Markets Advisory Council

16th July 2024

ESO

Agenda

Agenda Item	Lead	Time (14:00 – 17:00)
Welcome	Steve Jennings	14:00 – 14:05
NESO and Markets update *NESO Day 1, FES launch, update post election*	Matt Magill (ESO)	14:05 – 14:20
Whole Energy Market Strategy *Progress update, framework for whole energy market design*	Vicki Mustard (ESO) & Suki Ferris (ESO)	14:20 – 15:20
Break		15:20 – 15:30
Strategic Spatial Energy Planning	Alice Etheridge (ESO)	15:30 – 16:00
REMA Update	Rob Hewitt (DESNZ)	16:00 – 16:20
Scheduling & dispatch engagement *Plan for industry engagement*	Izzie Sunnucks (ESO)	16:20 – 17:00

5pm close / next meeting to be confirmed for September 2024

NESO & ESO Markets Leadership Update

Matt Magill

ESO

Whole Energy Market Strategy

Vicki Mustard

ESO

Whole Energy Market Strategy: Case for Change

- Markets Advisory Council (MAC)
- 16th of July

ESO

MAC session | 3 agenda topics

1. **Provide an introduction** to the Whole Energy Market Strategy programme & Phase 1
2. **Gather feedback** on the methodology and initial whole energy market risks & opportunity insights
3. **Discuss next steps** before report publication, and potential additional MAC engagement

Intro | Context & mandate of the Whole Energy Market Strategy (WEMS)

Energy Bill

- **Established of NESO** as an independent, public cooperation, with additional responsibility as an advisory body to Government
- **To provides strategic direction** across gas, electricity and future energy systems and markets
- **To promote achievement of 3 objectives**: net zero, security of supply and efficiency & economy

Business Plan

- Shape and drive the development of **competitive and efficient markets across multiple energy vectors** by taking a whole energy system approach

Whole Energy Market Strategy team

- We will be working with market participants and decision makers to explore the potential for **greater coordination between established and emerging energy markets**, to facilitate the transition to net zero in an affordable, secure, equitable and timely manner

Intro | This report aims to establish the case-for-change for more coordination across vectors, as the first step in a multi-phased effort

Phase 1:
Establish the Case for Change
Exploring the potential for greater coordination between established and emerging energy markets

Problem statement

1. The energy decarbonisation transition will lead to increasing interaction between the vectors
2. Generates the need to consider markets holistically, and explore how to improve cross-vector interactions through market coordination

Scope

- Electricity
- Natural gas
- Hydrogen
- Networked Heat (as a vector, ie, district heating networks)
- Networked Carbon (as a vector, ie, carbon transported via sequestration network)

Objectives

1. Establish the case-for-change, conveying the urgency for a Whole Energy Market Strategy approach in market design
2. Build common understanding of existing market and policy design across 5 vectors
3. Identify the largest cross-vector risks & opportunities, underpinned by a robust analytical framework
4. Create new and innovative cross-vector thinking, while building on previous NESO market design programmes, and to not re-open debates of previous work and consultations including REMA

Extensive external engagement process by bilateral discussions has provided key insight into Phase 1

Project partnership with BCG

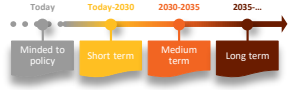
Provisional Phase 2:
Assess & refine opportunities
Market coordination opportunity assessment

Co-creation with industry to explore in greater detail provisional opportunities identified through the case for change project

Stakeholder engagement

Opportunity assessment

Opportunity phasing



Define further next steps

Inputs | We are leveraging both a bottom-up and top-down approach to the identification of risks and opportunities to improve coordination of whole energy market design

Bottom-up analyses

Breakdown of market design into key elements, to undertake comparison of as-is market design mapping across networked energy vectors

- Electricity
- Gas
- Hydrogen
- CO_2
- Networked heat

External stakeholders and experts

Top-down inputs from external stakeholders and experts on risks in as-is market design and opportunities for a whole energy market approach

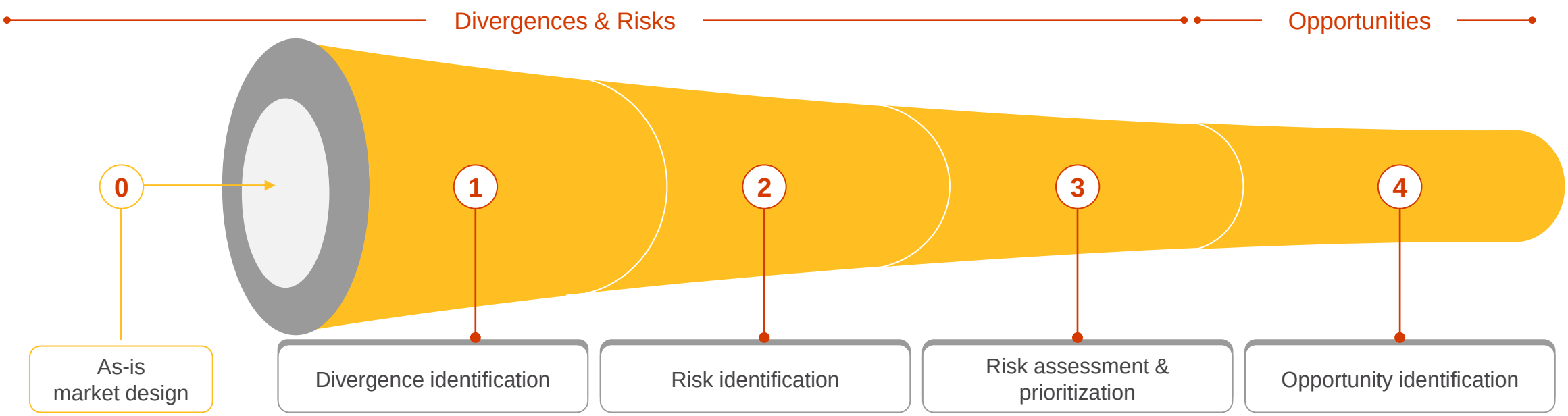
- Industry participants
- Consumers groups
- Thought leaders
- Public stakeholders
- …

Feedback loops between 2 sources to test opportunities

Shortlist of risks & opportunities

	Types of stakeholders	UK & international stakeholders interviewed
Energy industry participants	Transport & storage	*5 stakeholders interviewed*
	Integrated Energy Company	*2 stakeholders interviewed*
	Producers	*5 stakeholders interviewed*
	Original Equipment Manufacturer	*1 stakeholder interviewed*
	Retailers	*2 stakeholders interviewed*
	Disruptors (e.g., storage-only players, H2 developers, energy thinkers)	*4 stakeholders interviewed*
Investors, Thinkers, Consumer groups, Public stakeholders	Investors	*3 stakeholders interviewed*
	Energy thinkers (e.g., research groups)	*4 stakeholders interviewed*
	Consumer groups (e.g., residential/ industrial consumer groups)	*2 stakeholders interviewed*
	Public stakeholders	*2 stakeholders interviewed*

Methodology | Bottom-up approach to identify & assessing risks and opportunities



- Mapping of detailed market design research to a structured framework for 5 vectors, to create a comprehensive view on 'as-is' market design

- Identifying divergences in elements of the as-is market design across vectors
- Indication of level of divergence to only retain meaningful divergences

- Identification of the potential risk of the divergence in as-is market design
- Objective description of potential risks of the divergence

- Assessing the urgency of each risk through urgency of their timescale & irreversibility, and its severity through materiality & probability
- Prioritization of risks based on urgency & severity

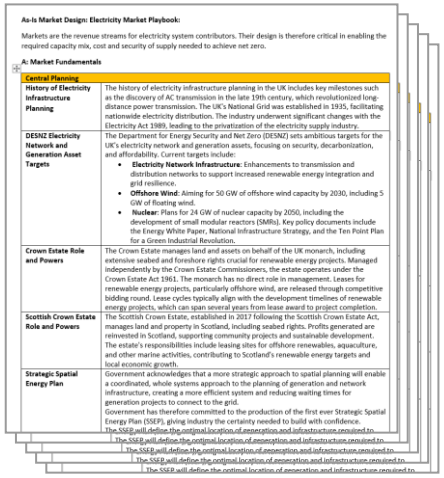
- Identification of opportunities to address prioritized risks

As-is market design | Detailed market design research mapped to a framework for 5 vectors, creating a comprehensive view on 'as-is' market design

Primer

Outlines the background, current market structure and policy developments across each vector

Prose text



As-Is Market Design: Electricity Market Playbook:

Markets are the revenue streams for electricity system contributors. Their design is therefore critical in enabling the required capacity mix, cost and security of supply needed to achieve net zero.

A: Market Fundamentals

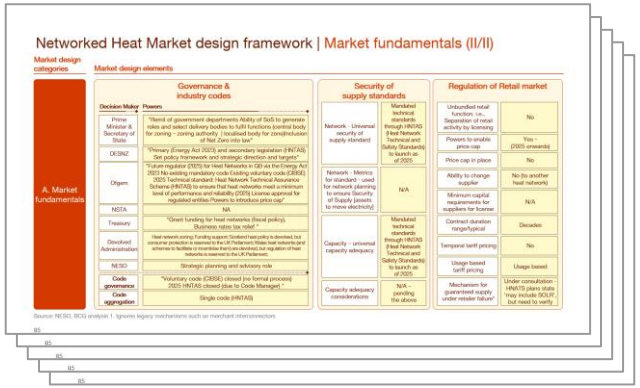
Central Planning	
History of Electricity Infrastructure Planning	The history of electricity infrastructure planning in the UK includes key milestones such as the discovery of AC transmission in the late 19th century, which revolutionized long-distance power transmission. The UK's National Grid was established in 1935, facilitating nationwide electricity distribution. The industry underwent significant changes with the Electricity Act 1989, leading to the privatization of the electricity supply industry.
DESNZ Electricity Network and Generation Asset Targets	The Department for Energy Security and Net Zero (DESNZ) sets ambitious targets for the UK's electricity network and generation assets, focusing on security, decarbonization, and affordability. Current targets include: • **Electricity Network Infrastructure**: Enhancements to transmission and distribution networks to support increased renewable energy integration and grid resilience. • **Offshore Wind**: Aiming for 50 GW of offshore wind capacity by 2030, including 5 GW of floating wind. • **Nuclear**: Plans for 24 GW of nuclear capacity by 2050, including the development of small modular reactors (SMRs). Key policy documents include the Energy White Paper, National Infrastructure Strategy, and the Ten Point Plan for a Green Industrial Revolution.
Crown Estate Role and Powers	The Crown Estate manages land and assets on behalf of the UK monarch, including extensive seabed and foreshore rights crucial for renewable energy projects. Managed independently by the Crown Estate Commissioners, the estate operates under the Crown Estate Act 1961. The monarch has no direct role in management. Leases for renewable energy projects, particularly offshore wind, are released through competitive bidding round. Lease cycles typically align with the development timelines of renewable energy projects, which can span several years from lease award to project completion.
Scottish Crown Estate Role and Powers	The Scottish Crown Estate, established in 2017 following the Scottish Crown Estate Act, manages land and property in Scotland, including seabed rights. Profits generated are reinvested in Scotland, supporting community projects and sustainable development. The estate's responsibilities include leasing sites for offshore renewables, aquaculture, and other marine activities, contributing to Scotland's renewable energy targets and local economic growth.
Strategic Spatial Energy Plan	Government acknowledges that a more strategic approach to spatial planning will enable a coordinated, whole systems approach to the planning of generation and network infrastructure, creating a more efficient system and reducing waiting times for generation projects to connect to the grid. Government has therefore committed to the production of the first ever Strategic Spatial Energy Plan (SSEP), giving industry the certainty needed to build with confidence. The SSEP will define the optimal location of generation and infrastructure required to…

i Aiming to publish as an interim deliverable for the Case for Change project

Market Design Framework

Deconstruction of the holistic market design into core elements across each vector

Structured documentation per framework



Networked Heat Market design framework | Market fundamentals (II/II)

Market design categories

Market design elements

A. Market fundamentals

Governance & industry codes

Security of supply standards

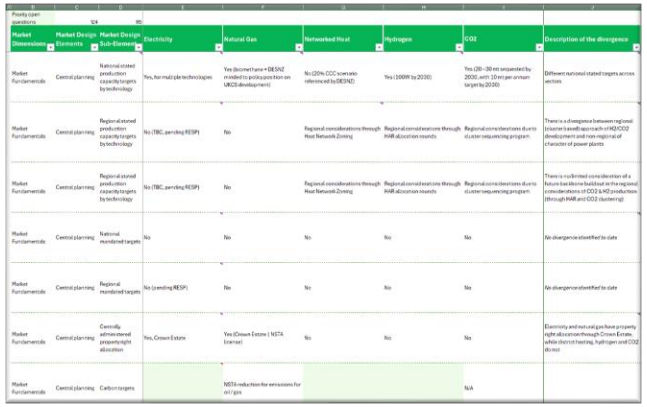
Regulation of Retail market

i Developed through market design element framework methodology

Comprehensive view on 'as-is' market design

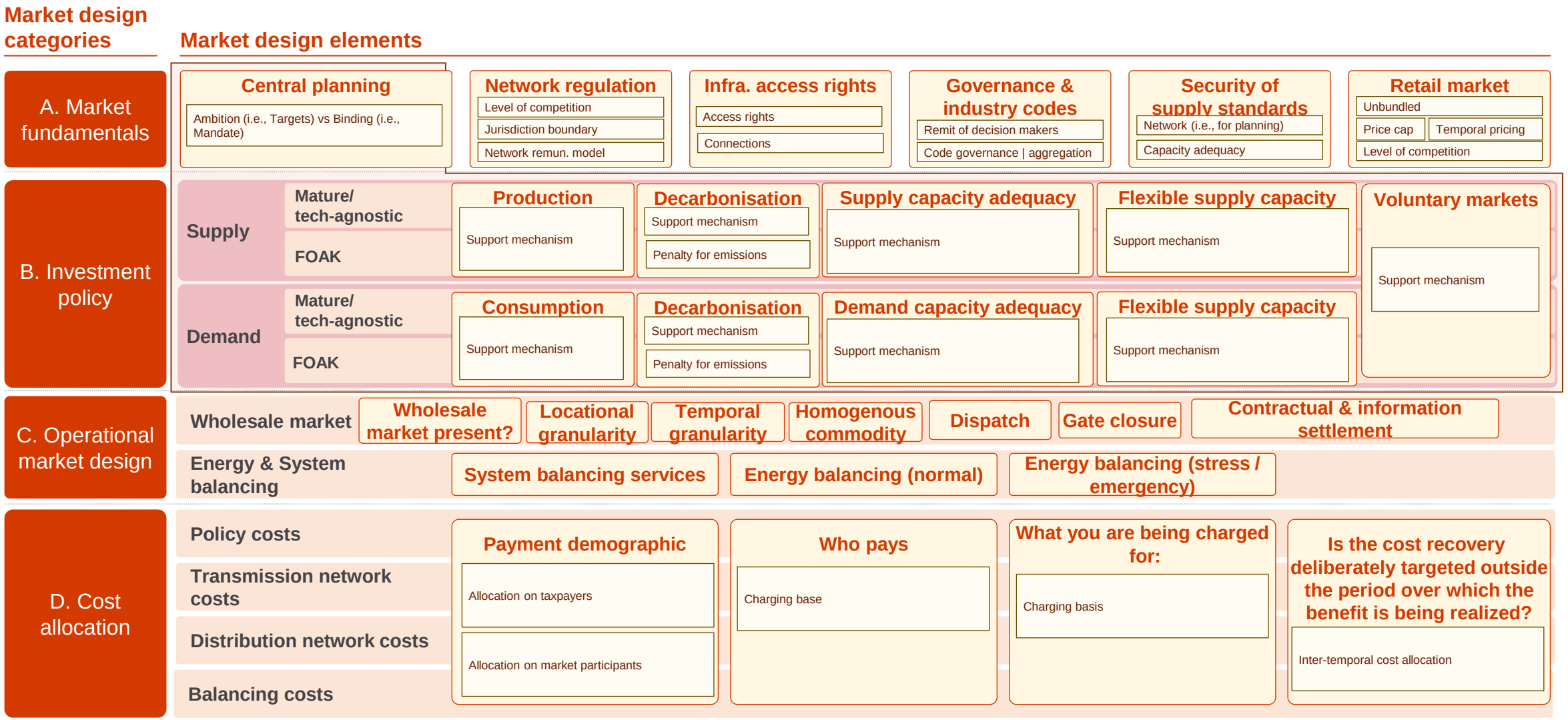
Detailed representation of as is market design, comparing each market design element across the 5 vectors

Matrix consisting of 125 MDE x 5 vectors

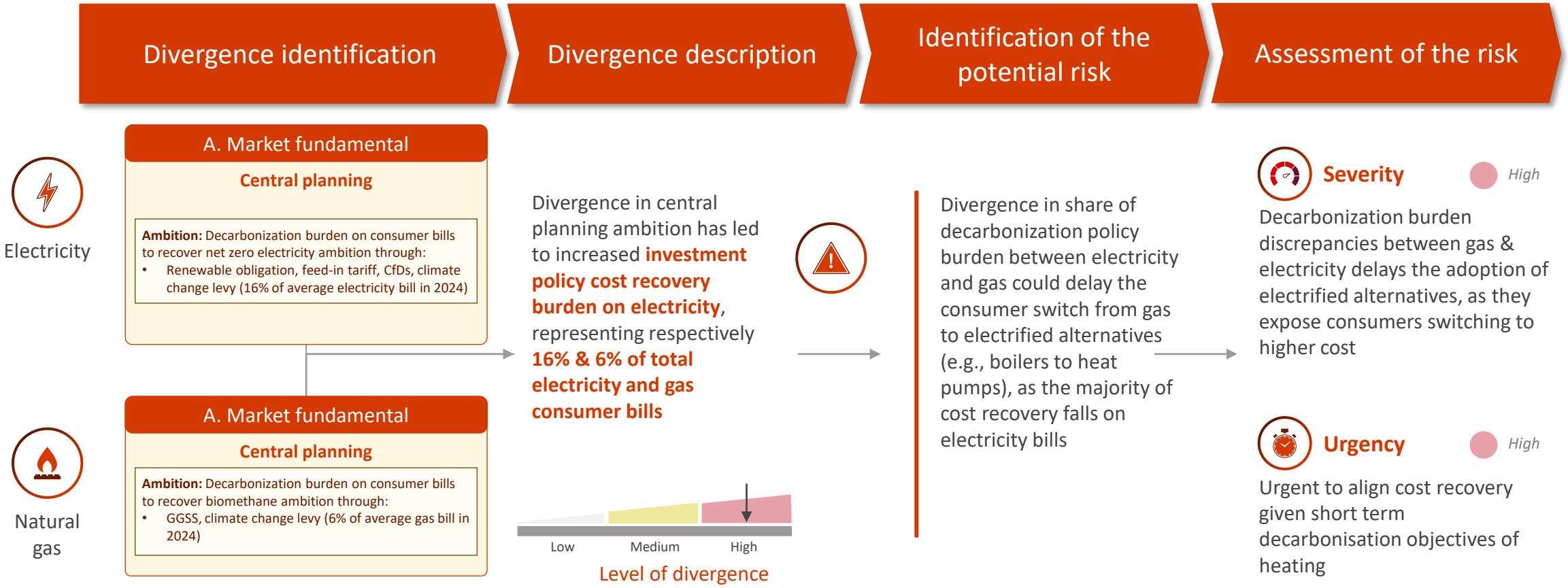


Market Dimension	Market Design Elements	Market Design Sub-Elements	Electricity	Natural Gas	Networked Heat	Hydrogen	CO2	Description of the divergence
Market Fundamentals	Central planning	National-stated production capacity targets by technology	Yes, for multiple technologies	Yes (scenario name + DESNZ modelled to policy position on UKCS development)	No (20th CCC scenario referenced by DESNZ)	Yes (100W by 2030)	Yes (20–30 mt sequested by 2030, with 10 mt per annum target by 2030)	Different national stated targets across vectors
Market Fundamentals	Central planning	Regional-stated production capacity targets by technology	No (TBC, pending RESP)	No	Regional considerations through Heat Network Zoning	Regional considerations through HAR allocation rounds	Regional considerations due to cluster sequencing program	There is a divergence between regional (cluster) based approach of HAR/CO2 development and non-regional of character of power plants
Market Fundamentals	Central planning	Regional-stated production capacity targets by technology	No (TBC, pending RESP)	No	Regional considerations through Heat Network Zoning	Regional considerations through HAR allocation rounds	Regional considerations due to cluster sequencing program	There is no/limited consideration of a future backbone build-out in the regional considerations of CO2 & H2 production (through HAR and CO2 clustering)
Market Fundamentals	Central planning	National mandated targets	No	No	No	No	No	No divergence identified to date
Market Fundamentals	Central planning	Regional mandated targets	No (pending RESP)	No	No	No	No	No divergence identified to date
Market Fundamentals	Central planning	Centrally administered property right allocation	Yes, Crown Estate	Yes (Crown Estate / NSTA license)	No	No	No	Electricity and natural gas have property right allocation through Crown Estate, while district heating, hydrogen and CO2 do not
Market Fundamentals	Central planning	Carbon targets		NSTA reduction for emissions for oil / gas			N/A	

As-is market design | Detailed market design framework is the basis for risk & opportunity identification



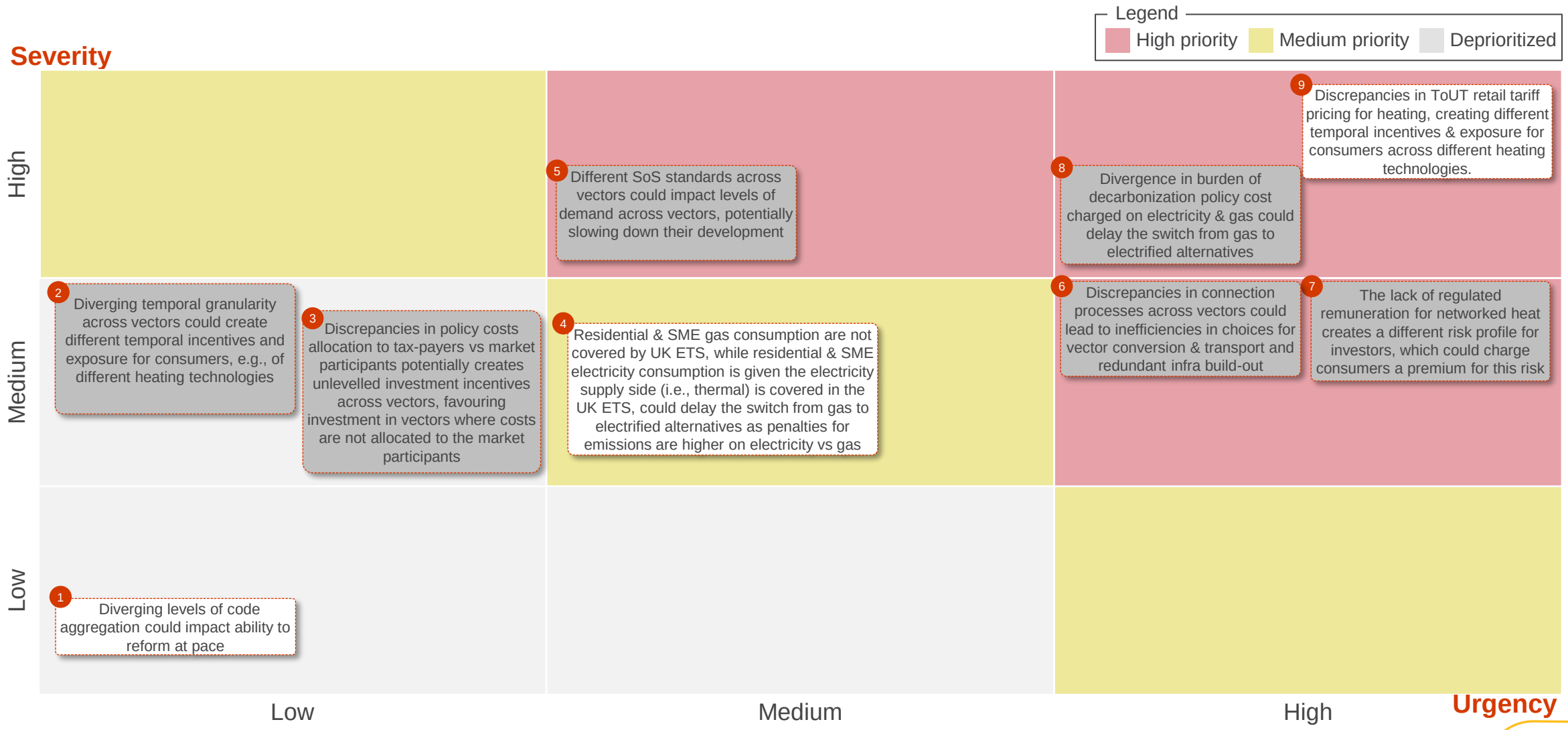
Divergence & risk identification | Divergences in as-is market design lead to risks, which are rated according to their severity and urgency



Source: ClimateXchange, Energy & Climate Intelligence Unit, BCG analysis

Risks (partly) covered by minded to policy are still shown

Risk assessment | Illustrative assessment of select risks by severity and urgency



Source: NESO inputs, BCG analysis

Opportunity identification | Opportunities emerge by converging or coupling divergent as-is market design across vectors

	Divergence example	Overview of divergence	Convergence (Left hand of spectrum)	Convergence (Right hand of spectrum)	Convergence (Middle Ground)	Coupling (overarching)
A. Market fundamental	Diverging levels of code aggregation	Electricity: Multiple codes Gas: Multiple codes H2: TBD CO2: 1 code NH: None currently	Full disaggregation (code by function, e.g. separate balancing and settlement code *etc*)	Full aggregation by vector	Partial disaggregation by vector	• Single code for all vectors and all functions • Single code by function for all vectors
B. Investment policy	Capacity adequacy mechanism	Electricity: Capacity Market Gas: Operating Margins (not an incentive signal) H2: NA CO2: NA NH: NA *NA due to lack of wholesale market	Removal of Capacity Mechanism in electricity (energy only electricity market)	Introduction of Capacity Mechanism markets for each vector with equivalent strength of incentive	Introduction of Capacity Mechanism markets for each vector with diluted strength of incentive (i.e., spread cost of CM across vectors)	Introduction of single Capacity Mechanism for total system adequacy
C. Operational market	Temporal granularity	Electricity: 30 mins Gas: 1 Day H2: TBD CO2: 1 Day NH: NA	30 mins	1 Day	EFA block (4 hours)	Combined energy market (i.e., Single market single period, trade in energy)
D. Cost allocation	Divergence in share of levies	Electricity: *Almost all* proportion of decarbonization policy burden Gas: Negligible decarbonization policy burden H2: Negligible decarbonization policy burden CO2: NA NH: (Pending energy vector source)	Majority proportion of decarbonization policy burden on electricity	Majority proportion of decarbonization policy burden on natural gas	Smoothing the transition, equitable distribution of policy burden across vectors (administrative body per vector responsible for recovering levies)	Each vector pays fair share of policy burden (i.e., total investment policy cost would be spread evenly over final units of energy use for each vector, with overall administrative body responsible for recovering levies by energy unit rate)

Opportunities | Bottom-up analyses and top-down stakeholder & expert interviews lead to shortlist of opportunities

Bottom-up analysis

- Equivalent regulated T&S remuneration model for networked heat, eg, RAB based model
- Development of a more level playing field for domestic heating substitutes, i.e., distribution of decarbonization incentives / penalties across vectors
- Converged connection process across vectors, to level playing across the different connection solutions available
- Couple existing and/or emerging vector System Operation to improve security of supply and minimise operational blind spots
- Cross-vector network cost allocation, to avoid disproportionate cost exposure for users of sunsetting or emerging networks
- Inter-temporal network cost allocation across vectors, to protect cost exposure to consumers for network depreciation or development
- Exploration of linepack / stored heat as a service, to derive remuneration for capacity adequacy services
- Tech-agnostic support for decarbonized energy supply, to create a level playing field to reach most cost-effective solutions (*longer term opportunity beyond initial requirement for bespoke support*)

External stakeholders & experts

- International alignment of carbon market, eg, CBAM and coupled UK/ EU ETS
- Improvement of equitable investment policy across supply and demand through review of investment policy, incentives and penalties (i.e., ETS)
- Exploration of inter-technology competition to renumerate demand flexibility
  - **This is being considered through the Constraints Collaboration Project*

Key to note this is an indicative opportunity list from work in progress

Key to note, for all opportunities identified, further assessment (i.e., through Phase 2 of Whole Energy Market Strategy Case for Change Programme) is needed to explore the suitability of identified solution options for further detailed exploration.

Source: NESO inputs, external stakeholder interviews, BCG analysis

Key take aways – Risks | Current trajectory will delay net-zero, misallocate capital, increase cost exposure and risk security of supply

Delays on achieving net-zero

Misallocation of capital

Cost exposure of consumers

Security of supply risks

Key take aways – Opportunities | 5 themes of market design opportunities emerge

Market design opportunity themes		Example
1	**Limit consumer exposure through cost allocation & retail market review** to support the decarbonization transition whilst ensuring socially inclusive & feasible consumer decarbonisation costs	**Cross-vector network cost allocation** to avoid disproportionate cost exposure for users of sunsetting or emerging networks
2	**Ensure multi-vector security of supply** considering impact across vectors, to unlock broader system benefits of emerging vectors & optimise the whole energy system	**Coupled system operations** across vectors (e.g. elec. & H_2) to improve security of supply and minimise operational blind spots
3	**Drive fuel switching & unlock multi-vector flexibility** by driving uptake of decarbonisation solutions at the demand side, while unlocking the flexibility new assets can offer to the system	**Structured approach to establishing level playing field for domestic heating substitutes,** i.e., removal of conflicting incentives across vectors
4	**Align decarbonisation incentives** across technologies and with flexibility/adequacy policy, to enable market-based development of real decarbonisation options whilst ensuring a resilient system	**Tech-agnostic support for supply decarb.** creating a level playing field to reach most cost-effective solutions *(*long term opportunity beyond initial FOAK support)*
5	**Coordinate system planning across vectors** to enable pace, capital efficiency & optionality, with consideration of system-wide effects on users & suppliers, market development, and energy transport alternatives	**Responsibilities set out in the establishment of NESO** to develop SSEP, CSNP and RESP.

Source: BCG analysis

Next steps

Detailed timeline in back-up

End of July 1 — Finalize the report

August 2 — Continue internal & external engagement
Share report findings with key stakeholders, and perform final adjustments based on inputs & feedback

After summer 3 — Publish the report

For discussion — **Potential additional MAC engagement**

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Break

Strategic Energy Planning

Alice Etheridge

ESO

REMA Dispatch Assessment Update

Lizzie Blaxland & Izzie Sunnucks

ESO

Recap from the last MAC

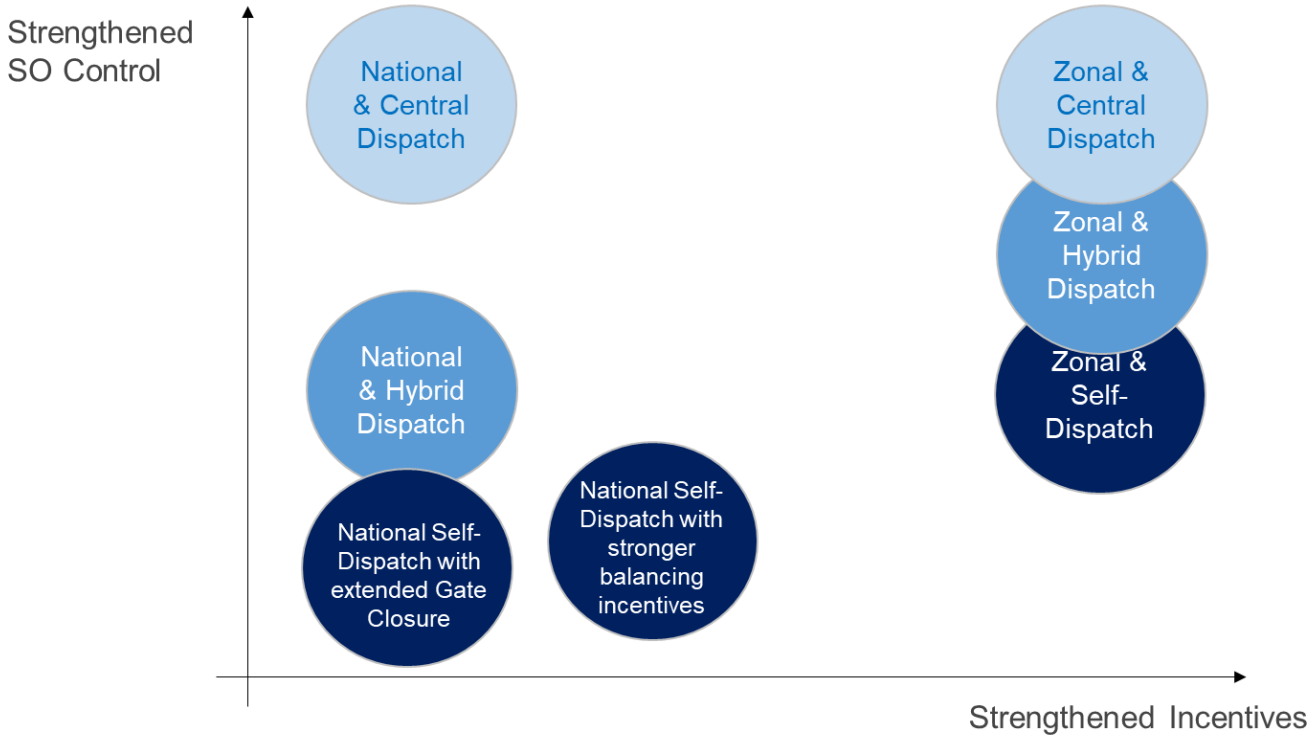
At the last MAC, we shared our objectives and approach for the assessment of Dispatch options in REMA

Establish the case for change	Identify possible solutions	Develop solutions for REMA evaluation
Build shared understanding of what issues should be addressed with scheduling & dispatch reform	Work with industry, within REMA programme timescales, to identify options for reforming dispatch arrangements	Identify shortlist of dispatch options and support DESNZ to assess within the broader REMA programme

Since then:

- We have published AFRY's report outlining the 'Case for Change' that reforms to Dispatch should seek to address
- Feedback at our public engagement focused on:
  - The need for **further quantitative analysis** to support effective prioritisation of solutions
  - Can ESO more clearly **distinguish between balancing costs** and where an issue impacts **wider system costs**
  - Any assessment needs to fully **account for the impact of any change on the whole system**, including consumers and transmission owners

Next steps: Tomorrow we are holding a follow-up webinar where we will discuss the strawman Dispatch models we have identified so far



The purpose of the engagement is to get feedback on:

1. Whether we've identified the right spectrum of models?
2. Whether the distinctions between models are clear?
3. Whether we've identified the right hypothesised pros/cons of each model that would need to be validated in REMA

Questions for the MAC

1. Based on the pre-read, does the MAC have feedback on how we are framing the Dispatch model options?

2. Would an independent review help industry confidence in ESO's assessment of Dispatch?

3. Recognising there is not much time between the meeting and the webinar to update content, we would however appreciate any MAC feedback on the technical content of the pre-read from interested members

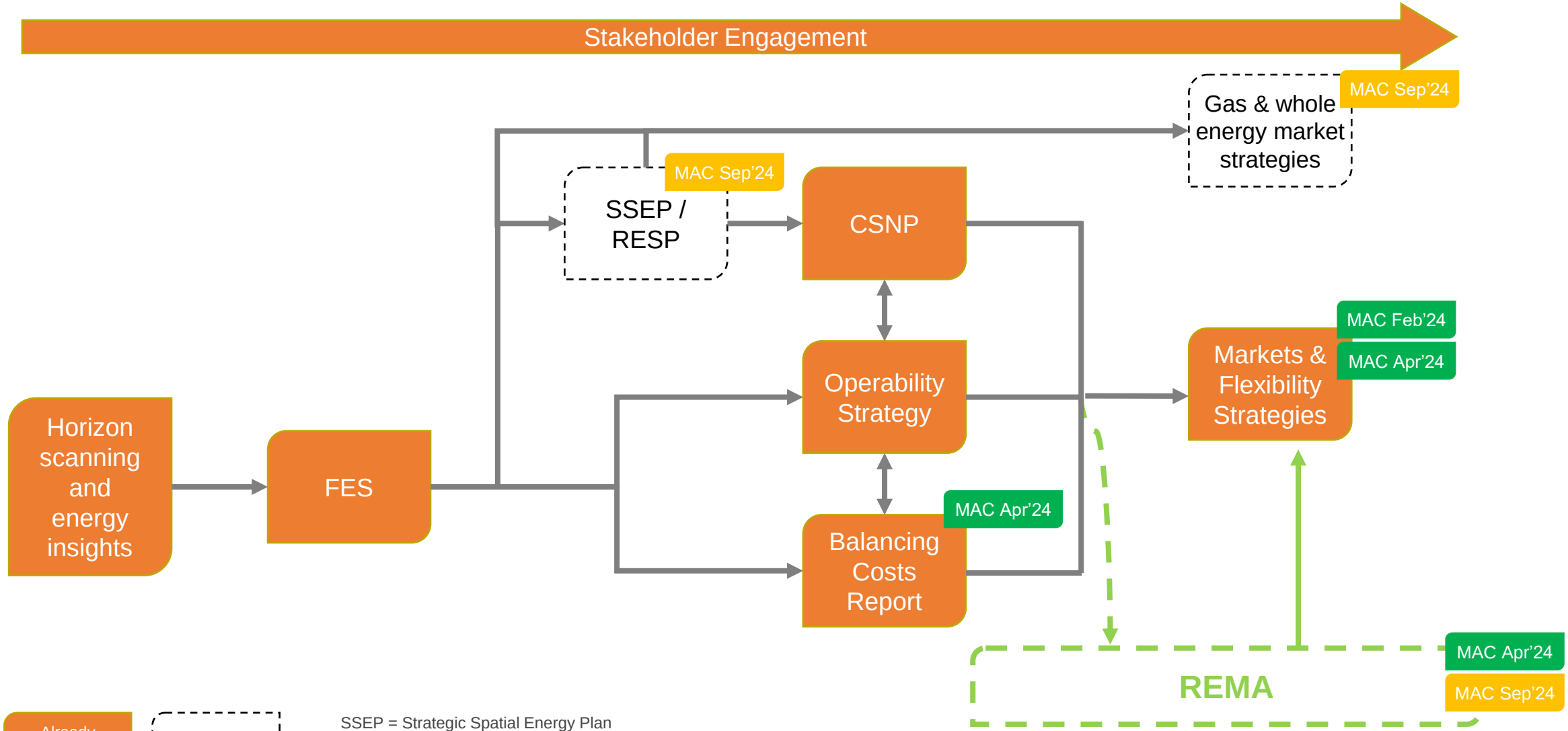
AOB

Appendices

ESO Strategy & Planning Cycle

ESO Planning, Modelling & Strategy Cycle

To articulate the fundamental processes performed by ESO from early horizon scanning through to tailored strategy and policy development. This will be repeatable as a closed loop.



Already delivered / in development

Being scoped

SSEP = Strategic Spatial Energy Plan
RESP = Regional Energy Strategic Plan
CSNP = Centralised Strategic Network Plan
FES = Future Energy Scenarios