GRID ENTRY – Increasing Flexibility

Grid Injection -The Virtual Pipeline

SGN

Your gas. Our network.

Introduction

1. SGN and Gas Distribution Networks within the UK
2. Network connection constraints
3. Virtual Pipeline Concept
4. PDH Site and Operation
5. Pro’s and Cons

SGN and Gas Distribution Networks within the UK

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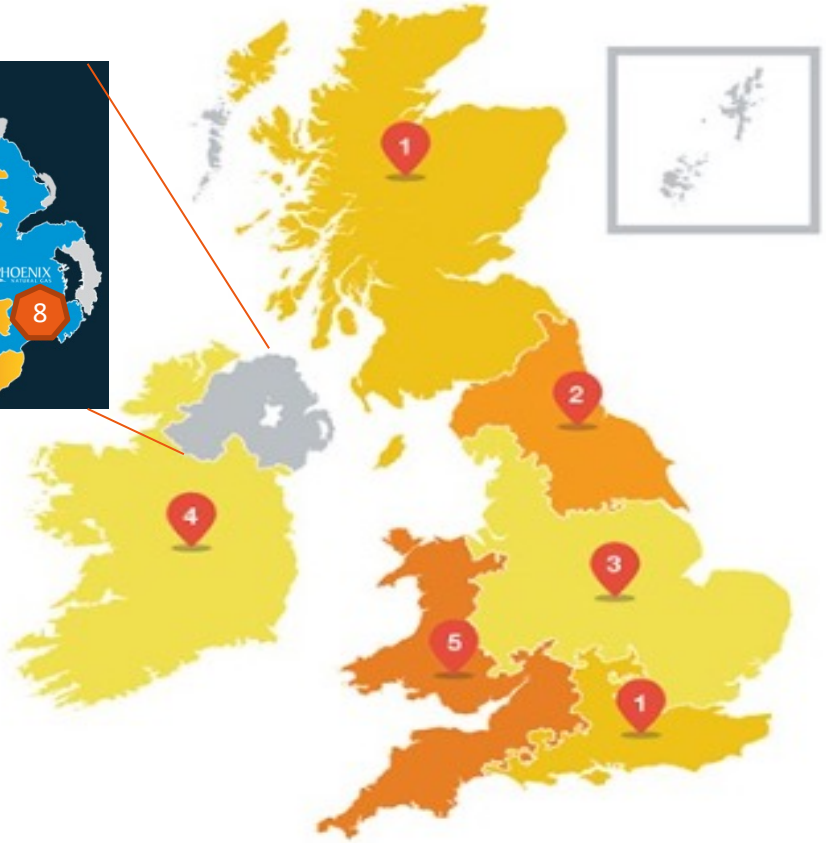
UK Gas Networks

6 SGN Natural Gas

7 taking natural gas further firmus energy

8 PHOENIX NATURAL GAS



Gas Distribution

1 SGN

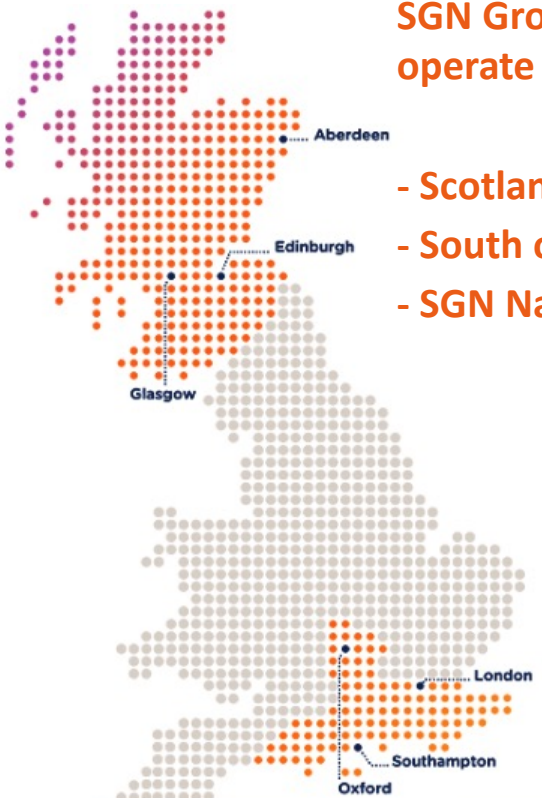
2 Northern Gas Networks

3 Cadent Your Gas Network

4 Gas Networks Ireland

5 WALES&WEST UTILITIES

Who are SGN ?

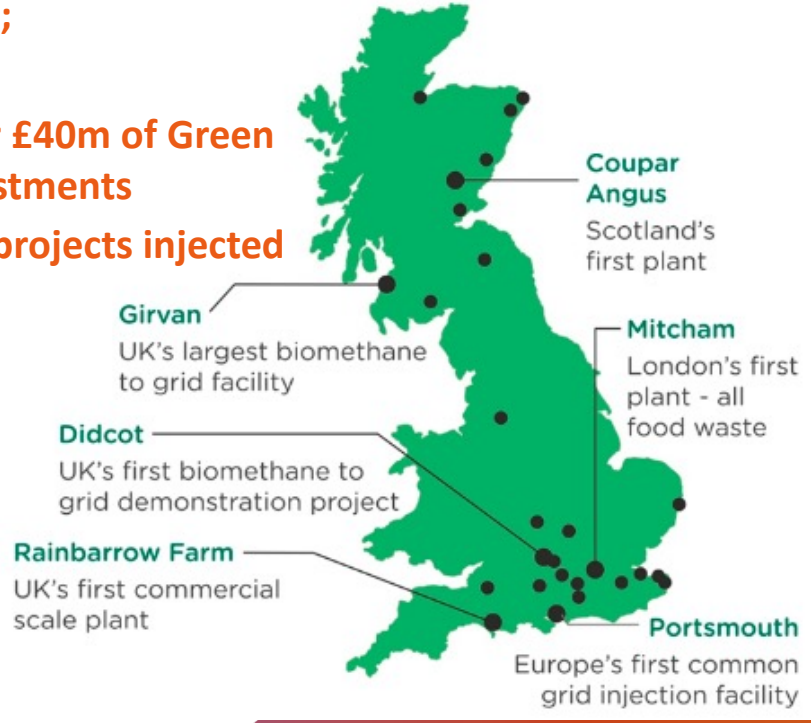


SGN Group own and operate 3 GDN's;

- Scotland
- South of England
- SGN Natural Gas (NI)

Plus SGN Commercial Services;

- Over £40m of Green Investments
- 30+ projects injected



Network Connection Constraints

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Common obstacles to Gas Entry

✓ AD Sites with clean up plant located central to feedstock availability

Gas Network Constraints to Entry

- Local gas grids not able to take the required volumes
- Interaction with other sources (grid supply, Biomethane plants, etc)
- Cost of transporting feedstock / availability of local feedstocks
- Cost of connection prohibitive (high pressure, distance or plant size)
- Existing AD assets not near a suitable gas grid system

Virtual Pipeline Concept

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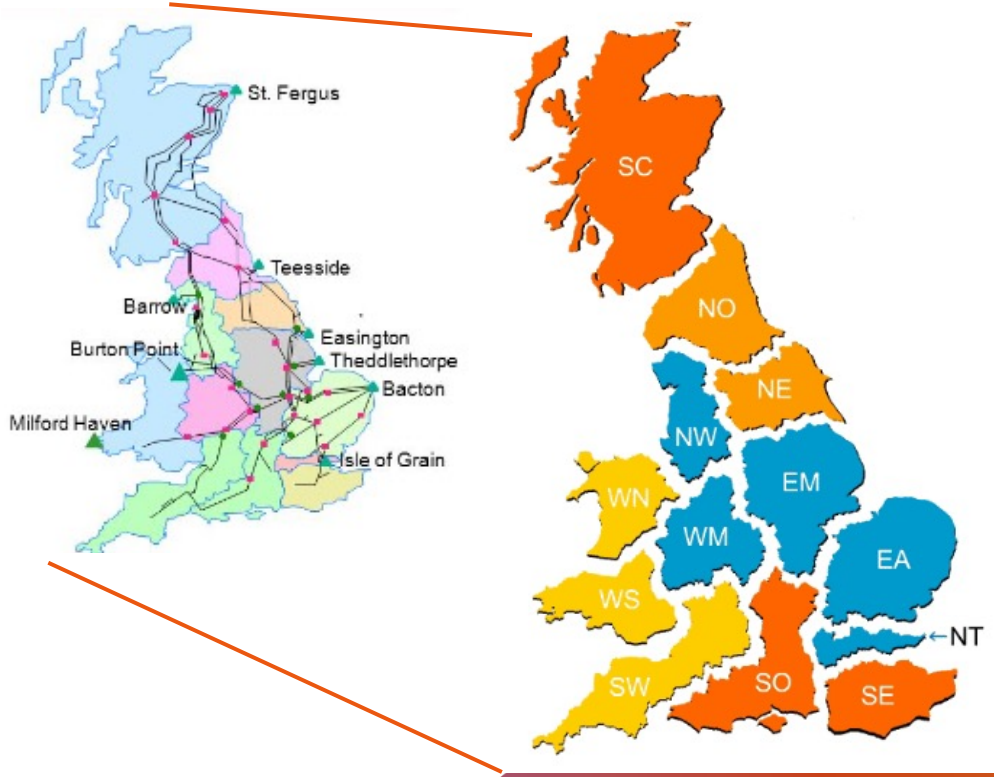
Key considerations – Understand your options

The Search for Injection point

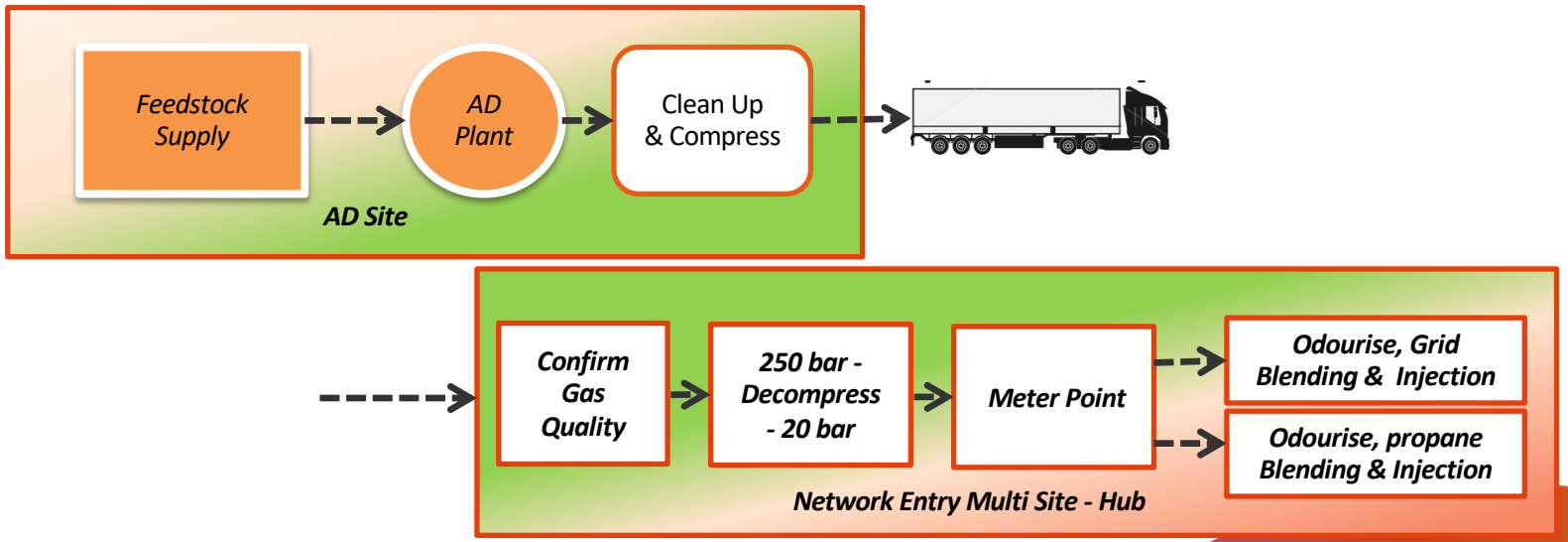
- Understand the history
- Know what to ask

- ✓ Locate high-capacity network
- ✓ Look for year flow characteristics (blending potential)
- ✓ Ask if the network can be reconfigured
- ✓ Good Traffic Routes - Must
- ✓ Land availability close by (lower connection cost)

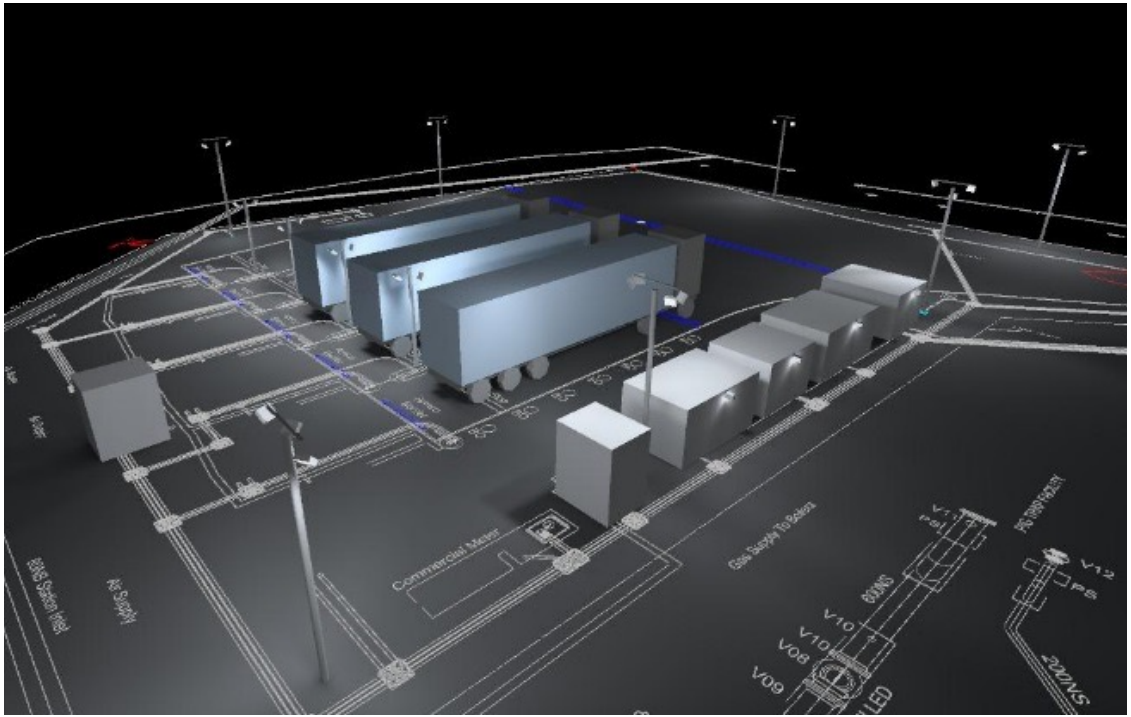


The Virtual Gas Network - Concept

Providing a pathway to utilise *ALL* organic feedstocks



Site Concept



5,000 m3/hr

Biomethane Injection Hub

NO PROPANE

The Site and Operation

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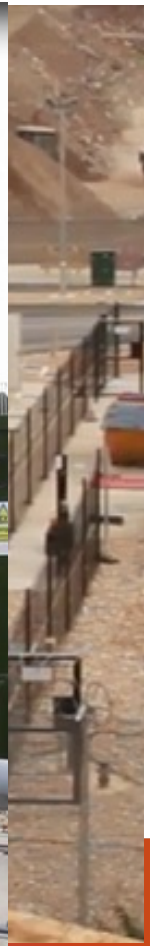
Portsdown Hill PRI

- Consists of :-
  - 5 Metered Download Bays – 1,000 m^3/h each bay (400 – 1200 m3/hr
  - Pressure and flow control download (250 bar to 30 bar)
  - FWACV (Blending) and GSMR Checking Equipment
- Blend ratio 4 or 5 : 1 (dependant on trailer CV)
- Added Coalescing Filtration - Oil carry over into tankers effecting meters and instrumentation

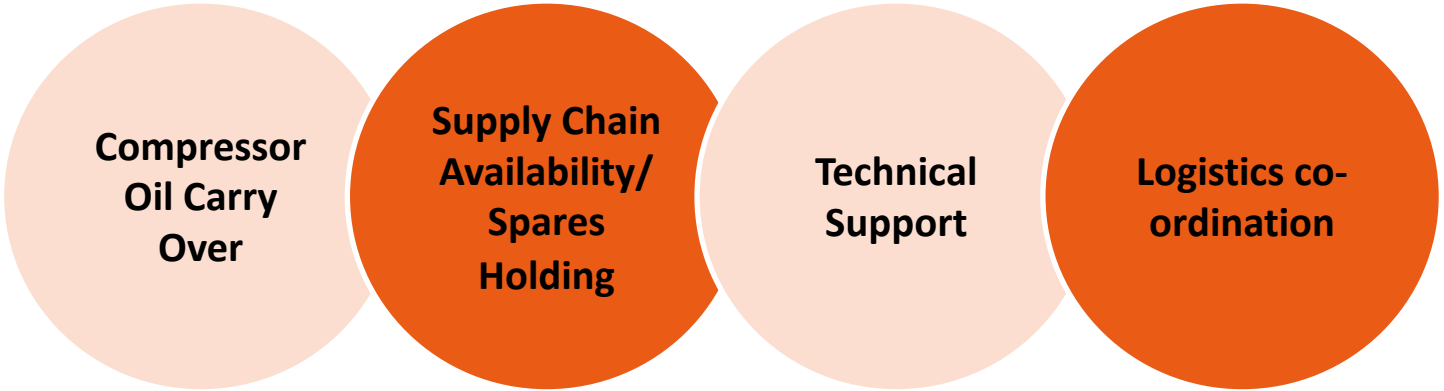
Portsdown Hill in construction



Portsdown Hill – Providing Grid Flexibility from 2014

- 1st stream commissioned in 2014
- Last stream commissioned 2017
- Full Capacity contracted
- New sites under consideration

Operational Challenges



Network Entry Point – Managed as production facility (i.e. Car Factory)

Pros and Cons

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Pros

- ✓ No Propane required
- ✓ Opens up access to the gas networks
- ✓ Provides viability to remote feedstocks
- ✓ Reduces time for network connection for repeat plants
- ✓ Reducing connection costs
- ✓ Shared use of expensive equipment
- ✓ High volume injection, allowing AD scalability

Cons

- Technically demanding – Blending control, Process safety & compliance.
- Commercial viability – balance of scale, distance, transport.
- Regulatory challenges – multi site metering, gas movement traceability
- Operator Challenges – logistics management, additional gas analysis
- New Transport Trailers – Initial rigorous purging, to remove nitrogen

Thank You

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