

Biomethane Projects: the challenges faced and the perception of the regulatory regime

28th Sept 2017

John Baldwin
Managing Director
CNG Services Ltd

john.baldwin@cngservices.co.uk

www.cngservices.co.uk

07831 241217

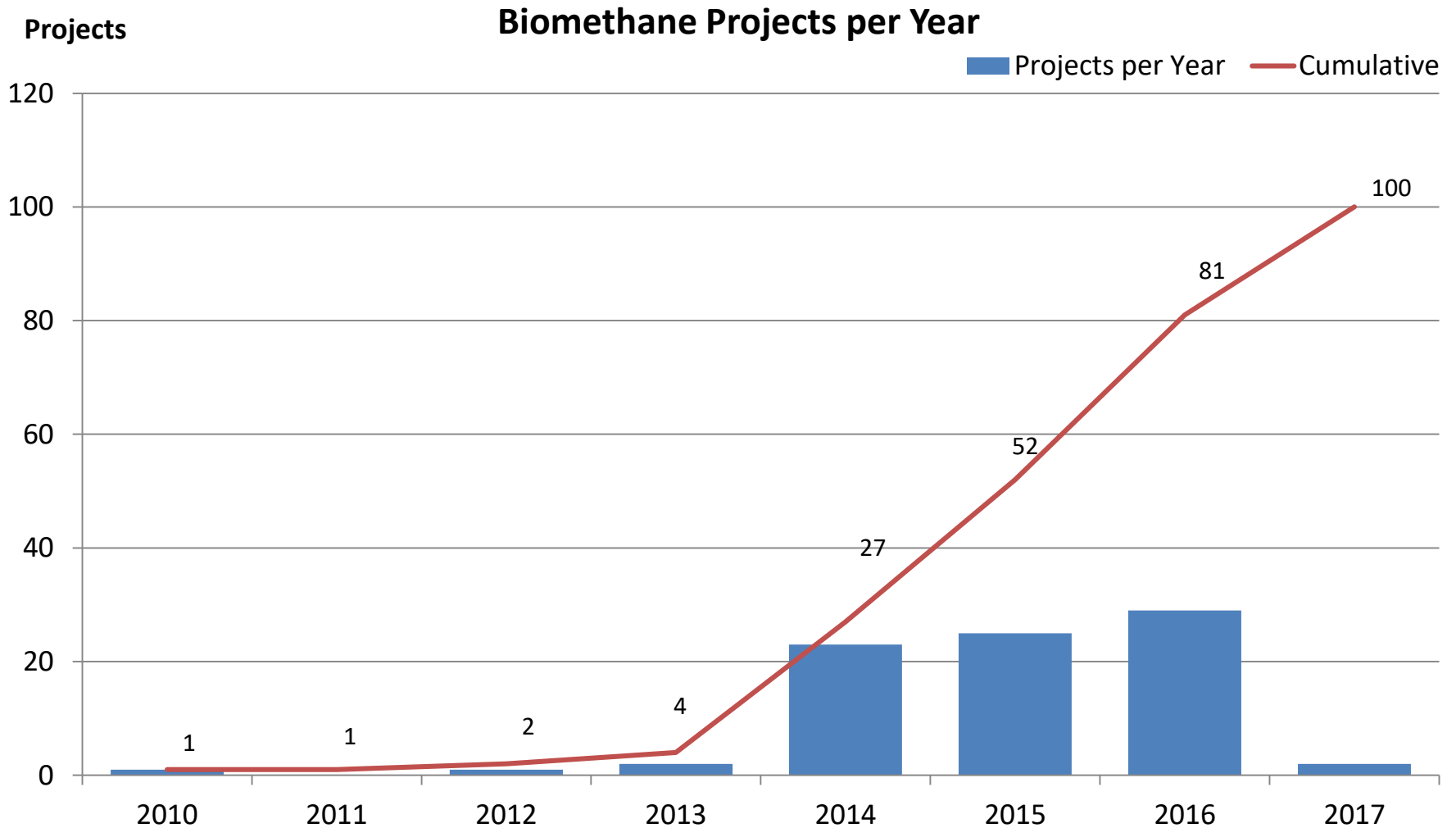
Biomethane Projects: the challenges faced and the perception of the regulatory regime

1. Biomethane Project Update
 - 81 projects
2. Challenges faced
 - RHI
 - Capacity
 - Regulatory and GDN complexity
3. Innovation
 - Some example projects
 - Hexel One
 - Bio-CNG from LTS
4. Golden Age for Gas

HSE regulations are not seen as major issue

BIOMETHANE PROJECT UPDATE
81 PROJECTS BY END DEC 16

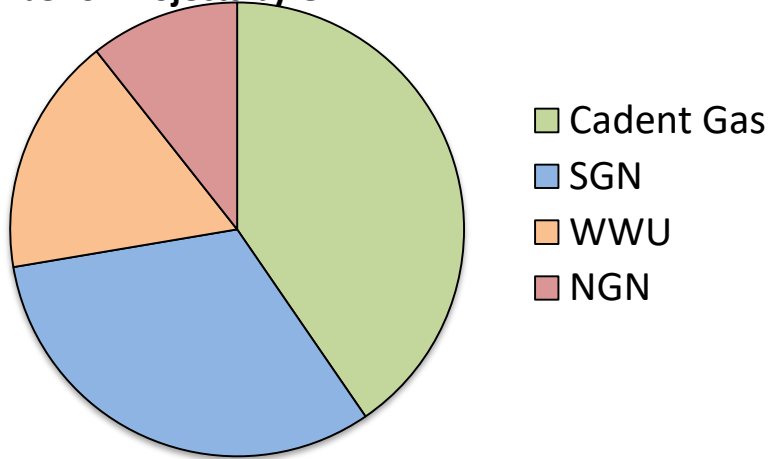
Biomethane projects per year 2010-2017



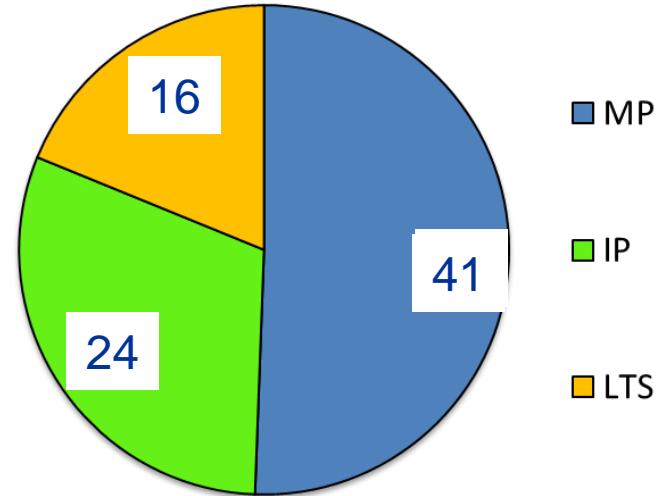
81 projects by 2016 – the election has delayed Project 100 until 2019?

GDN, LDZ, Pressure, Flow-rate

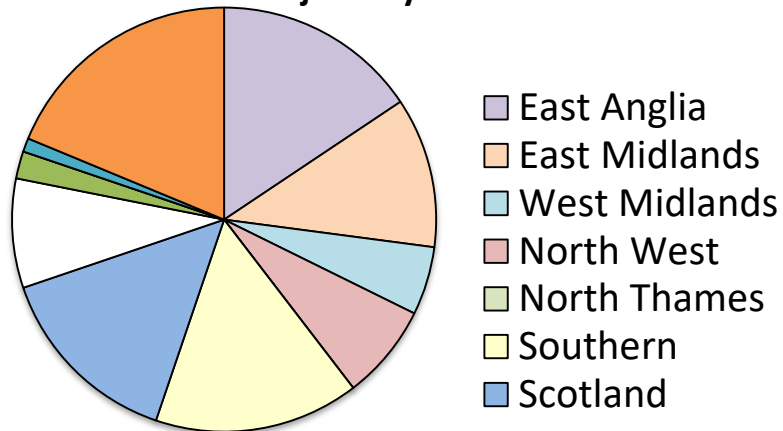
Number of Projects by GDN



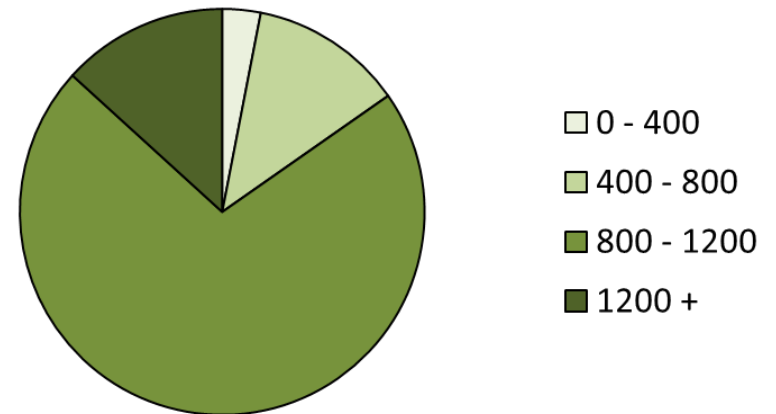
Number of Projects by Pressure Tier



Total Number of Projects by LDZ

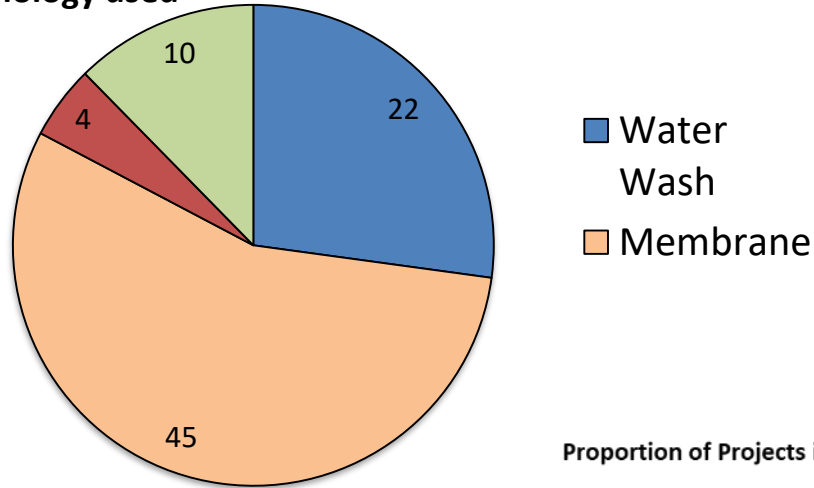


% Projects by Biogas Flow Rate

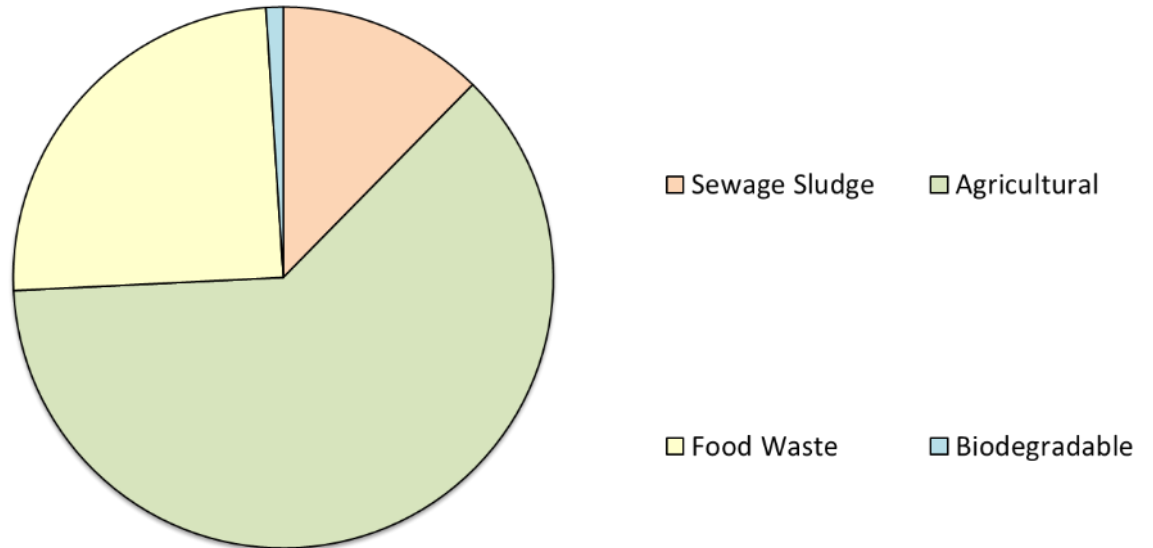


CO2 Removal Technology and AD Feedstock

Technology used



Proportion of Projects in each Feedstock Category



CHALLENGES 1

THE RHI

New RHI

1. New RHI expected May 2017, delayed due to a drafting error and then the General Election
2. May be introduced in Dec 2017 or Q1 2018
3. Only 2 new projects in 2017
4. Potential for 30 - 40 projects in next 2 - 3 years
 - Needs to make >50% of biogas from waste
 - Ability to lock in tariff subject to:
 - Planning
 - Connections contract
 - Finance
 - Complete by 31 Dec 2019
 - Issue due to lost 2017, request to extend into 2020

It is not clear how Ofgem will handle 20-30 projects wanting to lock in a tariff

CHALLENGES 2

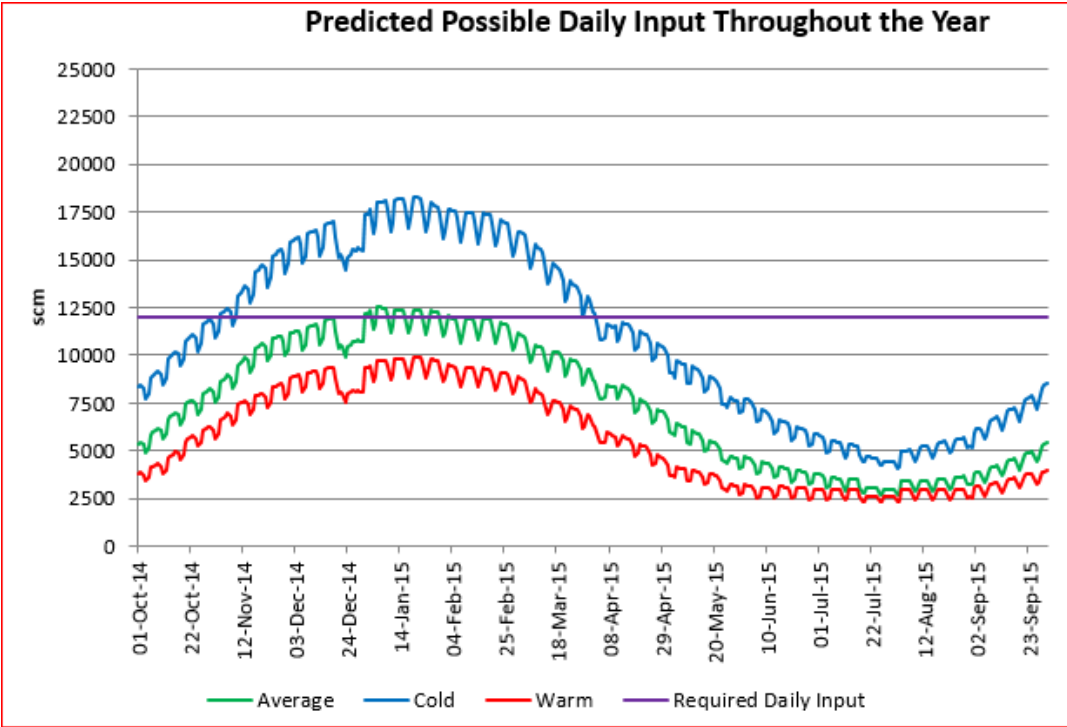
THE CAPACITY QUESTION

New RHI – impact on capacity

1. With new biomethane projects needing to make >50% of biogas from waste, the location of the AD has to be where the waste is
 - This reduces the number of sites and means that grid capacity is critical
2. For >150 years gas has flowed through the grid from high pressure to low pressure.....time to change that
3. The Gas Networks are not designed for smaller distributed sources such as biomethane:
 - Very limited metering or knowledge of real flows at sites that feed the IP and MP pipelines (and any metering designed for peak so not accurate at low flow)
 - No concept of a summer “1 in 20” – so the network analysis models still use winter peak which can only give theoretical issues at grid extremities
 - Some ‘guaranteed’ pressures for I&C customers prevent lowering of pressure to accept injection of biomethane
4. Finally, there is no financial incentive on GDNs in relation to biomethane

Capacity is the key issue facing the industry

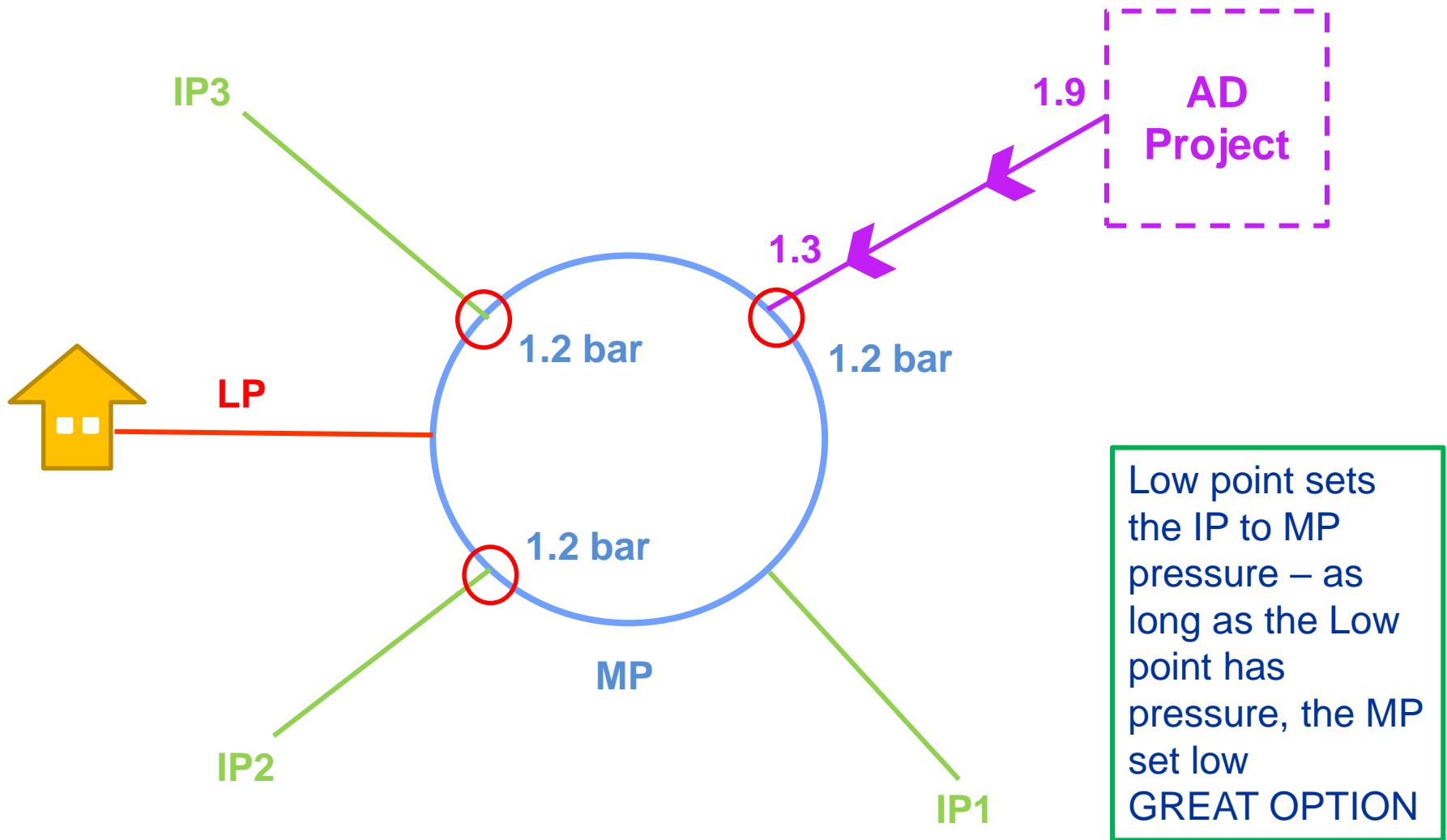
GDN Capacity Reports



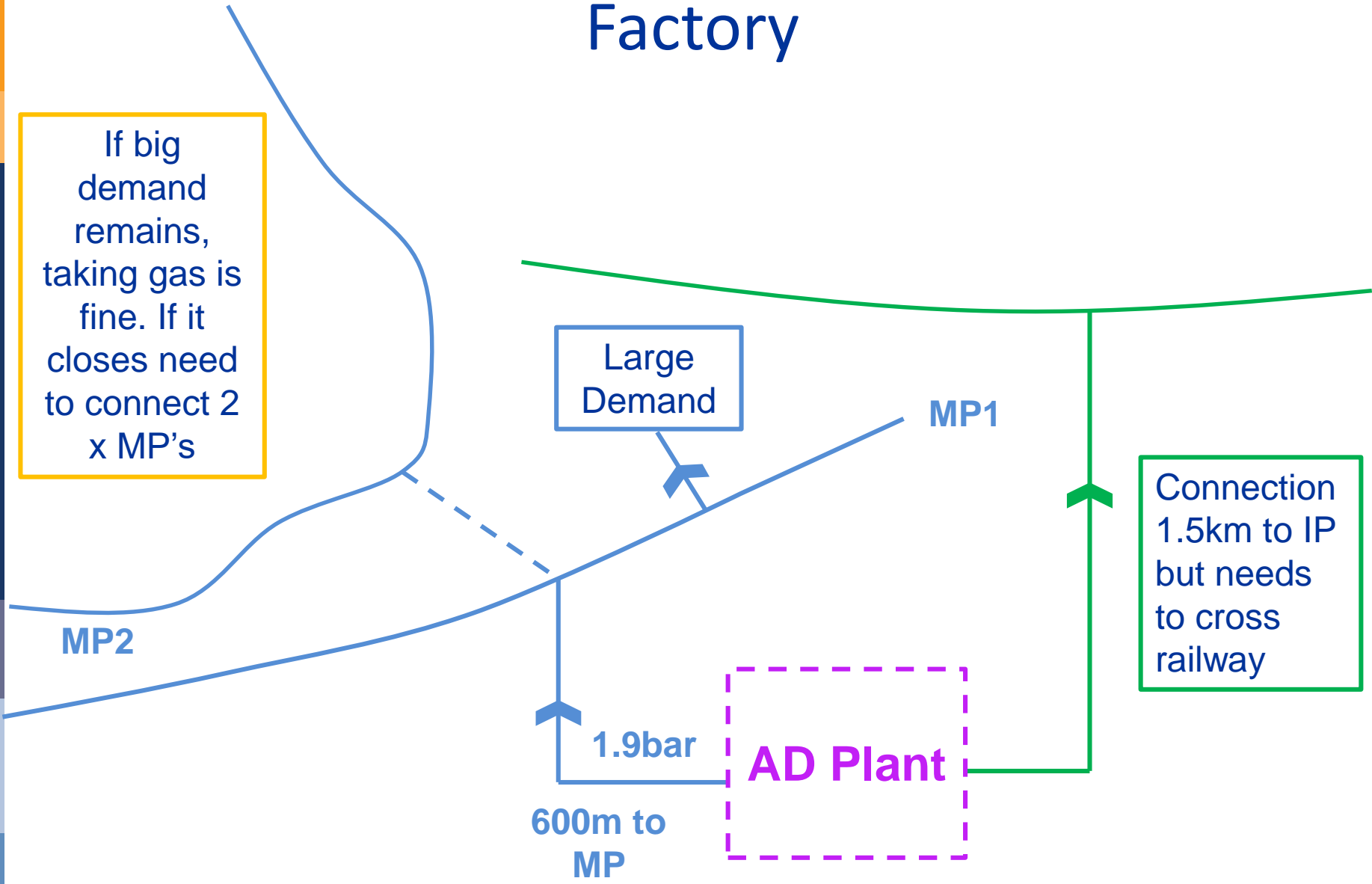
Above is a typical graph showing a typical project where there is not enough capacity due to insufficient demand in the network

We must solve this problem...next slides show developments

Project 1 – Biomethane into MP Capacity

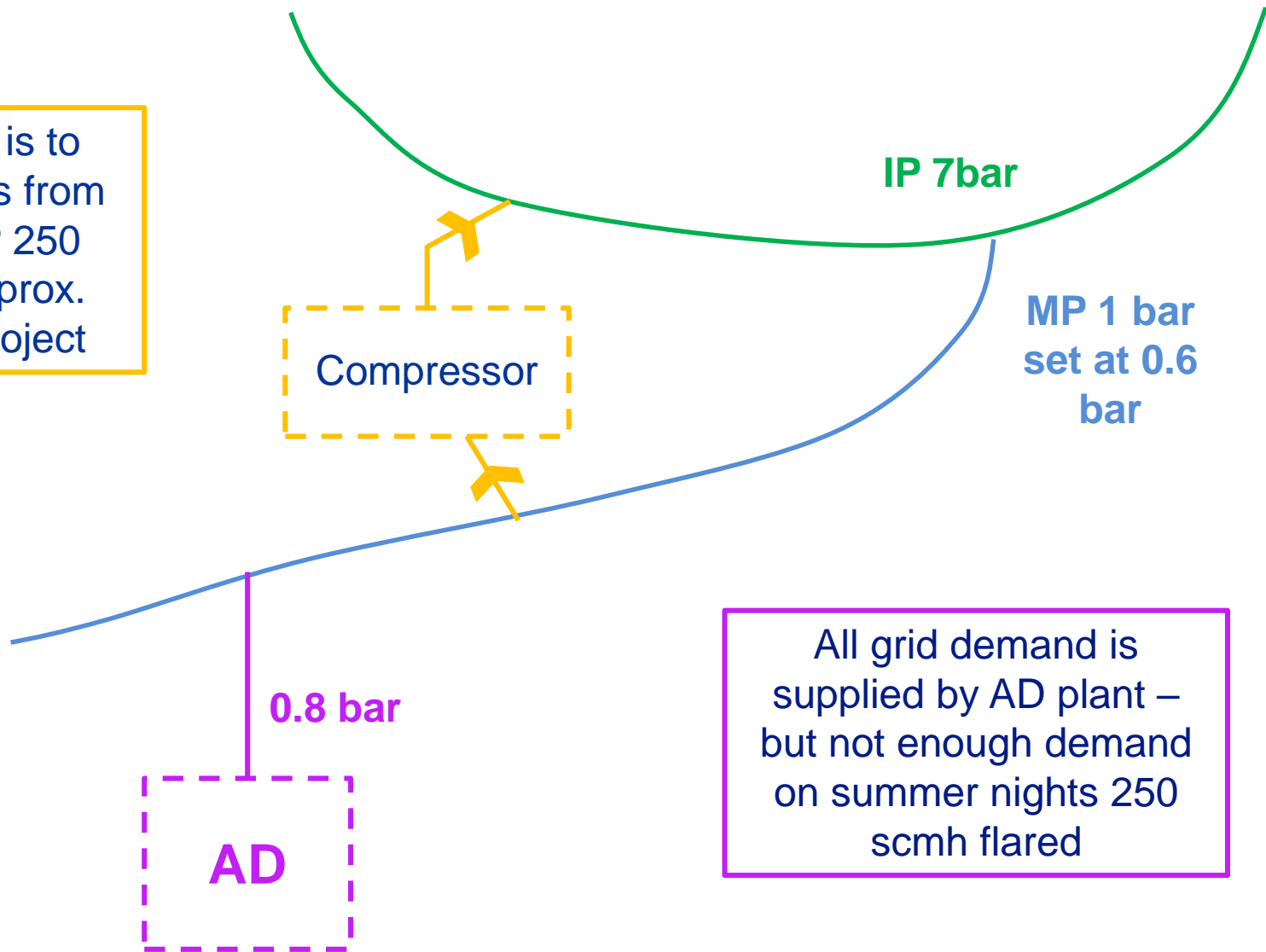


Project 2 – Capacity provided by Local Factory



Project 3 – MP to IP Compression

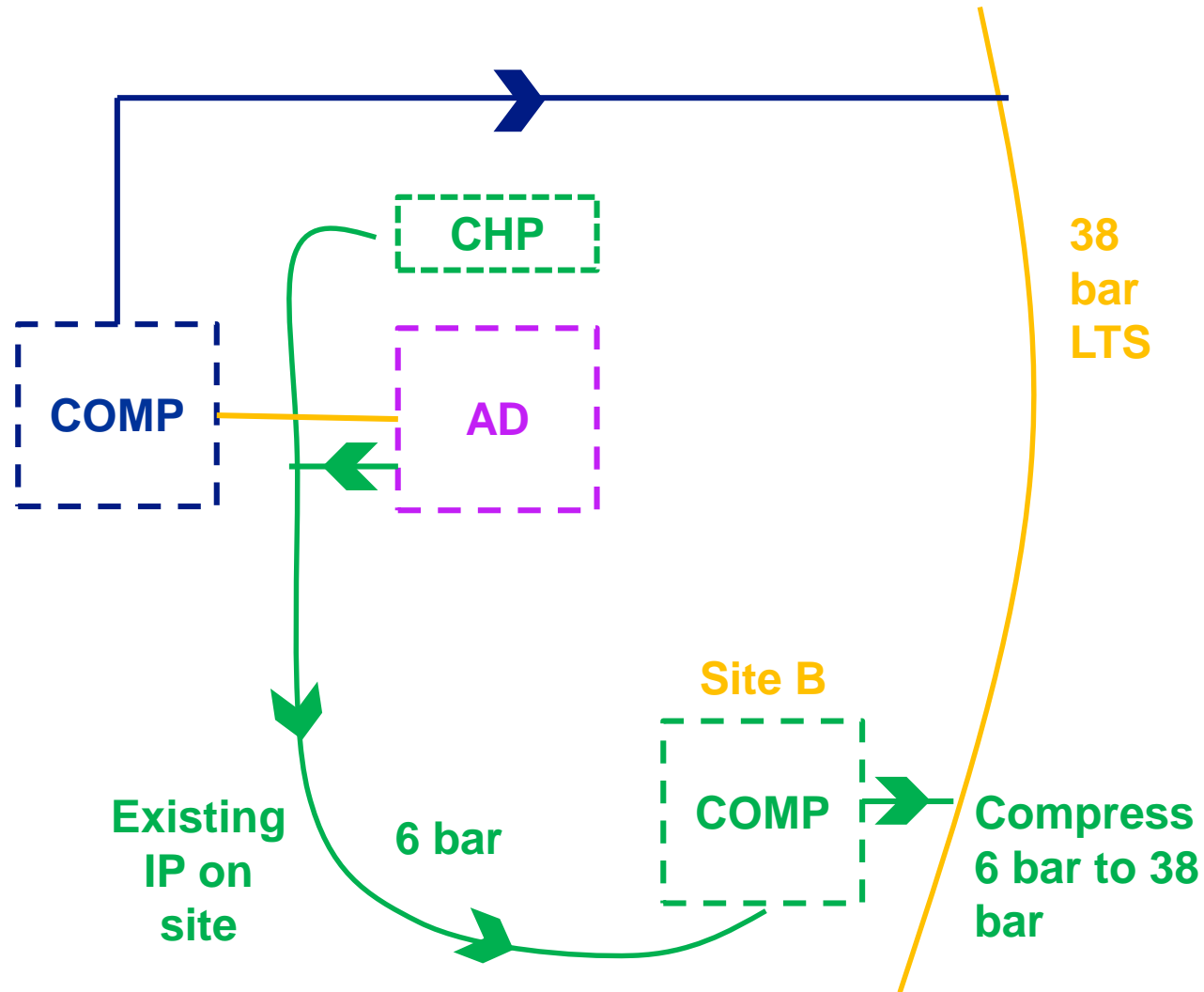
Solution is to export gas from MP to IP 250 scmh approx. £300k project



Project 4 – IP and within Grid Comp

Option 1
Compress all
gas into LTS
£2.5 million
capex
High opex

Option 2
Inject into local
IP
GDN
compresses
from IP to LTS at
site B
£1 million capex
Low opex as
<1000 hours



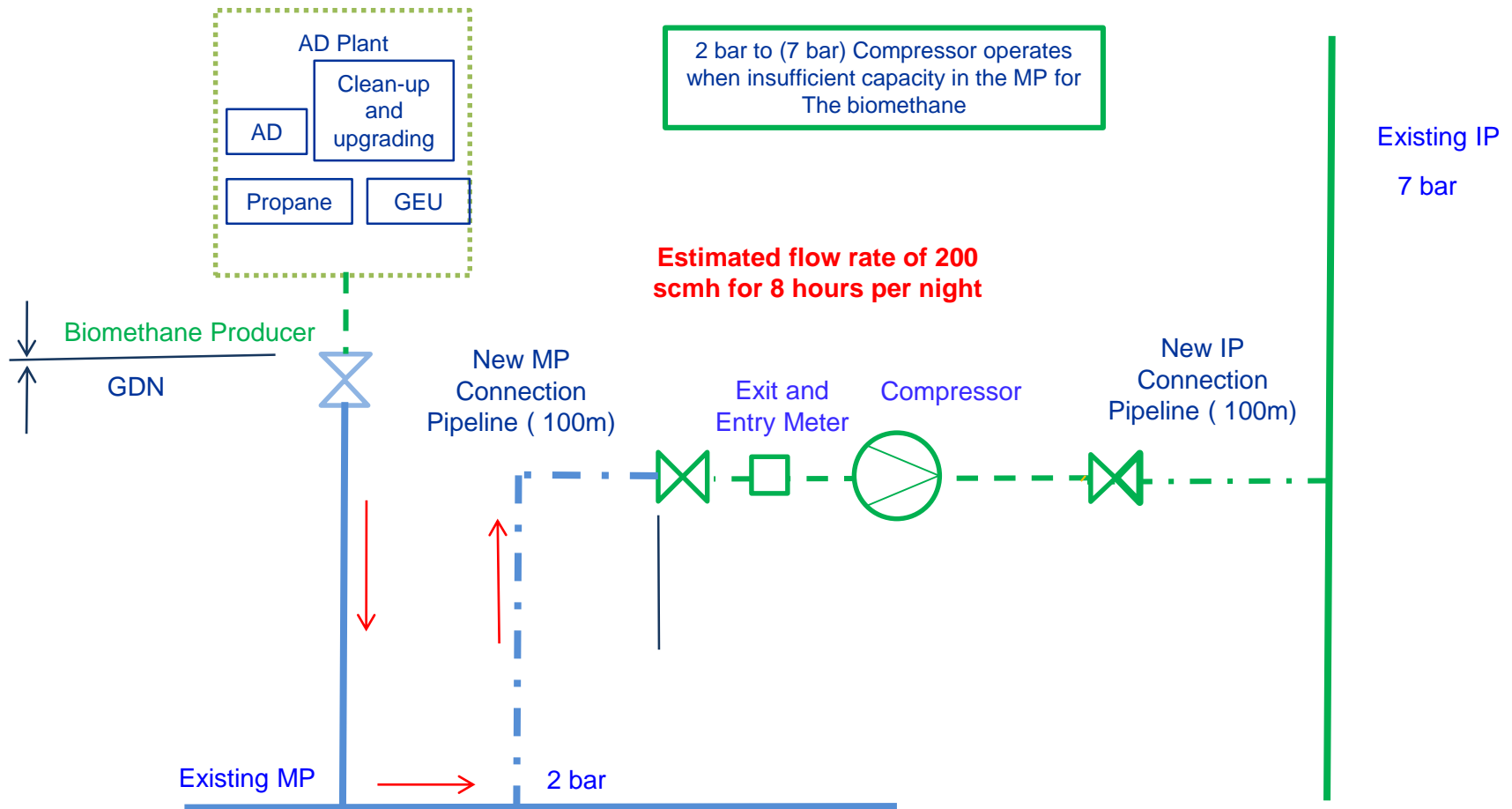
Compression Plant



16 LTS Injection Projects with Compression Plant as above
All Biogas upgrading plants also have compression plant, so there is
nothing new in having compressors

Project Example of MP to IP

Compression plant – owned and operated by the Biomethane Producer



Its straightforward but new – compare to Odorant Change in 1997

Capacity wish-list

1. We want the GDNs to develop innovative solutions to provide capacity, the main one is to install compressors to export gas:
 - From 2 bar to 7 bar
 - From 2/7 bar to LTS
2. We want the GDNs to be doing 20 ‘within grid’ compressors per annum
 - Significant GHG benefit from only compressing when there is a capacity issue
3. The linking of IP-MP settings to the low point in the grid is also a great idea for existing projects (Project 1 above)
4. We want the GDNs to always take the gas and install, own and operate the compressors or allow the Biomethane Producer to do so (with no Network charges)
5. We want a 1 in 20 peak summer concept, better network analysis, better metering and an individual Operating Plan for each biomethane project
6. We don’t want to wait until the start of the next Price Control

This is a key issue for biomethane

CHALLENGES 3

REGULATORY AND GDN COMPLEXITY

Gas Quality issues in 2012

1. Oxygen – class exemption to 1%
 - Actually mostly <0.2% but exemption provided confidence re excursions
2. Siloxanes from sewage treatment works
 - Minworth, Howdon, Avonmouth, Five Fords, Davyhulme, Strongford
 - Removal plant seems to be successful with near zero siloxanes
3. Odour masking
 - GQ/8 process reviews potential compounds and ensures they are removed from the biomethane

Would be useful if HSE could request details from the GDNs on all above and issue an updated note to show that these issues have been satisfactorily addressed

Regulatory Complexity

1. Ofgem FWACV regime is not fit for purpose
 - Should be similar to GSMR
 - Rules that are completely pointless
2. Ofgem rules for meter accuracy not fit for purpose
 - Meter calibration (ME/2) clearly not appropriate for biomethane level flows
3. No particular HSE issues though it would be good if:
 - There was more openness from GDNs
 - Eg publish actual gas quality data (eg Oxygen, H₂S, siloxanes)
 - Issue a “Near Miss” or Incident Report on any issues that have risked off-spec gas going into the grid
 - Rules for >7 bar pipelines could be reviewed
 - Notice period for mods and new pipelines
 - Guidance re intelligent pigging for short connection pipelines

Ofgem struggle to find time for biomethane given all other energy issues

GDN Complexity

1. Ofgem led EMIB review in 2012-13 set basic industry rules
2. Significant biomethane policy divergence:
 - One GDN adopts the odorant injection plant
 - One GDN only adopts the ROV
 - One GDN has a separate shutdown PLC which the other GDNs reject
 - Two GDNs adopt ROV and RTU
 - It appears arbitrary and without any legal or safety justification, but means 4 different GEU designs, significant additional cost and complexity
3. One GDN insists on no ROV Bypass, another insists on a full bore bypass but with software modified so cannot normally flow through the bypass
4. GDNs adopt different standards for <7 bar than they accept in the GIRS process, some have company specific standards
5. Countless examples of divergence with no business case presented

GDNs recognise the long term threat to their business but this has not stopped technical and commercial divergence which adds cost and risk

INNOVATION

1. Euston (Bury St Edmunds)

- 42 bar gas grid around 8 km from AD plant
- Connect to existing AGI



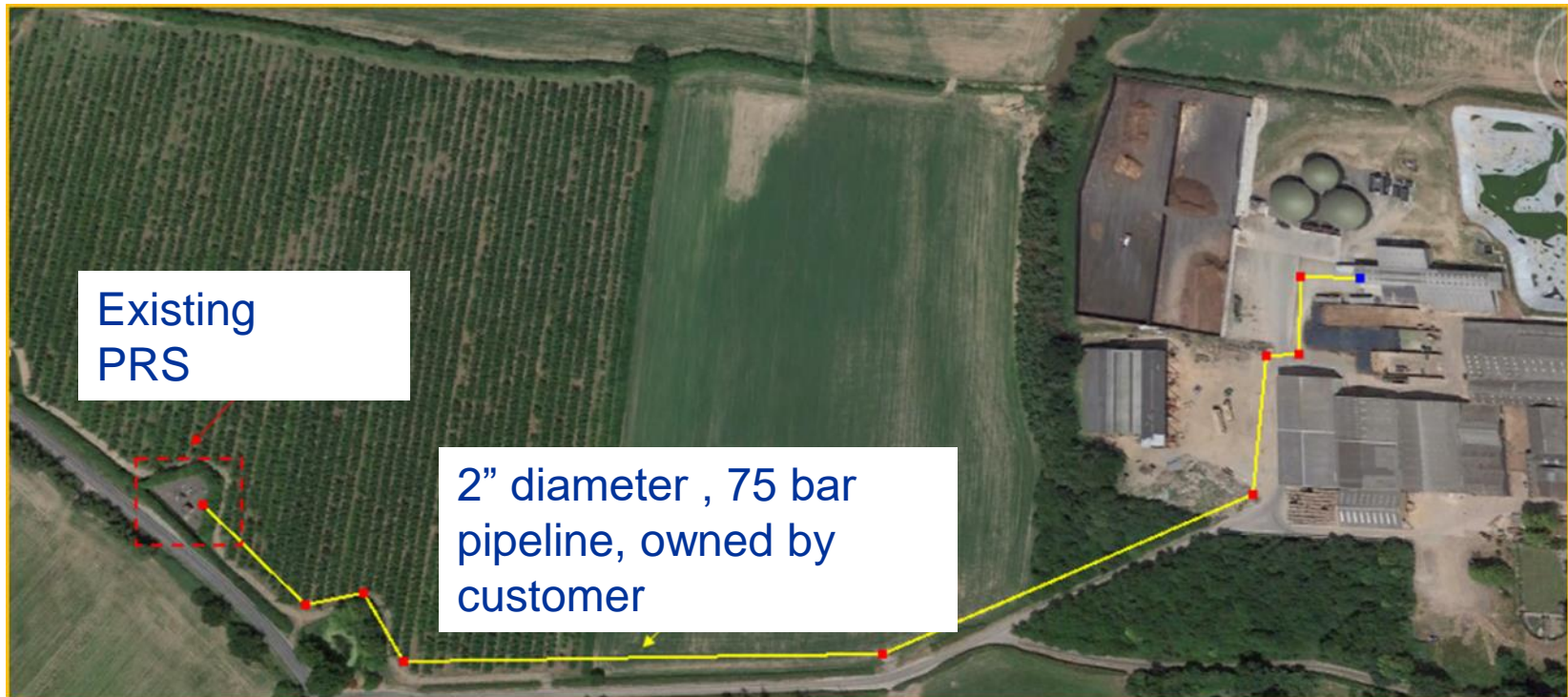
2. Methwold (Norfolk)

- 3.5 km of <7 bar PE and compress into 38 bar
- Hot tap



3. Hampton Bishop (Hereford)

- 750M of 2" diameter 70 bar to LTS AGI
- Not a "Pipeline" as on single premise
- Connected to existing AGI



4. Raynham Estates (Norfolk)

- 19 bar gas grid – 1.5 km of 19 bar Hexel One



5. Leyland CNG Station

- Connection to 38 bar LTS for CNG station
- LTS CNG gives 17 - 25% saving on GHG (“Well to Motion”)



Unregulated Gas Meter



- Credit to HSE for arranging changes to GSIUR

Scania 340 bhp



- 10 on the road from Jan 2017, 35 more by end 2017
- 500 mile range on CNG
- 250 bar composite CNG tanks – weight is 500kg less than steel
- Initial 15% Well to Wheel GHG saving compared to diesel (independent report)

Iveco Stralis 420 bhp



- 420 BHP
- Asda running 5 from Crewe from October 2017
- Great potential in 2018



GOLDEN AGE FOR GAS

Despite certain adverse developments....

1. All 4 peak shaving LNG plants scrapped
2. COP Terminal at Theddlethorpe closing in 2018
3. South Morecambe gas terminal closed
4. Rough storage facility closing
5. Many CCGTs closed or closing, eg Barking Power

To the untrained eye, could appear negative for gas.....

But lots more positives....

1. Biomethane, Bio-SNG and H2 blends
2. Boom in 20 – 50 MW gas engine power plants
 - Flexible gas is needed to back up intermittent electricity
 - Gas/solar/batteries is a great combination
3. Not one CNG car on the road in the UK in 2017, likely to have 10 million in 2040 (that's EV's using electricity made from gas)
4. CNG trucks and LTS combo is unbeatable and set for huge growth
5. Shale gas drilling underway (10 wells by end 2018)
6. Our projects to take CNG to Tain and Islay and other off grid towns using new Type 4 CNG Storage technology

It's a Golden Age for Gas