Guidance for Completion of the Sector Evidence Template

Issue 1

(Prepared for the Department for Energy Security and Net Zero by Ricardo)

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A. Introduction

In letters sent to Sector Associations on 4 July 2023 DESNZ offered Sector level targets for TP6 taking account of the performance achieved at TP5.

If Sectors wish to propose alternative targets for TP6 a completed Sector Evidence template, together with supplementary information on the data collected, will need to be provided. This guidance explains how to complete the Evidence Template.

The Evidence Template has been based on versions which Sector Associations have previously used in support of target negotiations. It comprises spreadsheets as follows:

- **2022 Quantitative –** The purpose of this is to evidence how performance improvement (at the end of TP4 and TP5) has been achieved relative to 2018 base year data. This information informs the opportunity to go further by 2024 which is considered in the 2024 Quantitative spreadsheet.
    - For sectors that did complete an Evidence Template to negotiate their TP5 target the data provided in 2020 has been input. This may be adjusted to reflect the performance improvement achieved at the end of TP4 and TP5. Where the data is adjusted an explanation of the changes should be provided in the 2022 Explanation spreadsheet. The calculated performance improvement for the breakdown of energy demand and supply efficiencies should match as closely as possible with the actual performance improvement achieved at the end of TP4 and TP5
    - For Sectors that did not complete an Evidence Template to negotiate their TP5 target this spreadsheet will need to be fully completed. An initial list of potential abatement measures has been provided and may be modified to include further abatement measures and other factors that have contributed to the current performance.

- **2022 Explanation –** The purpose of this spreadsheet is to provide additional explanation for figures given in the 2022 Quantitative spreadsheet, covering all the energy demand and supply efficiencies and any other factors that have contributed to performance improvements. Comments on throughput changes may be particularly pertinent for sectors with TUs that have Absolute targets. For Sectors that did complete an Evidence Template to negotiate their TP5 target, the data they provided in 2020 has been input and may be adjusted if necessary.

Guidance on filling in the 2022 spreadsheets is given in Part C of this guidance.

- **2024 Quantitative –** The purpose of this is to project forward to the performance improvement that can realistically be achieved by the end of 2024. The 2018 base year data, energy demand and supply efficiencies that explain the 2022 performance are pulled through from the 2022 Quantitative spreadsheet to provide the foundation for calculation of the performance improvement that can realistically be achieved by the end of 2024. The realistic penetration of abatement measures and additional energy supply efficiencies in 2024 need to be provided.

- **2024 Explanation –** The purpose of this is to explain data given in the 2024 Quantitative spreadsheet. The 2022 Explanation spreadsheet covers data provided in the 2022 Quantitative spreadsheet, this data is copied over and should not be changed. The additional explanations required are for the improvements (changes in penetration levels) that are expected to contribute to the TP6 target.

Guidance on filling in the 2024 spreadsheets is given in Part D.

If you need further help or wish to ask questions please email cca@beis.gov.uk

B. Before Completion

The following are essential points to consider before completing the evidence template:

- The evidence template requires data at the sector level, not individual TU or Facility level.
- If Sectors have sub-sectors an evidence template for each of these may be provided.
- The evidence template's default position is for a high level of disaggregated data to be supplied, we are looking for best estimates rather than exact numbers. It is anticipated that Sectors will already have considered how performance has improved through the current scheme and will have been identifying best practices to share with Operators.
- A pre-populated evidence template will be provided to each Sector that rejects the initial TP6 target offer made by DESNZ. The 2022 Quantitative spreadsheet will be pre-populated with an initial list of abatement measures that are thought to be pertinent to your sector. The initial list may be modified, amalgamating or split out in the way that best reflects the opportunities that have resulted in the performance improvement achieved to 2022 and the opportunities to progress further to 2024. If any of the initial list of abatement measures are no longer covered then please do not remove them but provide an explanation in the Explanation spreadsheet. Please also add any additional measures which are pertinent, in particular covering other factors which have contributed to performance improvement.
- Some spare rows have been provided to accommodate modification of the abatement measures list. Rows should not be added or deleted (but may be hidden if unused). Please ask if you need further rows.
- Abatement measures may be very specific or use a mix of technologies and it may be necessary to be quite descriptive in naming them. For example, in the case of lighting, 'Energy Efficient lighting' could mean an upgrade from incandescent lighting to compact fluorescent or from compact fluorescent to LED lighting. Where practicable, please capture the specifics of the upgrade in the description given in the Abatement Measures Column.
- Considering how the performance improvement to 2022 has been achieved will identify how much potential penetration of abatement measures is left to deliver by 2024. Where Sectors provided data in 2020 the level of penetration anticipated for 2022 for some abatement measures was 100%. The new evidence template is seeking up-to-date estimates for penetration in 2022 to identify the remaining potential for improvement by 2024.
- There may be interactions between abatement measures such that the improvement they make to energy consumption overlaps. In order to explain how performance has improved to 2022 it will be necessary to estimate the extent of these interactions. DESNZ accepts that determining figures for these interactions is very difficult and is just looking for sense checking that the contributions made to the overall performance improvement by each measure is reasonable.
- Energy supply efficiency data is required on the extent of CHP and renewables within the sector. It is anticipated that Sectors will be able to determine this from base year and reported data for 2022. Projections to 2024 should be based on currently foreseeable

developments (planned or being built). DESNZ anticipates being able to cross check these.

- If specific data supplied is commercially sensitive, please note this in the Explanation spreadsheet and flag it when you return the completed template.

C. 2022 Quantitative and Explanation Spreadsheets

The Quantitative spreadsheet is for numeric data and the Explanations spreadsheet for supporting information to assist understanding and interpretation of the numeric data.

The primary purpose of these spreadsheets is to cross check how the resultant performance improvement calculated from the data provided matches up with the performance improvement achieved in 2020 and 2022 according to Target Period reporting. This should provide understanding of how the level of penetration for energy demand abatement measures and energy supply efficiencies has increased since the 2018 base year and consequently how much potential is left to contribute to a 2024 target.

Sectors that did completed an Evidence Template in 2020

The only new data required is the actual performance improvement achieved in TP4 and TP5 relative to the 2018 Base Year data. These values should be input in cells H4 and H6 of the 2022 Quantitative spreadsheet. The performance improvement for TP4 should be estimated relative to the 2018 Base Year data and for the cohort included in the 2018 Base Year, the value relative to the original TP4 Base Year (2008 for most sectors) should not be used.

Data provided by sectors that completed an evidence template in 2020 has been replicated in the 2022 Quantitative and Explanation spreadsheets. The 2018 base year data should not be changed. Adjustments may be made as necessary in Sections 3 and 4 of the 2022 Quantitative and Explanation spreadsheets such that the calculated performance improvement for 2020 and 2022 shown in cells H5 and H7 of the 2022 Quantitative spreadsheet reasonably closely matches the performance improvement achieved as shown in cells H4 and H6.

- Cells K29 to K53 of the Quantitative spreadsheet should give the level of penetration for each abatement measure which was actually achieved in 2020 - currently they give the penetration realistically expected to be achieved in 2020.
- Cells M29 to M53 of the Quantitative spreadsheet should give the level of penetration for each abatement measure which was achieved in 2022 - currently they give the penetration realistically expected to be achieved in 2022.
- Cell D59 of the Quantitative spreadsheet should give the proportion of total heat generated by direct fuel actually supplied by CHP in TP4, it currently gives the proportion realistically expected in TP4.
- Cell G59 of the Quantitative spreadsheet should give the proportion of total heat generated by direct fuel actually supplied by CHP in TP5, it currently gives the proportion realistically expected in TP5.
- Cell D60 of the Quantitative spreadsheet should give the proportion of total heat generated by direct fuel actually supplied by renewables in TP4, it currently gives the proportion realistically expected in TP4.

- Cell G60 of the Quantitative spreadsheet should give the proportion of total heat generated by direct fuel actually supplied by renewables in TP5, it currently gives the proportion realistically expected in TP5.

Adjustments may, if necessary, account for a significant change to the applicable Base Year data as a result of Facility exits and entries. The outcome should be an updated assessment of the penetration levels of abatement measures achieved at the end of TP5 (2022) to take forward into the assessment of what further improvement can be made by the end of TP6 (2024).

After making any necessary adjustments and providing associated explanations, Sectors that completed an evidence template in 2020 may skip to Part D of this guidance.

Sectors that did not completed an Evidence Template in 2020

Sectors that accepted the initial target offer made by BEIS for TP5 and therefore did not complete an Evidence Template in 2020 will need to complete the 2022 Quantitative and Explanation spreadsheets. Data provided for the 2018 base year should be for the cohort of TUs that participated in TP3 reporting. The performance improvement calculated for 2020 and 2022 should align with that actually achieved at Sector level in the TP4 and TP5 reporting. If the applicable base year data has changed significantly since 2018 as a result of Facility exits and entries, then adjustment to the data such as penetration levels to allow for this should be explained in the Explanations spreadsheet.

Section 1 – Sector Summary

This section requires basic information about the sector:

Sector – Enter name of sector

Number of TUs – Enter the number of TUs that participated in TP3.

Type of Agreement – Enter the type of agreement that the sector has e.g. Relative Energy, (this cannot be changed).

Achieved Performance Improvement % for 2020 relative to 2018 BY – Calculate and enter the % performance achieved for the sector (do not use the TP4 performance result measured against a 2008 Base Year).

Achieved Performance Improvement % for 2022 relative to 2018 BY – Input the TP5 performance improvement % for the Sector.

This section also provides the calculated results once all data has been input:

Calculated Performance Improvement % for 2020 relative to 2018 BY – This is the calculated performance improvement for 2020 based on data provided in Sections 2, 3 and 4 of the spreadsheet. The aim is to match this result as closely as possible to the achieved performance in 2020 by providing best estimate data in sections 3 and 4.

Calculated Performance Improvement % for 2022 relative to 2018 BY – This is the calculated performance improvement for 2022 based on data provided in

Sections 2, 3 and 4 of the spreadsheet. The aim is to match this result as closely as possible to the achieved performance in 2022 by providing best estimate data in sections 3 and 4.

Section 2 - Energy Summary

This section accounts for the energy consumed in 2018 by all TUs that reported at the end of TP3. Energy consumed in 2018 that resulted in emissions within the scope of EU ETS Phase III must be excluded.

The sector's energy consumption must be resolved into two types of energy consumption:

- Primary electricity consumption (this will remain as 2.6 x the sum of metered grid electricity and metered renewable electricity consumed within a Facility)
- Direct fuel consumption (excluding EU ETS)

Appendix 1 shows how these two types of energy consumption are worked out for a hypothetical facility.

Reported data should be included for new entrants that did not report for the whole of 2018

Actual data should be included for greenfields that initially reported using estimates

Energy Definitions – Types of Energy Consumption to Use in the Analysis

The following categories of energy consumption within CCA Eligible Facilities are defined for the purposes of this analysis:

- Electricity (Grid) - This is electricity imported from the grid and renewable electricity consumed within a Facility.
- Electricity (Other) – This is non-grid electricity consumed within the Eligible Facility which is either generated within the Eligible Facility or outside of the Eligible Facility and not supplied via the grid, e.g. CHP electricity.
- Direct Fuel – This is fuel consumed for the generation of heat which is consumed within the Eligible Facility. This includes renewable and waste fuels combusted for the generation of heat. The fuel consumption can be inside or outside of the Eligible Facility, so long as the heat is consumed **within** the Eligible Facility. An example of the latter is when steam is imported by an Eligible Facility from a CHP operated by a 3rd Party.

Appendix 1 explains further by example the difference between these three main categories of energy consumption.

Worked Example

Consider a hypothetical CCA sector made up of three facilities each carrying out similar processes as illustrated in the following diagrams. Some demand side abatement measures had already been implemented in 2018, all others had been implemented by 2020, with the remaining potential expected to be implemented by 2022, giving no further demand side improvement potential for 2024. Some supply side abatement had been implemented in 2018 (CHP), no further supply side abatement had been implemented by 2020. However further CHP is expected to be installed by 2022 and 2024.

All facilities require electricity for lighting and heat (in the form of hot water) to drive a process.

The facilities differ in the following respects:

- One facility sources its heat from a 3rd Party supplier (CHP), while the others generate their heat within the facility in boilers.
- The direct fuel used to generate heat in a boiler at one facility is covered by UK ETS, while the other sources of heat generation are not covered by UK ETS
- The abatement measures that have already been implemented (green ellipses with solid lines)
- The abatement measures that can be implemented (green ellipses with dotted lines)

These abatement measures (last two bullet points) illustrate how to complete Section 3.

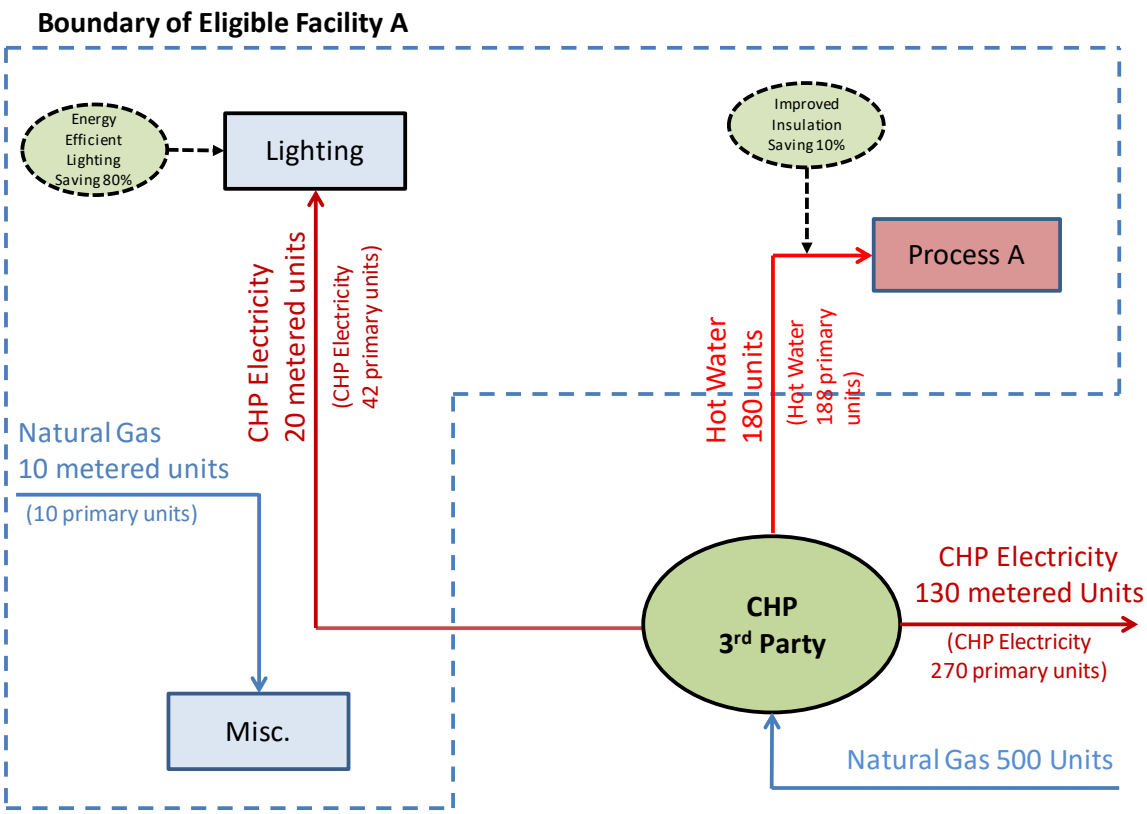
The situation at each facility is now described in turn and the energy consumption for the three types of energy (primary grid electricity, primary other electricity and direct fuel) at each facility is derived.

Facility A – Summary of Situation: None of the energy consumed by this facility is covered by EU ETS. The heat demand for the facility is met by a 3rd Party CHP. The CHP was operational in 2018 and remained so in 2020.

The following abatement measures are applicable and were not implemented in 2020:

- More efficient lighting
- Improved insulation on hot water pipework

Improvement in the pipework insulation was not within the control of the Operator and could not be included in the potential savings. The implementation of energy efficient lighting had been planned for implementation before 2020 but was not installed until 2022.



CHP	Units
CHP Fuel	500
CHP Electricity	150
CHP Heat	180
Fuel for Elec	313
Fuel for Heat	188
Facility A	Units
CHP Electricity Consumption	20
CHP Heat Consumption	180
Fuel for CHP Elec.	42
Fuel for CHP Heat	188

Table 1 Summary of energy consumption for facility A

Facility	Facility Metered Grid Electricity	Facility Primary Grid Electricity	Facility Metered Other Electricity	Facility Primary Other Electricity	Facility Direct Fuel	Total Facility Primary Energy	Other Electricity EU ETS Phase III	Direct Fuel EU ETS Phase III	Total TU Primary Energy
A	0	0	20	42	198	239	0	0	239

N.B. Rounding leads to an overall primary energy figure of 239 and not 240 units.

The CHP at Facility A generated 180 units of heat (hot water) which were consumed. The miscellaneous use of gas (10 units) is considered to generate heat all of which is consumed. Therefore, the heat generated and consumed at Facility A is 180 units + 10 units = 190 units. This information is needed to estimate the proportion of all heat generated and consumed within the sector

which is generated in CHP and is required to complete Cell C59 of the 2022 Quantitative spreadsheet.

Facility B – Summary of Situation: Natural gas consumed by boilers at the facility is covered by EU ETS (or EU ETS opt-out). Moreover, because of this, all consumption of fuel for the generation of heat is covered by EU ETS. This means that none of the direct fuel used in counted in the CCA target area.

As a consequence, none of the heat generated in this facility is relevant for determining the proportion of heat generated and consumed in the sector that was generated in CHP.

The following abatement measures are applicable:

- Energy efficient lighting
- Boiler economiser
- Variable Speed Drives (VSDs) on pumps
- Improved insulation

The following abatement measures had been implemented by 2018:

- Energy efficient lighting
- Boiler economiser
- Improved insulation on hot water pipework

The following abatement measures had been implemented by 2020:

- Variable Speed Drives (VSDs) on pumps

Boundary of Eligible Facility B

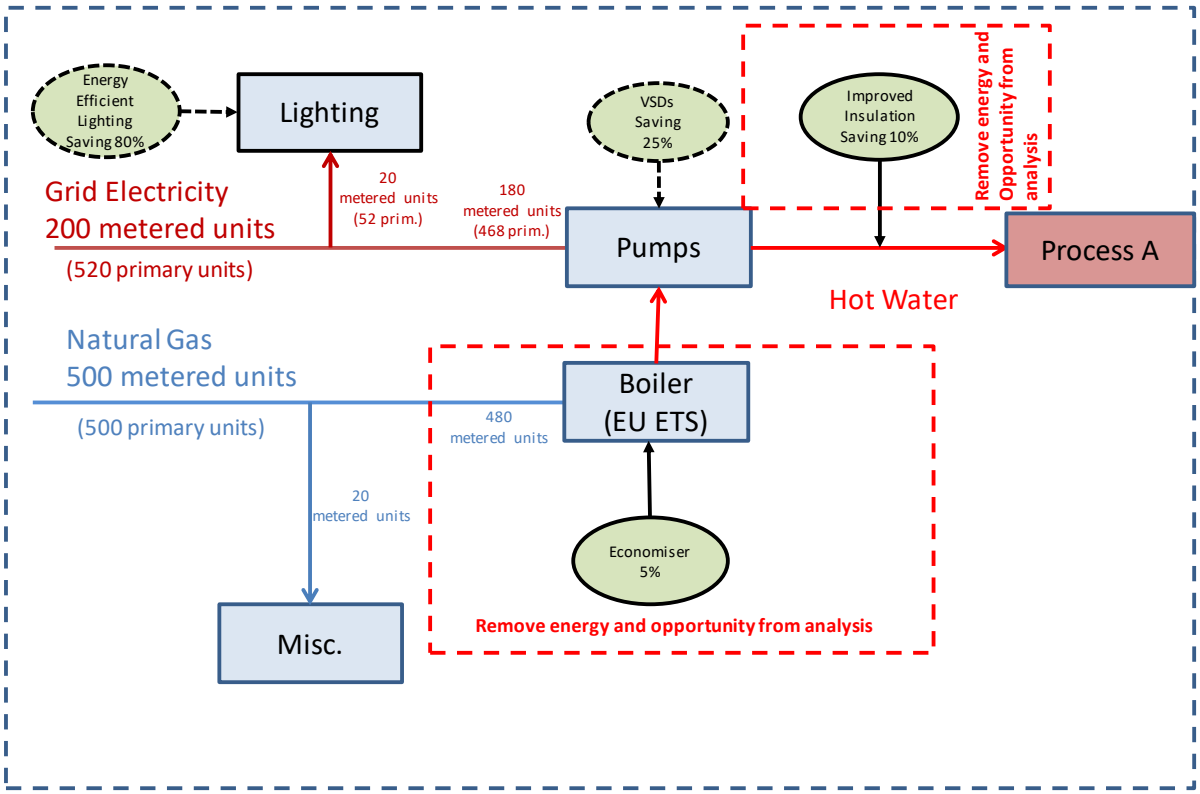


Table 2 Summary of energy consumption at facility B

Facility	Facility Metered Grid Electricity	Facility Primary Grid Electricity	Facility Metered Other Electricity	Facility Primary Other Electricity	Facility Direct Fuel	Total Facility Primary Energy	Other Electricity EU ETS Phase III	Direct Fuel EU ETS Phase III	Total TU Primary Energy
B	200	520	0	0	500	1020	0	480	540

Facility C – Summary of situation: None of the energy consumed by the facility is covered by UK ETS.

The boiler at Facility C uses 480 units of gas to generate 400 units of heat (83% efficiency) which are consumed. The miscellaneous use of gas (20 units) is considered to generate heat all of which is consumed. Therefore, the heat generated and consumed at Facility C is 400 units + 20 units = 420 units.

Prima facie, the following abatement measures are available:

- Energy efficient lighting
- Boiler economiser
- VSDs on pumps
- Improved insulation on hot water pipework

The following abatement measures had been implemented by 2018:

- Boiler economiser

The following abatement measures had been implemented by 2020:

- Energy efficient lighting
- Partial improvement of insulation on hot water pipework (full insulation was expected to happen before 2020).

The following abatement measures could not be implemented for technical reasons:

- VSDs on pumps (Denoted by a red cross)

Boundary of Eligible Facility C

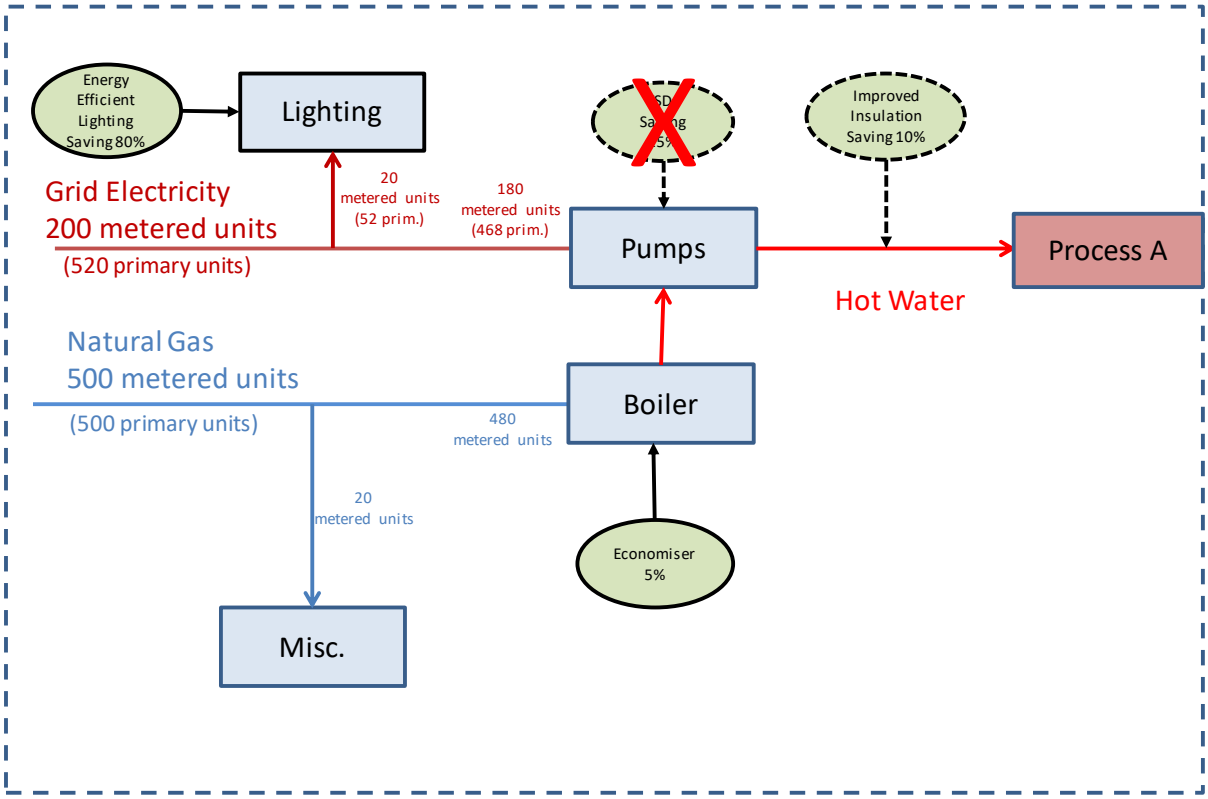


Table 3 Summary of energy consumption at facility C

Facility	Facility Metered Grid Electricity	Facility Primary Grid Electricity	Facility Metered Other Electricity	Facility Primary Other Electricity	Facility Direct Fuel	Total Facility Primary Energy	Other Electricity EU ETS Phase III	Direct Fuel EU ETS Phase III	Total TU Primary Energy
C	200	520	0	0	500	1020	0	0	1020

Data for Energy Summary

Aggregating the energy consumed at each facility produces the sector level energy consumption, as summarised in Table 4, below. The values for entry in the spreadsheet are identified.

Table 4 Energy summary for sector

Facility	Facility Metered Grid Electricity	Facility Primary Grid Electricity	Facility Metered Other Electricity	Facility Primary Other Electricity	Facility Direct Fuel	Total Facility Primary Energy	Other Electricity EU ETS Phase III	Direct Fuel EU ETS Phase III	Total TU Primary Energy
A	0	0	20	42	198	239	0	0	239
B	200	520	0	0	500	1020	0	480	540
C	200	520	0	0	500	1020	0	0	1020
Total	400	1040	20	42	1198	2279	0	480	1799
							0.0%	40.1%	
Relevant Cell		**C12**		**D12**	**E12**		**D14**	**E14**	

When the relevant values are entered in Cells D14 and E14, the quantities of primary electricity and direct fuel relevant to the New Scheme are returned in Cells C17 and D17. **Subsequent savings are expressed with respect to these two types of energy**.

The proportion of direct fuel (cell D17) that was consumed to provide steam, hot water or hot oil should also be estimated in cell E17 and will automatically calculate the direct heat used in the form of hot air (Cell F17).

Section 3 - Abatement Summary – Demand Side

This section considers the measures to improve the efficiency with which energy at the final point of use is consumed. It is different from Section 4, which looks only at measures that improve the primary energy efficiency and carbon efficiency with which energy for final consumption is generated.

Principles of Analysis

Abatement measures will save primary electricity, direct fuel or a combination of the two. The 2022 Quantitative spreadsheet has been pre-populated with an initial list of abatement measures that are thought to be pertinent to your sector. The initial list may be modified, amalgamated or split out in the way that best reflects the opportunities that have resulted in the performance improvement achieved to 2022, and the opportunities to progress further to 2024. If any of the initial list of abatement measures are not relevant then please do not remove them but provide an explanation in the Explanation spreadsheet. Please also add any additional measures which are pertinent, in particular covering other factors which have contributed to performance improvement.

This section primarily determines the energy savings achieved according to the extent each abatement measure has penetrated the sector since 2018.

NOTE: **The base year energy data applied from Section 2 in the calculations is adjusted according to the data provided in Section 4. It will be necessary to finalise the data provided in Section 4 before finalising the data in Section 3.**

For each abatement measure estimate the following:

1. (Col C) The typical lifetime of the measure (years). This is the period of time over which an abatement measure can be expected to be in place.
2. (Col D) The % of primary electricity consumed by the sector which is impacted by an abatement measure. This is the percentage of the sector's primary electricity consumption passing through a process to which the abatement measure can be applied (see examples below).
3. (Col E) The % of direct fuel consumed by the sector which is impacted by an abatement measure. As for 2 but considering direct fuel rather than electricity.
4. (Col F) The % of primary electricity that could be saved by an abatement measure with respect to the commonly used non-energy efficient technology/technique. The degree to which this displacement has already taken place and the degree to which it could take place are considered separately under penetration, so Col F should consider the full savings by replacing the commonly-used less efficient technology with the listed measure. For example, an incandescent lighting system consumes 100 units of metered electricity. This is 260 units of primary electricity. The system is completely upgraded with a compact fluorescent lighting system. The system then consumes 20 units of metered electricity, which is 52 units of primary electricity. The saving is therefore (260-52)/260 = 80%.
5. (Col G) The % direct fuel that can be saved by the measure. As for 4, but considering direct fuel rather than electricity.
6. (Col H) Payback period technical (years). The payback period associated with technical potential (this is the full extent to which a measure could be applied).

7. (Col I) Payback period realistic (years). The payback period taking account of the cost effectiveness of the measure and any financial constraints or non-financial barriers to uptake. Financial constraints may include issues such as raising capital, while non-financial barriers could include physical site constraints, institutional, commercial, or legislative issues. This provides background appreciation of the extent to which it might increase further. It is not used in calculation of the savings achieved.
8. (Col J) Achieved Penetration in 2018. This is the extent to which the abatement measure had been implemented in the 2018 Base Year. It is expressed as the ratio of the energy that passes through the process where the abatement measure is already fitted to the total energy that passes through the process to which the abatement measure could be fitted. As such, it is the estimated proportion of energy in Col D and Col E that, in the Sector Base Year, passed through the relevant process where the abatement measure was already fitted.
9. (Col K) Achieved Penetration by 2020. This is the extent to which the abatement measure was implemented by 2020. If a measure is not applicable to a process the maximum penetration may have been limited to below 100%. An example of this is the application of VSDs to motors. Where the motor is a constant speed motor, then a VSD is not applicable and could not be included in the penetration.
10. (Col L) 2020 Interaction extent is an estimate of the extent to which an abatement measure overlaps with others in terms of the energy savings it generates, 0% being no overlap and 100% meaning a complete overlap with another abatement measure and so no additional savings. For example, suppose energy management relates to 100% of primary electricity in column D and could save 5% - the interaction % for this would be 0% unless it had a contributing effect on other abatement measures. Suppose process optimisation relates to 100% of primary electricity in column D and could save 5%, but that this saving overlaps with stock preparation optimisation, which also covers the same 100% of primary electricity. In this case there would be some double counting of savings. Col L provides a means of attenuating the savings generated by each measure. The overall effect can be seen in Col Q, which shows contributions being made to the overall performance achieved.
11. (Col M) Achieved Penetration by 2022. This is the extent to which the abatement measure was implemented by 2022.
12. (Col N) 2022 Interaction extent is an estimate of the extent to which an abatement measure overlaps with others and is anticipated to be the same figure as provided in Col L. If there are reasons for a different figure, then these should be given in the 2022 Explanation spreadsheet.
13. (Col P) Achieved Abatement in 2020 is the calculated savings for an abatement measure in kWh given the increase in penetration between 2018 and 2020 and the interaction extent of the measure.
14. (Col Q) Contribution to abatement in 2020 is the calculated percentage saving made by an abatement measure. This is provided to aid estimation of the interaction extent by enabling comparison and hence a sanity check on the relative contribution being made by each abatement measure.
15. (Cols R and S) As Cols P and Q but for 2022.

Worked Example

This builds on the one set out in Section 2. The explanations given indicate the sort of commentary that it would be useful to provide in the relevant cells within the 2022 Explanation spreadsheet. The following table summarises the demand side abatement implementation used in the examples below:

Installed	2018	2020	2022
Facility A			
Pipework Insulation	Not within control		
Energy Efficient Lighting	N	N	Y
VSDs	N/A	N/A	N/A
Boiler Economiser	N/A	N/A	N/A
Facility B			
Pipework Insulation	Y	Y	Y
Energy Efficient Lighting	Y	Y	Y
VSDs	N	Y	Y
Boiler Economiser	Y	Y	Y
Facility C			
Pipework Insulation	N	Partial	Y
Energy Efficient Lighting	N	Y	Y
VSDs	Not possible		
Boiler Economiser	Y	Y	Y

Note in this case there is no potential left for demand side abatement from 2022 to 2024.

Improved pipework insulation

Lifetime of the measure (years)
Enter the expected lifetime of the abatement measure is 5 years.

Enter 5 in Cell C29

Abatement Primary Electricity
Improved insulation is not associated with electricity consumption.

Enter 0% in Cell D29

Improved insulation of the hot water distribution network does not save any electricity.

Enter 0% in Cell F29

Abatement Direct Fuel
Improved insulation of hot water distribution system saves heat and, therefore, saves the fuel used to generate it. Savings due to this measure should be expressed in terms of the direct fuel they save. In the case of Facility A, this measure saves CHP fuel, while for Facilities B and C boiler fuel is saved.

The amount of fuel covered by CCA targets that can be saved needs to be estimated. In the case of Facility B, the fuel going to the boiler is covered by EU ETS and is, therefore, not relevant in this analysis. The implementation (or potential to implement) improved insulation at Facility B should therefore be disregarded for the purposes of this analysis.

The direct fuel consumed in the generation of heat is:

188+480 = 668 primary units

The direct fuel consumed by the sector is 718 units

Therefore, the % of direct fuel impacted by this abatement measure is 668/718 = 93%

Enter 93% in Cell E29

Improved insulation reduces heat losses and can save 10% of fuel.

Enter 10% in Cell G29

Payback Period Technical (years)
The average non-discounted payback period across the facilities for improved insulation is 4 years (3 years in Facility A and 5 years in Facility C).

Enter 4 in Cell H29

Payback Period Realistic (years)
Facility A reports the fuel burned in the CHP to generate the heat it consumes, it does not own the pipework and therefore has no say as to whether the insulation on it can be improved or not. Therefore, Facility A will not pay back. Facility C will, however, giving a payback period (from the remaining installation option) of 5 years.

Enter 5 in Cell I29

Achieved Penetration in 2018
Improved insulation is only relevant to Facilities A and C, as Facility B fuel for heat is covered by EU ETS. Improved insulation was not implemented at either Facilities A or C.

Enter 0% in Cell J29

Achieved Penetration in 2020
Some insulation has been installed at facility C but there is still scope to add more.

Enter 20% in Cells K29

2020 Interaction Extent
Insulation of the pipework only has a second order effect on other abatement measures by reducing heat losses and so the interaction is 0%.

Enter 0% in Cell L29

Achieved Penetration by 2022
The ownership of the pipework is an example of a non-technical, non-financial barrier to 100% cost effective penetration being realised. The Operator of Facility A does not have control over the installation of insulation by the 3rd party CHP provider.

The achieved penetration in this case is therefore 480/(188+480) = 71.9%

Enter 72% in Cell M29

2022 Interaction Extent
This is expected to be the same as in 2020.

Enter 0% in Cell N29

Energy Efficient Lighting

Lifetime of the measure (years)
Enter the expected lifetime of the abatement measure.

Enter 10 in Cell C30

Abatement Primary Electricity

The primary electricity consumed by lighting is:

42+52+52 = 146 primary units

The primary electricity consumed by the sector is 1,082 units

Therefore, the % of primary electricity impacted by the abatement measure is 146/1,082 = 13.5%

Enter 13.5% in Cell D30

When energy efficient lighting is applied it can save 80% of the electricity consumed by lighting.

Enter 80% in Cell F30

Abatement Direct Fuel

Lighting does not consume direct fuel.

Enter 0% in Cell E30

Energy efficient lighting does not save direct fuel.

Enter 0% in Cell G30

Payback Period Technical (years)
The technical payback period is 4 years.

Enter 4 in Cell H30

Payback Period Realistic (years)
For Facility B the technical payback period was not increased by cost or other constraints and the abatement measure was already implemented in 2008. For Facility C, the cost effective payback period was six years and the abatement measure was implemented in 2012. For Facility A the payback period is also 6 years but constraints have delayed implementation.

Enter 6 in Cell I30

Achieved Penetration in 2018

The penetration is expressed in terms of the proportion of primary electricity consumed by all lighting that is consumed by energy efficient lighting, i.e.

52/(42+52+52) = 36%

Enter 36% in Cell J30

Achieved Penetration in 2020
The penetration in 2020 is:

(52+52)/(42+52+52) = 71%

Enter 71% in Cells K30.

2018 Interaction Extent
Energy efficient lighting does not impact on the other abatement measures so the interaction is 0%.

Enter 0% in Cell L30

Achieved Penetration by 2022
Energy efficient lighting can be installed at Facility A.

Enter 100% in Cell M30

2022 Interaction Extent
This is expected to be the same as in 2020.

Enter 0% in Cell N30

VSDs on Pumps

Lifetime of the measure (years)
Enter the expected lifetime of the abatement measure.

Enter 20 in Cell C31

Abatement Primary Electricity

The primary electricity consumed by pumps is:

468+ 468 = 936 primary units

The primary electricity consumed by the sector is 1,082 units

Therefore, % primary electricity potentially impacted by this abatement measure is 936/1,082 = 86.5%

Enter 86.5% in Cell D31

When VSDs are applied to pumps it can save 25% of the energy consumed by the pump.

Enter 25% in Cell F31

Abatement Direct Fuel

VSDs on pumps are not associated with direct fuel and, therefore, do not save it.

Enter 0% in Cells E31 and G31

Payback Period Technical (years)
The technical payback period is 4 years

Enter 4 in Cell H31

Payback Period Realistic (years)
For Facility B the technical payback period is not increased by cost or other constraints. For Facility C it is not possible to fit VSDs for technical reasons.

Enter 4 in Cell I31

Achieved Penetration in 2018

Only Facilities B and C have pumps and VSDs have not been applied to any of the pumps at Facilities B and C.

Enter 0% in Cell J31

Achieved Penetration in 2020
No VSDs have been fitted.

Enter 0% in Cell K31.

2020 Interaction Extent
VSDs do not impact on the other abatement measures so the interaction is 0%.

Enter 0% in Cell L31

Achieved Penetration by 2022

For technical reasons, it is not possible to fit a VSD to the pump at Facility C. The proportion of primary electricity consumed by pumps where VSDs can be fitted is:

468/(468+468) = 50%

Enter 50% in Cell M31

2022 Interaction Extent
VSDs do not impact on the other abatement measures so the interaction is 0%.

Enter 0% in Cell N31

Section 4 - Abatement Summary – Supply Side

This section looks only at abatement measures that have the potential to improve the primary energy efficiency or carbon efficiency with which delivered energy (electricity and heat) is generated for final consumption. These are distinct from the measures looked at under Section 3, where only measures that improve the efficiency with which delivered energy is consumed were considered.

The data should relate to Target Units that reported at the end of TP3 and only cover the supply of delivered energy that is consumed within the CCA target facility, i.e. it must exclude the supply of delivered energy which is generated in plant covered by EU ETS. The following data is required in the 2022 Quantitative spreadsheet on heat consumed in the CCA target facilities that reported at TP3. Explanation for the data provided should be given in the 2022 Explanation spreadsheet.

CHP Data

CHP can use non-renewable or renewable fuels. The protocols for assigning primary fuel consumption to the CHP heat and power generated differ according to whether the fuel used

in non-renewable and renewable. These protocols are set out in the CCA Operations Manual.

For avoidance of doubt, this 'CHP Data' section applies to CHP using both non-renewable and renewable fuels. Responses under 'Renewable Heat Data' section should only relate to heat only plant using renewable fuels.

Cell C59 Base Year

The proportion of heat consumed that was generated in CHP plant. This means the proportion of heat generated by the fuel consumption shown in Cell D17 that was generated in CHP plant. The Explanation spreadsheet should be used to provide information on the fuel sources used and the quality of the CHP.

Cell D59 Target Period 4

The proportion of heat consumed in TP3 that was generated in CHP plant.

Cell E59 Target Period 4

The estimated primary energy savings that result from the consumption of CHP generated heat during TP3. This should be expressed relative to a counterfactual situation where the heat is generated in a boiler with an efficiency of 81% and any power generated by the CHP and consumed within the target facility displaced grid power with a primary to delivered ratio of 2.6. Usually, a well operated CHP, where all of the generated heat and power is consumed on site, would result in primary energy savings in the region of 10-30% relative to this counterfactual.

Cell F59 Target Period 5

The estimated proportion of heat consumed during TP5 that was generated in CHP plant.

Cell G59 Target Period 5

The estimated primary energy savings that result from the consumption of this CHP generated heat during TP5. Unless there has been a significant change in the extent of use of CHP, the CHP technologies used or the way the CHP is utilised, between TP5 and earlier periods, the value in this Cell G59 should be similar to the value in Cell E59.

Worked Example

The following example builds on the one set out in Section 2. The explanations given indicate the sort of commentary that it would be useful to provide in the relevant cells within the 2022 Explanation spreadsheet.

The following table summarises the proportion of heat generated and consumed that was generated in CHP in 2018.

Facility	Heat Generated in CHP and Consumed by Facility	Total Heat Generated and Consumed by Facility	% Heat Generated and Consumed which was Generated in CHP
A	180	190	95%
B (EU ETS)	0	0	0%
C	0	420	0%
Total for Sector	180	610	29.50%

No further CHP has been implemented by 2020 but the proportion of heat generated and consumed that is generated in CHP has increased to 35% by 2022 and is planned to increase to 50% by 2024:

Enter 29.5% in Cells C59 and D59

A value must also be entered for the primary energy saving that would have been delivered by the deployment of CHP, relative to a counterfactual of the electricity imported from the grid and heat generated in a boiler with an efficiency of 81%. An example of how to calculate this is given in Appendix 2. When these principles are applied, and the energy consumption figures for Facility A for 2018 are used, a primary energy saving of 19.0% are delivered.

Enter 19.0% in Cell E59

The proportion of heat generated and consumed that is generated in CHP is expected to increase to 35% by 2022. This is expected to achieve the same level of savings.

Enter 35.0% in Cell F59 and 19% in Cell G59

Renewable Heat Data

NOTE: The approach to filling in some of this section depends on whether the sector target is for energy or carbon savings.

For avoidance of doubt, this ‘Renewable Heat Data’ section applies only to heat-only plant using renewable fuels. CHP plant using renewable fuels are covered by the ‘CHP Data’ section above.

Cell C60 Base Year

The proportion of heat consumed that was generated using renewable fuels. This means the proportion of heat generated by the fuel consumption shown in Cell D17 that was generated using renewable fuel.

Cell D60 Target Period 4

The proportion of heat consumed in TP4 that was generated using renewable fuels.

Cell E60 Target Period 4

For sectors with energy commitments - The estimated primary energy savings that resulted from the consumption of renewable heat during TP3. This should be expressed relative to a

counterfactual situation where this heat is generated in a boiler with an efficiency of 81%. If the renewable heat generation quantified in Cell D60 was less efficient than 81%, then consider entering a negative percentage value in Cell E60.

For sectors with carbon commitments. The estimated carbon savings that resulted from the consumption of renewable heat during TP3. This should be expressed relative to a counterfactual situation where this heat is generated in a natural gas boiler. By default, this should be 100%, as all the emissions that would have been generated in a natural gas boiler will be avoided when using a renewable fuel.

Cell F60 Target Period 5

The estimated proportion of heat that was consumed during TP5 that was generated using renewable fuels.

Cell G60 Target Period 5

For sectors with energy commitments - The estimated primary energy savings resulting from the consumption of this renewable heat during TP5. This should be expressed relative to a counterfactual situation where this heat is generated in a boiler with an efficiency of 81%. If the renewable heat generation quantified in Cell F60 was less efficient than 81%, then consider entering a negative percentage value in this Cell G60.

For sectors with carbon commitments - The estimated carbon savings resulting from the consumption of this renewable heat during TP5. This should be expressed relative to a counterfactual situation where this heat is generated in a natural gas boiler. By default, this should be 100%, as all the emissions that would be generated in a natural gas boiler will be avoided when using a renewable fuel.

D. 2024 Quantitative and Explanation spreadsheets

The Quantitative spreadsheet is for numeric data and the Explanations spreadsheet for supporting information to assist understanding and interpretation of the numeric data.

The primary purpose of these spreadsheets is to evidence what the Sector can achieve, building on the levels of abatement penetration already delivered and demonstrated by the TP5 reported performance. The time horizon to 2024 is relatively short and progress towards the TP6 (2024) target will be partly known (at least some of 2023 improvements will have been implemented or planned). It is anticipated that assessment of the potential performance improvement by 2024 can therefore be informed by current and planned abatement activities.

Additional data needs to be provided in these spreadsheets irrespective of whether a Sector completed an Evidence template in 2020.

Section 1 – Sector Summary

Data in this section is brought through from the 2022 Quantitative Spreasheet and should not be changed. It provides the calculated results once further data has been input in Sections 3 and 4 of the 2024 Quantitative spreadsheet:

Cell H7 Realistic abatement % for 2024 – This is the calculated performance improvement anticipated in 2024 based on data provided in Sections 3 and 4 of the spreadsheet.

Cell H6 Counter Offer % for 2024 relative to 2018 BY – This provides an opportunity for the Sector Association to offer a slightly different value to that calculated but supplementary evidence would be needed to justify this.

Note the calculated performance improvement % is given to 3 decimal places, not because this accuracy is justified by the estimation process but because a target to 3 decimal places in needed in the CCA register to perform accurate assessments of performance improvements achieved.

Section 2 - Energy Summary

Data in this section is brought through from the 2022 Quantitative Spreasheet and should not be changed.

Section 3 - Abatement Summary – Demand Side

This section imports data from the 2022 Quantitative Spreadsheet and only requires some additional data regarding the increased penetration of abatement measures to 2024.

NOTE: The base year energy data applied from Section 2 in the calculations is adjusted according to the data provided in Section 4. It will be necessary to finalise the data provided in Section 4 before finalising the data in Section 3.

Columns C to L are from the 2022 Quantitative spreadsheet – see details provided under Part C of this guidance.

For each abatement measure estimate the following:

1. (Col M) Realistic penetration of an abatement measure in 2024. This is the extent to which the abatement measure is anticipated to have penetrated in 2024 given progress made since 2018 and currently planned implementation for the rest of 2023. Justification of the value given should be provided in the Explanation spreadsheet.
2. (Col N) 2024 Interaction extent is an estimate of the extent to which an abatement measure overlaps with others and is anticipated to be the same figure as provided in Col L. If there are reasons for a different figure then these should be given in the 2024 Explanation spreadsheet.
3. (Col P) Achieved Abatement in 2022 is the calculated savings for an abatement measure in kWh given the increase in penetration between 2018 and 2022 and the interaction extent of the measure.
4. (Col Q) Contribution to abatement in 2022 is the calculated percentage saving made by an abatement measure. This is provided to aid estimation of the interaction extent by enabling comparison and hence a sanity check on the relative contribution being made by each abatement measure.
5. (Cols R and S) As Cols P and Q but for 2024.

Worked Example

The example set out in Part C left no further potential for demand side abatement after the improvements made by 2022. Therefore the % target for 2024 will be the same as for 2022. In the 2024 Quantitative spreadsheet the figures pulled through in columns K and L are entered in columns M and N.

Section 4 - Abatement Summary – Supply Side

This section looks only at abatement measures that have the potential to improve the primary energy efficiency or carbon efficiency with which delivered energy (electricity and heat) is generated for final consumption. These are distinct from the measures looked at under Section 3, where only measures that improve the efficiency with which delivered energy is consumed were looked at.

This section imports data from the 2022 Quantitative Spreadsheet and only requires additional data regarding the increased penetration of abatement measures to 2024.

The following data is required in the 2024 Quantitative spreadsheet in respect of heat consumed in the CCA target facilities that reported at TP3. Explanation for the data provided should be given in the 2024 Explanation spreadsheet.

CHP

Cell F60 Target Period 6

The estimated proportion of the heat generated by CHP that will be consumed during TP6. This should take account of existing CHP capacity that is expected to still be running in 2024 and any new CHP capacity expected to come on line and be running during TP6.

Cell G60 – Target Period 6

The estimated primary energy savings that will result from the consumption of CHP generated heat during TP6. Unless there is a significant change expected to the extent of use of CHP, the CHP technologies used or the way the CHP is utilised, between TP6 and earlier periods, the value in this Cell G60 should be similar to the savings estimated for the earlier periods.

Worked Example

The exampled developed in Part C noted that there would be a further increase in the proportion of heat generated and consumed that is generated in CHP to 50% 2024. This would be at the same efficiency as before.

Enter 50.0% in Cell F59 and 19% in Cell G59

Renewable Heat

Note: The approach to filling in some of this section depends on whether your sector has an energy of a carbon savings commitment

Cell F61 Target Period 6

The estimated proportion of the heat generated using renewable fuels that will be consumed during TP5. This should take account of existing renewable heat generating capacity that is expected to still be running in 2022 and any new renewable heat generating capacity expected to come on line and be running during TP5.

Cell G61 Target Period 6

For sectors with energy commitments. The estimated primary energy savings that will result from the consumption of renewable heat during TP6. This should be expressed relative to a counterfactual situation where this heat is generated in a boiler with an efficiency of 81%. If the renewable heat generation quantified in Cell F61 is less efficient than 81%, consider entering a negative percentage value in this Cell G61.

For sectors with carbon commitments. The estimated carbon savings that will result from the consumption of renewable heat during TP6. This should be expressed relative to a counterfactual situation where this heat is generated in a natural gas boiler. By default, this should be 100%, as all of the emissions that would be generated in a natural gas boiler will be avoided when using a renewable fuel.

Appendix 1 Types of Energy Consumption

An Eligible Facility carries out two different processes (Process A and Process B), both requiring electricity and heat. Process A consumes grid electricity and natural gas for the generation of heat. Process B meets its needs for electricity and heat from a 3rd Party CHP. Fig. 1 summarises the situation.

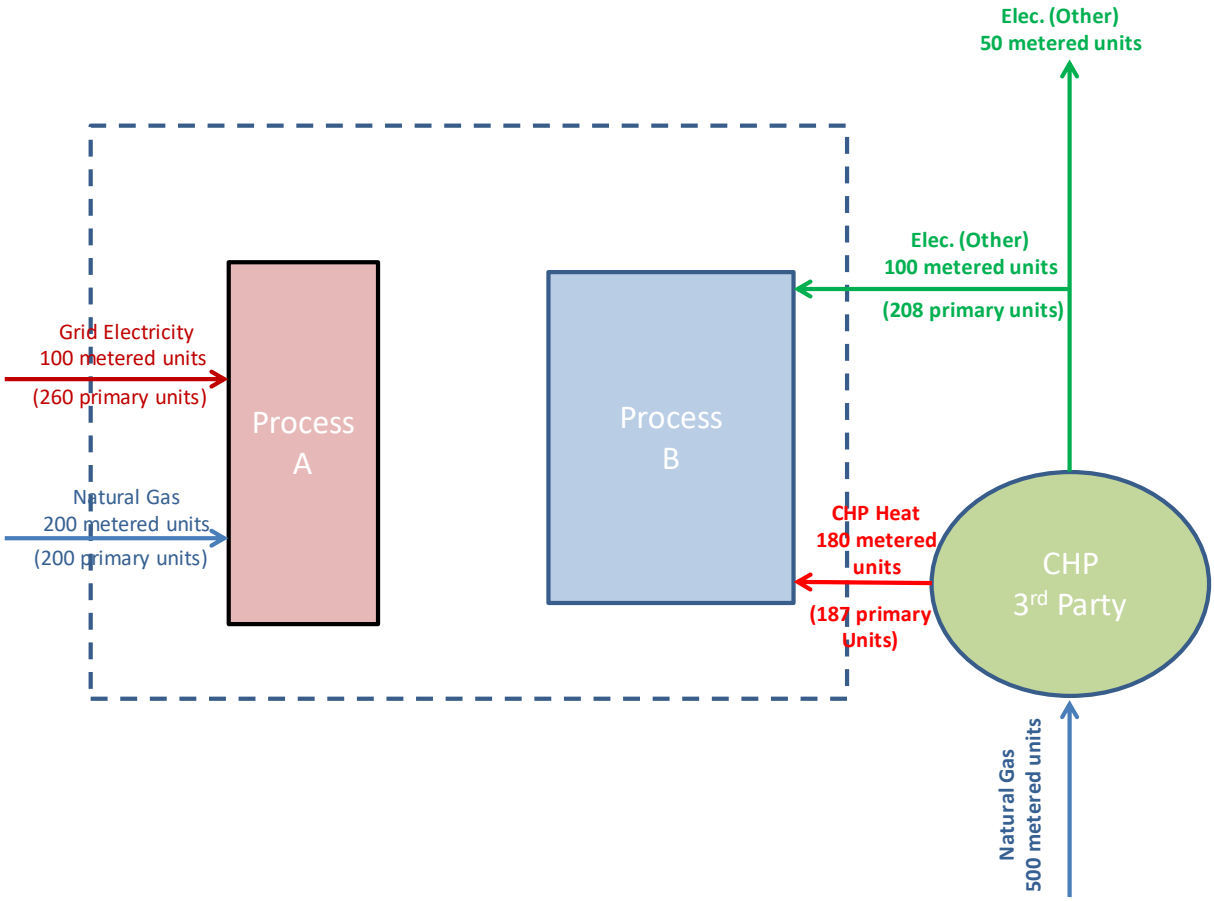


Figure 1 Three main types of energy consumption

CHP Energy

Using the standard CHP algorithm, the fuel inputs to the CHP are apportioned across the electricity and heat outputs as follows:

$$Fuel\ for\ Electricity = \frac{2 \times Total\ Fuel\ Input}{(2 \times Electricity\ Output) + (Heat\ Output)} \times Electricity\ Output$$

$$Fuel\ for\ Electricity = \frac{2 \times 500}{(2 \times 150) + (180)} \times 150 = 313\ Units$$

$$Fuel\ for\ Heat = \frac{Total\ Fuel\ Input}{(2 \times Electricity\ Output) + (Heat\ Output)} \times Heat\ Output$$

$$Fuel\ for\ Heat = \frac{500}{(2 \times 150) + (180)} \times 180 = 188\ Unit$$

Process B Primary Energy Consumption

Having calculated the fuel for CHP electricity and heat, the primary energy associated with the electricity and heat consumed by Process B is calculated as follows:

$$Fuel\ for\ Electricity\ Consumed\ in\ Process\ B = \frac{100}{150} \times 313 = 208$$

$$Fuel\ for\ Heat\ Consumed\ in\ Process\ B = \frac{180}{180} \times 187 = 187$$

Also including the energy consumed by Process A allows the energy consumed by the eligible facility to be summarised as in Table 1

Table A1 Summary of energy consumption of eligible facility

Process	Grid Electricity Metered	Grid Electricity Primary	Other Electricity Metered	Other Electricity Primary	Direct Fuel	Total Primary
A	100	260	0	0	200	460
B	0	0	100	208	187	395
Total for Facility	**100**	**260**	**100**	**208**	**387**	**855**

Total Primary Electricity	260+208 = 468
Total Direct Fuel	387
Total Primary	**855**

Appendix 2 Worked Example for CHP

Consider the case of a sector comprised of three single facility Target Units, A, B and C. TU B imports some electricity from the grid, but also generates CHP heat and power and consumes all of this. The other TUs source their power needs from the grid and generate the heat they need in boilers. None of the energy generating plant are part of installations covered by EU ETS.

At TP6, the projected position of the sector in terms of the mix and quantities of energy consumed is summarised below.

	A (Metered)	B (Metered/Estimated)	C (Metered)	D (Metered)	E (Metered)
TU	Metered Grid Electricity	Metered/Estimated Heat from Boilers	Metered CHP Heat Consumed	Metered CHP Power Consumed	CHP Fuel for CHP Heat and Power Consumed
A	5,000	12,000			
B	3,500		6,500	4,000	15,000
C	7,000	20,000			
Total	**15,500**	**32,000**	**6,500**	**4,000**	**15,000**

The primary energy associated with consumed energy is given below, with the fuel consumption associated with the consumed CHP heat and power calculated using the CHP algorithm.

F = A x 2.6	G (Metered)	H (Calculated using CHP algorithm)	I (Calculated using CHP algorithm)
Primary Grid Electricity	Metered Direct Fuel to Boilers	Direct Fuel for CHP Power	Direct Fuel for CHP Heat
13,000	14,100		
9,100		8,276	6,724
18,200	24,000		
40,300	**38,100**	**8,276**	**6,724**

The calculations required to generate the figures for the proportion of heat consumed during TP6 that will be generated by CHP (Cell F59) and the primary energy savings that will result from the consumption of this CHP generated heat (Cell G59) are given below.

J = B + C	K = D x 2.6	L = C/81%	M = K + L	N = M - F
Total Metered Heat Consumed	Counterfactual Primary Energy for CHP Power Consumed	Counterfactual Primary Energy for CHP Heat Consumed	Total Counterfactual Primary Energy for CHP Products Consumed	Primary Energy Savings from Consumption of CHP Products
12,000				
6,500	10,400	8,025	18,425	3,425
20,000				
38,500	**10,400**	**8,025**	**18,425**	**3,425**

Yielding the following figures for entry in Evidence Template workbook:

Cell F59 = Total Col C/Total Col J	**16.9%**
Cell G59 = Total Col N/Total Col M	**18.6%**