The webinar will start shortly.
To maximise participation and minimise disruption we will be taking questions via MS Teams Chat, therefore your microphones are muted.
Please note that the webinar will be recorded.

Dynamic Containment Performance Monitoring Webinar

24 March 2022

nationalgridESO

Agenda

1. Introduction
2. Background
3. Performance Monitoring
4. Grace Periods
5. Examples
6. A.O.B
7. Q&A

Introduction

Over the past weeks the ESO has been working through provider feedback around performance monitoring for the Dynamic Containment service.

This webinar will walk through the proposed changes that were issued to DC providers on the 14th March. The changes that have been proposed around the performance monitoring calculation methodology are to provide clarity on how performance monitoring is implemented.

Further to the changes to the methodology, guidance has been issued regarding how performance monitoring data should be submitted when there is an interaction with BOA instructions.

The ESO has reviewed and received legal guidance on the proposed changes in this presentation and has concluded that an industry consultation and a change to the service terms will be required.


Background

Background

Dynamic Containment (DC) Low (L) and High (H) are contracted separately. This means that DCL and DCH contracts are considered separate contracts on its own.
Schedule 2 of the service terms for DC describes three cases for the calculation of performance bounds:

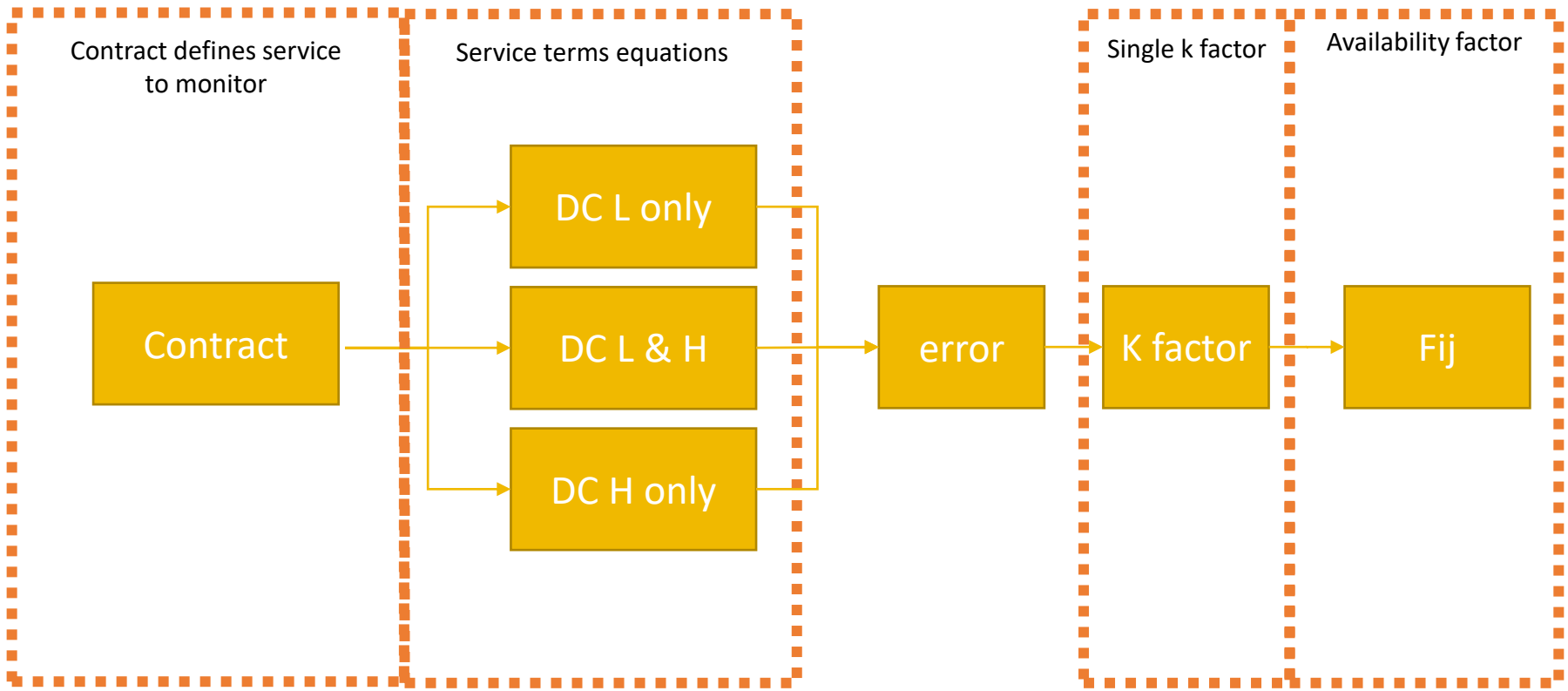
1) DC Low only
2) DC High only
3) DC Low and High

When a DC low and high services were contracted within the same EFA block, the algorithm calculated a single K factor for both services. Even though services were two separate contracts, the two services were dependant of each other for the final score. This resulted in an increase of penalties for DC Low and High contracts.

Contracts dependencies

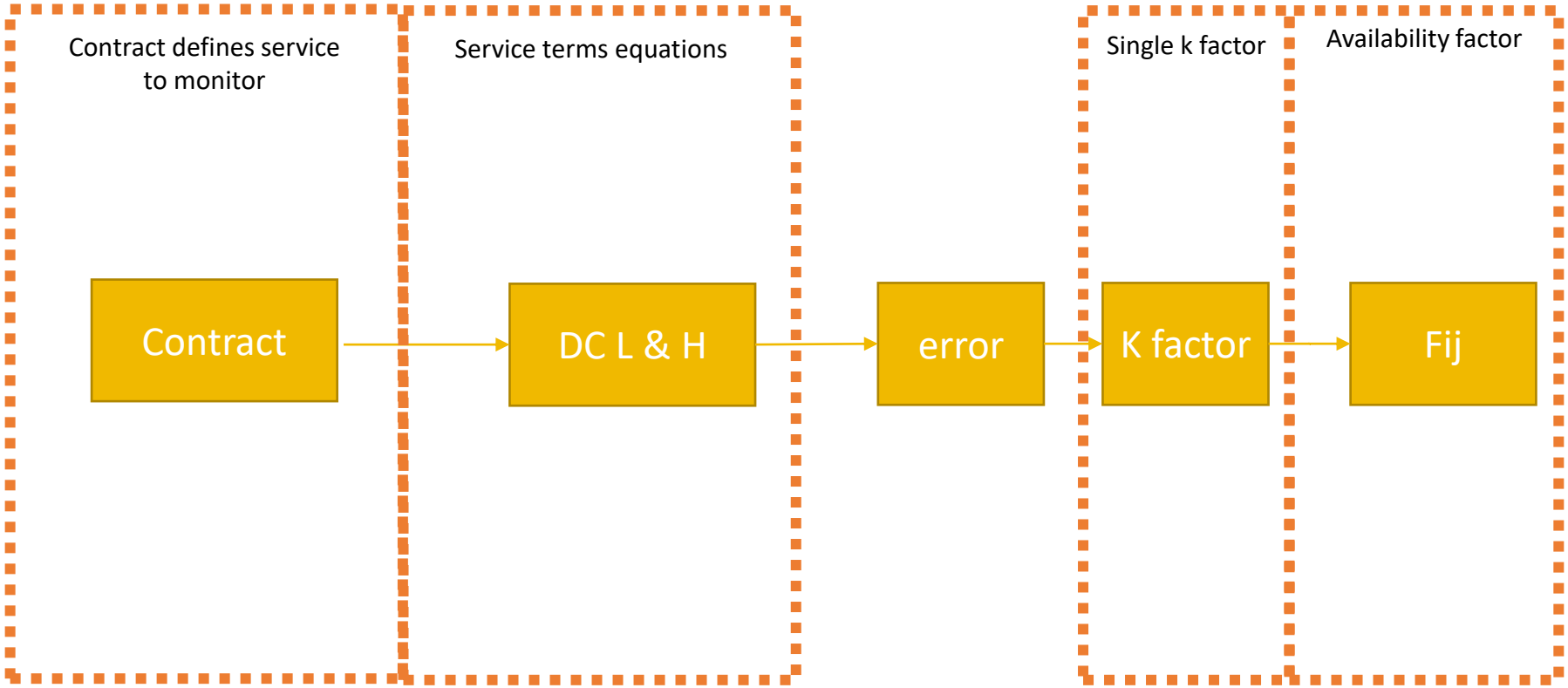
$$Si_e = \left(\sum_{j}^{CEB} \text{Round}\left(Pij_e \times Vij_e, 2\right) \times Fij_e \right) \times K_e$$

Previous methodology



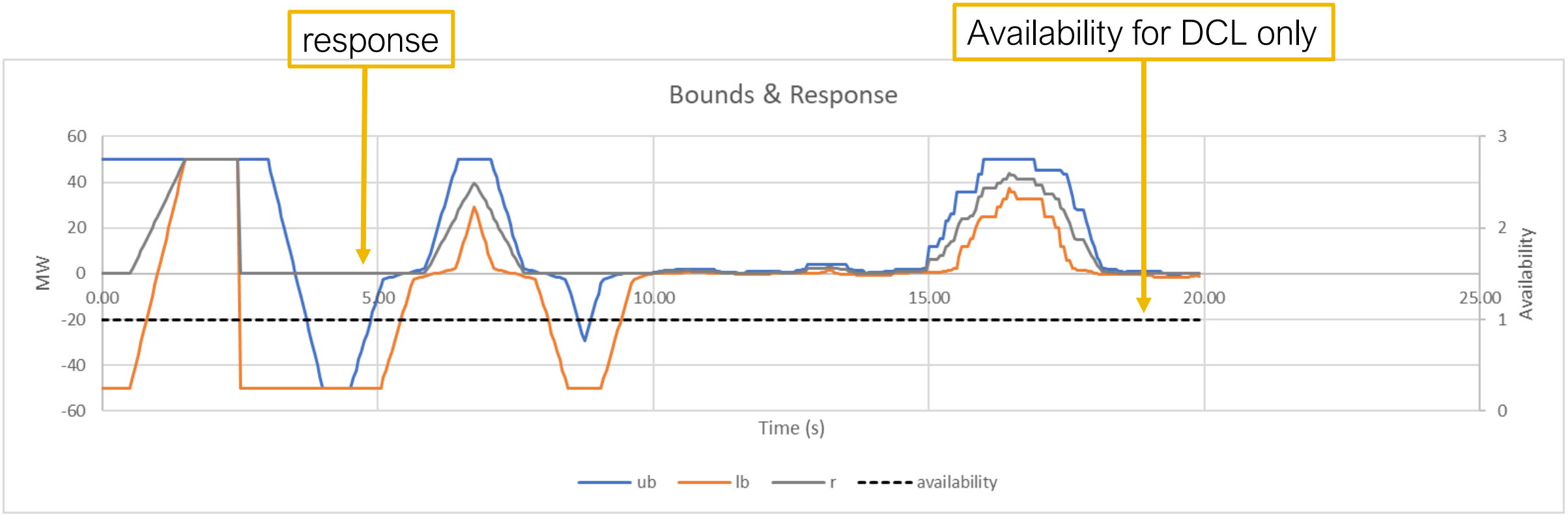
Contracts dependencies

DC Low and High contract (previous)



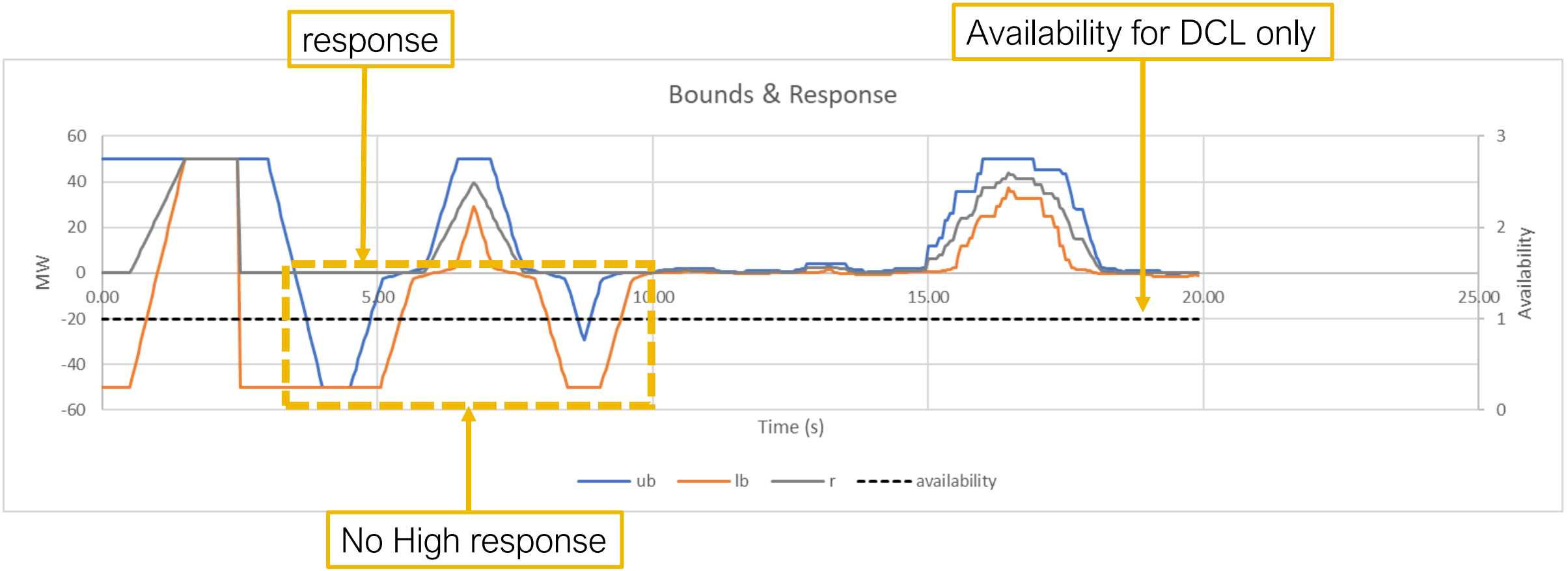
Contracts dependencies

DC Low and High contract (previous)



Contracts dependencies

DC Low and High contract (previous)



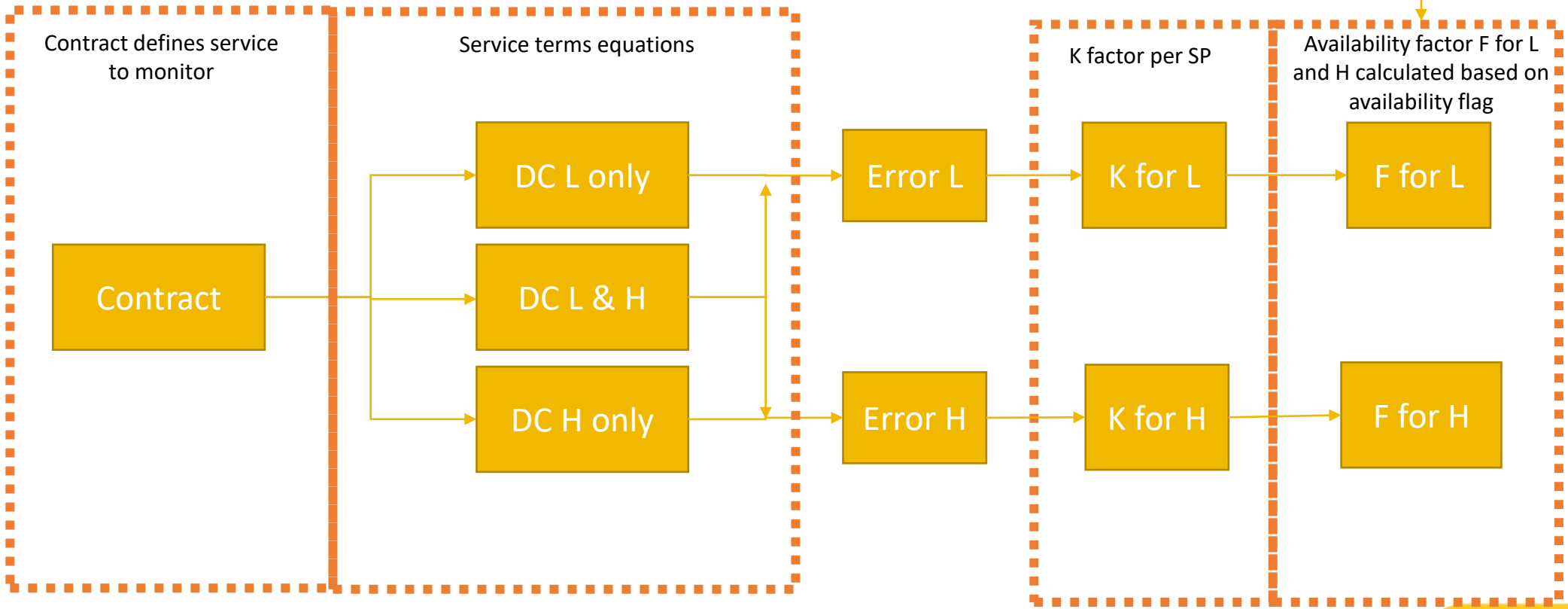
Contracts dependencies

DC Low and High contract (previous)

Proposed Methodology

Proposed methodology

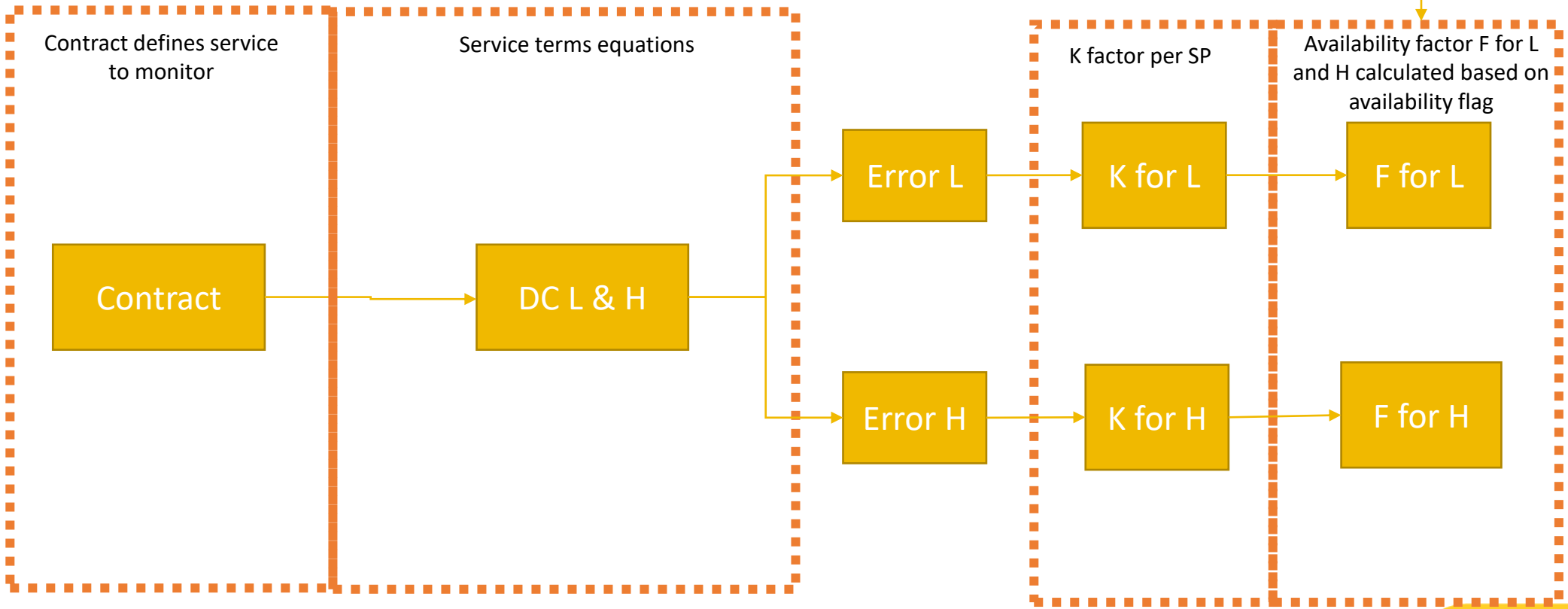
$$Si_e = \left(\sum_{j}^{CEB} \text{Round}\left(Pij_e \times Vij_e, 2\right) \times Fij_e \right) \times K_e$$



Proposed Methodology

DC Low and High contract (Proposed)

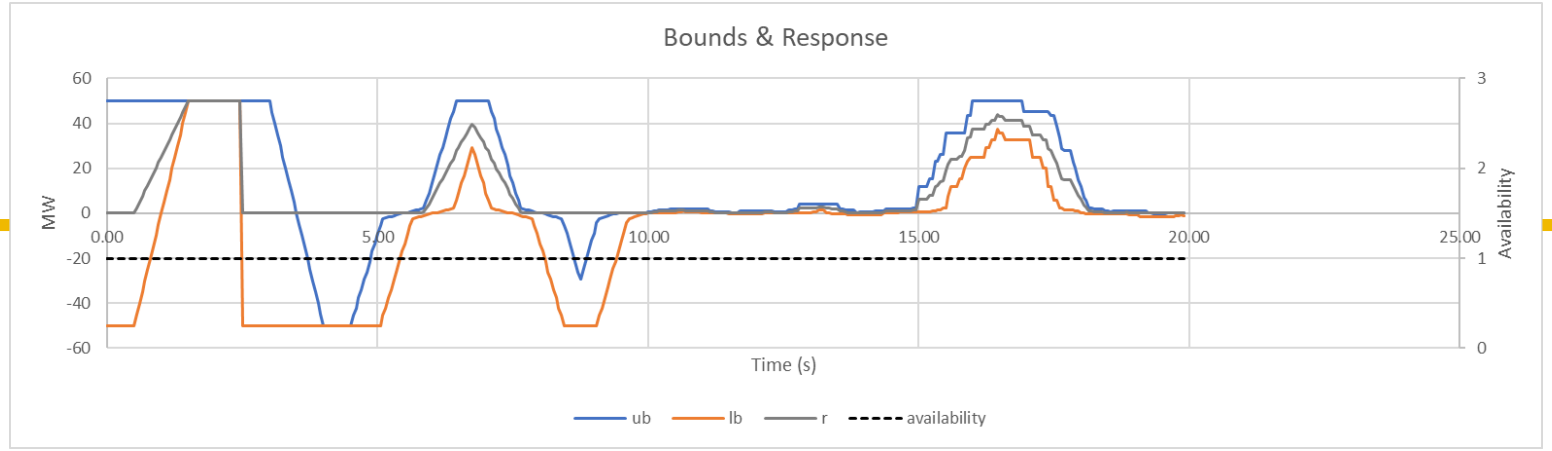
$$Si_e = \left(\sum_{j}^{CEB} \text{Round}\left(Pij_e \times Vij_e, 2\right) \times Fij_e \right) \times K_e$$



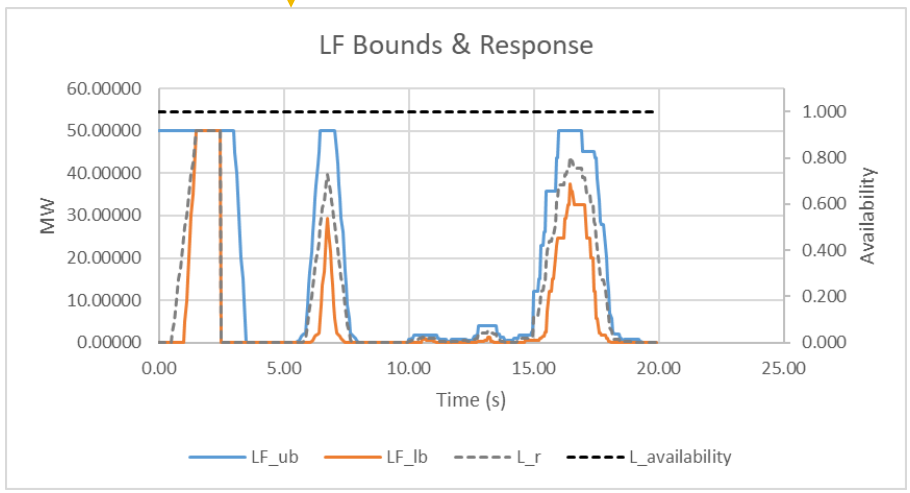
Proposed Methodology

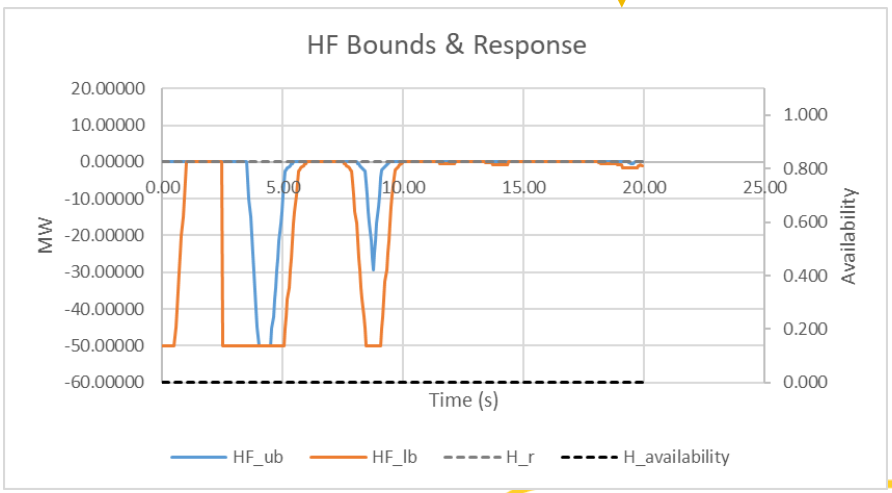
DC Low and High contract (Proposed)

DCL



DCH

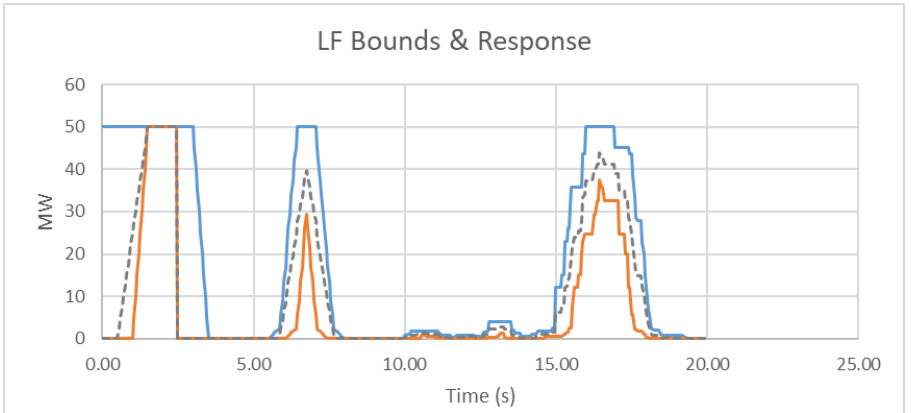


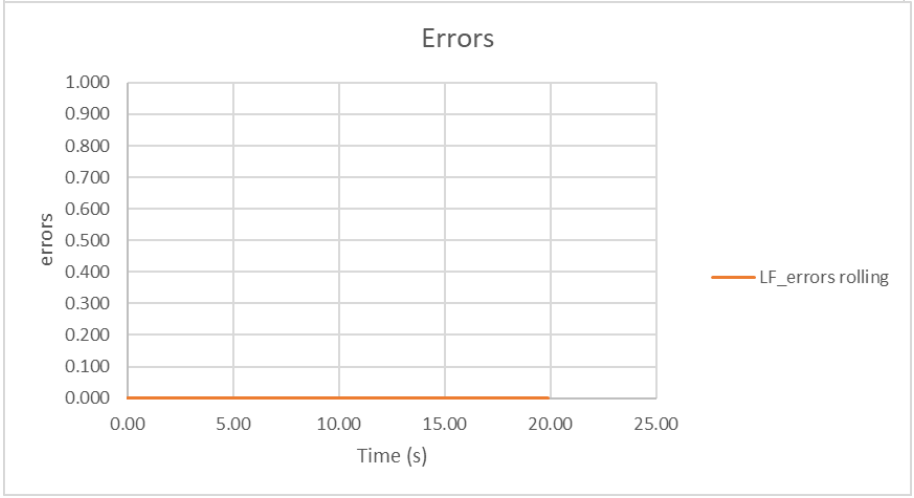


Proposed Methodology

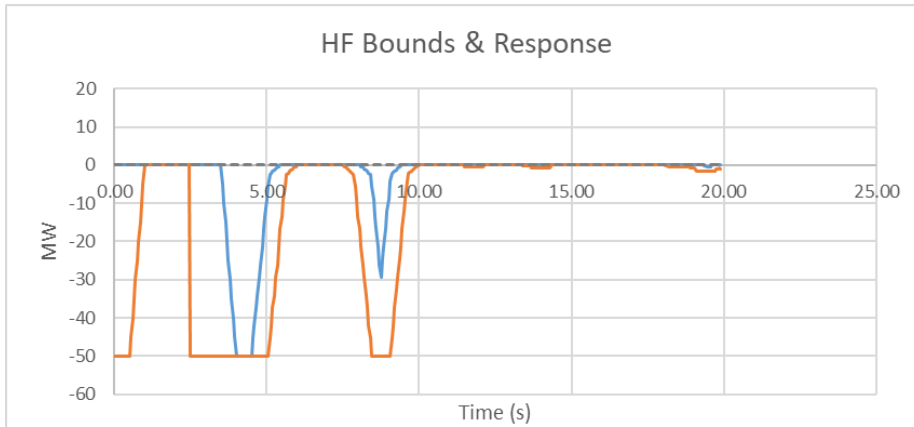
DC Low and High contract (Proposed)

DCL



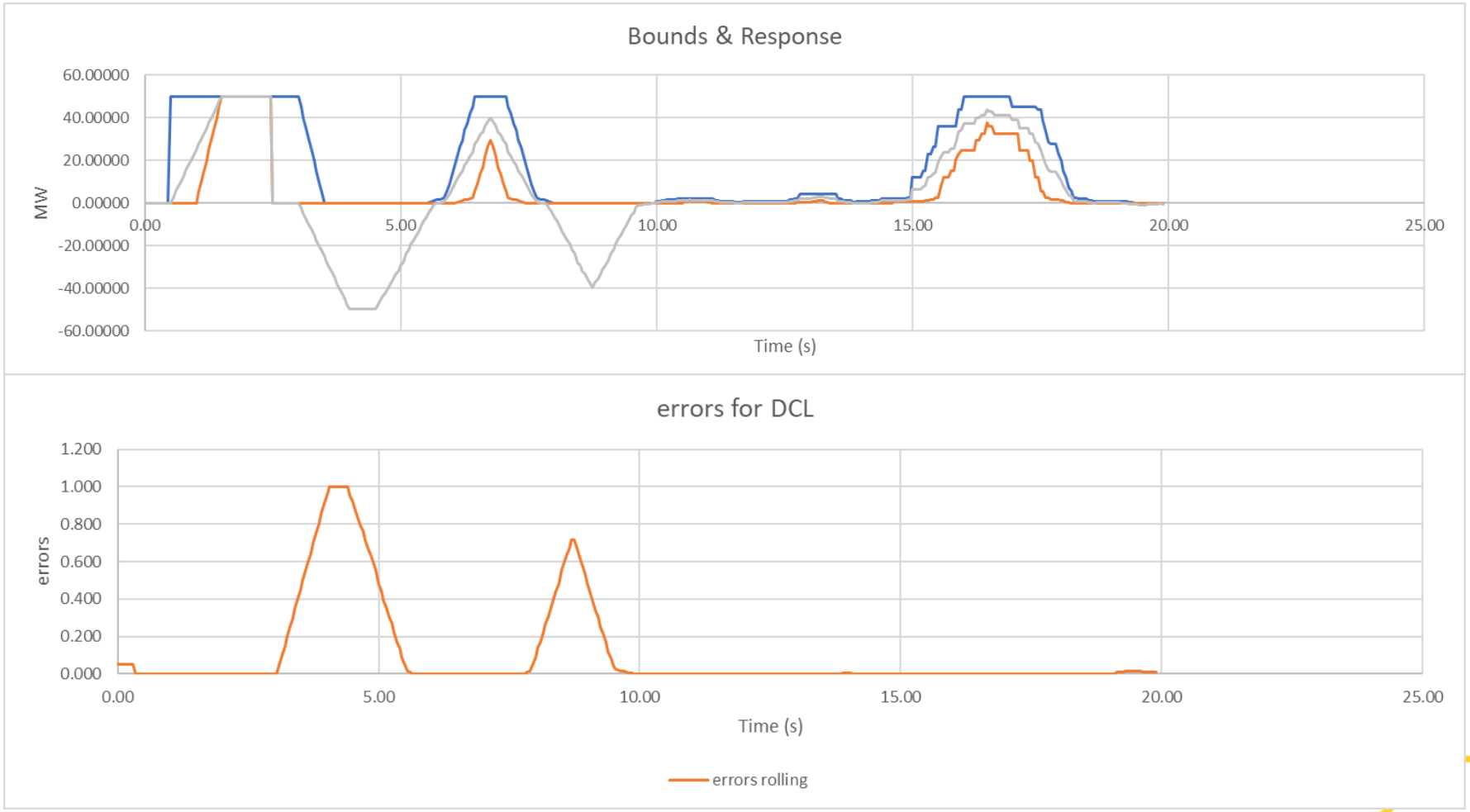


DCH



Proposed Methodology

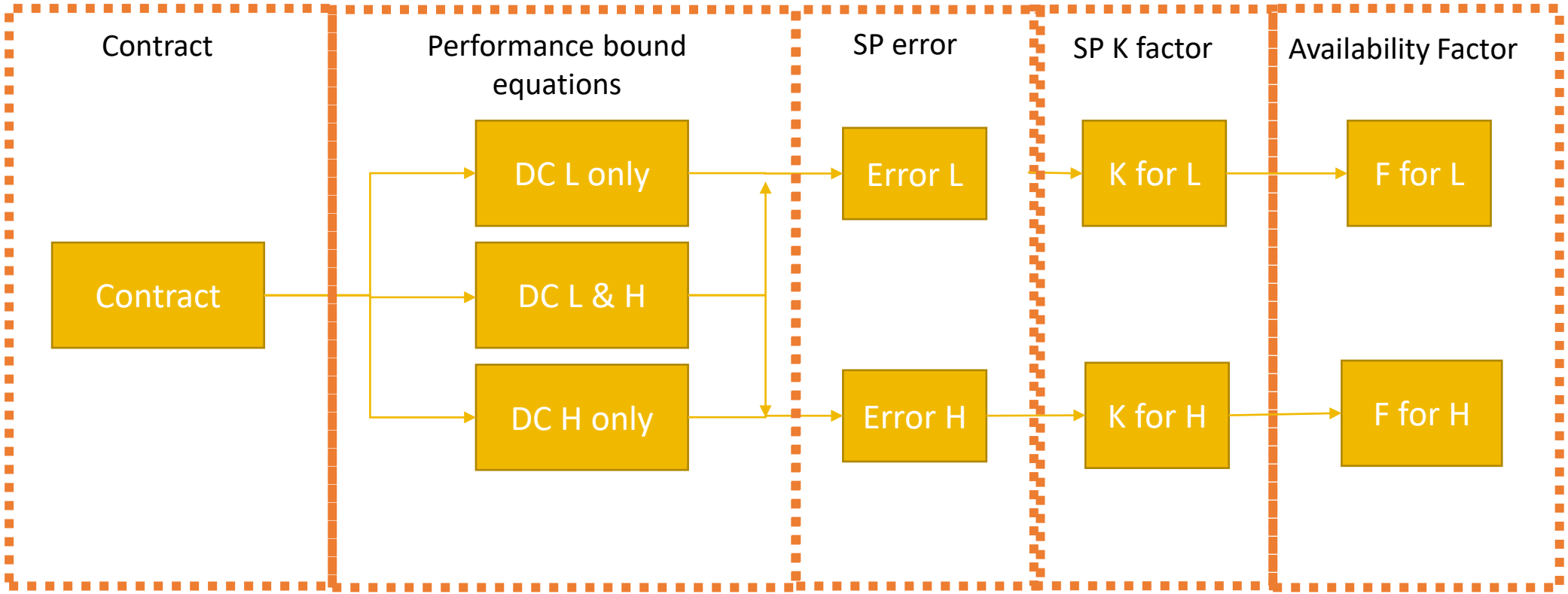
DC Low only (Proposed)




Performance Monitoring

Performance Monitoring

Proposed methodology



Contract

In the first stage, contracts are gathered and processed. This defines the services to be monitored.

DCL example:

Company	Unit Name	EFA Date	Delivery Start	Delivery End	EFA	Service	Cleared Volume	Clearing Price	Technology Type
COMPANY1	DC-UNIT2	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCL	50	1	NA

DCH example:

Company	Unit Name	EFA Date	Delivery Start	Delivery End	EFA	Service	Cleared Volume	Clearing Price	Technology Type
COMPANY1	DC-UNIT2	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCH	50	1	NA

DCLH example:

Company	Unit Name	EFA Date	Delivery Start	Delivery End	EFA	Service	Cleared Volume	Clearing Price	Technology Type
COMPANY1	DC-UNIT2	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCL	50	1	NA
COMPANY1	DC-UNIT2	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCH	50	1	NA

Performance bound equations

DC L only

Performance bounds for LF only

$$UB_{LF}(t) = RLD\left(R_{LF}\left(F^{lower}(t)\right), rr_{min} \right) \times P$$

$$LB_{LF}(t) = RLU\left(R_{LF}\left(F^{upper}(t)\right), rr_{min} \right) \times P$$

DC H only

Performance bounds for HF only

$$UB_{HF}(t) = RLD\left(R_{HF}\left(F^{lower}(t)\right), rr_{min} \right) \times Q$$

$$LB_{HF}(t) = RLU\left(R_{HF}\left(F^{upper}(t)\right), rr_{min} \right) \times Q$$

DC L & H

Performance bounds for LF and HF

$$UB(t) = ub(t) \times \begin{cases} P & ub(t) \geq 0 \\ Q & ub(t) < 0 \end{cases}$$

$$LB(t) = lb(t) \times \begin{cases} P & lb(t) \geq 0 \\ Q & \mathrm{lb}(t) < 0 \end{cases}$$

Error

The error e_m for one time measurement and metered response R:

$$e_m = \begin{cases} LB - R & R < LB \\ 0 & LB \leq R \leq UB \\ R - UB & R > UB \end{cases}$$

Scaled error es_m for one measurement:

For P > 0, Q = 0: $$es_m = \frac{e_m}{P}$$

For Q > 0, P = 0: $$es_m = \frac{e_m}{Q}$$

Error DCL

Performance bounds for DCL

$$UB_{LF}(t) = RLD(\, R_{LF}(F^{lower}(t)), rr_{min}\,) \times P$$
$$LB_{LF}(t) = RLU(\, R_{LF}(F^{upper}(t)), rr_{min}\,) \times P$$

Errors for DCL

$$e_m = \begin{cases} LB_{LF} - R & R < LB_{LF} \\ 0 & LB_{LF} \le R \le UB_{LF} \\ R - UB_{LF} & R > UB_{LF} \end{cases}$$

Scaled errors for DCL

$$es_m = \frac{e_m}{P}$$

Error DCH

Performance bounds for DCH

$$UB_{HF}(t) = RLD(\ R_{HF}(F^{lower}(t)), rr_{min}\ ) \times\ Q$$
$$LB_{HF}(t) = RLU(\ R_{HF}(F^{upper}(t)), rr_{min}\ ) \times\ Q$$

Errors for DCH

$$e_m = \begin{cases} LB_{HF} - R & R < LB_{HF} \\ 0 & LB_{HF} \leq R \leq UB_{HF} \\ R - UB_{HF} & R > UB_{HF} \end{cases}$$

Scaled errors for DCH

$$es_m = \frac{e_m}{Q}$$

Error for DCLH

$$UB(t) = ub(t) \times \begin{cases} P & ub(t) \geq 0 \\ Q & ub(t) < 0 \end{cases}$$

$$LB(t) = lb(t) \times \begin{cases} P & lb(t) \geq 0 \\ Q & \mathrm{lb}(t) < 0 \end{cases}$$

DCL

DCH

Performance bounds for LF:

$$UB_{LF}(t) = \begin{cases} UB(t) & UB(t) \geq 0 \\ 0 & otherwise \end{cases}$$

$$LB_{LF}(t) = \begin{cases} LB(t) & LB(t) \geq 0 \\ 0 & otherwise \end{cases}$$

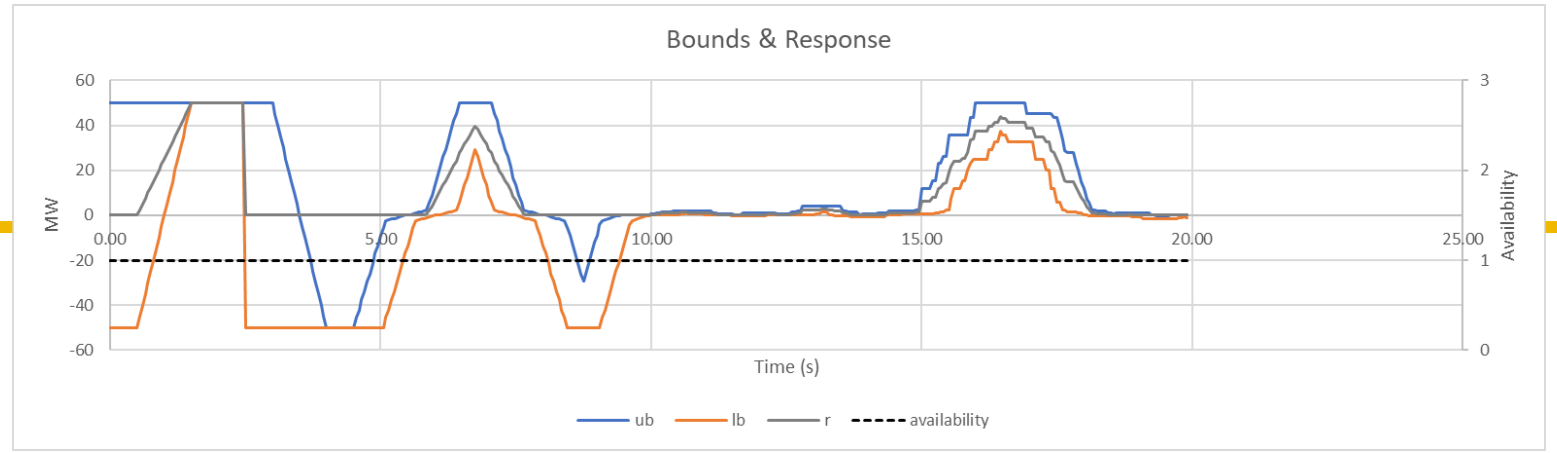
Performance bounds for HF:

$$UB_{HF}(t) = \begin{cases} UB(t) & UB(t) < 0 \\ 0 & otherwise \end{cases}$$

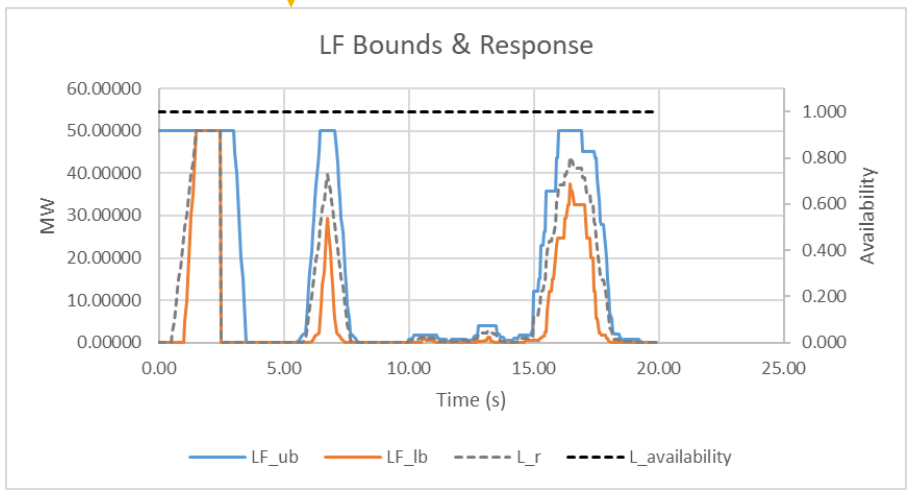
$$LB_{HF}(t) = \begin{cases} LB(t) & LB(t) < 0 \\ 0 & otherwise \end{cases}$$

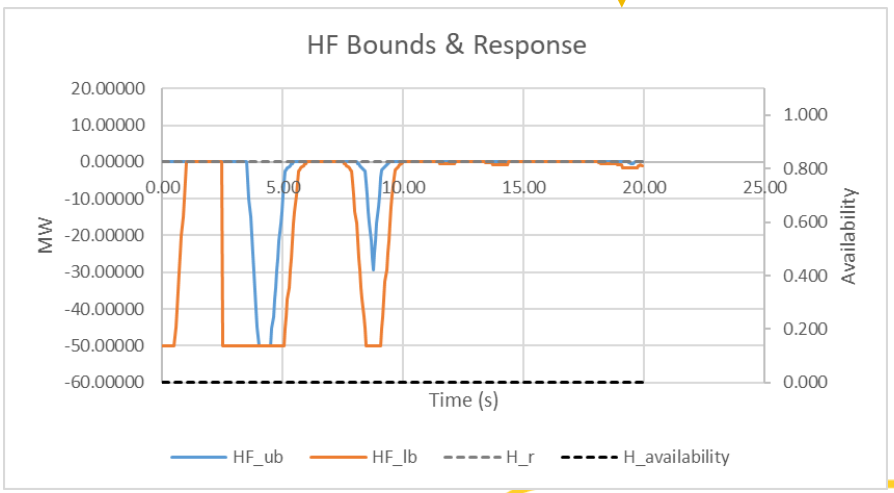
Error for DCLH

DCL



DCH





Error for DCLH

DCL

Performance bounds for LF:

$$UB_{LF}(t) = \begin{cases} UB(t) & UB(t) \geq 0 \\ 0 & otherwise \end{cases}$$

$$LB_{LF}(t) = \begin{cases} LB(t) & LB(t) \geq 0 \\ 0 & otherwise \end{cases}$$

$$e_m = \begin{cases} LB_{LF} - R_{LF} & R_{LF} < LB_{LF} \\ 0 & LB_{LF} \leq R_{LF} \leq UB_{LF} \\ R_{LF} - UB_{LF} & R_{LF} > UB_{LF} \end{cases}$$

$$es_m = \frac{e_m}{P}$$

DCH

Performance bounds for HF:

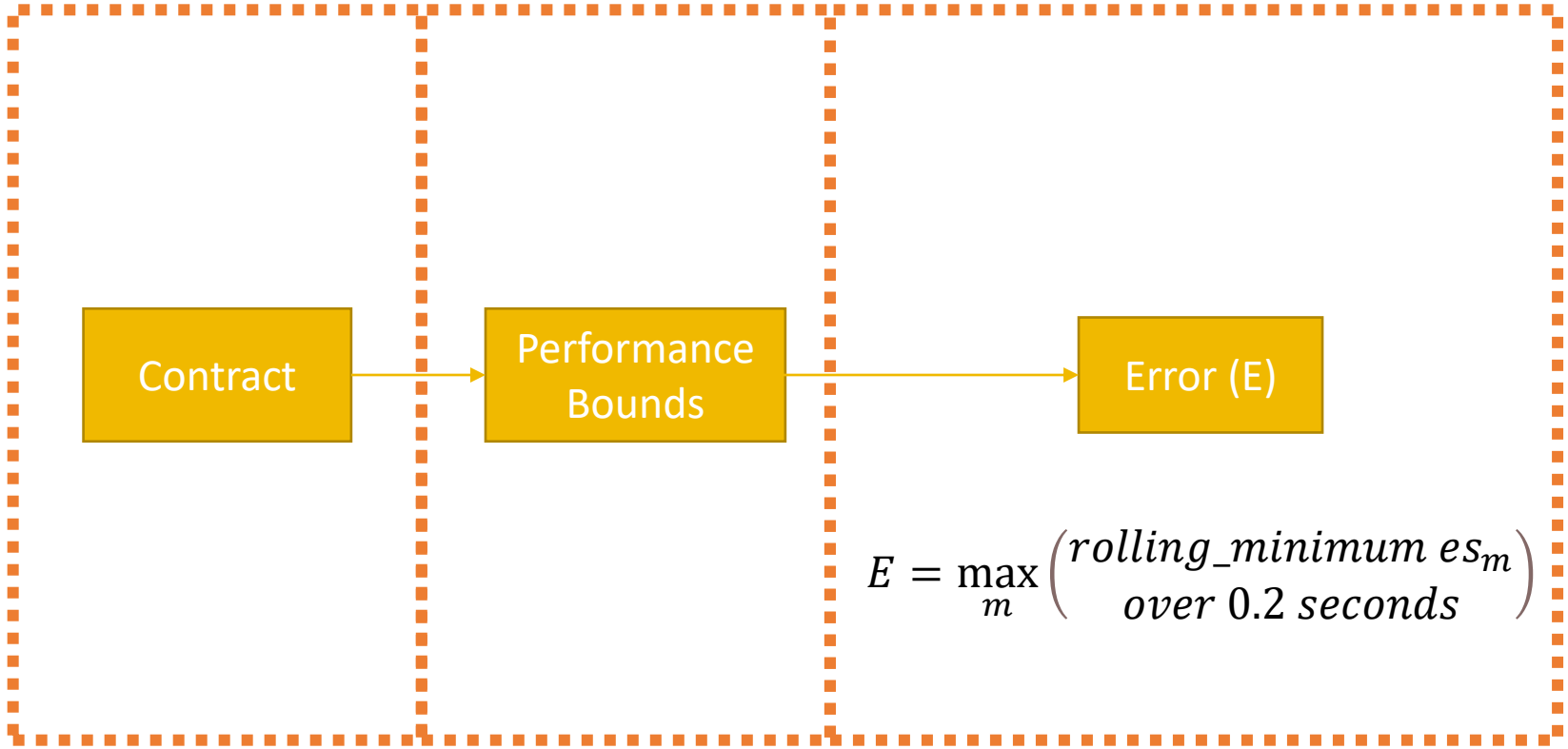
$$UB_{HF}(t) = \begin{cases} UB(t) & UB(t) < 0 \\ 0 & otherwise \end{cases}$$

$$LB_{HF}(t) = \begin{cases} LB(t) & LB(t) < 0 \\ 0 & otherwise \end{cases}$$

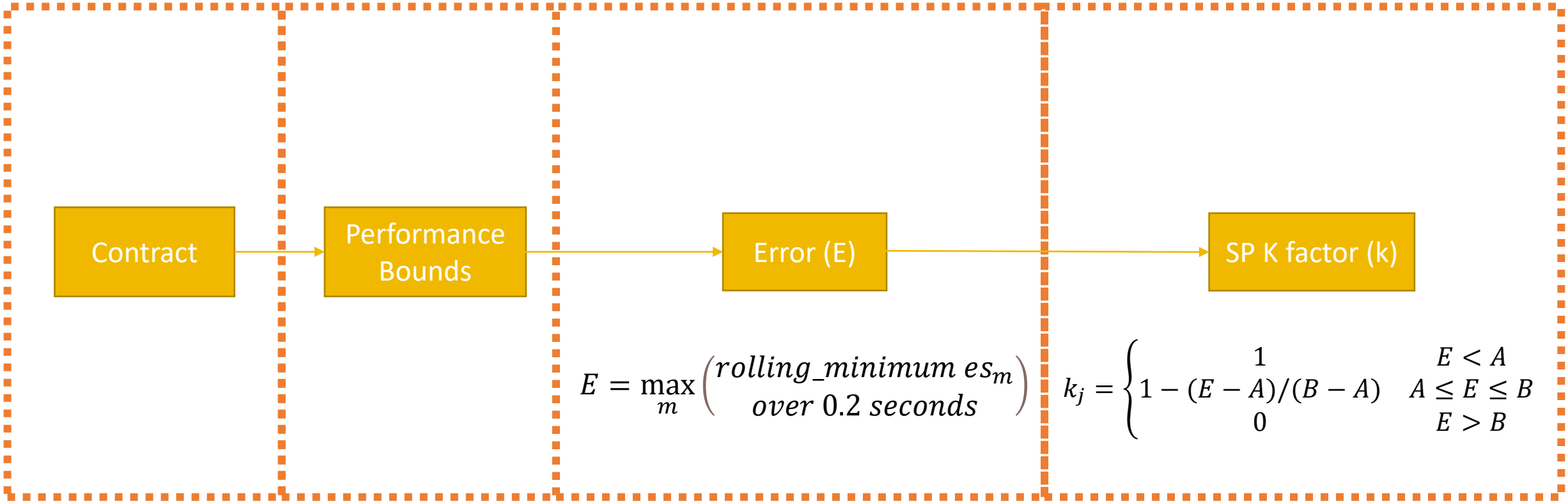
$$e_m = \begin{cases} LB_{HF} - R_{HF} & R_{HF} < LB_{HF} \\ 0 & LB_{HF} \leq R_{HF} \leq UB_{HF} \\ R_{HF} - UB_{HF} & R_{HF} > UB_{HF} \end{cases}$$

$$es_m = \frac{e_m}{Q}$$

SP Error


Contract
Performance Bounds
Error (E)
$E = \max_m \left(\begin{matrix} rolling\_minimum\ es_m \\ over\ 0.2\ seconds \end{matrix} \right)$

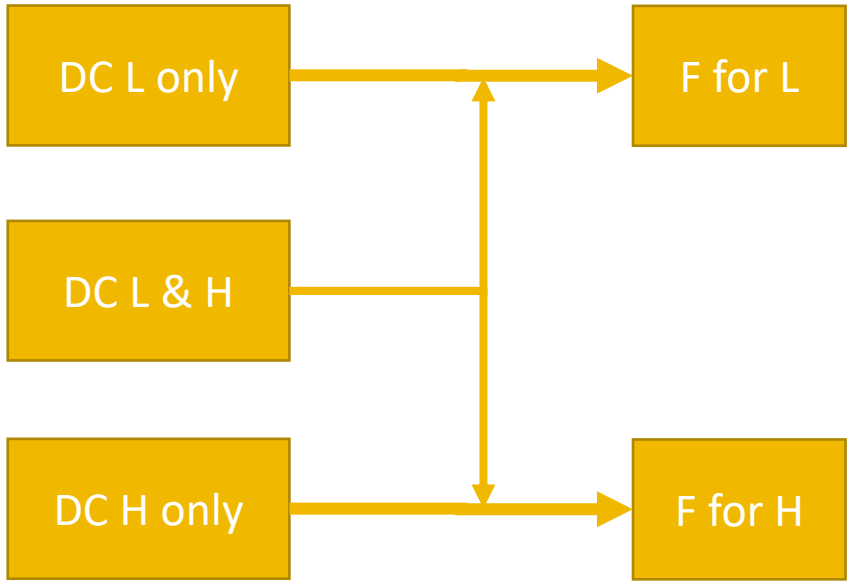
SP K factor


Contract
Performance Bounds
Error (E)
SP K factor (k)
$E = \max_m \left(\begin{matrix} rolling\_minimum\ es_m \\ over\ 0.2\ seconds \end{matrix} \right)$
$k_j = \begin{cases} 1 & E < A \\ 1 - (E - A)/(B - A) & A \leq E \leq B \\ 0 & E > B \end{cases}$

Availability Factor

$$Si_e = \left(\sum_{j}^{CEB} \text{Round}\left(Pij_e \times Vij_e, 2\right) \times Fij_e \right) \times K_e$$

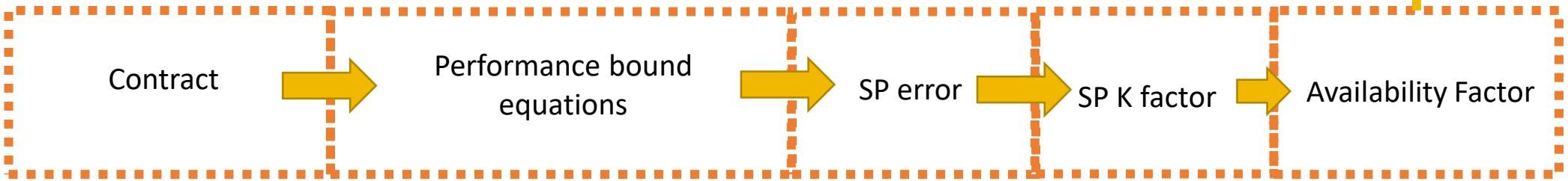
"Fij_e is zero where there is any period or periods of unavailability within Settlement Period j during the relevant Contracted EFA Block e, otherwise is 1."



Availability flag	DC L Availability	DC H Availability
3	1	1
2	0	1
1	1	0
0	0	0

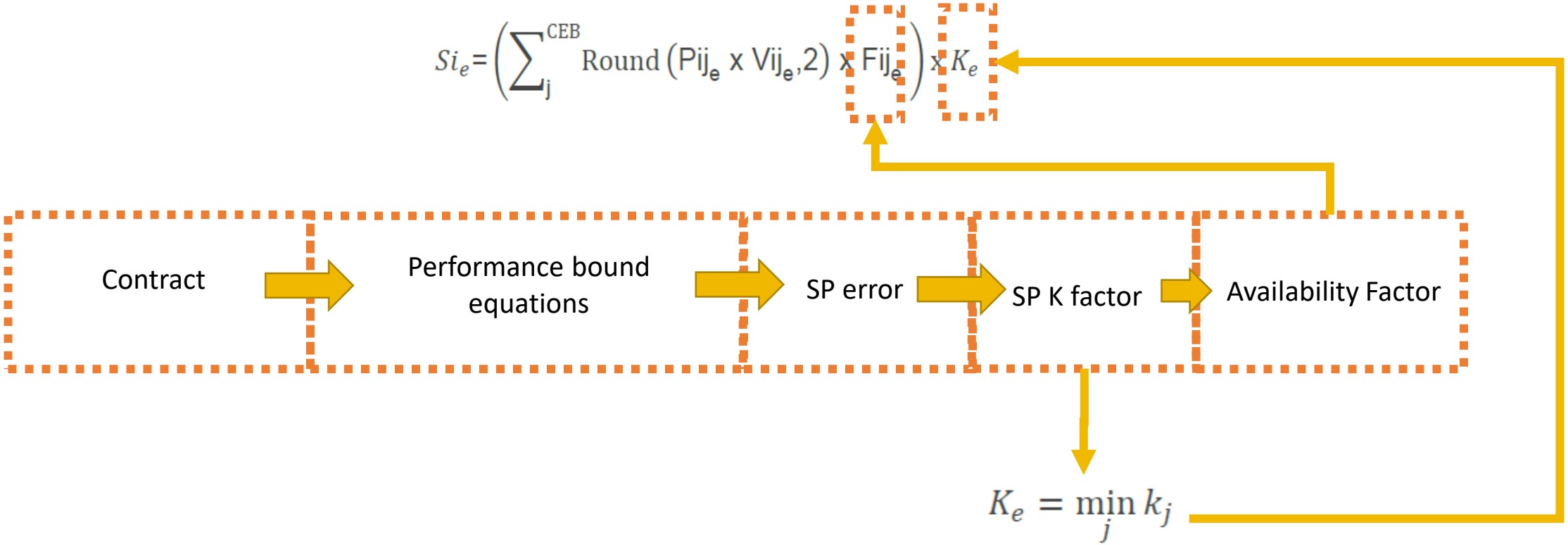
EFA K factor

$$Si_e = \left(\sum_{j}^{CEB} \text{Round}\left(Pij_e \times Vij_e, 2\right) \times Fij_e \right) \times K_e$$



EFA K factor

$$Si_e = \left(\sum_{j}^{CEB} \text{Round}\left(Pij_e \times Vij_e, 2\right) \times Fij_e \right) \times K_e$$




Grace Periods

Grace Periods

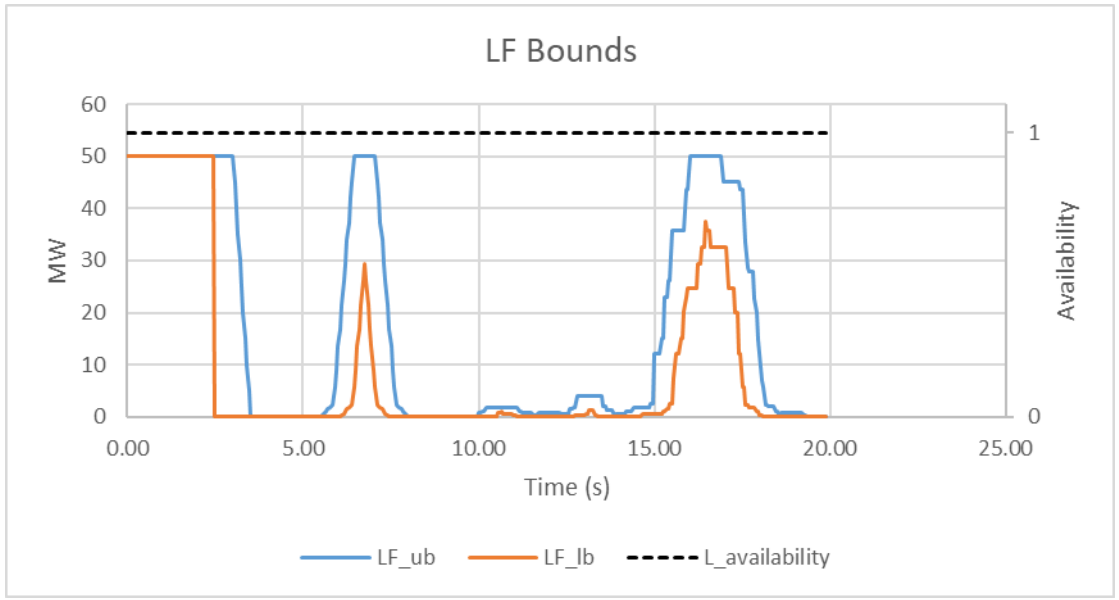
In the performance bound calculations, there are two types of grace periods:

- *For the first **0.55 seconds** after a response unit **begins delivery, after a period of missing data, or after switching from unavailable to available** the upper and lower performance bounds will be set to P and -Q respectively.*

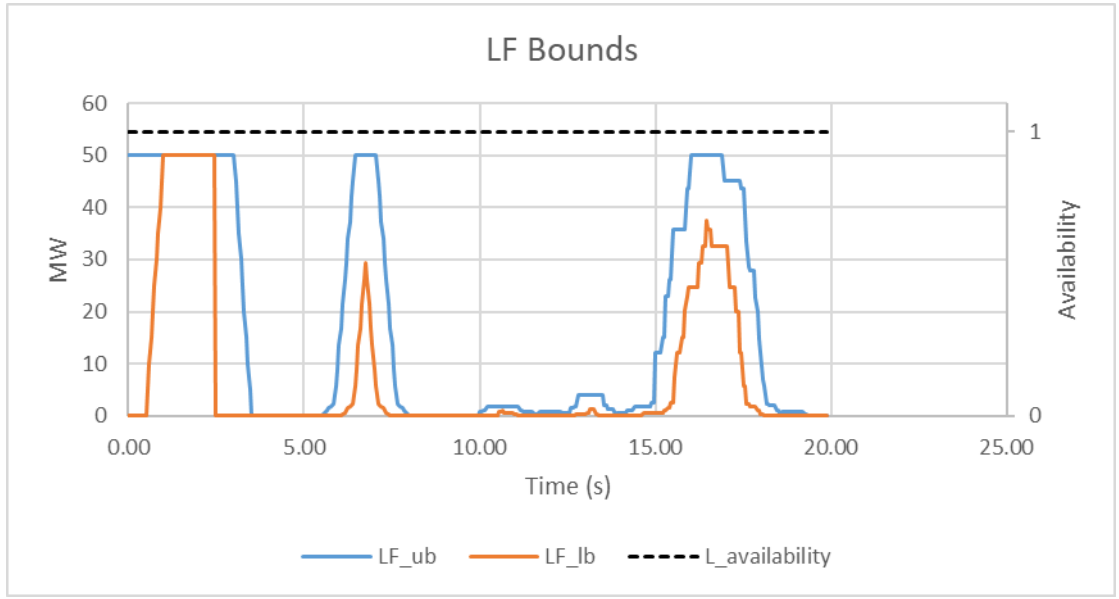
- *To allow time to change between contracts (**a change in P or Q**): the performance bounds will be calculated for **1 second** after the change using whichever of the contracts gives the lower bound, and the higher upper bound.*

0.55s grace period

*For the first **0.55 seconds** the upper and lower performance bounds will be set to P and -Q respectively.*



Without grace period

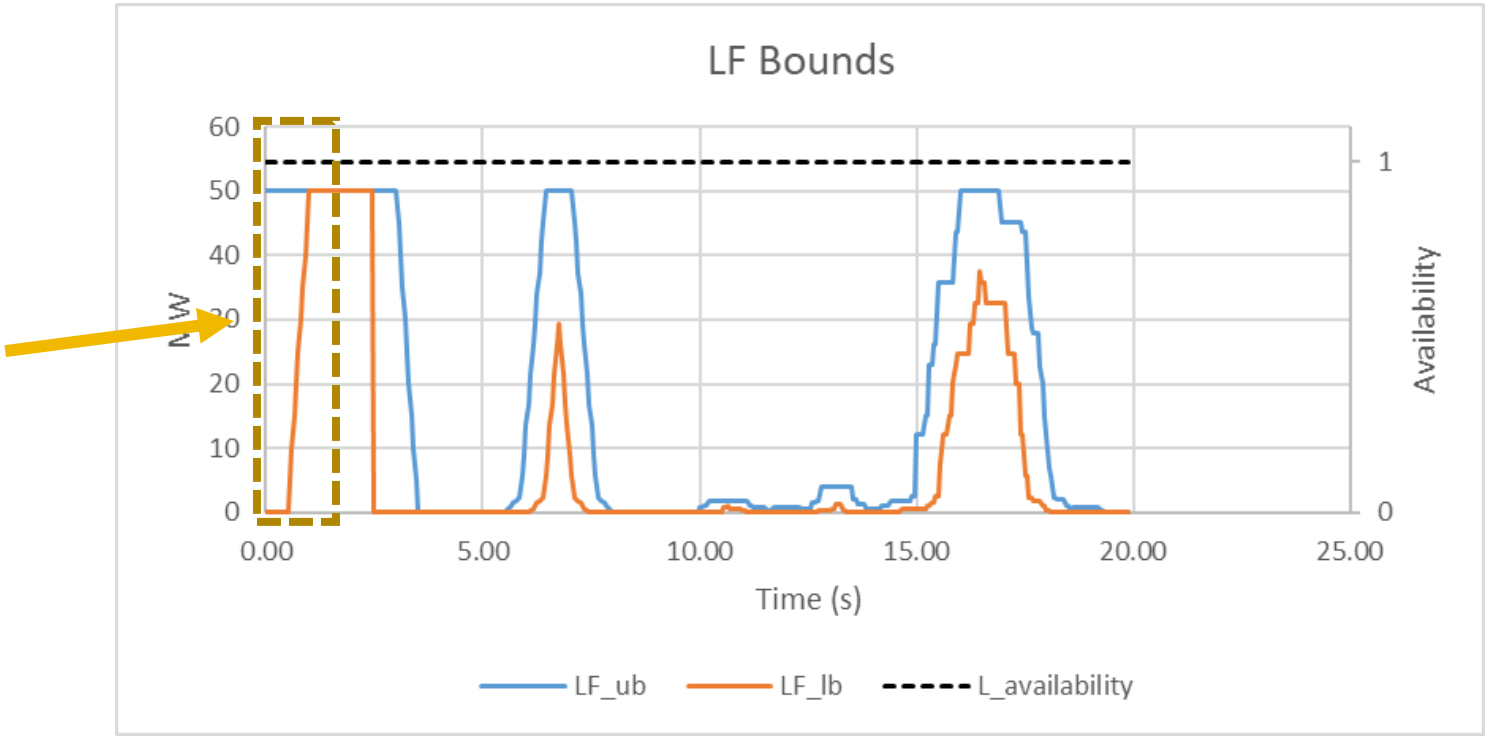


With grace period

0.55s grace period

*For the first **0.55 seconds** the upper and lower performance bounds will be set to P and -Q respectively.*

Note that this grace period follows ramping rules. This gives further allowance to respond

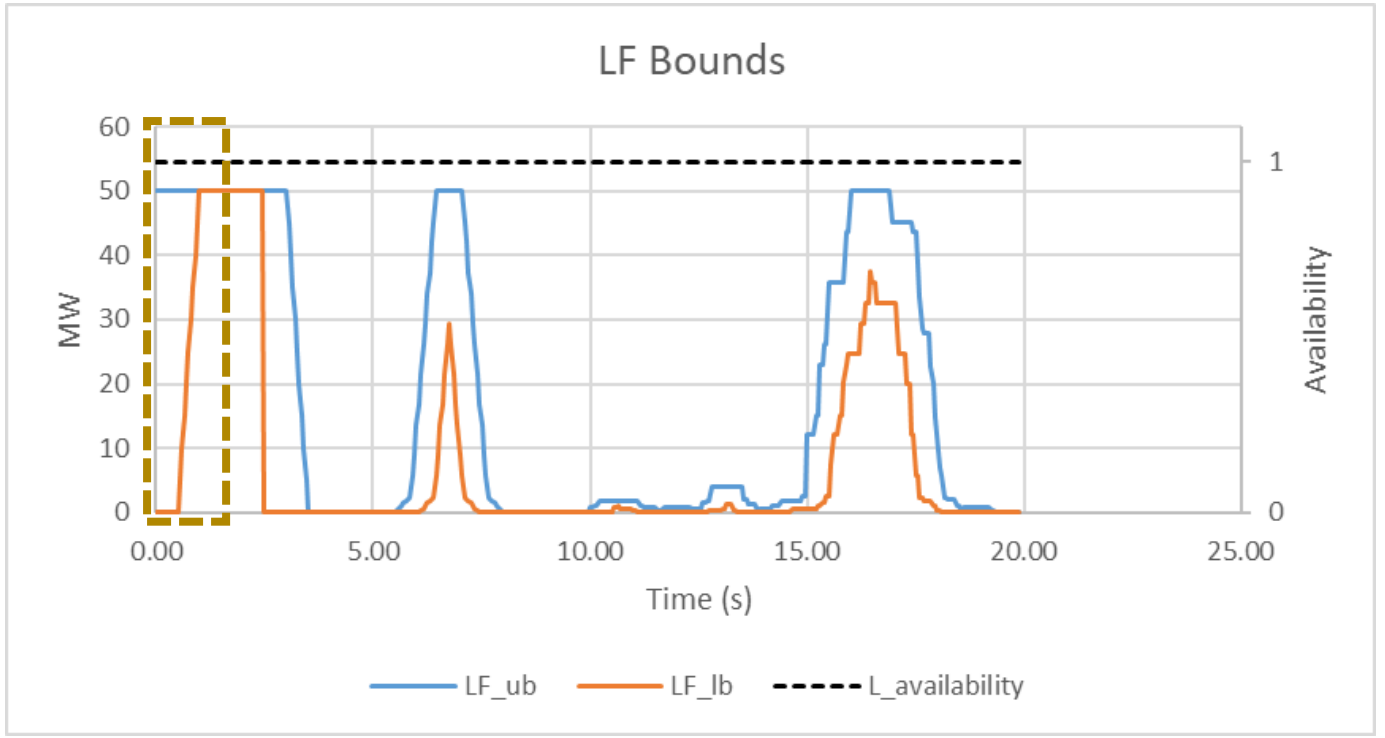


With grace period

Beginning of Delivery (0.55s)

Beginning of delivery is defined as the start of a DC service delivery from any other service not within DC.

EFA	Grace period
1	TRUE
2	FALSE
5	TRUE
6	FALSE

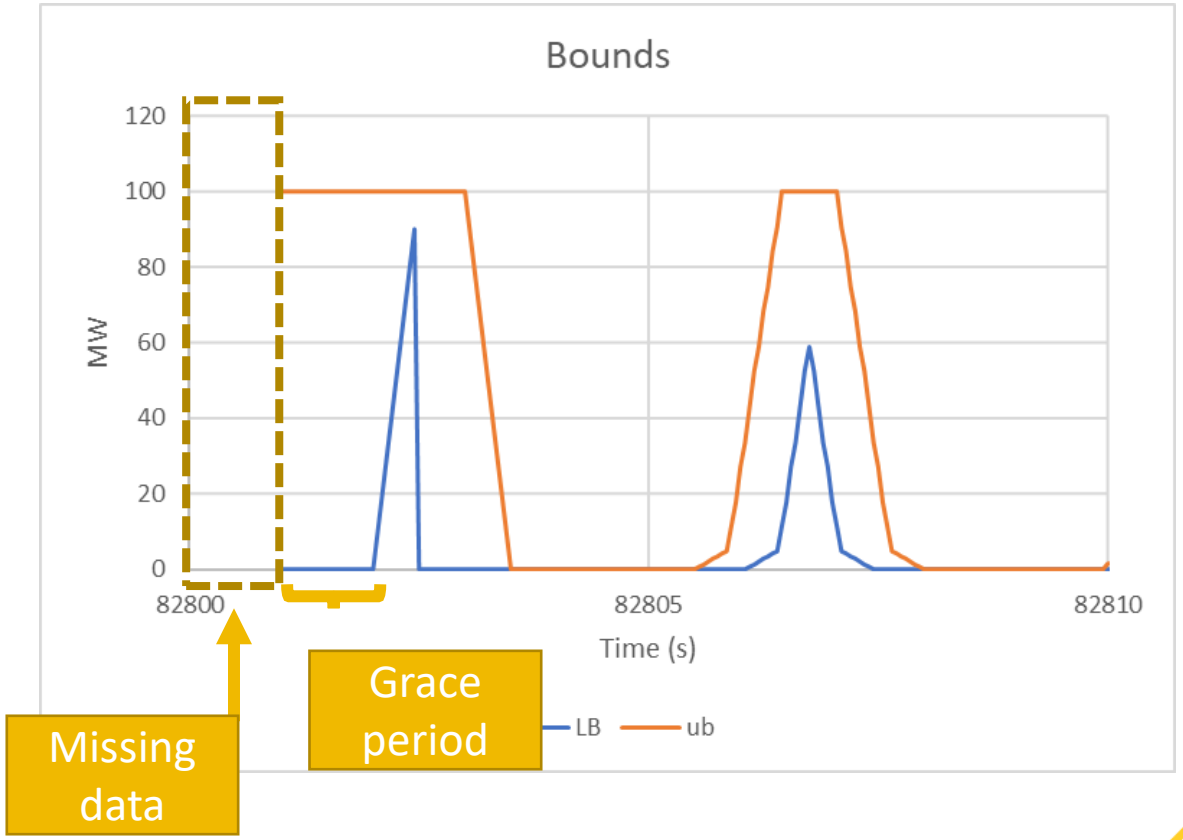


EFA 1

Period of Missing Data (0.55s)

Missing data is defined as gaps in time, for example if data for SP 1,2,5 and 6 are available, and data for SP 3 and 4 is missing, then:

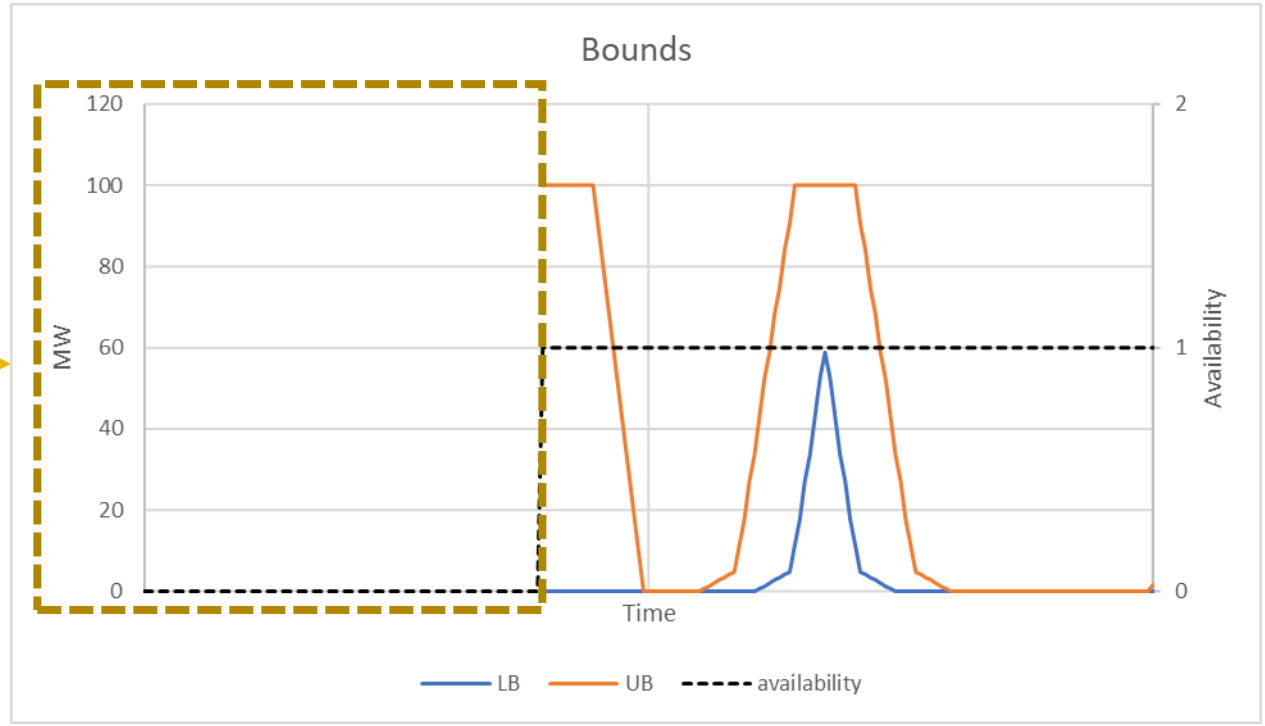
SP	Grace period
1	FALSE
2	FALSE
5	TRUE
6	FALSE



Unavailable to available (0.55s)

When a unit switches from unavailable to available the 0.55 seconds grace period will apply. This applies to every service within DC.

Unavailability period



Unavailable to available (0.55s)

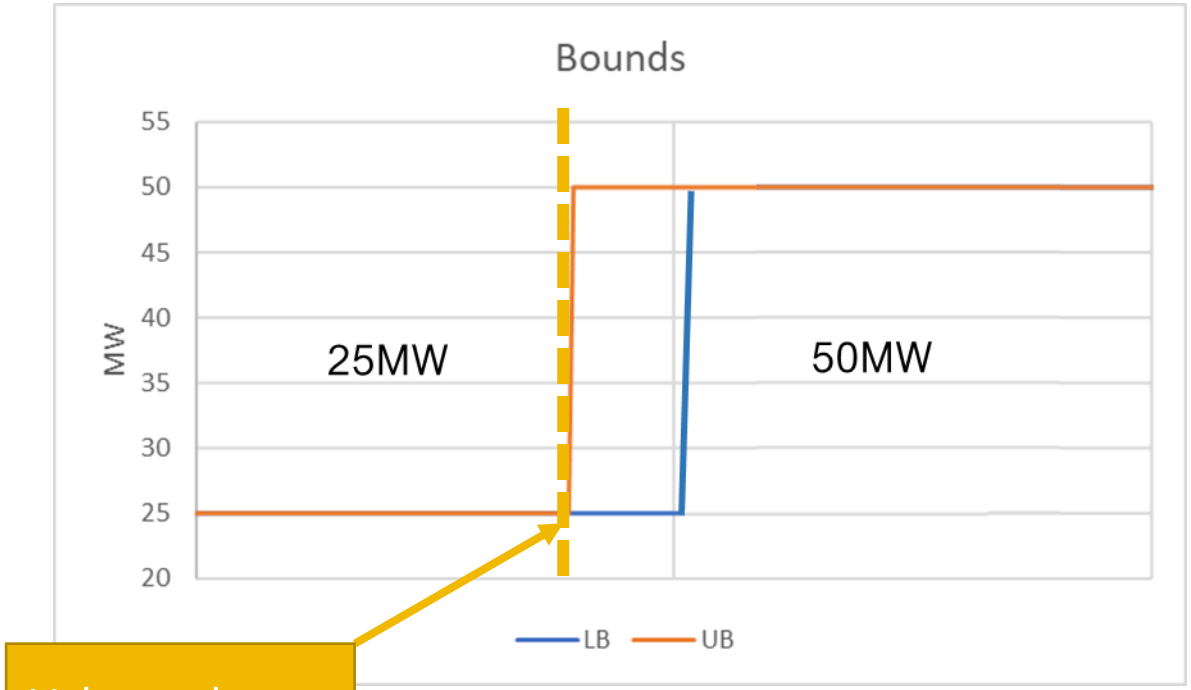
When a unit switches from unavailable to available the 0.55 seconds grace period will apply. This applies to every service within DC.

Availability flag change for DC L-only			
Contracted	from	to	Grace period
DC L-only	0	1	TRUE
DC L-only	0	2	FALSE
DC L-only	0	3	TRUE
DC L-only	1	2	FALSE
DC L-only	1	3	FALSE
DC L-only	2	1	TRUE
DC L-only	2	3	TRUE

Availability flag change DC H-only			
Contracted	from	to	Grace period
DC H-only	0	1	FALSE
DC H-only	0	2	TRUE
DC H-only	0	3	TRUE
DC H-only	1	2	TRUE
DC H-only	1	3	TRUE
DC H-only	2	1	FALSE
DC H-only	2	3	FALSE

Change Between Contracts (1s)

A change between contracts is defined as a change in P or Q. This change will provide a 1 second grace period where the Upper performance bound and the Lower performance bound will be calculated using whichever of the contracts gives the lower LB, and the higher UB.

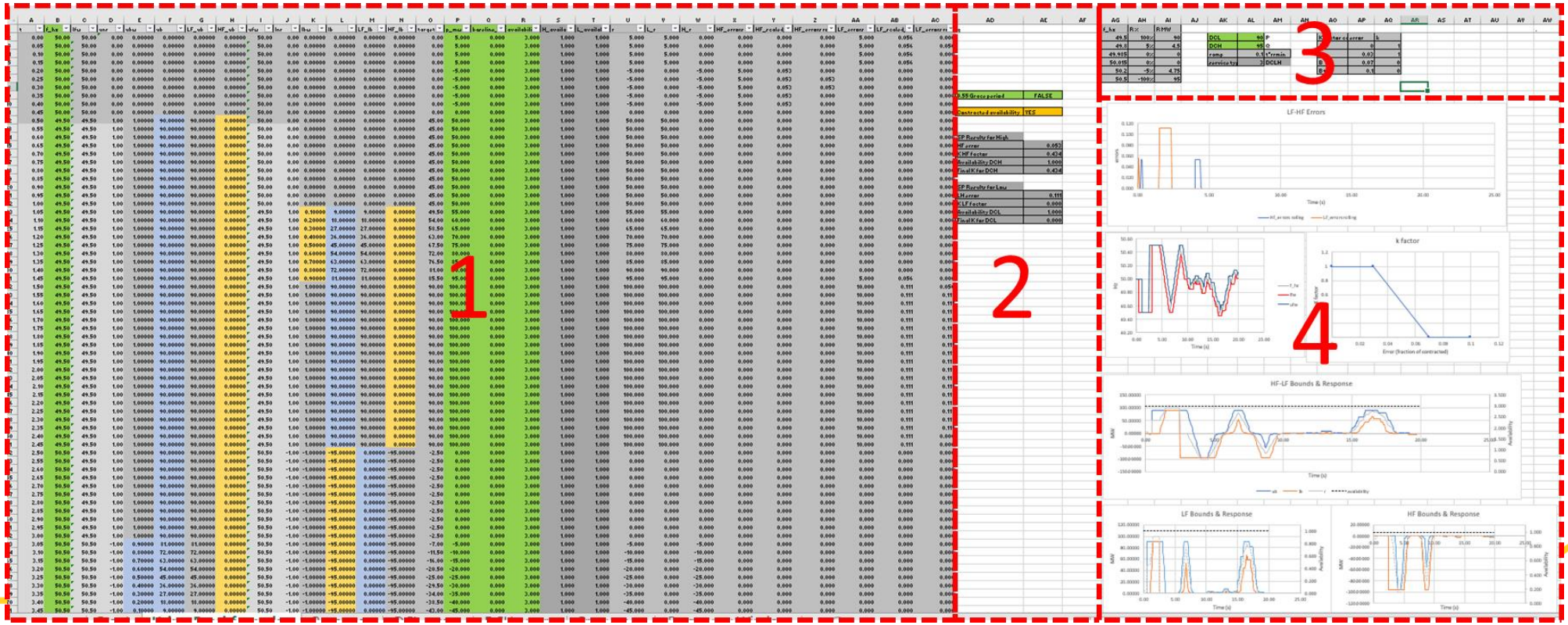



Examples

Excel Calculator

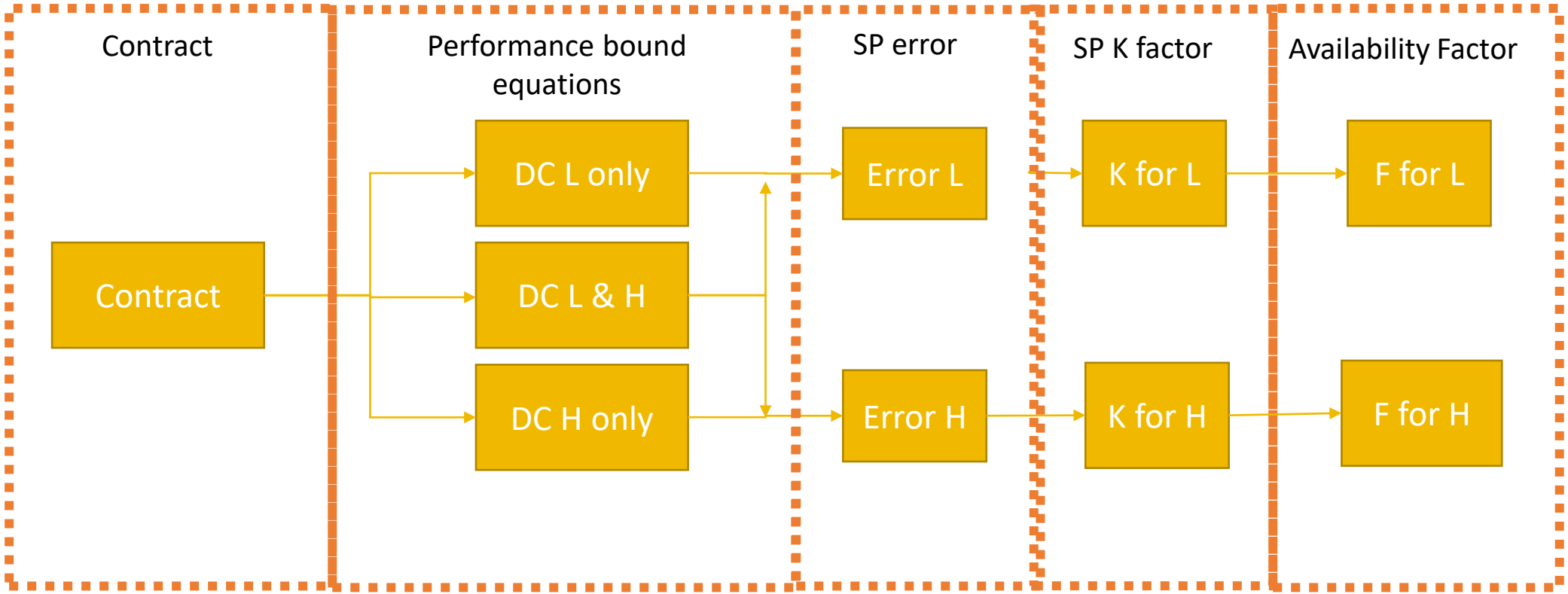
This excel sheet contains four sections:

- Section 1: Computation area, this is where all calculations take place.
- Section 2: Result area for DC low and high where applicable.
- Section 3: Contract and service information.
- Section 4: Output graphs



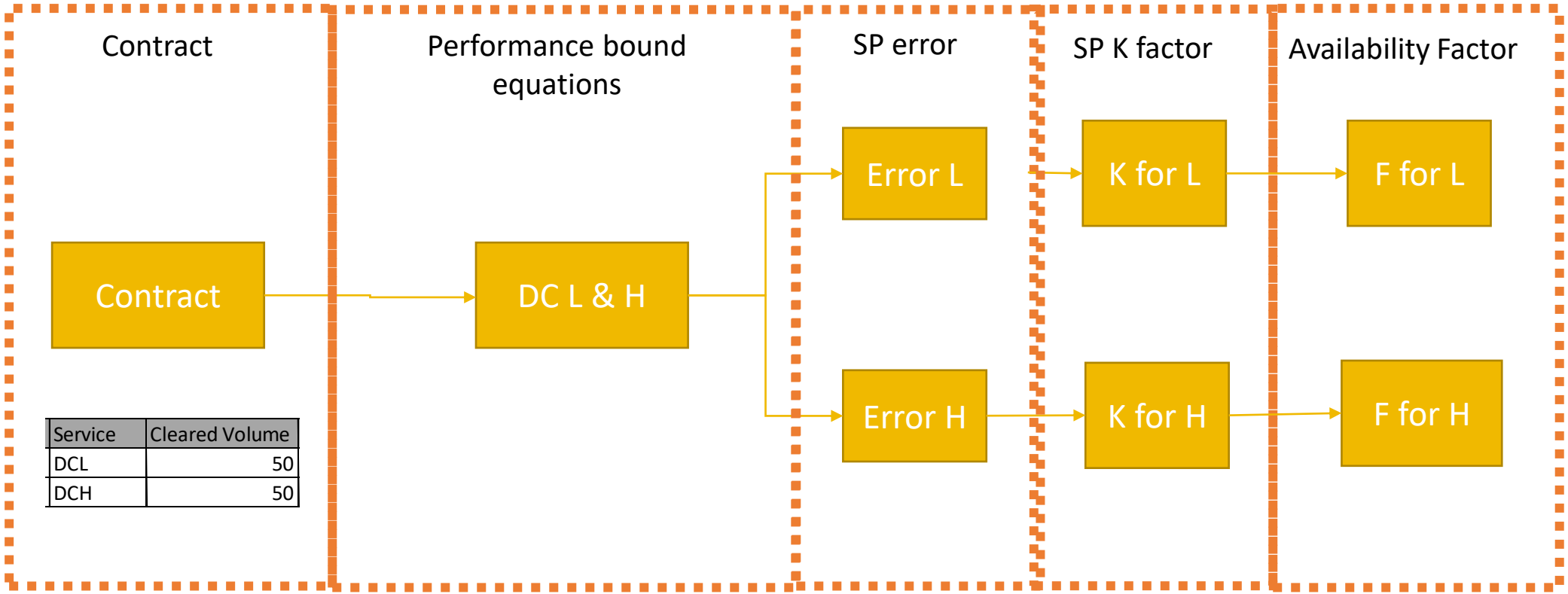
DCLH Example

Company	Unit Name	EFA Date	Delivery Start	Delivery End	EFA	Service	Cleared Volume	Clearing Price	Technology Type
COMPANY1	UNIT1	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCL	50	1	Battery
COMPANY1	UNIT1	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCH	50	1	Battery



DCLH Example

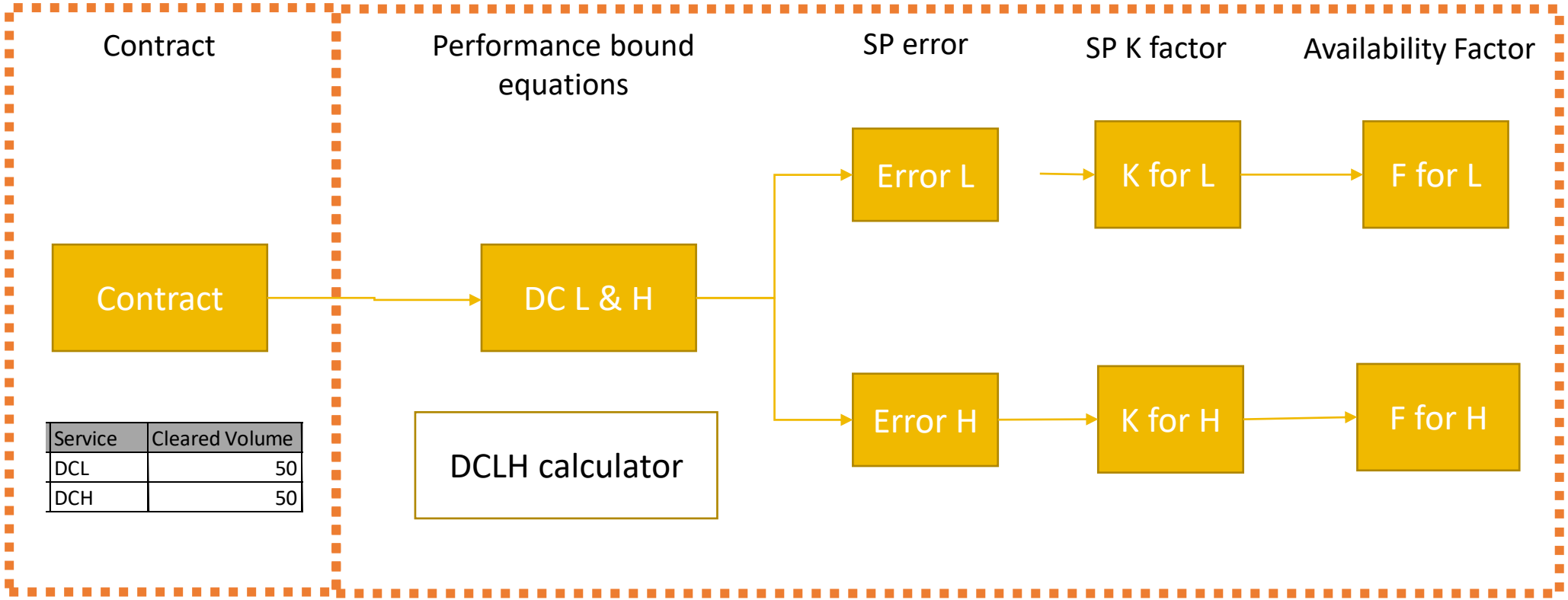
Company	Unit Name	EFA Date	Delivery Start	Delivery End	EFA	Service	Cleared Volume	Clearing Price	Technology Type
COMPANY1	UNIT1	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCL	50	1	Battery
COMPANY1	UNIT1	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCH	50	1	Battery



Service	Cleared Volume
DCL	50
DCH	50

DCLH Example

Company	Unit Name	EFA Date	Delivery Start	Delivery End	EFA	Service	Cleared Volume	Clearing Price	Technology Type
COMPANY1	UNIT1	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCL	50	1	Battery
COMPANY1	UNIT1	01/02/2022	31/01/2022 23:00	01/02/2022 03:00	1	DCH	50	1	Battery



DCLH Example

DCL	50	P
DCH	50	Q
ramp	0.1	t*rrmin
service type	3	DCLH

Service	Cleared Volume
DCL	50
DCH	50

DCLH calculator

Performance data

t	f_hz	p_mw	baseline_mw	availability
2022-01-31T23:00:00.000Z	50.00	0.000	0.000	3.000
2022-01-31T23:00:00.050Z	50.00	0.000	0.000	3.000
2022-01-31T23:00:00.100Z	50.00	0.000	0.000	3.000
2022-01-31T23:00:00.150Z	50.00	0.000	0.000	3.000

	A	B	P	Q	R	AD	AE
	t	f_hz	p_mw	baseline_m	availability		
	0.00	50.00	0.000	0.000	3.000		
	0.05	50.00	0.000	0.000	3.000		
	0.10	50.00	0.000	0.000	3.000		
	0.15	50.00	0.000	0.000	3.000		
	0.20	50.00	0.000	0.000	3.000		
	0.25	50.00	0.000	0.000	3.000		
	0.30	50.00	0.000	0.000	3.000		
	0.35	50.00	0.000	0.000	3.000	0.55 Grace period	FALSE
	0.40	50.00	0.000	0.000	3.000		
	0.45	50.00	0.000	0.000	3.000	Contracted availability	YES
	0.50	49.50	0.000	0.000	3.000		
	0.55	49.50	2.500	0.000	3.000		
	0.60	49.50	5.000	0.000	3.000	SP Results for High	
	0.65	49.50	7.500	0.000	3.000	HF error	0.000
	0.70	49.50	10.000	0.000	3.000	K HF factor	1.000
	0.75	49.50	12.500	0.000	3.000	Availability DCH	1.000
	0.80	49.50	15.000	0.000	3.000	Final K for DCH	1.000
	0.85	49.50	17.500	0.000	3.000		
	0.90	49.50	20.000	0.000	3.000	SP Results for Low	
	0.95	49.50	22.500	0.000	3.000	LH error	0.000
	1.00	49.50	25.000	0.000	3.000	K LF factor	1.000
	1.05	49.50	27.500	0.000	3.000	Availability DCL	1.000
	1.10	49.50	30.000	0.000	3.000	Final K for DCL	1.000

DCLH Example

Service	Cleared Volume
DCL	50
DCH	50

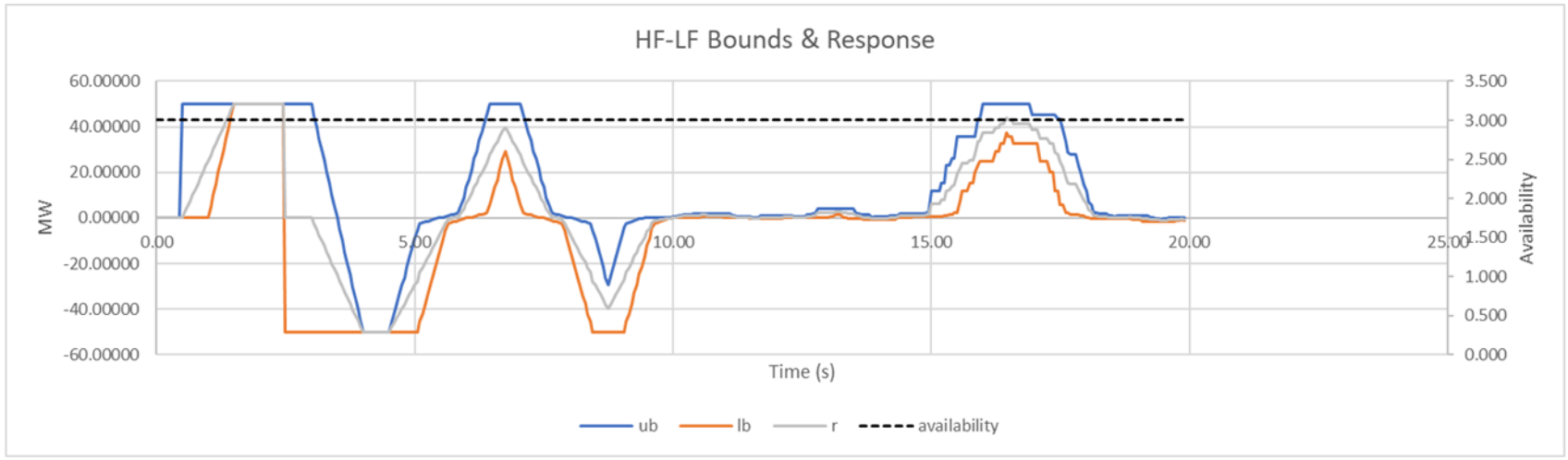
DCL	50	P
DCH	50	Q
ramp	0.1	t*rrmin
service type	3	DCLH

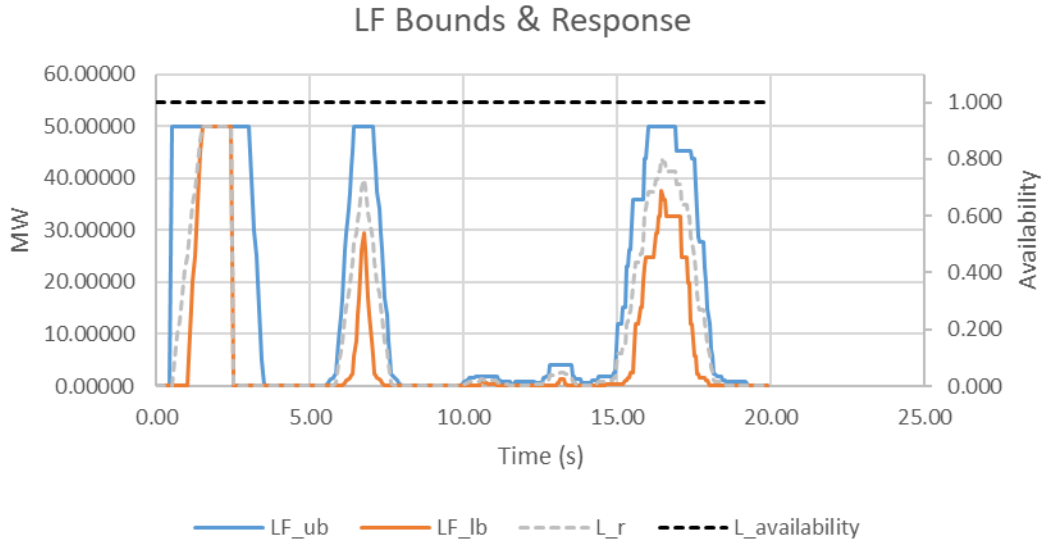
Performance data

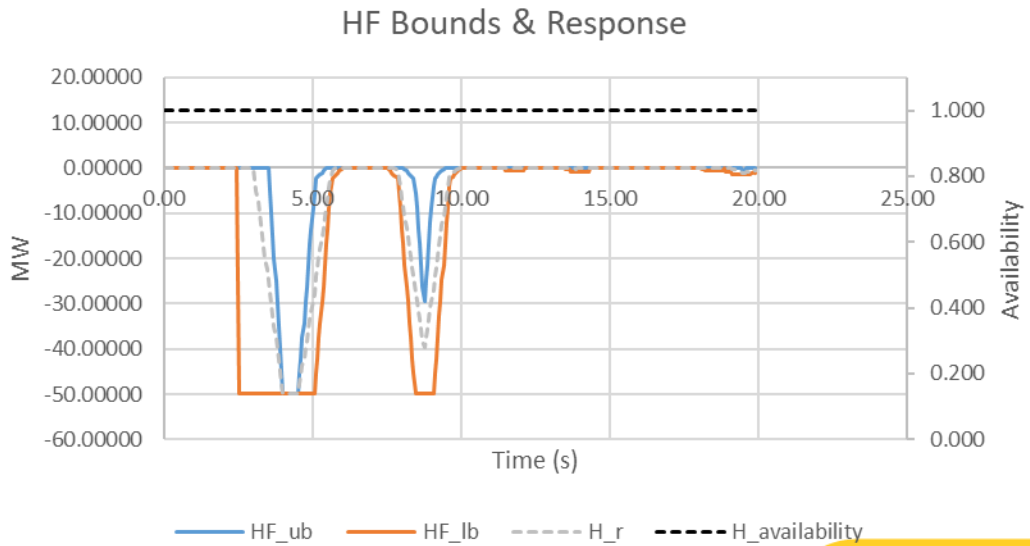
t	f_hz	p_mw	baseline_mw	availability
2022-01-31T23:00:00.000Z	50.00	0.000	0.000	3.000
2022-01-31T23:00:00.050Z	50.00	0.000	0.000	3.000
2022-01-31T23:00:00.100Z	50.00	0.000	0.000	3.000
2022-01-31T23:00:00.150Z	50.00	0.000	0.000	3.000

A	B	P	Q	R	AD	AE
t	f_hz	p_mw	baseline_m	availability		
0.00	50.00	0.000	0.000	3.000		
0.05	50.00	0.000	0.000	3.000		
0.10	50.00	0.000	0.000	3.000		
0.15	50.00	0.000	0.000	3.000		
0.20	50.00	0.000	0.000	3.000		
0.25	50.00	0.000	0.000	3.000		
0.30	50.00	0.000	0.000	3.000		
0.35	50.00	0.000	0.000	3.000	0.55 Grace period	FALSE
0.40	50.00	0.000	0.000	3.000		
0.45	50.00	0.000	0.000	3.000	Contracted availability	YES
0.50	49.50	0.000	0.000	3.000		
0.55	49.50	2.500	0.000	3.000		
0.60	49.50	5.000	0.000	3.000	SP Results for High	
0.65	49.50	7.500	0.000	3.000	HF error	0.000
0.70	49.50	10.000	0.000	3.000	K HF factor	1.000
0.75	49.50	12.500	0.000	3.000	Availability DCH	1.000
0.80	49.50	15.000	0.000	3.000	Final K for DCH	1.000
0.85	49.50	17.500	0.000	3.000		
0.90	49.50	20.000	0.000	3.000	SP Results for Low	
0.95	49.50	22.500	0.000	3.000	LH error	0.000
1.00	49.50	25.000	0.000	3.000	K LF factor	1.000
1.05	49.50	27.500	0.000	3.000	Availability DCL	1.000
1.10	49.50	30.000	0.000	3.000	Final K for DCL	1.000

DCLH Example

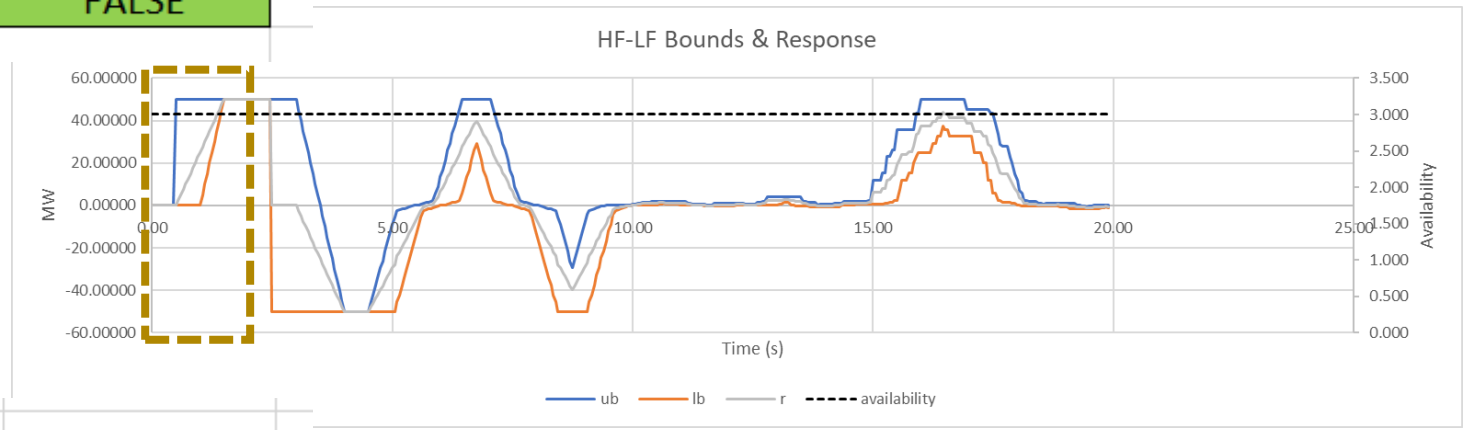




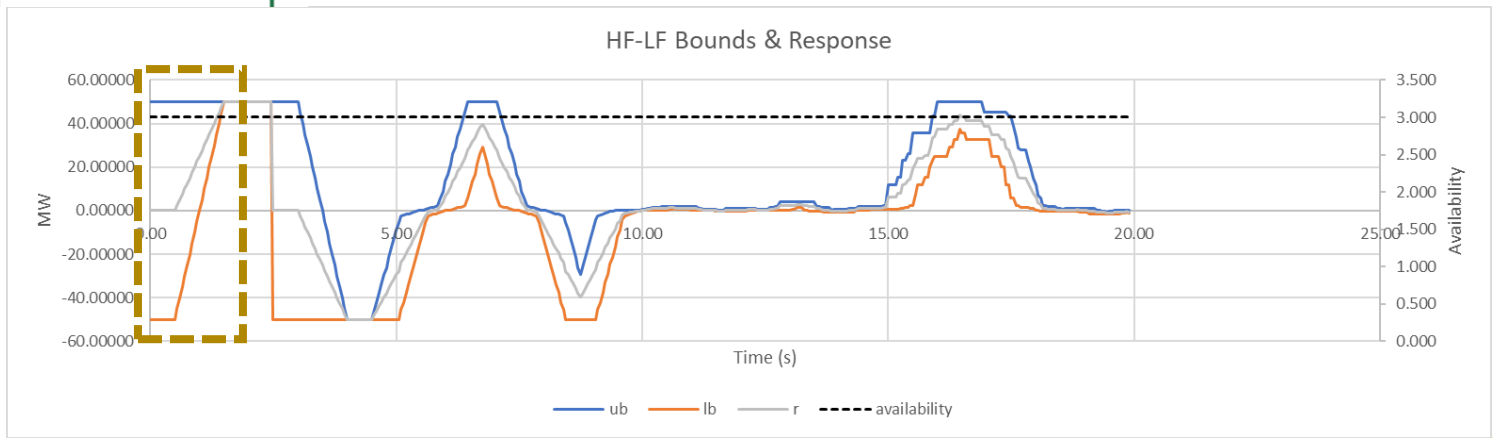


DCLH Example

0.55 Grace period	FALSE



0.55 Grace period	TRUE




A.O.B

Application of ABSVD for units participating in DC

NBM units

- We do not currently apply ABSVD for NBM units in DC
- Application of ABSVD for NBM units will begin in the near future, when DC is implemented in the new settlement system that is currently under development
- This will make adjustments going forwards with no backdating prior to the new system being implemented

BM units

- ABSVD is applied for BM units
- Due to a technical issue, the process did not run for a period of time in 2021
- All ABSVD data has now been submitted to Elexon from April 2021 onwards

Performance monitoring for DR and DM

Highlights

- Technical requirements around performance monitoring are included in the service terms.
- In the coming days, before the services launch, the ESO will confirm when we will start sharing performance monitoring data with providers.
- Once the services go live, we are considering giving providers a grace period during which performance monitoring data will be shared but penalties will not apply. We want to ensure all providers are clear on the performance monitoring methodology used and have the chance to review their data before penalties are applied. We will provide more information on the grace period soon.

Linear Order file

- Current format of “DC Linear Orders Master Data 2021-2022” on ESO Data Portal:

These fields describe the volume and price data of the ESO Buy Order

Table | Chart | Map

dl	TradeID	EFA	DeliveryStart	DeliveryEnd	ExecutedVolume	1P	1V	2P	2V	3P	3V	4P	4V
027 951	100000000272951	1	2022-03-19T23:00:00	2022-03-20T03:00:00	568	0	568	17	568	17	0	999.99	0
027 953	100000000272953	2	2022-03-20T03:00:00	2022-03-20T07:00:00	651	0	651	17	651	17	0	999.99	0
027 955	100000000272955	3	2022-03-20T07:00:00	2022-03-20T11:00:00	640	0	791	17	791	17	0	999.99	0

- We will soon include additional fields in this file (“5P”, “5V”, “6P”, “6V”, etc.). The number of these fields that will be populated with data will vary from day to day, we do not expect to exceed “50P” and “50V”.
- This change will be reflected in the downloadable .csv file, the API, and the .html table displayed on the data portal web page. We anticipate this change to take effect on **Monday 28th March 2022**.
- After launch of Dynamic Regulation and Dynamic Moderation, the Dynamic Containment Datasets (i.e., Block Orders, Linear Orders, Results by Unit, and Results Summary) will also contain data records pertaining to the DML, DMH, DRL, and DRH products. This change will take effect from Friday 25th March 2022.

Q&A

Please submit your questions via Teams chat

If you have further questions or feedback, please send them to:
settlement.queries@nationalgrideso.com