Network Use, Capacity Allocation and Nominations

CCS Network Code: Section E



Disclaimer

The details, as set out in this document, in whatever form they are expressed, are indicative only and do not constitute an offer by government and do not create a basis for any form of expectation or reliance. Parties are expected to get their own financial and legal advice. Government reserves the right to review and amend all provisions, for any reason and in particular to ensure that any proposals provide value for money (VfM) and are consistent with the current subsidy control regime.

Introduction

The network use, capacity allocation and nomination paragraphs within section E aim to clearly outline and define the capacity of the network, the process and products available for network users to acquire capacity on the network, and how to provide accurate nominations to enable T&SCo to operate the network successfully.

This section, unlike others in the CCS Network Codes, is in active development to ensure a fit for purpose process that:

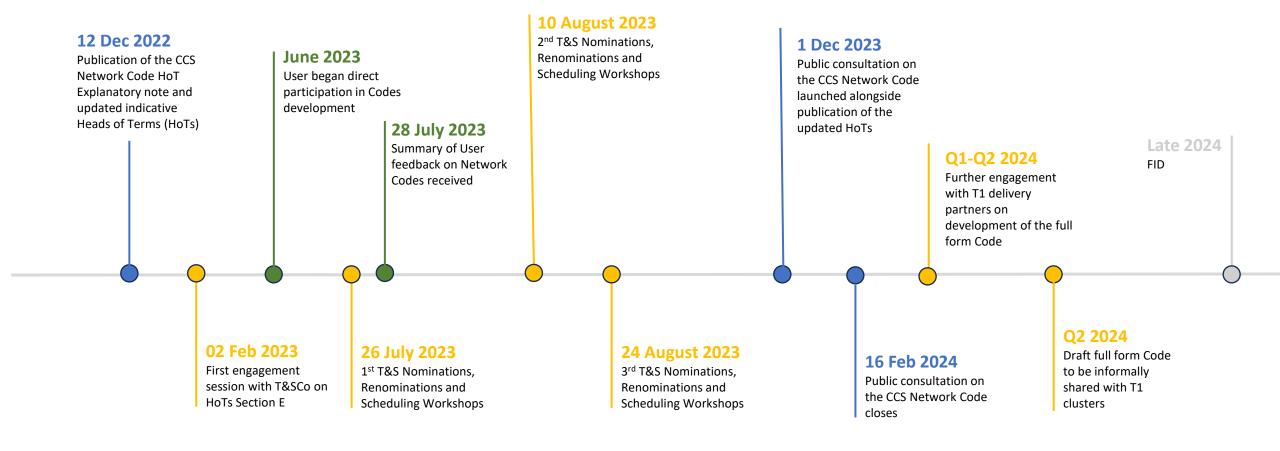
- Aims to meet the network access requirements for Users
- Provides an adequate process for T&SCo to operate under their Reasonable and Prudent Operator (RPO) duties
- A fair and transparent process that incentivises all stakeholders to pursue an efficient and economic use of the network
- Value for Money (VfM) on capital investment and subsequent energy consumer and UK taxpayer spend
- Enables the development and expansion of current and future networks, attracts and accommodates future Users and fundamentally avoids creating longer-term barriers for future network evolution

The consultation document puts forward the latest policy development to date constructed through considerations from engagement, feedback and communication from stakeholders.

We will further discuss this development in this session.



Timeline of Engagement



Definitions

NETWORK CAPACITY (NC)

Users may apply for and register as holding capacity in the T&S Network ("Network Capacity") at Delivery Points.

Network Capacity is expressed in tCO2/hour.

OBLIGATED NETWORK CAPACITY (ONC)

The minimum mass of Network Capacity
T&SCo is required to make available
("Obligated Network Capacity") in
accordance with the terms of its Licence.

REGISTERED CAPACITY (RC)

The Network Capacity which the User is registered (in accordance with this Section E) as holding at a Delivery Point; and

Which constitutes a User's entitlement (but not obligation) to deliver carbon dioxide at a Delivery Point measured in tCO2/hour and constituting the maximum instantaneous flow rate.

REGISTERED CAPACITY PRODUCTS

Registered Capacity Products are annualised products and can be booked yearly on a rolling basis or long-term up to 15 years ahead¹, this is initially managed through the selection process².

Where Users already hold Registered Capacity, they can (through the selection process):

- 1. apply for additional registered capacity (subject to the terms of the network codes)
- 2. surrender registered capacity (subject to another user requesting capacity. Where no other user demand exists, the capacity holder remains liable for the capacity and associated charges)



¹ it is expected that shorter-term capacity products and interruptible capacity will be introduced by modification where there is demand

² in the future Network Capacity will be allocated and registered through a different mechanism, such as set capacity allocation windows

An alternative approach on RC?



A core risk allocation feature of the Code is that Users can flow up to their maximum instantaneous flow concurrently. This enables at any required point in time that all Users could effectively flow continuously at 100% of their Registered Capacity, regardless of the likelihood of this event. There are initially no interruptible capacity products proposed. This gives risk to potential predictable underutilisation relative to the annual volume cap under a Storage Permit, because 100% operation at full RC is unlikely to occur.



An alternative approach (not currently assumed in the Code) could see aggregate Registered Capacity exceed Obligated Network Capacity by an amount appropriate, after factoring in network under-utilisation where it is expected to occur (e.g. due to variation in User flow processes, presence of dispatchable Users, and/or maintenance and other outages).



Benefits of higher utilisation include lower T&S charges for users, higher stored volumes and better value for public money. Such an approach, that prevented storage sterilisation, could also be useful when a T&S Co is considering when/by how to increase available Network Capacity (i.e. expansion).



To enable this alternative approach in the Code, it would need to provide that a T&S Co could constrain User(s) in the unlikely event the store volume cap was at risk of being breached, with Users assumed to receive protection via their support contracts, as with other outages. A User right to flow up to RC would be unchanged during normal operation. Note: other factors e.g. technical would need addressing beyond the Code.



Forecasts and Nominations

Users are expected to "Forecast" long-term projected flows and provide "Nominations" daily. The table below outlines each of these.

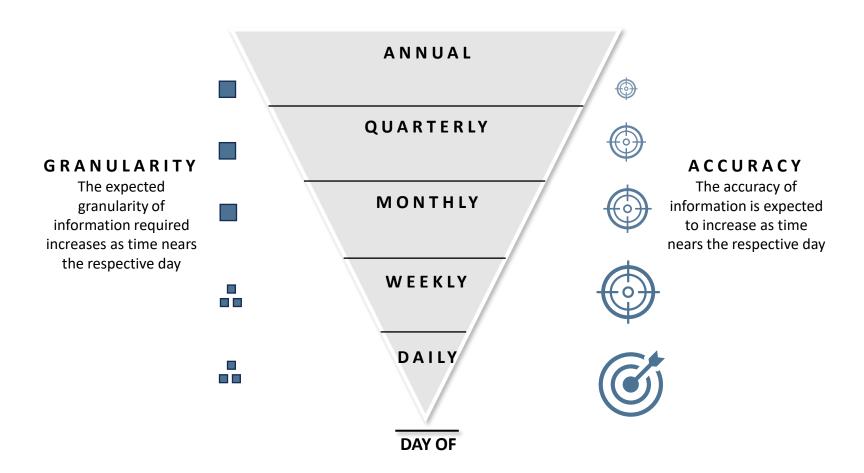
| REQUIREMENT | WHAT DOES IT COVER? | GRANULARITY |
|---------------------------------|--|------------------|
| Annual Forecast | Annual Forecasts will cover all days within the following the charging year | Daily breakdown |
| Quarterly (Rolling) Forecast | Quarterly Forecasts will be a required on a rolling basis covering all days within the following three calendar months, to be submitted alongside the Monthly Forecast | Daily breakdown |
| Monthly Forecast | Monthly Forecasts will cover all days within the following calendar month | Daily breakdown |
| Weekly Forecast | Weekly Forecasts will cover all days within the following week | Hourly breakdown |
| Daily Nomination | Daily Nominations will cover all hours within the following day | Hourly breakdown |

Annual, Quarterly (Rolling), Monthly and Weekly Forecasts are required for operational planning purposes and to indicate expected usage

Daily Nominations are an essential part of balancing and optimising network utilisation



Forecasts and Nominations



A User's Forecast specifies the amount of carbon dioxide expected to be delivered through a User's delivery point, in tCO2/Hour for any Hour, or Daily equivalent.

Registered Capacity determines an upper export limit of CO2 from a User site to the T&S network, implying, forecasts cannot and will not exceed this value.

A User shall use *reasonable endeavours* to ensure that each Forecast constitutes an accurate representation of the User's expected delivery of carbon dioxide during the time periods to which the Forecast relates to.



Purpose of Nominations

Nominations are required to enable T&SCo to:

- a) Ensure the stability around the operation of the T&S network and minimise the risk and likelihood of loss of service through flow related incidents
- b) Optimise the T&S system to operate as efficiently as possible providing value for money to all financial stakeholders

RC provides the right but not the obligation to flow onto the network, but alone does not inform day to day expected throughput on the network. There may be scenarios where a User is flowing within their RC, but with large variance from their nomination where T&SCo have the right to refuse flow under their RPO duties, without Users receiving business model protection. This could occur where user behaviour is causing material impact on the network integrity as a whole or having adverse impact on other Users access to the network.

Where nominations accuracy is poor or adherence to nominations is poor, and/or a User doesn't utilise the renomination process efficiently, this creates inefficiencies in the process and uncertainty to T&SCo. Who will in turn have to place redundancy measures (at cost, e.g. standby or run another compressor) to accommodate potential flow variance from nomination which may push flow into the next operating window.

For example;

- There is a cost to running one compressor alone (£)
- Additional cost to run an additional compressor on standby due to the potential for flow to surpass one compressor (££)
- Additional cost to run two compressors on part or full load (£££)

Uncertainty in flows push up User fees, create an underutilised network and degrade the value proposition of efficient CCUS networks.



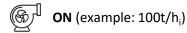
Purpose of Nominations (worked example)

Ex: Compressor States



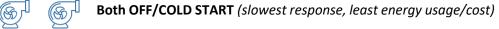






(Principles extend to wells, heaters and other system equipment)

Ex: Potential Dual Compressor Operational States



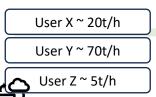
1st ON/ 2nd OFF/COLD START (limited response, expected energy usage/cost)

1st ON/ 2nd WARM STANDBY (reasonable response, additional energy usage/cost for increased flexibility)

1st ON/ 2nd HOT STANDBY (quicker response, increased additional energy usage/cost for further increased flexibility)

Both ON (fastest response, expected energy usage/cost)

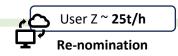
Day ahead confirmed

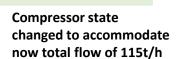


& & & & & & & &

(B)

Different compressor strategies and subsequent energy efficiency and cost, will be dependent on the confidence in the accuracy of User submitted nominations.







Forward notification of potential rapid increase in flow, i.e. balancing mechanism bid



Compressor state changed in preparation for potential increase flow

Re-nomination User X ~ 100t/h User X ~ 100t/h

Confirmation of flow increase (or eqv. confirmation of no flow increase)





Timeline of Nominations

DAY DAY 15:00 Hours OF **AHEAD** Confirmations Close Time -T&SCo to confirm acceptance or rejection of nominations XX:30 (+30 mins) 23:59 Hours submitted no later than this time. Day begins Example – Renomination Day ends Where T&SCo has not provided accepted and in effect notification to the User, the nomination is deemed accepted Renomination window starts. NOMINATION WINDOW RENOMINATION WINDO Users can renominate as required during the renomination window, including providing an updated renomination for an already (re)nominated hour Users can submit or change any nomination for any future Hours up 23:00-23:30 XX:30 Hours to 13:00 the day ahead Hours 13:00 Hours of the Day the Example -Renomination nominations will be Renomination Nominations Close Time - all window closes valid. submitted nominations to be received from Users wishing to flow the following day. Any failure to hourly nominate will result in a nomination of 0 assigned for each hour failed to nominate.



Progression of 'Nominations'

DESNZ has engaged with stakeholders in the process of developing the Network Code, holding topic specific working groups and received feedback on nominations and deviations alongside wider Code engagement. There was significant progression between December 2022 Head of Terms and the December 2023 updated release. The development thesis considers that;

- Users want flexibility,
- T&S optimisation requires some level of certainty around flow variance and;
- T&S flexibility depends on visibility of expected flows

Providing flexibility will build in costs for T&S to be a more reactive service provider, and there is an economical case for this within the Codes but also in the wider UK net zero energy strategy.

The long-standing and further outstanding questions are;

- 1) how much flexibility should a User have access to,
- 2) how should the additional costs of flexibility be targeted,
- 3) how are users encouraged to play an active role in nominations to minimise the uncertainty (and costs) faced by T&SCo (noting that charges passed through business models to taxpayers do not influence User behaviour)

A workable network Code must be in place for clusters to take FID, understanding that certain parameters, equipment specifications and overall network response capabilities will not be known until detailed design stages of development.



Progression of 'Nominations'

Nomination of expected flow



T&SCo propose a 3-hour to 8-hour nomination and renomination response time due to administrative and system response timelines

nomination proposals



• T&SCo note further detail cannot be provided until the Detailed

Design development phase has commenced post FID.

Users feedback the requirement for flexibility and the ability to flow as and when plant output requires within reason as to not impede on the underlying business activity of the User



Independent technical evaluation of network systems determines quicker response times should be possible with variation dependent on the operational standby state



Consultation proposal advocates for a 30-minute response time

- Standby states of compressors, wells and Incompatibility between User requirements and initial T&SCo other network infrastructure have been further evaluated through independent technical analysis
 - A 30-minute response time has been proposed based on this evaluation, to bridge the gap between requirements.
- Users are expected to actively assist T&SCo with predictability of flow variance by utilising and participating in the ongoing renomination window to progressively provide better expectation of flow during the day where variance is expected.
- Ongoing and proactive communication is expected between parties around the renomination process.

Technical Input

Policy Input

Users Input

User requirements vary between Users

T&SCos Input





Progression of 'Deviation from Nominations'

Nomination of expected flow



T&SCo provided proposals for schedule charge processes with ultimate shut-in rights for continued discrepancies

Scheduling Charges (SC) were proposed to create an incentivisation for accurate nominations and promote more efficient T&S operation, where T&S Co variable opex cost incurred was recovered.

 Precedent set-in other network systems.



User feedback indicated that the original proposal was not fit for purpose, would act as a penalty for business-as-usual operations and would be detrimental to User business models for CCUS

Cost recovery evaluated and concluded that cyclical nature of subsidisation creates no incentivisation

T&SCo suggested the right to restrain Users who were flowing out with nominations where it had the potential to cause impact on other Users access to the network or overall network integrity

Ability to provide accurate nominations examined and thresholds extended to remove (as far as possible) impact on business-as-usual operations, thresholds recalculate against a daily average.

Warning notification system was proposed to notify User of flow deviations outside of tolerance and remedial action to comply, with repeat deviations resulting in T&SCo's ability to prevent flow from Users onto the network, where deemed appropriate.

- Cost recovery through charging Users via SC creates little to no incentivisation whether charged through user business models or user business directly during subsidisation period. (explained in the following slide)
- T&SCo denote that a more responsive network will incur additional opex costs



Consultation proposal advocates for a warning system progressing to shut-in for consistent breaches of thresholds. Cost recovery proposed through charging and mutualisation process

- Extending the thresholds from hourly to daily allows within hour variation in flow, as raised as a concern from Users, and averages the deviations across the Day.
- This calculation process linked with the increased 30-minute response time for renominations and the ability to renominate as required throughout the day, should provide flexibility to Users as required.

Technical Input

Policy Input

Users Input

T&SCos Input





Charges during subsidisation

Requires further Codes policy development to implement a deviation charge, including changes to business model policy Direct charge, is applied IF deviation happens. If event has low probability (which nominations process is aiming to reduce), then potential for smaller cost. Also noting this is a time-bound option only. **Deviation Charge** Charged through User BM Funded by Taxpayer/Consumer Pass through, no Incentive on User Funded by Taxpayer/Consumer (High Cost) Marginal Incentive **Deviation Charge** Financial Risk factored into BM terms Charged to User directly Indirect charge as it is a GUARANTEED financial risk allocation that is factored into the business model regardless if the event happens or not. No/Minimal further Codes policy development With the extent of the business model cost, has required for cost recovery potential to be significant. Hence incentivisation has been separated Requires further Codes policy development to from cost recovery in the consultation and implement a deviation charge, including changes introduction of the warning system, leading to to business model policy discretionary shut-in by T&SCo provide incentivisation in its place. No direct charge Costs recovered through allowed Funded by Taxpayer/Consumer Pass through, no Incentive on User revenue t+2 adjustment mechanism



Consultation Proposal

Nomination of expected flow minimised. Renomination possible (up to 30mins ahead)

Via guicker 30min response time for renominations. Where a User can update their nomination in realtime based on data and known parameters, deviation should be

Commercial mechanism to reduce deviations from nominated capacity

Thresholds were extended to daily deviation calculations, to allow intra-day flexibility for User flows. This aims to allow variation between hours that does not trigger the warning system.

Daily thresholds introduced for deviations from renominations

Thresholds [5%] and [3%] resp. [square bracketed] in consultation for feedback.

Early feedback suggests:

- Users note suggested thresholds too narrow for operational purposes
- T&SCo note a preference for an Hourly threshold to reduce within hour flow variation

Warnings for Material and Persistent deviations under the Code guidance, resulting in discretionary shut-in from T&SCo where progressive deviations fail to be remedied.

Potential for disciplinary measures for persistent deviators

Early feedback suggests:

- Users note risk of shut-in is unbankable
- T&SCo noted no significant resistance to the proposal, but have provided cluster wide proposals as alternatives

The warning system proposed in the consultation aims to soften the direct impact to Users and provide a 'cease and desist' approach to reduce the likelihood of shut-in

The consultation requests further feedback on this proposal, including concerns from Users around un-bankability, noting that T&SCo has a right to refuse flow that may cause network issues, trips or impact other users' ability to access the network in their general duties as RPO of the T&S network

renominations cause additional operational expenditure (opex)

to T&S networks

Cost Recovery: Deviations from

(Opex costs for User deviations is expected to be relatively small respectively)

Spread across all Users

Mutualised costs for deviations for all Users as true-up charges in T+2

Actions by Users

Costs to Users

Actions by T&SCos

Policy mechanism



Consultation feedback and development

The purpose of the consultation is to seek views on the proposed Code Heads of Terms to inform drafting of the detailed (full form) version.

Following conclusion of the CCS Network Codes consultation, DESNZ will have limited further engagement with T1 delivery partners on development of the full form Code in Q1/Q2 2024 and we will informally share the draft full form to T1 clusters targeted for April 2024.

Section E of the consultation asks the following questions:

Registered capacity

- Do you agree with the proposed approach to Registered Capacity? (as proposed in the Heads of Terms)
- Would an approach that allowed aggregate Registered Capacity to be greater than Obligated Network Capacity be beneficial, and would
 the associated risk be manageable for early projects? (as discussed in slide 6)

Nominations

- Do you agree that the proposed approach to Nominations and Renominations will support efficient and responsive operation of a cluster, balancing the needs of both Users and T&S Co?
- Do you have any information or evidence that would support calibration of the "material" and "persistent" thresholds used to assess deviation between actual flows and Nominations?

DESNZ ask that all respondents use this opportunity to provide feedback on the above questions and the wider principles in Section E, noting the limited ability to input due to time restrictions before the full form is drafted. It is in the interest of all stakeholders that feedback provided considers actions and consequences, Users and T&SCos requirements (and limitations) and considers the wider system perspective.



Thank you

For additional information or queries, please contact: codes.engagement@energysecurity.gov.uk



CCS Network Codes: Recap of the Draft Heads of Terms

Section E (constraints)

23 January 2024



Disclaimer

The details, as set out in this document, in whatever form they are expressed, are indicative only and do not constitute an offer by government and do not create a basis for any form of expectation or reliance. Parties are expected to get their own financial and legal advice. Government reserves the right to review and amend all provisions, for any reason and in particular to ensure that any proposals provide value for money (VfM) and are consistent with the current subsidy control regime.

Constraints

CCS Network Code: Section E



Background

A "Capacity Constraint" is a constraint in or affecting any part of the T&S Network at any time, as a result of which carbon dioxide flows in any part of the T&S Network are less than the affected User's Registered Capacity.

We recognise that these events will affect the T&S Networks and have been exploring ways to manage the available capacity during these events, in a transparent and methodical way, noting the nascency of these networks and the limited options available (for example, mature networks may have a variety of capacity products which can be scaled back, or have multiple pathways for flow).

Furthermore, we recognise that the users of these networks will be very diverse and so, although some networks use 'merit orders' to dictate who gets priority access during constraints, we are seeking to treat all affected users in an even way. And finally, we are seeking to avoid the introduction of perverse incentives or opportunities for 'gaming' (for example, encouraging artificially high or low nominations).

This has culminated in DESNZ recommending that the default approach to managing constraints is based on a 'pro rata' process (which we believe addresses the considerations outlined above and has precedence as a tool in similar networks). Therefore, in the December 2023 Network Codes publication we have outlined this process and are seeking views on it as part of the consultation.



Pro rata process

Step 1

• Constraint arises (unplanned) or becomes known (this could arise from planned maintenance) and T&S Co performs the following calculation to determine the available capacity (tCO2/hour) to be allocated to each affected user: $\frac{\sum affected \ users' \ registered \ capacity}{\sum affected \ users' \ registered \ capacity} \times relevant \ user's \ registered \ capacity$

Step 2

• T&S Co informs affected users of the constraint and what their allocated available capacity is.

• Affected users can choose to utilise all of their available capacity, or a portion, or none (users have the right to utilise up to their available capacity, but not an obligation).

Step 3

• Similar to the 'normal' process, users will submit forecasts and nominations/re-nominations in line with their allocated available capacity and T&S Cos will confirm the prevailing nomination, which users are expected to flow in line with.

Note that Available Capacity will be pro-rated based on Registered Capacity.

Feedback

Based on feedback received so far, we believe that pro rata is a fair and reasonable default approach to managing constraints in the network, particularly in the early operational phases of the network.

However, we recognise that there are certain scenarios where pro rata may not be viable, in particular emergencies and unplanned constraints.

These are generally described as situations where the network operates outside of its normal operating envelope and reactive maintenance may be required, and in the most extreme cases there could be a loss of containment.

Furthermore, we recognise that the basic pro rata proposal may result in some available capacity not being utilised due to user capabilities varying during a constraint.

Therefore, on the following slides we detail our proposals for:

- (i) emergency/unplanned constraint scenarios; and,
- (ii) pro rata optimisation.



Emergencies

Where a constraint is caused by an emergency* then, unless it is safe and practicable for T&S Co to immediately apply pro rata, then T&S Co shall apply the relevant Emergency Procedure and the following Constrained Capacity Optimisation Principles in order to allocate available capacity in the network:

Primary objectives:

- Only reduce a constrained user's ability to deliver CO2 at their delivery point(s) as a last resort;
- Maximise quantity of CO2 stored.

In achieving these the T&S Co shall:

- Endeavour to maximise the number of affected users delivering CO2 into the Network;
- Take into consideration the operational features and requirements of constrained users including, but not limited to, a constrained user's
 minimum turndown rate, minimum and maximum ramp rates, any minimum flow requirements over a minimum period of time, and any
 maintenance that the user will carry out;
- Actively communicate with all constrained users.

Note that where a T&S Co applies the principles above to allocate available capacity, they shall transition to applying pro rata as soon as it is reasonably practicable.

*Definition of emergency: a situation where a T&S Co considers action must be taken without delay to (i) avert or reduce danger to life or property, or (ii) secure the network, or part of the network, or the safe transportation of CO2 by it or reducing the risk to it.



Unplanned constraints

Where a constraint is not caused by an emergency, but the circumstances of that particular constraint mean the application of pro rata will likely jeopardise the safety, integrity or operability of the T&S network then T&S Co may apply the Constrained Capacity Optimisation Principles (as per the previous slide) in order to allocate available capacity in the network.

Similar to an emergency scenario, where a T&S Co applies the principles to allocate available capacity, they shall transition to applying pro rata as soon as it is reasonably practicable.

Optimisation

Following the implementation of pro rata, we recognise that a constrained user may not be able to utilise any or all of the available capacity allocated to them, resulting in Surplus Available Capacity. Following notification by the relevant constrained user that there will be Surplus Available Capacity, T&S Co may reallocate this to an alternative constrained user in accordance with the Constrained Capacity Optimisation Principles (as per the previous slide).

Note that where a constrained user's registered capacity is reduced by (i) pro rata or (ii) application of the Constrained Capacity Optimisation Principles, then the difference between the user's registered capacity and what they are allocated during the constraint (Reduced Capacity) is known as Constrained Registered Capacity for the purposes of any availability adjustment under T&S Co's licence.



Thank you

For additional information or queries, please contact: codes.engagement@energysecurity.gov.uk

