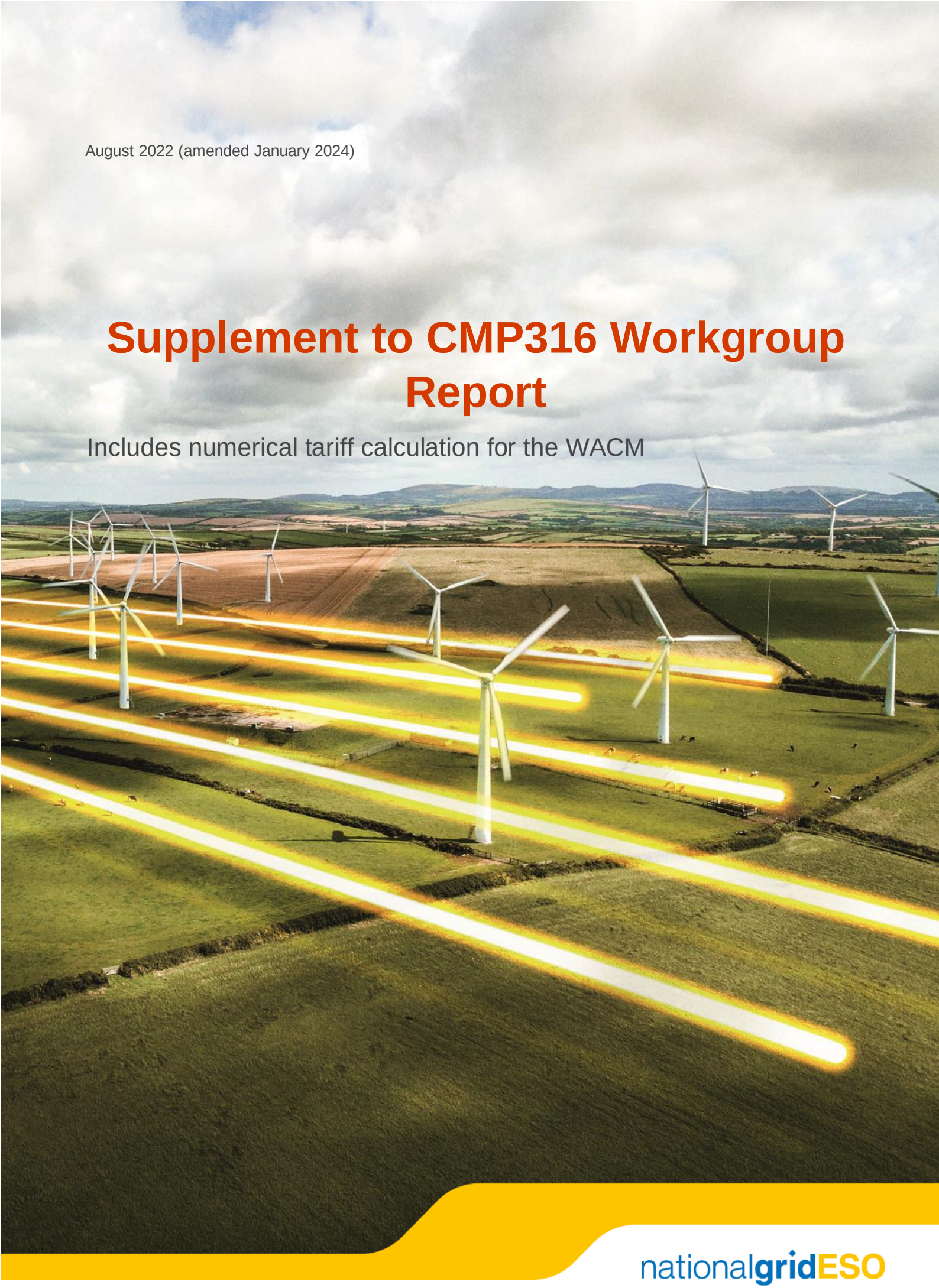
August 2022 (amended January 2024)

Supplement to CMP316 Workgroup Report

Includes numerical tariff calculation for the WACM



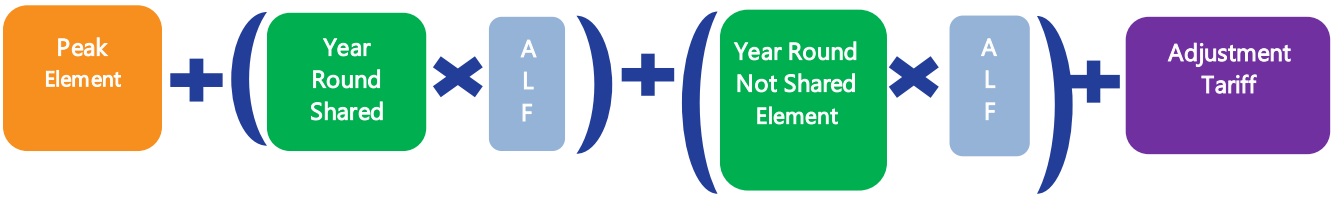
nationalgridESO

Supporting calculations to note

Wider tariffs by generation category:

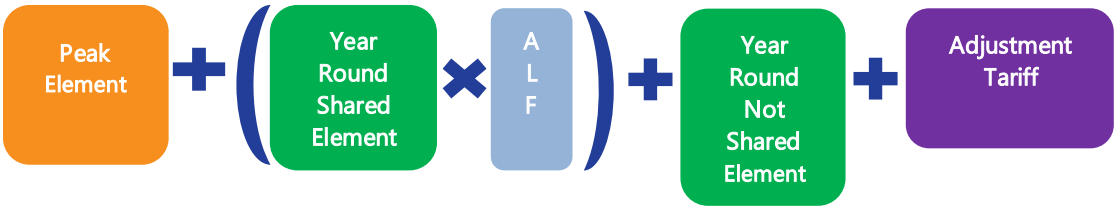
Conventional Carbon Generators

(Biomass, CHP, Coal, Gas, Pump Storage)



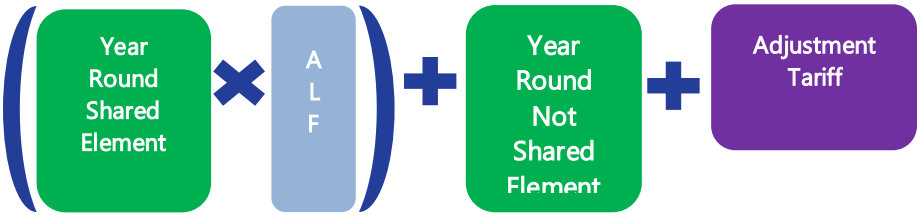
Conventional Low Carbon Generators

(Hydro, Nuclear)



Intermittent Generators

(Wind, Wave, Tidal)



nationalgridESO

Co-located generation site examples

Power station A has TEC of 60MW, and it consists of three BMUs/technology types. The capacity and the annual outputs (MWh) are listed below

	Maximum Capacity (MW)	Fuel type	Annual exporting (MWh)
BMU1	50	Wind	135,000
BMU2	40	CHP	250,000
BMU3	15	Battery	35,000

Given the following wider generation tariffs (note these are not current tariffs provided for illustration only)

Wider Tariffs (£/kW)			
Peak Security	**Shared Year Round**	**Not Shared Year-Round**	**Adjustment**
5	15	12	1

1. Baseline

As the predominant technology is wind, the power station is treated as wind.
As CUSC Section 14

14.15.102 For a given **Financial Year** "t" the Power Station ALF will be based on information from the previous five **Financial Years**, calculated for each **Financial Year** as set out below.

$$ALF = \frac{\sum_{p=1}^{17520} GMWh_p}{\sum_{p=1}^{17520} TECp \times 0.5}$$

The Power Station ALF will use the sum of the annual exporting MWh for each technology type.

ALF = (135000+250000+35000)/(60*8760)=80%

Then for the intermittent generation, its wider tariff is (15X80%+12+1=)£25/kW, and its wider charge is (25X60=) **£1,500k**

2. CMP316 Original solution

ALFs for each technology type are used to calculate a tariff for each technology type, and then these tariffs are applied by multiplying against a scaled capacity for each unit separately.

Note that the scaled capacities must equal the total power station capacity.

However, the ALFs for each technology type will not necessarily equate to the weighted average ALF of the total site. This difference will occur when the metered export of one of the technologies is not exported from the site, but is instead imported by the storage technology instead. In this case the weighted average ALF of the technologies will be greater than the site ALF.

The TEC of the power station is apportioned to each technology according to the Maximum Capacity (as defined within the Grid Code) of the relevant BMUs

As CUSC 14.18.7

For a Multi Technology **Power Station** the **Power Station**'s TEC is allocated across the different technology types, specifically:

$$MTPSTEC_{is} = \frac{CAP_i}{\sum_{i=1}^{n} CAP_i} \times TEC_s$$

Where:
$MTPSTEC_{is}$ = Multi Technology **Power Station**'s TEC for technology i at station s
CAP_i= Maximum Capacity for technology i
TEC_s = TEC of **Power Station** as defined in the Connection Agreement
n = number of different technologies on site

For Multi Technology **Power Station**'s wider liability, the Chargeable Capacities associated with each technology type is the $MTPSTEC_{is}$. The charge for a Multi Technology **Power Station** will be calculated as the summation of all individual technology liabilities as calculated using $MTPSTEC_{is}$.

e.g. for BMU1, MTSPTEC = (50/(50+40+15))*60 = 28.57

	MTPSTEC (MW)
BMU 1 (Wind)	28.57
BMU 2 (CHP)	22.86
BMU 3 (Battery)	8.57
Total (TEC)	**60**

N.B MTPSTEC values are rounded for ease of reading, but will total the site TEC when added

Generation charge

Given the wider generation tariffs

Wider Tariffs (£/kW)			
Peak Security	**Shared Year Round**	**Not Shared Year-Round**	**Adjustment**
5	15	12	1

As CUSC 14.15.102

Single Technology **Power Station** (as 14.15.7) will use the formula above to calculate the **Power Station** ALF. For a Multi Technology **Power Station** (as

14.15.7) where appropriate metering arrangements are in place, an ALF will be calculated for each technology type. Note that the sum of GMWh for a Multi Technology **Power Station** across all technology types will equal the total GMWh for the **Power Station**.

$$ALF_A = \frac{\sum_{p=1}^{17520} GMWh_{Ap}}{\sum_{p=1}^{17520} TEC_p \times 0.5} \ldots.$$

Where:
A denotes each technology type within a **Power Station**
$GMWh_{Ap}$ is the maximum of FPN or actual metered output in a Settlement Period related to the **BM Unit** associated with $MTPSTEC_A$

ALF1=135000/(60*8760)=25.68%

ALF2= 250000/(60*8760)=47.56%

ALF3=35000/(60*8760)=6.66%

There is some rounding in the illustration above. In this example the sum of the technology ALFs does sum exactly to the Power Station ALF with additional decimal places because in this example we assume the battery is importing from the system rather than another on-site technology. If importing from on-site technology, the sum of the technology ALFs could be higher than the site ALF.

Wider tariffs for each technology are

Wind: (15*0.2568+12+1=)£16.85/kW

CHP: (5+15*0.4756+12*0.4756%+1=)£18.84/kW

Battery: (5+15*0.0666+12*0.0666+1=)£7.80/kW

Total charges for each technology are

Wind = 16.85 X 28.6 X 1000 = £481.51k

CHP = 18.84 X 22.9 X 1000 = £430.68k

Battery = 7.89 X 8.6 X 1000 = £66.84k

And the wider charge for this power station is (£481.51k + £430.68k + £66.84k4 =) **£979.03k**

The table below shows how much each tariff component contributes to each charge, for comparison to WACM1:

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£110,078	£342,857	£28,571	£481,507
CHP	£114,286	£163,079	£130,463	£22,857	£430,685
Battery	£42,857	£8,561	£6,849	£8,571	£66.840
Total	£157,143	£281,719	£480,170	£60,000	£979,031

N.B the Adjustment Charge is calculated using MTPSTEC. Some rounding is used in these examples – refer to accompanying spreadsheet for exact figures.

Methodology when any wider tariffs are negative

When one of the BMU wider tariffs is negative, some payments may be reclaimed by NGESO at the end of the charging year, based on the calculation below. This calculation represents the final charge for that year, and as such any net differences between this and initial charges will be accounted for in the general reconciliation.

Instead of using installed capacity, the methodology uses the average output of each technology type over the three settlement periods of highest output from November to the end of February for the relevant year. These three settlement periods are specific to each BMU and must be separated from the other metered values for that BMU by ten clear days.

Instead of using TEC, Chargeable Station Capacity is used by calculating the average output of the station over the three settlement periods of highest output from November to the end of February. The station maximum metered values should also be separated by 10 clear days.

The previous example has been recalculated using the following tariff components:

Peak Security	YRS	YRNS	Adjustment
-5	-15	-12	-1

BMU 1 Wider Tariff = -16.85

BMU 2 Wider Tariff = -18.84

BMU 3 Wider Tariff = -7.80

This initial calculation results in a negative wider tariff for each technology type, meaning that the alternative 'Chargeable MTSPSTEC' calculation now needs to be used for each BMU.

e.g. to calculate Chargeable MTPSTEC for BMU1:

BMU Chargeable Capacities are already pre-defined for the purpose of this example in the table below.

If the highest metered values for BMU1 were 50, 48 and 37, Chargeable Capacity for BMU1 would be (50+48+37)/3 = 45. The same process would be repeated for BMU2 and BMU3 (each using the highest metered values for that specific unit) and at station level (using the highest overall station metered values).

MTPSTEC = BMU Chargeable Capacity/(Chargeable Capacity BMU1 + BMU2 + BMU3)* Station Chargeable Capacity

Chargeable Capacities for this example (average of three highest between Feb – Nov) are shown in table below

Chargeable MTPSTEC = 45/(45+36+13.5)*54 = 25.71

Station Chargeable Capacity = 54

	Maximum Capacity (MW)	**Fuel type**	**Annual exporting (MWh)**	**BMU Chargeable Capacity**	**Chargeable MTPSTEC (Negative Tariff)**
BMU1	50	Wind	135,000	45	25.71
BMU2	40	CHP	250,000	36	20.57
BMU3	15	Battery	35,000	13.5	7.71

The rest of the methodology is then treated in the same way, multiplying by the wider tariffs to give the charges:

	Chargeable MTPSTEC (MW)	Charge (£k)
BMU 1	25.71	-£ 433.36
BMU 2	20.57	-£ 387.62
BMU 3	7.71	-£ 60.16
Total liability:		-£ 881.13

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	£0	£-99,070	£-308,571	£-25,714	£-433,356
CHP	£-102,860	£-146,771	£-117,417	£-20,571	£-387,616
Battery	£-38,570	£-7,705	£-6,164	£-7,714	£-60,155
Total	£-141,429	£-253,547	£-432,153	£-54,000	£-881,128

When there is a mix of positive and negative tariffs, only the BMUs with negative tariffs need to be recalculated with Chargeable MTPSTEC. This is demonstrated in Appendix 1 of this document, and 'CMP316 Mixed' tab of the accompanying spreadsheet document.

3. CMP316 WACM Solution

The WACM calculates the charges for each technology type by component, with a different calculation for each. The ALF is treated differently, proportioning on MTPSTEC rather than site TEC.

The TEC of the power station is apportioned to each technology according to the maximum capacity of the relevant BMUs.

The metered export of each technology type is still used as the numerator in the ALF calculations.

The solution does not change the calculation of the tariffs. The tariff calculation is as the Original proposal. The charges differ by use of MTPSTECPK, MTPSECS and a scaling adjustment to account for the different capacity denominator used in the ALF calculation .

As CUSC 14.8.7 (note MTPSTECPK – used for each technology type could sum to less than the Power Station TEC but cannot higher than TEC)

MTPSTECPK is introduced for the purpose of calculating generation charge, and is calculated by allocating TEC in the following way:
$MTPSTECPK_{A...}$ is sum of Maximum Capacity (MC) for each technology type as long as the associated technology attracts a peak tariff component. (Where the associated technology does not attract a peak tariff component then the formula will consider that MC will be zero)
Note $MTPSTECPK_{A...}$ is capped at the MTPSTEC or technology MC, whichever is lower.

For each wider component (Peak Security; Year Round Not-Shared; Year Round), if Maximum Capacity for each technology does not attract peak security tariff then it will be removed from the denominator of calculation. This will be capped at the Maximum Capacity for each technology, whichever is lower, and therefore MTPSTEC could be lower than TEC. This applies for Generation Charges (14.18) procedures.

$$MTPSTECPK_{is} = \min\left(\frac{CAP_i}{\sum_{i=1}^{m} CAP_i} \times TEC_s, CAP_i\right)$$

Where CAP_i = Maximum Capacity for technology i to which peak security tariff applies
m = the number of technologies that attract peak security tariff

For Multi Technology **Power Station**s, 'Chargeable Capacity' is based on $MTPSTEC_{is}$ for year round wider tariff components and adjustment component, and based on $MTPSTECPK_{is}$ for peak security component. The charge for a Multi Technology **Power Station** will be calculated as the summation of all individual technology liabilities as calculated using $MTPSTEC_{is}$ and $MTPSTECPK_{is}$

	MTPSTEC (MW)	**Peak Capacity (MW) MTPSTECPK**
Technology 1 (Wind)	28.57	0
Technology 2 (CHP)	22.86	40
Technology 3 (Battery)	8.57	15
Total	**60**	**55**

Note MTPSTECPK is less than site TEC in this example.

Generation charge

Given the wider generation tariffs

Wider Tariffs (£/kW)			
Peak Security	**Shared Year Round**	**Not Shared Year-Round**	**Adjustment**
5	15	12	1

As CUSC 14.15.102

$$ALF_A = \frac{\sum_{p=1}^{17520} GMWhAp}{8760\ X\ MTPSTEC_A}$$

Where:
A denotes each technology type within a **Power Station**
$GMWh_{Ap}$ is the maximum of FPN or actual metered output in a Settlement Period related to the **BM Unit** associated with $MTPSTEC_A$

ALF1=135000/(28.6*8760)=53.94%

ALF2= 250000/(22.9*8760)=124.86%

ALF3=35000/(8.6*8760)=46.61%
(note that an ALF at technology level, for the WACM, can exceed 100%,but the station ALF would not exceed 100%)

The Peak charge for each technology type is MTPSTECPK x Peak Security Tariff:

Wind = 0 x 5 = £0

CHP = 40 x 5 = £200k

Battery = 15 x 5 = £75k

The Year Round Shared charge for each technology type is ALF x MTPSTEC x YRS Tariff:

Wind = 53.94% x 28.6 x 15 = £231.16k

CHP = 124.86% x 22.9 x 15 = £428.08k

Battery = 46.61% x 8.6 x 15 = £59.93k

The Adjustment Charge for each technology type is Adjustment Tariff x MTPSTEC:

Wind = 1 x 28.57 = 28.57

CHP = 1 x 22.86 = 22.86

Battery = 1 x 8.57 = 8.57

The Year Round Not Shared charge is then based off a different scaled capacity.

14.15.103 **For a Multi Technology Power Station (as 14.15.7), a secondary Annual Load Factor "Effective ALF" (EALF) is also used in the charging calculation. Where the the technology type is Intermittent, EALF will equal 1. For all other technology types EALF will be equal to ALF.**

An effective capacity is calculated which calculates how much capacity each technology would be liable for if they were separate stations with full TEC.

Intermittent and Conventional Low Carbon Effective ALF is treated as 1, Conventional Carbon is the same as the usual ALF

EALF1=135000/(28.6*8760)=100%

EALF2= 250000/(22.9*8760)=124.86%

EALF3=35000/(8.6*8760)=46.61%

Effective Capacity = Max Capacity x **EALF**

If total effective capacity exceeds TEC (which it does in this example), it is then scaled to equal TEC. This is summarised in legal text by introducing MTPSECS (Muti Technology Power Station Effective Capacity Scaled)

MTPSECS is introduced for the purpose of calculating the Year Round Not Shared Element of the generation charge (Multi Technology Power Station Effective Capacity Scaled). It uses the EALF (as per 14.15.104) multiplied by the technology maximum capacity, and then scaled so that total effective capacity does not exceed the PS TEC.

$$MTPSECS_{is} = min\left(\frac{EALF_i \times CAP_i}{\sum_{i=1}^{m} EALF_i \times CAP_i}\right) xTEC_s, (EALF \times CAP_i)$$

Where:
$MTPSECS_{is}$ = Multi Technology Power Station's Effective Capacity Scaled for technology i at station s
CAP_i = Maximum Capacity for technology i to which peak security tariff applies
m = the number of technologies that attract peak security tariff
TECs = TEC of Power Station as defined in the Connection Agreement
EALF is equal to 1 for intermittent or Conventional Low Carbon technology type, or ALF for Conventional Carbon as per 14.15.103)
MTPSECS is multiplied by the Year Round Not Shared tariff to calculate the Year Round Not Shared element of the generation charge.

Effective Capacity = **EALF** x Max Capacity:

Wind = 100% x 50 = 50.00MW

CHP = 124.86% x 40 = 49.94MW

Battery = 46.61% x 15 = 6.99MW

This gives a total of 107 MW, meaning that capacity needs to be scaled by 60/107:

Effective Capacity Scaled

Wind: 28.05MW

CHP 28.02MW

Battery = 3.92MW

This could also be calculated by using the summarised legal text formula e.g:

$$MTPSECS_{wind} = min\left(\frac{1 \times 50}{(1 \times 50) + (1.2486 \times 40) + (0.4661 \times 15)}\right) \times 60, (1 \times 50) = 28.05$$

The Year Round Not Shared charge for each technology type is MTPSECS x YRNS Tariff:

Wind = 28.05MW x 12 = £336.65k

CHP = 28.02MW x 12 = £336.27k

Battery = 3.92MW x 12 = £47.08k

Total Charges:

Wind = 0 + 231.16 + 336.65 + 28.57 = £596.39k

CHP = 200 + 428.08 + 336.27 + 22.86 = £987.21k

Battery = 75 + 59.93 + 47.08 + 8.57 = £190.58k

Total = £1714.18k

The table below shows how much each tariff component contributes to each charge, for comparison to the original:

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£231,160	£336,650	£28,570	£596,390
CHP	£200,000	£428,080	£336,270	£22,860	£987,210
Battery	£75,000	£59,930	£47,080	£8,570	£190,580
Total	£275,000	£719,180	£720,000	£60,000	£1,774,180

Change to methodology when any wider tariffs are negative

When any of the tariff components are negative, some payments may be reclaimed by NGESO at the end of the charging year, based on the calculation below. This calculation represents the final charge for that year, and as such any net differences between this and initial charges will be accounted for in the general reconciliation.

BMU Chargeable Capacities are already pre-defined for the purpose of this example in the table below.

The trigger for the methodology change in the WACM is when any of the tariff components are negative. Instead of using installed capacity, the methodology uses the average output of each technology type over the three settlement periods of highest output from November to the end of February for the relevant year when calculating the capacity to be applied to a negative component.. These three settlement periods are specific to each BMU and must be separated from the other metered values for that BMU by ten clear days. Instead of using TEC, Chargeable Station Capacity is used by calculating the average output of the station over the three settlement periods of highest output from November to the end of February. The station maximum metered values should also be separated by 10 clear days.

In this example, all tariff components are negative, therefore the chargeable capacity will have to be used for calculation of all components. Note that the ALF and EALF will be unchanged from the positive example, only the capacities change.

If the highest metered values for BMU1 were 50, 48 and 37, Chargeable Capacity for BMU1 would be (50+48+37)/3 = 45. The same process would be repeated for BMU2 and BMU3 (each using the highest metered values for that specific unit) and at station level (using the highest overall station metered values).

Peak Security	YRS	YRNS	Adjustment
-5	-15	-12	-1

	Maximum Capacity (MW)	**Fuel type**	**Annual exporting (MWh)**	**BMU Chargeable Capacity**	**ALF**	**EALF**
BMU1	50	Wind	135,000	45	54%	100%
BMU2	40	CHP	250,000	36	124.86%	124.86%

BMU3	15	Battery	35,000	13.5	46.61%	46.61%

Chargeable MTPSTEC (for YRS and Adjustment Charges):

e.g. for BMU1 Chargeable MTPSTEC = (45/(45+36+13.5))*54 = 25.71

Using the same method, BMU2 = 20.57 and BMU3 = 7.71

Chargeable MTSPSTECPk (for peak charge):

As BMU1 is Intermittent technology type which does not attract a peak tariff, value is 0

E,g, BMU2 = MIN: (36/(0+36+13.5)*54 OR 36 = 36

BMU3 = 13.5

Chargeable MTPSECS (for YRNS charge):

e.g. for BMU1 = MIN: (1 x 45/(1x45+1.25x36+0.47x13.5))*54 OR 1*45 = 25.25

BMU2 = 25.22, BMU3 = 3.53

	Chargeable MTPSTEC (MW) (Adjustment)	Chargeable MTPSTECPK (MW) (Peak Charge)	Chargeable MTPSECS
BMU 1	25.71	0	25.25
BMU 2	20.57	36.00	25.22
BMU 3	7.71	13.50	3.53

Tariffs will then be as follows:

Peak =Chargeable MTPSTECPk x Peak Security Tariff

YRS = ALF x Chargeable MTPSTEC x YRS Tariff

YRNS = Chargeable MTPSECS x Not Shared Year Round Tariff

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£-208,050	£-302,990	£-25,710	£-536,750
CHP	£-180,000	£-385,270	£-302,640	£-20,570	£-888,490
Battery	£-67,500	£-53,940	£-42,370	£-7,710	£-171,520
Total	£-247,500	£-647,260	£-648,000	£-54,000	£-1,596,760

4. Comparison of Original and WACM

Comparison of Positive Examples:

Baseline

Total charge = £1,500,000

Original

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£110,078	£342,857	£28,571	£481,507
CHP	£114,286	£163,079	£130,463	£22,857	£430,685
Battery	£42,857	£8,561	£6,849	£8,571	£66.840
Total	£157,143	£281,719	£480,170	£60,000	£979,031

WACM

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£231,160	£336,650	£28,570	£596,390
CHP	£200,000	£428,080	£336,270	£22,860	£987,210
Battery	£75,000	£59,930	£47,080	£8,570	£190,580
Total	£275,000	£719,180	£720,000	£60,000	£1,774,180

Comparison of Negative Examples:

Original

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	£0	£-99,070	£-308,571	£-25,714	£-433,356
CHP	£-102,860	£-146,771	£-117,417	£-20,571	£-387,616
Battery	£-38,570	£-7,705	£-6,164	£-7,714	£-60,155
Total	£-141,429	£-253,547	£-432,153	£-54,000	£-881,128

WACM

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£-208,050	£-302,990	£-25,710	£-536,750
CHP	£-180,000	£-385,270	£-302,640	£-20,570	£-888,490
Battery	£-67,500	£-53,940	£-42,370	£-7,710	£-171,520
Total	£-247,500	£-647,260	£-648,000	£-54,000	£-1,596,760

Comparison of Mixed Examples (Methodology in Appendix 1 and 2)

Original

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£110,078	£342,857	£-28,571	£424,364
CHP	£-114,286	£163,079	£130,463	£-22,857	£156,399
Battery	£-38,571	£7,705	£6,164	£-7,714	£-32,416
Total	£-152,857	£280,862	£479,484	£-59,142	£548,350

WACM

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£231,160	£336,650	£-25,710	£542,100
CHP	£-180,000	£428,080	£336,270	£-20,570	£563,780
Battery	£-67,500	£59,930	£47,080	£-7,710	£31,790
Total	£-247,500	£719,180	£720,000	£-54,000	£1,137,680

Appendix 1: Original Mix of Positive and Negative Tariffs

As with the previous examples, the first step is to calculate an initial tariff for each BMU using MTPSTEC

Peak Security	YRS	YRNS	Adjustment
-5	15	12	-1

	Maximum Capacity (MW)	**Fuel type**	**Annual exporting (MWh)**	**BMU Chargeable Capacity**
BMU1	50	Wind	135,000	45
BMU2	40	CHP	250,000	36
BMU3	15	Battery	35,000	13.5

Station Chargeable Capacity =54MW

TEC = 60MW

e.g. for BMU1 :

*BMU1 ALF = 135000/(60*365*24) = 25.70%*

BMU1 Tariff = Peak+ (ALFxYRS) + YRNS - Adjustment =0+ (0.257x15)+12-1 = 14.85

This results in the following initial tariffs

BMU 1 Wider Tariff = 14.85

BMU 2 Wider Tariff = 6.84

BMU 3 Wider Tariff = -4.20

As BMU1 and 2 have positive tariffs, they use MTPSTEC:

MTPSTEC BMU1 = (50/(50+40+15)) x 60 = 28.57

MTPSTEC BMU2 = (40/(50+40+15)) x 60 = 22.86

As BMU3 has a negative tariff, the chargeable MTPSTEC (based on max metered values) for BMU3 needs to used:

Chargeable MTPSTEC for BMU3 = 13.5/(45+36+13.5)*54 = 7.71

Charges are then:

BMU1 = 28.57 x 14.85 = £424.36

BMU2 = 22.86 x 6.84 = £156.40

BMU3 = 7.71 x -4.20 = £-32.42

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£110,078	£342,857	£-28,571	£424,364
CHP	£-114,286	£163,079	£130,463	£-22,857	£156,399
Battery	£-38,571	£7,705	£6,164	£-7,714	£-32,416
Total	£-152,857	£280,862	£479,484	£-59,142	£548,350

Appendix 2: WACM Mix of Positive and Negative Tariffs

Change to methodology when any wider tariffs are negative

The methodology change is only applied to any tariff components which are negative. As in the original, this triggers the use of maximum metered outputs instead of installed capacities and TEC. If the tariff components are as follows:

Peak Security	YRS	YRNS	Adjustment
-5	15	12	-1

	Maximum Capacity (MW)	**Fuel type**	**Annual exporting (MWh)**	**BMU Chargeable Capacity**	**ALF**	**EALF**
BMU1	50	Wind	135,000	45	54%	100%
BMU2	40	CHP	250,000	36	124.86%	124.86%
BMU3	15	Battery	35,000	13.5	46.61%	46.61%

Peak and Adjustment Charges use maximum metered values (Chargeable MTPSTECPk for Peak and Chargeable MTPSTEC for Adjustment)

YRS and YRNS uses the standard methodology to calculate MTPSTEC and MTPSECS

MTPSTEC (YRS Charge):

e.g. for BMU1 = (50/(50+40+15))*60 = 28.57

BMU2 = 22.86, BMU3 = 8.57

Chargeable MTPSTEC (Adjustment Charge):

e.g. for BMU1 Chargeable MTPSTEC = (45/(45+36+13.5))*54 = 25.71

Using the same method, BMU2 = 20.57 and BMU3 = 7.71

Chargeable MTSPSTECPk (for peak charge):

As BMU1 is Intermittent technology type which does not attract a peak tariff, value is 0

E,g, BMU2 = MIN: (36/(0+36+13.5)*54 OR 36 = 36

BMU3 = 13.5

MTPSECS (for YRNS charge):

e.g. for BMU1 = MIN: (1 x 50/(1x50+1.25x40+0.47x15))*60 OR 1*45 = 28.05

BMU2 = 28.02, BMU3 = 3.92

	Chargeable MTPSTEC (MW) (Adjustment)	Chargeable MTPSTECPK (MW) (Peak Charge)	MTPSTEC (YRS Charge)	MTPSECS (YRNS Charge)
BMU 1	25.71	0	28.57	28.05
BMU 2	20.57	36	22.86	28.02
BMU 3	7.71	13.5	8.57	3.92

Tariffs will then be as follows:

Technology	Peak Charge	YRS	YRNS	Adjustment	Total
Wind	0	£231,160	£336,650	£-25,710	£542,100
CHP	£-180,000	£428,080	£336,270	£-20,570	£563,780
Battery	£-67,500	£59,930	£47,080	£-7,710	£31,790
Total	£-247,500	£719,180	£720,000	£-54,000	£1,137,680

Appendix 3: Reconciliation

Starting with the negative example from the Original solution:

1.The initial tariffs were calculated for each BMU:

BMU 1 Wider Tariff = -16.85 (MTPSTEC 28.6)

BMU 2 Wider Tariff = -18.84 (MTPSTEC 22.9)

BMU 3 Wider Tariff = -7.80 (MTPSTEC 8.6)

2.Throughout the year, the Power Station will be paid on the basis of these tariffs, so:

BMU1 Charge = -16.85 x 28.6 = £-481.51k

BMU2 Charge = -18.84 x 22.9 = £-430.68k

BMU3 Charge = -7.80 x 8.6 = £-66.84k

Payment to Power Station = £979.03k

3.Generator will be paid £481.51 + £430.68 + £66.84 = £979.03k throughout the year

4.After the end of the charging year, ESO will use the negative methodology to calculate the final tariffs. For the Original solution example. These were:

BMU 1 Charge = £-433.36k

BMU2 Charge = £-387.62k

BMU3 Charge = £-60.16k

Payment to Power Station = £881.13k

5.As payment to the generator is lower following the updated calculation, ESO will need to reclaim the following:

Reconciliation amount = £979.03k - £881.13k = £97.90k

Appendix 4: WACM Mix of Positive and Negative Tariffs

Acronym / key term	Meaning
ALF	Annual Load Factor
BMU	Balancing Mechanism Unit
BSC	Balancing and Settlement Code
CAPi	Maximum Capacity for Technology i
Chargeable Capacity	Chargeable Capacity is the basis of the generation charge, where Local Annual Liability = Chargeable Capacity x Local Tariff
CHP	Combined heat and power
CMP	CUSC Modification Proposal
CUSC	Connection and Use of System Code
EALF	Effective ALF
EBR	Electricity Balancing Regulation
ESO	Electricity System Operator
GC	Generation Capacity

GWh	Gigawatt hours
MTPSECS	Multi Technology Power Station Effective Capacity Scaled
MTPSTEC	Multi Technology Power Station TEC for each technology
MTPSTECPk	Multi Technology Power Station TEC (Peak)
Mod App	Modification Application (to a Connection Contract)
MWh	Megawatt hours
NETS	National Electricity Transmission System
PV	Photo Voltaic
SCR	Significant Code Review
SQSS	Security and Quality of Supply Standards
STC	System Operator Transmission Owner Code
T&Cs	Terms and Conditions
TDR	Transmission Demand Residual
TEC	Transmission Entry Capacity
TNUoS	Transmission Network Use of System
YRNS	Year Round Not Shared
YRS	Year Round Shared