

“Beyond ancillaries”

Timera GB BESS webinar

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'Beyond ancillaries' webinar scope

Agenda

1. Market drivers

- Wholesale pricing
- Balancing pricing
- Ancillary pricing

2. Value drivers

- DC to energy arbitrage
- Revenue backtesting
- Key risks & value drivers

3. Q&A

Speakers

David Stokes
(Managing Director)



Steven Coppack
(Director Power)



Rosie Read
(Director Energy Transition)



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About Timera Energy

Specialist energy consultancy

Focus on power, gas & hydrogen

Extensive industry expertise

Practical knowledge from senior industry roles

Pragmatic commercial focus

Covering investment, value monetisation & market analysis

Strong client base

Leading energy companies (e.g. producers, utilities, traders, funds)

Leading industry blog

30,000+ regular readers, publications, conferences

Timera clients include



What does Timera do?

BESS consulting advice

- BESS revenue analysis (e.g.GB, DE, FR, NL, BE, IT, ES)
- Market & price analysis
- Transaction support & DD
- Investment targeting
- Offtake structuring
- Trading performance benchmark

Battery subscription service

- Investment tool updated (Qtrly)
- GB BESS Report (Bi-annual)
- Bespoke workshop (Bi-annual)

Examples of client work

Project	Client	Description
1. GB BESS	Infra Fund	Commercial due diligence & BESS portfolio valuation to support bid for large GB BESS portfolio.
2. BESS investment	IPP	Market & margin analysis to support 1GW+ pipeline of GB BESS asset development.
3. Scottish BESS	Fund	Analysis of revenue stack & congestion returns for large portfolio of Scottish BESS assets.
4. Flex co-location	Fund	Analysis of value & risk benefits of co-locating UK storage & engines with solar/wind portfolios.
5. Storage investment	Fund	Commercial DD advisor & valuation analysis for bid on 2GW UK battery portfolio.
6. Flex monetisation	Utility	Trading strategy & optimisation advice for large portfolio of UK gas engines & batteries.
7. Battery valuation	Aggregator	Value capture & optimisation analysis & advice for operational UK portfolio of batteries.
8. PPA / market access	Fund	Advising on competitive selection process & structure for UK flex asset PPA & market access.

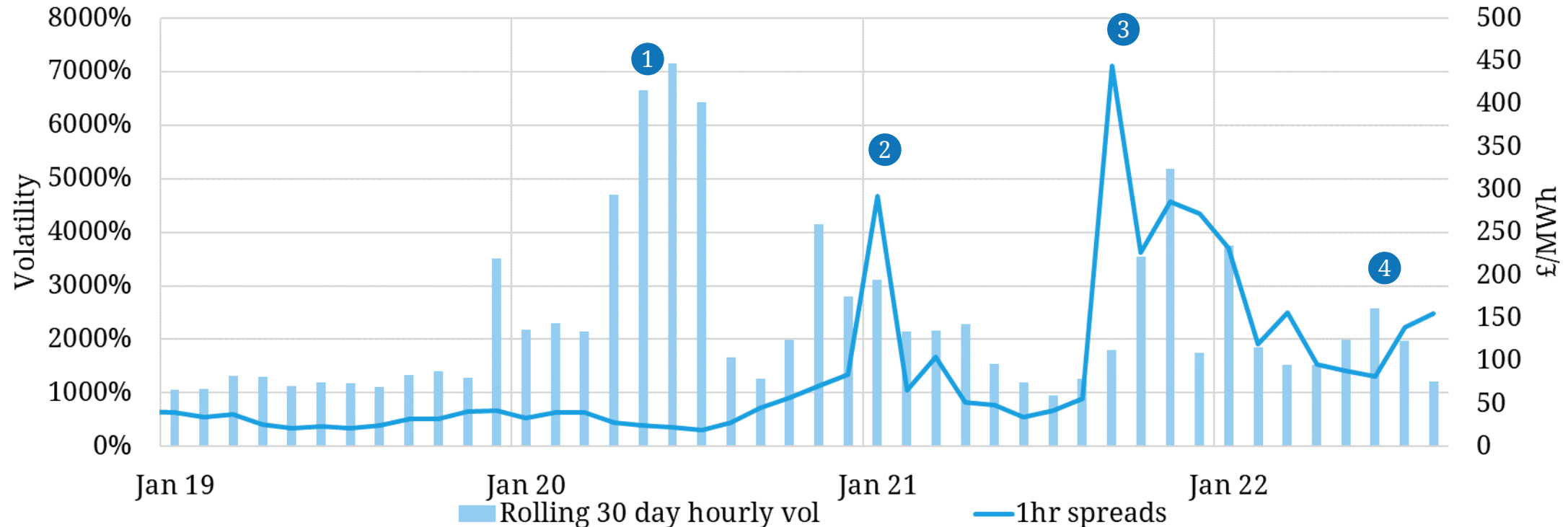
Market drivers

Prices signaling flex shortfall

Sharp rise in vol since Q1-2020 onwards

- 1 Covid lockdown drives vol, oversupplied market suppresses spreads
- 2 IFA outages & supply shortfall (nuclear, CCGT)
- 3 Low wind, rapidly rising gas prices & tight margins
- 4 Russian gas disruption, low FR nuclear balance and low European hydro stocks

Evolution of GB daily price spreads & historical volatility



Rising price shape & spreads

Average price spreads have increased YoY

- Price shape has become significantly more volatile YoY
- Average 1hr price spreads across 2022 have exceeded £120/MWh

Summer Day-Ahead price shape evolution

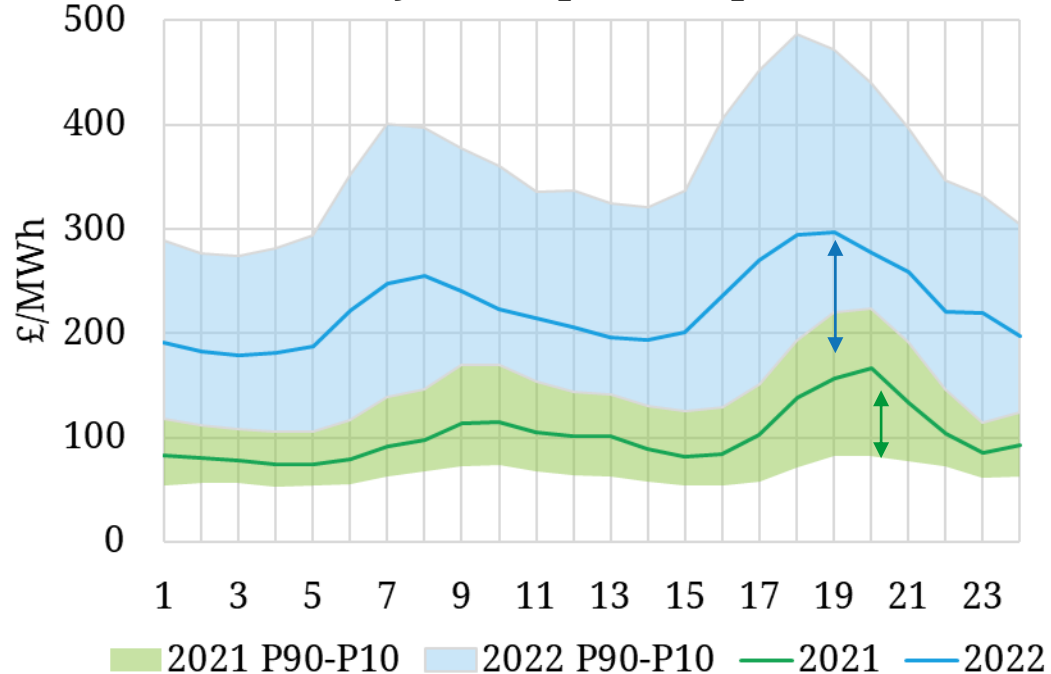


Chart compares the average price shape observed across Summer 22 compared to the range of prices and the price shape observed in the previous year

Summer 22 price spread duration curve

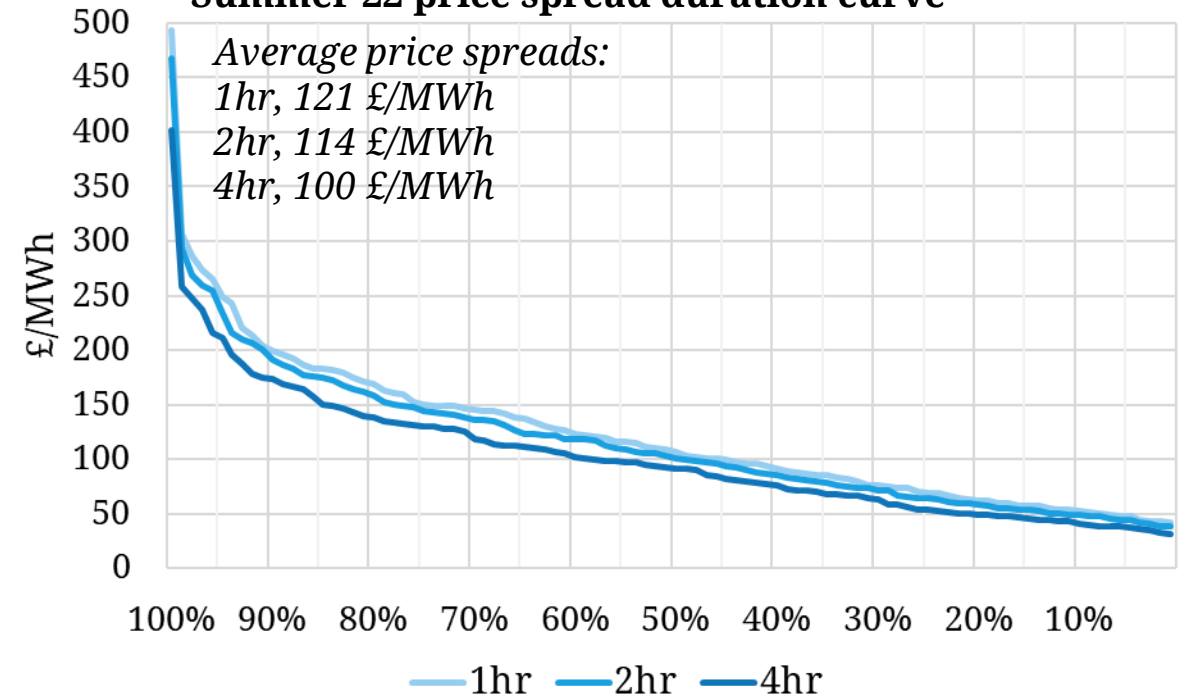


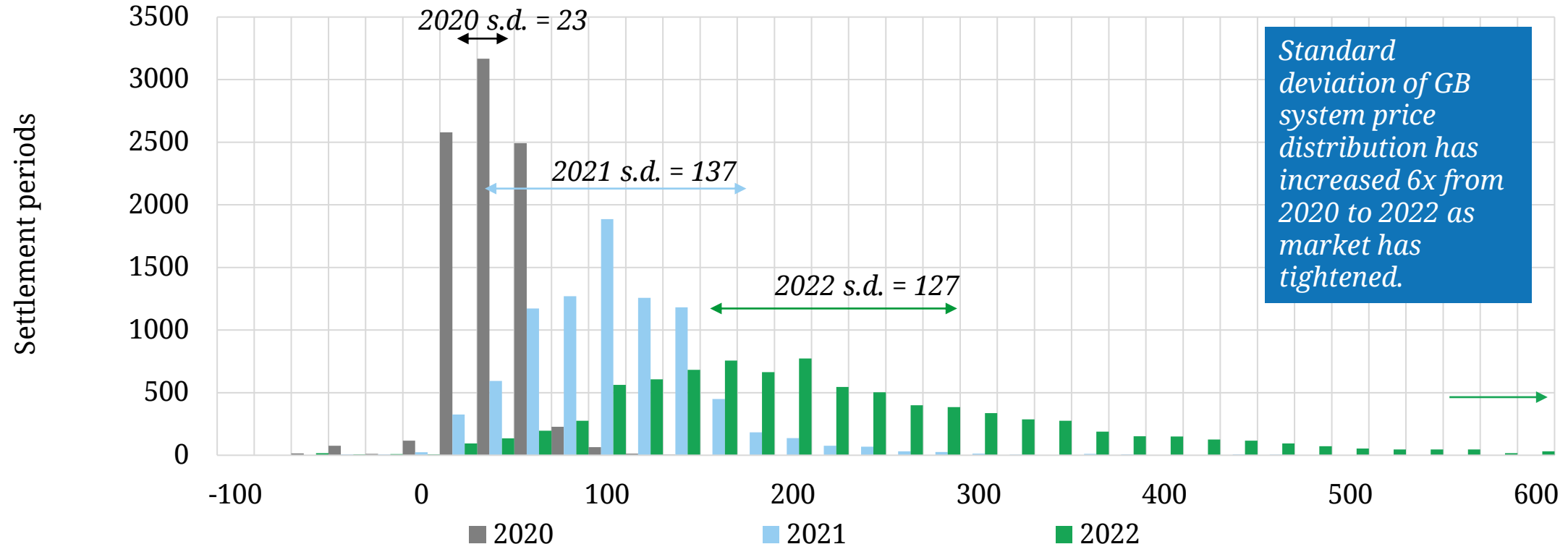
Chart shows the price-duration-curve of the widest hourly price spreads in the Day-Ahead auction across the 2022 summer 6 months.

System price distribution broadening

System prices are becoming more volatile

- Since 2020, system price distributions have become significantly broader
- S.D. of system prices has increased 6 fold since 2020, driving BESS opportunities

Summer system price distributions (2020-22)

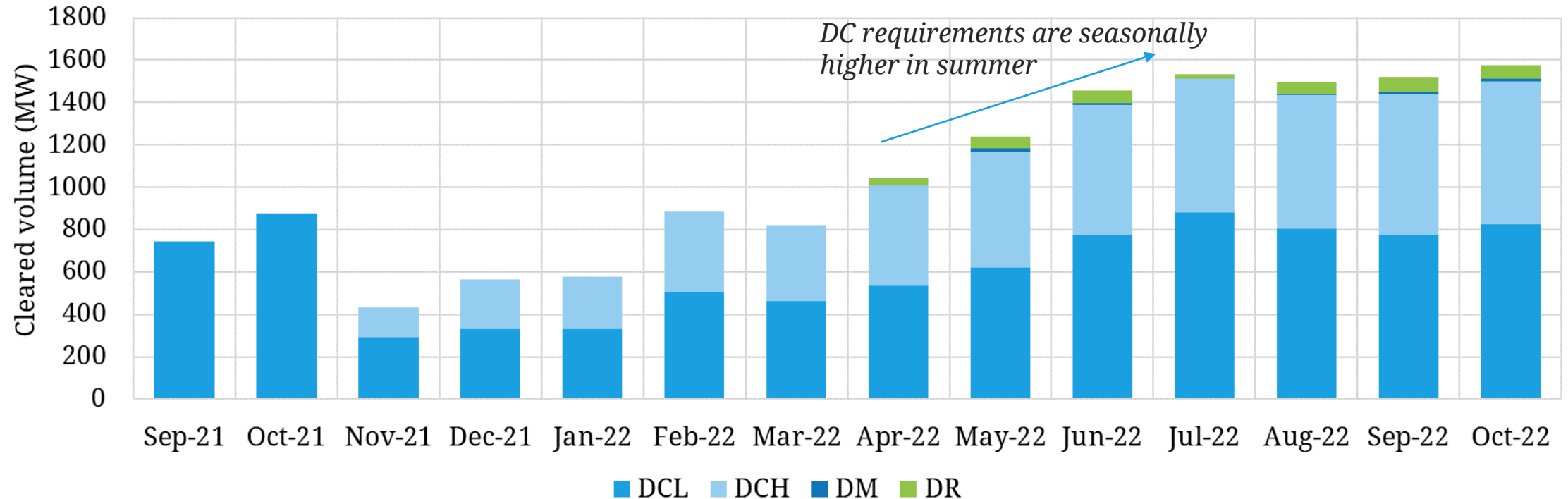


Dynamic Containment volumes grew across S22

“Dynamic” ancillary service volumes reach a monthly max of 1600MW

- DC volumes have increased sharply across Summer 22 on rising BESS capacity and increased summer demand
- DC volumes projected to fall across Winter 22 as seasonal requirement decreases

Monthly clearing volume in DC, DR and DM

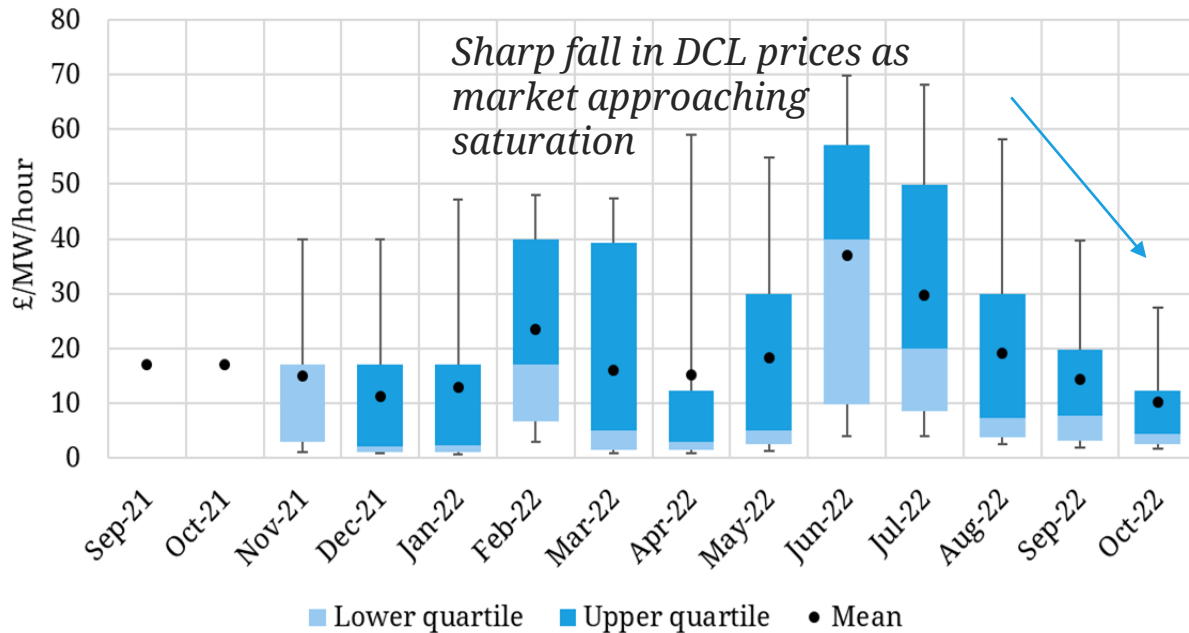


DC returns falling from highs

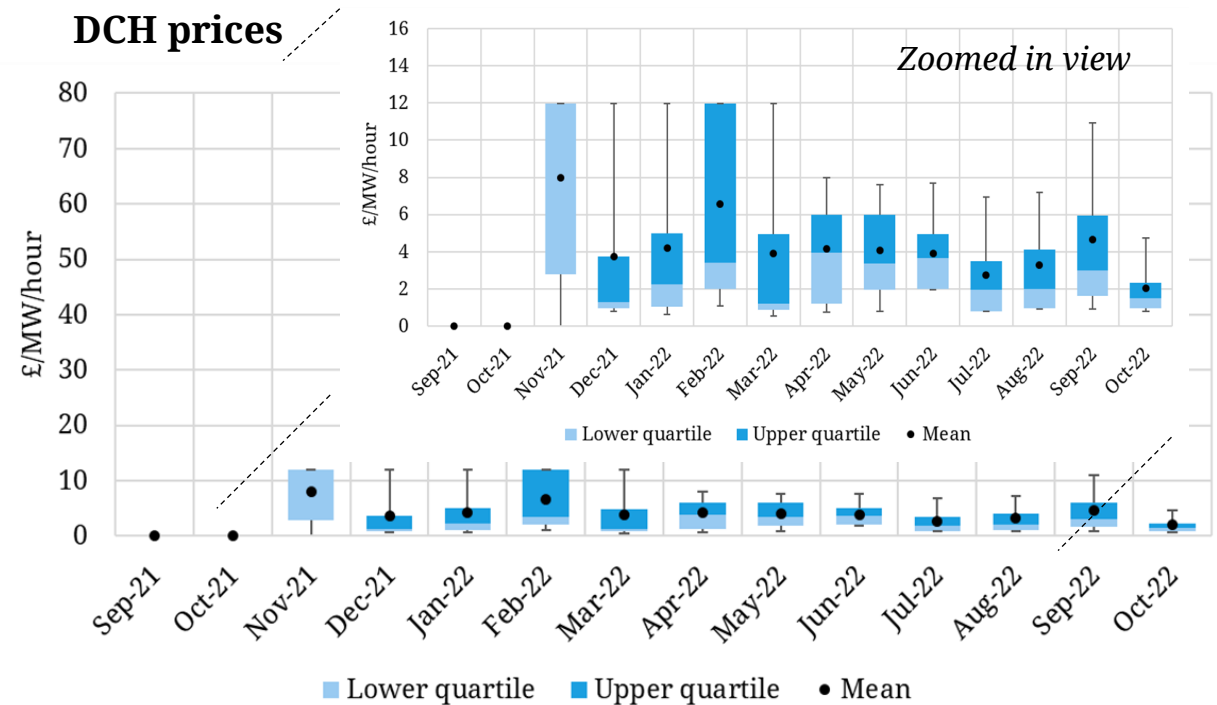
DC capacity fees fall sharply from July 22

- DCH prices clearing at a substantial discount to DCL.
- A combination of energy crisis driven market stress and low wind output drove up DCL prices in Jun – Jul 2022.
- But average DCL prices have fallen almost 75% from Jun to Oct with evidence of saturation.

DCL prices



DCH prices

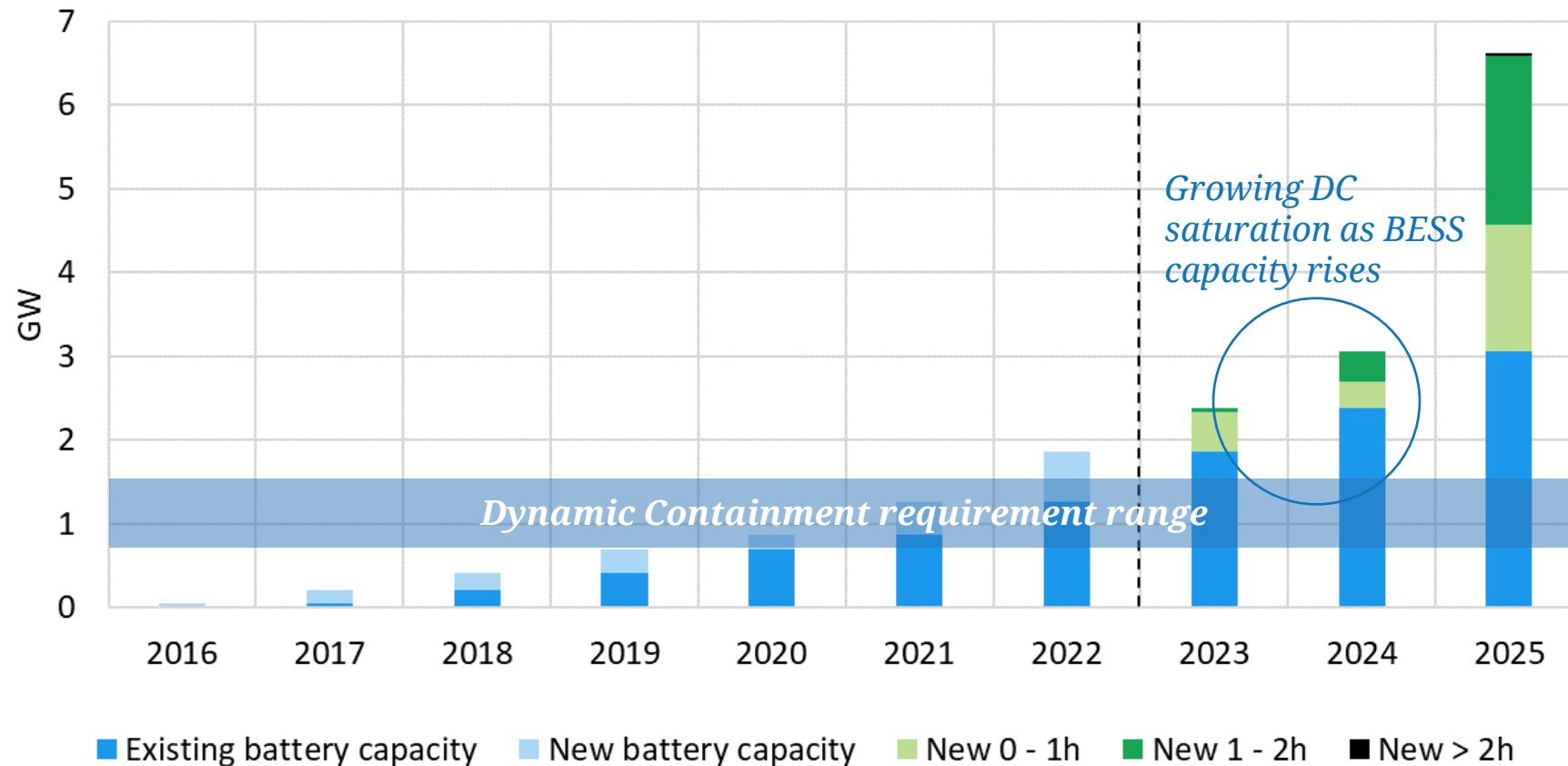


Value drivers

DC saturation = transition to energy arbitrage

BESS capacity growth rapidly swamping ancillary service demand

- Combined DC service (DCH + DCL) demand mostly within a 0.8-1.5GW range across 2021-22
- BESS capacity set to grow above 3GW by the 2024 capacity year and to over 6GW by 2025.



Back-testing BESS revenues

What backtest have we chosen today?

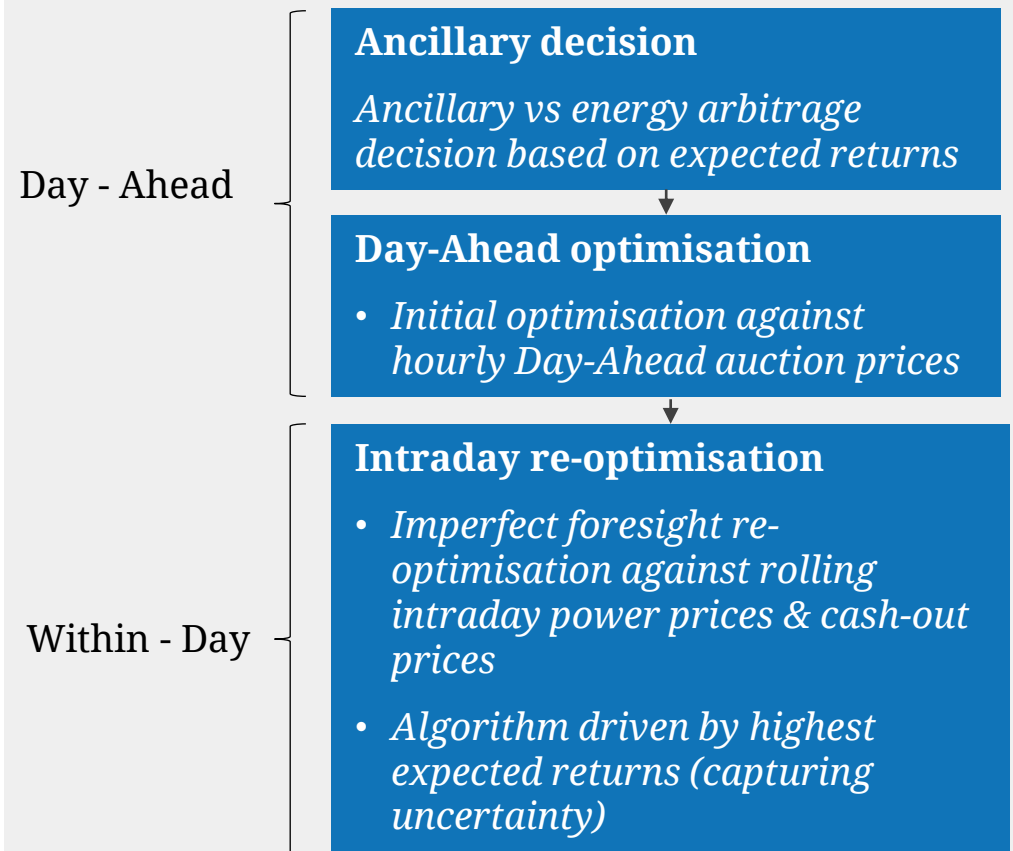
- Configuration: 2 hr duration; grid connected; 88% RTE
- Two optimisation strategies
 1. Pure energy arbitrage
 2. Pure DC
- Focus on revenue capture in a post DC saturated world

BESS modelling principles

Driver	Detail
Value objectivity	Optimised against published DC, DA, WD & cashout prices
Captures real conditions	Reflects imperfect foresight, price uncertainty & limited liquidity
Benchmark externally	Analysis regularly benchmarked against actual optimiser returns

Timera BESS back-testing algorithm

For each trading day

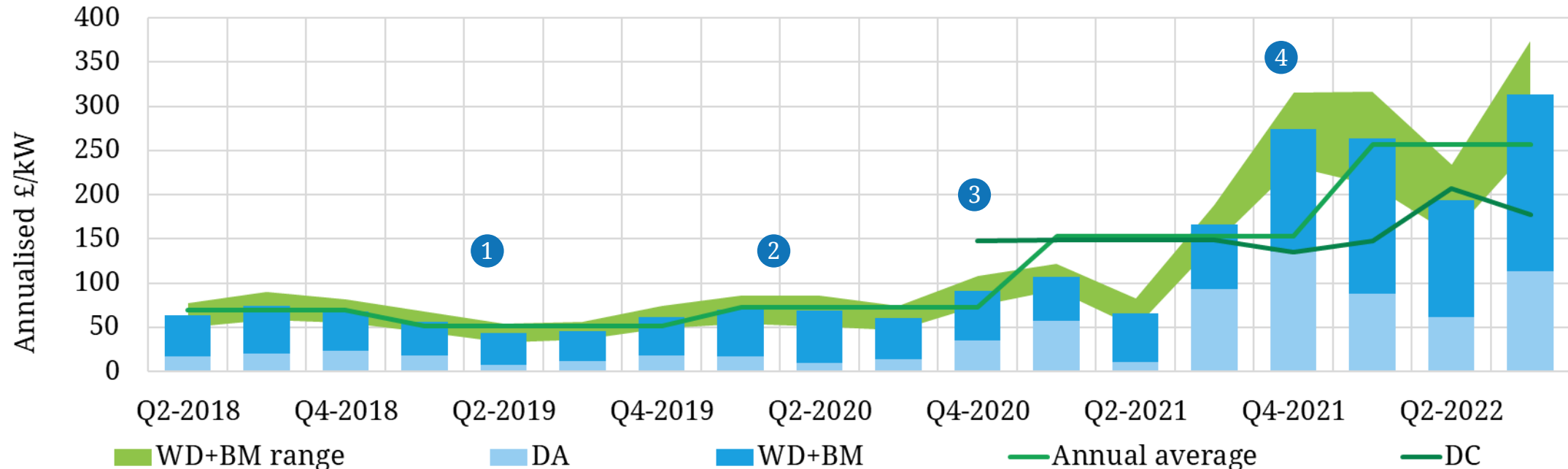


BESS energy arbitrage revenues surge since Q4-21...

2hr battery revenues increase to significantly above LRMC from 2021 onwards

- 1 Relatively well supplied markets weigh on BESS returns
- 2 Covid lock downs weigh on DA spreads, shifting value to WD & BM optimisation
- 3 New Dynamic Containment products launch, shifting value further into ancillary services
- 4 Q4-21 onwards, potential energy market value exceeds pure dynamic containment strategy

Back-tested battery revenues, 2hrs @88% RTE



Battery service

What does the Battery Service include?

A. Battery Investment Tool (Quarterly)

Highly configurable Tool to allow you to value wide range of GB BESS assets

B. Storage Report (Bi-annual)

Latest data driven analysis & conclusions to support commercial & investment decision making

C. Talk to the experts (Bi-annual)

'One on one' workshop with Timera's team of storage experts

HIGHLY CONFIGURABLE TOOL

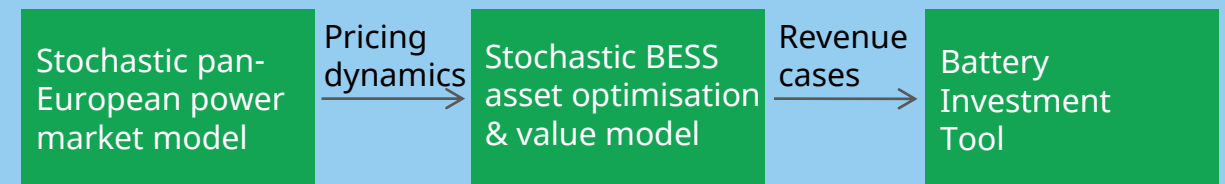
Core assumptions user can define by asset

Capacity (MW)	Duration (hours)	Location (zone)	Voltage (level)	Timing (date)	Margin case (%)
135	1	1	TC	online Sep 25	P90
		2	EHV		
	2	.	HV	Mean	
	4	40	LV	P10	
		41		start Jan 24	
<i>user defines</i>	<i>user selects</i>	<i>user selects</i>	<i>user selects</i>	<i>user defines</i>	<i>user selects</i>

Other sensitivities

- Efficiency
- Cell degradation
- Cell replacement (% degradation)
- Optimisation strategy

UNDERPINNED BY SOPHISTICATED MODELLING



5 Key GB BESS risks

Takeaway	Description
1. DC Saturation	<ul style="list-style-type: none">• BESS capacity is projected to exceed requirements for ancillary services across 2023• Dynamic Containment returns already fallen 50% from Summer 22 peak
2. Market easing	<ul style="list-style-type: none">• Current market returns supported by tight supply margins in GB and Europe & gas market volatility• Pace of market easing across 2023-2026 will impact front year BESS returns
3. Supply chain crunch	<ul style="list-style-type: none">• Global demand for BESS and stretched supply chains slowing deployment of BESS and boosting CAPEX
4. BESS pipeline	<ul style="list-style-type: none">• Over 4.7GW of new BESS supported across capacity auctions 2023-2025• Risk of BESS deployment outpacing capacity requirements & RES deployment
5. REMA & policy review	<ul style="list-style-type: none">• Potential changes in locational & capacity price signals

5 key takeaways

Takeaway	Description	Value impact
1. Crisis driving up BESS returns	<ul style="list-style-type: none"> Surge in energy arbitrage revenues underpinning BESS revenue stack 	Value support
2. Market signalling flex shortage	<ul style="list-style-type: none"> GB market pricing signalling structural shortage of flexible capacity i.e. more BESS required 	Value support
3. DC revenues high but eroding	<ul style="list-style-type: none"> DC revenues have been strong, but emerging signs of erosion & transition to energy arbitrage 	Value risk
4. BM returns rising	<ul style="list-style-type: none"> Strong rise in BM price volatility; BM importance to rise as DC revenues erode 	Value support
5. BESS pipeline, capex & REMA	<ul style="list-style-type: none"> Strong BESS growth in 2025, caveat supply chain & capex issues; evolving impact of REMA review 	Value risk

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