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RIIO-GD2 Decarbonisation Stakeholder Group

Introduction

Pete Wightman, Head of Gas Distribution

Meeeting 1: 29/08/18

Agenda (Decarbonisation) August 29th

1. Introductions (10:00 – 10:25) *(Pete Wightman, Head of Gas Distribution)*

- Overview of what we wish to achieve from the meeting
- Run through of action log

2. Connections and the Economic Test (10:25 – 12:25) *(SGN)*

3. Lunch (12:45 – 13:15)

4. Regulatory mechanisms for funding heat projects in GD2 (12:55 – 13:40) *(Ofgem)*

5. Business Plans (13:40 – 14:25) *(NGN)*

What part of the GD2 business plan related to heat can be seen as no/low regrets and for part of the GD2 business plans?

6. Break (14:25 - 14:55)

7. Shrinkage and Leakage (14:55 – 15:40) *(Cadent)*

- How the model works and how it can be used to set targets.
- What value do the targets provide to consumers?
- Whether the model is still fit for purpose for use in RIIO-GD2, and justify how using the model provides value to consumers.
- Could and/or should any improvements be made to the model? What would be the value of these improvements to the consumer?

8. Any other business (16:00 – 16:15)

Economic Test

20th September 2018

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Economic Test Overview

The economic test is a simple and effective assessment for new connections in a predictable environment that supports the principle of non-discrimination.

- Simple Net Present Value Model
  - A year-one analysis – based on reserved capacity at the time the connection request - that does not take into account any future connections.
  - Covers the cost of reinforcement upstream of the charging point.
  - Discounted at 3.5%-4%.
  - 25 year period for larger loads and 45 years domestic / smaller loads
- Cost of connection > discounted value of transportation charges, customers asked to pay the difference.
- Customer has 90 days to agree to the Connection Agreement offer.
- Once connection agreement signed.
  - Networks will treat the capacity as committed load.
  - The site will be assigned an MPRN (for the ECV location)
  - Upgrade work will be undertaken to facilitate that new load
- Customer enters into a supply agreement with a supplier / shipper. The shipper pays transportation charges from agreement date (regardless of whether gas is flowing).
- Transportation charges set according to local distribution zones these change over time.

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Complex sites

The assessment of complex sites or sites that require reinforcement of the NTS are more time consumer and costly and the network may change during that process.

- For complex sites the customer maybe asked to pay for a Reinforcement Design Study (SCJ) to better understand the Specific Costs.
    - These SCJ costs could be as much as £35k (exc transmission) and may be more for complex analysis.
    - The GDN assessment process can take around 16 weeks from receipt of Request to fulfilment of quote where an SCJ has been required.
- The Economic Test only covers the cost of increasing transportation capacity on the Local GND Transmission System.
- If additional reinforcement require on the National Transmission System (NTS) , then customer asked to apply to NG Transmission directly.
    - The existing PARCA system will apply.
    - Cost of ~£140k for assessing the network capacity commitment with NTS.
    - Once the NTS agreement is signed then GDN will allow acceptance of the GDN connection offer.
- Timing for NTS reinforcement must be reflected in the GDN connection timing

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Opportunity Cost

Risk that socially desirable projects are not progressing due to the limited economic benefit reflectiveness

Resilience:

- Constrained connection to network adding high cost (£ms) to any future development.
- Upgrade would have significant social benefits associated with improved resilience to critical sites.

Environmental Benefits:

- Direct Carbon benefits associated with reduced heavy fuel oil / coal use particularly in off grid community.

Social Benefits:

- Where extending the gas network can have significant economic and social benefits of reduced risk of fuel poverty, economic growth, and industrial competitiveness.

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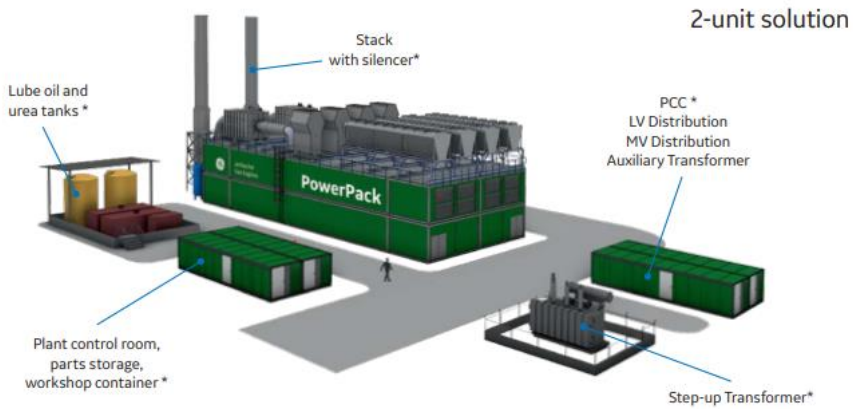
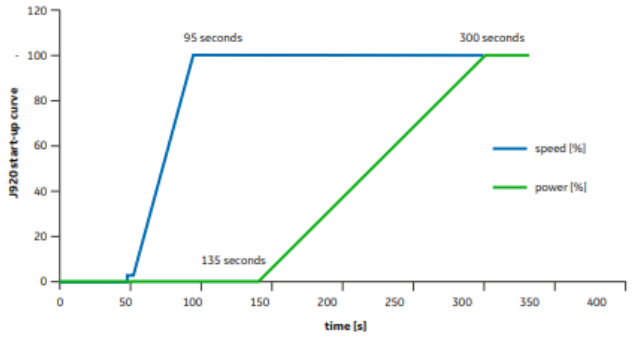
Forward Look

Flexible Gensets

Flexible generators are a rapidly growing source for new connection demand and their locations are hard to predict.

- Modular units of typically 5MW-25MW(e)
- Providing rapid response / balancing and electricity grid support services.
- One site has equivalent demand of 2-10k domestic properties.
- Investment decision often driven by Electricity Capacity market success.
- Type and location of new capacity determined according auction success.
- Short deployment times.
- Limited forward visibility on the likely location and there maybe numerous in the same region.





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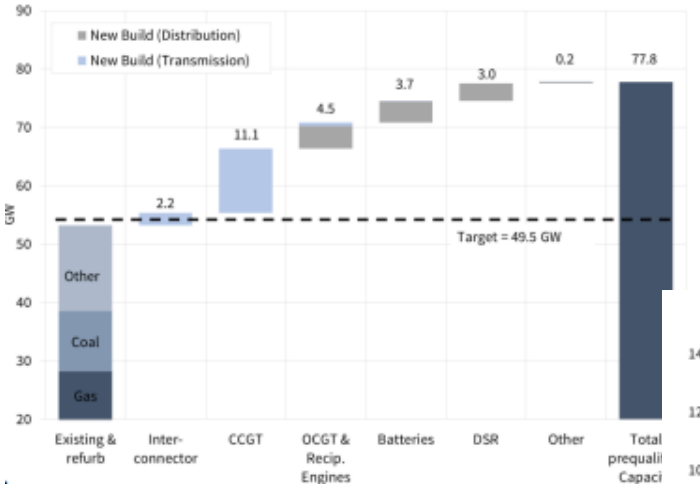
Going Forward

In a benign market the challenges of economic test would not be a problem, but in a rapidly growing market driven by peaking generation this is likely to change.

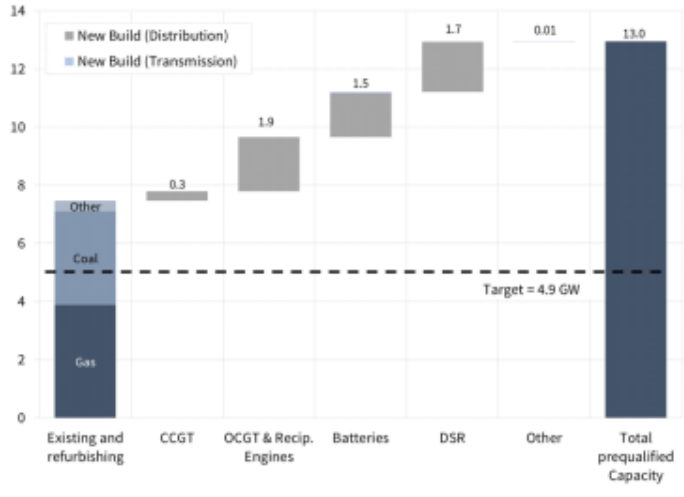
2018 t-4 auction
(Source Timera)

4.5 GW new OCGT & Recips



2018 t-1 auction
(Source Timera)

1.9 GW new OCGT & Recips



Potential Improvements

- × Reducing the time to progress Requests
  - SCJ time is determined by resources to do the study and what the study is required to cover. Faster progress may not be possible and add substantial resource costs.
- × Base capacity on known enquiries rather than actual capacity
  - Problem with number of enquiries and complexity of multiple enquiries for same site.
- ? Hold capacity for longer / extend reservation period.
  - Potentially anti-competitive as it reserving non-committed load in favour of new enquiries
- ✓ Introducing cost recovery
  - ? Parent company guarantees / letters of credit
  - ? Advance Reservation of Capacity (time bound) with Penalty for Non Commitment at the point of capacity acceptance.
- ? Adjusting life assumption according to type of asset, if less that 25/45 years
  - Hard to establish the basis on which to change an asset life assumption.
- ✓ Nominated shipper at the time of the enquiry (i.e. NI Model)
- ✓ Including broader benefit valuations for economic, social and environmental considerations

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Timing of changes (*for discussion)*

Step 1: To agree whether breaking rule of non-discrimination is relevant or not.

- *If it is then change required in legislation and substantial timeline implication*
- *Assess whether a different economic test could be applied*

Step 2: Agree the scope of the changes considered desirable

- *Define scope of changes*
- *Define materiality of impact on connection charges*
- *Assess impact on business plan submission and reinforcement costs*
- *[Approx time 2mths]*

Step 3: Consult on changes to the economic test

- *Set out consultation document and review responses*
- *[Approx time 6mths]*

Step 4: Update Charging Statements

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Lunch

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Ongoing policy development – for discussion only

Potential regulatory mechanisms for funding heat projects in RIIO-GD2

What do we mean by ‘heat projects’?

Ongoing policy development – for discussion only

- Spending by GDNs on projects that relate to alternative heat sources which contribute to decarbonisation.
- Examples include electrification of the heating system, using heat networks, biogas, and hydrogen.
- Spending by GDNs is funded by gas networks customers through the RIIO price control.

Ongoing policy development – for discussion only

We don't currently expect any substantial changes in Government heat policy before the start of RIIO-GD2

- A "substantial change in Government policy" is a change in legislation (and policies) that signals the path towards heat decarbonisation to hit the 2050 targets.

Do you agree?

- Current key Government heat policy milestones:
  - BEIS Hy4Heat Innovation programme (looking at downstream of the meter) due to complete early 2021.
  - If successful, live trials to start late 2021.
  - BEIS policy decision on future of heat to follow ~ **mid-2020s**.

Anything missed?

A starting position for discussion….

Ongoing policy development – for discussion only

The RIIO-GD2 framework:

1. Should enable GDNs to continue to fund **network-related** heat projects, providing technical evidence to inform Government on future heat policy decisions.

2. **Could** be adaptable to accommodate change in Government policy during the price control period (1 April 2021 – 31 March 2026).

Ongoing policy development – for discussion only

1. The RIIO-GD2 framework should enable GDNs to continue to fund **network-related** heat projects, providing technical evidence to inform Government on future heat policy decisions.

For discussion

1) In the absence of any substantial changes in Government heat policy, the primary source of funding for heat-related projects under RIIO-2 should be its specific innovation mechanisms.

- We're still developing the RIIO-2 innovation schemes – dedicated workshops being held on this.
- For illustration only. If we assumed GD1 innovation schemes' (NIC and NIA) scope and funding, then:
  - There is substantial innovative funding available that could be used for network related heat projects.
  - There is an established process for funding innovative projects which: recognises the risk that some innovation projects may be unsuccessful; helps ensure coordination of ideas; and shares learning and costs across the network companies (and wider society).

2) Limited justification for Ofgem to provide upfront funding for heat-related projects in network companies' business plans.

- See decision tree in next slide.

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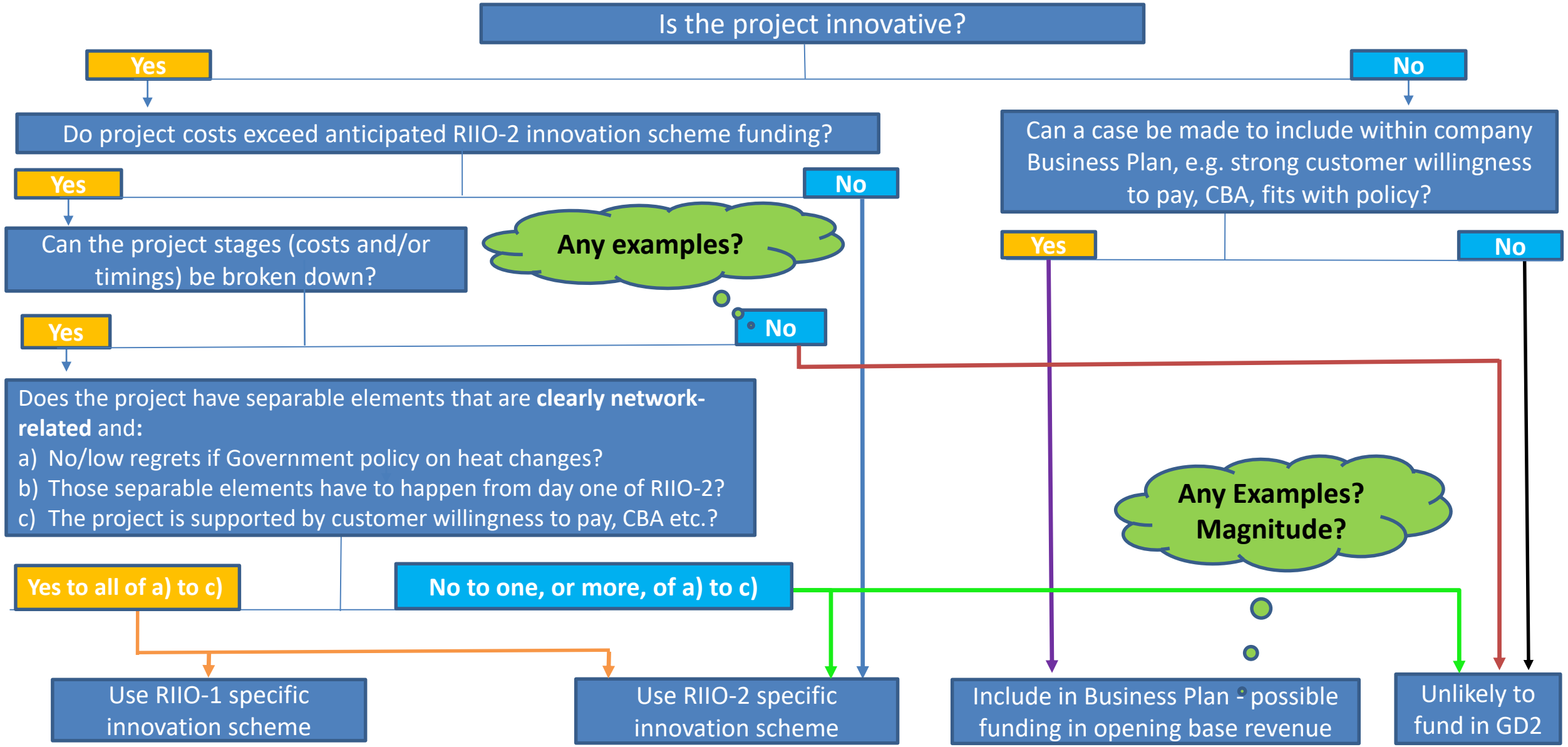
A possible decision-making tree for regulatory treatment of heat projects in RIIO-GD2?

Ongoing policy development – for discussion only



Ongoing policy development – for discussion only

2. The RIIO-GD2 framework **could be** adaptable to accommodate change in Government policy during the price control period (1 April 2021 – 31 March 2026).

Adaptability of the RIIO-2 Framework could be achieved through:

- The RIIO-2 Innovation Scheme; and

- A potential **Heat Reopener uncertainty mechanism**.
- In the event of substantial changes in Government policy during the price control period further funding could be considered.
- We would need to think carefully about:
  - What the trigger would be – new legislation?
  - Materiality of the trigger?
  - Timing and window of decision for the reopener?

Is an uncertainty mechanism for heat projects appropriate?

Ofgem decarbonisation stakeholder session

What part of the GD2 business plan related to heat can be seen as no/low regrets and form part of the GD2 business plans?

Agenda

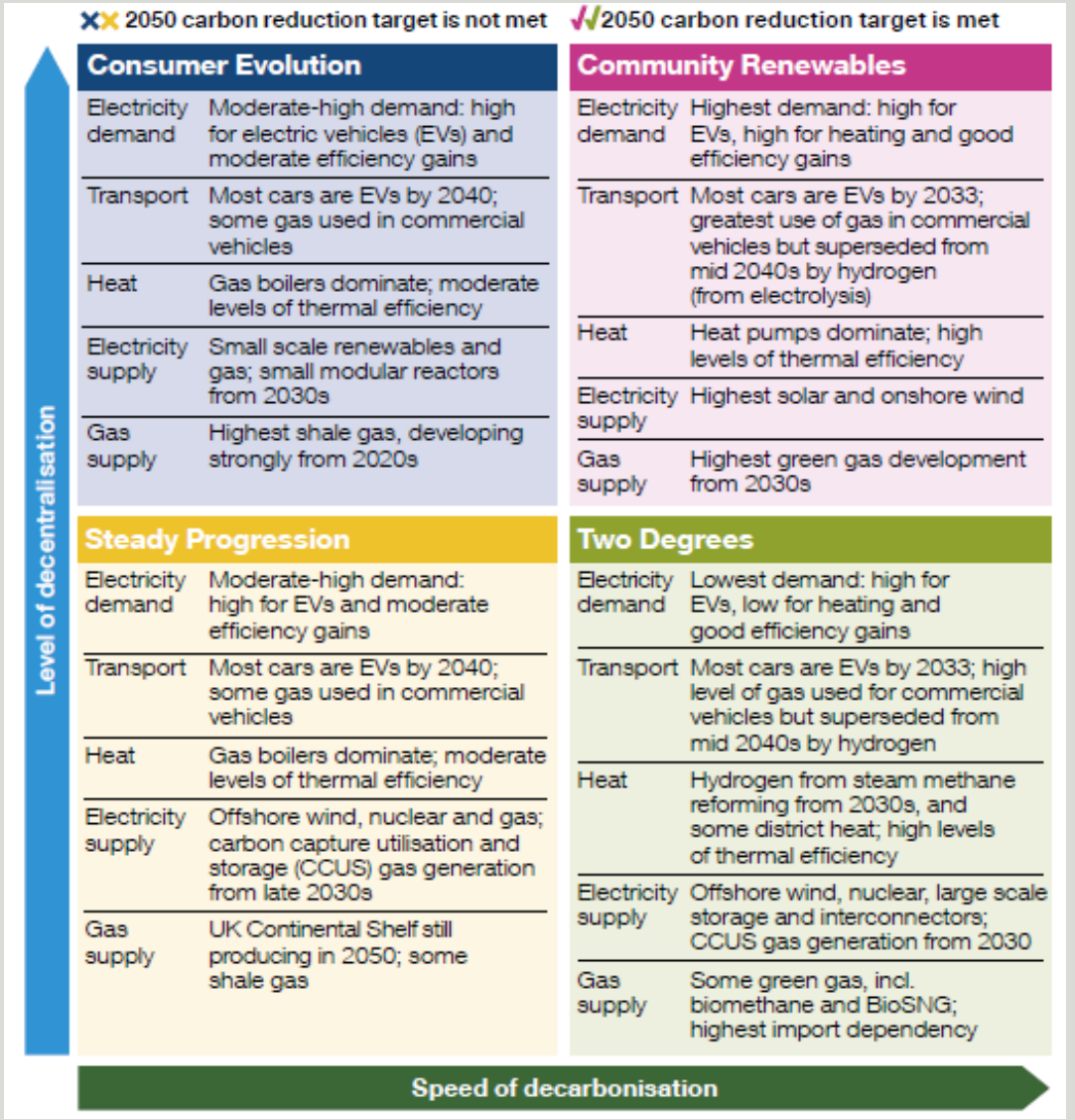
What part of the GD2 business plan related to heat can be seen as no/low regrets and form part of the GD2 business plans?

- What scenarios are being planned for
- Impact of scenarios on totex in GD2
- Potential no/low regret investment in GD2

4 Future Energy Scenarios (FES)

- FES broadly accepted as directionally correct – power, heat & transport
- GDNs assessed likelihood and impact of FES on totex investment up to 2026
- High / medium / low impact based on RRP table 2.2

We have focused on 2050 compliant scenarios for 20th Sept as they have a more significant impact on investment



Impact of 2050 compliant scenarios on totex investment areas

High Impact

- Storage (within day) – low likelihood GD2
- IT systems
- Entry reinforcement (including storage & compression)
- Valve installation
- Scheduling & Scope of pipe replacement (mains & services) – low likelihood GD2

Medium Impact

- Local Transmission System reinforcement
- Connections & Fuel Poor
- Reinforcement (<7 bar)

Some of these can be addressed by a revised economic test which would limit any additional investment needed by GDNs

Totex investment areas not addressed by a revised economic test

High Impact

- Storage (within day) – low likelihood GD2
- IT systems
- Entry reinforcement (including storage & compression)
- Valve installation
- Scheduling & Scope of pipe replacement (mains & services) – low likelihood GD2

Medium Impact

- Local Transmission System reinforcement
- Connections & fuel poor (net capex = zero)
- Reinforcement (<7 bar)

The link between these and decarbonising heat as well as levels of regret are described in more detail

Valve installation

Investment Type	• Network modification (totex)
Strategic Objective	• Hydrogen fuel

What is the problem?

Large scale conversion of the gas network to transport 100% hydrogen will practically require a phased approach whereby small sections/regions of the network are converted at a time, along with the properties they supply.

In doing this, the gas network will need to transport methane and 100% hydrogen in adjacent regions. There will be a need to isolate sections of the network as a conversion is carried out in order to keep the methane and hydrogen separate.

Conversely, should the gas network need to be fully decommissioned, a phased approach would need to be used.

Currently, isolating parts of the network will involve excavation and temporarily 'blocking' the network. This is unsuitable for an extended period of time (weeks), which will be required for conversion. Installing valves at the time of conversion to provide a more permanent method of isolation will create additional disruption to highways and be less cost effective than doing as an ongoing part of the repex programme.

What will be built?

Installation of a large number of mechanical valves at strategic points in the network, as part of the replacement programme. This will enable different parts of the gas network to be isolated whilst conversion to hydrogen (property/appliances) is carried out or decommissioning is completed.

What value is delivered?

Financial benefits in GD2 or GD3	Potential - Could enable isolation of parts of the network in emergency situations/incidents - quicker than temporary isolation during conversion. Installing valves as part of repex programme has less impact on cost than retro-fitting and avoids disruption to public & highways at a later date
Carbon benefits in GD2 or GD3	Potential – if a policy decision is made early 2020's, some parts of the network could be converted to hydrogen by end GD3
Improve Air Quality in GD2 or GD3	Potential – if a policy decision is made early 2020's, some parts of the network could be converted to hydrogen by end GD3
Accelerate 2050 low carbon targets	Yes – avoids adding to lead times associated with installing valves post policy decision

What could the regrets be?

Stranded assets should hydrogen conversion not go ahead (valves could be used on occasion for emergency incidents).
Valves would not have any negative impact on the daily operation of the gas network.

Scheduling / scope of pipe replacement

Investment Type	• Network modification (totex)
Strategic Objective	• Hydrogen fuel

What is the problem?

Large scale conversion of the gas network to transport 100% hydrogen could require a fully plastic (PE) gas network in order to be safe (minimise leakage) and reliable (avoid impact of hydrogen on steel/iron).

The existing investment in replacing the gas network is largely driven by an HSE mandate and asset risk model. These two things mean that repex is scheduled for the pipes that deliver the best and earliest output performance but which are not always in the same geography.

Without either a change to the way investment is allocated, the time at which replacement is delivered or additional investment above the mandated replacement programme, it is unlikely entire areas of the gas network will be fully plastic (PE). In particular they won't be fully plastic before a full conversion to hydrogen is required, which will delay the potential conversion to hydrogen and decarbonisation of heat.

What will be built?

The proposal is to either support a re-phasing or acceleration (additional investment) in the replacement programme, rather than changing the way investment is allocated (HSE mandate or risk models)

Additional funding will allow projects to be constructed that deliver areas of the gas network that are fully plastic. This would be focused on areas that have characteristics suited to hydrogen conversion. (totex)

What value is delivered?

Financial benefits in GD2 or GD3	Yes – reduced leakage/shrinkage costs and reduced repair costs
Carbon benefits in GD2 or GD3	Yes – greater reduction in leakage and shrinkage leading to reduced impact of carbon emissions
Improve Air Quality in GD2 or GD3	n/a
Accelerate 2050 low carbon targets	Yes, if policy decision is made regarding a hydrogen conversion it will accelerate conversion and decarbonised heat

What could the regrets be?

Stranded assets - Should hydrogen conversion not go ahead and there is a decision to stop investing in the gas network, investment has been made in assets that weren't high risk (failure) or needed long term.

This will be a minor regret in the context of the mandated replacement programme

Reinforcement, storage & compression

Investment Type	• One off projects (capex) • Network modification (capex)
Strategic Objective	• Gas as a transport fuel • Hydrogen fuel • Sustainable sources of gas

What is the problem?

Investors in sustainable sources of gas are being declined connections on the basis of restricted capacity; this is limited by throughput at the point of connection or limited demand downstream. This is preventing new sustainable sources of gas being connected to the network, which would make a contribution to decarbonising heat.

In the event of areas of the gas network being converted to hydrogen, strategic reinforcement will be required in order to increase capacity and transport enough energy as hydrogen. This reinforcement often requires long term planning and enabling works so has a long lead time. Not doing this work could lead to a delay to hydrogen conversion and hence significant decarbonisation of heat, following a policy decision.

In the event there is an increase in demand for CNG/alternative fuelling stations or peak electricity plants, a new demand for large load connections will be created. Meeting this demand could require network reinforcement/extension and, for fuelling stations, compression of gas to 200bar.

What will be built?

- Specific one off network reinforcement or extension to enable bio-methane, SNG or CNG fuelling connections (economic test?); store (in the network) and transport gas from low demand areas to high
- Specific compression facilities at Pressure Reduction Stations to enable bio-methane, SNG gas to go up the pressure tiers or CNG fuelling connections to be made (economic test?)
- Strategic reinforcement to enable hydrogen conversion (totex)

What value is delivered?

Financial benefits in GD2 or GD3	n/a
Carbon benefits in GD2 or GD3	Yes – enable larger volume of sustainable sources of gas and CNG fuel to be connected. Enable more peak electricity plants to be connected.
Improve Air Quality in GD2 or GD3	Yes – provide infrastructure for CNG vehicles and encourage commercial fleet conversion
Accelerate 2050 low carbon targets	Yes – decarbonisation of heat asap following policy decision

What could the regrets be?

Underutilised (not stranded) assets from strategic reinforcement for hydrogen

IT Systems

Investment Type	• One off projects (capex)
Strategic Objective	• Whole energy systems

What is the problem?

Integrated and flexible energy systems are recognised as being needed for the UK to balance supply and demand for electricity and gas in order to decarbonise heat effectively and make best use of generation and storage assets.

Existing SCADA systems and control rooms for gas and electricity are currently designed and operated in isolation. Data is not shared and with cyber security risks/threats, this is increasingly challenging to do.

For the UK to operate integrated energy networks, demand and supply data will need to be shared openly and in real time between DNOs and GDNs as a minimum. Furthermore, networks will need be operated/controlled remotely in an integrated and transparent way. If this is not achieved, system balancing and asset/carbon optimisation will be difficult to achieve.

What will be built?

- Integrated SCADA systems (capex)
- Integrated network control rooms (processes, security, procedures)
- Integrated demand forecasting models

What value is delivered?

Financial benefits in GD2 or GD3	n/a
Carbon benefits in GD2 or GD3	Yes – enables integration of networks late in GD2/GD3. Could enable power to gas at scale
Improve Air Quality in GD2 or GD3	n/a
Accelerate 2050 low carbon targets	Yes – as above

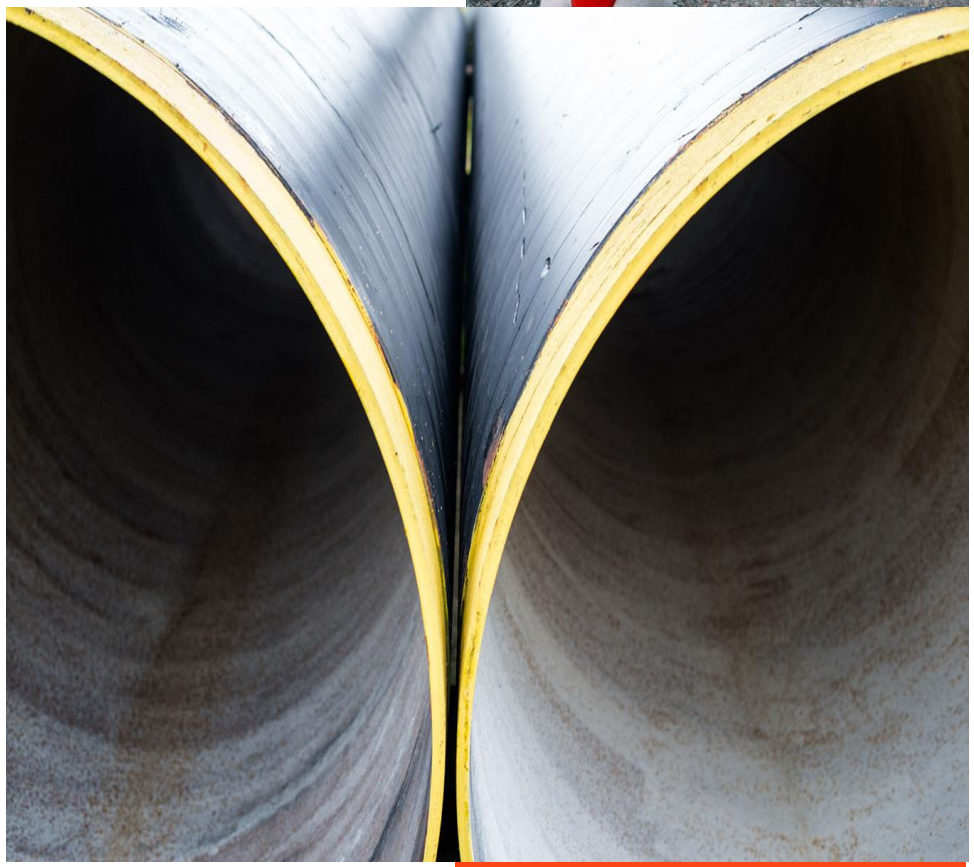
What could the regrets be?

n/a but this could be suitable for NIC funding

Summary

- Consider valve installation, strategic reinforcement (hydrogen) and scheduling/scope of pipe replacement
- Develop economic test to accommodate other reinforcement, storage & compression
- Include a GD2 framework re-opener mechanism for additional investment that is driven by policy decisions
- NIC funding to balance funding for gas & electricity, access to third parties and confirm support for IT system development

Break



RIIO-GD2 Decarbonisation working group

Shrinkage & leakage model overview

Cadent
Your Gas Network

Shrinkage Overview

- Background to Shrinkage
- Modelling overview
- Credibility of model
- RIIO 2 recommendations

Background to Shrinkage

Shrinkage

Background to Shrinkage

Shrinkage refers to the gas which is lost from the transportation network.

Under the Unified Network Code (UNC), gas distribution network companies are responsible for purchasing gas to replace the gas lost through Shrinkage.

DNs utilise a world leading leakage model to calculate leakage and shrinkage.

Shrinkage forms the majority of a Gas Distribution companies business carbon footprint.

Shrinkage = Leakage + Own Use Gas + Theft of Gas

Shrinkage

Background to Shrinkage

The Leakage Model was developed by Advantica and approved by Ofgem. It was used to establish Leakage and Shrinkage baselines and also actual annual performance.

DNs have a licence condition to continuously examine ways of improving the accuracy of this model. Any modifications to the model must be consulted on and approved by Ofgem.

The model is updated annually with actual asset records and performance data.

The model is used to calculate actual shrinkage and leakage annually and reported to Ofgem via Regulatory Returns.

Shrinkage

Background to Shrinkage

Annually, DNs undertake many internal checks and audits on the asset and pressure data used in the model to calculate the annual Shrinkage and Leakage returns – this is formally documented as part of the Data Acquisition Governance (DAG) procedure.

DNs have invested significantly in pressure management systems to minimise pressures.

DNs have invested in MEG equipment to minimise leakage from Cast Iron mains.

Annual replacement of 1000’s km of metallic mains and services continues to significantly reduce shrinkage.

Shrinkage

Background to Shrinkage

Why is Shrinkage important?

Lowering emissions contributes to **UK government emissions targets** and **safeguards the global environment** for future generations

Lowering emissions contributes to **reducing customer bills**

Lower emissions = happy regulator

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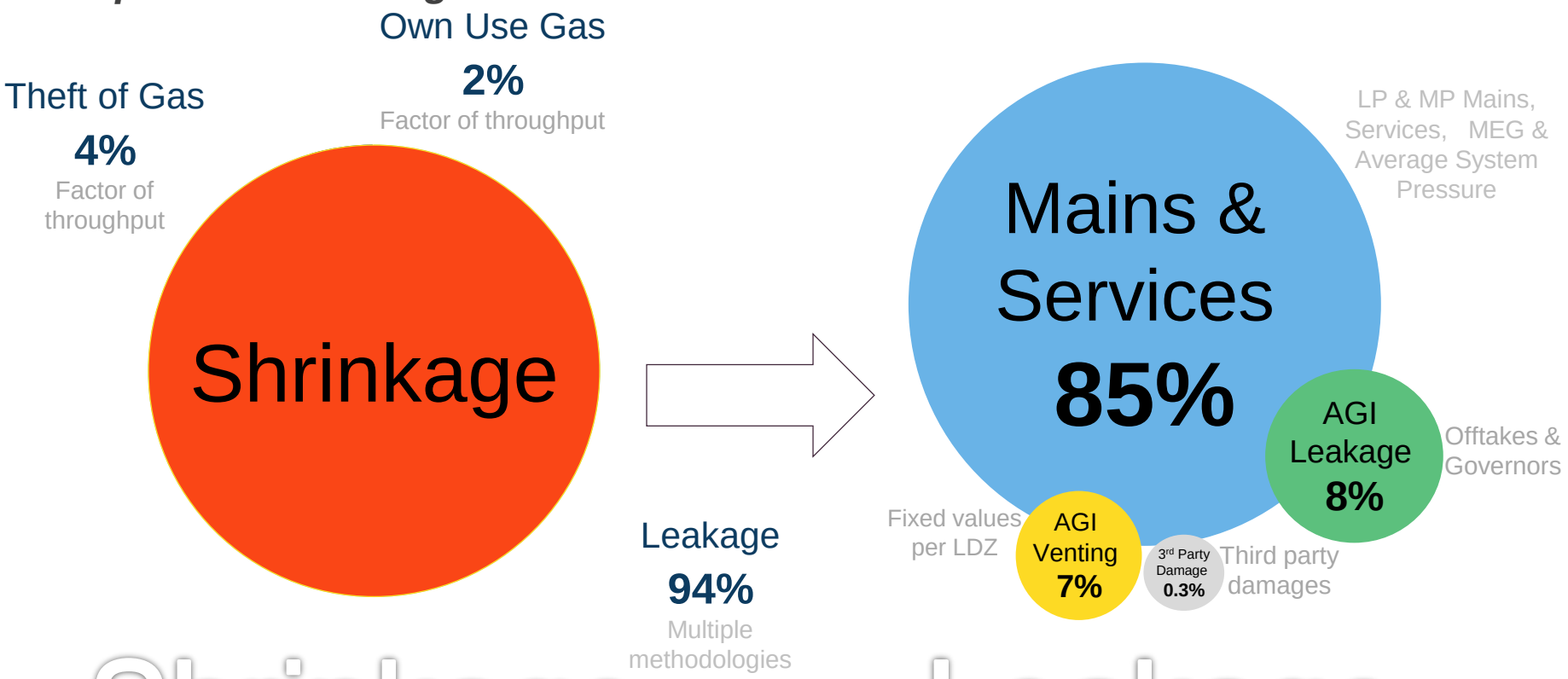
Regulator rewards emission reduction and **incentivises Gas Distribution companies** to implement **enduring** improvement

Shrinkage

Background to Shrinkage

Components of Shrinkage



Shrinkage
Combusted gas not metered

Leakage
None combusted gas released

Shrinkage

Background to Shrinkage

Cadent is **incentivised** to **reduce** gas that is lost to the atmosphere.

Incentive performance is benchmarked against Ofgem baselines.

Incentive is **uncapped** (positive and negative).

8 year roller mechanism means incentive **performance relies on year 8 outturn**.

Three main levers impact incentive:

1. Delivery of Mains Replacement
2. Average System Pressures
3. MEG performance

Year 8 Performance

Mains Replacement

All Mains Replacement needs to be completed by the **final day** of the final year of RIIO, shortfall in Mains Replacement volumes has negative incentive impact.

Average System Pressure

Requires great performance over the **entire** 2020/21 year with progressive improvement throughout RIIO.

MEG Performance

Sampled quarterly, progressive performance over RIIO with sustainable performance achieved for **entire** 2020/21 year.

8 year roller mechanism promotes continued investment and improvement throughout RIIO-GD1. Mechanism rewards enduring improvements and drives the right behaviours whilst rewarding DNs accordingly.

Shrinkage
Background to Shrinkage

Two mechanisms of incentivisation for GDNs

Shrinkage

Relates to total losses from the transportation network.

Uses price of gas and agreed pre-set **shrinkage** baseline to set an annual allowance to purchase gas lost through **shrinkage.**

If a GDN experiences losses lower than forecast then they keep the remaining allowance.

Shrinkage incentive rewards the savings in lost gas and the cost of this is to customers.

Shrinkage

Combusted gas not metered

Environmental Emissions Incentive

Related to gas leakages to the environment.

Uses the social cost of carbon to form an incentive value.

For each unit of **leakage** a GDN is under or over their baselines the incentive value is applied.

Leakage rewards the environmental benefit in the form of carbon reduction which benefits customers.

Leakage

None combusted gas released

Shrinkage

Background to Shrinkage

Current modelling methodology only has 3 levers we can pull, we are maximising these as much as possible.

Current Levers

Mains Replacement

By delivering Mains Replacement detailed in Final Proposals we should receive zero incentive (baselines based on this element) as we are funded elsewhere for this activity. Mains Replacement is biggest contributer to annual Shrinkage reduction

MEG Saturations

MEG swells lead yarn joints in Cast Iron and Spun Iron mains. The greater the MEG saturation the more emissions reduce. Iron mains are replaced annually so available mains to treat are decreasing year on year.

System Pressures

Driving a reduction in average system pressures will reduce leakage from mains and so reduce emissions. There is a limit to the levels we can take pressures down to and still maintain customer requirements. We are intending to complete RIIO-GD1 as near to this optimal point as possible.

Modelling Overview

Shrinkage
Modelling Overview

We estimate Shrinkage using an industry approved methodology and engineering model. All DNs use the same methodology.

Distribution Networks regularly meet to ensure consistency in the application of modelling methodology.

Continually review the methodology with a view to enhancing the calculation methods and improving the accuracy of the Shrinkage assessment.

Model applies pre-determined leakage rates but is updated annually for a number of activity based factors.

Did you know...

Shrinkage accounts for around 1% of all GB greenhouse gas emissions

Credibility of the Model

Shrinkage
Model Improvements & Alternatives

Leakage Model is a consistent approach to modelling emissions.

Granular detail allows DNs to understand areas to target for improvement.

Impact of changes to ASP, MEG, MR have impact on Shrinkage.

Analysis conducted as part of Energy UK report commissioned by Shippers resulted in the DNs to jointly conclude the Leakage Model methodology is best in class.

Leakage rates are based on 2002/03 data.

Starting points in RIIO-GD1 impact on power of the incentive.

There are only 3 levers that we can influence for emissions reduction, so advanced interventions or leakage reduction outside of the framework would not be recognised.

Zero leakage is unachievable (e.g. PE mains leak).

Shrinkage
Model Improvements & Alternatives

Could we use Smart Meters to report Shrinkage volumes in place of the LM?

Assuming 100% saturation of meters and easy data provision of customer usage

Gas metered when entering network

Gas leaks from system or is used in operation

Smart Meter records usage

Difference = Shrinkage?

What about meter errors? Theft? CV errors? How do we identify what is leaking to put it right (Current model shows allows insight into Leakage areas for targeted improvement)?

The overall GDN consolidated view is that using Smart Meter data would remove accuracy from the Shrinkage estimation and so Smart Metering is unsuitable. Error tolerance in meters alone is greater than estimated LM tolerances

Shrinkage
Model Improvements & Alternatives

Netherlands use above ground leakage detection, along with NG US, does it work?

Vans equipped with gas detectors drive over part or all of DN territory

Gas leaks from system

Gas detected and recorded as leakage

= Shrinkage?

Would only give volume from mains leaks, would be difficult to cover entire gas pipeline in a year so would need some extrapolation removing accuracy. Difficult to determine what is natural gas and not methane from other sources (such as sewers, swamps, decomposition or cows)

NG US state that using above ground detectors that they found escapes on network that were actually not escapes, so demonstrated that they were detecting other sources of gas.
This method wouldn't detect gas used in routine operation or from other leakage sources so would still require a model.
Would suggest this is less accurate that current methodology.

Improvements
Model Improvements & Alternatives

Through the modification of the leakage modelling methodology there are a number of other accuracy levers we could unlock in this or future regimes.

Medium Pressure Profiling

Changing the Leakage Model to include a system pressure correction would increase modelling accuracy and also unlock potential opportunities to reflect emission reduction.

DNs currently working with academics to understand modelling change requirements. Would increase Model accuracy and could have high impact on emissions.

Own Use Gas

Currently the methodology for this calculation is a factor of throughput, changing to an activity based calculation would increase leakage modelling accuracy and could allow equipment to be replaced and reduce emissions. (GWh volume of this is low)

Low impact and little room to make real emissions reduction. Would increase modelling accuracy.

AGI Venting

Currently the methodology for this calculation is a single value per LDZ. Moving to an activity based calculation would increase accuracy and allow none venting equipment to be installed. This would reduce emissions.

Low impact, current methodology is outdated but suggestion impact of increasing accuracy would be minimal.

RIIO 2 Recommendations

Shrinkage
Recommendations & Conclusions

Conclusions:

The Leakage Model is the best method for DNs to combat and model environmental impact of lost gas.

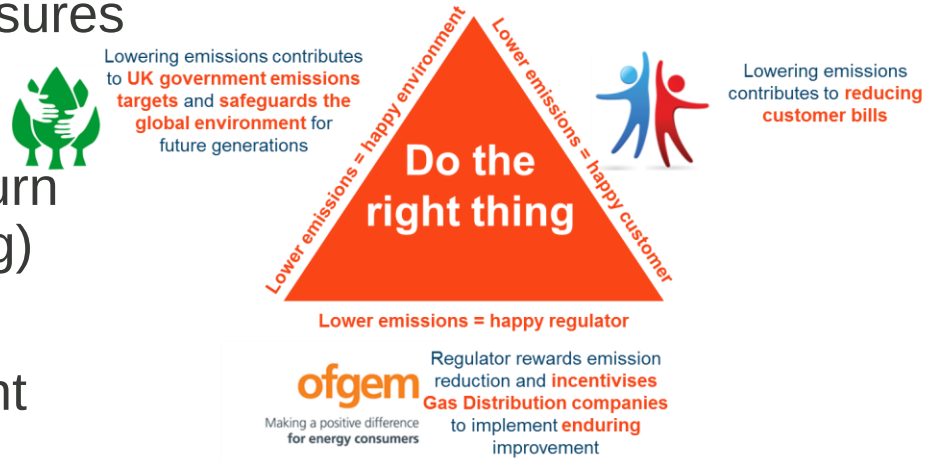
Detailed breakdown of Leakage areas allows targeted improvement.

RIIO-GD1 incentive regime has driven the right behaviours with the right results.

The other options (emissions detection/smart metering etc) offer nothing to suggest that they would give an accurate estimation of leakage above and beyond a form of leakage model

Shrinkage
Recommendations & Conclusions

Leakage Model can be built using assumed future performance measures to determine targets. Targets for GD2 should be set on 2019/20 performance outturn (the last outturn reported prior to GD2 commencing)



Incentivising networks to reduce Leakage in GD1 promoted the right behaviours and improvements.

Shrinkage rewards the savings in lost gas and the cost of this is to customers.

Leakage rewards the environmental benefit in the form of carbon reduction which benefits customers.

Shrinkage
Recommendations & Conclusions

Continuing the incentive to minimise losses on network will continue to drive environmental benefit to deliver 2050 environmental targets.

Investigation into whether the Leakage Model could be updated to factor in benefits of innovative leakage reduction.

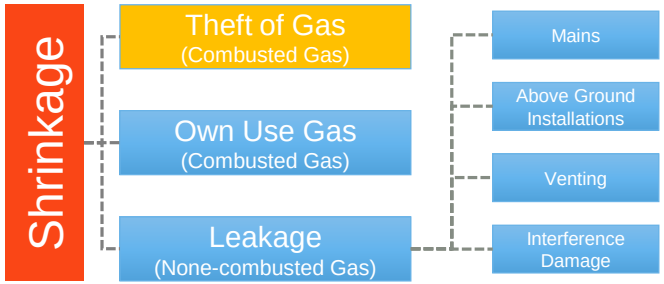
Increase the power of incentive as you get nearer to optimal level of performance.

Incentivising the networks to better manage Shrinkage / Leakage ultimately benefits customers:

- More efficient network. Encourages networks to think innovatively.
- Less Opex
- Less escapes.
- Safer network

Appendices

Shrinkage
Modelling Overview



Measure: Theft of Gas

Weighting*: 4% of total Shrinkage

Combusted Gas: Yes No

Modelling Complexity: Low Med High

General Calculation:

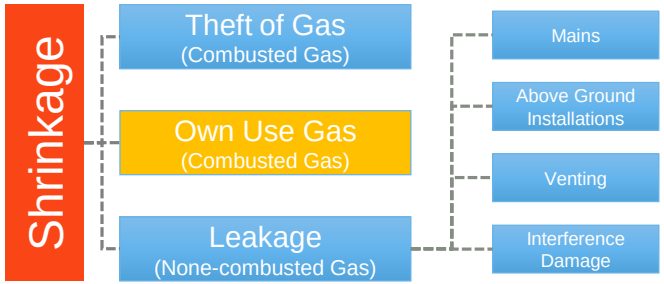
0.02% of Consumption

Additional Information:

Theft of Gas is defined as gas lost upstream of the meter, with a single factor being applied across all LDZs.

**Will vary year on year and by Distribution Network*

Shrinkage
Modelling Overview



Measure: Own Use Gas

Weighting*: 2% of total Shrinkage

Combusted Gas: Yes No

Modelling Complexity: Low Med High

General Calculation:

0.0113% of Consumption

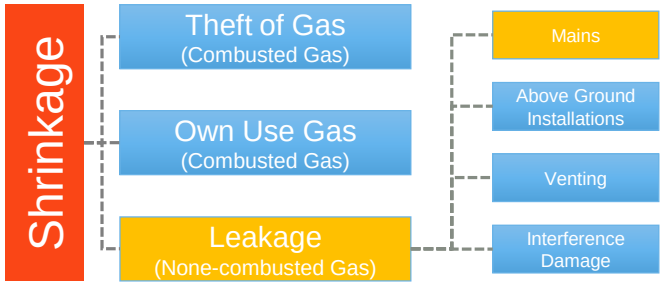
Additional Information:

Own Use Gas is gas that is used, but not metered, as part of the operational requirements of the distribution network at pressure reduction stations. This is gas that is used (for example) for pre-heating prior to pressure reduction to ensure the gas doesn't freeze.

Possible opportunity to improve accuracy described later.

**Will vary year on year and by Distribution Network*

Shrinkage
Modelling Overview



Measure: Mains & Services

Weighting*: 85% of total Shrinkage

Combusted Gas: Yes No

Modelling Complexity: Low Med High

General Calculation:

Low Pressure: Asset Length x Leakage Rate x ASP correction x MEG treatment
Medium Pressure: Asset Length x Leakage Rate

Additional Information:

Material and diameter of asset determine the rate of Leakage as per the National Leakage Test results from 2002. The NLT used the pressure decay method to determine leakage on a random sample of pipes (different diameter and materials)

Possible opportunity to improve accuracy of MP calculation described later.

**Will vary year on year and by Distribution Network*

Shrinkage
Modelling Overview

Mains Leakage – LP Calculations

Low Pressure: 5 material types x 5 diameters = 25 different leakage rates (applicable at 30mbar pressure).

The higher the system pressure the more an asset will leak.

Lead yarn joints leak less if MEG is saturated in the gas. More MEG = Less Leakage.

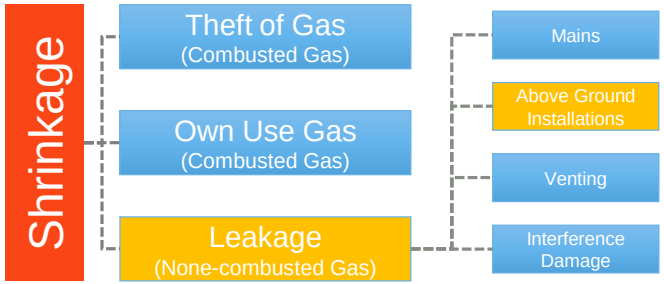
Leakage rates in Cu.m/Annum/Km at 30mb Standard System Pressure

MATERIAL	D1 <=3"	D2 4"-5"	D3 6"-7"	D4 8"-11"	D5 >=12"
PE	63.509	63.509	63.509	63.509	63.509
Steel	3416.345	3854.337	3854.337	3854.337	3854.337
Ductile	719.184	719.184	576.399	576.399	576.399
Pit Cast	2407.209	1639.845	2525.467	2203.980	7463.399
Spun Cast	1075.711	1075.711	1075.711	1075.711	1075.711

88.5% of Pit Cast and 18.5% of Spun Cast LP mains have Lead Joints.

**Will vary year on year and by Distribution Network*

Shrinkage
Modelling Overview



Measure: Above Ground Installations

Weighting*: 8% of total Shrinkage

Combusted Gas: Yes No

Modelling Complexity: Low Med High

General Calculation:

Number of assets x leakage rate

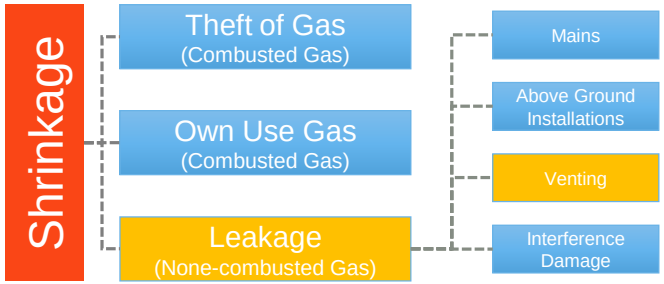
Additional Information:

5 different leakage rates for AGI asset types, based on a national survey completed in 2002/03.

Categories: Gas Holders, NTS Offtakes, LTS Offtakes, District Governors, Service Governors.

**Will vary year on year and by Distribution Network*

Shrinkage
Modelling Overview



Measure: Venting

Weighting*: 7% of total Shrinkage

Combusted Gas: Yes No

Modelling Complexity: Low Med High

General Calculation:

Annual leakage value per LDZ (static value)

Additional Information:

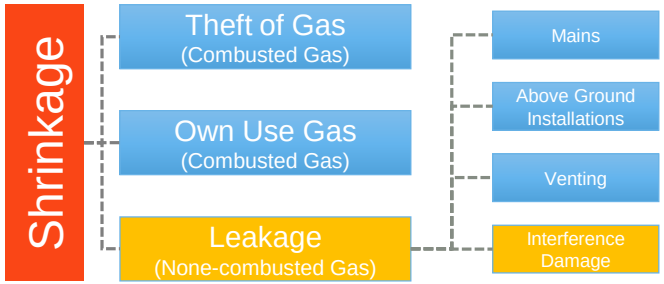
Venting rates were determined as part of a 1994 Watt Committee Report.

This report is no longer available within the public domain.

Possible opportunity to improve accuracy described later.

**Will vary year on year and by Distribution Network*

Shrinkage
Modelling Overview



Measure: Interference Damage

Weighting*: 0.3% of total Shrinkage

Combusted Gas: Yes No

Modelling Complexity: Low Med High

General Calculation:

Large scale (>500kg): If volume lost is estimated this is used else default to 500kg
Small scale (<500kg): No incidents x leakage rate x average response/fix time

Additional Information:

Interference damage is a combination of large scale and small scale unplanned gas escapes into the atmosphere, usually caused by third party damage.

**Will vary year on year and by Distribution Network*

AOB

Next Customer and Social Workshop: 25th October, London (tbc)

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