Dynamic Containment Requirements Webinar

26th October 2021

Introductions

On the webinar today from the ESO today we have:

- Paddy McNabb
- Kashia Anderson
- Abisola Dapo Akinpelu
- Andy Rice

Agenda

Todays webinar today will cover the following agenda items:

- Where we are
- Background of DC-LF and DC-HF
- Frequency Policy
- Requirements methodology and sensitivities
- Long-term view
- Short-term view
- Questions

Where we are

Where we are

August response MIR:

- Initial view of DC-LF requirements with the move from a tender to auction and EFA block procurement
- Updated to keep DC-LF requirements static for September and October during launch of DC-LF auction

From Nov 1st:

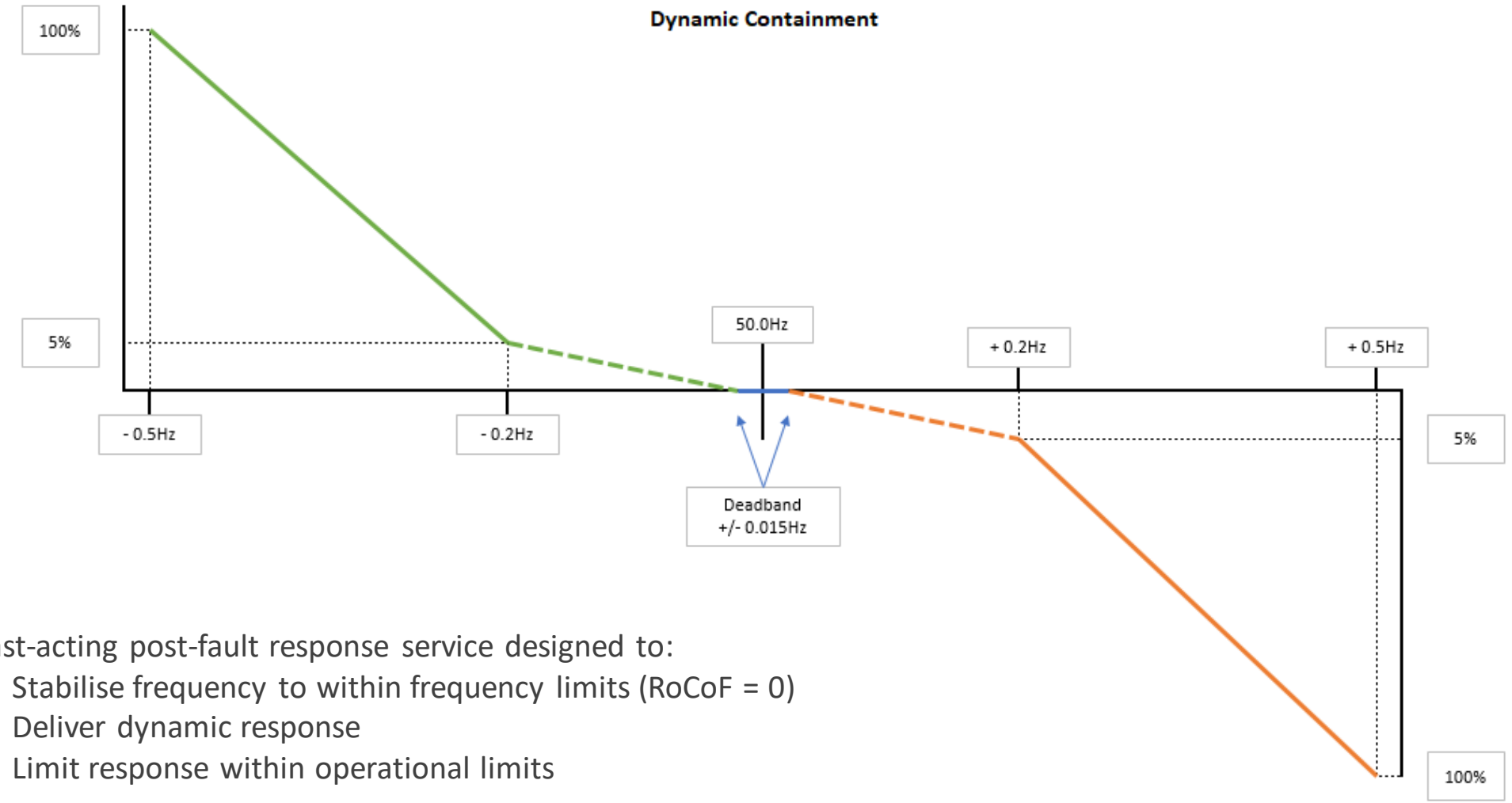
- ESO will begin procuring DC (HF and LF) at EFA block granularity
- As published in the September MIR for November delivery

Market comms:

- Publish longer-term 12 month view of DC requirements
- Publish short-term 4-day view of DC requirements

DC Response

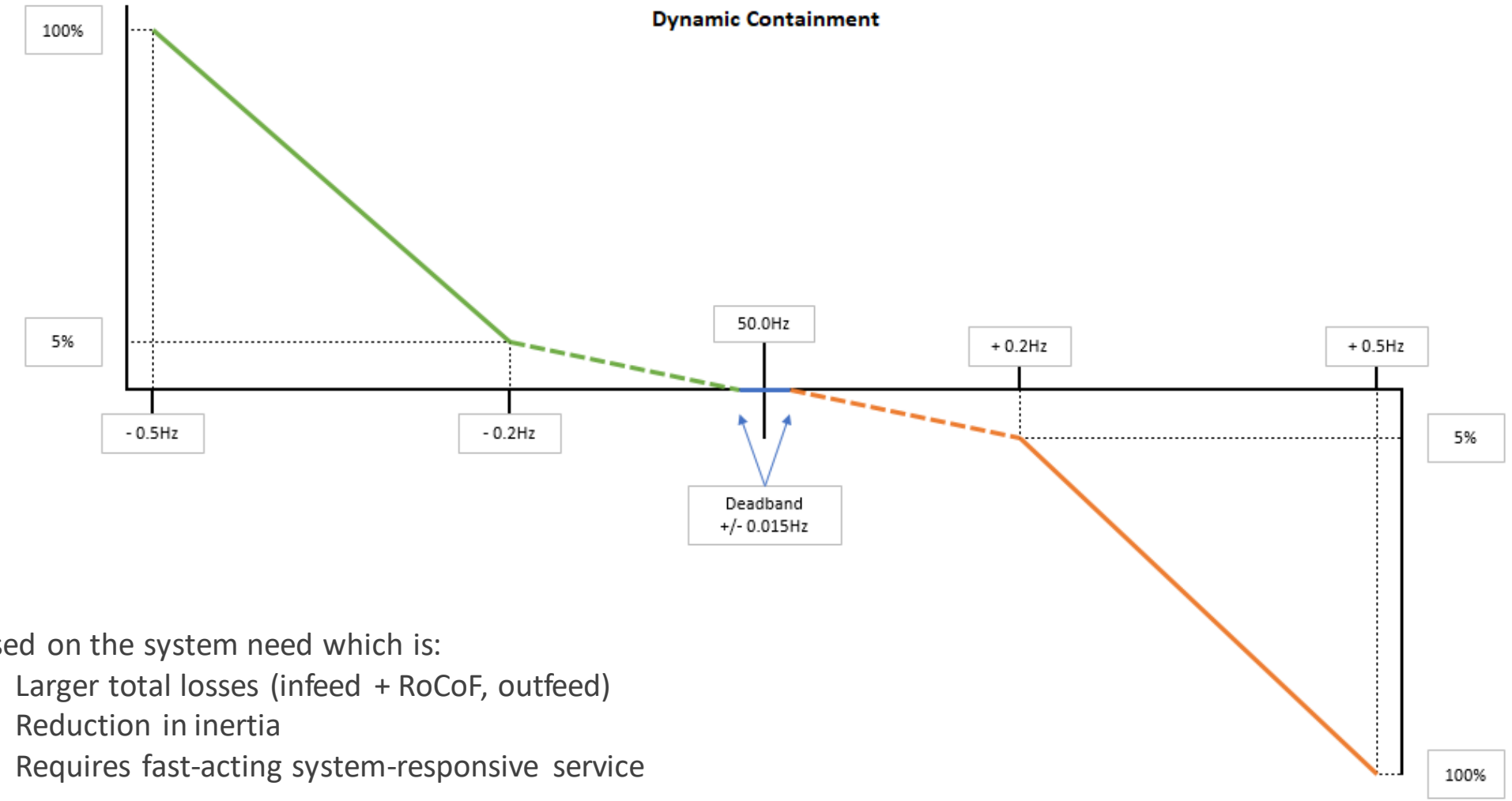
DC Characteristic



DC is a fast-acting post-fault response service designed to:

- Stabilise frequency to within frequency limits (RoCoF = 0)
- Deliver dynamic response
- Limit response within operational limits

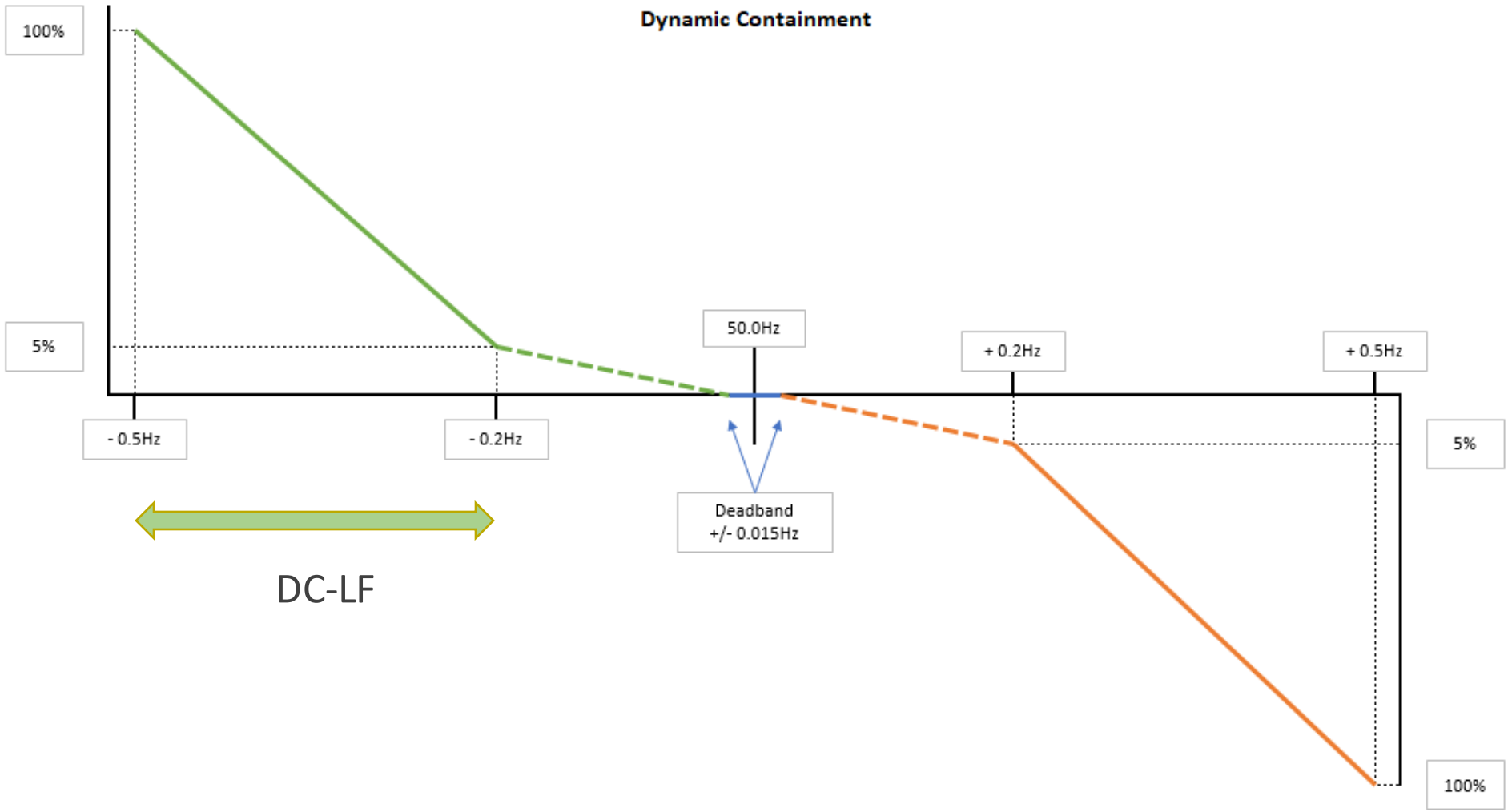
DC Need



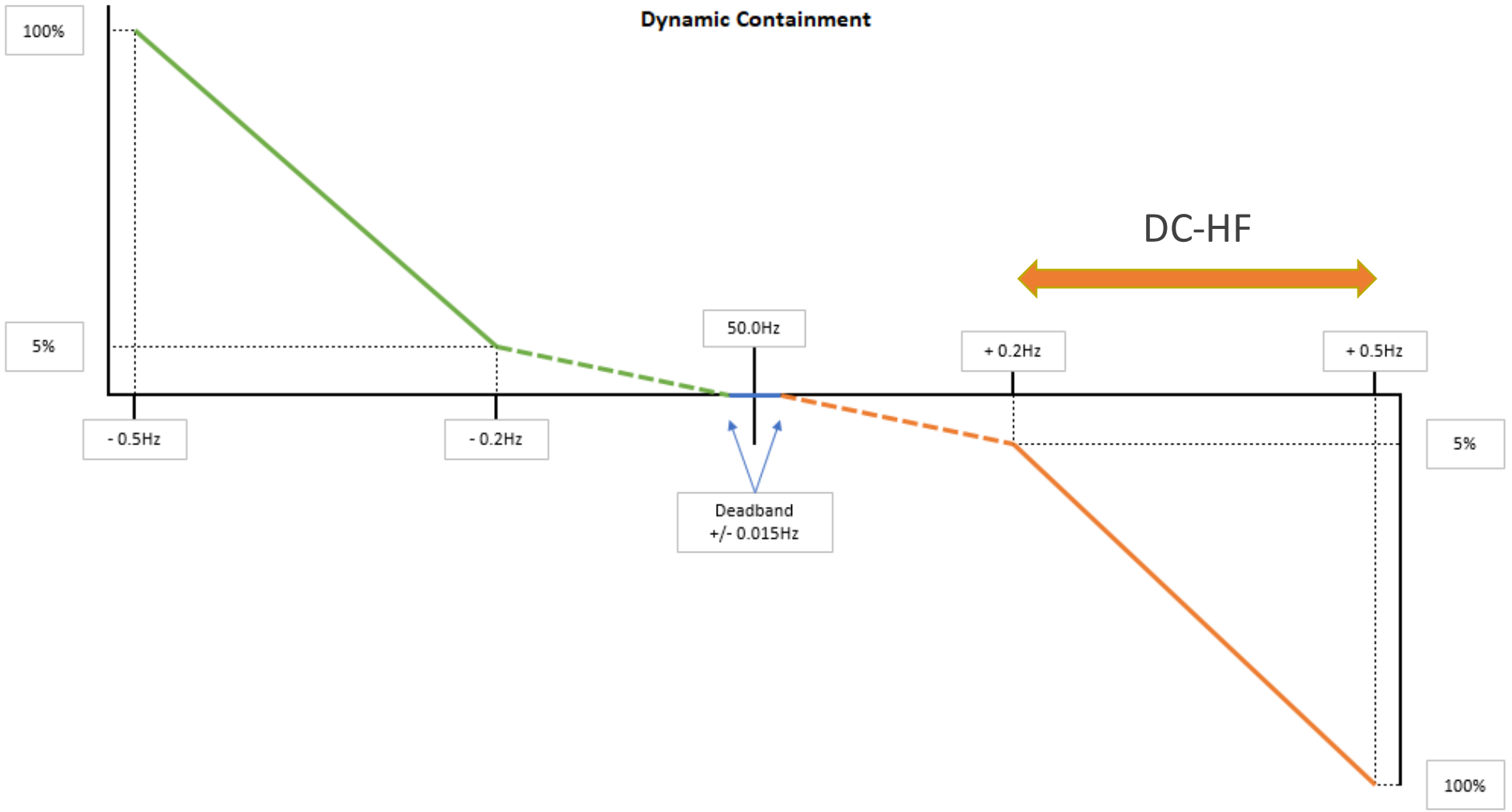
DC is based on the system need which is:

- Larger total losses (infeed + RoCoF, outfeed)
- Reduction in inertia
- Requires fast-acting system-responsive service

DC-LF


Dynamic Containment
100%
5%
- 0.5Hz
- 0.2Hz
50.0Hz
+ 0.2Hz
+ 0.5Hz
5%
100%
Deadband
+/- 0.015Hz
DC-LF

DC-HF


Dynamic Containment
100%
5%
- 0.5Hz
- 0.2Hz
50.0Hz
Deadband
+/- 0.015Hz
+ 0.2Hz
+ 0.5Hz
DC-HF
5%
100%

Frequency Management Policy

Policy

Implementation of Phase 1 & Phase 2 of Frequency Risk and Control Report (FRCR) recommendations:

Phase 1 – COMPLETED - 25th May 2021

- removing the tighter frequency limit of 49.5Hz for smaller infeed losses
  - *only applying the wider limit of 49.2Hz to all BMU-only infeed losses (back to within 49.5Hz in 60s)*
  - *securing BMU-only outfeed losses to 50.5Hz*
- No longer taking additional bids/offers on events re-categorised as BMU+VS events
  - *i.e. network faults like double circuits and single circuits*

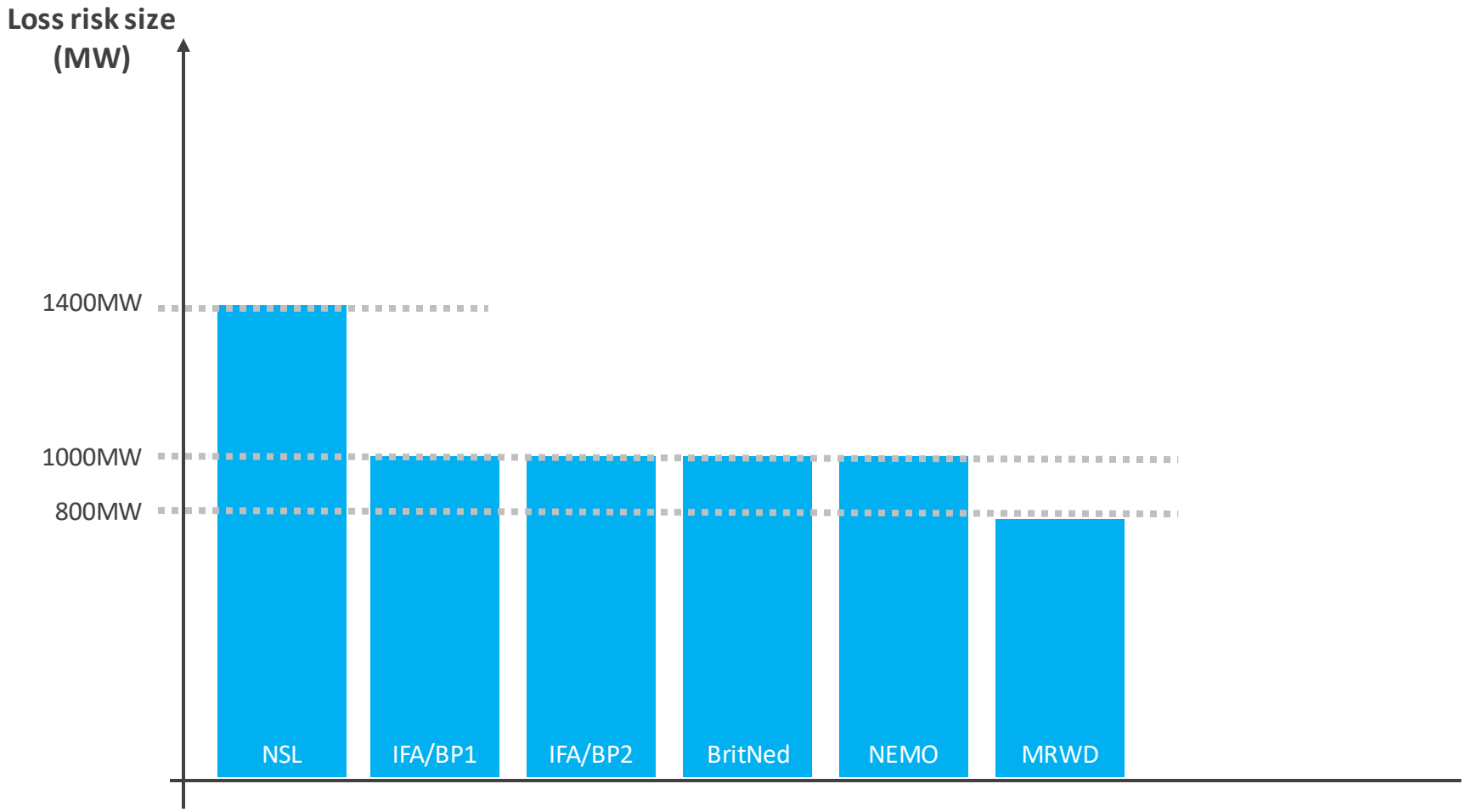
Phase 2 – COMPLETED– 7th October 2021

- allow BMU-only infeed loss risks to cause a consequential RoCoF loss, if the resulting loss can be contained to 49.2Hz and 50.5Hz

Overview of LF losses

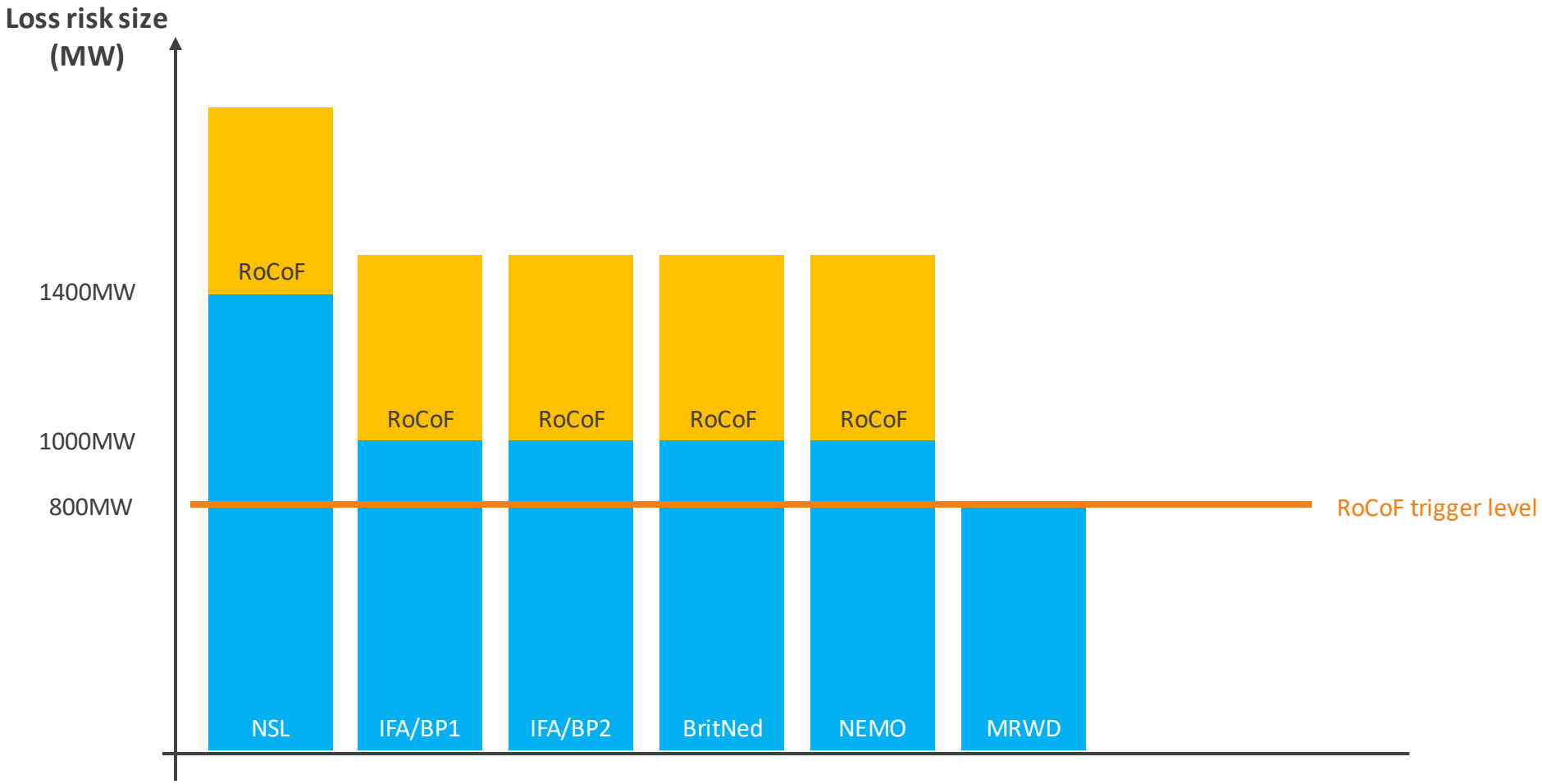
Overview - LF

View of *infeed* loss risks on the system



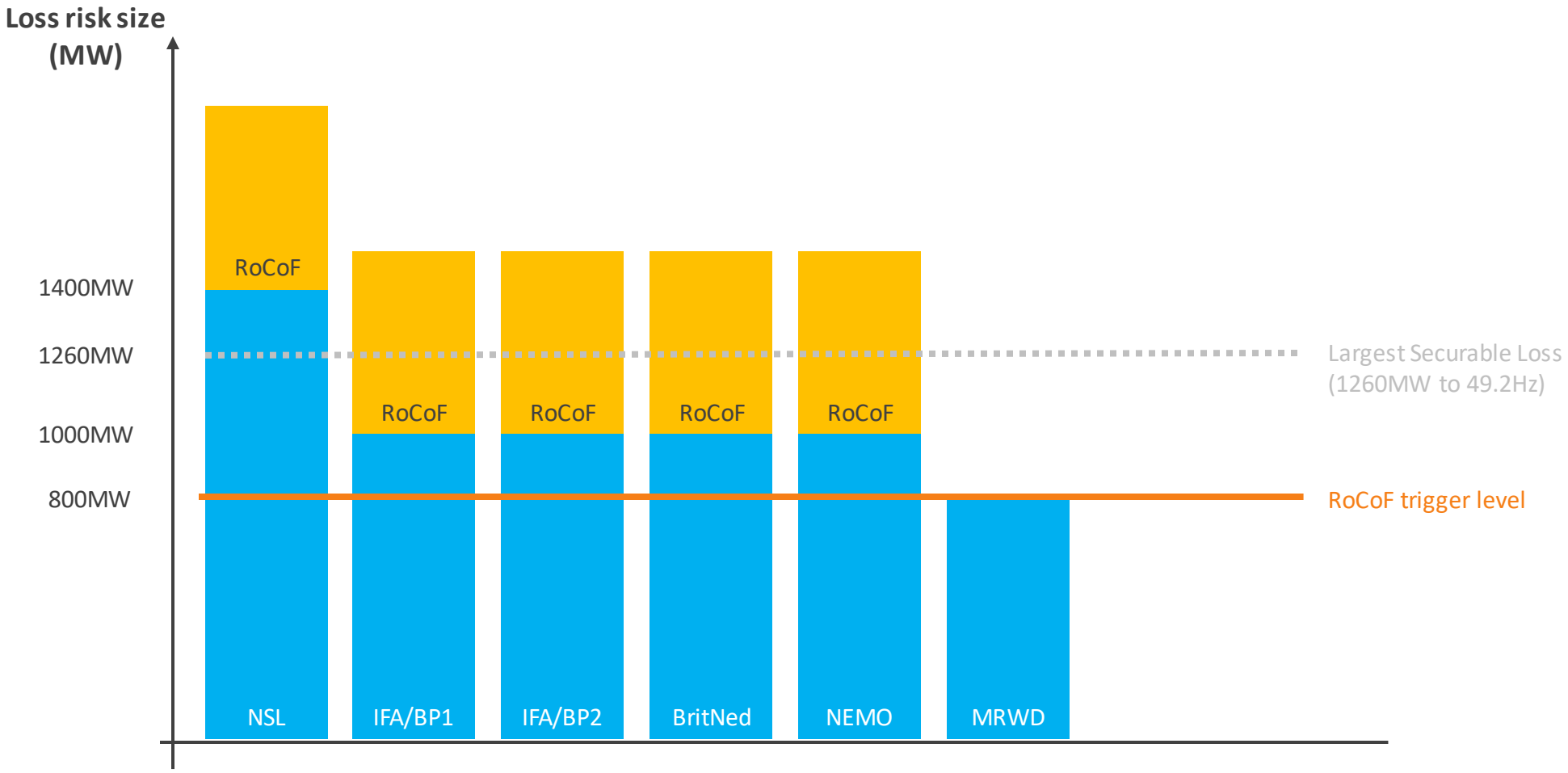
Overview - LF

Inertia level -> RoCoF trigger level



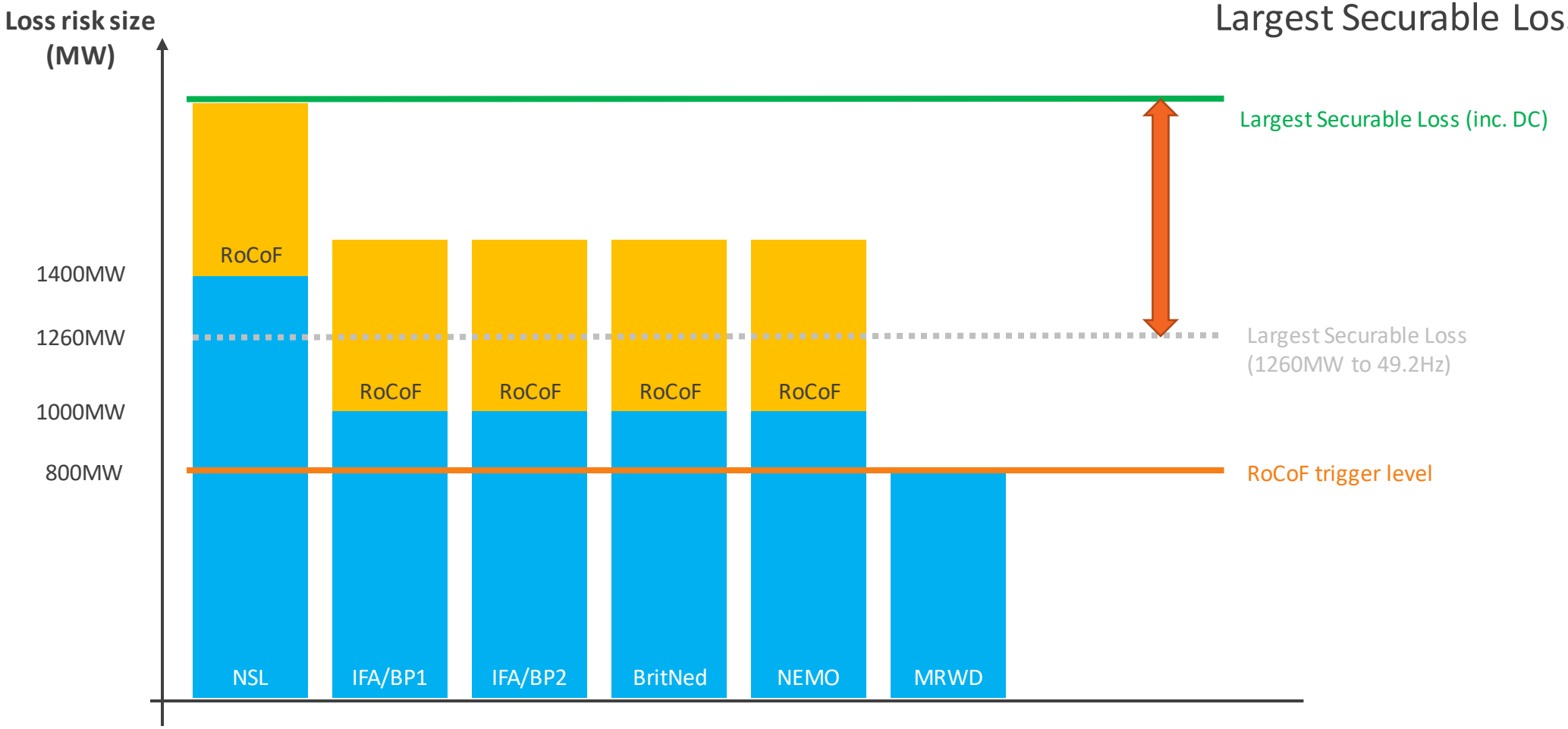
Overview - LF

Existing response (non-DC)



Overview - LF

Dynamic Containment increases the size of the Largest Securable Loss



Overview - LF

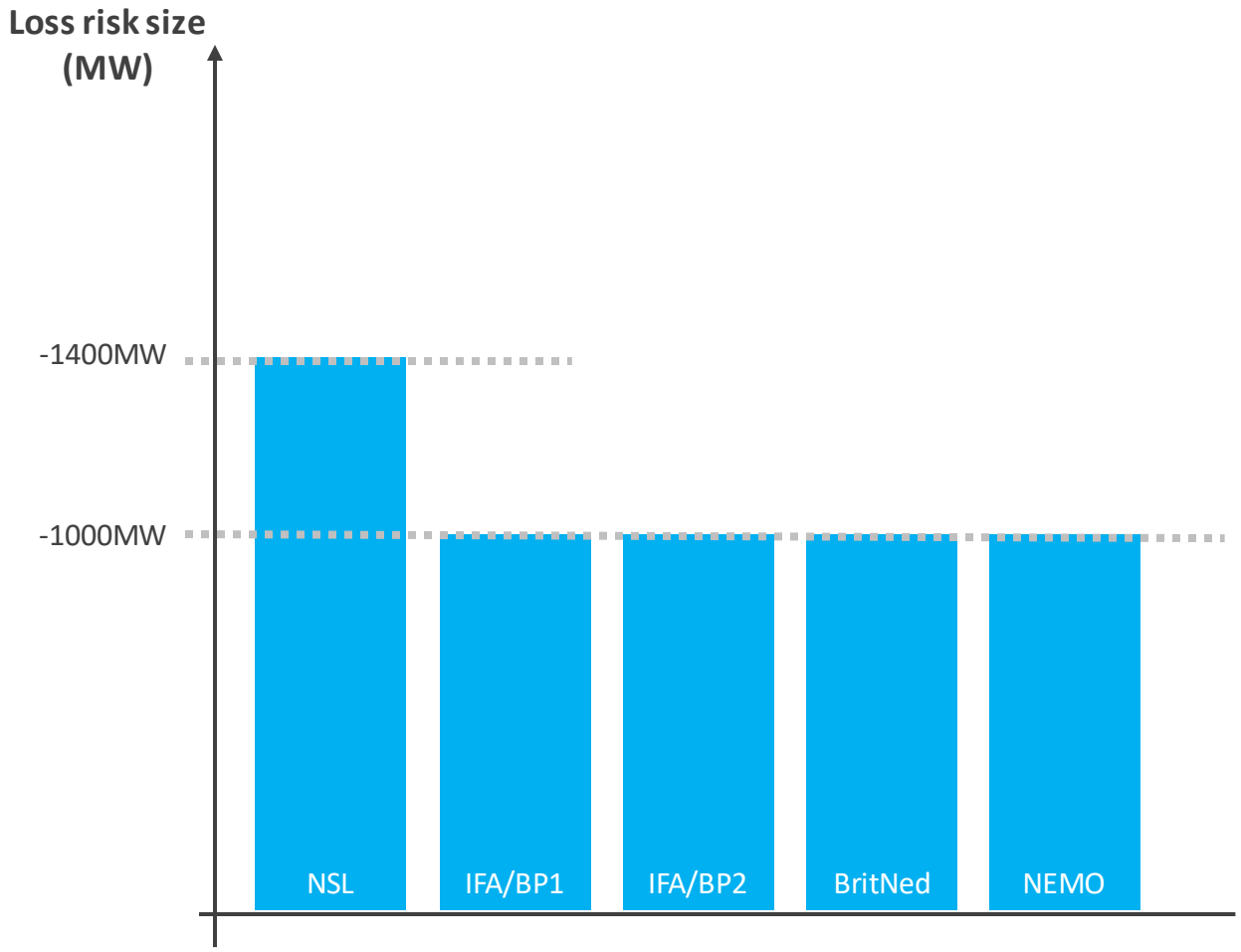
The size of the DC-LF requirement for a given settlement period depends on:

- **Inertia**
- **RoCoF loss**
- Size of operational loss risks
- Volume of non-DC response
- Demand

Overview of HF losses

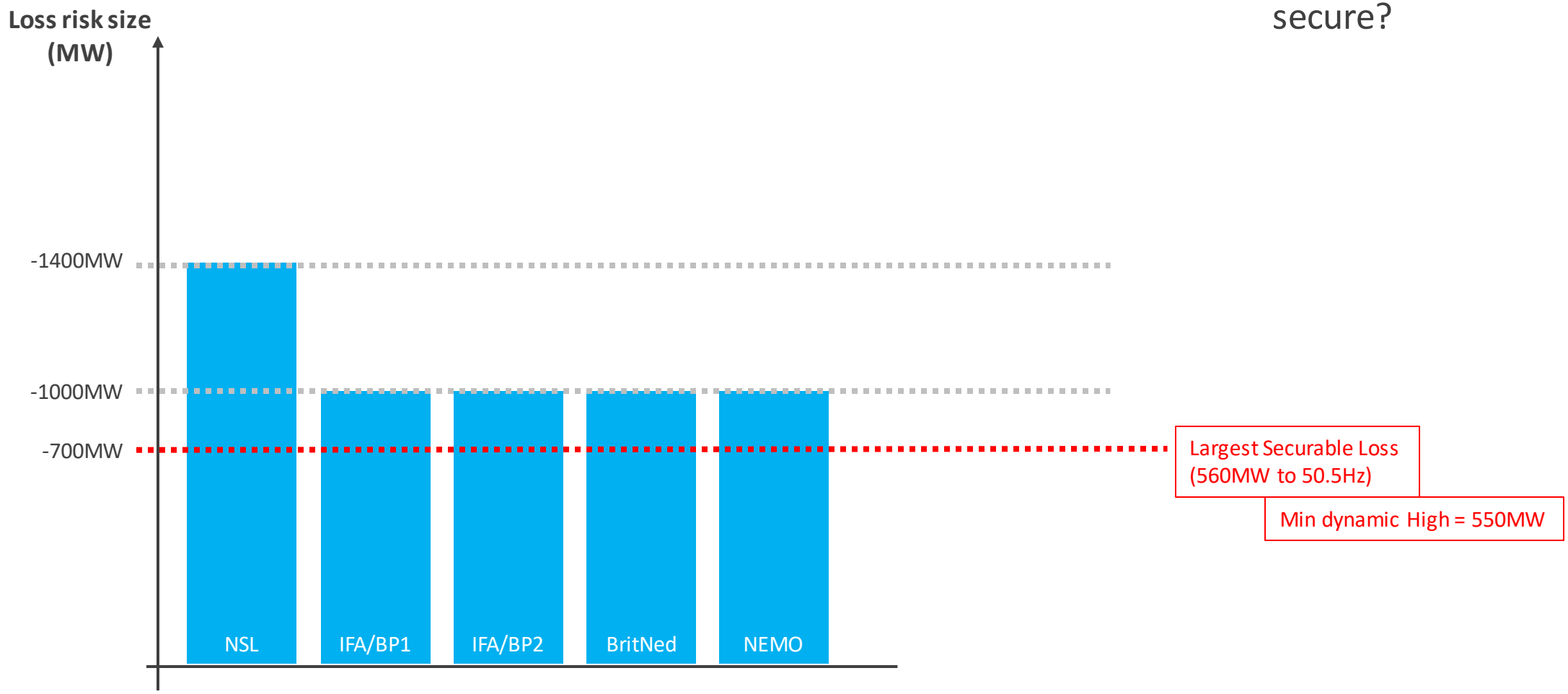
Overview - HF

View of *outfeed* loss risks on the system



Overview - HF

What outfeed loss does existing response secure?



Overview - HF

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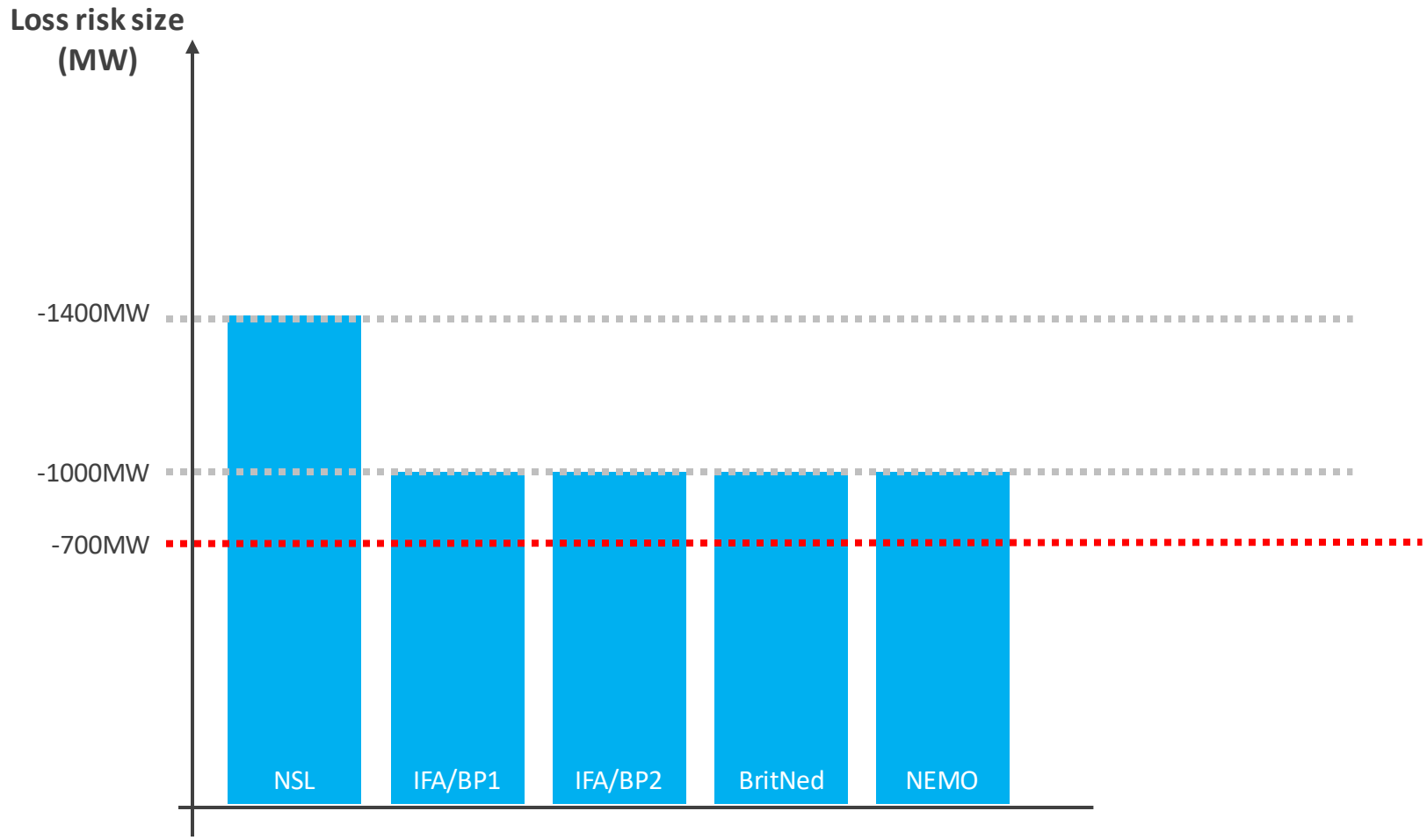
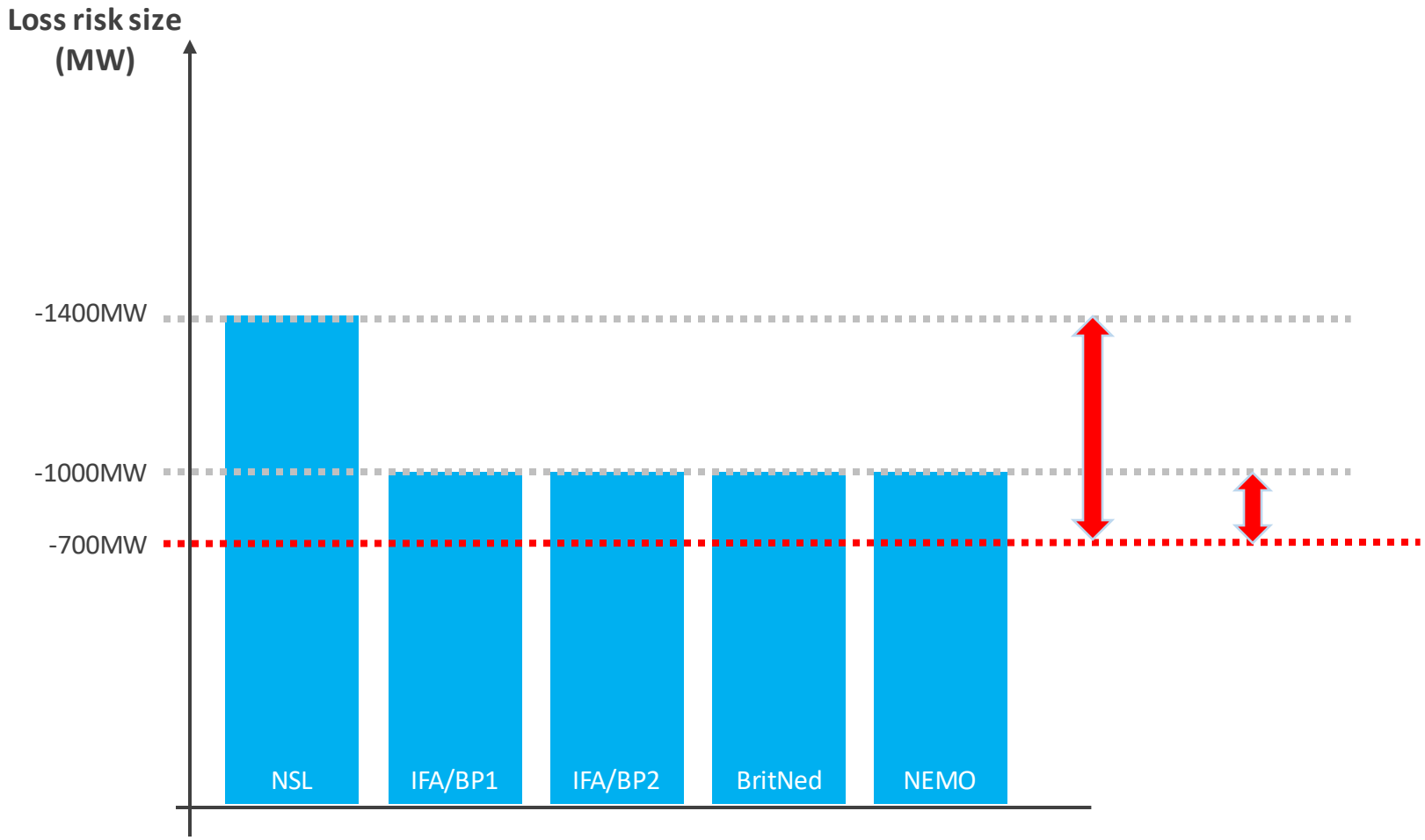


Min High + EFR + Demand >= 700MW

Largest Securable Loss (560MW to 50.5Hz)

Min dynamic High = 550MW

Overview - HF



DC-HF required if large enough outfeed loss exists **> 700MW***

*Can be up to 1000MW at higher demand

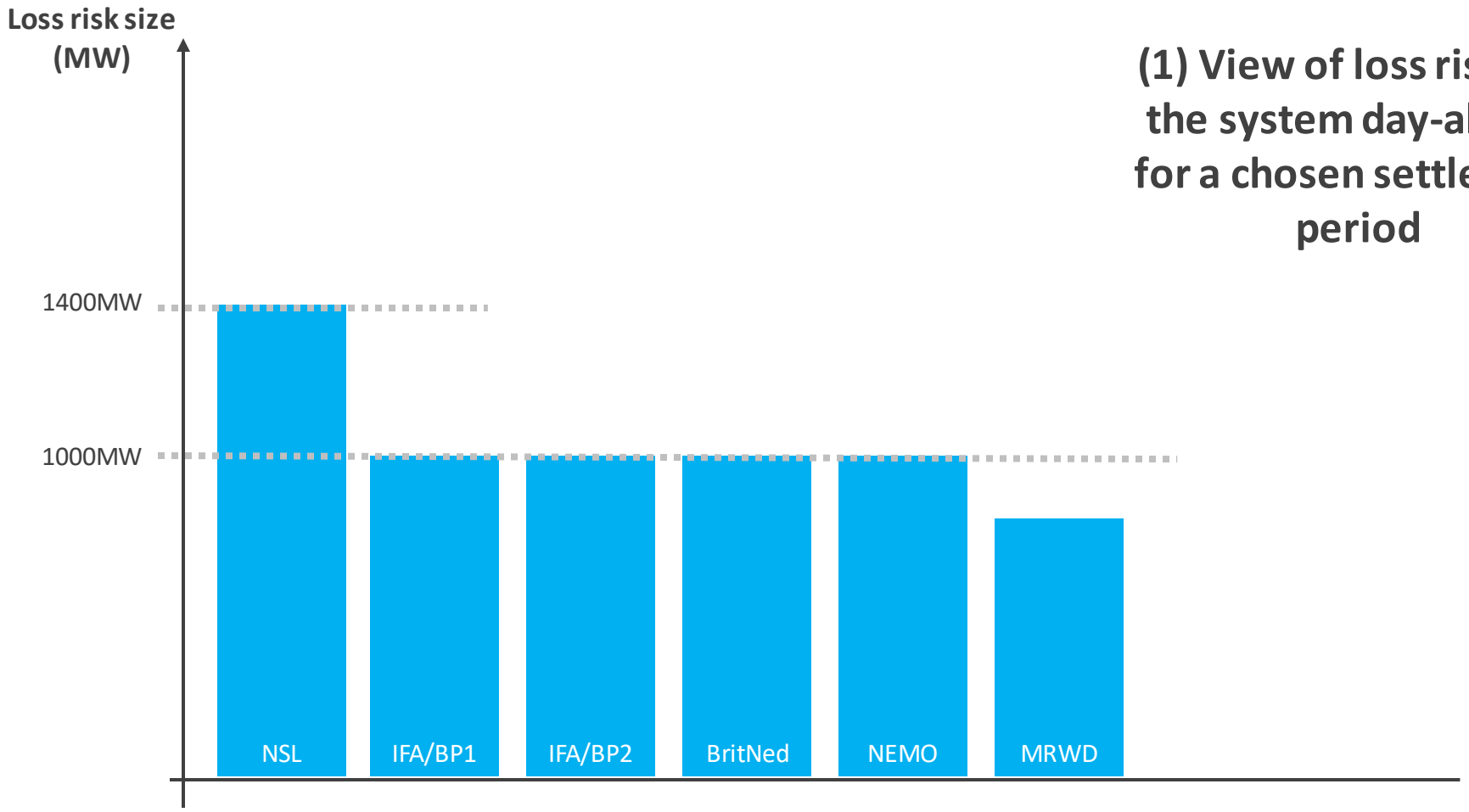
Overview - HF

The size of the DC-HF requirement for a given settlement period depends on:

- Size of operational loss risks
- Demand
- Inertia
- Volume of non-DC response

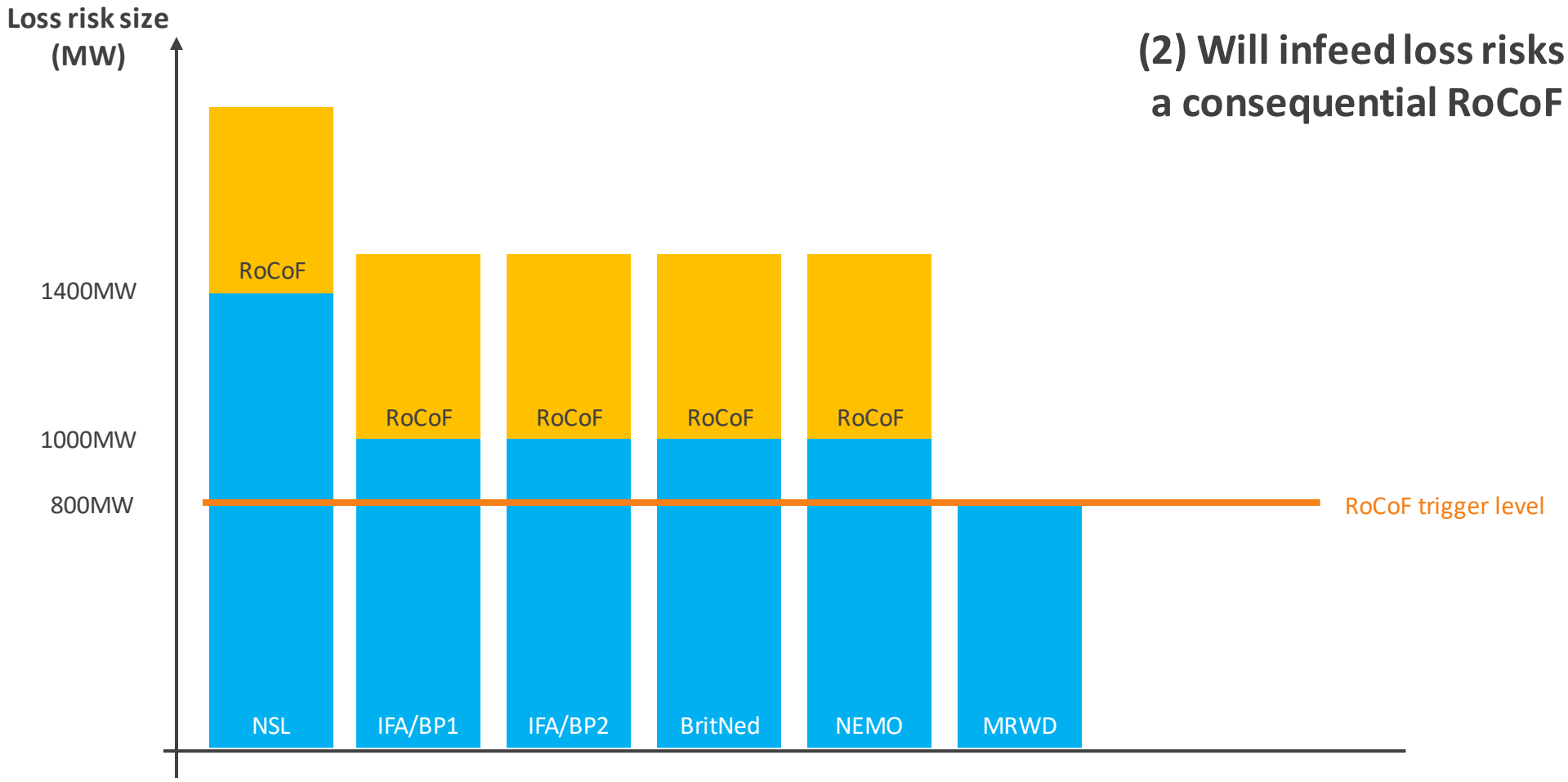
Requirements Calculation Methodology

Overview - LF



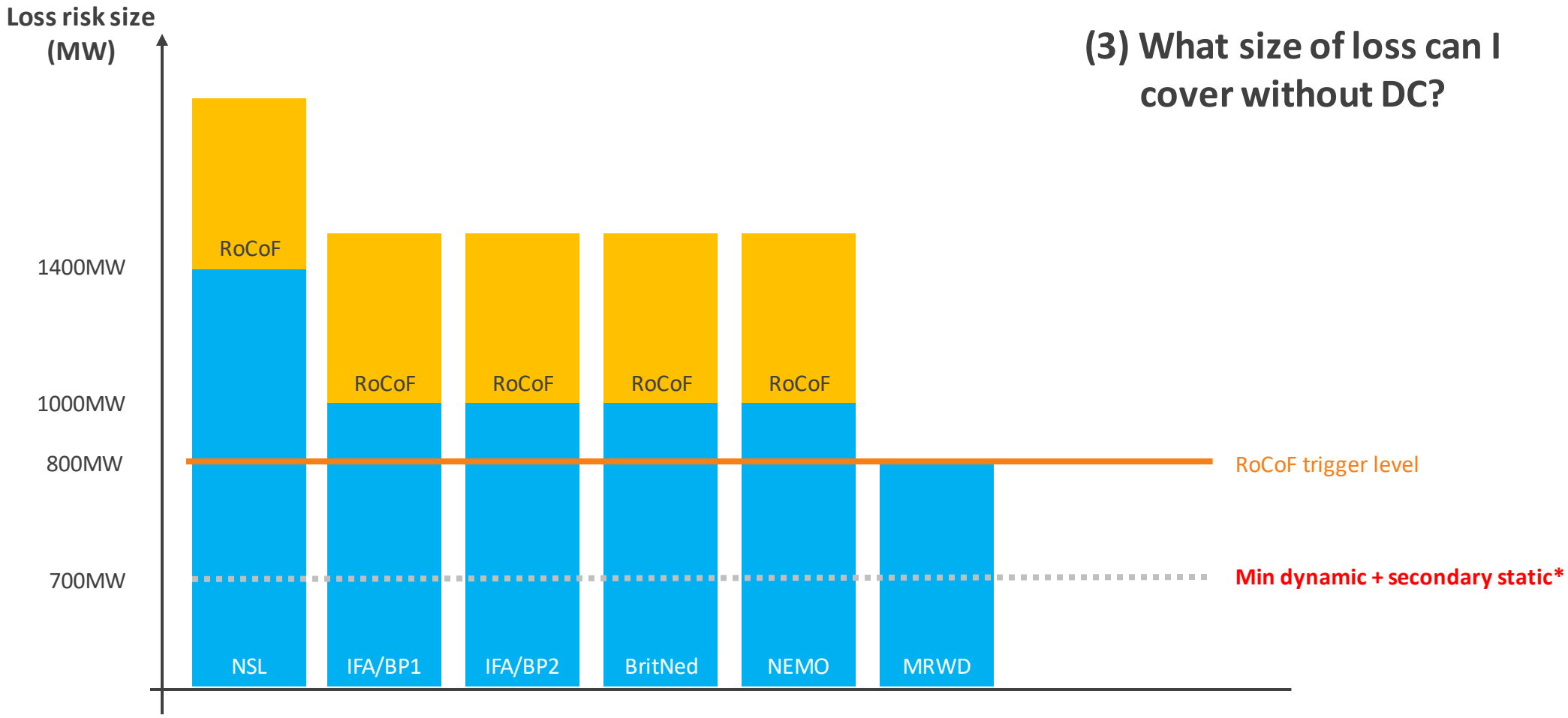
(1) View of loss risks on the system day-ahead, for a chosen settlement period

Overview - LF



(2) Will infeed loss risks cause a consequential RoCoF loss?

Overview - LF

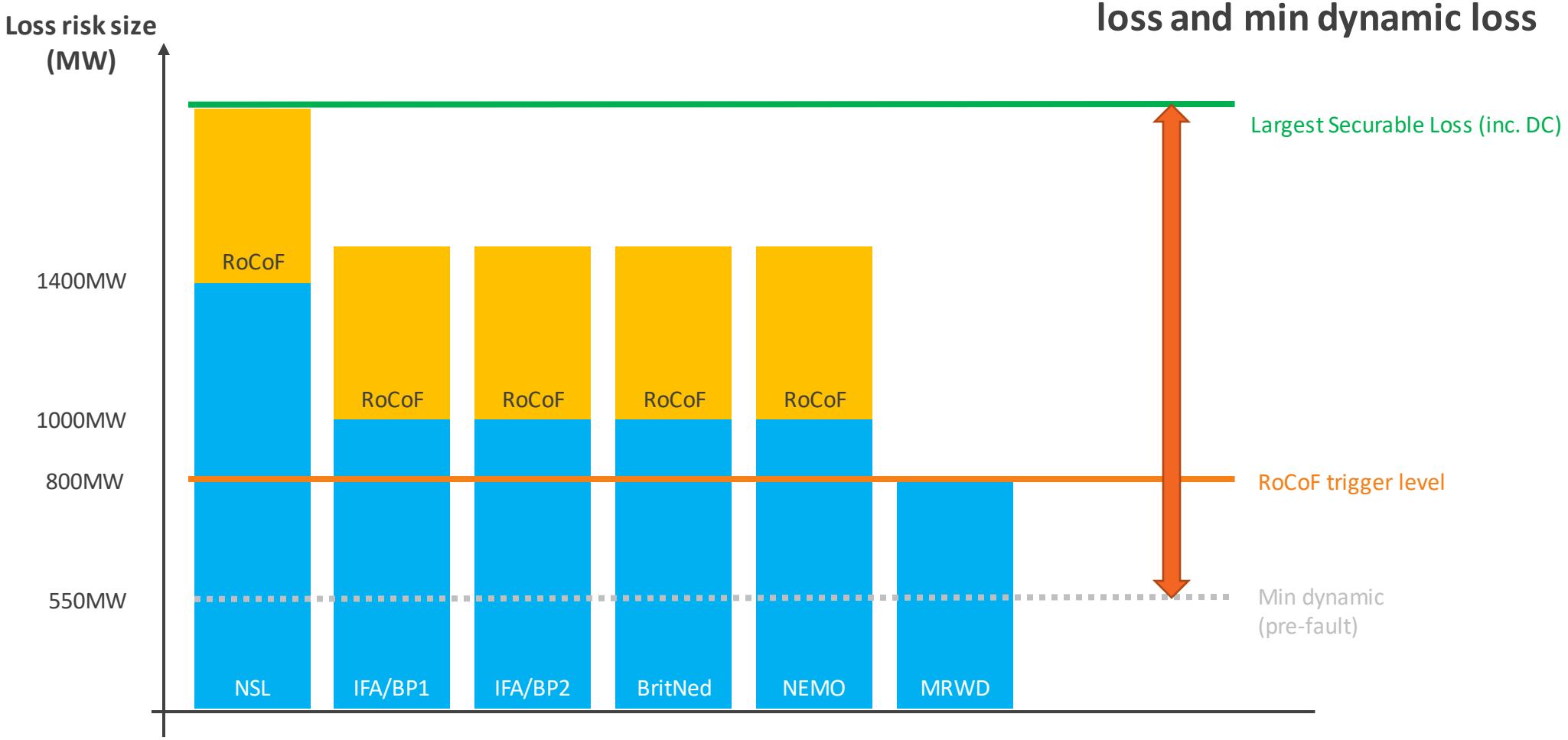


(3) What size of loss can I cover without DC?

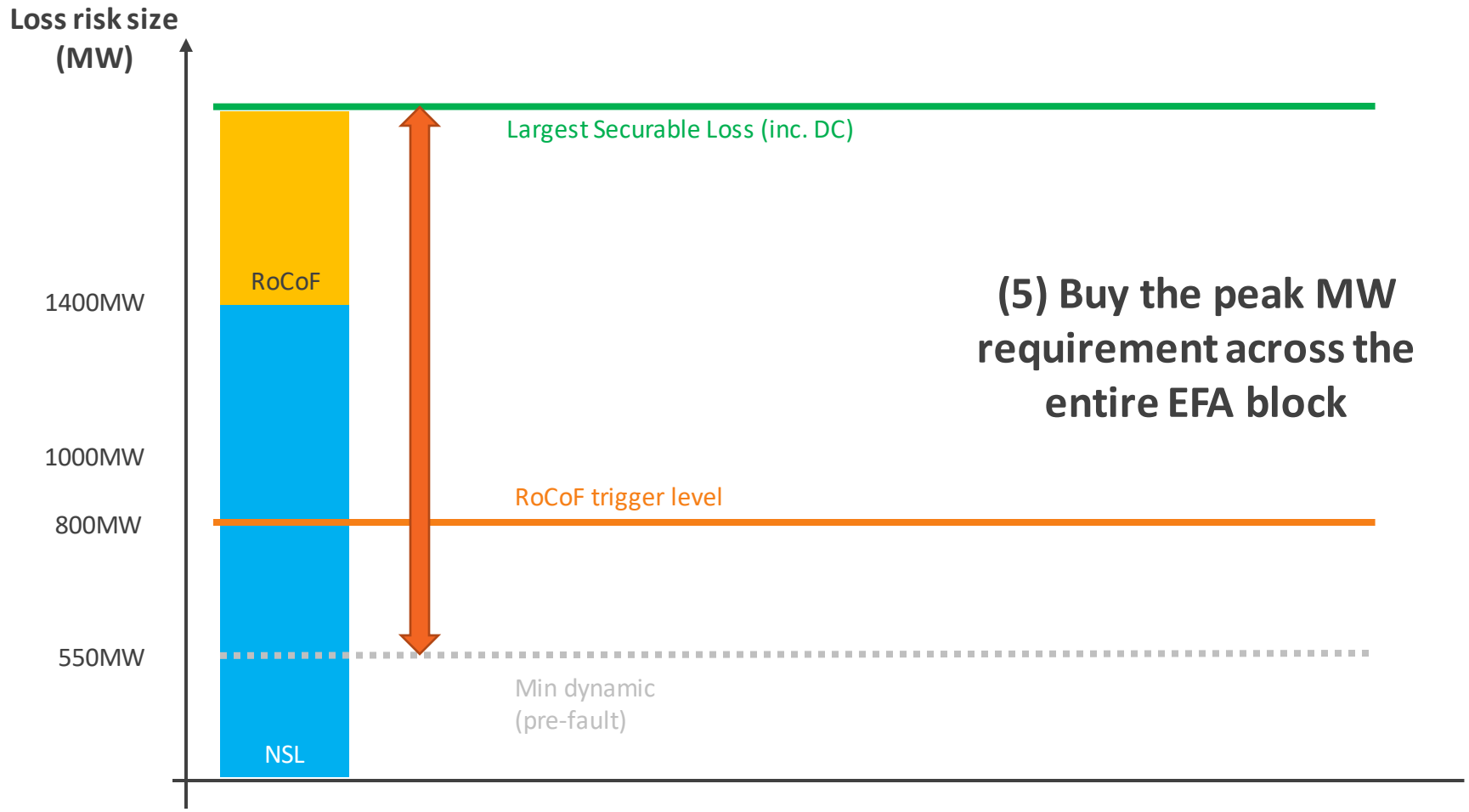
*Procuring min dynamic PSH for long term DC requirements view

Overview - LF

(4) Use DC to cover the shortfall between the largest loss and min dynamic loss



Overview - LF


Loss risk size
(MW)
1400MW
1000MW
800MW
550MW
RoCoF
NSL
Largest Securable Loss (inc. DC)
RoCoF trigger level
Min dynamic
(pre-fault)
(5) Buy the peak MW requirement across the entire EFA block

Market Information

December View

The short-term view of DC requirements are based on:

- Using 2019-2021 as historic years, corrected for new connections

Using response, LoM and loss risk assumptions:

- Procuring PSH to cover a **1260MW** loss to 49.2Hz*
- EFR, fast and slow static included
- Updated LoM RoCoF capacities at 0.125Hz/s and 0.200Hz/s
- NSL limited to 700MW in both directions

Procured via DC auction on EPEX:

- Procuring at EFA block granularity

*In coming months the ESO will transition to buying DC based on procurement of min PSH (550MW)

DC-LF December 2021 forecast

DC-low		EFA						
From (MW)	To (MW)	1	2	3	4	5	6	All-day
0	0	0%	0%	19%	32%	42%	0%	16%
1	300	0%	0%	29%	19%	39%	45%	22%
301	600	29%	35%	32%	35%	16%	35%	31%
601	900	65%	58%	16%	10%	3%	19%	28%
901	1200	6%	6%	3%	3%	0%	0%	3%
1201	1500	0%	0%	0%	0%	0%	0%	0%
1501		100%	100%	100%	100%	100%	100%	100%

DC-HF December 2021 forecast

DC-high		EFA						
From (MW)	To (MW)	1	2	3	4	5	6	All-day
0	0	97%	100%	100%	100%	100%	100%	99%
1	300	0%	0%	0%	0%	0%	0%	0%
301	600	3%	0%	0%	0%	0%	0%	1%
601	900	0%	0%	0%	0%	0%	0%	0%
901	1200	0%	0%	0%	0%	0%	0%	0%
1201	1500	0%	0%	0%	0%	0%	0%	0%
1501		100%	100%	100%	100%	100%	100%	100%

DC-LF
12 Month View

Long term view

The long-term view of DC requirements are based on:

- Using 2019-2021 as historic years, corrected for new connections

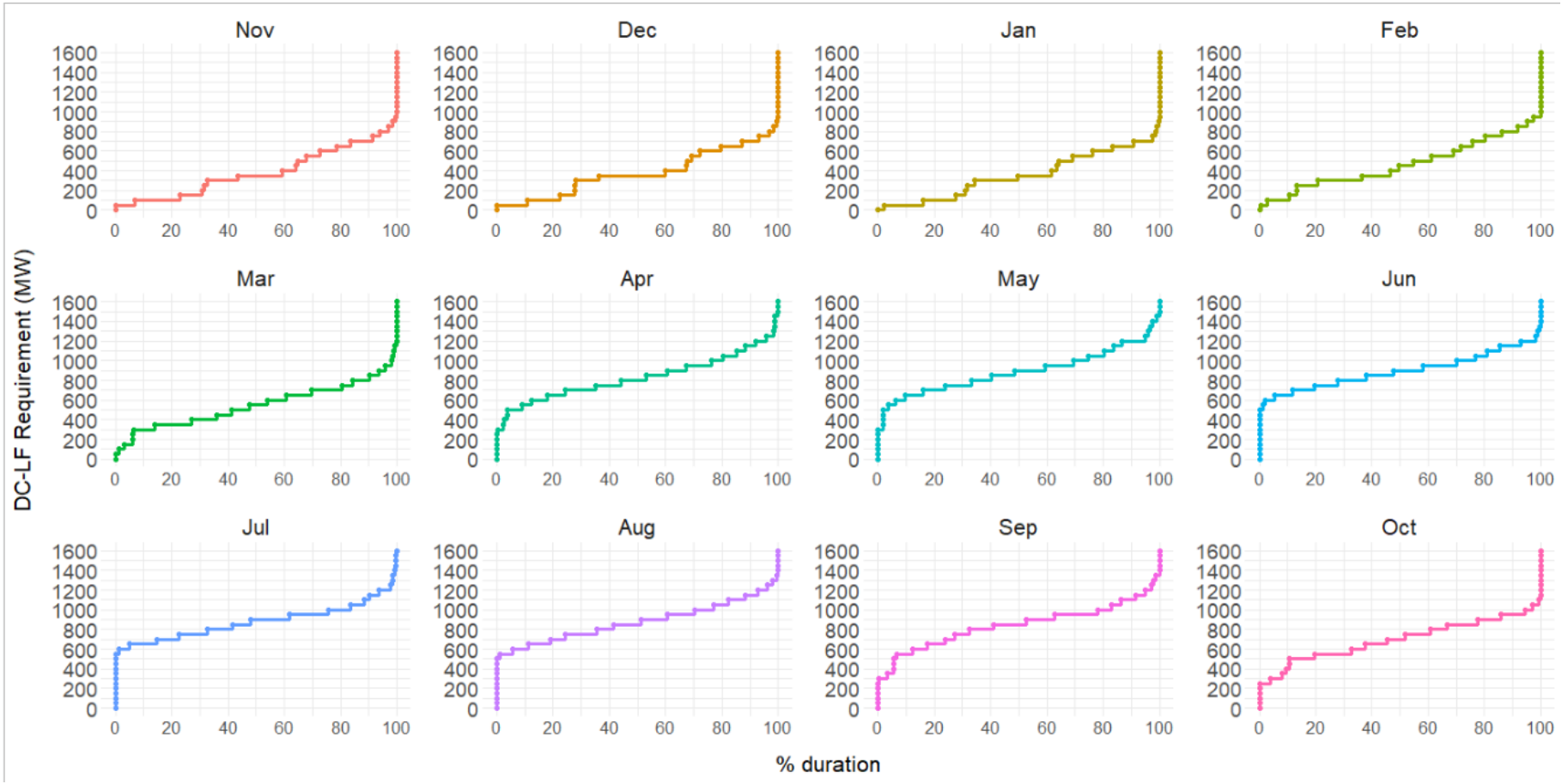
Using response, LoM and loss risk assumptions:

- Procuring min dynamic PSH of **550MW**
- EFR completing in April 2022
- No fast static from 2022, retaining slow static service
- Updated LoM RoCoF capacities at 0.125Hz/s and 0.200Hz/s
- NSL limited to 700MW in both directions till Jan 2022, then release of 200MW per month until April 2022

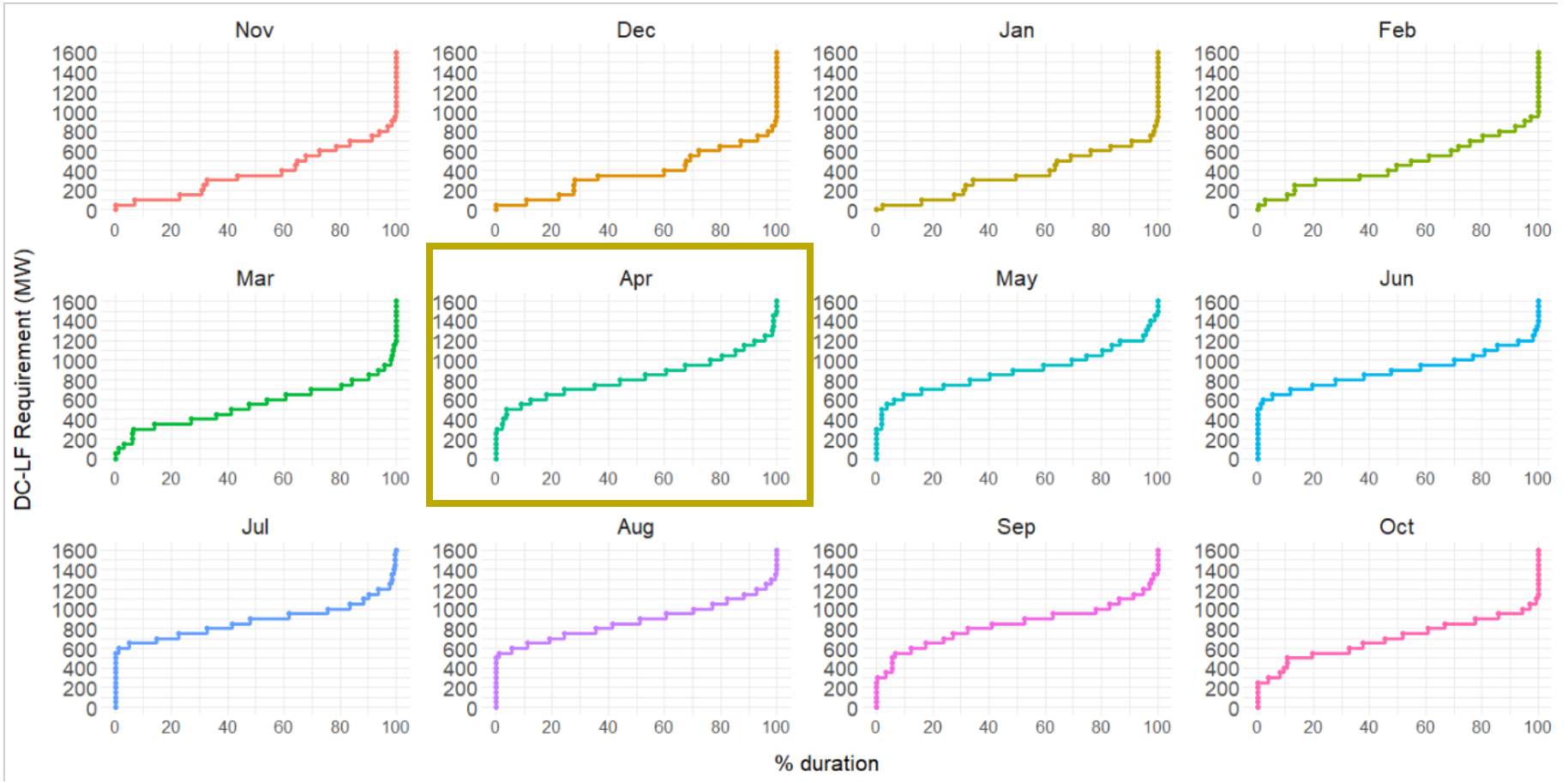
Procured via DC auction on EPEX:

- Procuring at EFA block granularity

DC-LF Requirements forecast - 12 Month View



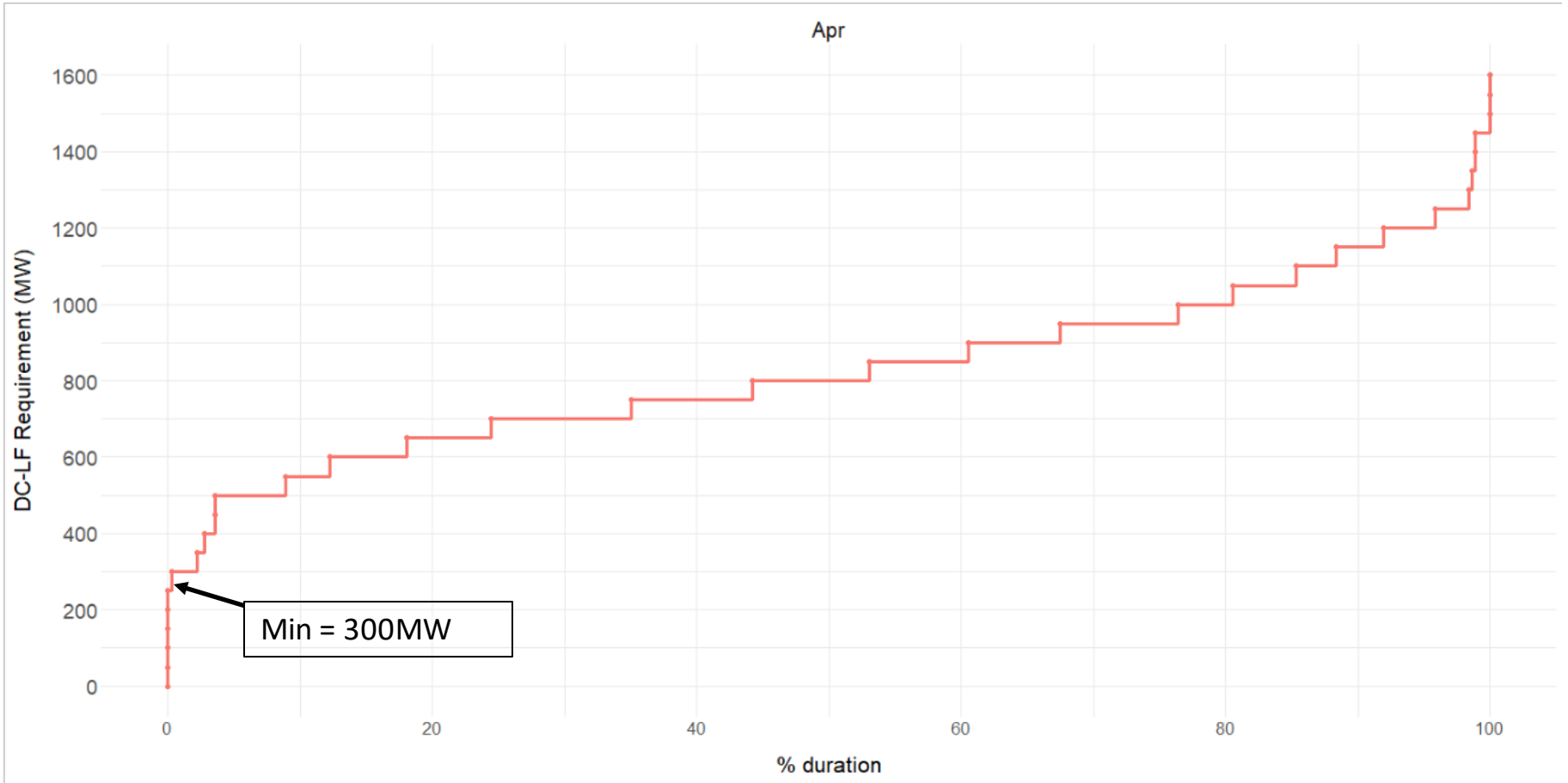
DC-LF Requirements forecast - 12 Month View



April assumptions:

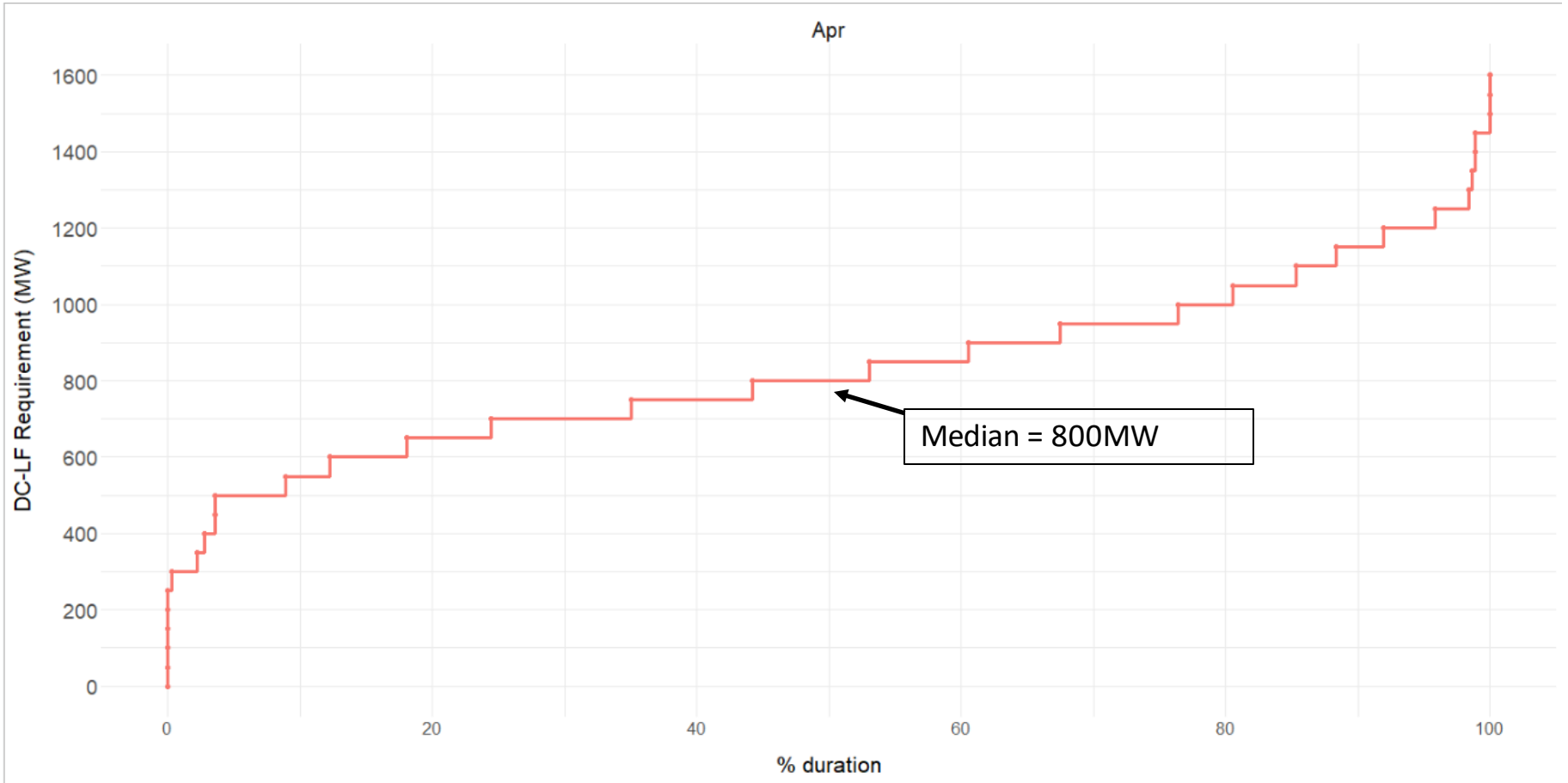
- NSL full 1400MW capacity
- EFR = 0MW
- PSH = 550MW

DC-LF Requirements forecast - April



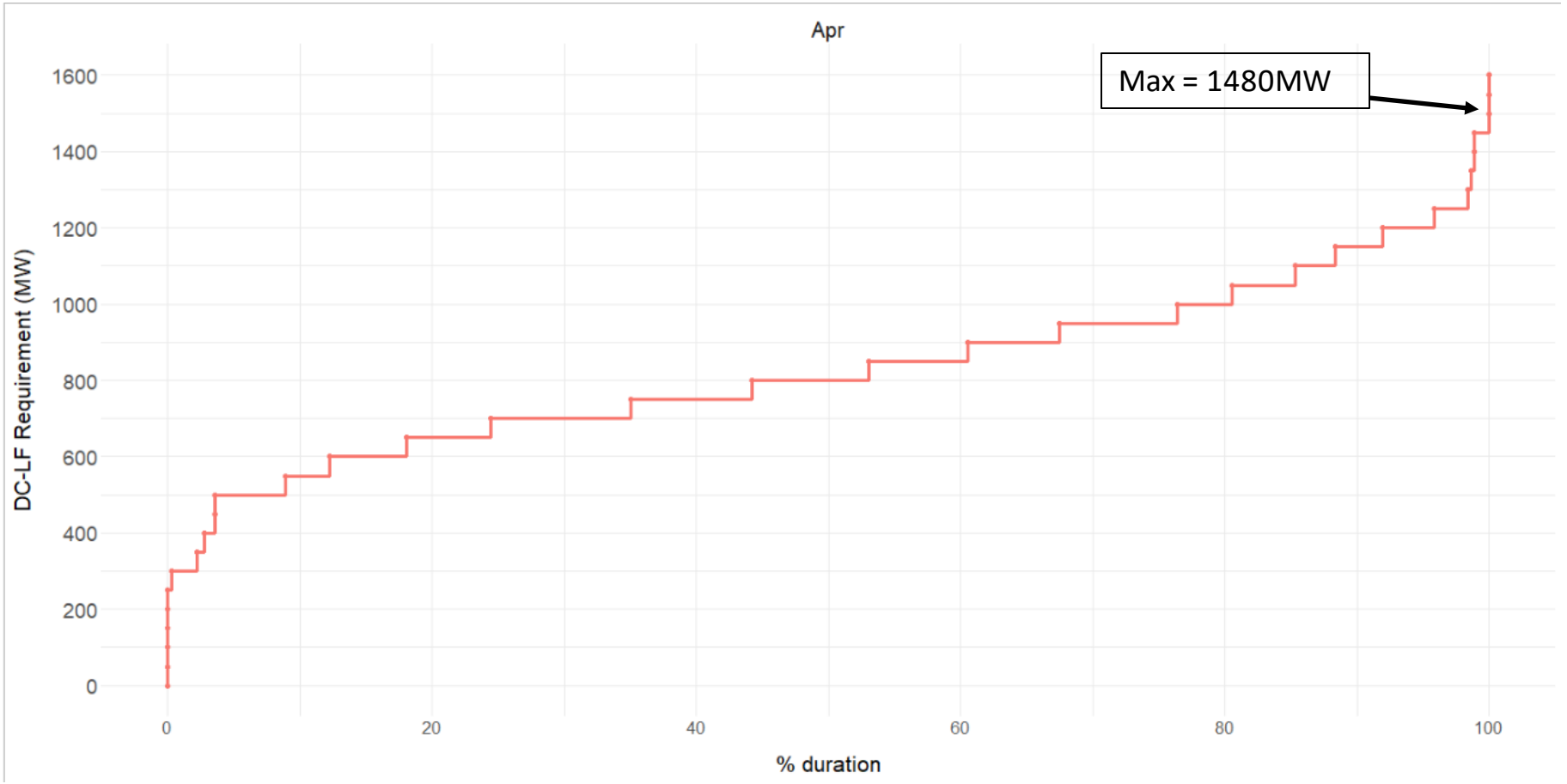
Or, 100% of settlement periods have a DC-LF requirements > 300MW

DC-LF Requirements forecast - April



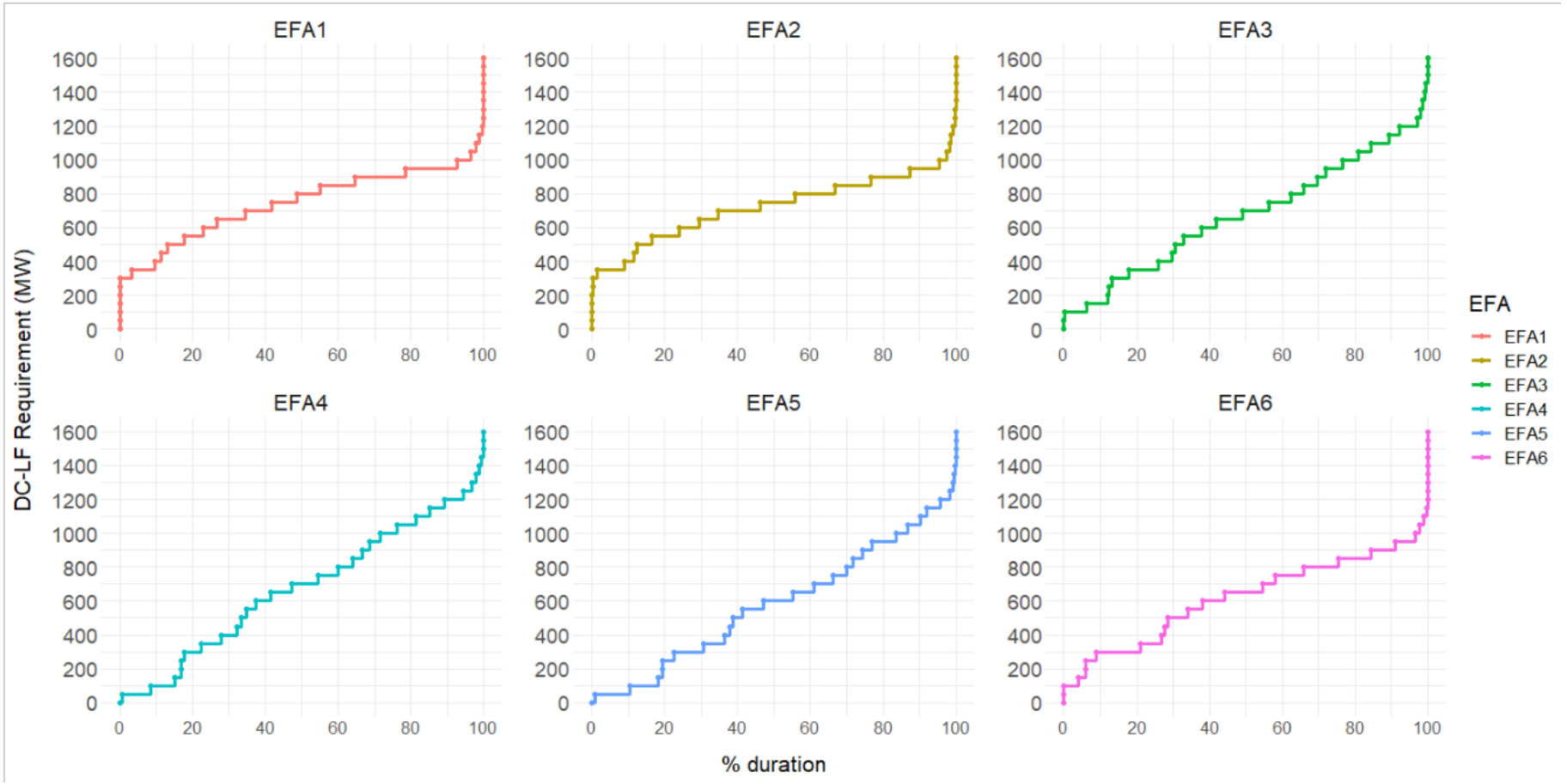
Or, 50% of settlement periods have a DC-LF requirements > 800MW

DC-LF Requirements forecast - April

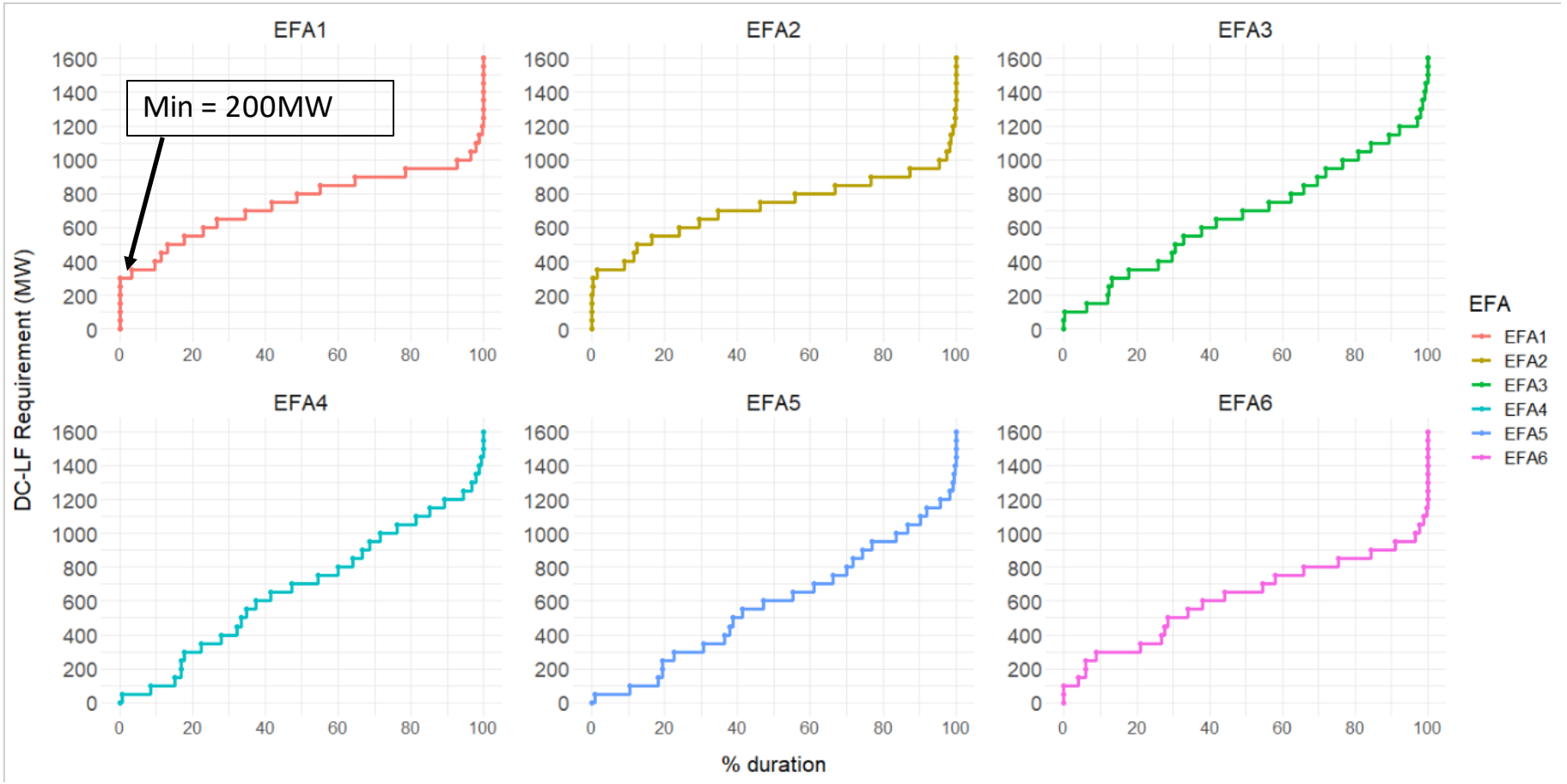


Or, 100% of settlement periods have a DC-LF requirements < 1480MW

DC-LF Requirements forecast - EFA block



DC-LF Requirements forecast - EFA block



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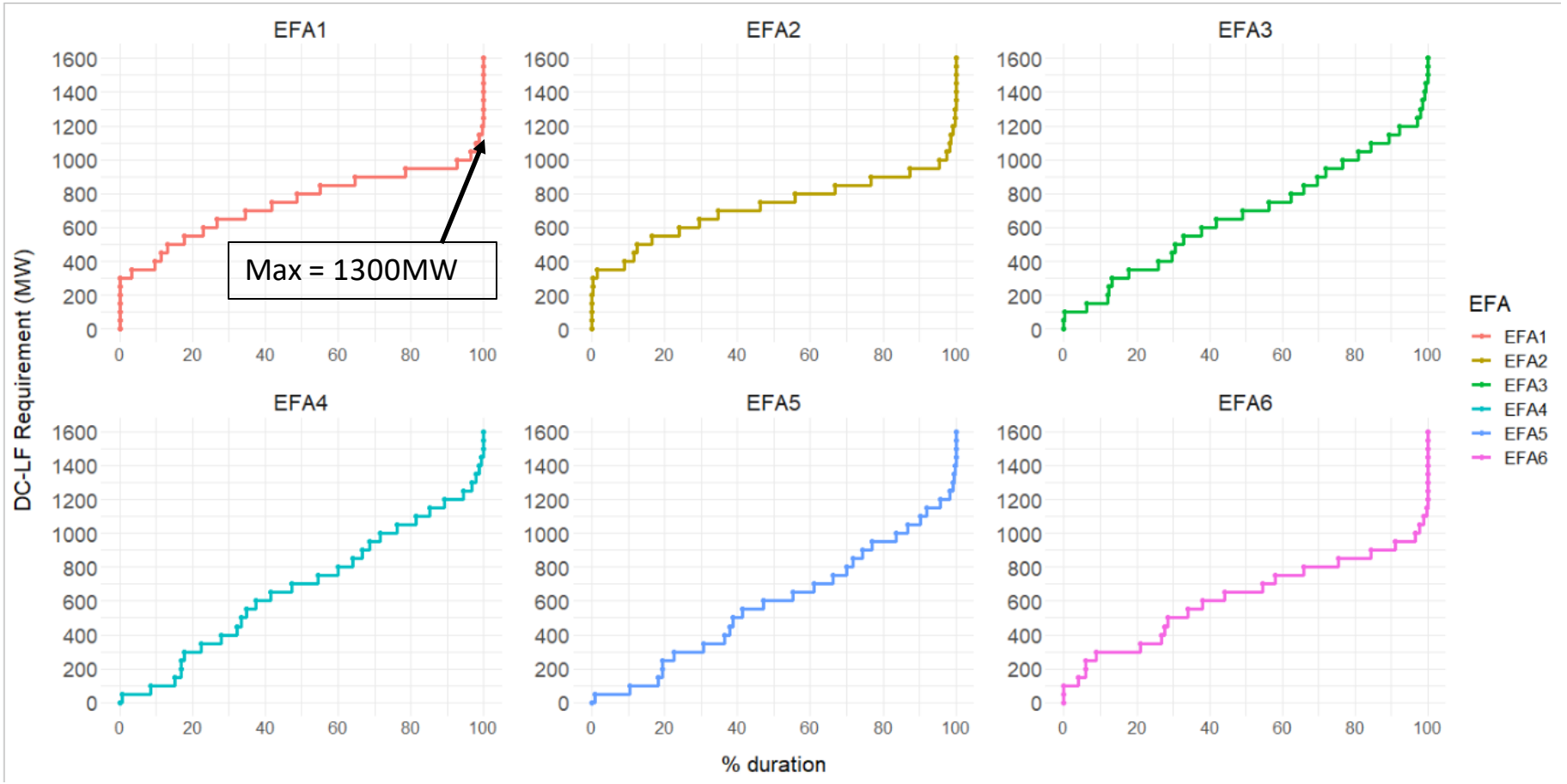

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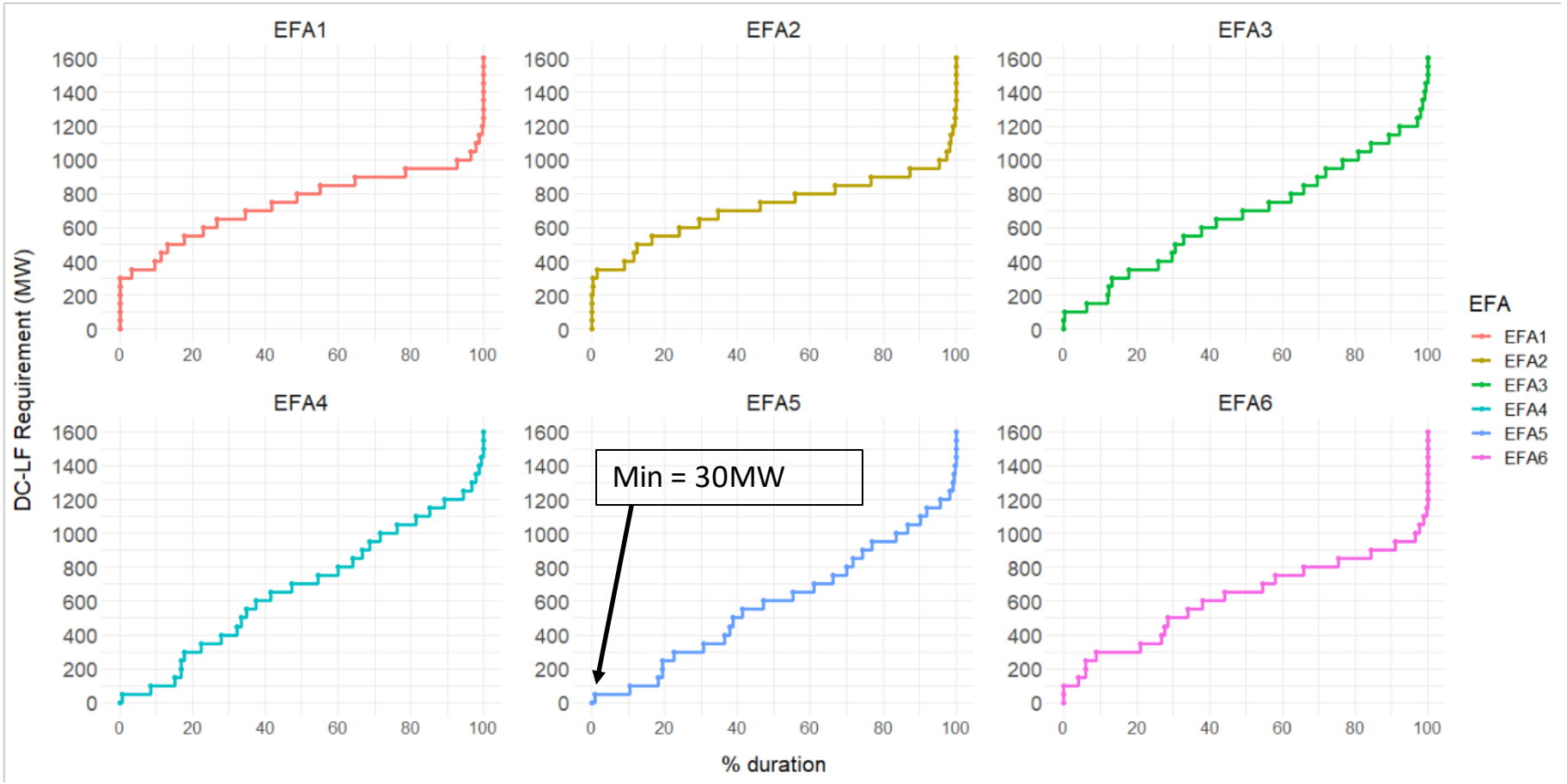
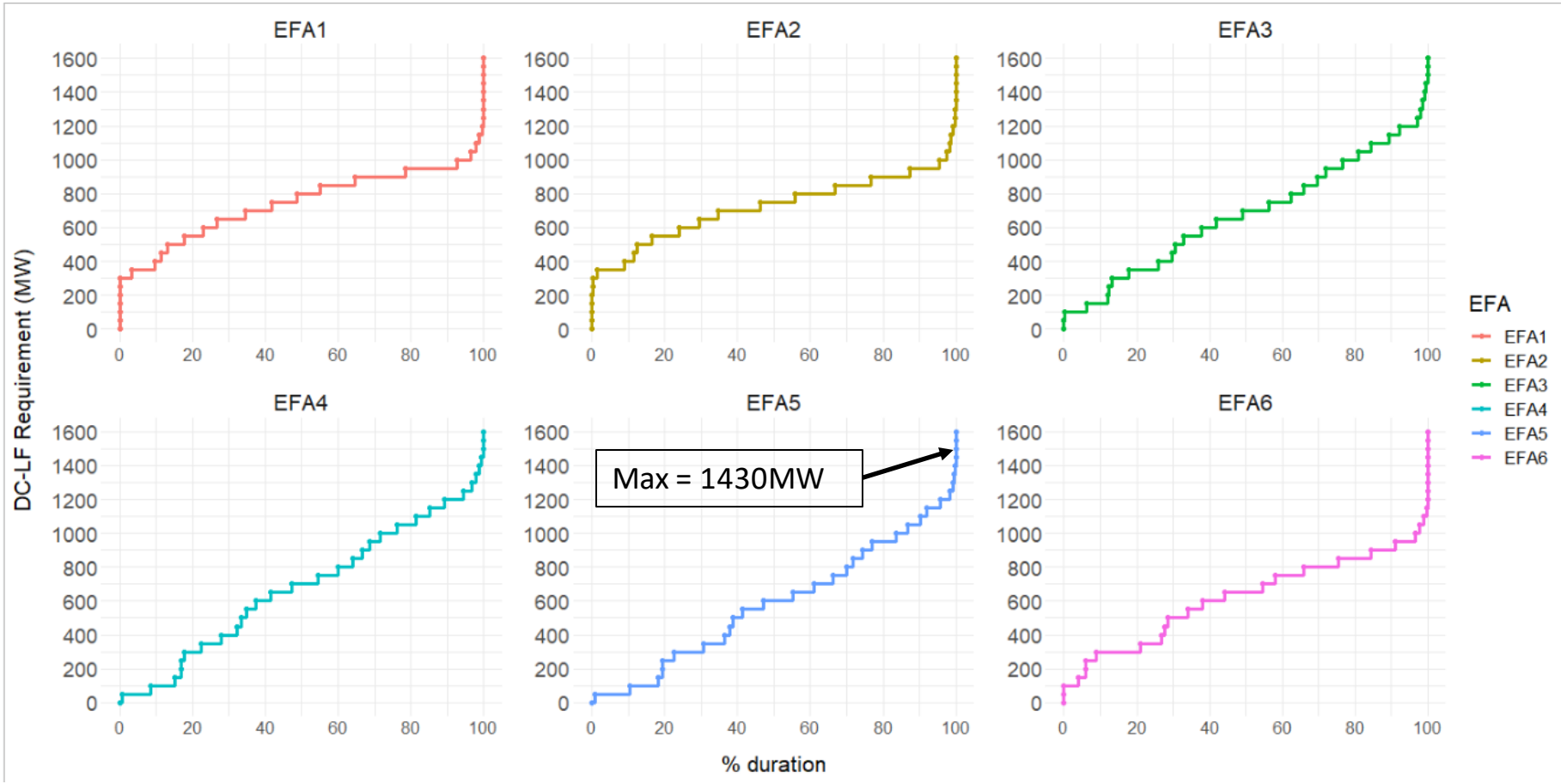
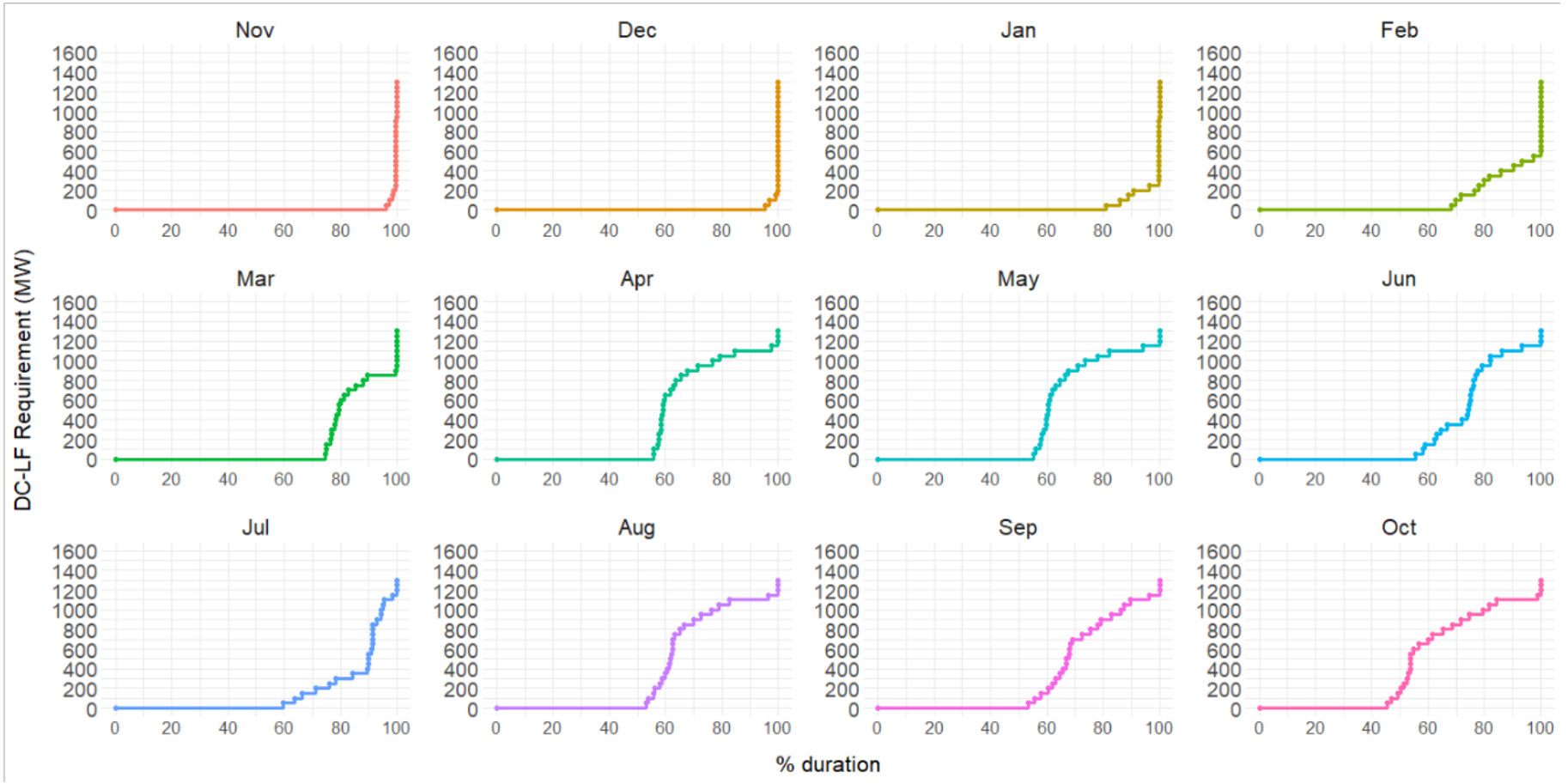


DC-LF Requirements forecast - EFA block

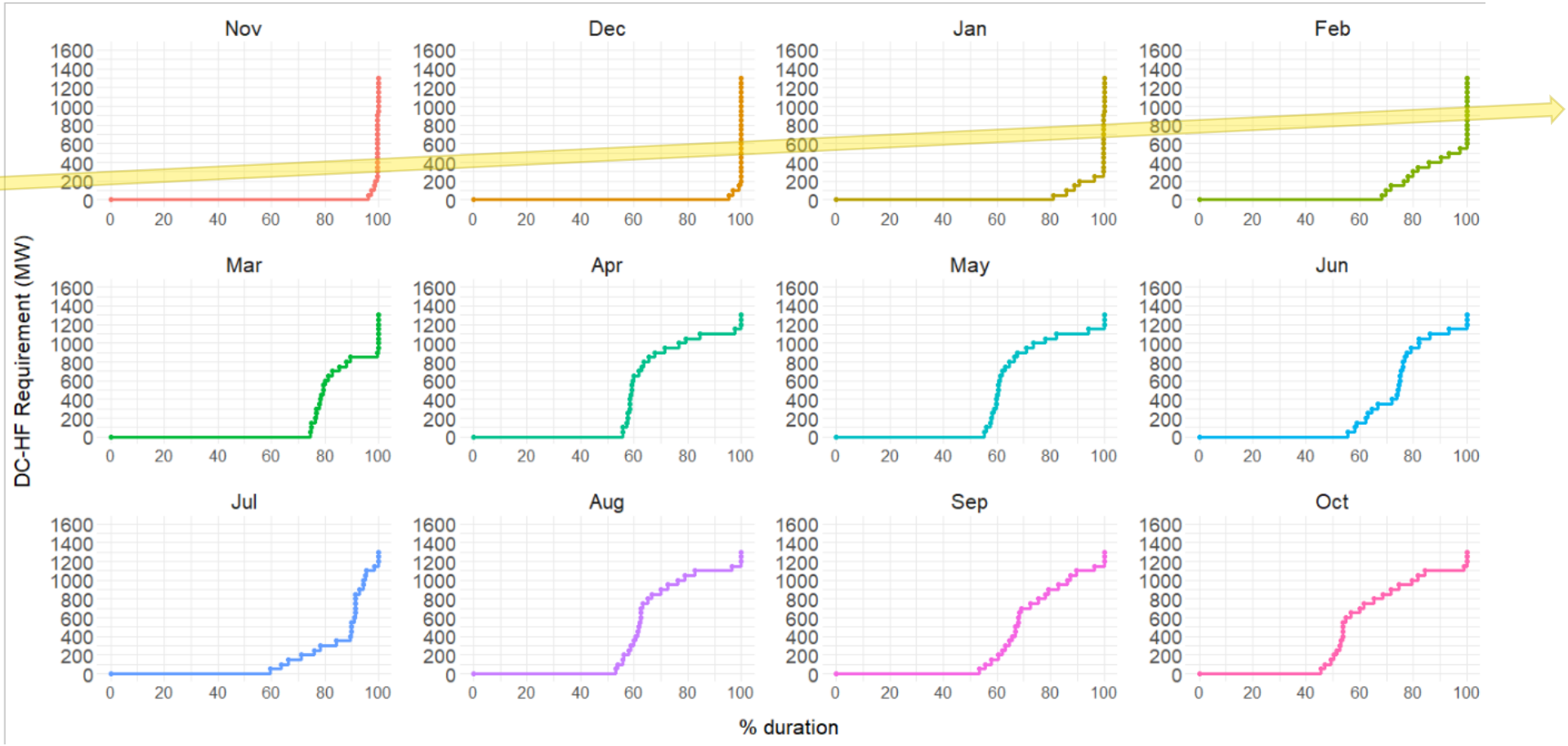


DC-HF
12 Month View

DC-HF Requirements forecast -12 Month View



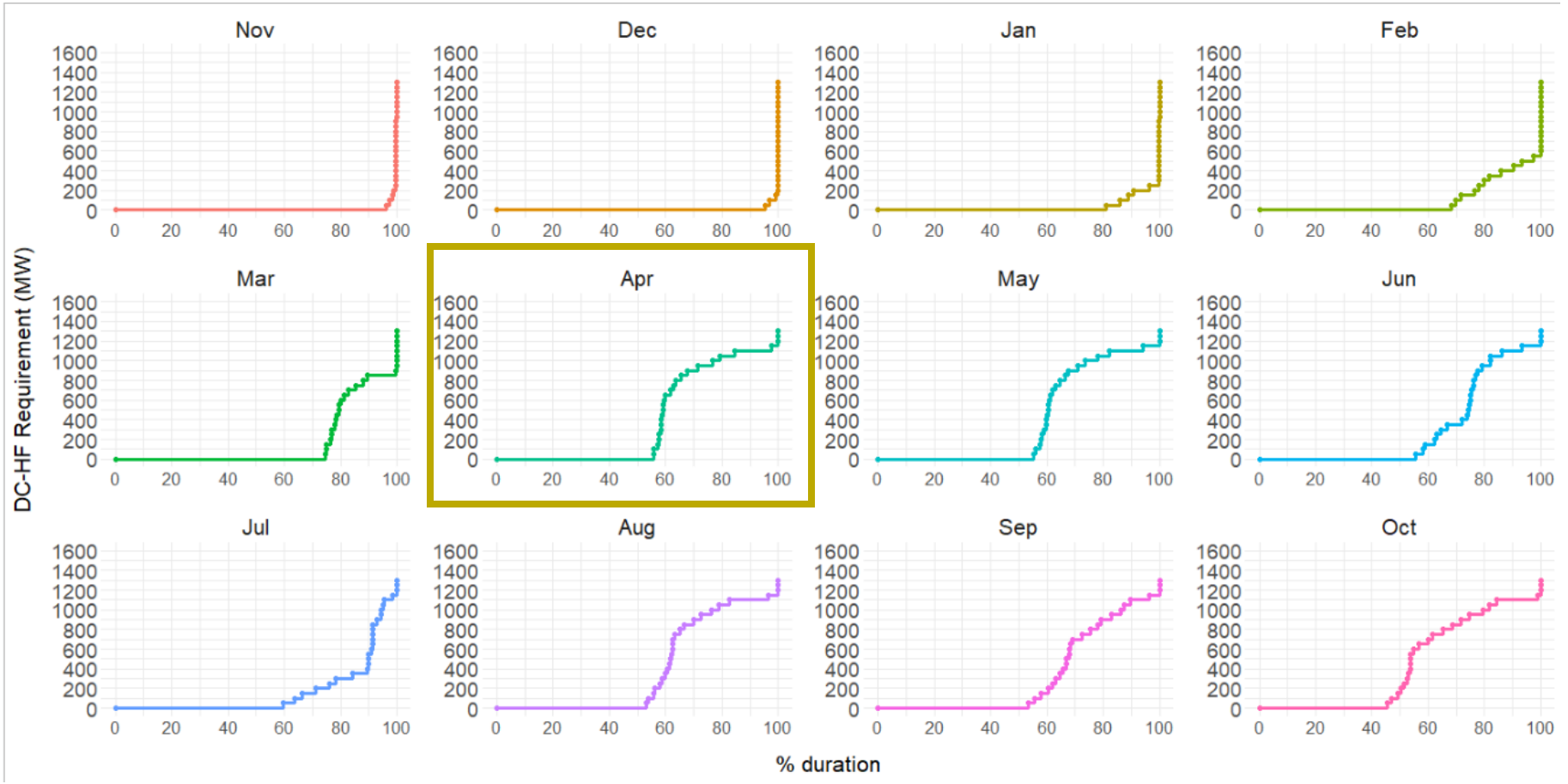
DC-HF Requirements forecast - 12 Month View



Increase in DC-HF volume requirements from Nov – Apr

Due to gradual release of NSL capacity

DC-HF Requirements forecast -12 Month View



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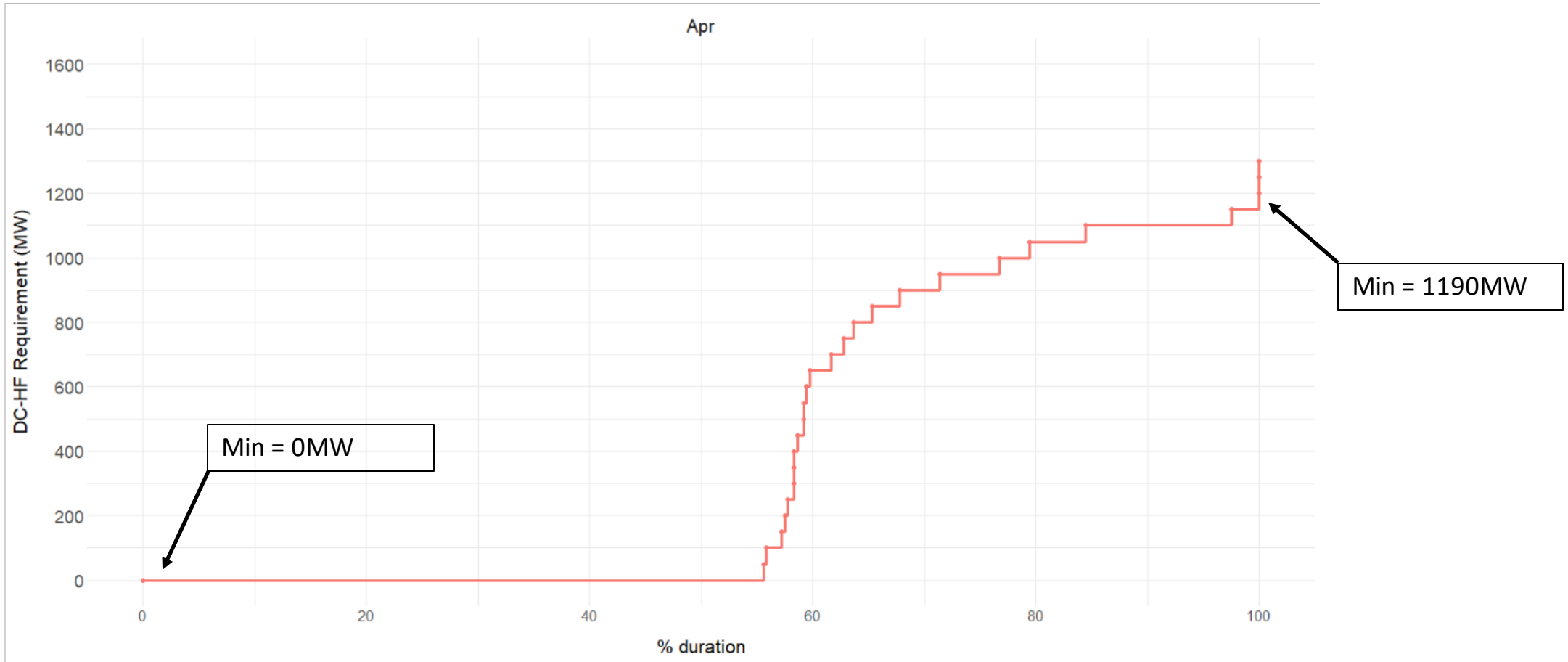
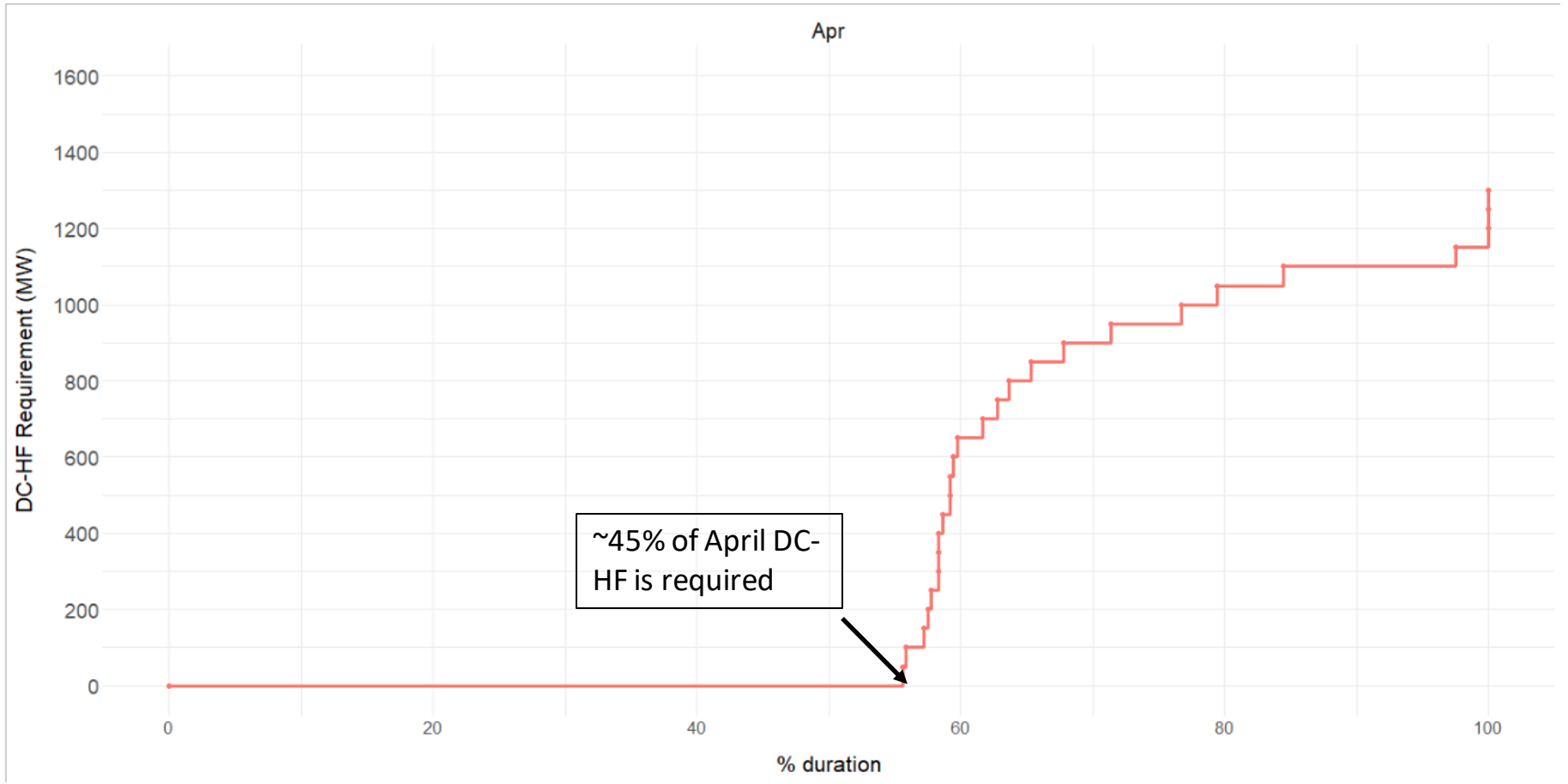
DC-HF Requirements forecast - April

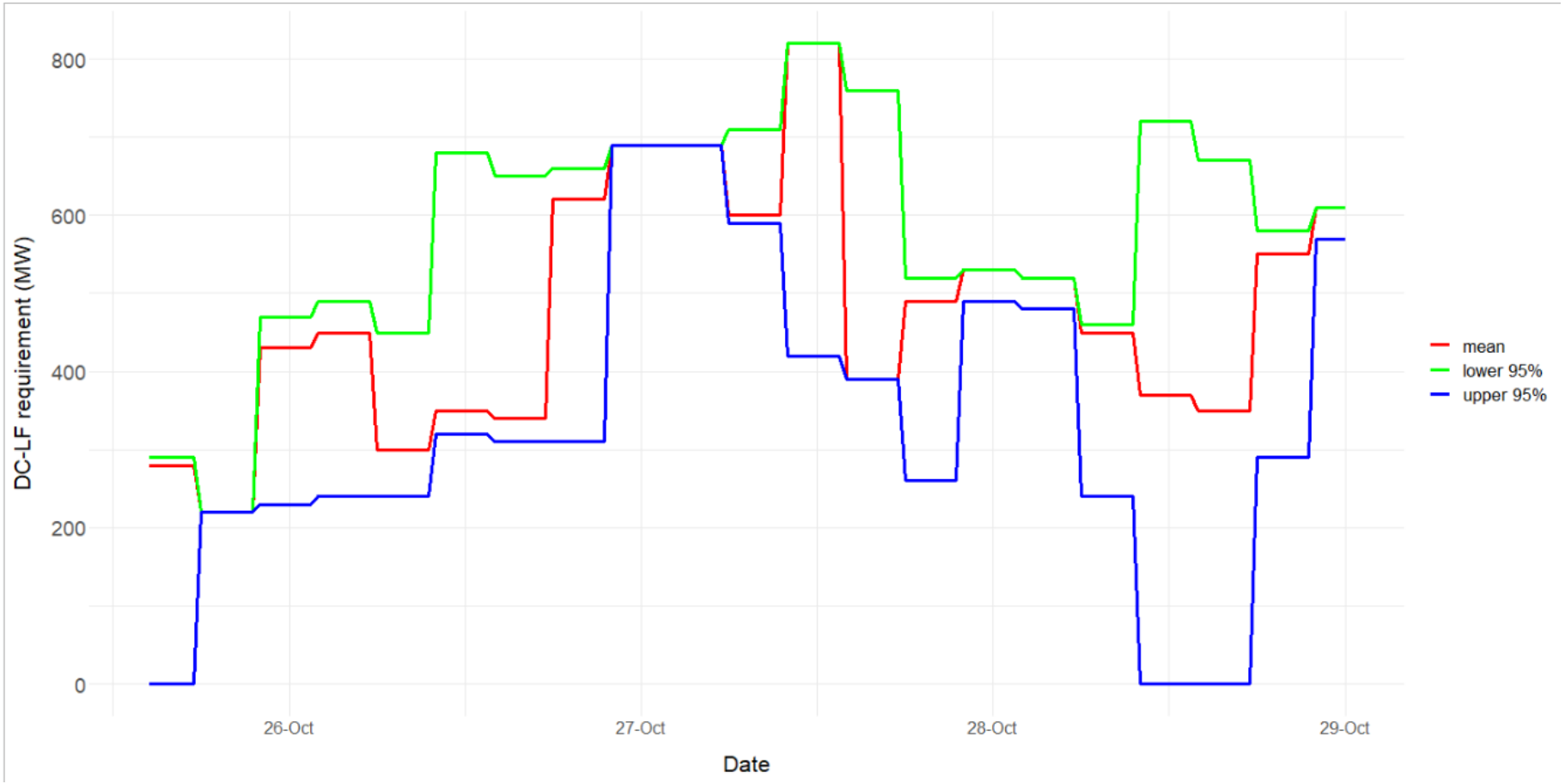


DC-HF Requirements forecast - April



4-Day view

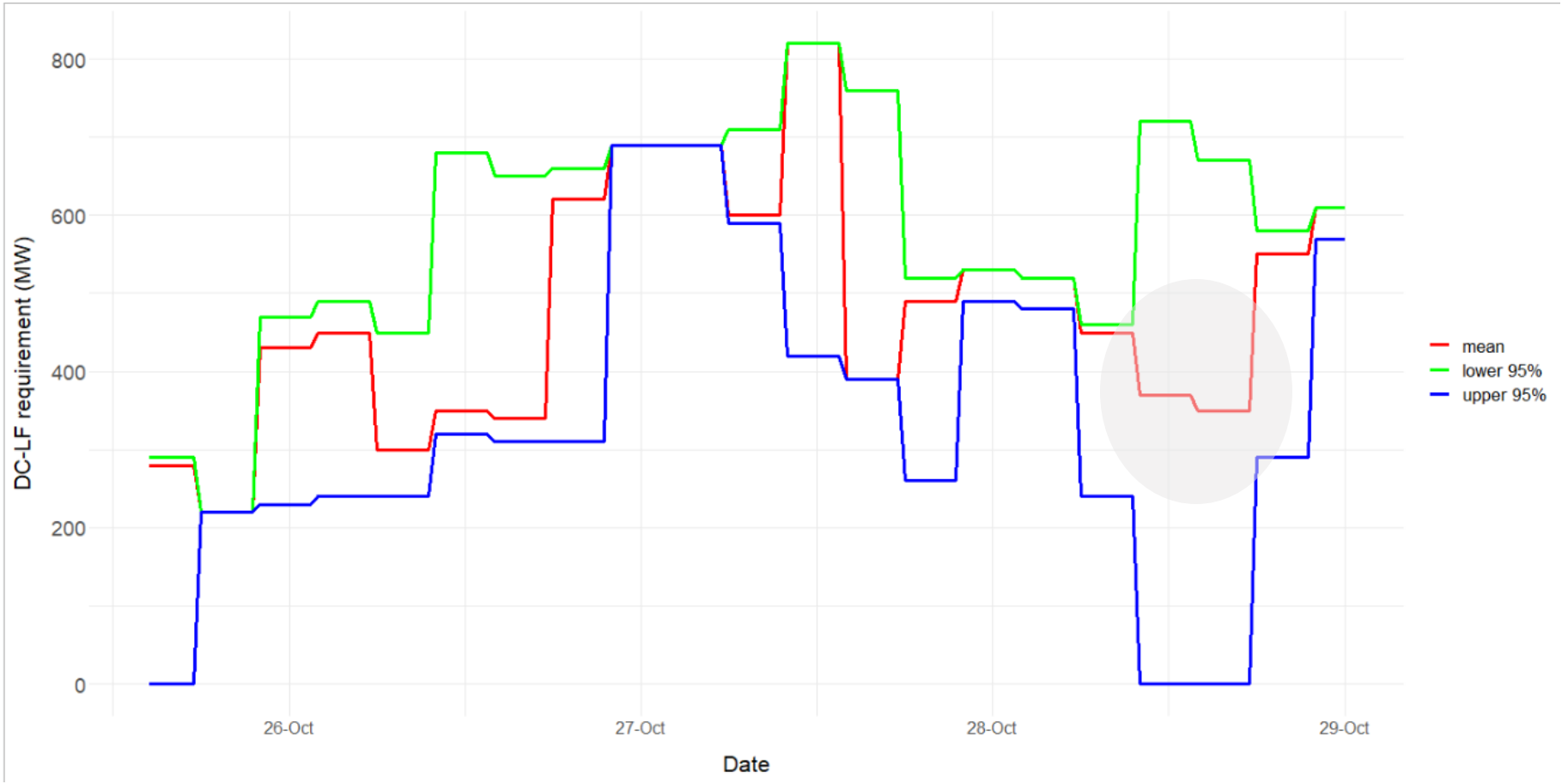
DC-LF 4-day ahead forecast



4-day view of DC-LF:

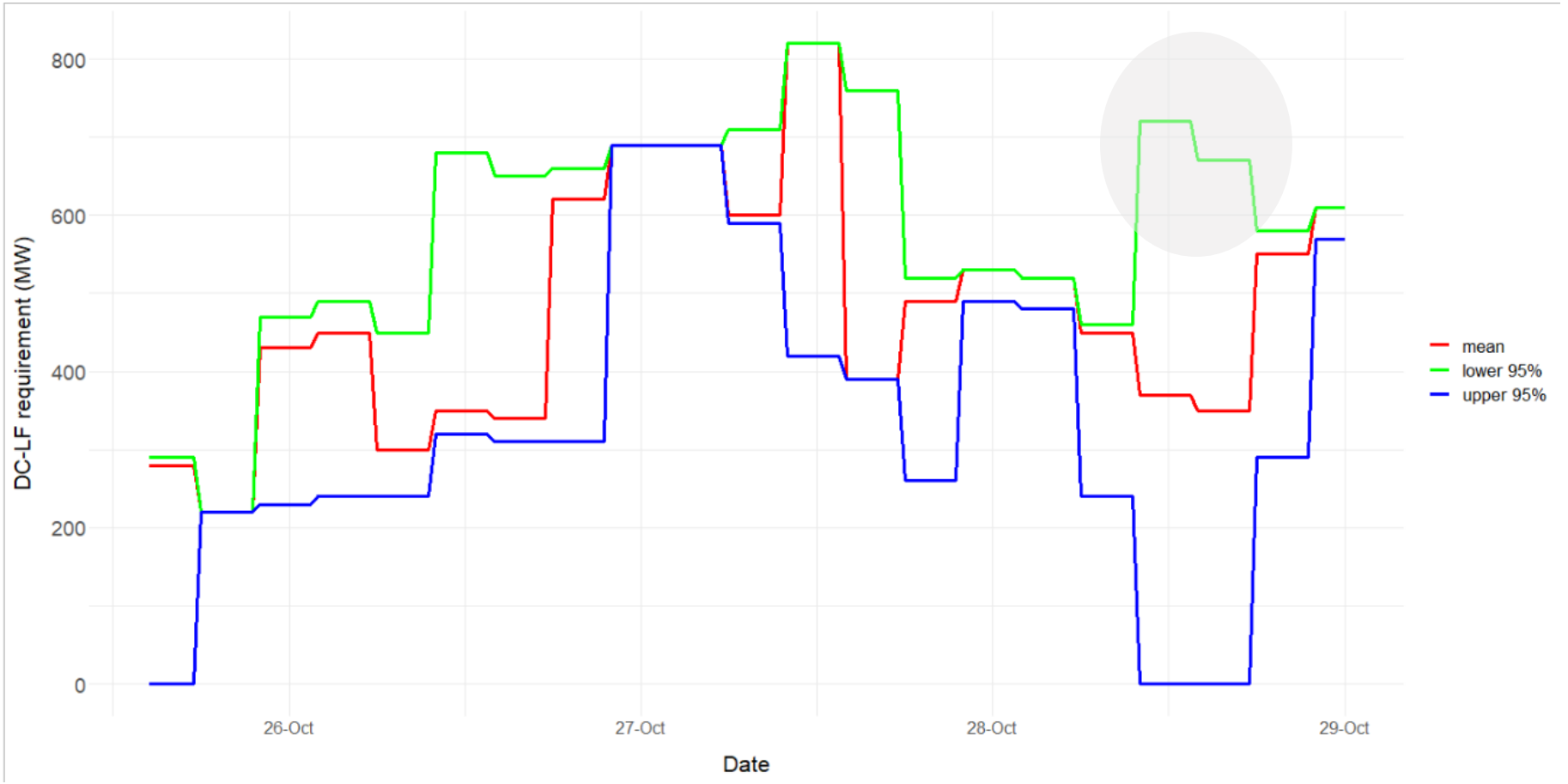
- 4-day time series forecast
- Inertia sensitivities show impact on DC-HF requirements

DC-LF 4-day ahead forecast



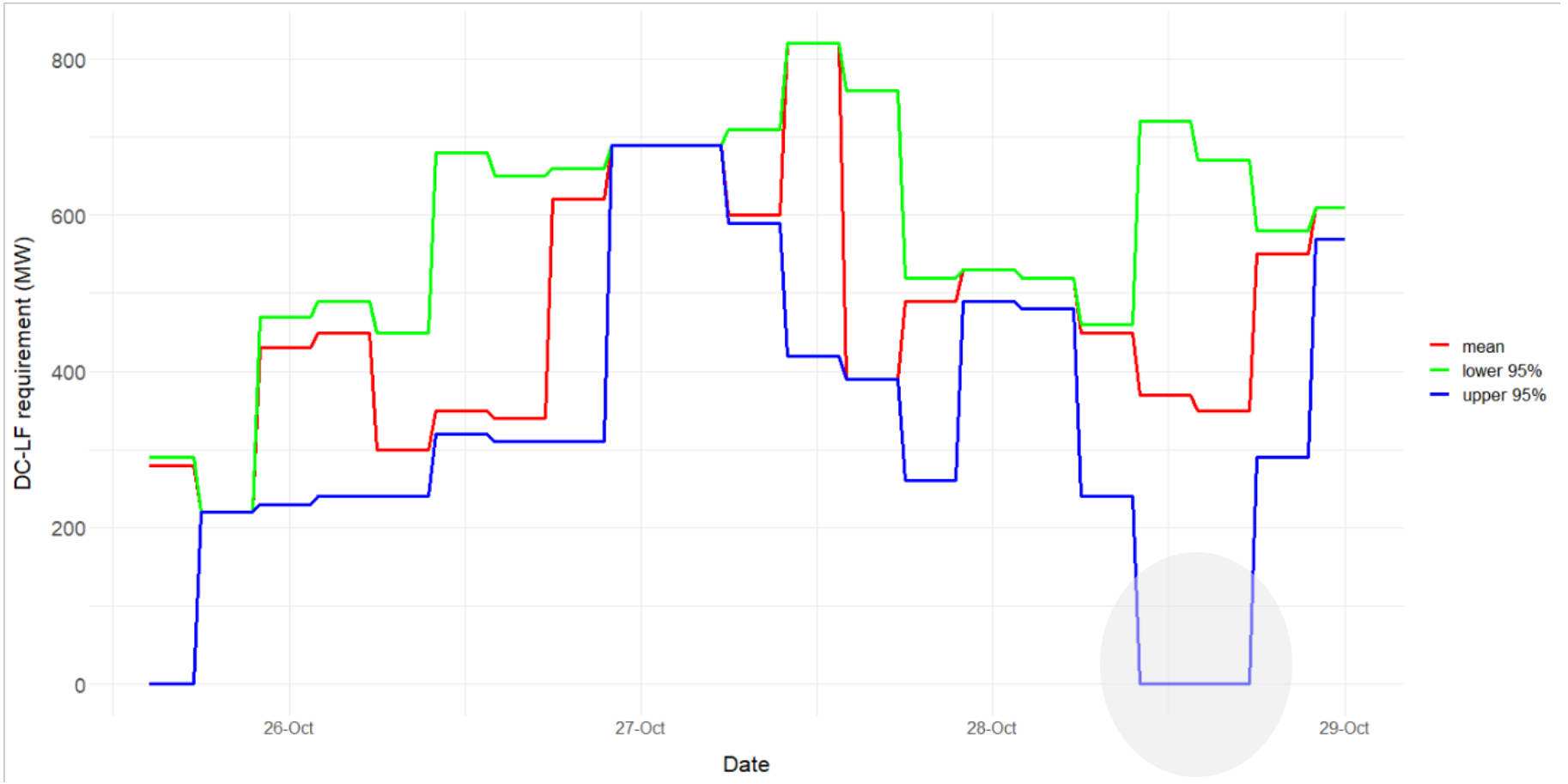
EFA 4-5, 28th Oct 2021
Mean inertia = ~400MW DC-LF

DC-LF 4-day ahead forecast



EFA 4-5, 28th Oct 2021
Lower inertia = ~700MW DC-LF

DC-LF 4-day ahead forecast



EFA 4-5, 28th Oct 2021
Higher inertia = 0MW DC-LF