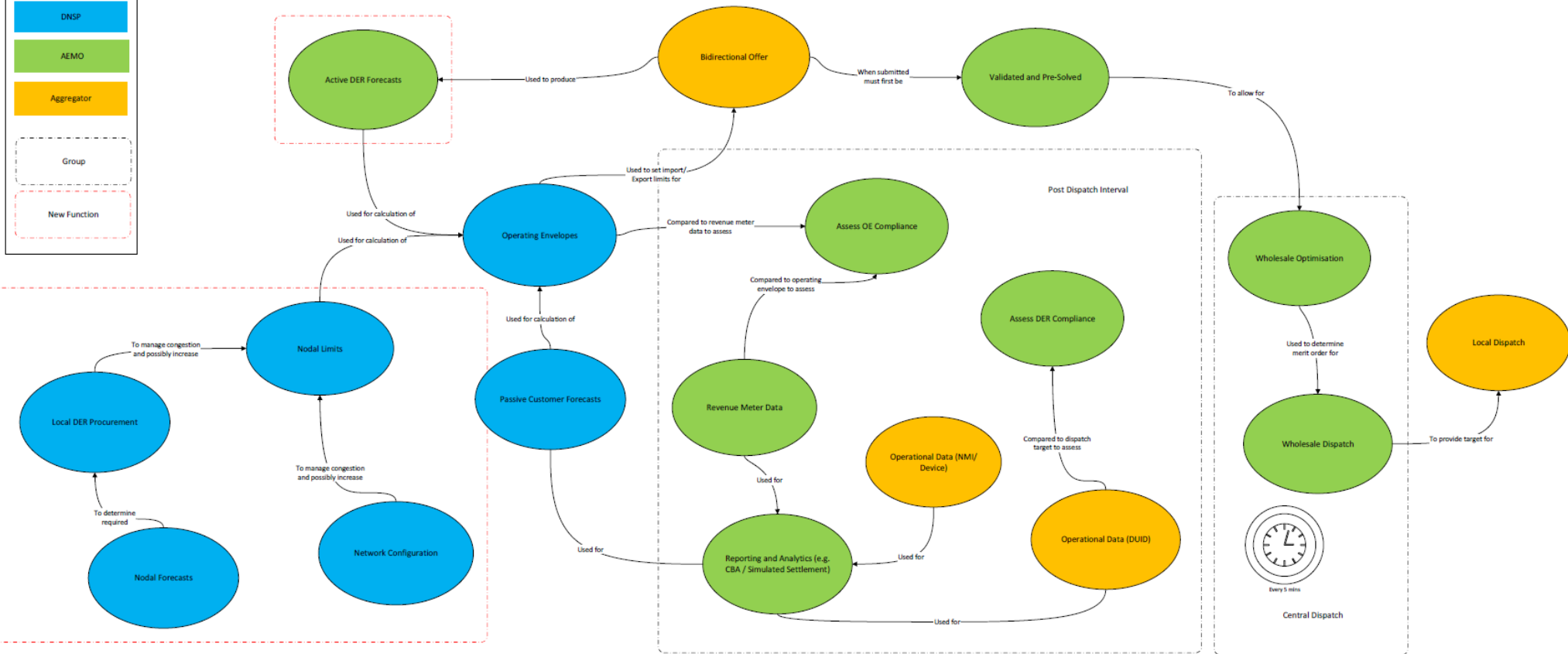
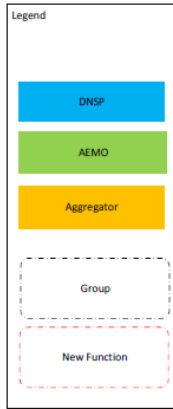
Operating Envelope - Basic Model



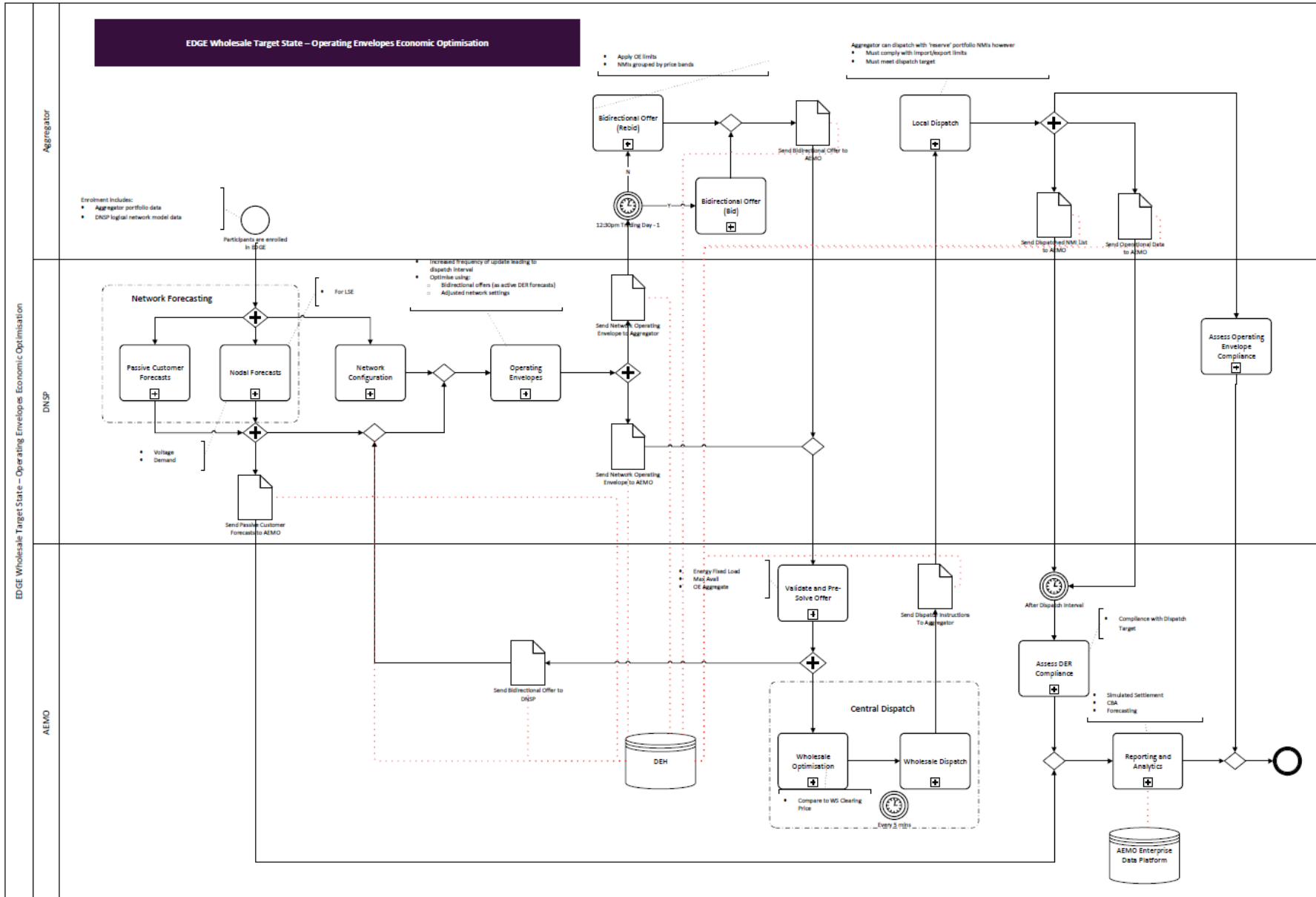
Operating Envelope - Basic Model



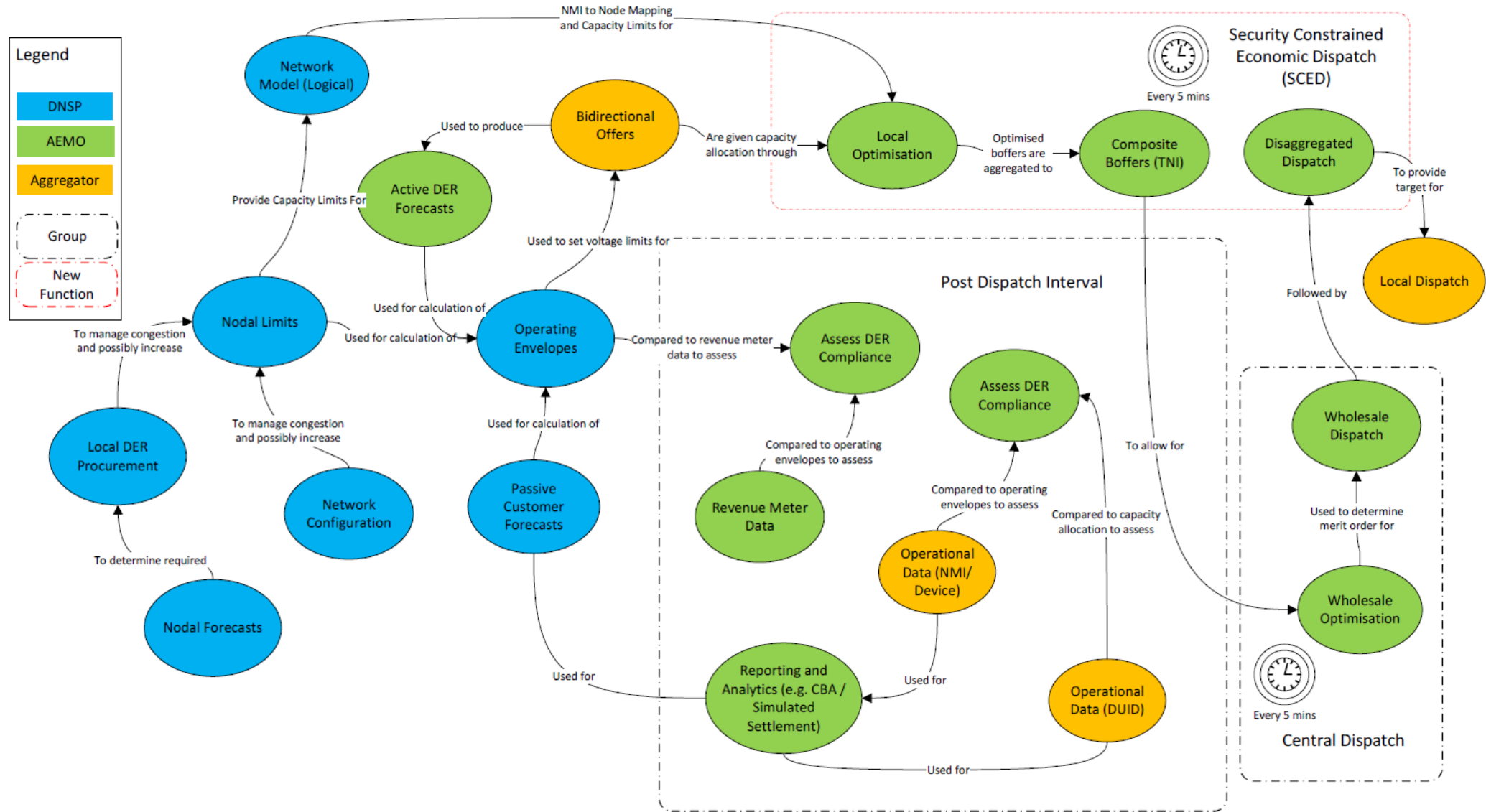
Operating Envelope - Bid Optimised Model



Operating Envelope - Bid Optimised Model



Nodal Constraints Model



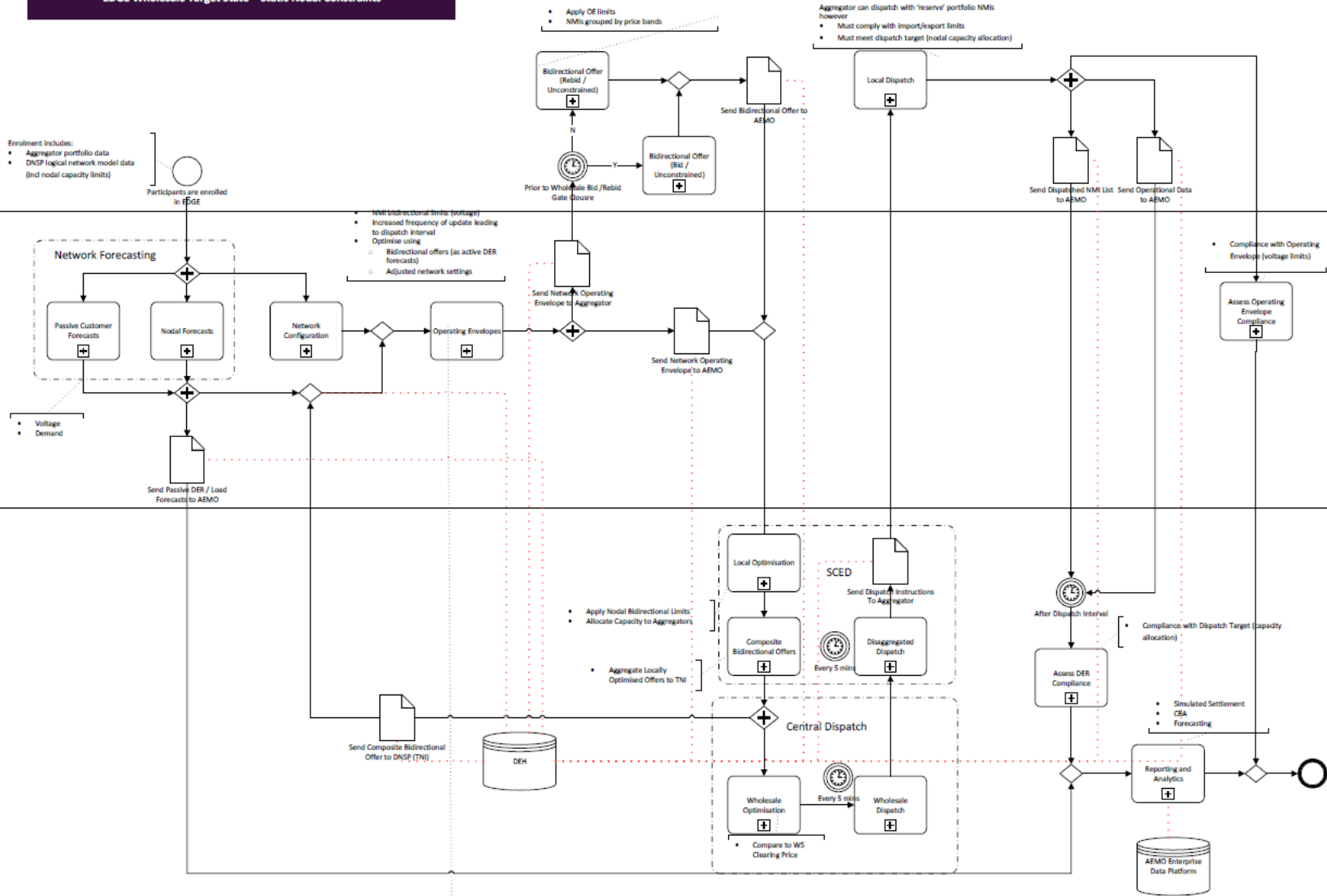
Nodal Constraints Model

EDGE Wholesale Target State – Static Nodal Constraints

Aggregator

DNSP

AEMO



Network platform efficiency considerations



Networks Platform Design Considerations that impact cost

Network Normal Scenario

- 1** Minimum Network measurements to produce operating envelope *Complexity of algorithm used, having regard to available data sets (resource, network model, AMI metering and weather)*
- 2** Network sensing interval to produce operating envelope *Sampling frequency and refresh rates of network monitoring data*
- 3** Operating envelope interval and refresh frequency for Market Participants *Day ahead vs 5-min interval*

Network Optimised Scenario

- 4** Use of active Network optimisation *HV network configuration/operational options to maximise network access for DER*

Introducing the discussion questions

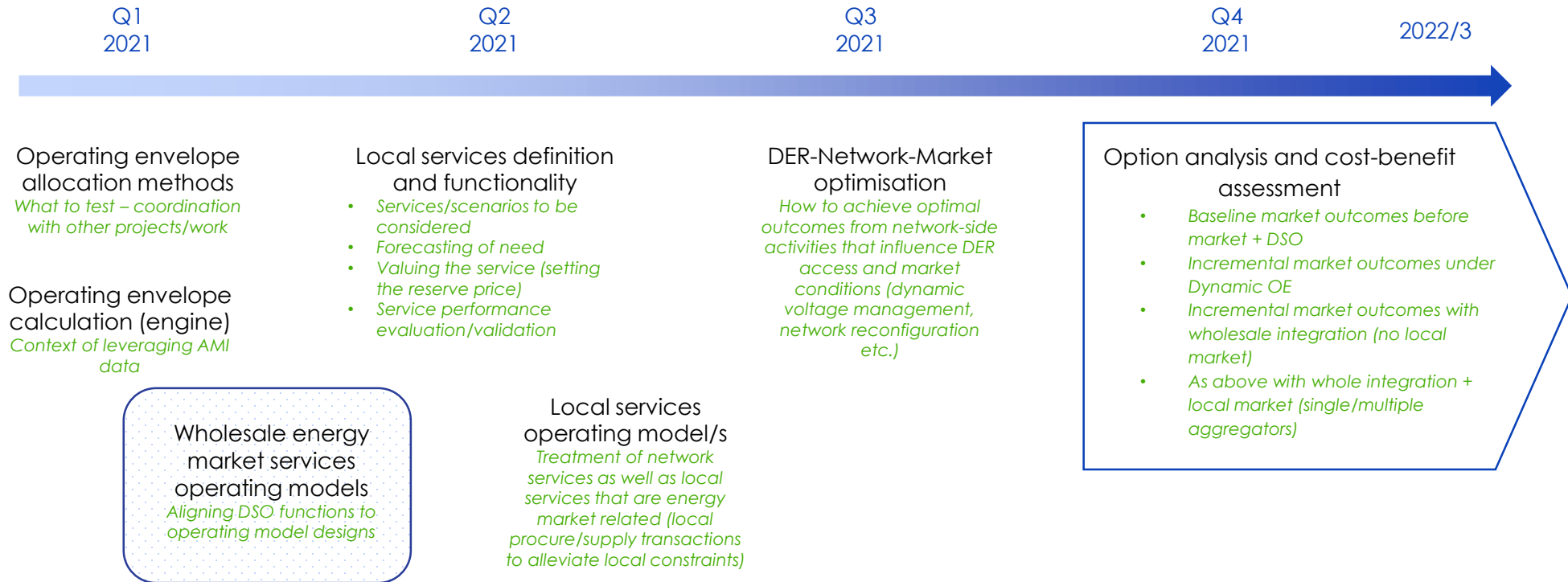
Suggested topics to ponder and discuss

- Are there any perceived “showstoppers” from a DNSP perspective in the proposed models for testing?
- What is the perceived most likely progression of operating arrangements for aggregated DER participation in the wholesale energy market?
- What might be the key enablers or obstacles to consider that would prevent a practical BAU transition to the models that are being tested?
- What are the most important things to “settle on” or “build” in the wholesale energy market component of the EDGE project that will have an enduring value, or assist with the transition?
- How should one treat network levers that can impact DER market participation?
- How should one assess the respective merits/shortcomings of the market operating models being tested?
- Any suggestions as to how one might best use the EDGE project works in progress to influence/shape the current ESB thinking (ref. DER Decentralised Platform)?

Interactive session – Enlarging the conversation

The look ahead

Anticipated future Advisory Group focus



To be shaped by the Advisory Group member input