



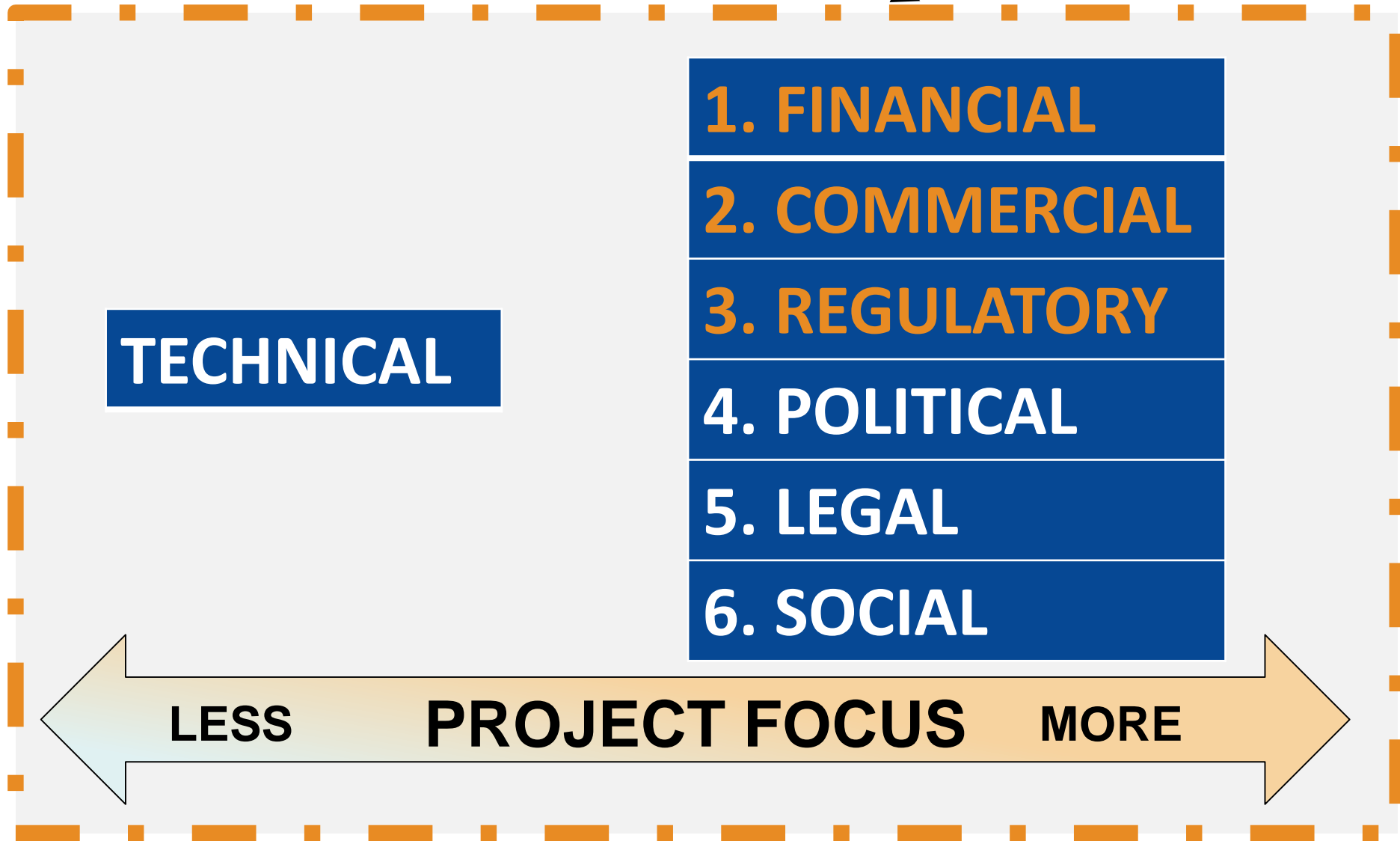
ERP Plenary Meeting

July 2016

Barriers to System-Wide Energy Storage

July 2016

WHOLE SYSTEM NEED FOR ES



The system need for storage

System-wide energy storage already exists...

Conventional forms:

- Pumped Hydro – 0.03 TWh
- Coal - 158 TWh
- Gas - 45 TWh
- Existing vehicles (petrol tanks)

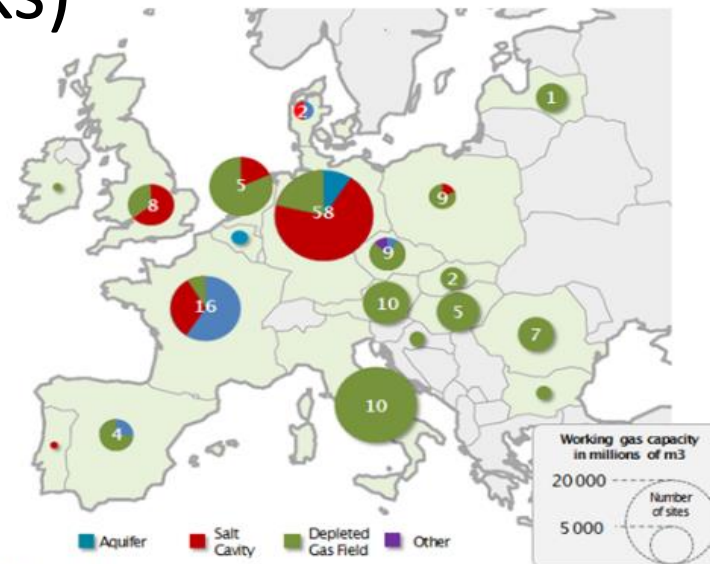


wiseGEEK



More 'invisible' forms:

- Hot Water Tanks
- Electric Storage Heaters



Source : GSE (2015)



Existing storage needs changing or replacing...

- in a cost appropriate way, with system-wide benefits

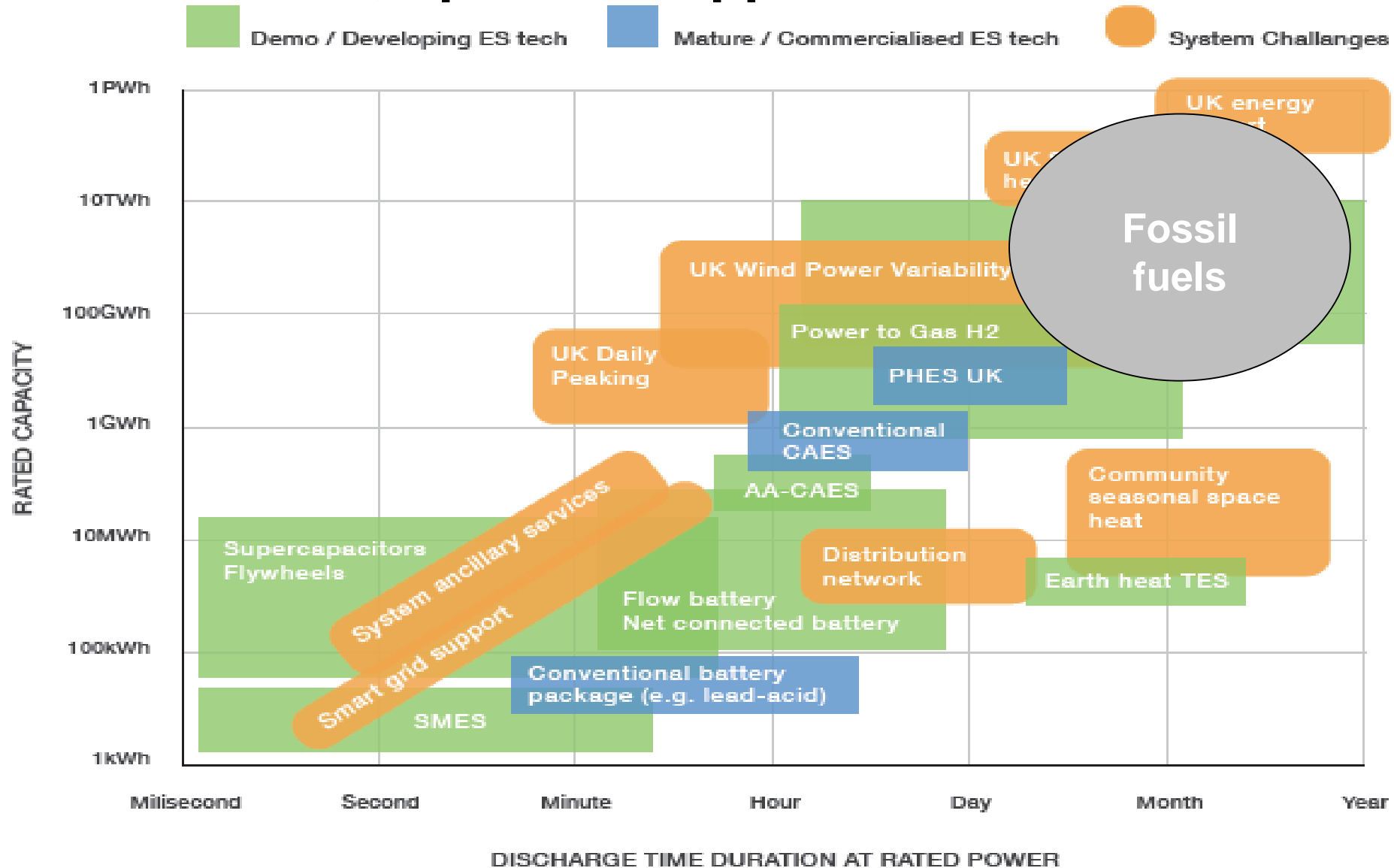
Challenges:

- The 'trilemma'
- Electrification
- Seasonality of heat
- Variability
- Distributed energy
- Innovation

Current (novel) storage solutions:

- Electrical Storage
 - Batteries, Flywheels etc
 - CAES vs PHES?
 - EVs / PHEVs / NGVs
 - Thermal Storage
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- Hydrogen:
 - Underground (caverns/gas fields)
 - Power to Gas
 - FCEVs / HEVs

Characteristics, options & applications



Fossil fuels

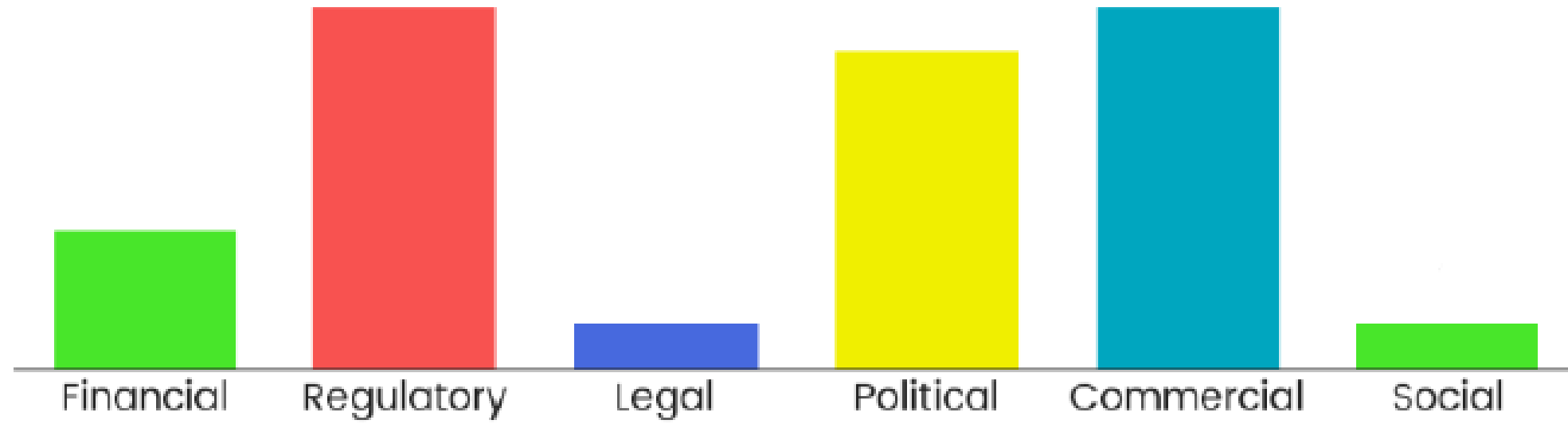
PHES
 ~£112/kWh
 60 yr life
 73% eff.

Li-ion battery
 ~£376/kWh
 3-10 yr life
 90% eff.

Barriers & Recommendations

Which set of barriers most inhibit the deployment of system-wide Energy Storage?

Mentimeter



Barriers to System-Wide Energy Storage

5 key barriers with associated recommendations...

3 main areas:

1. Valuing system services
2. Promoting a level-playing field
3. Clarifying the role of system-wide energy storage

System-level Recommendation

R1: Value and identify levels of key system services

Issues:

- Storage provides **flexibility, resilience & energy security**
- Some “externality benefits”
- **Lack of valuation** = undervaluation & under-delivery
- Associated **metrics and mechanisms** required

Impacts:

- Stimulate and secure **markets**
- Promote **investor confidence**
- Enable a **level-playing field** with other solutions

System-level Recommendation

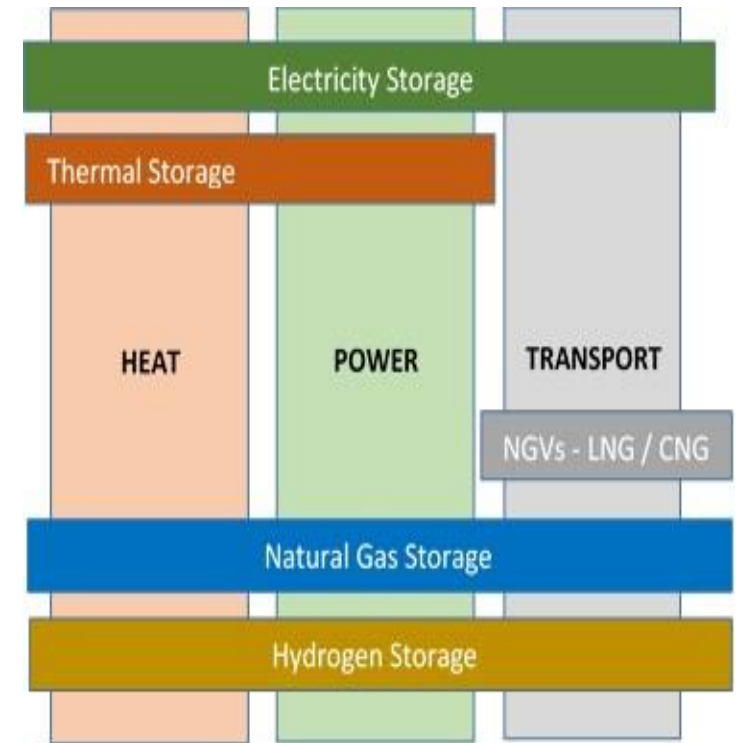
R2: Assign a dedicated, independent body... ...with responsibility for designing, advising, facilitating from a whole-system perspective

Issues:

- Lack of **clarity** re future role and system-wide benefits
- No effective (whole-system) **evaluation of options** vs other solutions
- **Improved alignment** of activities

Results:

- Identification of cross-sector benefits
- Help **characterise & value** system services
- Define high-level direction → create a market role → increase investor confidence



Storage Recommendation

R3: Adapt existing regulatory frameworks to enable a level-playing field

Issues:

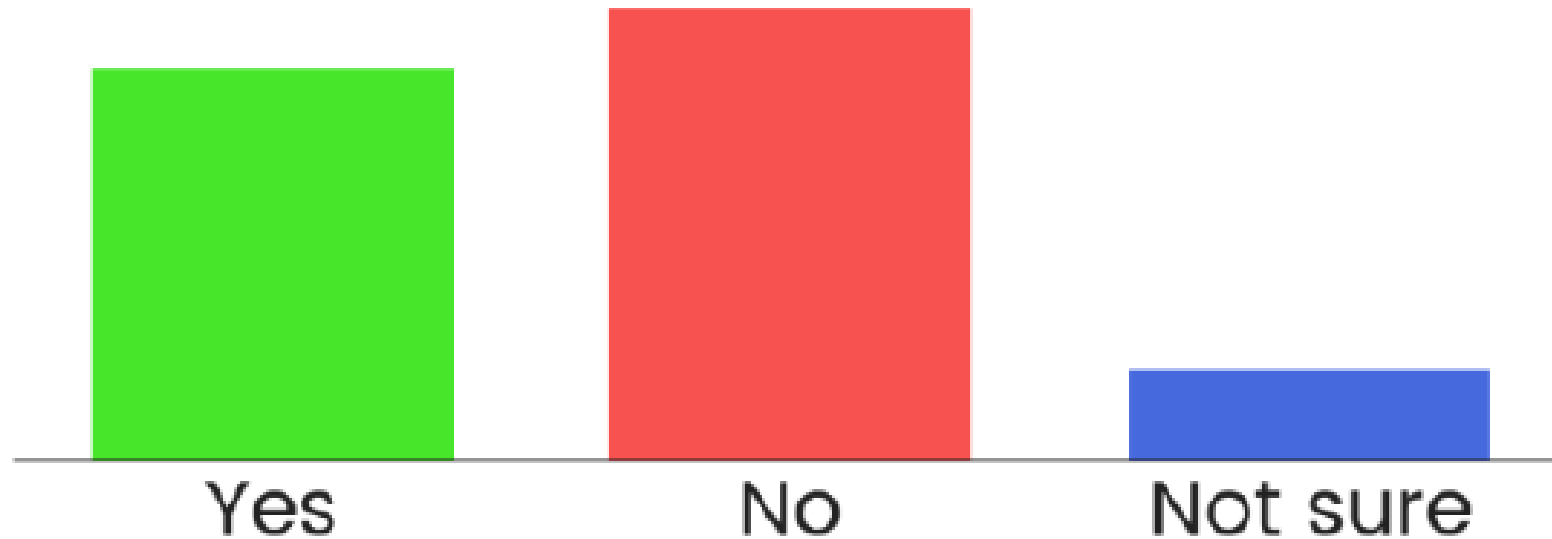
- Sometimes **no clear signal = no need**
- Where there are clear signals - **barriers exist** and hinder storage services
- Two key options:
 1. **Provide storage with dedicated treatment**
 2. **Adapt existing framework to promote level-playing field & remove disadvantages**

Impacts:

- Compete on a level-playing field with other solutions
- Allow benefits to accrue, particularly where there is a clear *market need*

Does storage need its own regulatory treatment and its own governance framework?

Mentimeter



➤ R3: continued:

Adapt existing regulatory frameworks vs dedicated treatment

Examples of dedicated treatment / disadvantages:

- Double-charging
 - Legal definition
 - DNO ownership
- } Electrical storage
- Gas storage business rates – **35-50% of costs in some cases**
 - Incentives for uptake? **Subsidies – NO**
 - More to incentivise storage on the heat side – winter peaks!

Intrinsic / economic value – government priorities???

Storage Recommendation

R4: Create conditions of greater certainty for investors

Issues:

- No shortage of available capital, keenness to invest
- Lack of certainty = lack of *risk-capital*
- **Lack of valuation of system services storage provides**
- Shift away from financing assets only → financing *services* also

Results:

- Reduce risk and increase investment
- Indication of market sizes
- Allow other options to compete and newer options to come forward

Storage Recommendation

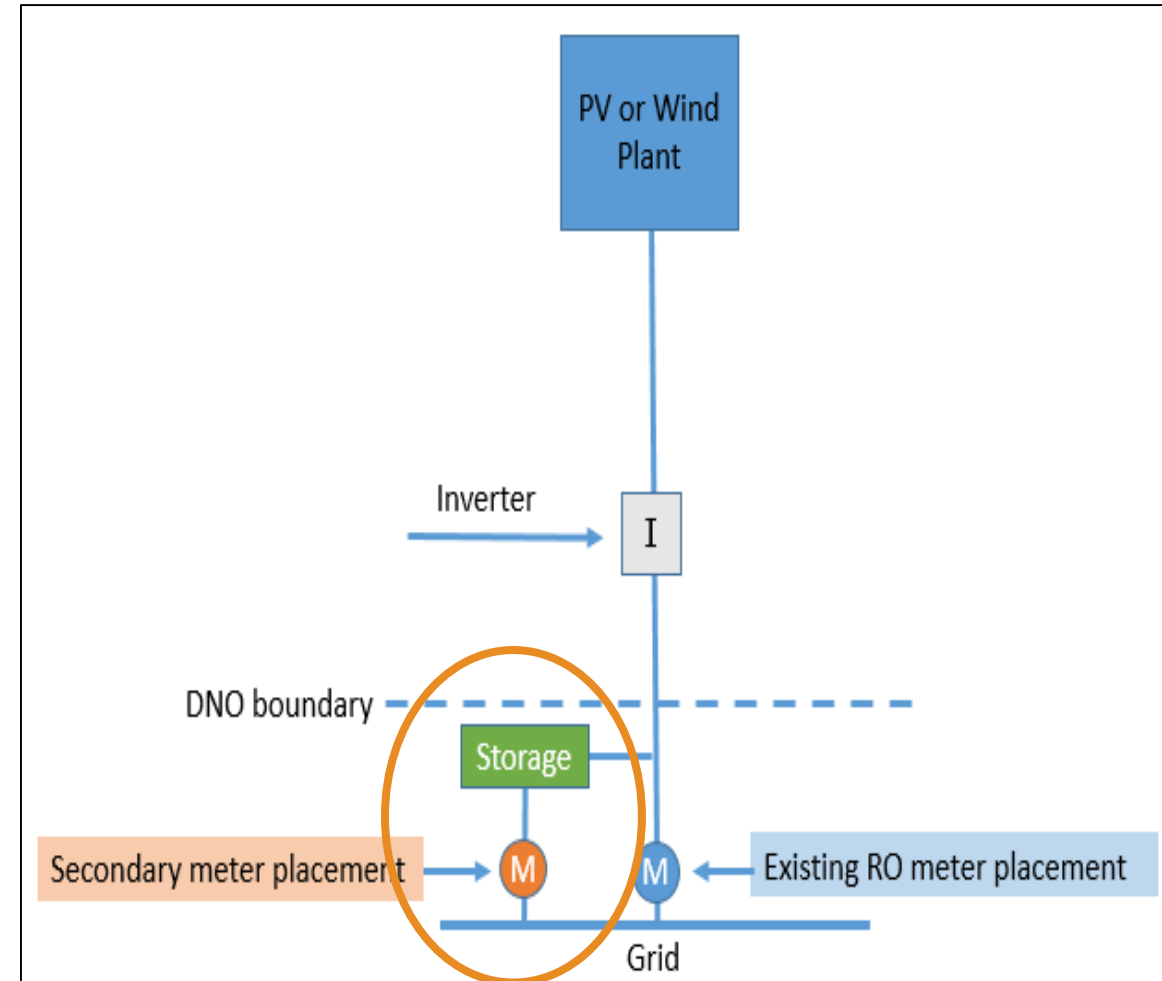
R5: Address regulatory rules that result in heavy risk

Issues:

- Addition of storage places revenues at risk
- Off-take / PPAs
- ROC or RHI payments on hold
- Meter vs storage placement – ‘gaming’
- Connection times

Impacts:

- Reassurance to investors e.g. pre-approved’ configurations or operating models for retrofit
- Greater deployment of electrical storage



Barriers to System-Wide Energy Storage

5 key barriers with associated recommendations...

3 main areas:

1. Valuing system services
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Next steps & Member Feedback

More work on:

- Future market potential
- Costs & business cases
- Thermal, Transport & H2
- Solutions to barriers

October 2016:

- Final publication
- Post-plenary session

Impact to date:

- Engagement & dialogue
- Noted system-wide storage
- Gaps & issues raised
- **Sounding-board for DECC & Ofgem's 'Call for Evidence'**

Member feedback please:

- Work / key messages so far
- Additional areas of interest