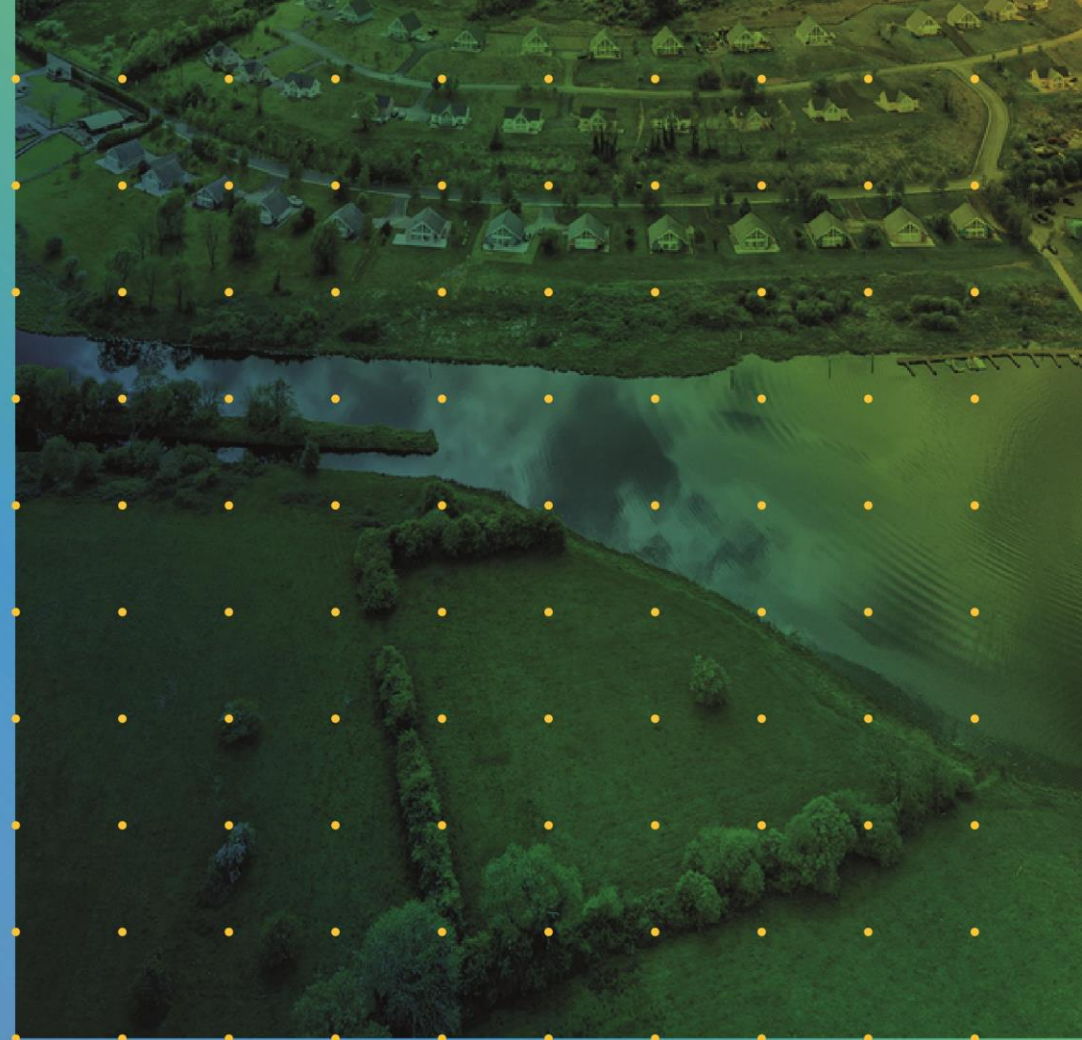




NETWORKS

# NATIONAL NETWORK LOCAL CONNECTIONS PROGRAMME

ADVISORY COUNCIL  
MEETING 4 | APRIL 5<sup>TH</sup> 2023



# AGENDA

Chair: Dr. Ellen Diskin

Agenda Item	Time	Owner
Welcome Back	5 Mins	Gerry Noone / All
Apologies and New Joiners to Council	10 Mins	Gerry Noone / All
Actions up-date for Meeting 3	10 mins	Gerry Noone/All
Multi-Year Plans Up-date	15 Mins	Gerry
2023 Key Milestones	40 mins	Ellen / All
15 -20% Flexibility by 2025	45 mins	Ellen/ All
Roundtable Discussion	20 mins	All
Lunch	12:30	All

# GENERAL HOUSE KEEPING

## Transparency

- Minutes being recorded and will be published on the stakeholder forum and made available to general public
- Presentations will be published in the stakeholder forum and made available to general public

Stakeholder forum link : ([Our Advisory Council \(esbnetworks.ie\)](https://www.esbnetworks.ie))

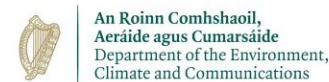
## Questions



If joining us virtually please raise your hand or drop questions into the chat function

**Please note over the course of the year there may be open procurement processes so there may be aspects of the programme we will not be in a position to discuss.**

# WELCOME



# WELCOME



**National Network,  
Local Connections  
Programme**

# Advisory Council Meeting 3 Minutes & Actions Sign off

Meeting Minutes found here: Action Log: [advisory-council-meeting-2-minutes-final.pdf \(esbnetworks.ie\)](https://www.esb.ie/assets/energy/2022/04/Advisory-Council-Meeting-2-Minutes-Final.pdf)

Item	Topic	Detail	Status	Progress
1	DSO/TSO Multi-Year Plan Consultation	Request for a webinar to be Mid January.	Closed	Closed. This Consultation was delayed but is now closed for responses. The slide deck from the Roundtable session is included in Appendix A
2	DSO/TSO Multi-Year Plan Consultation	Request made to publish webinars online.	Open	This facility is not currently available. ESN is reviewing the website with a view to adding functionality
3	DSO/TSO Multi-Year Plan Consultation	Request made by NN,LC for Council Members to share content within their organisations to spread awareness	Closed	
4	DSO/TSO Multi-Year Plan Consultation	CRU to review the timelines, based on consensus that 6 weeks was acceptable	Closed	Closed as the Consultation is now closed to public responses
5	Flexibility Multi-Year Plan Consultation	The subject of Carbon abatement raised. Discussion on the establishment of a sub-group to address	Open	
6	Pilot 4 A&B Connections	NN,LC to provide up-date on impact to customers of any delays	Moving to Close	NN,LCP have identify the qualifying Projects for Pilot 4 and significant 1:1 engagement has taken place. Projects are now considering Modifications to their applications
7	Advisory Council Membership	Request made for nominations for new members to Advisory Council in order to expand representation	Closed	2 new external members nominated and approved representing Storage

# Multi-year Plan Consultations Status Up-date

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## Visibility Multiyear Plan

NATIONAL NETWORK, LOCAL CONNECTIONS PROGRAMME

DOC-230223-GYO

Updated following consultation in DOC-230921-GYO

Consultation closed. Plan being up-dated to include responses received

## DSO/TSO Multi-Year Plan 2023 - 2027

Joint System Operator Programme  
February 2023

EirGrid ESB NETWORKS

Consultation closed. Plan being up-dated to include responses received

ESB NETWORKS

## Flexibility Multiyear Plan

NATIONAL NETWORK, LOCAL CONNECTIONS PROGRAMME

DOC-230921-GYW

Updated following consultation in Q4 2021

On agenda for discussion today



# Flexibility Multi-year Plan Work Plan 2023

# Flexibility MYP | Draft Major 2023 Milestones

LEVEL	DATE	MILESTONE	DESCRIPTION	PR5 OBJECTIVE
Major	H1 2023	Dynamic Instructions Sets Go-Live	Week-ahead and day-ahead scheduling of individual demand sites within DSUs commences, replacing annual instruction sets.	New Products & Services
Major	H1 2023	Publication of 15 – 20% Strategy & Scenarios Consultation	Publication of 15 – 20% Strategy Paper	Transparency & Reporting
Major	H2 2023	Mullingar Local Flexibility Market go-live	Multiple flexibility schemes operating within the pilot area go live, including customers down to domestic level.	Non Wire Alternatives
Major	H2 2023	Flexible Access Available (New flexible connection products)	RESS-1 projects can connect on a non-firm basis (for N-1 events).	Non Wire Alternatives
Major	H2 2023	CVR: Accelerated roll-out of CVR	Conservation reduction scheme to address winter security of supply challenges.	Non Wire Alternatives
Major	H2 2023	BTP Carbon Reduction Product Go-Live	Go-Live of a domestic behavioural flexibility scheme designed to reduce carbon emissions	New Products & Services
Major	H2 2023	First 15-20% Flexibility Schemes Call to Competition	Call to competition goes live . Based on current information, likely that these target medium duration storage and Large Industrial customers, but pending outcomes of H1 15-20% Strategy Consultation	New Products & Services
Major	H2 2023	Scale-up of BTP Schemes	Consolidating and increasing participation in highest impact BTP Scheme(s)	New Products & Services

# Flexibility MYP | Draft Minor 2023 Milestones

LEVEL	DATE	MILESTONE	DESCRIPTION	PR5 OBJECTIVE
Minor	H1 2023	Proposition Development (med. duration storage & industrial customers)	Development of Market Products for Storage and Large Industrial Sectors *Pending outcomes of H1 15-20% Strategy	New Products & Services
Minor	H1 2023	System Strength (Short Circuit Level) Studies Complete	Foundational system profiling and analysis to enable the design and introduction of future system strength flexibility products	Non Wire Alternatives
Minor	H1 2023	Information Note on Flexible Access (New flexible connection products)	Information paper on Flexible Access	Non Wire Alternatives
Minor	H1 2023	Increase awareness of BTP schemes	Increase awareness of BTP schemes through appropriate media and communicable channels	Transparency & Reporting
Minor	H1 2023	15-20% Sectoral Research Complete	Sectoral research enabling the definition of commercial sector flexibility services calls to competition for 2024 launch.	Transparency & Reporting
Minor	H1 2023	15-20% Technology Solution Defined	Technology Strategy: Options analysis & Recommendation	Transparency & Reporting
Minor	H2 2023	Customer Identification, Engagement and Proposition Testing	Market testing of products for Storage and Large Industrial Sectors *Pending outcomes of H1 15-20% Strategy Consultation	New Products & Services
Minor	H2 2023	Local community dashboards go-live	Local Community dashboards' available for a pilot group of sustainable energy communities, providing local and community-specific information including renewables and electricity carbon intensity.	New Products & Services
Minor	H2 2023	Dynamic Stability Studies Complete	Foundational system profiling and analysis to enable effective TSO/DSO coordination	Non Wire Alternatives
Minor	H2 2023	Location and System Analysis	Location and System Analysis for Storage and Large Industrial Sector Locations *Pending outcomes of H1 15-20% Strategy Consultation	Non Wire Alternatives
Minor	H2 2023	Smart Inverter Pilot	Go-live of Smart inverter pilot in preparation, to support increased mini generation connections, by reducing the requirement for export limitation and reducing connection costs	Non Wire Alternatives
Minor	H2 2023	Mullingar: Second round of flexibility schemes procurement	Procurement for a number of flexibility schemes to operate within the pilot area, including customers down to domestic level and the launch of new products.	Non Wire Alternatives

# Flexibility MYP | Draft Minor 2023 Milestones

LEVEL	DATE	MILESTONE	DESCRIPTION	PR5 GROUPING
Minor	H2 2023	Pilot learnings published	<ul style="list-style-type: none"> <li>Pilot 1 (Commercial flexibility) Year 1 learnings published</li> <li>Pilot 3a (Commercial flexibility) Winter 1 learnings published</li> <li>Pilot 6 (Domestic Flexibility) Wave 1 learnings published</li> <li>Pilot 7a (Active Management – CVR) Wave 1 learnings published</li> </ul>	Transparency & Reporting
Minor	H2 2023	Standard industry reporting	Establishment of initial standard market and regulatory reporting on the procurement and dispatch of DSO flexibility. Critical to building transparency and supporting flexibility market liquidity.	Transparency & Reporting
Minor	H2 2023	Tools and supports to enable community energy participation in flexibility progressed	Community Energy Participation: Development of tools and supports progressed to enable community energy participation in flexibility.	Transparency & Reporting



# Questions

- Do you need a few clarifications?
- Can you see the sector or customers you represent in these milestones?
- Do you think any of the minor milestones should be prioritized as major?
- Do you / the sector or customers you represent value the major milestones?
- Are there additional major or minor milestones you think should be prioritized ahead of those included?

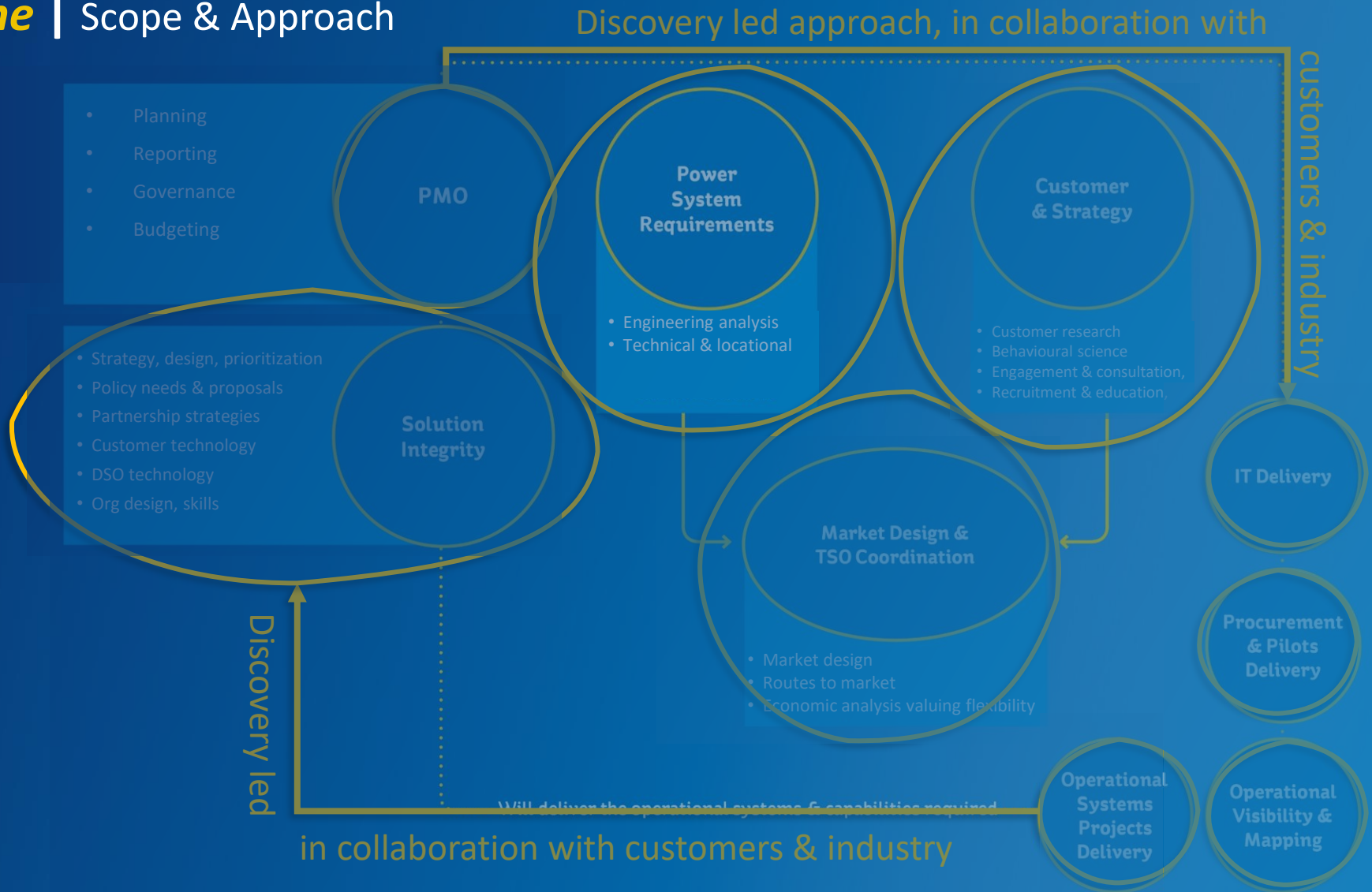
# 15-20% Flexibility by 2025

- 15-20% Strategy for Consultation
- Abridged Version

# NN,LC Programme | Scope & Approach

## NN,LC Scope & Role within ESB Networks

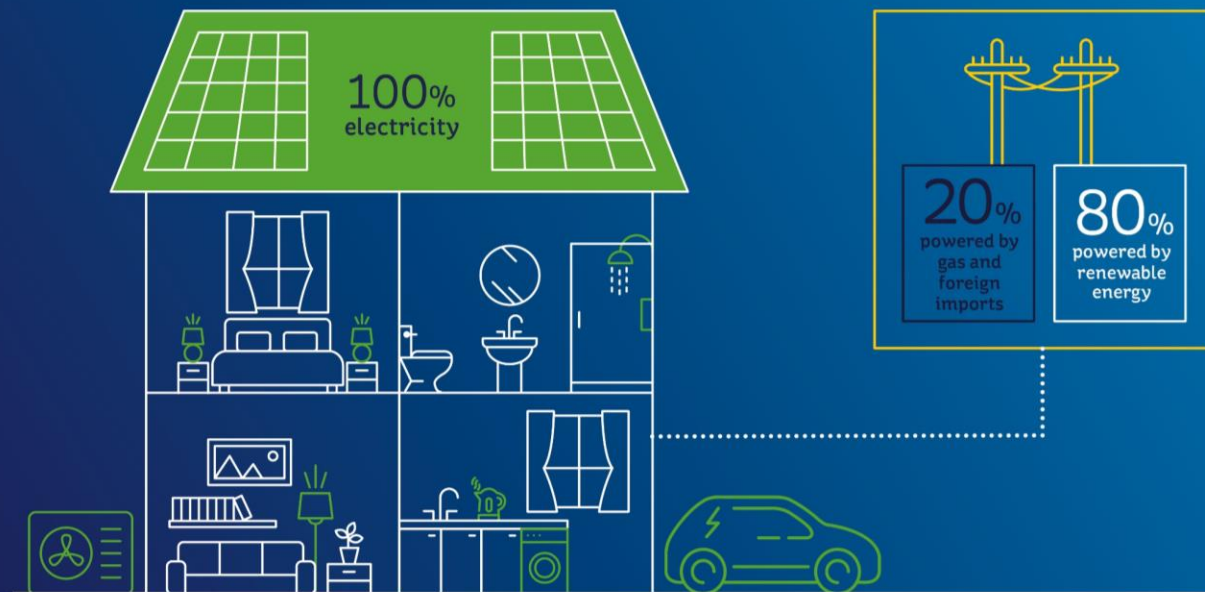
- Define & introduce a new DSO role, as per [CRU PR5 Determination](#) and [ESB Networks Strategy](#)
- DSO role in delivering 15-20% flexibility by 2025.
- DSO role in delivering 20-30% flexibility by 2030



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# It's 2030 | What are our vital statistics?



10-12 TWh of additional demand, incl. 5-6 TWh heat & transport adding 3-3.5 GW peak demand (+65%)

- 22-23 GW renewables (+300%)
- 7% oversupply limit (-40%)
- 3 MtCO<sub>2</sub>eq. p.a. (-75%)

1 – 10 TWh of flexibility (1.4 – 2.4 GW)  
0.86 MT CO<sub>2</sub> abatement p.a.

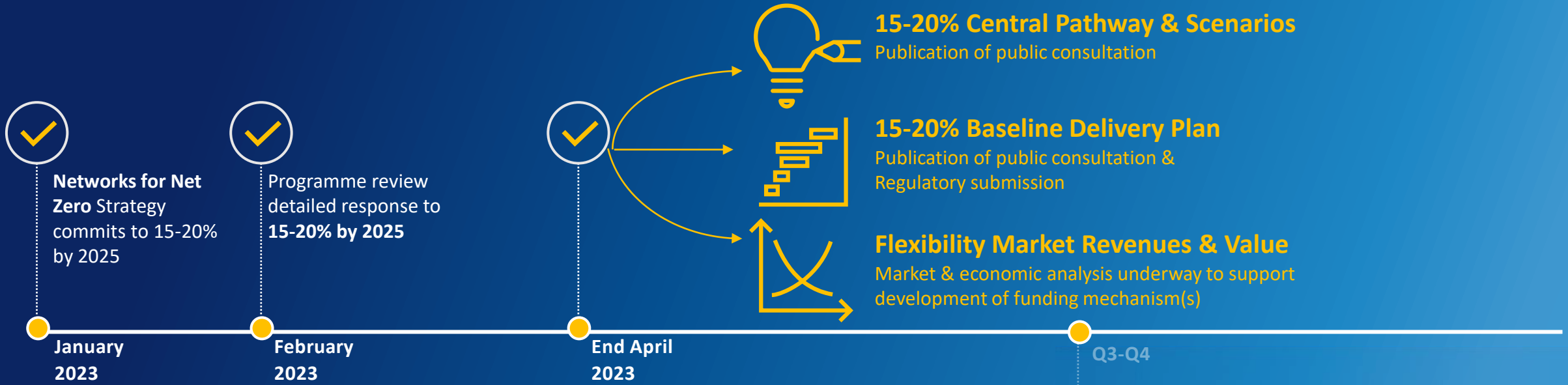








# Accelerated Flexibility Target | 9-Month Look-Ahead



- Critical support & collaboration may be needed:**
- Public consultation & direct engagement
  - Industry-specific research Q2, Q3
  - Planning permission process (DHPLG)
  - Industry engagement & agencies (IDA, Ent. Ireland)
  - Funding mechanisms (CRU)
  - Etc

- ★ **Long Duration Flexibility (Storage)**  
 Product launch & call to competition  
 Carbon abatement & peak demand reduction
- ★ **Large Energy Users**  
 Product launch & call to competition  
 Carbon abatement & peak demand reduction

**Indicative – Early Market Testing & Long Lead Time Activities**



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## 15-20% Flexibility | Working Definition (Descriptive)

*“Flexible system demand” is the ability of electricity system demand to respond to changing states of generation, demand, storage and network conditions.*

- *It is characterised by direct system operator actions, coupled with individual/collective customer behaviour.*
- *It is measured as a % of peak system demand, but is not necessarily available at peak system demand (or intended to be).*
- *It includes demand increases and decreases, which may be simultaneous or occur at different times, for different reasons.*

*“Carbon abatement” attributable to demand side flexibility (i.e. scope of this particular target) is carbon consumption that is avoided directly as a result of flexibility*

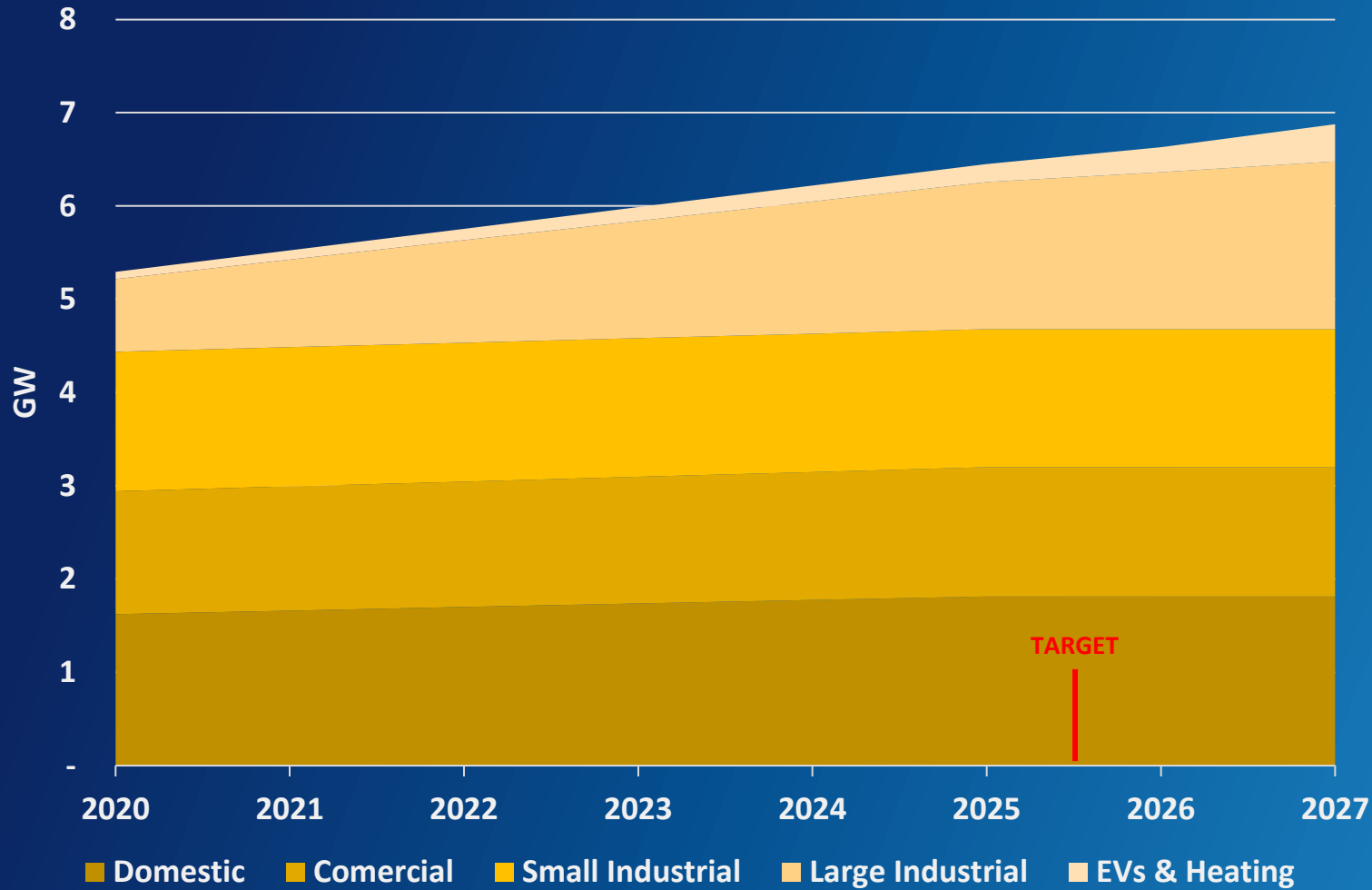
### Includes

- ✓ **Contracted flexibility**
  - ✓ To either TSO, DSO or both in relevant markets
  - ✓ To suppliers, and responsive but not “traded”
- ✓ **Flexibility Readiness**
  - ✓ Flexible connection agreement
  - ✓ Flexibility readiness (“equipped”)
- ✓ **Technologically enabled flexibility**
  - ✓ Dynamic voltage regulation (CVR)
  - ✓ Med / long duration storage
  - ✓ Behind-the-meter generation (e.g. CHP, diesel)
- ✓ **Behavioural flexibility**, including achieved via dedicated educational measures (hard to measure)

### Excludes

- ✓ Supply-side flexibility e.g.
  - ✓ Storage providing dynamic response, fast reserves
  - ✓ DSUs providing DS3 services
  - ✓ Flexible supply side technologies (e.g. synch. compensation)
  - ✓ Flexible generation
  - ✓ Flexible renewables connections
- ✓ DSUs participating in the capacity market are not in line w. intent but to be reported separately as a related volume.
- ✓ **NOTE** Some flexibility abates carbon, other flexibility adds carbon. Some of the flexibility used to achieve the 15-20% will result in increased emissions, in which case a higher volume of flexibility is needed to achieve the carbon abatement target.

# Definition of the Target | Numeric Definition

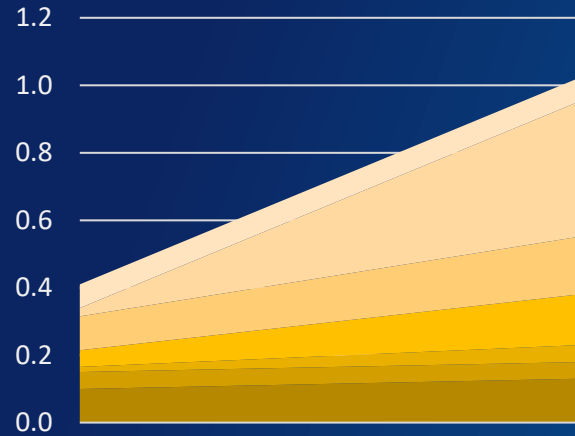


	TWh	GW
Flex. to cap dispatch down at 7%	9.5	c. 3
Flex. to abate 0.8 MT CO <sub>2</sub>	2.5	
Flex. to manage peak demand	0.7	c. 1

## 2. To Deliver CAP 2023 targets | Scenarios & Testing

### Evidence Based (initially)

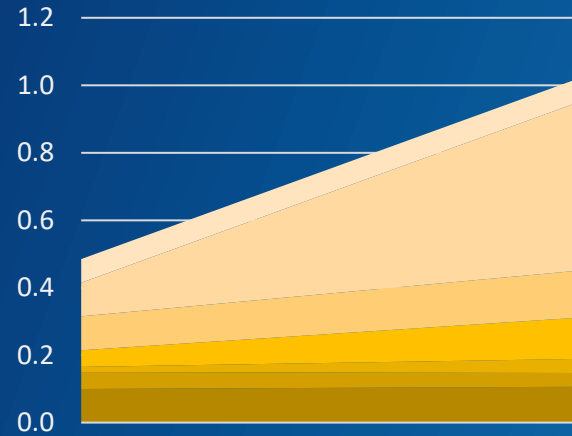
Central



2025

2026

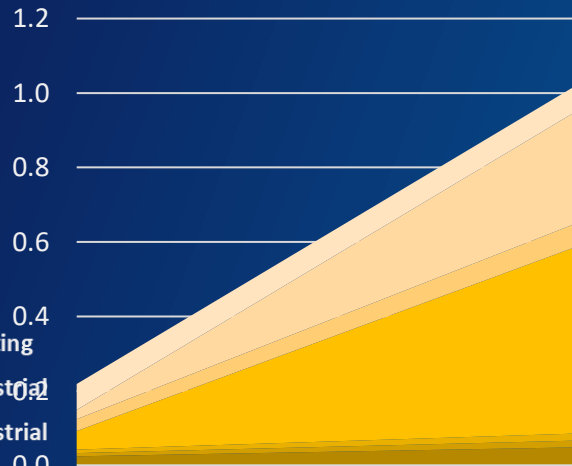
Storage Led



2025

2026

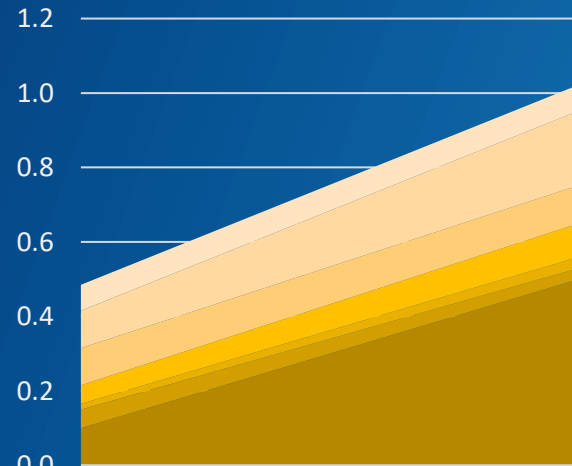
Industry Led



2025

2026

Consumer Led



2025

2026

- EVs & Heating
- Large Industrial
- Small Industrial
- Commercial
- Domestic

### Discovery Led (thereafter)

#### Market Viability & Readiness

Market Research

Market Engagement

Market Testing

#### 2023

##### Q1

★ "Fast follow" research

##### Q2

★ DG6/7 research  
 ★ Domestic PV research  
 ★ Storage research & eng.  
 ★ LEU research & eng

##### Q3

★ Storage research & eng.  
 ★ LEU research & eng.  
 ★ Farmers PV research  
 ★ Transport standards eng  
 ★ Social housing eng.

##### Q4

★ BTP-Carbon results  
 ★ Domestic PV research  
 ★ Transport standards eng

#### 2024

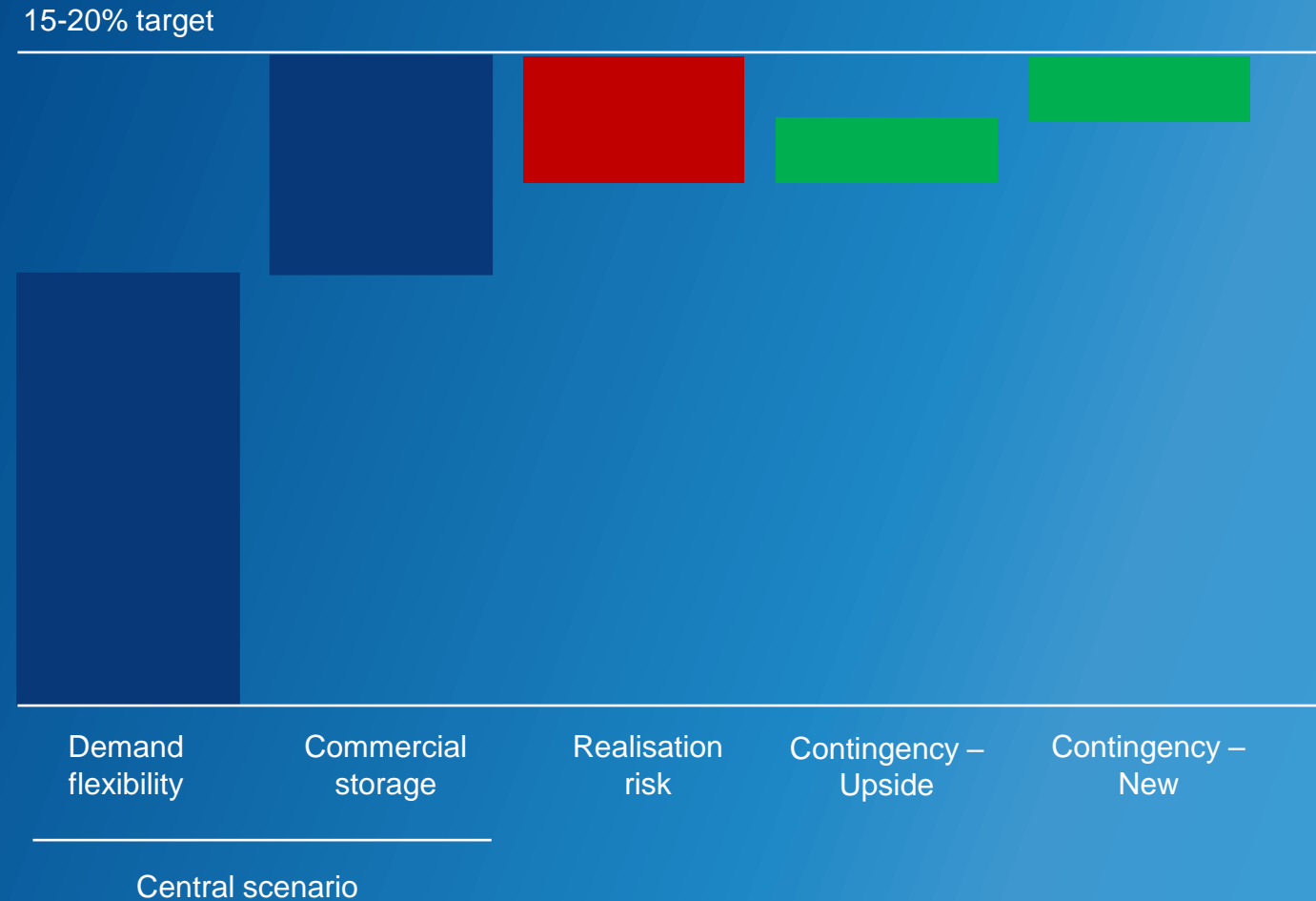
##### Q1

★ Storage PQQ responses

##### Q2

## Central Pathway | Expert Validation

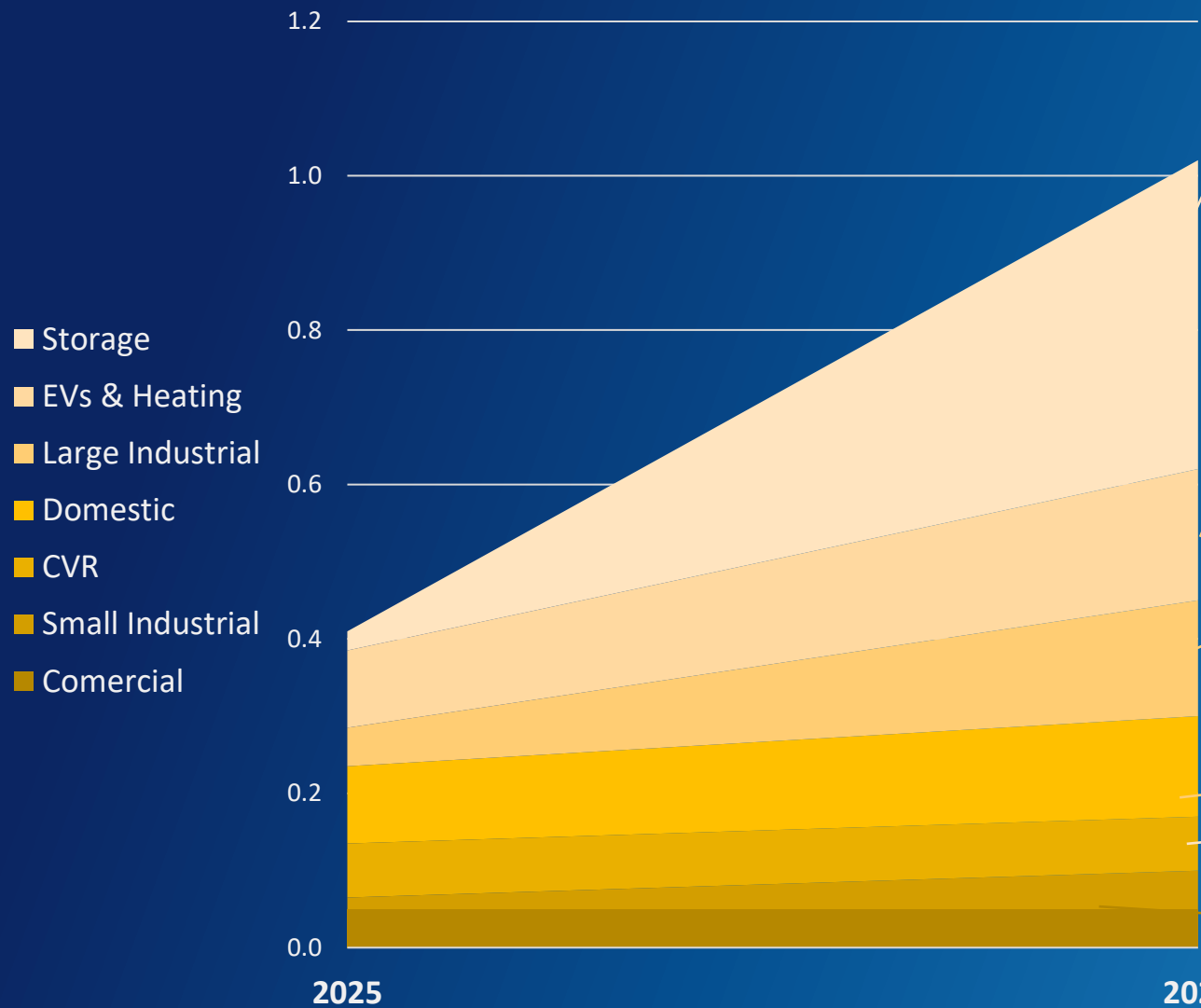
- Flexibility has big theoretical potential
- But the results of real world trials and scale deployment is varied. Getting customer to participate is very hard
- There is a high dependency upon mandates, technology interoperability and effective markets and commercial incentives
- The approach has a central scenario for flexibility provided by demand, which is contingent upon customer participation. Commercial storage – an infrastructure-based solution – closes the gap
- There is risk to realising target flexibility and so contingency opportunities have also been identified. These contingencies include upside on the central scenario and new opportunities





# Central Pathway | Proposals & Impact

Evidence Based (initially)



**Medium Duration (multihour) storage**

Establishment of multi-year contracts to provide secure route to market for location specific distributed storage, participating in local balancing to deliver

- carbon abatement
- Peak demand management
- Renewables oversupply management

**HIGH**

**Flexibility Ready Transport**

Introduction of standard flexibility readiness for all new EV changepoints and commercial electric transport connections

**HIGH**

**Large Energy Users**

A range of (initially bespoke) carbon abatement products to incentivise LEUs to make operational & investment decisions which reduce location specific emissions as part of local DSO balancing

**HIGH**

**Domestic PV, Agricultural PV, Communities**

Flexibility services targeted at domestic customers, farming customers and communities. Two models under development: behavioural & supplier/aggregator led

**HIGH**

**Conservation voltage reduction**

Controllable demand reduction by marginal adjustments to electricity system voltages. Immediate direct customer benefits

**MED**

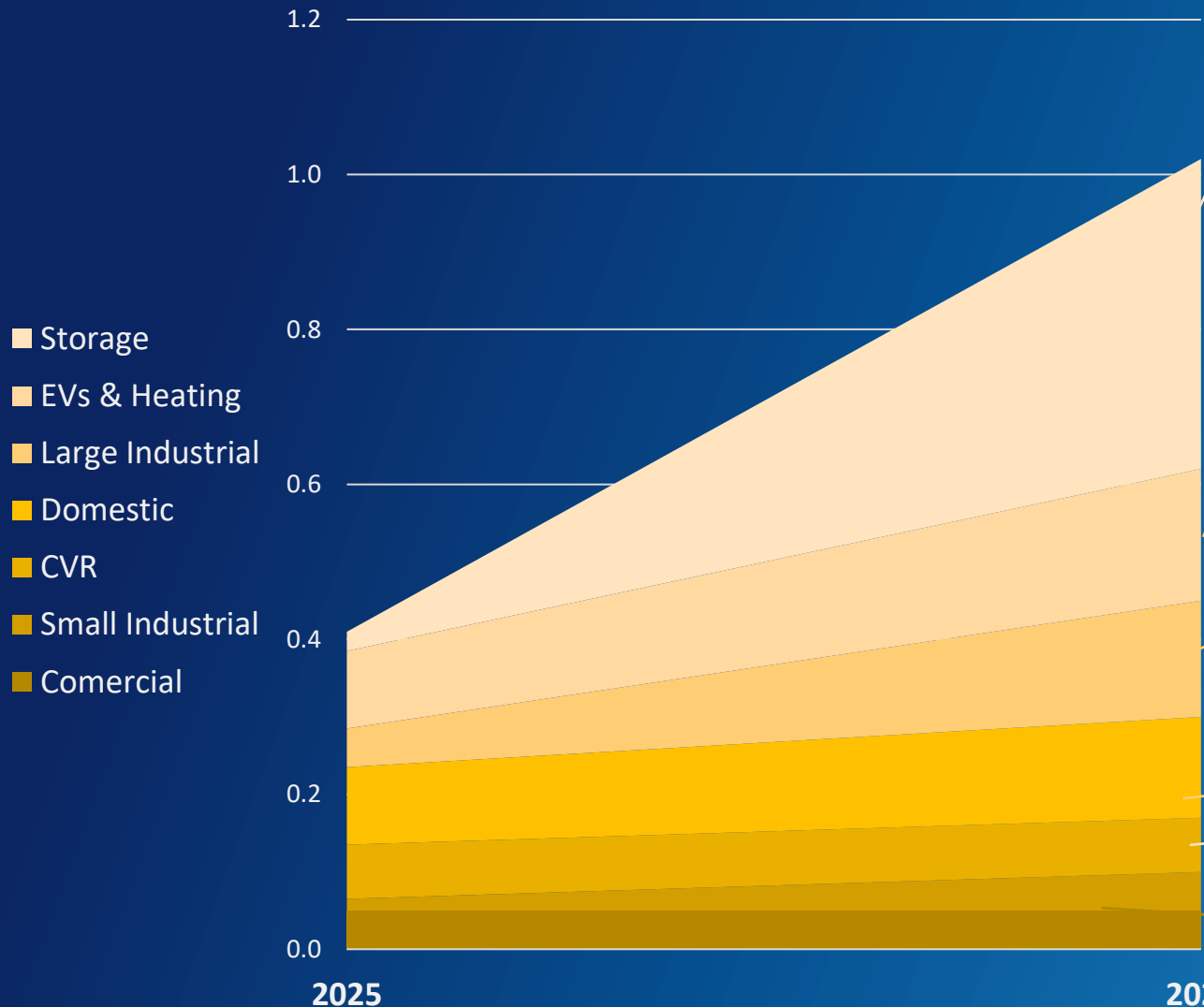
**Sector Specific Initiatives**

Sectoral analysis underway to identify commercial sectors with high Irish penetration and high potential propensity for flexibility

**MED**

# Central Pathway | Key Assumptions & Priorities for Testing

Evidence Based (initially)



### Medium Duration (multihour) storage

- Recent capacity auction results reflect market readiness
- Planning permission & sites available
- Market access to battery production slots

**H**

### Flexibility Ready Transport

- OEM readiness
- Cost impact
- Supply chain
- Vendors' willingness to "unlock"

**M**

### Large Energy Users

- LEUs willing to invest in gas recips & green certs, storage or process shifting
- LEUs value robust carbon emissions reduction & reporting, and security, not just financial compensation

**H**

### Domestic PV, Agricultural PV, Communities

- Supplier readiness is low / risk is too high, but we can partner on the designn of a hybrid approach that addresses market failures & supports supplier entry & DSO exit.
- CRU and DECC supportive of ESBN addressing market failures

**H**

### Conservation voltage reduction

- Engineering calculations are accurate
- Tech solution can be implemented
- Backfeed voltage range can be tolerated during security sensitive conditions.

**M**

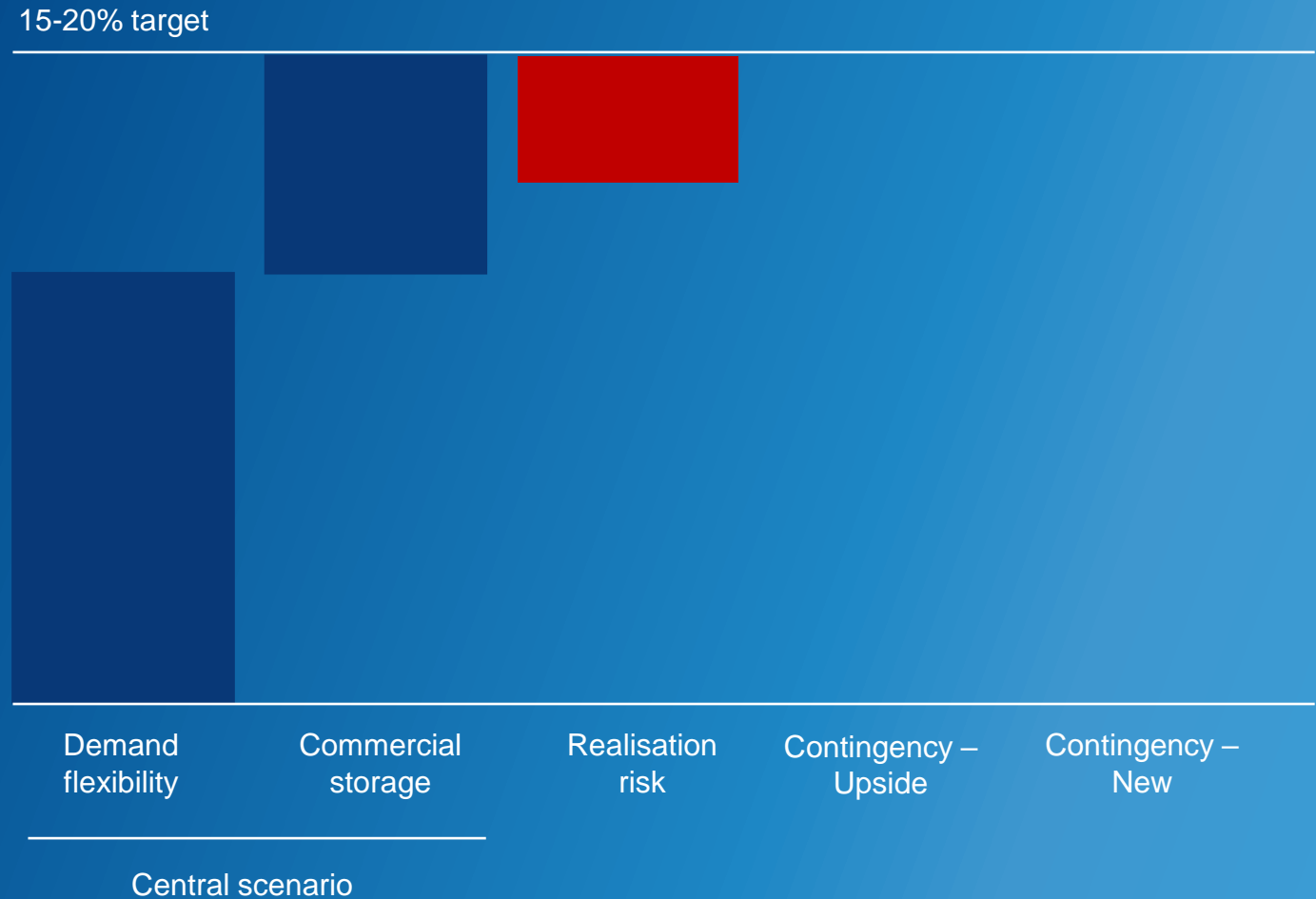
### Sector Specific Initiatives

- Analysis from other jurisdictions borne out in Irish context

**M**

## Central Pathway | Expert Validation

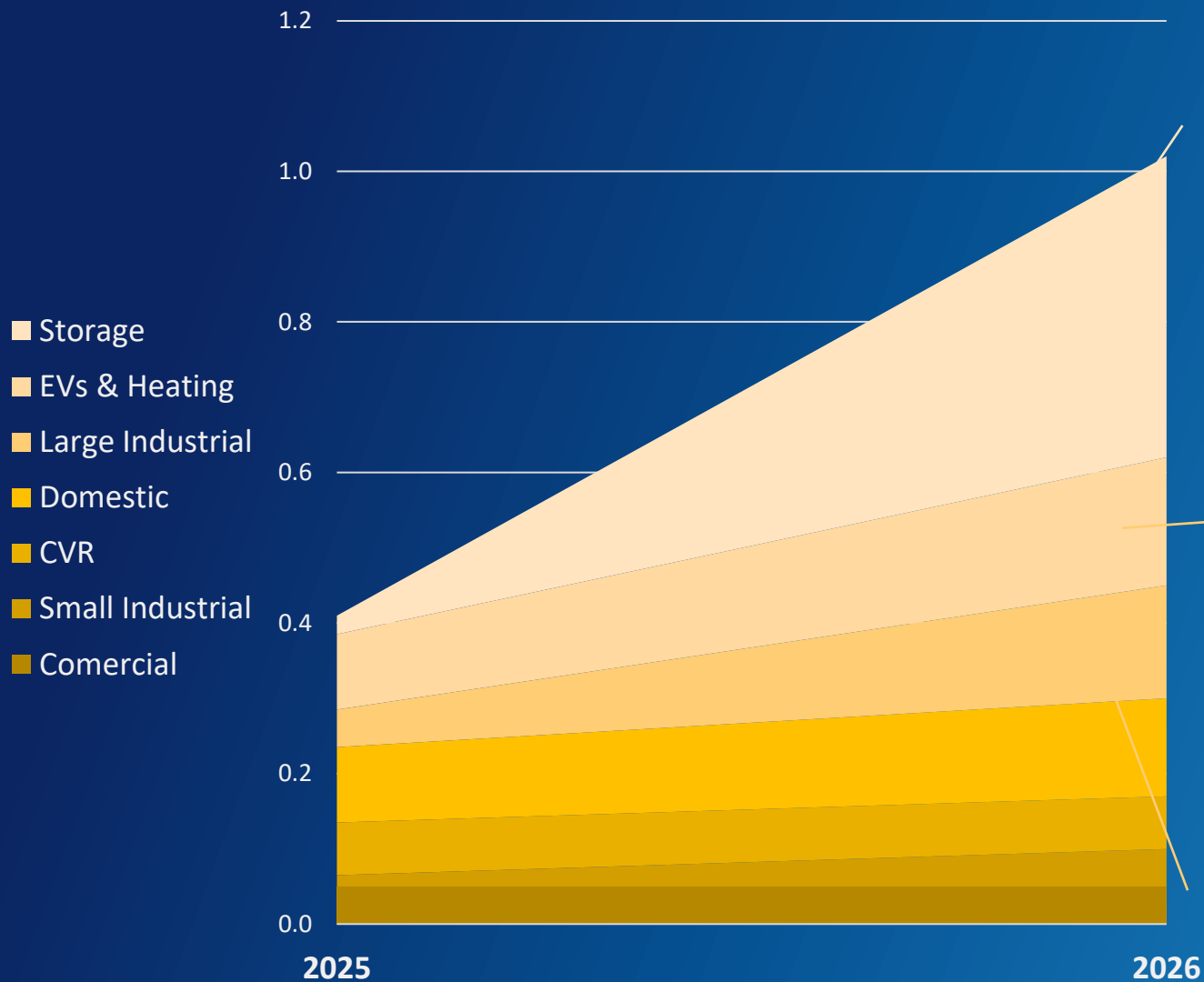
- Flexibility has big theoretical potential
- But the results of real world trials and scale deployment is varied. Getting customer to participate is very hard
- There is a high dependency upon mandates, technology interoperability and effective markets and commercial incentives
- The approach has a central scenario for flexibility provided by demand, which is contingent upon customer participation. Commercial storage – an infrastructure-based solution – closes the gap
- There is risk to realising target flexibility and so contingency opportunities have also been identified. These contingencies include upside on the central scenario and new opportunities



# Central Pathway | Expert Confidence & Mitigations

Evidence Based (initially)

High confidence	Strong body of supporting evidence both for individual customer flexibility and willingness to participate at scale
Med Confidence	Robust proof points from participating customers, but limited precedent at target scale / evidence of voluntary participation challenges .
Low Confidence	Limited supporting evidence / highly context specific



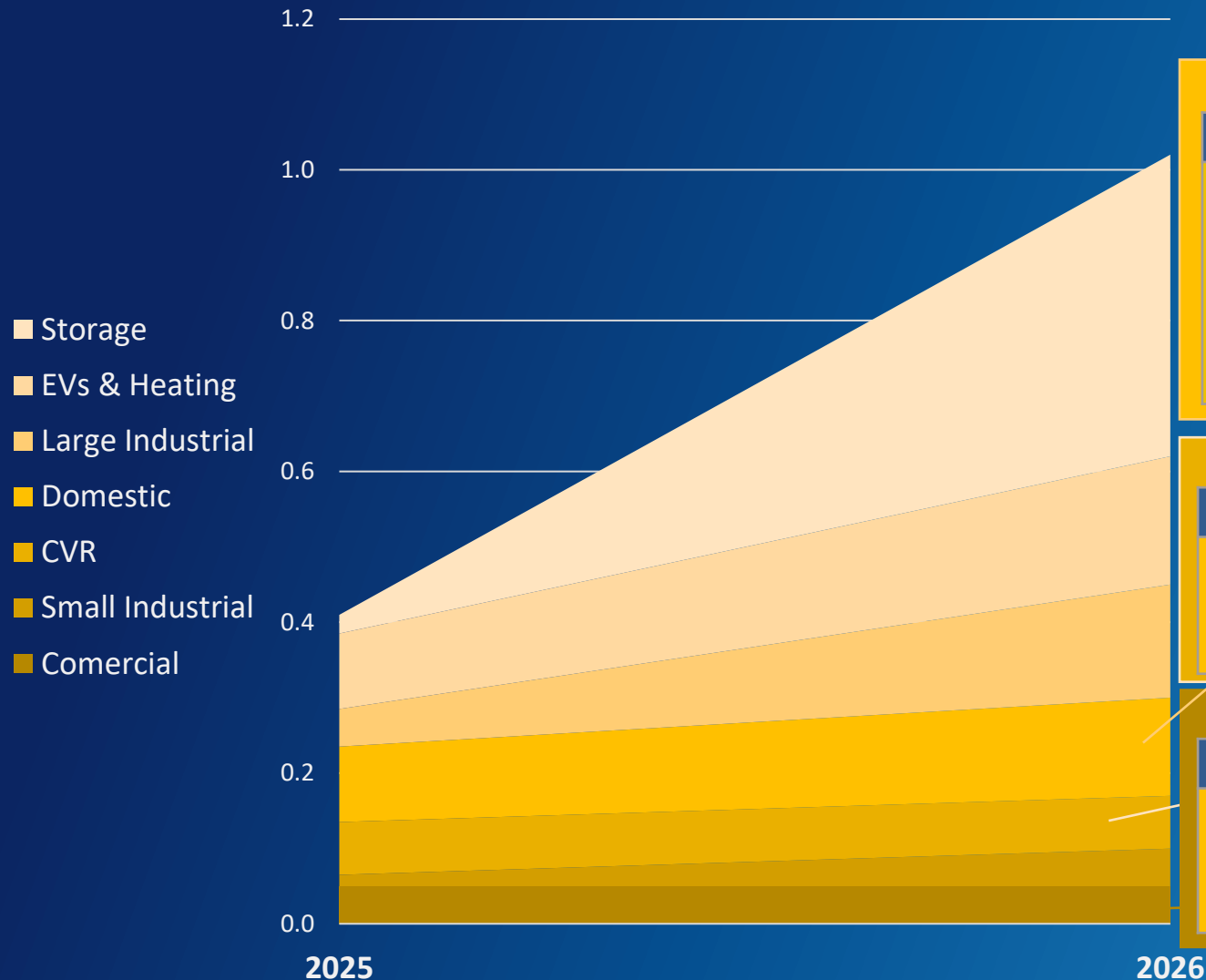
Medium Duration (multihour) storage		
Confidence	Key observations	Recommended Mitigations
L	<ul style="list-style-type: none"> <li>Ability to provide timely commercial certainty and accelerate planning</li> </ul>	<ul style="list-style-type: none"> <li>Engagement on statutory planning acceleration required commercial model &amp; certainty to progress to a timeline that hits 2026 commissioning</li> </ul>

Flexibility Ready Transport		
Confidence	Key Observations	Recommended Mitigations
M	<ul style="list-style-type: none"> <li>Participation in an opt in model is key concern e.g. CrowdFlex had a participation rate of 11-26% in EV ToU trial and Dutch experience is 1% uptake on opt-in flexible charging =&gt; moving to mandatory model</li> </ul>	<ul style="list-style-type: none"> <li>Engage with stakeholders to understand technical constraints and regulatory models to support opt-out / mandatory requirements</li> </ul>

Large Energy Users		
Confidence	Key Observations	Recommended Mitigations
Industrial H	<ul style="list-style-type: none"> <li>10-17% in EU analysis<sup>2</sup></li> <li>UK participation estimate 10% of peak<sup>2</sup></li> <li>Irish industry mix is largely batch process based =&gt; conducive to demand flexibility</li> </ul>	<ul style="list-style-type: none"> <li>Uptake contingent on production process – batch / job shop (food ) vs. continuous production (steel, refining). Detailed assessment of Irish industrial mix</li> </ul>
Data Centres M	<ul style="list-style-type: none"> <li>0.81GW estimate of flex across back-up, location &amp; time shifting and UPS<sup>1</sup></li> <li>Contingent upon willingness to participate against customer SLAs</li> </ul>	<ul style="list-style-type: none"> <li>Engage with both hyperscale and colocation DC providers to understand willingness, technical / asset readiness and necessary economic incentives</li> </ul>

# Central Pathway | Expert Confidence & Mitigations

Evidence Based (initially)



<b>High confidence</b>	Strong body of supporting real world evidence both for individual customer flexibility and willingness to participate at scale
<b>Med Confidence</b>	Robust proof points from participating customers, but limited success at target scale / evidence of voluntary participation challenges .
<b>Low Confidence</b>	Limited supporting evidence / highly context specific

<b>Domestic PV</b>		
Confidence	Key observations	Recommended Mitigations
M	<ul style="list-style-type: none"> <li>Residential flex in 4 EU countries 2-18% vs residential peak load<sup>4</sup></li> <li>UK CrowdFlex delivered 41% turn down &amp; 131% turn up from one-off signals for non-EV houses</li> <li>Low participation rates: 2% non-smart &amp; 4% smart for turn down, 19% non-smart &amp; 63% smart for turn up<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>Focused analysis on participation and need for a mandatory model given challenges with participation rates</li> </ul>

<b>Conservation voltage reduction</b>		
Confidence	Key Observations	Recommended Mitigations
M	<ul style="list-style-type: none"> <li>Winter 22/23 analysis GW potential of up to 0.09</li> <li>Average modelled CVR factor of 0.77, modelled voltage reduction range 0.5% - 4.5% (average 1.52%)</li> <li>To achieve the 0.09, a technological solution would need to be in place</li> </ul>	<ul style="list-style-type: none"> <li>Progress definition of a technological solution</li> <li>Implement a hybrid between 'Always On' and 'Event-based'</li> <li>Network improvements can increase the headroom for temporary voltage reduction</li> </ul>

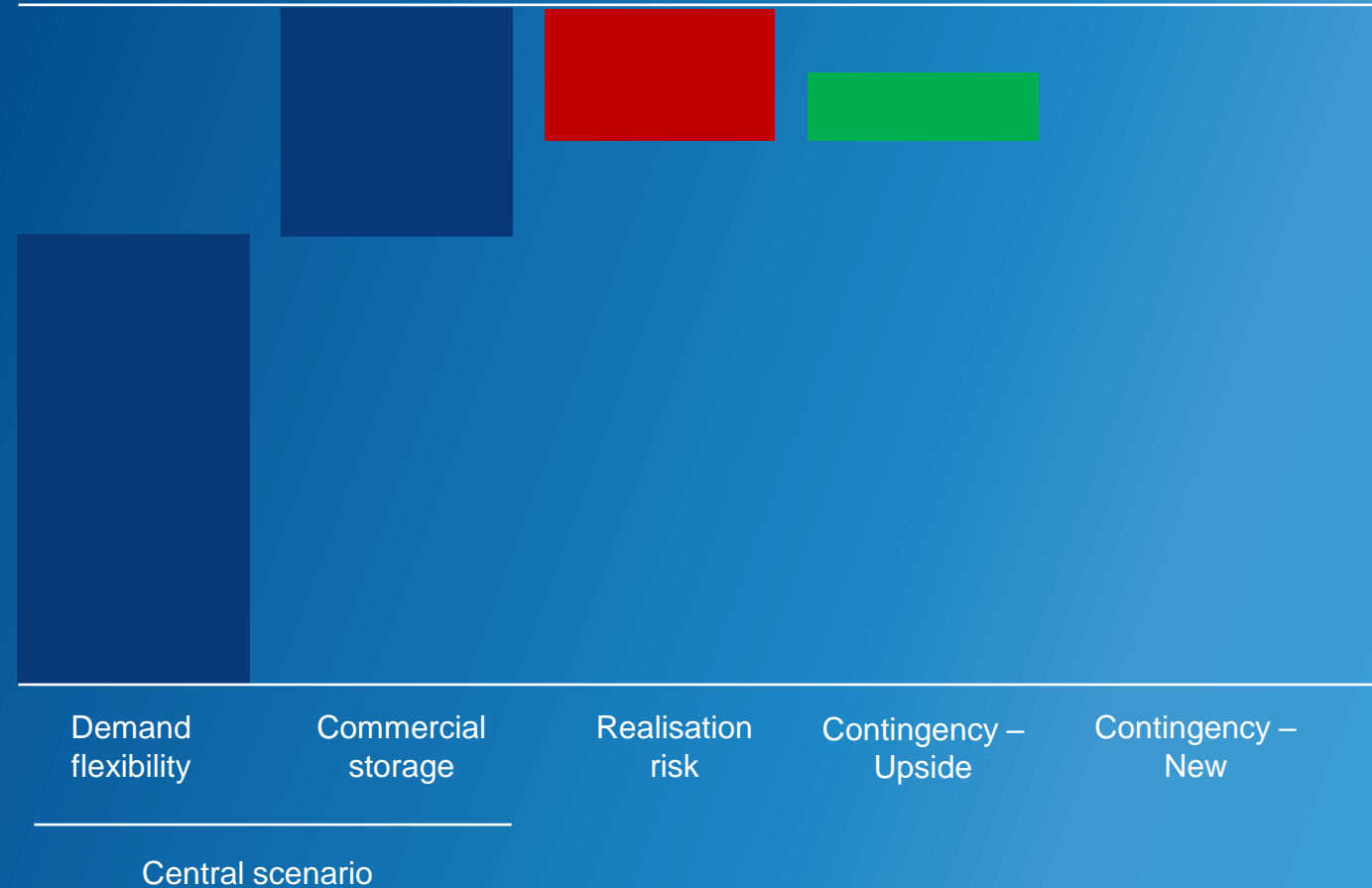
<b>Sector Specific Commercial Initiatives</b>		
Confidence	Key Observations	Recommended Mitigations
M	<ul style="list-style-type: none"> <li>Assessment of various studies found a <b>15-30% reduction</b> in building electric power demand via demand response<sup>6</sup></li> <li>Participation in commercial real estate is complicated by the relationship between owner, building manager &amp; tenant.</li> </ul>	<ul style="list-style-type: none"> <li>Engage with public sector building managers &amp; decision makers to understand willingness to participate across the public sector estate</li> </ul>

# Central Pathway | Expert Validation – Upside Opportunities

## 1. Upside on existing opportunities

Opportunity	Upside potential	Next steps
Commercial: dairy farm back-up generation and other commercial back-up	<ul style="list-style-type: none"> <li>140k dairy farms in Ireland, significant portion expected to have back-up generation sized to milking load as milking has to be resilient to loss of supply</li> <li>Other back-up generation not already contracted in the capacity market</li> </ul>	<ul style="list-style-type: none"> <li>Research to identify total installed back-up generation capacity including generators powered by farm tractors</li> </ul>
Residential: non-PV households	<ul style="list-style-type: none"> <li>Selected PV households given higher likelihood of participation as assumed 10% load flexibility.</li> <li>Potential to extend to all households and achieve higher proportion e.g. in line with CrowdFlex trials</li> </ul>	<ul style="list-style-type: none"> <li>Extend the analysis to non-EV households and consider range of residential peak demand</li> </ul>
Data centres: full flex potential across back-up, location & time shifting and UPS	<ul style="list-style-type: none"> <li>BNEF available flex estimate for data centres in Ireland is nearly 10x the 2026 target given the potential of back-up and UPS in addition to location and time shifting</li> </ul>	<ul style="list-style-type: none"> <li>Create data centre range, recognising that only a subset of operators may be willing to participate</li> </ul>

15-20% target

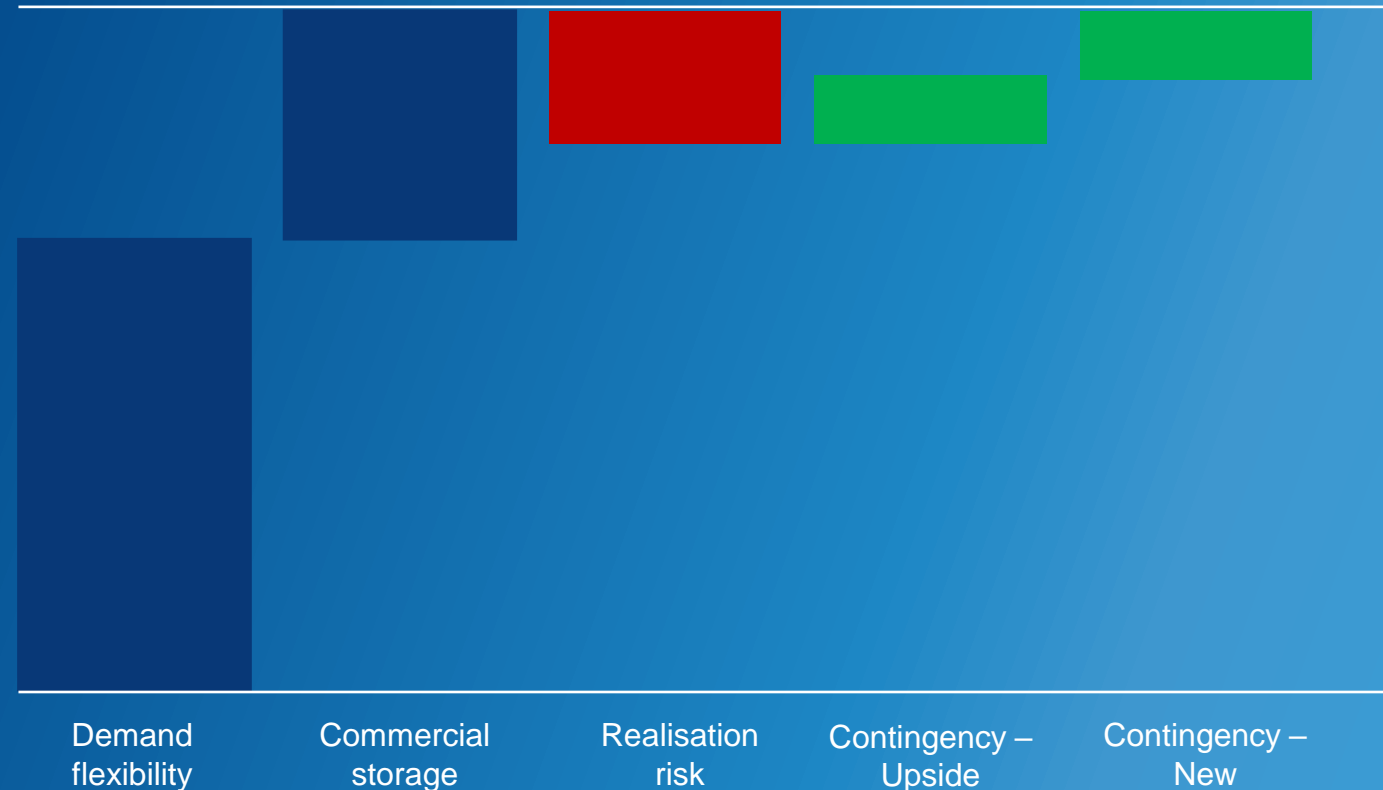


# Central Pathway | Expert Validation – Upside Opportunities

## 2. Pipeline opportunities

Opportunity	Upside potential	Next steps
Residential behind the meter storage	<ul style="list-style-type: none"> <li>Residential storage could be attractive to address V / PQ issues at LV feeders with high penetration of DG / EVs / heat pumps as an alternative to LV reinforcement ( w. associated cost and disruption)</li> <li>Larger battery installations have superior cost economics, but cannot address LV challenges. Value of reinforcement deferral or avoidance of LV may match the inferior unit cost economics</li> </ul>	<ul style="list-style-type: none"> <li>Identify scale of opportunity at an LV level based upon current and forecast power quality issues and assess whether this would provide a material amount of incremental flexibility</li> </ul>
MV substation community storage	<ul style="list-style-type: none"> <li>Storage at MV substations could address thermal constraints as an alternative to reinforcement and provide increased flexibility</li> </ul>	<ul style="list-style-type: none"> <li>Assess MV storage as an alternative to reinforcement &amp; scale of opportunity</li> </ul>
Electrolysers	<ul style="list-style-type: none"> <li>Electrolysers if / when green H2 production scales</li> <li>CAP analysis on green H2 production identifies no planned electrolyser capacity pre-2030, so this would require accelerated green hydrogen production</li> </ul>	<ul style="list-style-type: none"> <li>Watching brief on green H2 progress. Influence policy decisions on role of H2 in whole system approach to decarbonisation</li> </ul>
V2G	<ul style="list-style-type: none"> <li>V2G has the potential to increase the flexibility potential of EVs beyond what is possible with smart charging. But significant technology challenges to be overcome.</li> </ul>	<ul style="list-style-type: none"> <li>Watching brief on the development of V2G</li> </ul>

15-20% target



Central scenario

## 2. To Deliver CAP 2023 targets | 9-Month Look-Ahead



Market Research	Market Engagement	Market Testing
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**Critical support & collaboration may be needed:**

- Planning permission process (DHPLG?)
- Industry engagement & role of agencies (IDA, Enterprise Ireland)
- Funding mechanisms to provide route to market
- Other – issues being identified

- ★ **Long Duration Flexibility (Storage)**  
 Product launch & call to competition  
 Carbon abatement & peak demand reduction
- ★ **Large Energy Users**  
 Product launch & call to competition  
 Carbon abatement & peak demand reduction



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# Thank You! Round Table



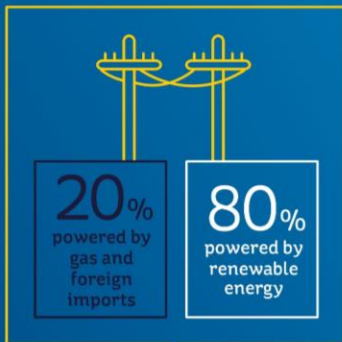
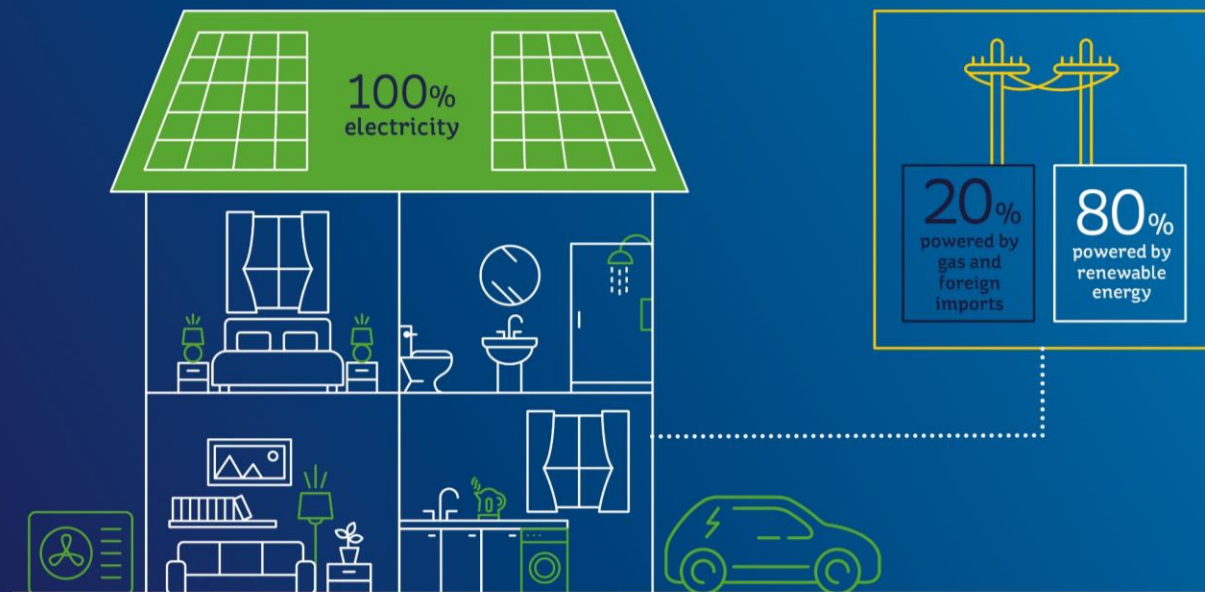
ESB

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[Abridged] 15-20% Flexibility by 2025

# It's 2030 | What are our vital statistics?

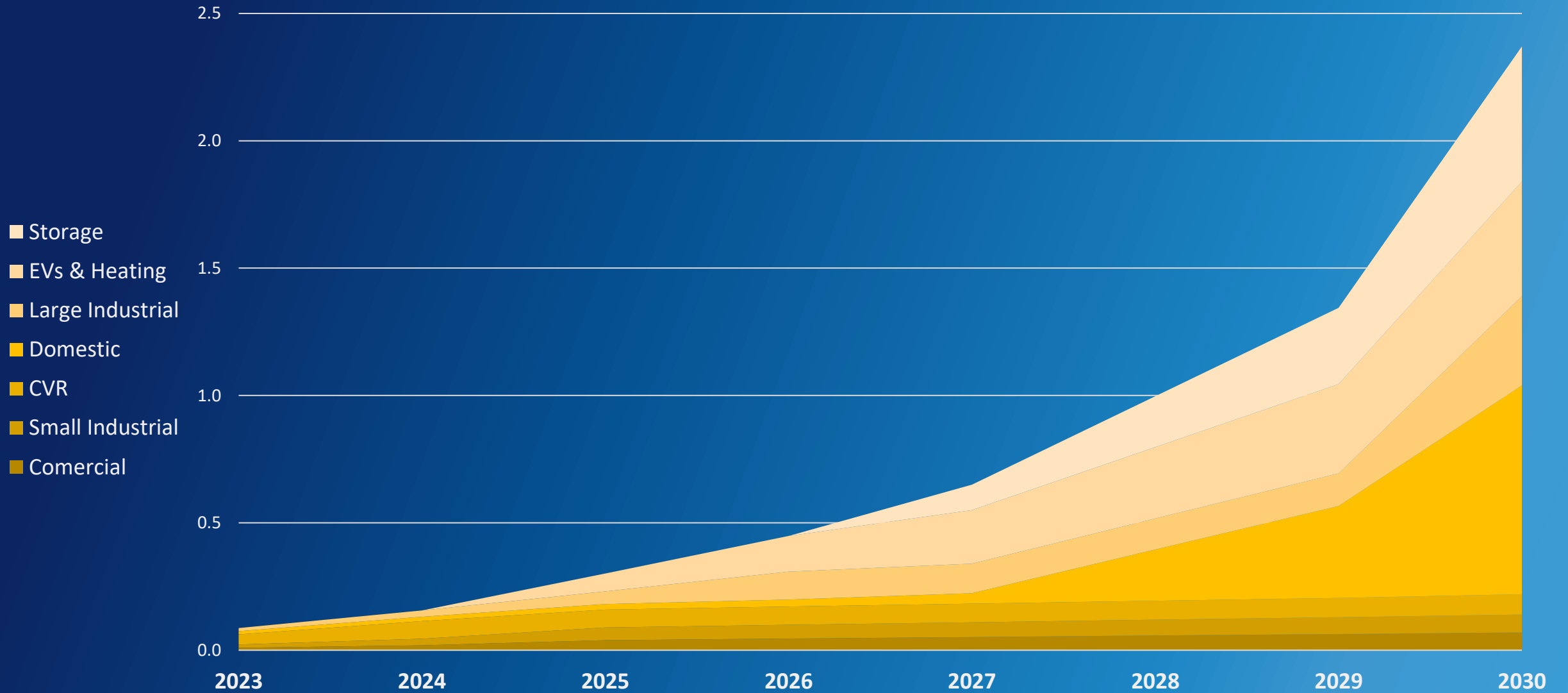


10-12 TWh of additional demand, incl.  
5-6 TWh heat & transport adding 3-3.5  
GW peak demand (+65%)

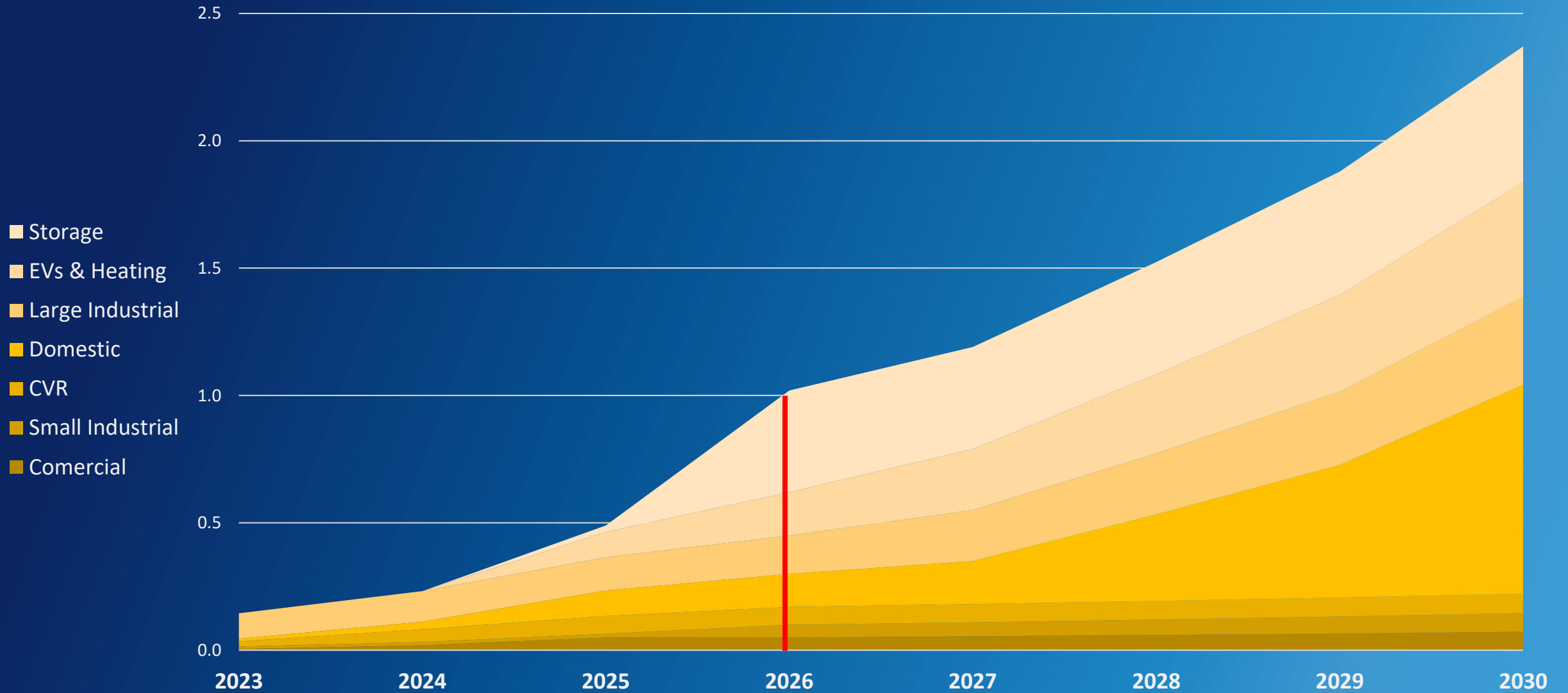
- 22-23 GW renewables (+300%)
- 7% oversupply limit (-40%)
- 3 MtCO<sub>2</sub>eq. p.a. (-75%)

1 – 10 TWh of flexibility (1.4 – 2.4 GW)  
0.86 MT CO<sub>2</sub> abatement p.a.

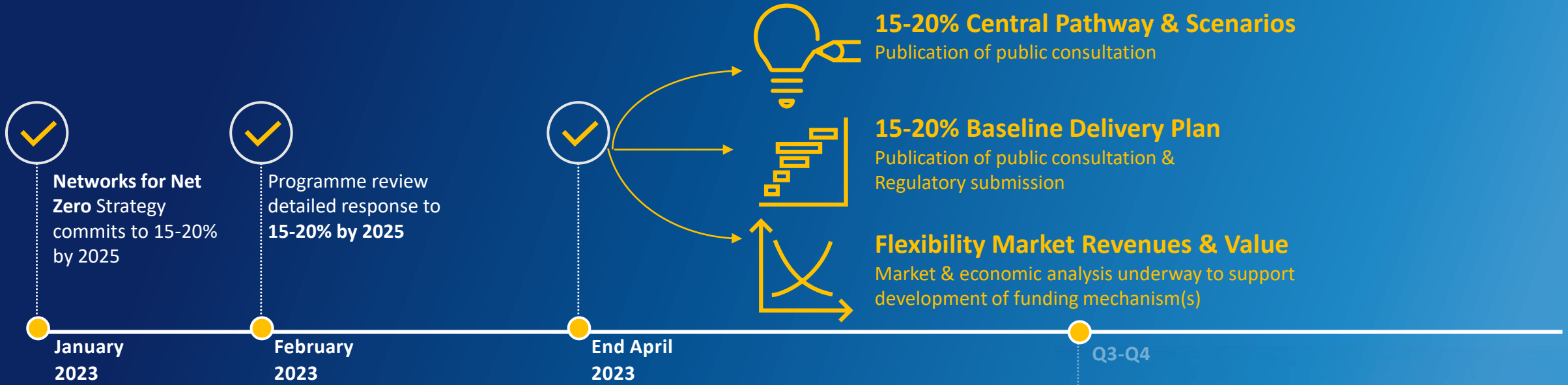
# 2023 - 2030 | Pre CAP23



# 2023 - 2030 | Scenario used for Baseline Plan



# Accelerated Flexibility Target | 9-Month Look-Ahead



- Critical support & collaboration may be needed:**
- Public consultation & direct engagement
  - Industry-specific research Q2, Q3
  - Planning permission process (DHPLG)
  - Industry engagement & agencies (IDA, Ent. Ireland)
  - Funding mechanisms (CRU)
  - Etc

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**Indicative – Early Market Testing & Long Lead Time Activities**



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## 15-20% Flexibility | Working Definition (Descriptive)

*“Flexible system demand” is the ability of electricity system demand to respond to changing states of generation, demand, storage and network conditions.*

- *It is characterised by direct system operator actions, coupled with individual/collective customer behaviour.*
- *It is measured as a % of peak system demand, but is not necessarily available at peak system demand (or intended to be).*
- *It includes demand increases and decreases, which may be simultaneous or occur at different times, for different reasons.*

*“Carbon abatement” attributable to demand side flexibility (i.e. scope of this particular target) is carbon consumption that is avoided directly as a result of flexibility*

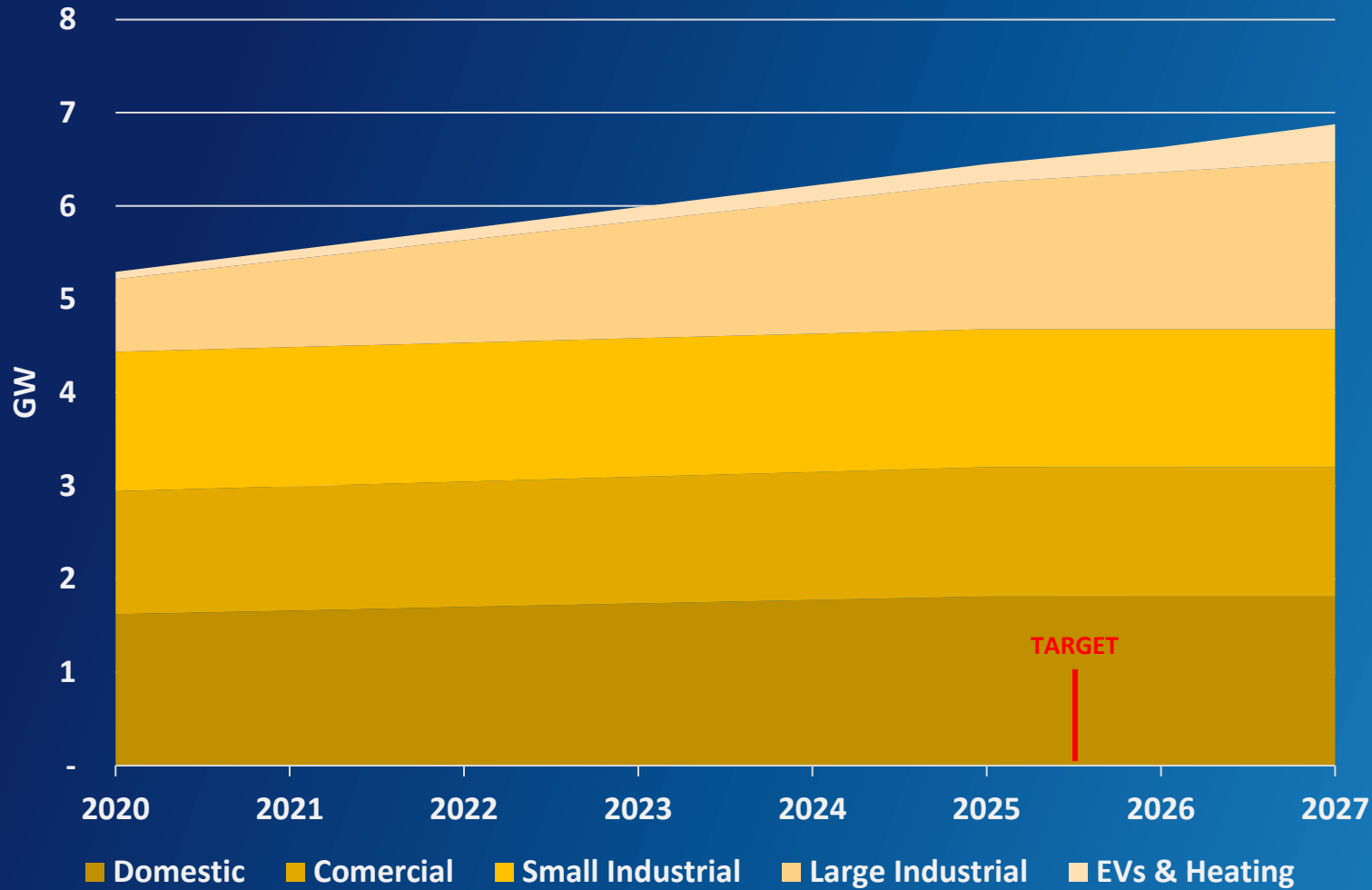
### Includes

- ✓ **Contracted flexibility**
  - ✓ To either TSO, DSO or both in relevant markets
  - ✓ To suppliers, and responsive but not “traded”
- ✓ **Flexibility Readiness**
  - ✓ Flexible connection agreement
  - ✓ Flexibility readiness (“equipped”)
- ✓ **Technologically enabled flexibility**
  - ✓ Dynamic voltage regulation (CVR)
  - ✓ Med / long duration storage
  - ✓ Behind-the-meter generation (e.g. CHP, diesel)
- ✓ **Behavioural flexibility**, including achieved via dedicated educational measures (hard to measure)

### Excludes

- ✓ Supply-side flexibility e.g.
  - ✓ Storage providing dynamic response, fast reserves
  - ✓ DSUs providing DS3 services
  - ✓ Flexible supply side technologies (e.g. synch. compensation)
  - ✓ Flexible generation
  - ✓ Flexible renewables connections
- ✓ DSUs participating in the capacity market are not in line w. intent but to be reported separately as a related volume.
- ✓ **NOTE** Some flexibility abates carbon, other flexibility adds carbon. Some of the flexibility used to achieve the 15-20% will result in increased emissions, in which case a higher volume of flexibility is needed to achieve the carbon abatement target.

# Definition of the Target | Numeric Definition



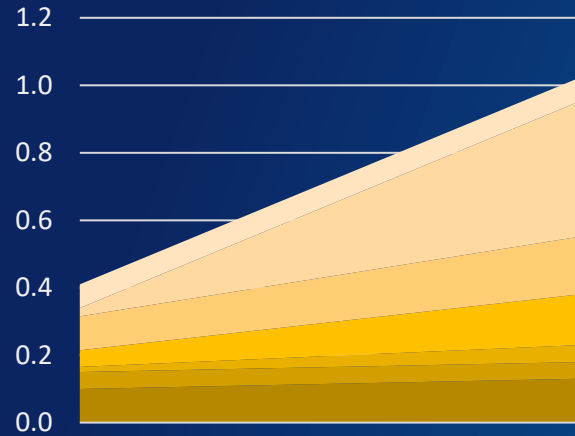
	TWh	GW
Flex. to cap dispatch down at 7%	9.5	c. 3
Flex. to abate 0.8 MT CO <sub>2</sub>	2.5	
Flex. to manage peak demand	0.7	c. 1



## 2. To Deliver CAP 2023 targets | Scenarios & Testing

### Evidence Based (initially)

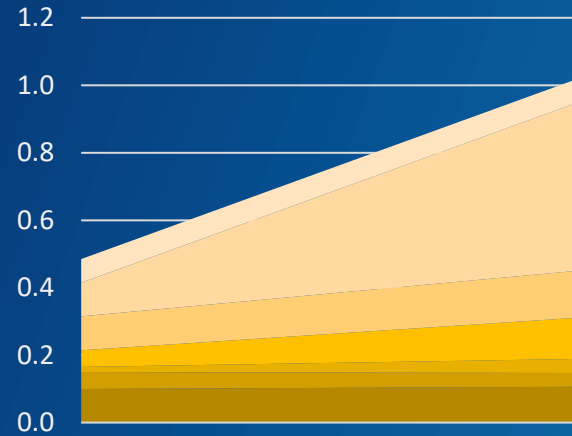
Central



2025

2026

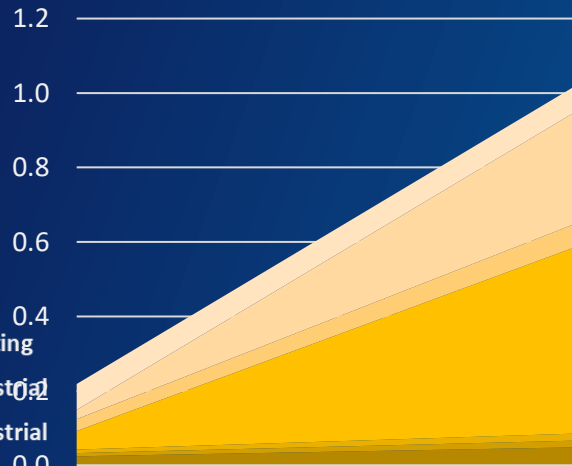
Storage Led



2025

2026

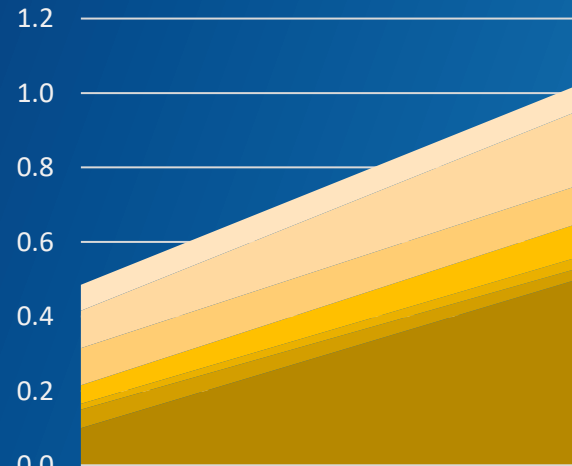
Industry Led



2025

2026

Consumer Led



2025

2026

- EVs & Heating
- Large Industrial
- Small Industrial
- Commercial
- Domestic

### Discovery Led (thereafter)

#### Market Viability & Readiness

Market Research

Market Engagement

Market Testing

#### 2023

##### Q1

★ "Fast follow" research

##### Q2

★ DG6/7 research  
 ★ Domestic PV research  
 ★ Storage research & eng.  
 ★ LEU research & eng

##### Q3

★ Storage research & eng.  
 ★ LEU research & eng.  
 ★ Farmers PV research  
 ★ Transport standards eng  
 ★ Social housing eng.

##### Q4

★ BTP-Carbon results  
 ★ Domestic PV research  
 ★ Transport standards eng

#### 2024

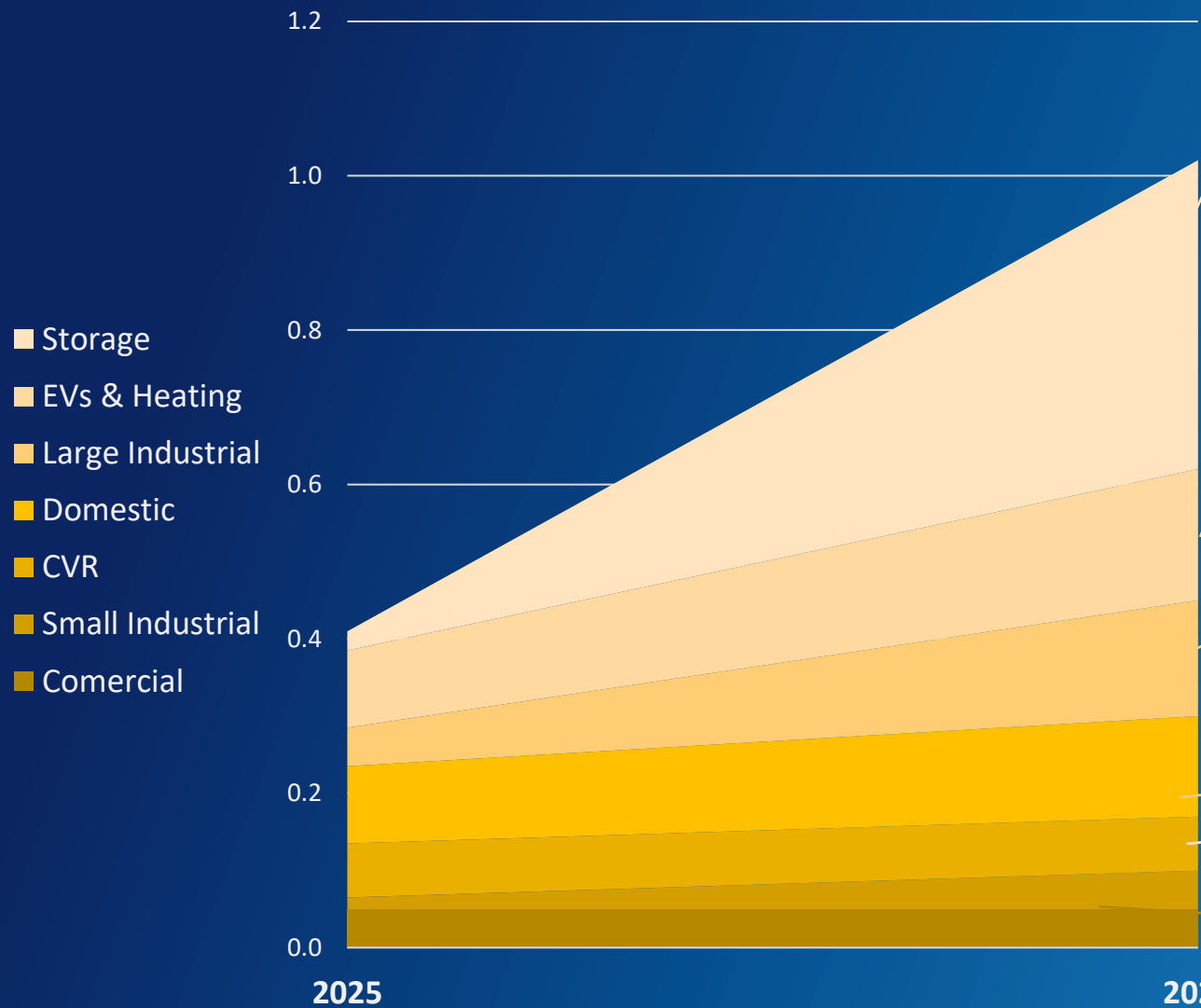
##### Q1

★ Storage PQQ responses

##### Q2

# Central Pathway | Proposals & Impact

Evidence Based (initially)



**Medium Duration (multihour) storage**

Establishment of multi-year contracts to provide secure route to market for location specific distributed storage, participating in local balancing to deliver

- carbon abatement
- Peak demand management
- Renewables oversupply management

**HIGH**

**Flexibility Ready Transport**

Introduction of standard flexibility readiness for all new EV changepoints and commercial electric transport connections

**HIGH**

**Large Energy Users**

A range of (initially bespoke) carbon abatement products to incentivise LEUs to make operational & investment decisions which reduce location specific emissions as part of local DSO balancing

**HIGH**

**Domestic PV, Agricultural PV, Communities**

Flexibility services targeted at domestic customers, farming customers and communities. Two models under development: behavioural & supplier/aggregator led

**HIGH**

**Conservation voltage reduction**

Controllable demand reduction by marginal adjustments to electricity system voltages. Immediate direct customer benefits

**MED**

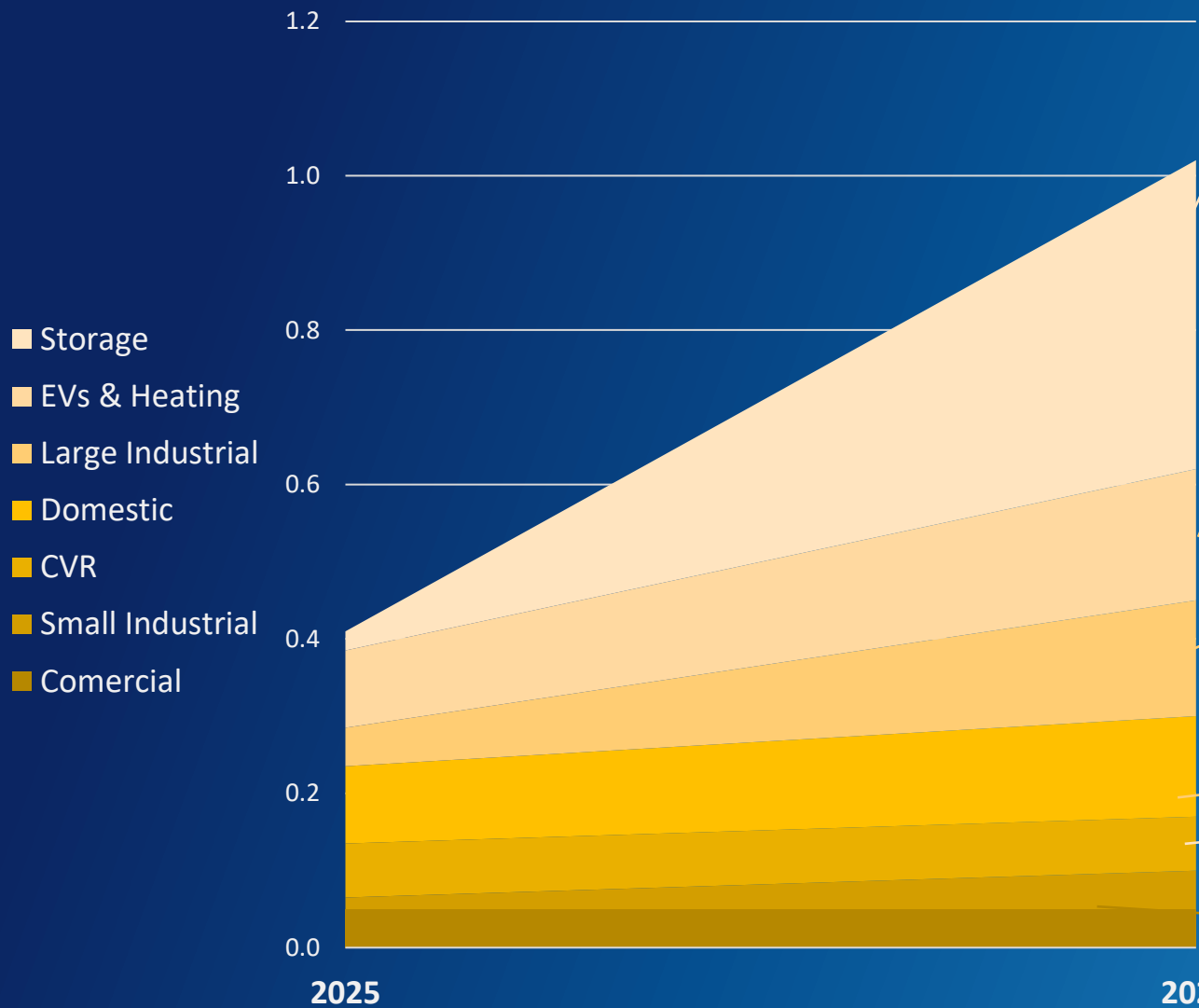
**Sector Specific Initiatives**

Sectoral analysis underway to identify commercial sectors with high Irish penetration and high potential propensity for flexibility

**MED**

# Central Pathway | Key Assumptions & Priorities for Testing

Evidence Based (initially)



**Medium Duration (multihour) storage**

- Recent capacity auction results reflect market readiness
- Planning permission & sites available
- Market access to battery production slots

**H**

**Flexibility Ready Transport**

- OEM readiness
- Cost impact
- Supply chain
- Vendors' willingness to "unlock"

**M**

**Large Energy Users**

- LEUs willing to invest in gas recips & green certs, storage or process shifting
- LEUs value robust carbon emissions reduction & reporting, and security, not just financial compensation

**H**

**Domestic PV, Agricultural PV, Communities**

- Supplier readiness is low / risk is too high, but we can partner on the designn of a hybrid approach that addresses market failures & supports supplier entry & DSO exit.
- CRU and DECC supportive of ESBN addressing market failures

**H**

**Conservation voltage reduction**

- Engineering calculations are accurate
- Tech solution can be implemented
- Backfeed voltage range can be tolerated during security sensitive conditions.

**M**

**Sector Specific Initiatives**

- Analysis from other jurisdictions borne out in Irish context

**M**

## 2. To Deliver CAP 2023 targets | 9-Month Look-Ahead



Market Research	Market Engagement	Market Testing
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**Critical support & collaboration may be needed:**

- Planning permission process (DHPLG?)
- Industry engagement & role of agencies (IDA, Enterprise Ireland)
- Funding mechanisms to provide route to market
- Other – issues being identified

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# Appendix A.

# Multi-Year Plan Roundtable session

DSO/TSO roundtable session was held on March 2<sup>nd</sup>. The content from that session is here:



Adobe Acrobat  
Document

Visibility roundtable session was held on March 16<sup>th</sup>. The content from that session is here:



Adobe Acrobat  
Document