Real Time Settlement Methodology (RTSM) Programme – Session 4

Stakeholder Engagement Forum

25th November 2025

Welcome and Introductions

Meet the Team

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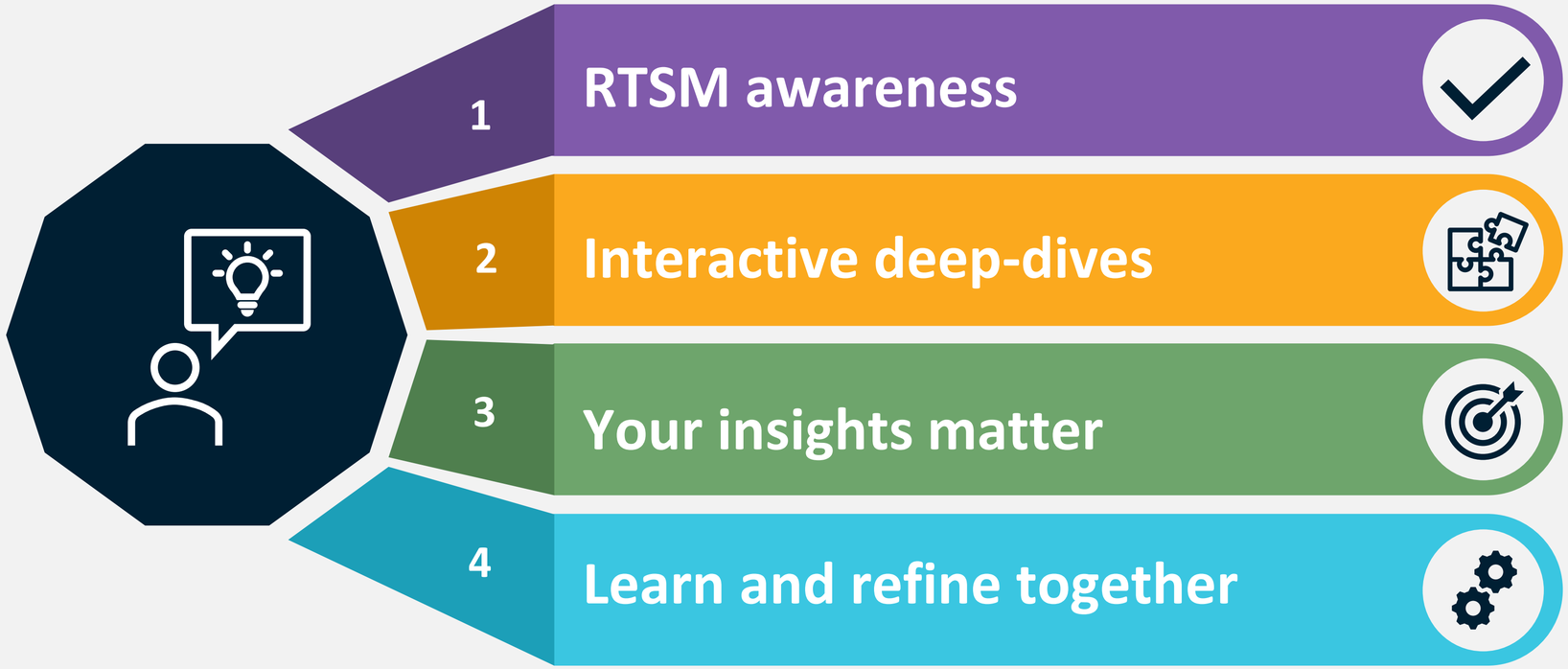
Expectations for the Sessions



Q&A

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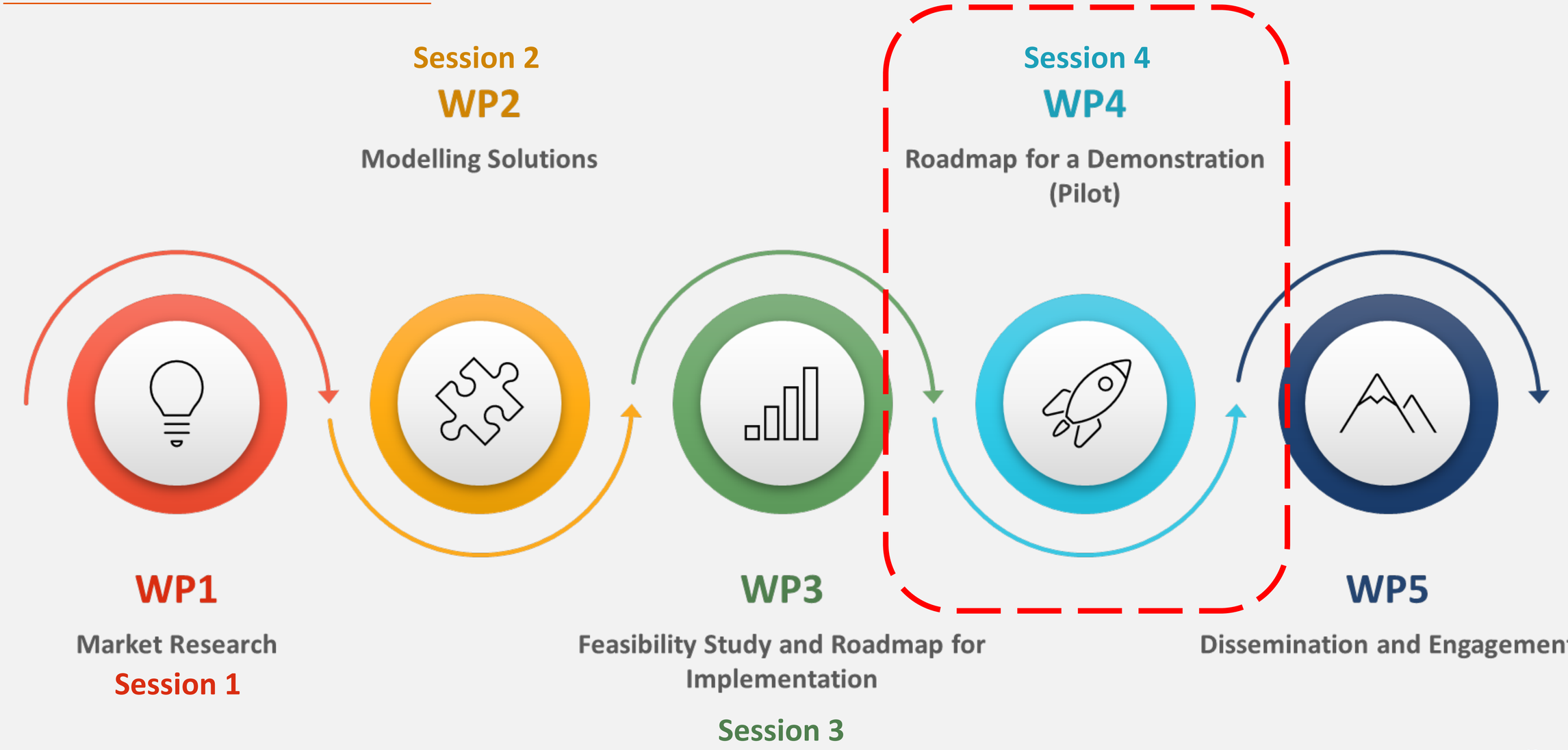
RTSM Phase 1


Session 2
WP2
Modelling Solutions
Session 4
WP4
Roadmap for a Demonstration (Pilot)
WP1
Market Research
Session 1
WP3
Feasibility Study and Roadmap for Implementation
Session 3
WP5
Dissemination and Engagement

Agenda – Session 4

Time	Topic	Lead
14:00 – 14:05	Welcome and Opening Remarks	SGN
14:05 – 14:10	Actions from Previous Meeting	SGN
14:10 – 14:20	Recap of Session 3	BIP
14:20 – 15:00	Work Package 4 (Part 1)	BIP
15:00 – 15:10	Check Point and Break	All
15:10 - 15:40	Work Package 4 (Part 2)	BIP
15:40 – 16:00	Q&A	All

Actions from Previous Meeting

ACTION:

- Publish meeting materials and share meeting notes from previous meeting.
- Investigate whether RTSM could be eligible/considered for Ofgem's Impact Assessment.

UPDATE:

- Slides published on the SGN RTSM website.
- Meeting notes & actions issued on 4th November 2025.
- Awaiting Ofgem's feedback on RTSM eligibility and inclusion in their Impact Assessment.

Work Package 3 Recap - Feasibility Study and Roadmap

Solution design – key themes

Time resolution

What is the suggested time resolution of the model?

Node granularity

What is the level of detail of network segmentation?

Accuracy

What is the target accuracy of the model?

Architecture & Process

Who will be responsible for CV simulation?

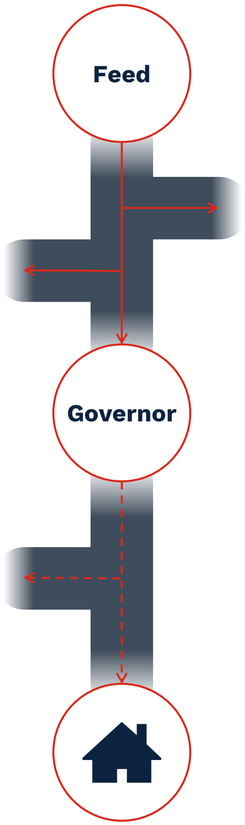
Regulation

What is the impact of CV modelling on regulations?

Vendors engagement

Key insights from software providers

Suggested CV modelling solution (1)



Hourly CV is simulated from injection points down to governors' level (node)

Each node identifies a charging area – a group of delivery points receiving gas from that node

Daily CV is computed and assigned to meters inside the charging area

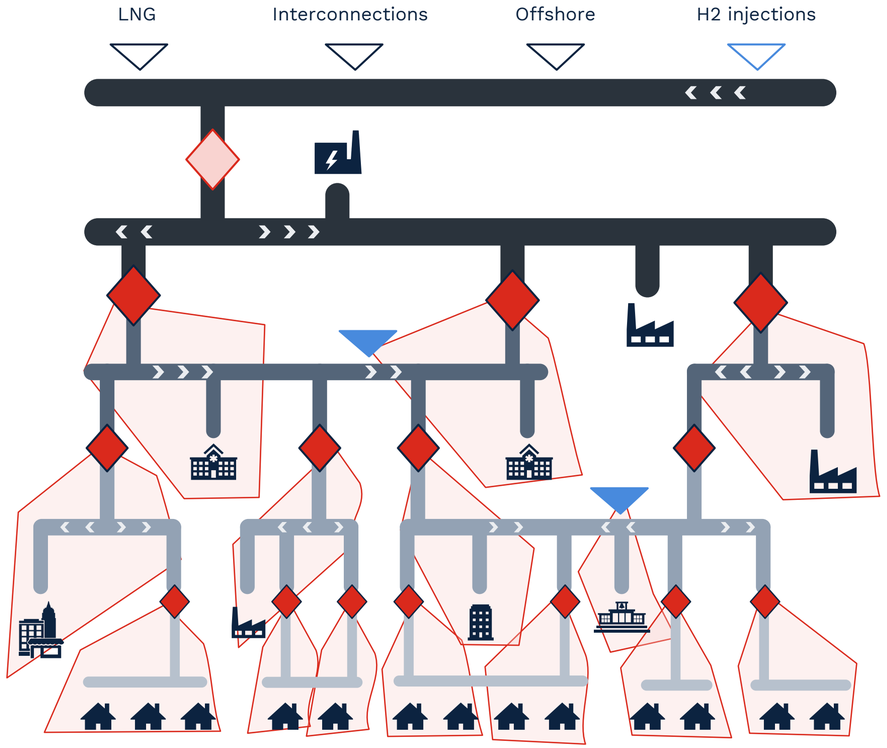
Each EUCs[1] is assigned an hourly consumption profile, to differentiate between timing of gas usage

Daily CV for each EUC is computed weighting the 24h CVs for the respective consumption profiles

1) EUC = End User Category

Suggested CV modelling solution (2)

To **avoid the use of standard profiles**, which may lead to inaccuracy and higher data volume, **CV should be simulated at node level**; nodes must be defined through network analysis, however, as first step, **each pressure reduction point can be considered a node**, then additional nodes can be defined near to injection points



Considerations

Hourly demand availability
Hourly demand at meter level for NDM is not available and is not possible to correctly model gas usage at each meter level. The use of standard profiles to model gas consumption and simulate CV at meter level increase complexity and capacity requirements without increasing accuracy

Nodes definition
CV should be modelled at reduction points as real data on volume is available, increasing accuracy of CV calculation.

Higher granularity
In the nearest of a biomethane or hydrogen injection plant additional calculation points should be identified to reflect higher CV variations; this will be done through network modelling – a rough estimation suggests 3 additional points for each injection point

Lower Granularity
If a **node is identified where no significant CV variations is observed** (e.g. only natural gas injection) it is possible to **avoid the modelling** of all the reduction points located “below” that node, if **they are independent from the rest of the network**

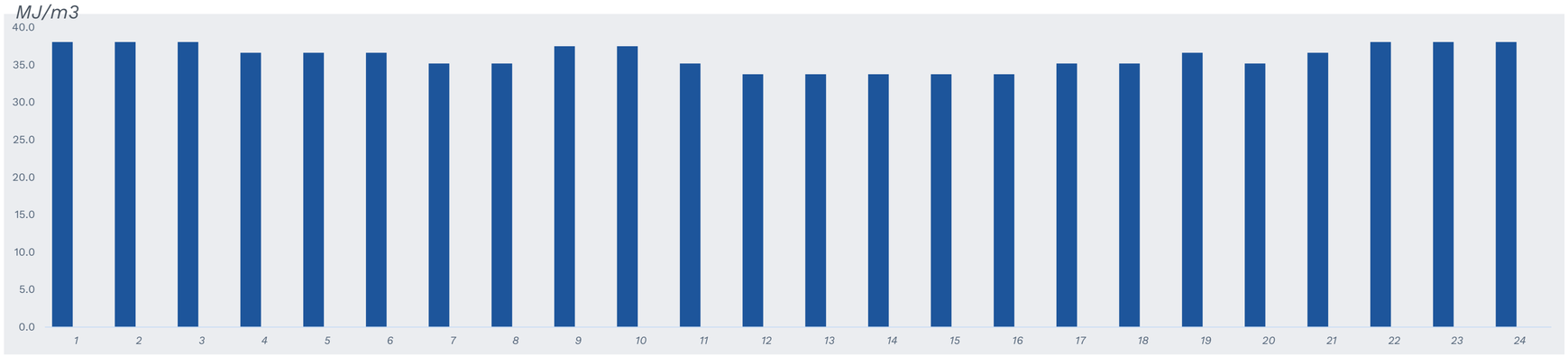
CV simulation point, node

1) NDM = Non Daily Metered

Suggested CV modelling solution (3)

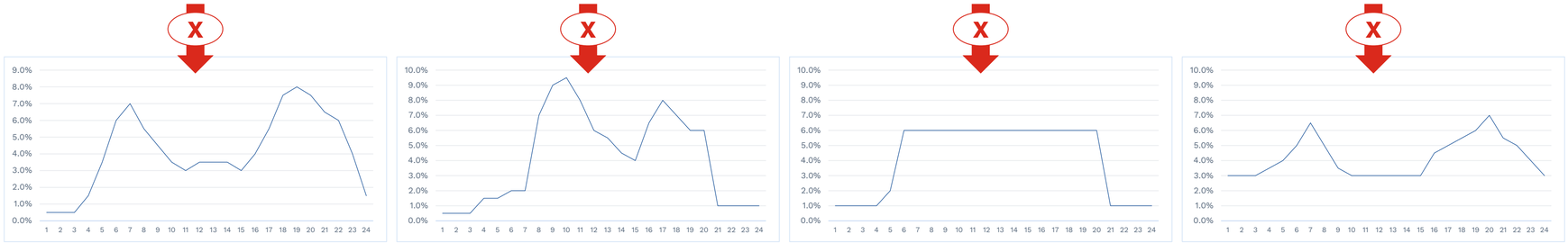
Once hourly CV per node is computed, **a daily average value is determined for each End User Category (EUC) using EUC standard profiles**; this will maintain the **same time resolution of current FWACV** for billing and settlement – hourly CVs could be used for hourly metered users

Hourly CV Value per node n - *Output of the model*



Hourly standard profile for each EUC

Also DM users will be assigned to a specific End User Category to model hourly profile



Computed daily average CV for each EUC, performed through Gemini and UKLink by CDSP

Work Package 4 -
Roadmap for a demonstration

High Level Roadmap & Strategy

Objective of WP4

1. DESIGN OF THE PILOT
2. PERFORM SITE SELECTION
3. IDENTIFY PILOT COSTS
4. DRAFT PILOT ROADMAP

Please note that:

WP4 has not been concluded yet, as the discussion around multiple topics required additional time and effort. It is still useful to **present the work to industry stakeholders to get feedback and considerations**, given the importance of the topic.

No decision will be taken at this stage. The work developed within WP4 will support the detailed analysis that will be addressed in Phase 2 of the RTSM to define the strategy for the pilot.

Agenda

- Key design themes
- Alternative scenarios for CV variability
- Pilot site selection: methodology and criteria
- Next steps

Key design themes

Key design themes of the pilot

Objective	What is the final objective of the pilot? What do we want to prove?
Measurement	How do we measure real data to evaluate CV simulation accuracy?
Software solution	How and when the software selection to run the pilot is performed?
Deployment	Will the CV simulation software be integrated with current systems used by the GNO?
CV variability	What is the required CV variability? Should the pilot include H2 injections? How do we manage impacts on regulation?

Pilot objective (1)

The overall objective of the pilot should be to prove that **CV modelling solution could work as a substitute for the current FWACV regime for the future gas network**; this can be done by **comparing the level of accuracy of the two methodologies** and gathering insights on the complexity of CV modelling

Evaluate accuracy of CV simulation

Evaluate software accuracy in simulating gas CV at pre-defined nodes

Perform software Selection

Compare software solutions and performances to conduct a software selection

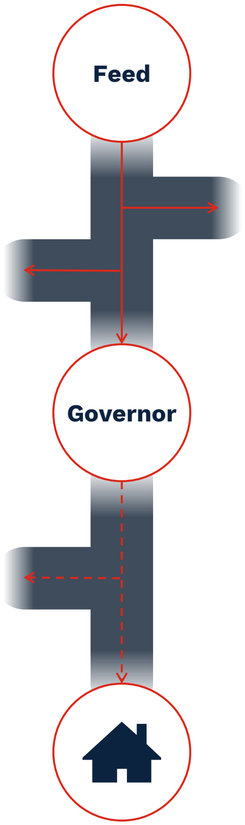
Evaluate accuracy of CV assignment

Evaluate accuracy of different methodologies for CV assignment to meters

No Downstream Integration testing

The proposed pilot does not include any activities to test software integration with CDSP, shippers and suppliers for billing and settlement

Pilot objective (2)



CV is simulated from injection points down to governors' level

1st milestone:

To prove accuracy of CV simulation at node level

First is critical to prove how the software performs in modelling hourly CV at each node of the network and to evaluate the level of accuracy

PILOT STAGE 1

Node CV is assigned to meters inside the charging area

2nd milestone:

To prove accuracy of CV assignment at meter point

Different methodologies[1] for daily CV assignment will be evaluated against FWACV, while also the impact of alternative network segmentation on accuracy will be compared

PILOT STAGE 2

1) See next slide

Simulated CV Assigned CV

Pilot objective – CV assignment comparison

Once hourly CVs at strategic nodes are computed by the software, they will be **aggregated into a unique daily value, used to estimate the energy balance for billing and settlement**; to assess the impact on accuracy, **different methodologies for CV aggregation and assignment will be compared** with current margin of error of FWACV at LDZ level

Current regime — **Use of standard hourly profiles** — **Different segmentation**

Test 0:	*Test 1:*	*Test 2:*	*Additional test:*
Accuracy of current regime	**Accuracy of single daily CV**	**Accuracy of EUC dedicated CV**	**Accuracy of network segmentation**
Since we foresee the measurement of daily energy consumption, it would be possible to estimate the accuracy of current FWACV, which will be the **baseline for comparison with alternative approaches**	Hourly CV at reduction points are aggregated into an **average daily value weighted on the gas flow; all the meters** assigned to that charging area **will receive the same CV**, which will be multiplied by AQ	Hourly CV at reduction points are aggregated into an **average daily value different for each EUC;** the hourly values are **multiplied by the hourly share of standard hourly profile** for each specific EUC	All the analysis are repeated considering a different network segmentation: **nodes will be aggregated, and it will be analysed the accuracy variation** on final consumers It is just based on re-analysis of existing data; **it does not require additional run.**

Measurement - Options

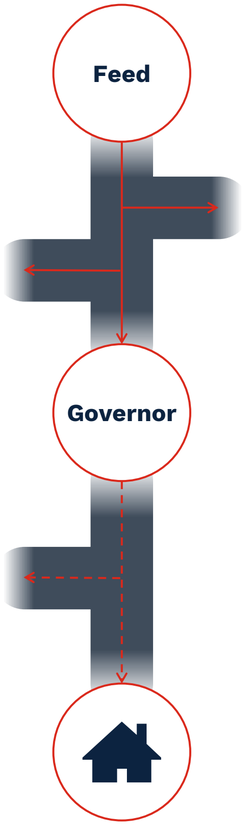
To evaluate accuracy of CV simulation and assignment, **real data must be collected from the network during the pilot**; Installing CV metering devices and gas sampling campaigns are the two options assessed

	Option 1 – Gas sampling	Option 2 – Low-cost CV metering
	Description Gas sampling campaigns to take gas samples from identified network locations (nodes) at different hours of the day, for laboratory analysis and comparison with the hourly modelled CV	***Description*** Installation of (few) **CV and gas flow metering devices, strategically located in the network, which allow for continuous monitoring of CV** and help in the correct measurement of energy consumption at a specific point
Key advantage	Does not require the installation of new fixed elements on the network, which will be mainly used only during the pilot	The continuous metering of CV and gas flow allows the calculation of daily energy consumption
Key drawback	The organisation of sampling campaigns is complex and expensive, and they would not allow to reach the same granularity of data collection	Requires the purchase and installation of metering devices just for the purpose of the pilot

Further analysis will be performed to identify the most suitable solution for the RTSM pilot

Measurement - Compared values

The analysis of pilot results should focus on two main areas, which are the accuracy of CV simulation at reduction points and the margin of error of the different methodologies proposed for CV assignment to meters, which should be compared with each other and with the current FWACV regime accuracy



What we test	*What we compare*		*How we collect the values*	*Considerations*
Accuracy of CV simulation	**Hourly measured CV**	*vs*	**Hourly CV data from installed CV meters at nodes**	No real issues identified for testing software accuracy
	Hourly simulated CV		**Hourly output of the software simulation at nodes**	
Accuracy of CV assignment	**Daily energy consumption**	*vs*	**Installation of CV and flow meters at consumers location**	The feasibility of installing gas flow and CV meters at households should be assessed
	Daily energy assigned		**Calculation of daily CV** *(under different assumptions)* **and multiplication for daily AQ**	

Software solutions included in the pilot

As there are not enough information to support a decision from the GNOs over the selection of single vendor to run the project with, it has been proposed to include multiple software solutions in the first stage of the project, to collect reliable data and select a single partner for stage 2.

Option 1 – Single vendor

A software selection is performed before initiating the pilot to identify a single software provider that will support the pilot implementation

Rationale

More direct engagement with the vendor as a partner for the development of a tailor-made solution and **lower complexity** to manage the pilot

Key drawback

The **selection will not be made based on CV modelling performances** and there's a risk that a **single provider will have contractual advantage** over a full implementation tender

Option 2 – Multiple vendors

The pilot involves selecting the software: a shortlist of software providers (ideally three) chosen based on RTSM Phase 1, will compete during the pilot, while sharing important feedback on accuracy of CV modelling

Rationale

Possibility to get **more reliable information to support an informed decision**, which is not available at this stage

Key drawback

Higher complexity in managing the pilot as multiple vendors will be involved, also **reducing opportunity for customization** of the solution

Software deployment

Since multiple vendors will be involved in the first stage, it is suggested to run the pilot offline, while performing integration during the trial phase, which will involve a single software

Two main process

CV simulation	Option 1 **GNO (SGN)**	• The software is integrated with GNO's system • The GNO needs to set up a team responsible for monitoring and running the model
	Option 2 **Provider**	• The GNO needs to transfer hourly data for running the model to the vendors • The vendors perform the simulation offline and share results Suggested option
CV assignment	Option 1 **GNO (SGN)**	• The GNO needs to set up a dedicated team responsible for computing the daily CVs and compare accuracy with measured quantities
	Option 2 **Third player**	• An external player will be responsible for the overall coordination of the process

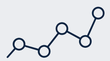
Summary of pilot design

PILOT Stage 1

Objective
To test **accuracy of CV simulation** at node points and perform a software selection to run the 2nd phase

Software solution
As there's not enough information to select a single provider at this stage, **multiple vendors will be included** in the pilot to compare performances

Deployment
As multiple vendors will be involved, the simulation will be run **offline**



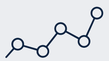
Measurement
CV meters will measure at **node points**, while CV and gas flow devices will measure at **delivery points** to compare actual and simulated values.

PILOT Stage 2

Objective
To test **accuracy of CV assignment** at delivery points and compare with FWACV

Software solution
Single software provider based on stage 1 results and cost quotation

Deployment
System integration with internal database to automate data transfer and simulation



Measurement
CV meters will measure at **node points**, while CV and gas flow devices will measure at **delivery points** to compare actual and simulated values.

What are your considerations on the key design themes presented and on the possible structure of the pilot?

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CV variability and H2 inclusion

Considerations

Two key aspects are: determining the appropriate range of CV variability for the pilot and whether hydrogen should be included

- Getting **higher CV variability**, including biomethane and/or hydrogen in the pilot, allows to **increase reliability of results…**
- …However, the inclusion of biomethane and H2 in the pilot brings **complexity on the regulatory side and increases costs and timeline.**

Options

A) **Baseline conditions**	Perform CV simulation in the network at current conditions (FWACV capping)	*CV variability range* ***38.5 - 41***
B) **Biomethane propanation**	Adjust biomethane propanation – either reducing or increasing it – to achieve the desired CV variability in the area near the injection point	*CV variability range* ***36.5 - 41***
C) **Biomethane & H2 Injection in live network**	Adjust biomethane propanation and inject H2 in a small sub-network (MP) to simulate real conditions	*CV variability range* ***34 - 41***
D) **Biomethane in live network & H2 in off-grid environment**	Test the software in the real grid with biomethane and run the simulation in an off-grid injection of H2 to test software compatibility with H2	*CV variability range* ***34 - 41***

The RTSM focuses on CV modelling for billing and settlement but is open to exploit any potential synergies to perform tests on H2 blends and injection in the network if H2 will be in scope of the pilot

Check Point and Break

10 minutes

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Alternative scenarios for CV variability

Option A - Baseline

Description & Rationale

The first option is to run the pilot at current network conditions, without making changes to increase CV variability or affecting the FWACV regime. **This will allow to save time, cost and effort and still test CV modelling accuracy**

FIT WITH RTSM OBJECTIVE

Option A will not enable testing software performance with unpropanated biomethane and H2 injection. Results may not be robust enough to support a full rollout – risks include having to revisit and re-approve the methodology later

IMPACT ON REGULATION

- The approach is **feasible** from a regulatory perspective and has **no impact on the current billing/settlement process**

IMPACT ON TIMELINE

- Expedited pilot roll-out as no approval is required from regulator and current processes will remain in place for consumers

IMPACT ON SITE SELECTION

- Analyses of CV variability at offtakes to identify a network with high existing CV variability (due to LNG and biomethane)
- No security issues on site selection

IMPACT ON COST

- **CV meters and software costs** are not differential

Option B – Biomethane propanation

Description & Rationale

This approach focuses on adjusting biomethane propanation to increase CV variability in test network, requiring to address amendments in the FWACV regime. **Adjusting biomethane enrichment allows for increased CV variability (up to 5MJ/m3), reducing the need for regulatory amendments/derogations.** Hydrogen injection is not considered for this option.

FIT WITH RTSM OBJECTIVE

Option B enables testing of greater CV variability, however, H2 is not included in the pilot. For a broader implementation, it may be required to demonstrate the compatibility of the software solution with H2 in the future

IMPACT ON REGULATION

- Approval from Ofgem for a **dedicated billing regime is required** as unpropanated biomethane will be injected
- **HSE exemption to inject H2 is not required**

IMPACT ON TIMELINE

- Additional time required to get Ofgem approval on billing regime
- Community acceptability may increase the timeline to start the pilot

IMPACT ON SITE SELECTION

- The selection of a network where at least one **biomethane plant is located is a preferred option**
- Network analysis of **biomethane diffusion** (area of influence) is required

IMPACT ON COST

- **CV meters and software costs** are not differential
- Additional costs for customer compensation

Option C - Biomethane & H2 Injection in live network

Description & Rationale

This option foresees the injection of both adjusted biomethane propanation and blends of hydrogen in the real network to monitor gas mixing in a complex grid, requiring exemptions from HSE

FIT WITH RTSM OBJECTIVE

Option C fully aligns with RTSM objectives and Ofgem guidance, as it will allow to test CV modelling in “real” conditions, increasing the reliability of results in the view of a broader implementation

IMPACT ON REGULATION

- **HSE exemption** to inject up to maximum 20% H2 – this would require the development of a **Quantitative Risk Assessment and Safety Case**
- Approval from Ofgem for a **dedicated billing regime**

IMPACT ON TIMELINE

- **Regulatory approval will require at least 12 months**, and effort will depend on size of pilot
- Pilot set up includes **provision of H2 and injection equipment**, which may take significant time
- Possible delay due to obtaining **customer acceptance**

IMPACT ON SITE SELECTION

- Selected site must be **compatible with H2**
- **H2 injection must be feasible** from a network management perspective
- High number of meters receiving biomethane or hydrogen increase complexities and costs
- Analysis are required to assess the feasibility of **installing a new injection unit**

IMPACT ON COST

- **CV meters and software costs** are not differential
- Higher cost for **customer compensation** due to the presence of H2
- Additional cost for **H2 sourcing and H2 injection unit**

Option D - Biomethane in live network & H2 Injection in off-grid environment

This option consists of running two separate pilots: the real grid will be assessed considering only variations in biomethane propanation and injection, reducing regulatory impact; in parallel, software compatibility with hydrogen will be tested at an off-grid test site, where H2 will be injected, and the diffusion will be monitored and validated

FIT WITH RTSM OBJECTIVE

Option D will allow the evaluation of the software's performance on CV modelling for both biomethane and hydrogen; however, H2 will be tested in a simplified, off-grid network where no mixing with bioCH4 occurs

IMPACT ON REGULATION

- **HSE exemption is not required**
- Approval from Ofgem for a **dedicated billing regime is still required** as unpropanated biomethane will be injected

IMPACT ON TIMELINE

- **Shorter timeframes to get regulatory approval** for biomethane injection
- Multiple years could be required if the **off-grid site has to be built**

IMPACT ON SITE SELECTION

- Using an **existing biomethane injection site** allows cost savings compared to building a new biomethane supply and injection unit
- The possibility of using an **existing off-grid test facility** must be evaluated to reduce implications on costs and time

IMPACT ON COST

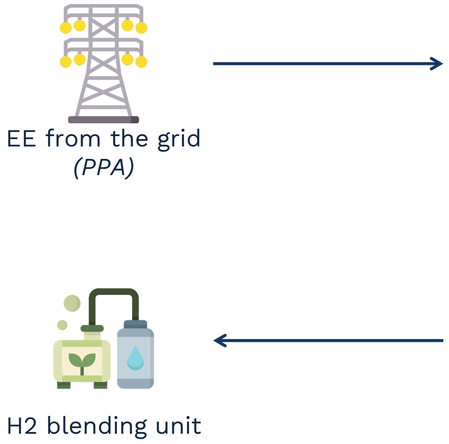
- CV meters and software costs are not differential
- **Lower cost for customer compensation** due to the absence of H2 in the live network
- Significantly **higher costs for building off-grid facilities** (£10M+)

Option C – H2 Configuration

The analysis assumes 32 ton of H2 are required on a yearly basis – this represents a network of around 3,000 meters

Alternative 1) **Fixed PEM electrolyser**

Fixed plant



CapEx	OpEx
• Electrolyser • H2 buffer • H2 blending unit • EPC	• Electricity from the grid • OEM

LCOH = ~ £10 - £12 /kg

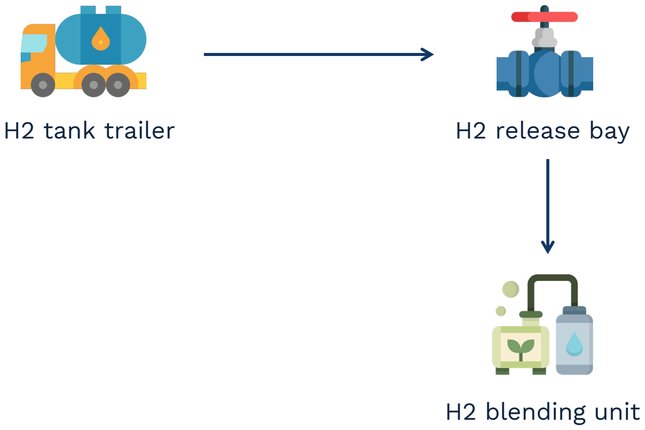
Annual cost = ~ £320 - £370

Fixed plant with high fixed costs. It is reasonable if the plant is operational after the end of the pilot

Suggested option

Alternative 2) **H2 tank supply**

Mobile unit



CapEx	OpEx
• H2 blending unit • H2 release bay • EPC	• H2 supply

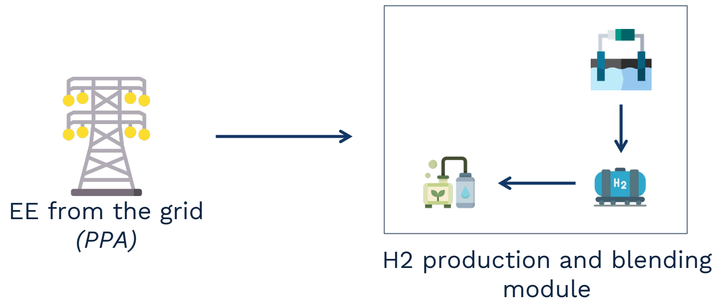
LCOH = ~ £15 - £18 /kg

Annual cost = ~ £550 - £600

High variable cost for H2 supply. Suitable for short term project

Alternative 3) **H2 production and blending module**

Mobile unit



CapEx	OpEx
• EPC	• Leasing of modular unit • Electricity from the grid

LCOH = ~ £18 - £20 /kg

LCOH = ~ £630 - £670

Low capex cost related only to the EPC activities, while the unit is a leasing solution

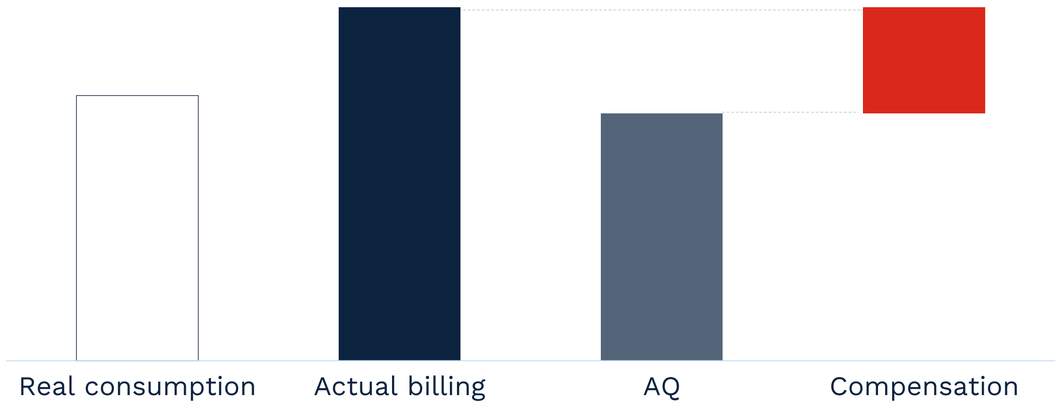
Compensation costs

Objective

To assess the mechanism and the value of the compensation required to protect customers from being overbilled due to consuming higher volume of gas with lower CV whilst being billed against existing LDZ FWACV

Suggested option for customer protection

Customers will be **billed using the LDZ CV**, which will result in **overbilled quantity**, as volume consumption will be higher due to biomethane and hydrogen. Customers will receive compensation for the billing variances, which is computed as the **difference between the billed energy and the related annual quantity**. The lower the CV of the gas, the higher the compensation costs.



Cost estimation

Only Biomethane propanation

LDZ CV: ~39.4 MJ/m3
Biomethane CV: ~36 MJ/m3
Yearly overbilled quantity per customers: £67 *(based on WP2 analysis)*
Variability factor: +15% *(to reflect higher LDZ CV or higher energy demand)*
Meters in the pilot site: 3,000
Yearly cost: £ 231,150

Biomethane propanation and Hydrogen injection

LDZ CV: ~39.4 MJ/m3
Biomethane CV: ~33.9 MJ/m3
Yearly overbilled quantity per customers: £116 *(based on WP2 analysis)*
Variability factor: +15% *(to reflect higher LDZ CV or higher energy demand)*
Meters in the pilot site: 3,000
Yearly cost: £ 400,200

Compensation costs will be covered by the programme

Option C – Additional activities for H2 injection

1) REQUEST AMENDMENT TO HSE AND JOINT OFFICE THROUGH A RISK ASSESSMENT

*An **exemption to the GS(M)R is required from the HSE to blend up to a maximum 20% hydrogen** in the grid; this would need to conduct a quantitative risk assessment **(QRA) and full Safety Case review** which requires the following activities (synergies with HyDeploy could be exploited):*

Analysis of end user's appliances !
Door-to-door inspection to prove that all user's appliances are safe for the use of 20% H2

Analysis of gas characteristics
Analysis of H2 blends characteristic to demonstrate the switch from NG to 20% H2 blend will not negatively affect network operations and security

Assessment of materials and asset compatibility !
Demonstrate that all network elements are compatible with 20% of hydrogen and there's no risk of failure or lack of supply

Review of procedures and operations !
Ensure that the GNO conducting the pilot can manage H2 blends effectively within its daily operations, procedures, and other relevant considerations.

In field inspections
Develop a plan for in-field inspections to verify that the network is operated correctly

2) DEVELOPMENT AND APPROVAL OF A DEDICATED BILLING REGIME

A **specific billing regime to cover the pilot should be developed and approved by Ofgem** to ensure that all the meters inside the pilot area are not over- or underbilled due to the presence of H2 and unpropanated biomethane.

This would require **suppliers' engagement** and activities to raise awareness with the community to ensure pilot acceptance

Community engagement activities to ensure customer acceptance and buy-in

3) BUILD H2 SUPPLY CHAIN AND INSTALLATION OF H2 EQUIPMENT

Three main activities have to be developed:

- Provision of **H2 grid entry units** (blending) and pipe;
- **Provision of H2**, either through suppliers or through local production
- Verification of **H2 ready equipment** and eventual installation of H2 compatible elements (governors, valves…)
- **Daily monitoring** of pilot area subject to H2 injection

+ 12 months estimated

+ 3 months

Which option do you consider is more appropriate and beneficial for the pilot?

a) Baseline (FWACV)

b) Biomethane Propanation

c) Biomethane & H_2 injection in live network

d) Biomethane in live network & H_2 injection in off-grid environment

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OFGEM Engagement

As part of WP4, the RTSM group held preliminary engagement sessions with Ofgem to discuss proposed approaches and collect Ofgem feedback

SCOPE AND DIRECTION

- **Omitting hydrogen now risks having to revisit** and re-approve the methodology later
- **UK government support for hydrogen blending** up to 20% underscores hydrogen's relevance
- Develop **multiple options for the pilot** for further discussion to support an informed decision

ROADMAP

- **Next step comprises a CBA on the various options** to provide additional information and define the pilot structure
- Conduct a **Pilot to test the solution**, follow with a **Decision Gate to review outcomes**, then proceed to a **Trial to refine before wider rollout**
- The **Decision Gate** will enable engagement with regulators to agree on whether to continue the RTSM programme

OFGEM Guidance

Key milestones of the roadmap following Ofgem guidance

CBA OF ALTERNATIVE STRATEGIES FOR PILOT	FEED (RTSM Phase 2)	REGULATORY APPROVAL PROCESS	SET UP	PILOT DEPLOYMENT (RTSM Phase 3)	DECISION GATE	TRIAL PHASE
Compare costs and benefits of the different options to identify the most effective and value-driven approach	FEED phase - Detailed planning stage to develop the execution strategy, design, cost estimates, risks mitigation plans, etc.	Engage with regulators and perform required analysis	Software set up, equipment provision and installation	Run of the pilot to test CV modelling accuracy	Engagement with regulators to determine how to proceed on the RTSM based on pilot results	Trial phase to test solution integration in view of the go live

Pilot site selection: methodology and criteria

Key considerations

The identified site must be statistically significant to represent wider GB

For the pilot to be effective as a true test, the selected site must be statistically representative of the wider Great Britain gas network. This ensures that the findings are robust and relevant, providing confidence that results can be applied to broader implementation across the network.

The site should be appropriately sized to ensure efficient management

The bigger the size of the pilot site (number of meters, pipeline) the greater the effort to set up and run the pilot. High number of meters increases complexity of getting regulatory approval and ensuring community acceptance. Additionally, higher biomethane and/or H2 volume will be required, increasing the overall costs. Previous H2 injection projects focused on small-sized networks (up to 600 customers).

Methodology

1	2	3	4	5
IDENTIFICATION OF SITE SELECTION CRITERIA	IDENTIFICATION OF POSSIBLE PILOT AREAS FROM A NETWORK PERSPECTIVE	ASSESSMENT OF DATA AVAILABILITY	EVALUATION OF H2 / BIOMETHANE INJECTION FEASIBILITY*	DISCUSSION WITH OFGEM, SHIPPERS & SUPPLIERS
Support from: **SGN Network Planning Team**	*Support from:* **SGN Network Planning Team**	*Support from:* **SGN Gas Control Team**	*Support from:* **SGN Network Planning Team**	

In WP4 scope

Will be addressed in future work

**Multiple analysis is required: e.g., evaluate land availability to install injection units, assess constraints from a network management perspective, analyse expected biomethane/hydrogen diffusion*

Criteria for site selection

Pressure range	MP and LP necessary; IP is suggested, HP will be a plus
Data availability	Presence of meters and collected data to be used for running the simulation
Complexity	Multiple feeds and pressure reduction units
End user categories	Multiple EUC, no sensitive users
CV variability	High CV variability at current offtakes (NG, biomethane and LNG) will increase reliability

Biomethane plants	Presence of a biomethane plant is required if the pilot will include only biomethane propanation
Delimited network	Presence of a clearly delimited network for H2 and bioCH4 diffusion
H2 feasibility *H2 Injection only*	Subnetwork where it is feasible to inject H2 from a network management perspective
H2 supply *H2 Injection only*	Availability of H2 near the site will be a plus

Size of the pilot

Two options are being analysed:

Run the pilot on a small network

Average characteristics of the pilot site:

- *Pressure range:* **LP, MP and/or IP**
- *Pipeline length:* **< 50 km**
- *Number of meters:* **1,000-3,000**
- *Pressure reduction stations:* **1-10**
- *Biomethane plant:* **not guaranteed**

PROs:

- Effective pilot management
- Minimised risks of customer acceptance issues
- Lower costs, as less equipment is required

CONs:

- MP and IP could not both be present
- IP and MP length could be very short
- Only few governors, resulting in few CV calculation points
- Risk that the network is not complex enough to be representative of the GB network, impacting reliability of results

Run the pilot in a medium/large network, but inject hydrogen and unpropanate biomethane only in a small subnetwork

Average characteristics of the pilot site:

- *Pressure range:* **LP, MP and IP (HP is an option)**
- *Pipeline length:* **500-1,500 km**
- *Number of meters:* **50,000-150,000**
- *Pressure reduction stations:* **50-150**
- *Biomethane plant:* **at least one, could be multiple**

PROs:

- May span all pressure tiers
- High number of pressure reduction stations and CV calculation points
- CV will be modelled in a large network which can be considered representative for wide GB

CONs:

- Higher management effort
- Higher costs
- Higher risks related to customer acceptance
- Need to clearly identify and delimit the subnetworks where CV variation will occur (H2 and biomethane injection)

Criteria for site selection – Option D

In case Option D is selected, additional criteria must be considered for selecting the off-grid site where testing hydrogen:

1. Mapping of existing off-site test grid

2. Evaluate whether they are available, or an ongoing project is running

3. Evaluate whether their features are aligned with RTSM objective

4. Evaluate possibility to build a new site

The site must replicate a sufficient level of complexity to be able to demonstrate performances of CV simulation:

- At least 1 km of pipeline
- Multiple pressure tiers
- Multiple reduction stations
- Possibility to simulate end user consumption profiles

Preferred option for pilot site selection:

a) **Run the pilot in a small network** – this allows to reduce complexity and impact on customers

b) **Run the pilot in a large network** – this allows to increase reliability of results

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Next Steps

Next activities

RTSM next steps

- Evaluate candidates for pilot site selection
- Conduct the CBA on pilot options
- Assess impacts on pilot customers and compensation mechanism

RTSM parallel sub-projects

- Further analysis on smart meters
- Assessment of RTSM impacts on CDSP’s system and processes
- Assessment of RTSM impacts on shippers’ and suppliers' systems and processes

RTSM future work

PILOT STRATEGY DEFINITION

- CBA
- Agreement on pilot strategy
- FEED phase
- Network analysis and selection of pilot site
- Tender setup
- Vendors engagement and selection
- Engage with biomethane and hydrogen producers

REGULATORY ENGAGEMENT

- Initiate relevant derogations if required
- Develop QRA to get HSE exemption, if required
- Develop and approval of dedicated billing regime, or customer compensation mechanism
- Engage with shippers and suppliers
- Community engagement

PILOT SET UP

- Purchase and installation of CV meters
- Data system design and data preparation
- Topology data sharing and network building
- H2 provision
- Purchase and install H2 equipment
- Community engage
- Network segmentation
- Develop EUC profiles

PILOT RUN

- Hourly data collection
- Data transfer
- Collect simulation results
- Collect measured CV
- Results monitoring
- Request budget quotation and Software selection

Thank you for your support

For any additional material please visit the SGN RTSM website

Q&A

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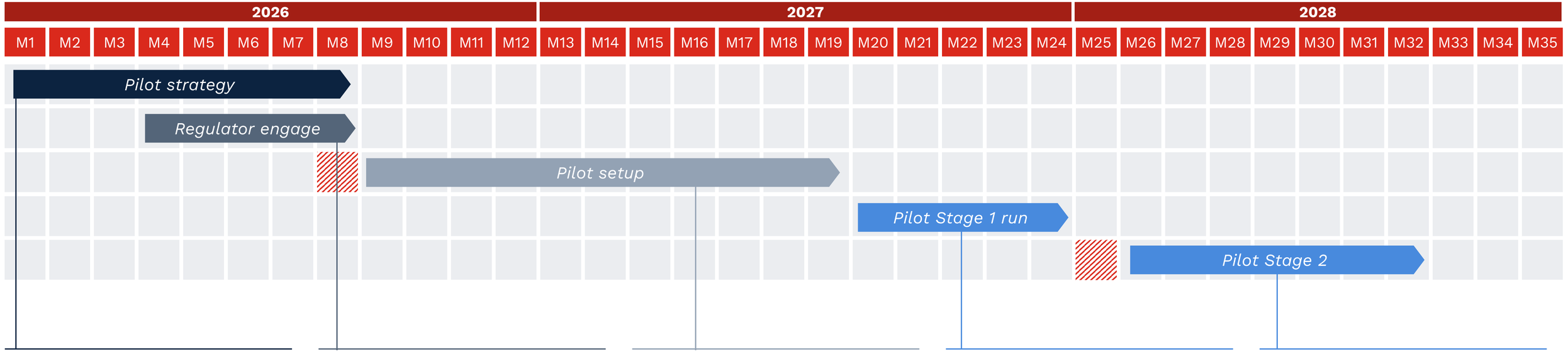
Additional Materials

Subject to change

Option A - Roadmap



Pilot strategy

- Agreement on pilot strategy
- CBA
- FEED phase
- Network analysis and selection of pilot site
- Economic analysis
- Tender setup, vendors engagement and selection

Regulator engage

- Engagement with regulator
- Engagement with shippers and suppliers
- Community engagement

Pilot setup

- Purchase and installation of CV and flow meters
- Data system design and data preparation
- Topology data sharing and network building
- Community engagement
- Network segmentation
- Develop EUC profiles

Pilot Stage 1

- Hourly data collection
- Data transfer
- Collect simulation results
- Collect measured CV
- Results monitoring
- Software selection

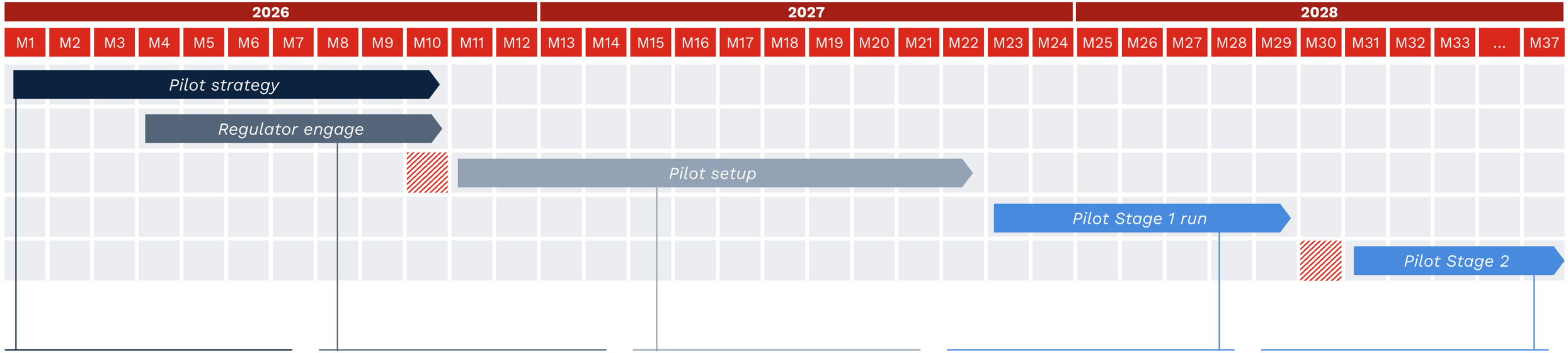
Pilot Stage 2

- Software integration
- Run simulation and collect node CVs
- Calculation of daily CV assigned to meters
- Collect measured CV
- Monitoring and adjustments

Decision point

Subject to change

Option B - Roadmap



Pilot strategy

- Agreement on pilot strategy
- CBA
- FEED phase
- Network analysis and selection of pilot site
- Economic analysis
- Tender setup, vendors engagement and selection
- Engage with biomethane producers

Regulator engage

- Development and approval of dedicated billing regime
- Engagement with regulator
- Engagement with shippers and suppliers
- Community engagement

Pilot setup

- Purchase and installation of CV and flow meters
- Data system design and data preparation
- Topology data sharing and network building
- Community engagement
- Network segmentation
- Develop EUC profiles

Pilot Stage 1

- Hourly data collection
- Data transfer
- Collect simulation results
- Collect measured CV
- Results monitoring
- Software selection

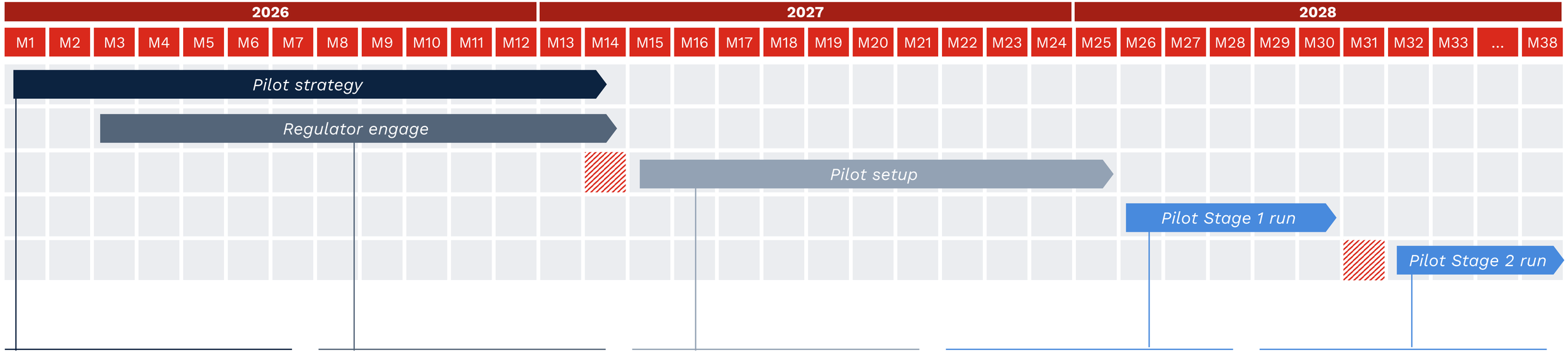
Pilot Stage 2

- Software integration
- Run simulation and collect node CVs
- Calculation of daily CV assigned to meters
- Collect measured CV
- Monitoring and adjustments

Decision point

Subject to change

Option C - Roadmap



Pilot strategy

- Agreement on pilot strategy
- CBA
- FEED phase
- Network analysis and selection of pilot site
- Economic analysis
- Tender setup
- Vendors engagement and selection
- Engage with biomethane producers

Regulator engage

- Develop QRA to get HSE exemption
- Develop and approval of dedicated billing regime
- Engage with suppliers
- Community engagement

Pilot setup

- Purchase and installation of CV meters
- Data system design and data preparation
- Topology data sharing and network building
- H2 provision
- Purchase and install H2 equipment
- Community engage
- Network segmentation
- Develop EUC profiles

Pilot Stage 1

- Hourly data collection
- Data transfer
- Collect simulation results
- Collect measured CV
- Results monitoring
- Request budget quotation and Software selection

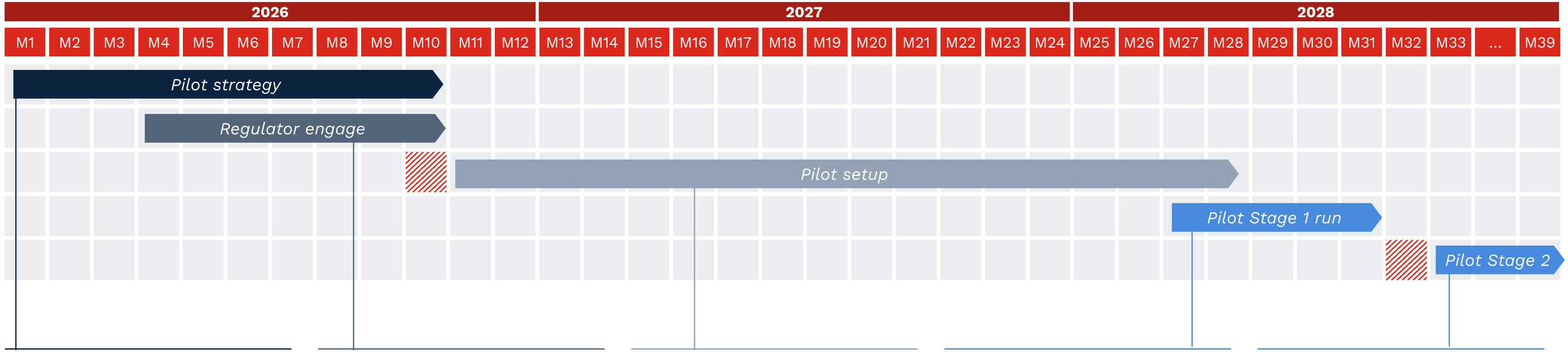
Pilot Stage 2

- Software integration
- Run simulation and collect node CVs
- Calculation of daily CV assigned to meters
- Collect measured CV
- Monitoring and adjustments

Decision point

Subject to change

Option D - Roadmap



Pilot strategy

- Agreement on pilot strategy
- CBA
- FEED phase
- Network analysis and selection of pilot site
- Economic analysis
- Tender setup, vendors engagement and selection
- Analysis of existing off-grid test sites
- Engage with biomethane producers

Regulator engage

- Develop and approval of dedicated billing regime
- Engage with suppliers
- Agreement and approval on off-site test facility
- Community engagment

Pilot setup

- Purchase and installation of CV and flow meters
- Data system design and data preparation
- Topology data sharing and network building
- Community engagement
- Construction of off-grid test facility
- H2 provision
- Network segmentation
- Develop EUC profiles

Pilot Stage 1

- Hourly data collection
- Data transfer
- Collect simulation results
- Collect measured CV
- Results monitoring
- Request budget quotation and Software selection
- Run simulation on test grid

Pilot Stage 2

- Software integration
- Run simulation and collect node CVs
- Calculation of daily CV assigned to meters
- Collect measured CV
- Monitoring and adjustments

Decision point