Investment Policy Conclusions

Net Zero Market Reform programme

4 July 2023

ESO

Welcome and opening remarks

Claire Dykta
Director of Markets
Electricity System Operator
(ESO)

Agenda

Time	Session
09:30-09:40	Welcome and opening remarks Speaker: **Claire Dykta**, Director of Markets, ESO
09:40-10:00	ESO presentation: **Net Zero Market Reform to date** Speaker: **Cian McLeavey-Reville**, Head of Markets Development, ESO
10:00-10:50	Panel discussion: **How should investment policy evolve to support a net zero market** Chair: **Isabel Sunnucks**, Market Strategy Co-Manager, ESO Speakers: • **James Samworth**, Partner, Schroders Greencoat • **Rachel Fletcher**, Director of Regulation and Economics, Octopus Energy • **Andrew McAleavey**, Founder and COO, Penso Power Ltd

Agenda

Time	Session
10:50-11:10	Break
11:10-11:40	ESO presentation: **Net Zero Market Reform assessment of investment policy** Speaker: **Sarah Keay-Bright**, Market Strategy Co-Manager, ESO
11:40-12:20	Q&A with ESO Moderator: **Cian McLeavey-Reville**, Head of Markets Development, ESO Speakers: • **Sarah Keay-Bright**, Market Strategy Co-Manager, ESO • **Isabel Sunnucks**, Market Strategy Co-Manager, ESO • Market Strategy team
12:20-12:30	Concluding remarks Speaker: **Cian McLeavey-Reville,** Head of Markets Development, ESO

ESO Net Zero Market Reform to Date

Cian McLeavey-Reville

Q&A: please add questions using the Teams Q&A function.

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We continue to examine the holistic changes needed to GB electricity market design, informed by our unique position as system operator

1 Our current electricity market was not designed for the high-renewable, flexible, low carbon system being developed in GB, and requires reform to avoid risking delivery of our carbon targets

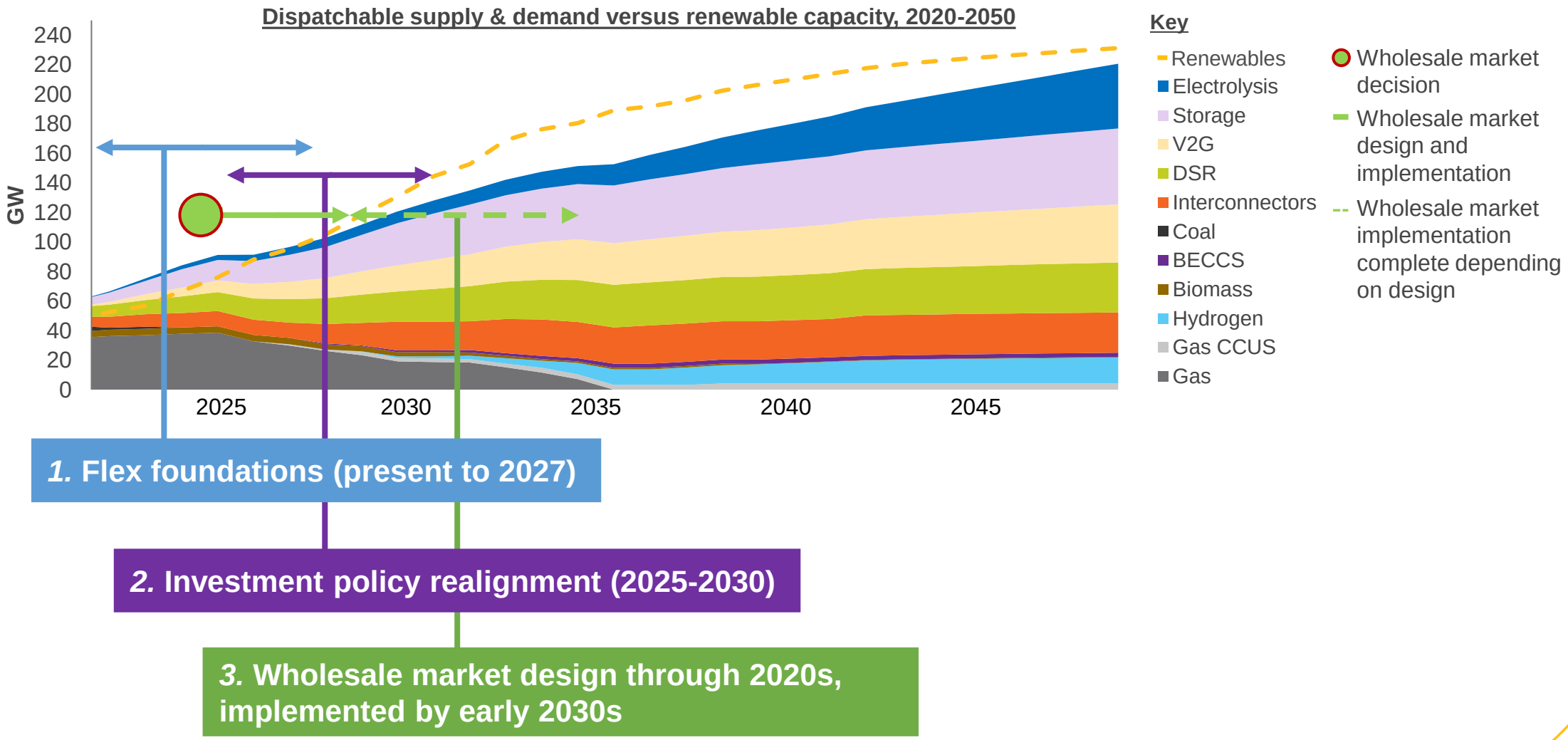
2 **NZMR findings:**

1. Greater transmission network investment, wholesale market reform, and changes to investment policy are all needed urgently
2. In the wholesale market, locational marginal pricing is needed to support efficient operation of the future system and would deliver significant socioeconomic benefits
3. The Contracts for Difference and Capacity Mechanism designs must be adapted to better integrate with real time system needs

3 **Considerations for the transition:**

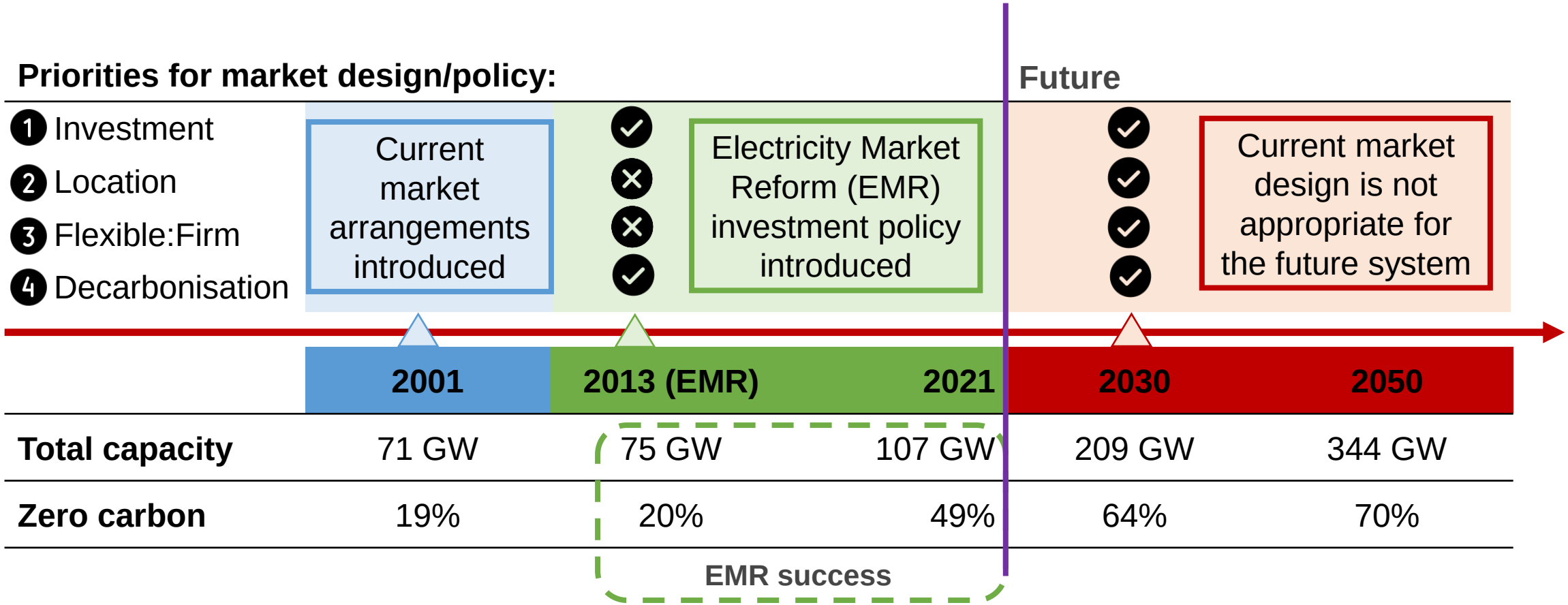
- Clarity on the direction of reform, a clear transition pathway, and arrangements to protect existing investments are needed to maintain necessary investor confidence
- Multiple options exist to mitigate concerns around the distributional impacts of market reform on residential consumers

Our holistic long-term vision for GB electricity market design emerges from three key implementation phases



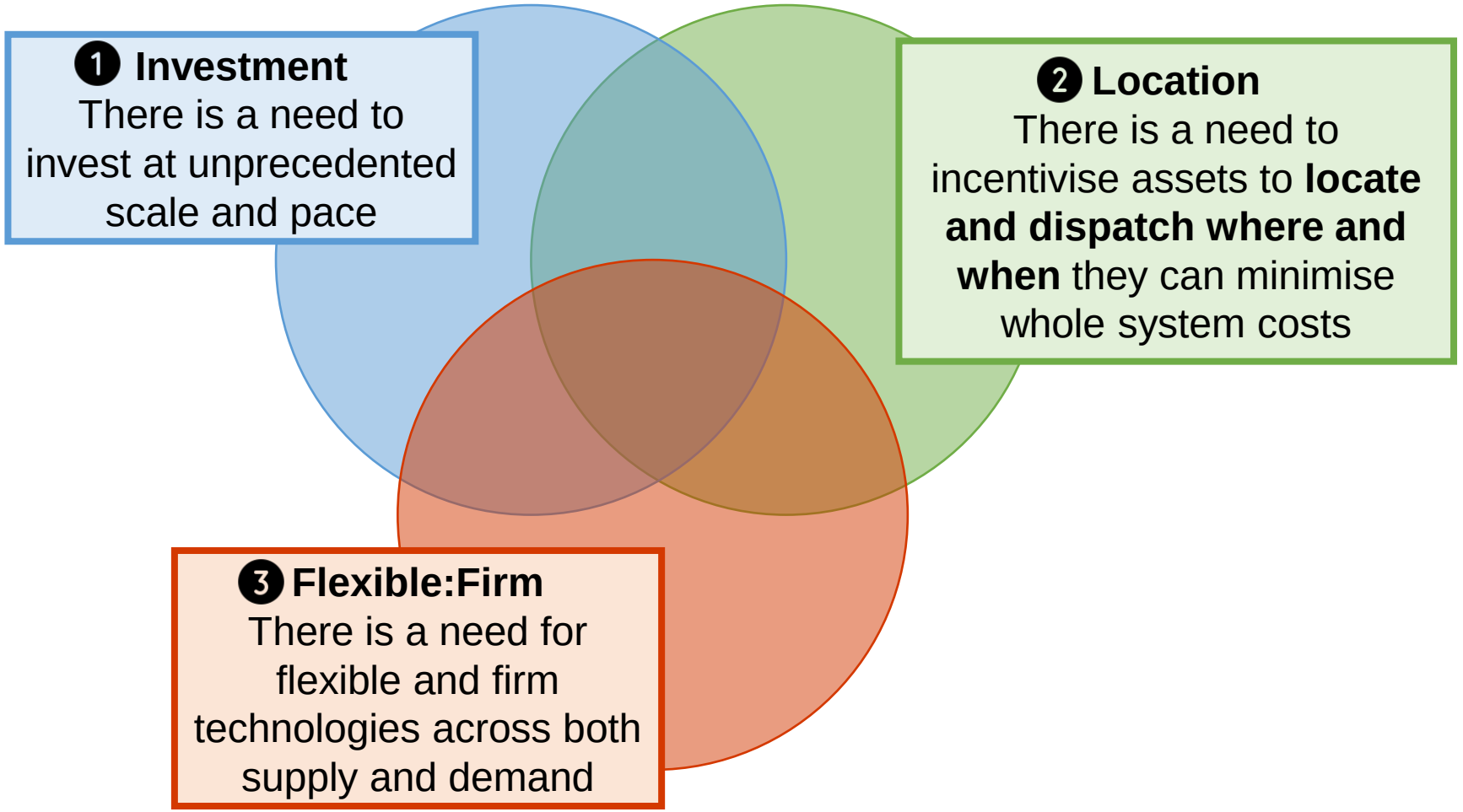
Note: Year ranges represent illustrative implementation dates

Our current market was not designed for a high-renewable, flexible, low carbon system, and requires reform for net zero



Source: DUKES 5.8 ,Ofgem; FES2022 Note: Zero carbon includes nuclear, renewables, but not storage, interconnectors

Our ‘Case for Change’ identified three key challenges facing the GB electricity market that need to be addressed by reform



Real time price signals underpin investment decisions. To mitigate distortions, decisions on wholesale market design should precede investment policy decisions

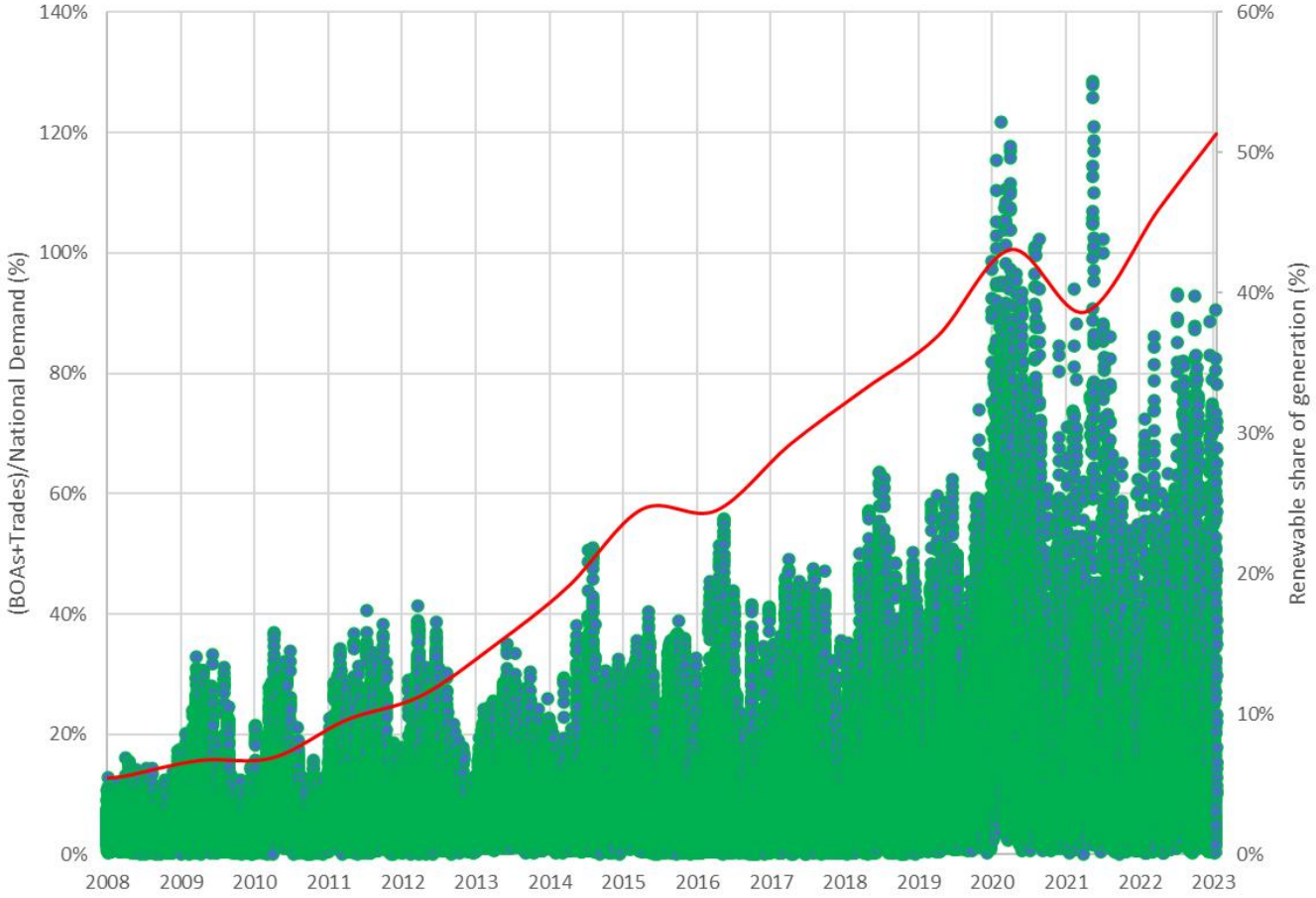
Our assessment order

Wholesale market design	Investment policy	Operability and more
Decide on design of spot/balancing markets	**Determine what investment policy support is needed** to address missing money not provided by spot market prices **Ensure investment support is aligned with spot/ balancing markets**	**Determine remaining operability requirements**

Wholesale market assessment

Increasing ESO redispatch actions indicate the link between wholesale market incentives and real-time system needs is broken

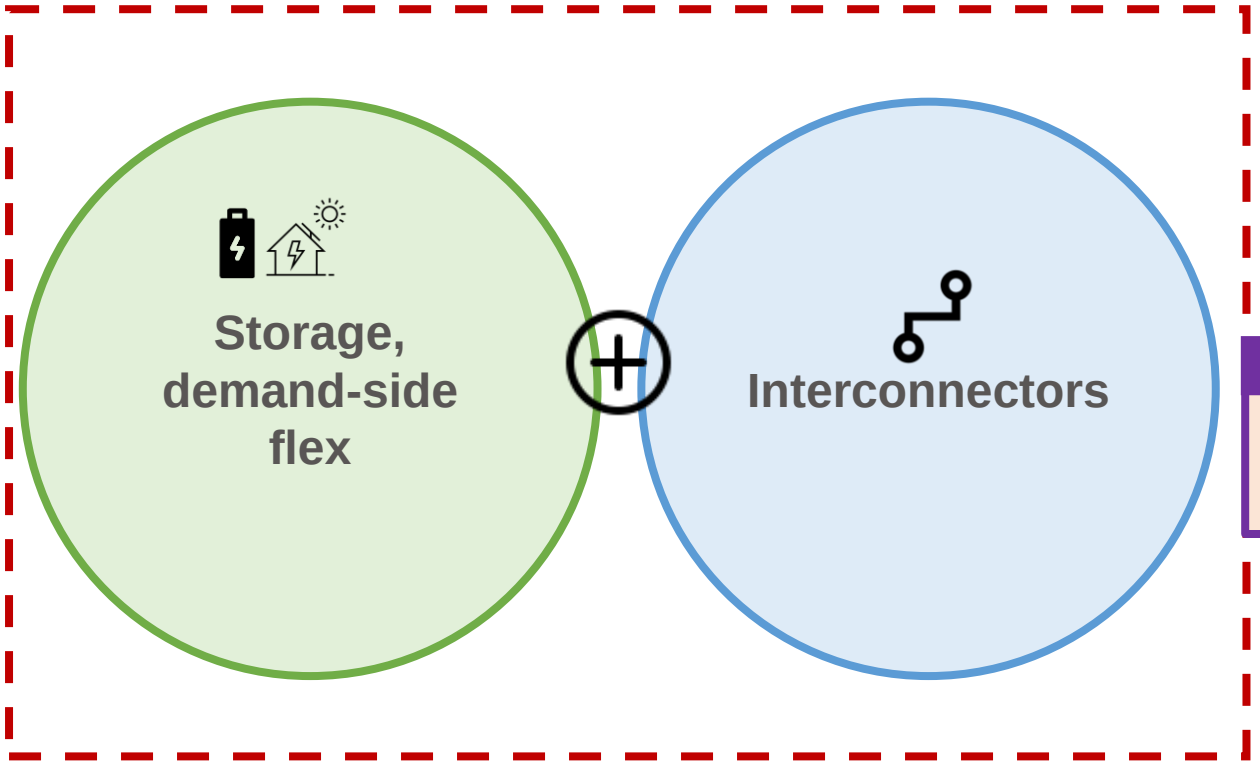
The proportion of ESO redispatch actions has increased as a % of National Demand, in line with higher renewables penetration



- Absence of accurate real-time wholesale prices means the market does not have sufficient visibility of underlying system value
- GB's flexible resource can act counter to system needs/be under-utilised
- BM conveys locational operational signals in opaque and imprecise manner

Wholesale market assessment

By revealing the true real-time value of electricity, locational marginal pricing would maximise renewable capacity use via efficient flexible resource operation



Net impact on…

A) Under national pricing: Unnecessary curtailment when flexible resource is not enabled to use local surplus

Renewables

B) Under locational marginal pricing: Flexible resource shifting effectively avoids/mitigates renewable curtailment

Investment policy assessment

Continued investment policy support is needed through this decade; however, reforms are required to avoid costly market distortions

1 Investment policy support is needed

2 Current investment policy is not fit for purpose

3 Reformed policy must be compatible with end-vision

End-vision:

1. Reformed wholesale market that supports efficient operation and investment

2. Investment policy with minimal wholesale market distortion

3. Greater demand-led contracting longer-term

Summary of assessment

Market reform must be implemented with clear transitional pathways to retain investor confidence in order to achieve net zero at lowest cost to consumers

Our market reform priorities

- **Introduce locational marginal pricing** to re-establish link between wholesale market incentives and real-time system needs
- **Retain investment policy** but reform to address distortions

Implementation considerations

- Investment reforms should be **coherent with future wholesale market design**
- **Reform package pathways are critical** to minimise regulatory risk and ensure investor confidence
- Need to coordinate with complementary strategic transmission network build

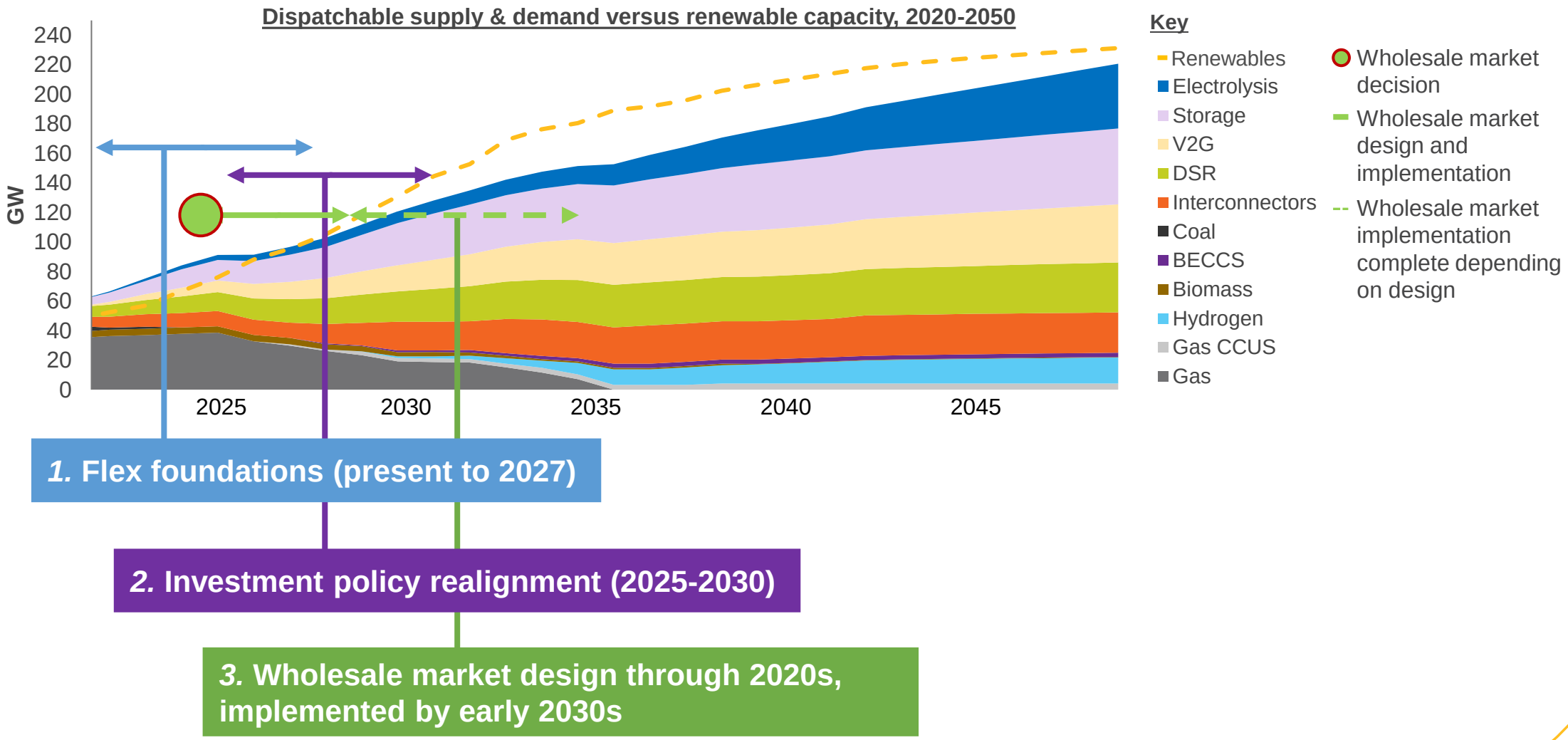
Our preferred pathway

1. Flex foundations (present to 2027)
2. Investment policy realignment (2025-2030)
3. Wholesale market transition (2028-2035)

See next slide for detail

Implementation

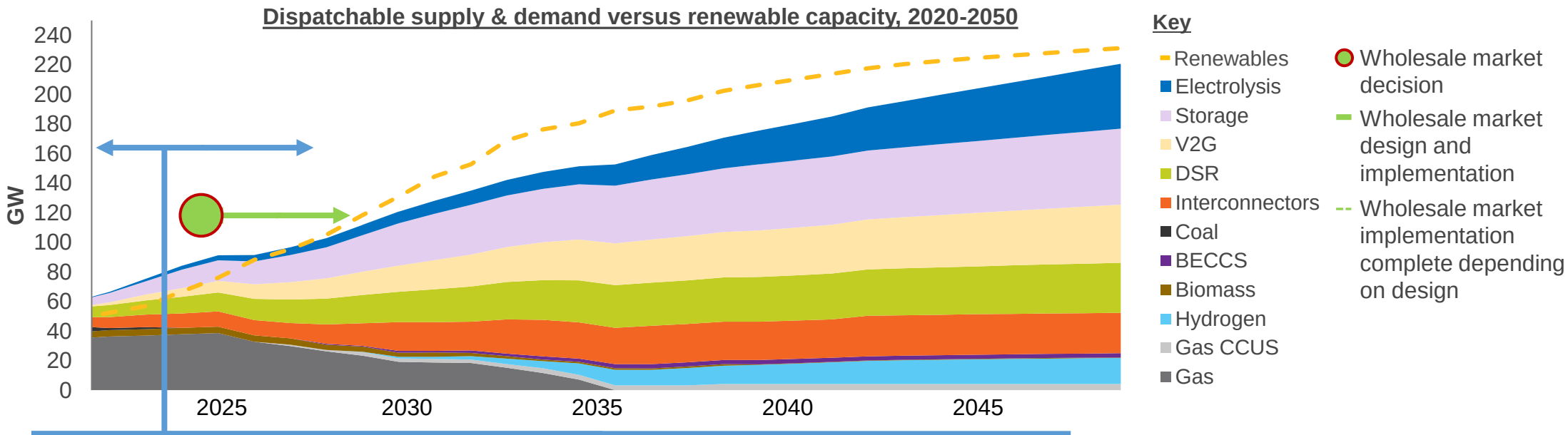
Our holistic long-term vision for GB electricity market design emerges from three key implementation phases



Note: Year ranges represent illustrative implementation dates

Implementation

Our holistic long-term vision for GB electricity market design emerges from three key implementation phases: 1) Flex Foundations



1. Flex foundations (present to 2027)

Drivers for phase: rapid expansion in flexible capacity

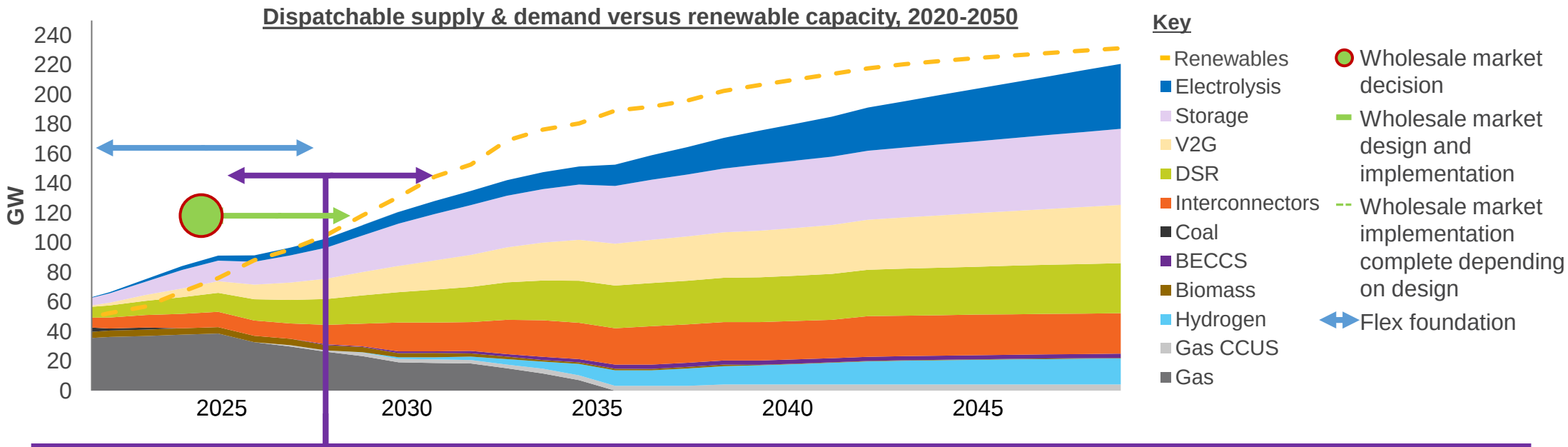
Focus: expedite flex enablers including:

- Smart metering rollout
- Market half hourly settlement
- Retail market reforms
- Wider access to Balancing Mechanism
- Connections reform

Note: Year ranges represent illustrative implementation dates

Implementation

Our holistic long-term vision for GB electricity market design emerges from three key implementation phases: 2) Investment policy realignment



2. Investment policy realignment (2025-2030)

Drivers for phase: Total £bn CfD support triples between 2025-35*/ average length of tight periods triples between 2030-35

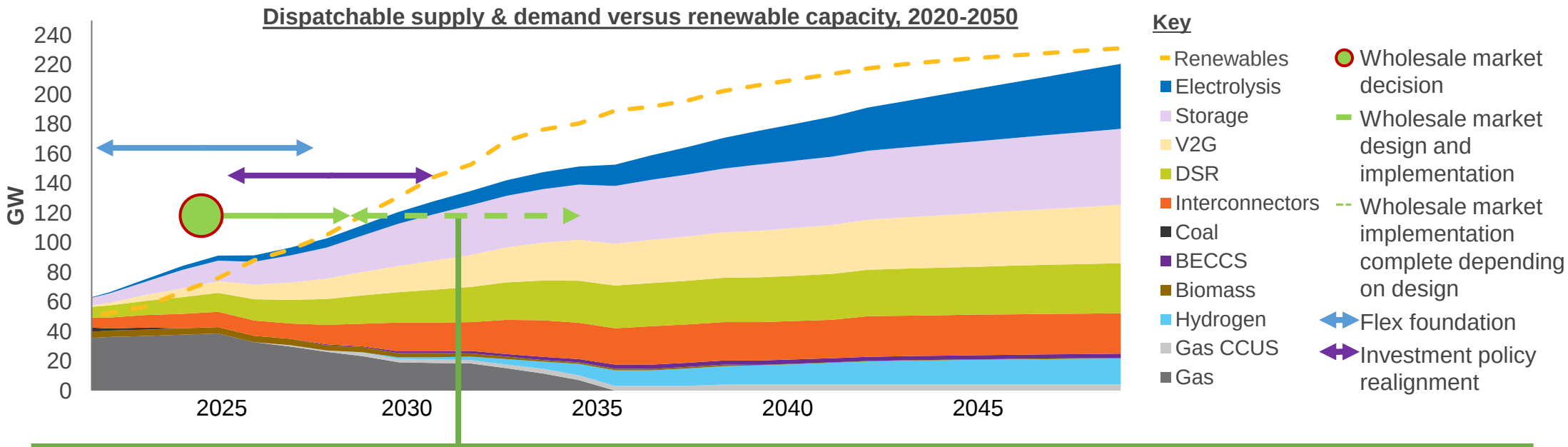
Focus:

- In the short term, implement reform to CfD scheme and improvements to the Capacity Market
- Reform investment policy for post 2030 to reflect radically different nature of system security requirements
- Ensure coherent with chosen wholesale market design

Note: Year ranges represent illustrative implementation dates; * ESO Net Zero Market Reform Phase 2: analysis by LCP

Implementation

Our holistic long-term vision for GB electricity market design emerges from three key implementation phases: 3) Wholesale market transition



3. Wholesale market design through 2020s, implemented by early 2030s

Drivers for phase: Demand, storage and interconnectors dominate GB's dispatchable capacity

Focus:

- Locational marginal pricing required to align assets with two-way flows with system needs
- Introduce dynamic and granular wholesale market signals with demand side exposure to unlock our growing flexible resource

Note: Year ranges represent illustrative implementation dates

NZMR ongoing work and next steps

1. Preliminary conclusions on investment policy in today's **next ESO presentation**

2. Final conclusions on investment policy will be set out in our **autumn publication**, taking into account stakeholder feedback from today's session

3. ESO best-view reform package that coherently combines investment policy and wholesale market design, will be set out in our **autumn publication**

4. In depth assessment of centralised and decentralised scheduling ongoing; stakeholder engagement will start in Autumn

5. We continue to work with government and Ofgem on REMA, advising from unique System Operator viewpoint

Panel Discussion

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Panel discussion: How should investment policy evolve to support a net zero market?

Chair

Isabel Sunnucks

Market Strategy Co-Manager

ESO

Panel

James Samworth

Partner

Schroders Greencoat

Rachel Fletcher

Director of Regulation and Economics

Octopus Energy

Andrew McAleavey

Founder and COO

Penso Power Ltd

Q&A – please add questions for the panel using the Teams Q&A function

Assessment of Investment Policy

Sarah Keay-Bright

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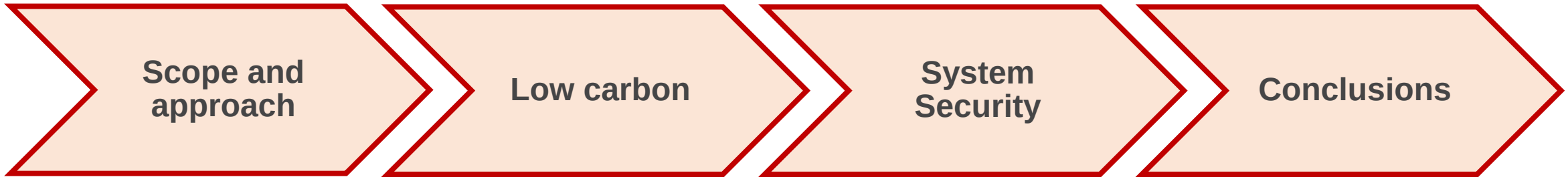
Overview of presentation



EMR successfully facilitated early-stage investment in low carbon technologies but the economic, policy and system context has changed

Late 2010s energy challenges

- Retirements
- Nascent technologies
- Missing money and carbon
- Moderate carbon ambition

EMR success

- ~30GW contracts by 2030
- Lower cost of capital
- Returned money to consumers during high prices
- Competition through auctions
- Supplied ‘missing money’
- Coal phased out

Challenges for REMA

- Ambitious climate targets
- Accelerated low carbon investment, without distortions
- Need for accurate flexibility
- Changing nature of reliability/security
- Managed exit of fossil fuels

The current policy framework is not fit for delivering the REMA objectives; our assessment identified three key limitations

1. Inaccurate operational signals
2. Policy distorting operational signals
3. Unequitable treatment of demand versus supply

Low carbon

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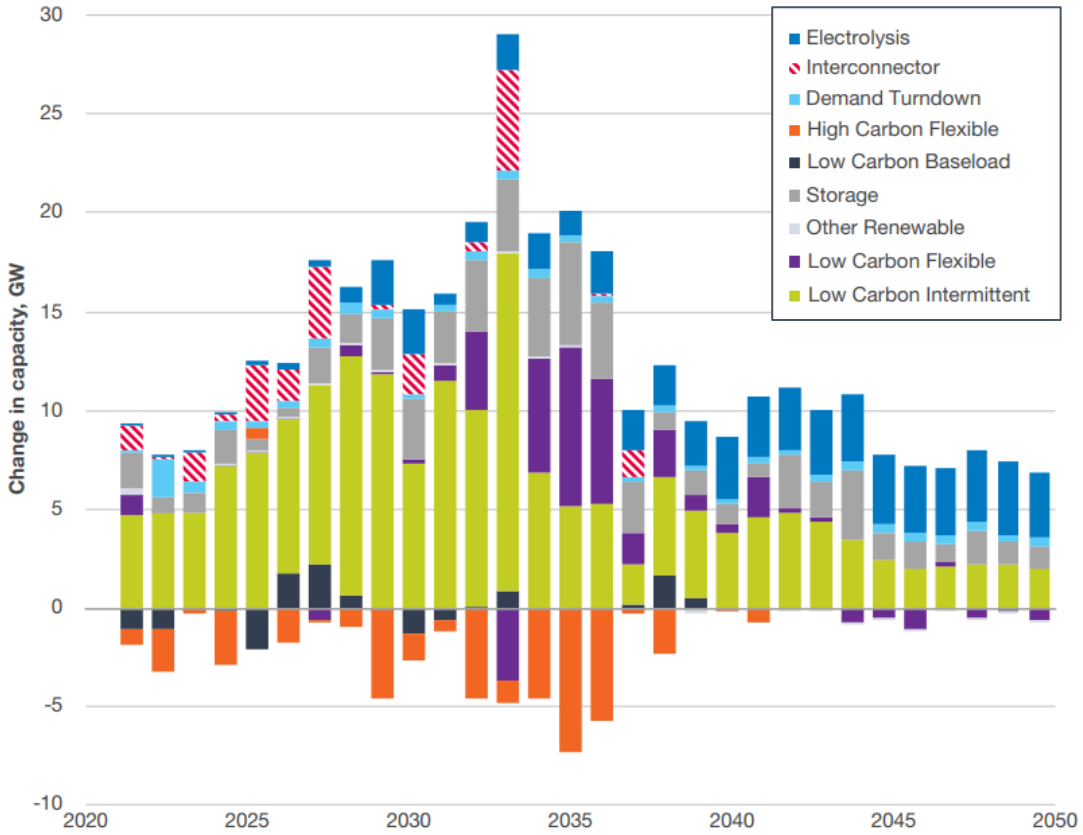
CfDs have accelerated investment and provided some protection for consumers against very high prices, but create distortions and impact generators' incentives

1. Central procurement has delivered significant investment in low carbon capacity to date, and will be integral to driving investment required for 2035 targets
2. Current Contracts for Difference (CfD) design disincentivises assets from delivering added system value, and has a distorting impact on wider markets
3. Policy reform should address distortions without introducing new ones and while retaining CfD benefits

1 Inaccurate operational signals 3 Unequitable treatment of demand versus supply

Centralised, directed procurement is required for accelerated investment, evolving towards greater demand-led investment longer-term

Capacity build and retirements – Leading the Way FES 2021*



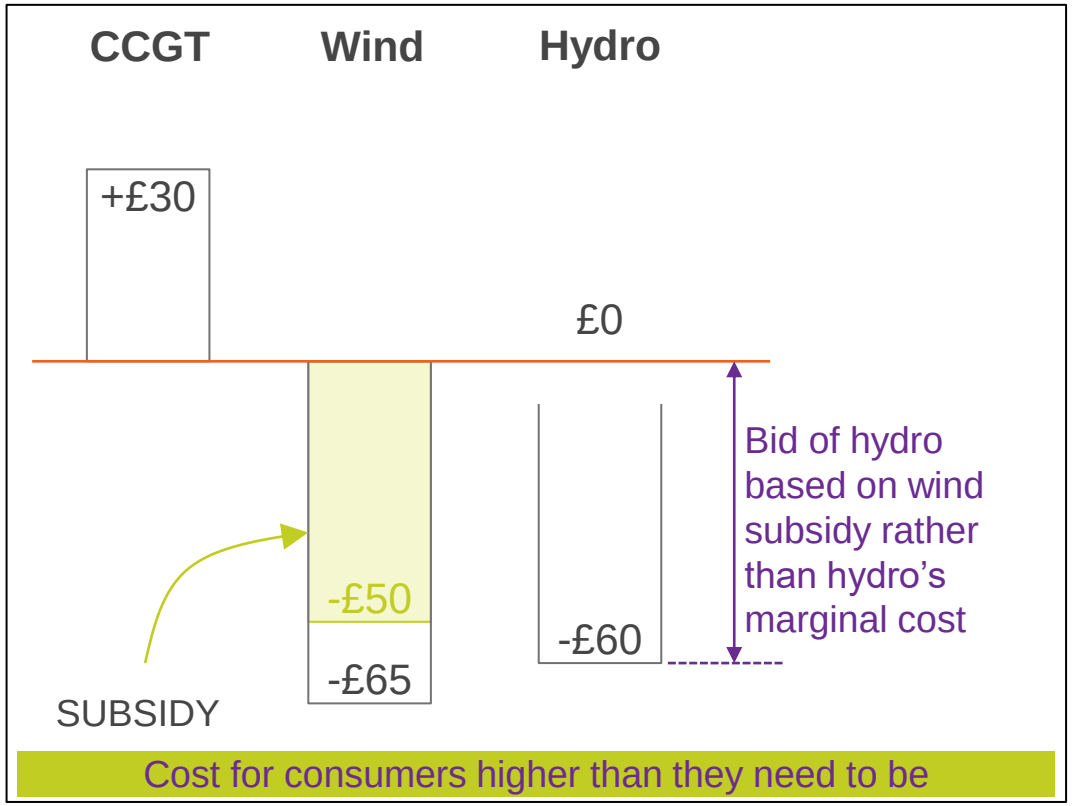
- Continued centralised procurement needed to attract financing at required pace and scale
- Challenges to consider when determining optimal procurement:
  - System sizing: given uncertain demand profile
  - Coordination: more transparent, coordinated approach needed
- Longer-term, demand-led investment driven through markets could deliver more efficient outcomes

Source: ESO NZMR Phase 2

2 Policy distorting operational signals

Current CfD design causes wholesale market distortions

Illustrative example of how bidding behaviour of CfD generators impacts bids of other BM participants



2 Policy distorting operational signals

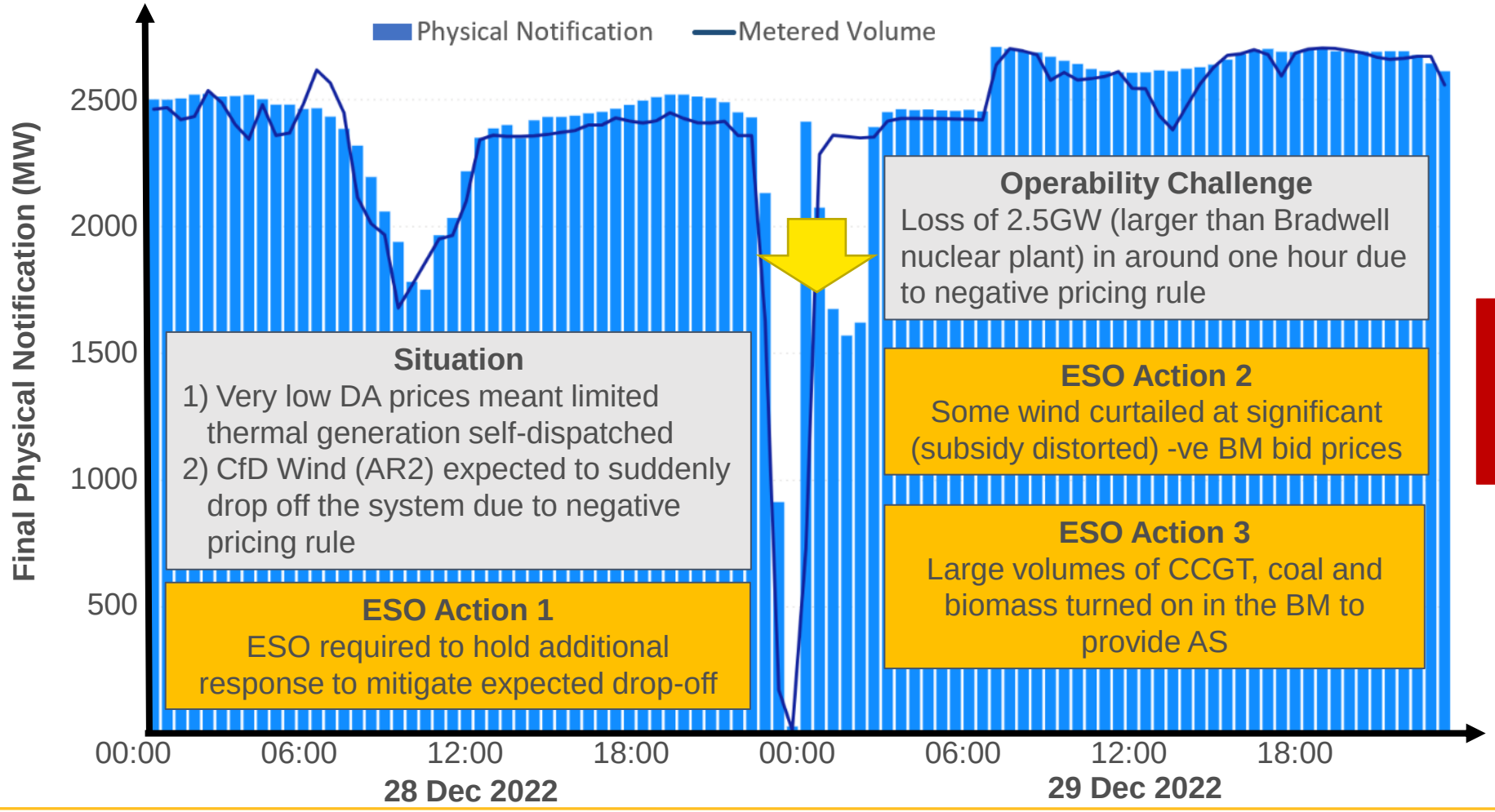
CfD design distorts incentives to provide ancillary services, despite asset technical capability

Service	Wind			Solar		
	Tech capable	Access	Providing	Tech capable	Access	Providing
Response	✓	✓	✗	✓	✓	✗
Stability	✓	✓ (in future)	✗	✓	✓ (in future)	✗
Local constraint market/MW Dispatch	✓	✓	✗	✓	✓	✗

2 Policy distorting operational signals

Example of a high balancing cost day due to CfD impacts, including 2nd order "herding" effect due to the negative pricing rule that aimed to fix CfD distortions

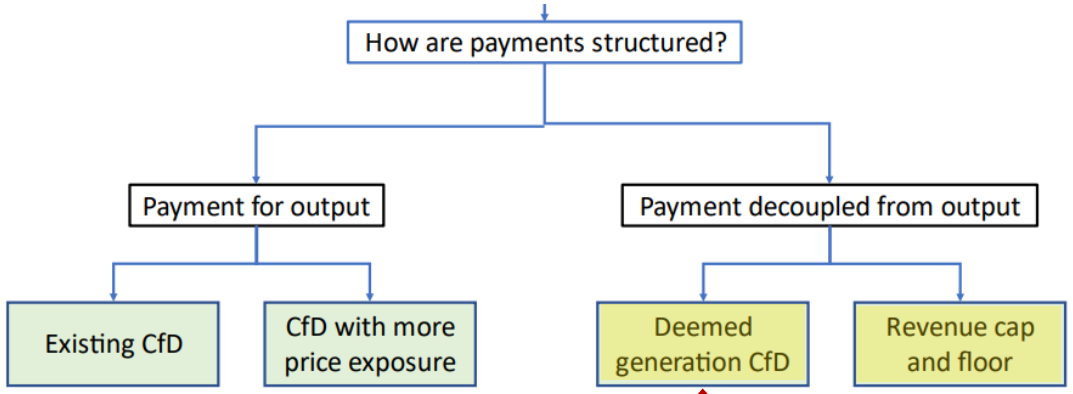
Aggregate output of wind generating units de-synched over 28/ 29 December due to negative prices



Outcome:
11th highest balancing cost day in 2022 (£11.9m)

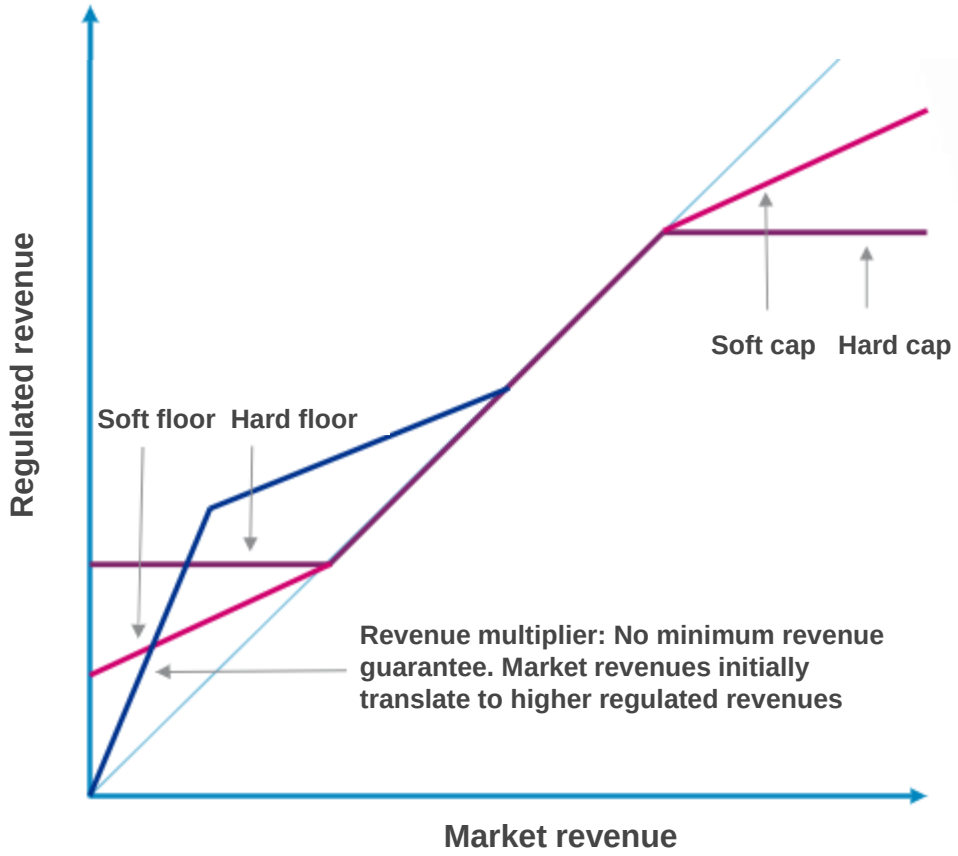
Low carbon investment policy options assessed as potential alternatives to current Contract for Difference (CfD) support scheme

Deemed Generation CfD



- Generators paid based on their potential to generate in a particular period, rather than actual generation output
- Generators would not have to export energy to receive their CfD top-up payment, as they do currently
- Aim to remove dispatch distortions by decoupling support from output

Revenue cap and floor



Some reform options could address distortions while retaining CfD benefits

- Reform options exist that could align generators' incentives with market signals in operational timescales while retaining benefits of current scheme to some degree
- In design, there is a trade off between cost of capital (CofC) reduction versus system net benefits
- It is important that reforms do not introduce new distortions/issues

Performance of some options against issues relevant to operational timeframes**

Option / **Issue**	*Revenue hard C&F	*Revenue soft C&F	Deemed generation	Financial CfD	CfD+ (removal of subsidies from bids)
Wholesale/BM distortion					
Herding behaviour					
Anc. service disincentive					
Scheduling maintenance					

*e.g. annual
** Subject to further analysis - detailed results to be presented in autumn report. Split amber-green RAG ratings reflect variation in design choices

System security

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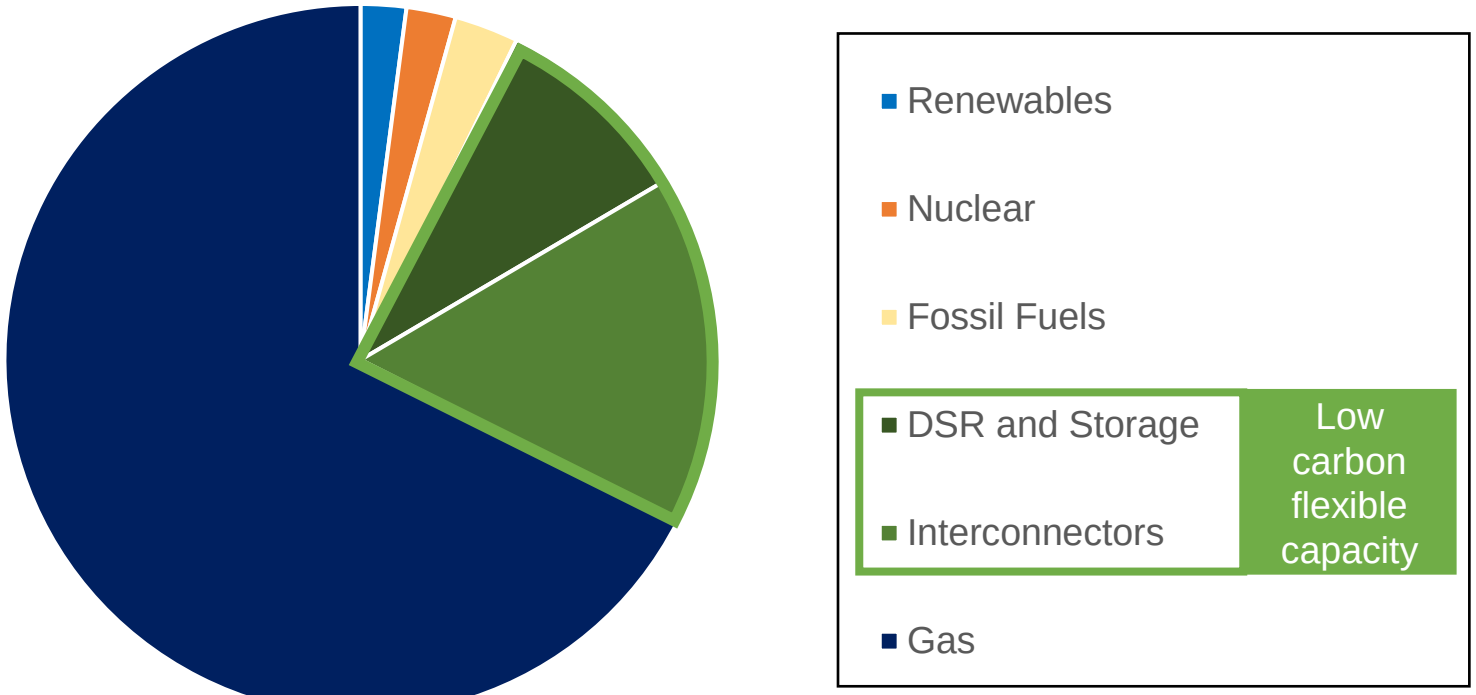
Capacity Market can be optimised to resolve some existing issues, but longer-term changing nature of system security may require alternatives

1. Current Capacity Market (CM) does not promote low carbon flexibility
2. System security challenge is changing: duration and bi-direction
3. CM limited in its ability to address future system security challenges

Short-term reforms to the Capacity Market are beginning to address urgent issues of carbon intensity and flexibility requirements

T-4 Auction results (2026/27) breakdown of CM agreements awarded by fuel type



- Current CM largely procures high-carbon capacity
- Improvements under consideration: delivery assurance and carbon limits
- FOAK support being designed for low carbon dispatchable tech (e.g. CCUS, LDES)

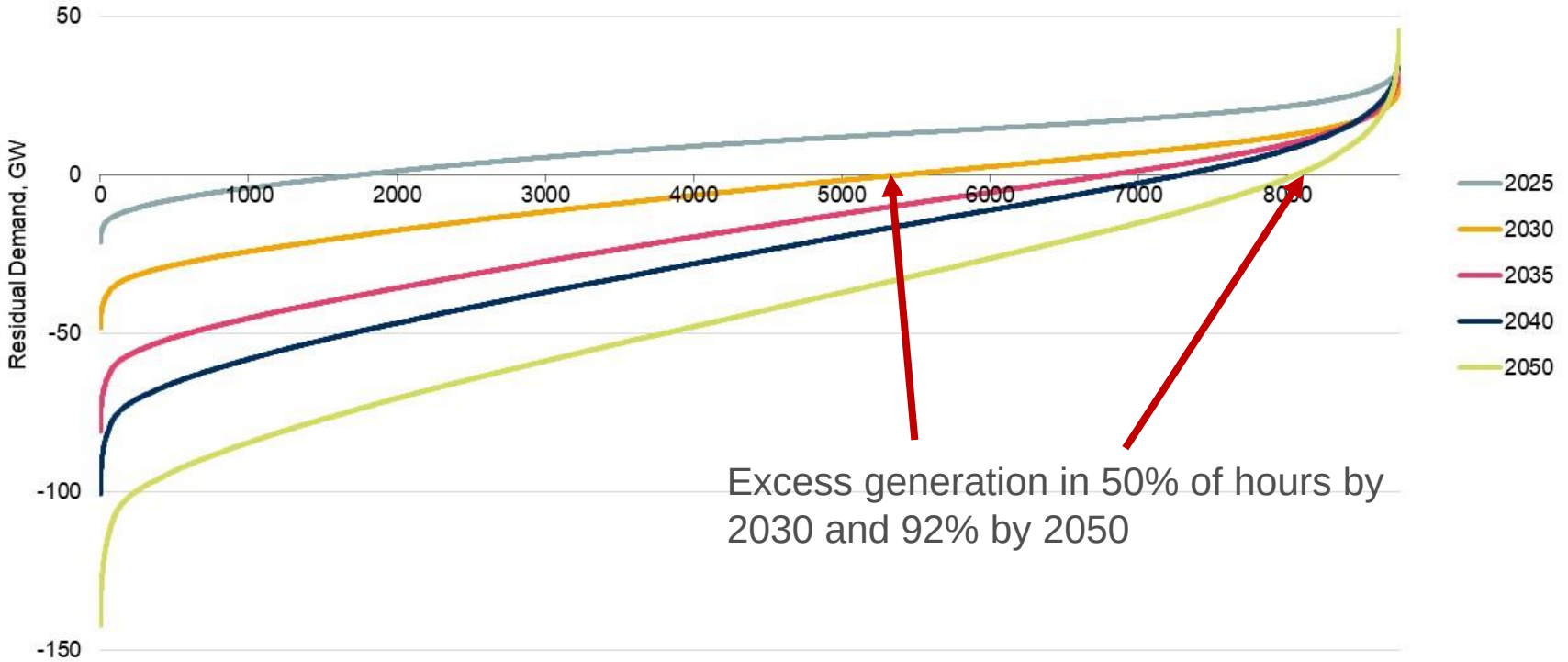
Note: low carbon flex includes DSR, nuclear and storage

① Inaccurate operational signals ② Policy distorting operational signals ③ Unequitable treatment of demand versus supply

The nature of the system security challenge is changing significantly

Stress events will increasingly involve generation excess as well as scarcity, with tight periods less exclusively driven by winter peak and distributed throughout the year

Excess Demand/Generation Distribution (GW): Leading the Way
(Source: ESO)



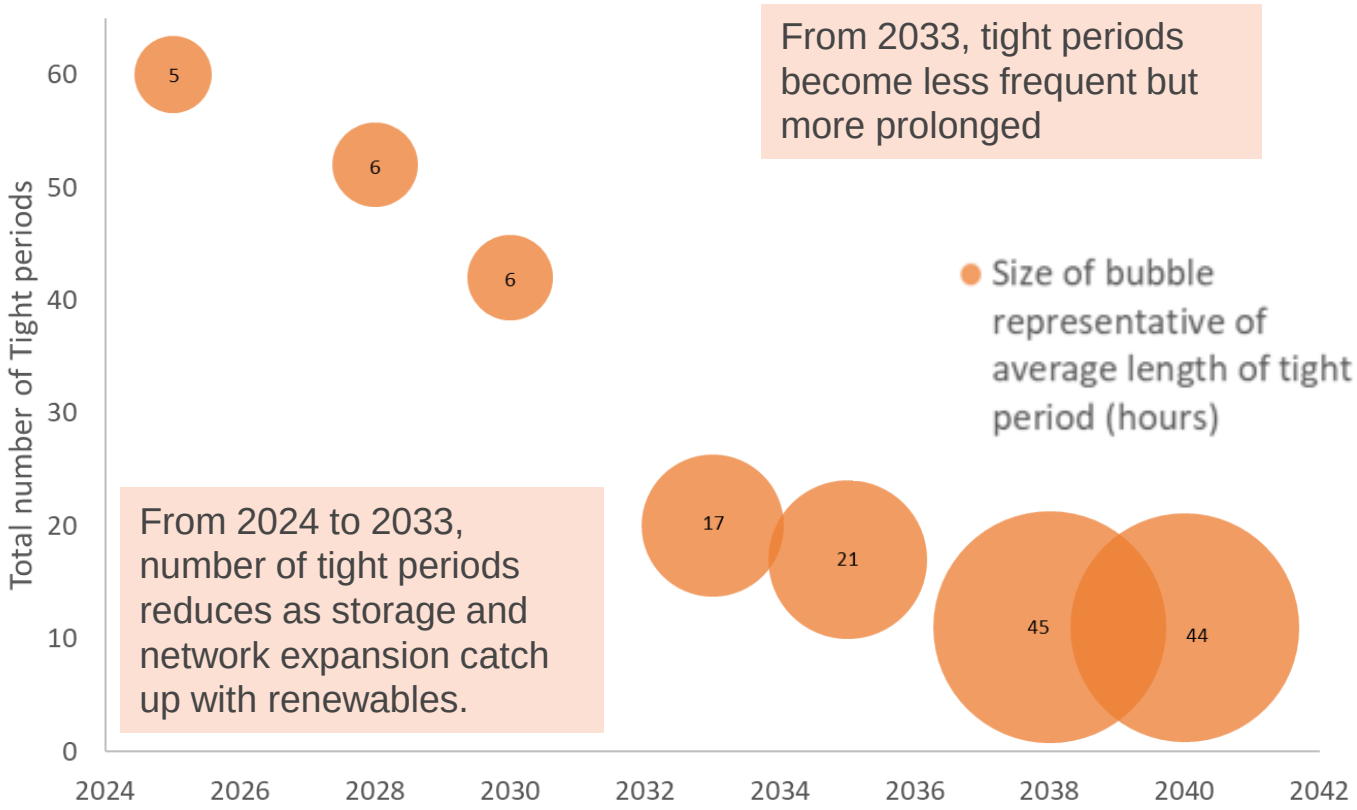
Requirements based on **dynamic and bidirectional residual demand**

1 Inaccurate operational signals 2 Policy distorting operational signals 3 Unequitable treatment of demand versus supply

The nature of the system security challenge is changing significantly

Tight periods will become less frequent but longer in duration, often lasting for days rather than hours

Frequency and duration of tight periods over time



From 2033, tight periods become less frequent but more prolonged

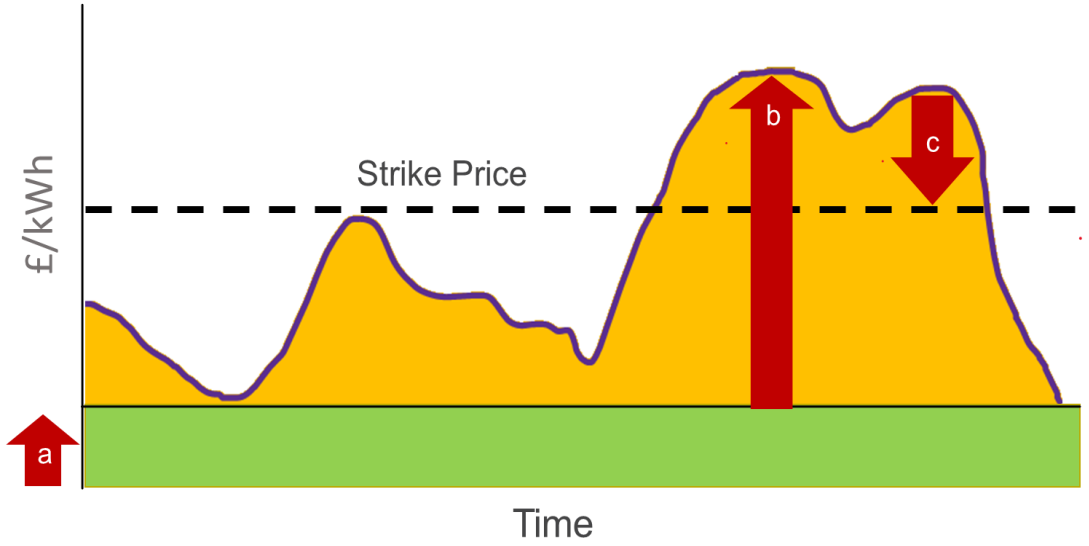
From 2024 to 2033, number of tight periods reduces as storage and network expansion catch up with renewables.

Future requirements more typically based on **rare, long duration** tight periods

Note: Tight periods are periods where energy prices reach VoLL

Investment policy options for system security assessed as potential alternatives to current Capacity Market (CM) support scheme

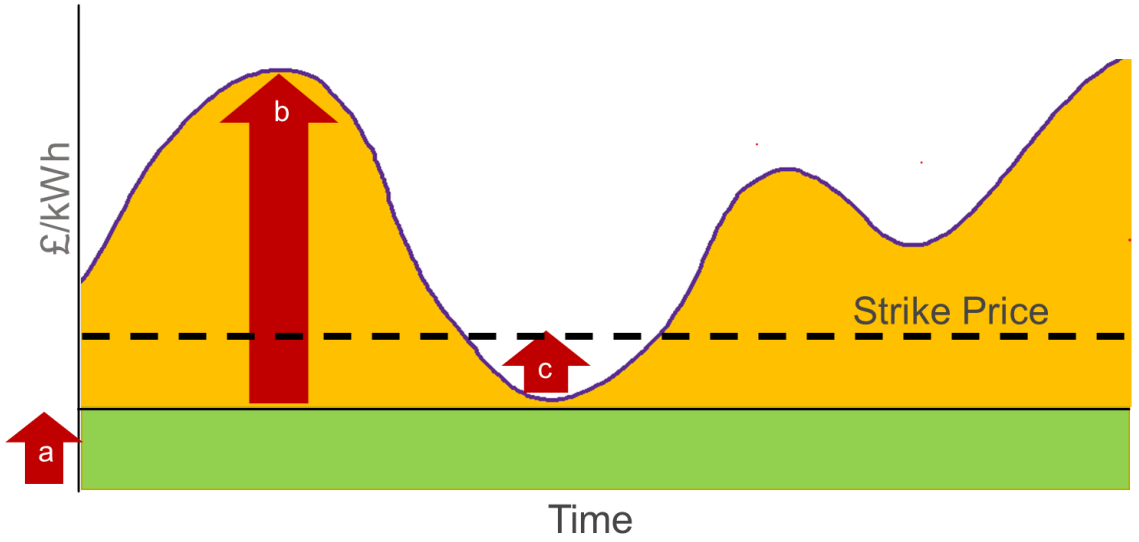
Centralised Reliability Option (CRO)



CRO = Buy option (central body has the ability to buy electricity at a set price)

A. Reliability contract fee – fixed payment for the option contracts (£/kWh/day)
B. Revenues in existing Wholesale market (£/kWh)
C. Reliability contract payback – payback the difference between strike price and reference price (£/kWh)

Reverse Reliability Option (RRO)

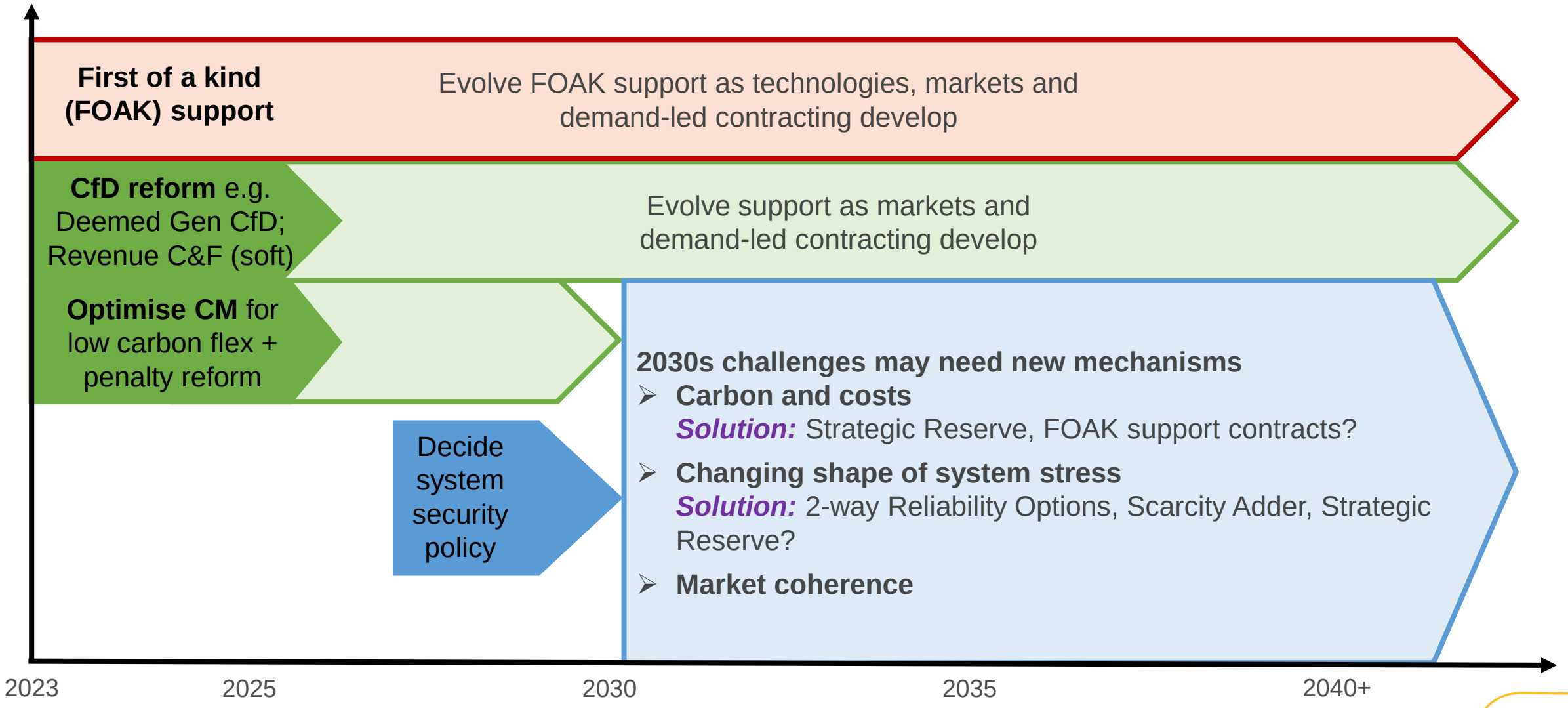


RRO = Sell option (central body has the ability to sell electricity at a set price)

A. Reverse Reliability contract fee – fixed payment for the option contracts (£/kWh/day)
B. Price paid in existing Wholesale market for electricity (£/kWh)
C. Reverse Reliability contract payback – payback the difference between strike price and reference price (£/kWh)

Conclusions

Possible timeline for investment policy reforms



Q&A

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Moderator

Cian McLeavey-Reville

Head of Markets Development

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Speakers

Sarah Keay-Bright

Market Strategy Co-Manager

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Isabel Sunnucks

Market Strategy Co-Manager

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Market Strategy team

- Tim Gregory
- Shona Watt
- Francisco Celis-Andrade
- Ben Timmins

Q&A – please add questions for the Market Strategy team using the Teams Q&A function. Please close and re-open the Teams Q&A function to refresh the question list since the panel

Concluding remarks

Cian McLeavey-Reville
Head of Markets Development
ESO

Feedback Form: NZMR Phase 4 Conclusions Webinar

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