Single Electricity Market Committee

Policy Parameters 2011

Consultation Paper

SEM-10-043

7 July 2010

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1. Introduction

The SEM Trading and Settlement Code (the Code) sets out a number of policy parameters which are determined by the Regulatory Authorities (RAs) on an annual basis.

VoLL/PCAP/PFLOOR

In accordance with paragraph 4.12 and 4.95 of the Code, the Regulatory Authorities (RAs) are required to determine the following three administered prices:

- the Value of Lost Load (VOLL);
- the Market Price Cap (PCAP); and,
- the Market Price Floor (PFLOOR).

Following consultation last year, the RAs decided (SEM-09-067) for the period from 1st January 2010 to 31st December 2010 that:

- PCAP will remain unchanged at €1,000/MWh;
- PFLOOR will remain unchanged at minus €100/MWh.

This Consultation Paper undertakes a review of the effectiveness of PCAP and PFLOOR with a view to setting the values for 2011.

The calculation of VOLL for 2011, using the methodology decided upon in 2007, will be published later in the year, to meet the requirement in paragraph 4.95 of the Code.

Uplift Parameters

Under paragraphs 4.70 and 4.71 of the Code, the RAs are also required to determine three parameters used in the calculation of Uplift[1]. These are:

- The Uplift Alpha value α, which governs the importance of the Uplift Cost Objective, such that $0 \leq \alpha \leq 1$;
- The Uplift Beta value β, which governs the importance of the Uplift Profile Objective, such that $0 \leq \beta \leq 1$ and such that $\alpha + \beta = 1$; and
- The Uplift Delta value δ, to constrain the overall impact on revenue in each Trading Day t arising from the Uplift calculation, such that $\delta \geq 0$.

Following consultation, the Regulatory Authorities last year decided (SEM-09-095) for the period from 1st January 2010 to 31 December 2010 that:

- α should be set to a value of zero;
- β should be set to a value of 1; and,

[1] For more on the background to the methodology and objectives of Uplift in the SEM see the following: Objectives of the Function to Include Start-Up and No-load Costs in SMP(AIP/SEM/92/06), SMP Uplift Objectives – Decision Paper (AIP/SEM/142/06), SMP Uplift Parameters Consultation (AIP/SEM/230/06), and SMP Uplift Methodology and Parameters – Decision Paper (AIP/SEM/51/07)

- δ should be set to a value of 5.

As stated in previous consultations, the RAs intend to monitor the effectiveness of the proposed Uplift Methodology. This paper presents some analysis of the behaviour of Uplift for the period November 2007 to April 2010 and proposes values for the three Uplift values (α, β and δ) for the year 2011.

2. PCAP

In each of the previous decision papers on PCAP, it was noted that the RAs were satisfied that:

- the various measures put in place to mitigate market power in the SEM (directed contracts and the requirement to bid at short run marginal cost) would limit the need for a cap on wholesale prices as a defence against the abuse of market power;
- the requirement on generators to bid at Short-run Marginal Cost (SRMC) should avoid prices in the SEM from spiking for reasons other than a spike in short run marginal costs (e.g. reflecting a spike in fuel prices) or from a spike in uplift;
- there was nonetheless a case for setting PCAP at a conservative level, at least until:
    - there was adequate liquidity in the contract market to enable participants to manage risk effectively;
    - there was sufficient certainty that the MSP software does not frequently drive prices to PCAP at times when all load is actually being served.

The RAs therefore decided to set PCAP at a number which was a reasonable multiple of the expected SRMC of the most expensive plant on the system. It was argued that this would:

- allow for variations in SRMC during the year to be reflected in SMP without constraint; and,
- ensure that no generator would be expected to generate at a loss if its SRMC was higher than PCAP.

Thus since the beginning of the market, the RAs set PCAP at €1,000/MWh. This level is set to be at a margin above the highest SMP that could be expected in the market in the following year, but not so high as to allow prices to go to excessive levels in the event that the MSP Software fails to determine a price when there is an Insufficient Capacity Event.

2.1 Price outcomes for the previous year in the SEM

In order to propose the value for PCAP for 2011 and to gauge its performance to date, it is instructive to examine prices over the course of the previous year.

Market data, relating to the Ex-Post Initial SMPs from the D+4 run, for the period from 1 May 2009 to 30 April 2010 show that:

- On one occasion SMP was set at PCAP. This was due to a setting in the market systems where, due to inconsistent application of tolerance levels between different phases of the MSP programme, there was an under-commitment of Generator Units which resulted in the ensuing Price Cap.[2] A software fix has since been deployed to resolve the defect and the relevant Trading Day was subsequently repriced and

[2] Further information on this incident is available in the following Market Incident Report, published by SEMOP http://www.allislandmarket.com//FTP/Market%20Publications/Ad%20Hoc%20Publications/Market%20Incident%20Report,%20January%2020th%202010.pdf

resettled. Note that the analysis in this paper uses the original data and not the revised data calculated following the repricing.

- SMP has exceeded €500/MWh on three occasions from the year May 2009 to April 2010 (0.02% of the time), as the table below shows:

SMP (€/MWh)	Occurrences (May '09 to April '10)	Percentage
500 +	3	0.02%
400 – 500	2	0.01%
300 – 400	41	0.23%
200 – 300	38	0.22%
100 – 200	320	1.83%
70 -100	483	3%
50 – 70	2942	17%
0 – 50	13689	78%

- The three prices above €500/MWh were as follows:

Highest SMPs May '09 to April '10	Date and Time
€1000 /MWh	20th January 2010 at 5 p.m.
€580.53 /MWh	25th August 2009 at 9 a.m.
€561.60 /MWh	9th September 2009 at 5 p.m.

Apart from the event discussed previously, where the price hit PCAP due to a systems defect, uplift has been responsible for spikes in SMP on a number of occasions. Notably it was the main cause of the two SMPs over €500 /MWh over the period examined - occurring at 09.00 on 25th August 2009 with a price of €580.53/MWh and at 17.00 on 9th September 2009 with a price of €561.60/MWh. Uplift in both cases was between €520/MWh and €530/MWh and was related to the recovery of start up costs for a unit in Ballylumford over one trading period.

- In the period being considered, the SMP exceeded €200/MWh in 84 trading periods (0.48% of the time). This compares with 117 trading periods (0.66% of the time) in the previous year (25th April 2008 to 24th April 2009).

One further relevant observation on price trends from January 2010 until end April 2010:

- Since 1 January 2010, the SMP has exceeded €400/MWh on just two occasions, one of which was the PCAP event.

2.2 Effectiveness

If SMP is frequently being set at PCAP - for reasons other than Insufficient Capacity Events in the MSP software or an inability of the software to reach a feasible solution - then it could be argued that PCAP was set at too low a level and that it was preventing the proper functioning of the price-setting algorithms in the market software.

The fact that PCAP was set at a level sufficiently in excess of the SRMC of the most expensive unit on the system as to allow prices to be set as intended by the MSP software without constraint suggests that PCAP was effective in achieving its objectives – i.e. allowing for variations in SRMC during the year to be reflected in SMP without constraint and ensuring that no generator would be expected to generate at a loss if its SRMC was higher than PCAP.

On the other hand, the issue with the different tolerance levels with the phases of the market engine, which resulted in the PCAP being hit for the Trading Day of 20th January, shows that when such an incident occurs, PCAP can prevent huge prices from being reached[3].

A PCAP of €700/MWh would have been equally effective in achieving the objectives of a price cap in the SEM. However, for the reasons given previously i.e. the fact that other measures are in place to prevent prices from spiking for reasons other than SRMC bidding and because Insufficient Capacity Events are rarely likely to be declared by the MSP software, the RAs continue to see merit in maintaining the present level for PCAP. Furthermore, in the setting of parameter values in the SEM, the RAs are cognisant of the need for as much certainty as possible for participants operating in the market.

The data presented for the year May 2009 to April 2010 above indicates that in general SMP has been lower and indeed there are fewer occurrences of price spikes relative to the period reviewed for the setting of the 2010 PCAP. Fuel prices have remained relatively stable in 2010 and forward fuel prices for the coming year are not significantly different from forward prices in 2007 when PCAP was set. Any argument that PCAP should be set to a lower value to reflect the decline in oil and gas prices relative to 2008 must be tempered by this consideration. The RAs would also point to the fact that when fuel and carbon prices reached record highs in mid-2008, the level of PCAP was maintained at €1000/MWh.

2.3 Proposal

The SEM Committee therefore proposes to leave PCAP unchanged at €1,000/MWh for 2011.

[3] It should be noted that the Trading Day in question has since been repriced and therefore the original PCAP is not a valid price.

3. PFLOOR

At the conclusion of last year's consultation, the RAs noted that:

- The majority of respondents agreed that PFLOOR should remain unchanged at minus €100/MWh for 2010;
- In an excessive generation event, the market price should send an efficient market signal both to generation and demand that there is an excess of generation and/or low demand. Such a signal should not be mitigated such that it prevents consumers from benefitting from negative prices which reflect market dynamics.

The RAs set PFLOOR in the SEM at minus €100/MWh, a level sufficiently below zero to allow renewable generators to bid the opportunity cost of their Renewable Obligation Certificates[4] and for CHP units to bid the opportunity cost of using their heat boilers.

3.1 Price outcomes so far in the SEM

Market data, relating to the Ex-Post Initial SMPs from the D+4 run, for the period from 1 May 2009 to 30 April 2010 show that:

- SMP has never been negative;
- PFLOOR has never been hit;
- The lowest SMP set in this period was €4.12/MWh[5] for two trading periods on the 22nd November 2009, where a CHP unit set the shadow price in the market of €4.12/MWh;
- There has been a marked increase (from 25% to 78%) in the number of trading periods where the SMP was below €50/MWh when compared to the previous year;
- Negative PQ bids have been submitted for CHP units[6], with the highest negative bid being minus €90.52/MWh; and,
- No Excessive Generation Events have been called.

3.2 Effectiveness

As was the case in previous years, the fact that SMP has not been set at PFLOOR since the SEM began indicates that it has been effective in achieving its purpose. If SMP had frequently been set at PFLOOR - for reasons other than Excessive Generation Events in the

[4] Setting the PFLOOR to minus €100/MWh would allow eligible renewable Variable Price Maker Generating Units in Northern Ireland to bid the opportunity cost of their Renewable Obligation Certificates (ROCs) with a margin to spare, given that the 'buyout' price for 2010/11 stands at £36.99.

[5] Note that the lowest SMP in the market thus far was €3.29/MWh, between 3:30am and 5:00 am on 23rd October 2008, where one of the hydro units operating in the market set the shadow price of €0/MWh.

[6] It should be noted that these particular CHP units have since been reregistered as price taker units and therefore no longer bid into the market.

MSP software - then it might be argued that PFLOOR was set at too high a level and that it was preventing the proper functioning of the price-setting algorithms in the market software.

The fact that SMP has never been set at PFLOOR indicates that prices have been set by the MSP software without constraint. This would suggest that PFLOOR has been effective in achieving its objectives of minimising exposure of participants to negative prices whilst allowing for an efficient market price signal.

Unlike other years when PFLOOR was set, given that there have been negative bids submitted by a generator, a PFLOOR higher than minus €100/MWh (e.g. minus €50/MWh or zero) would not have been as effective in achieving the objectives of a price floor in the SEM. The RAs continue to see merit in giving generators that are prepared to pay to stay on the system, rather than be constrained off, the opportunity to reflect that willingness to pay in negative price bids.

The period examined (May 2009-April 2010) shows a higher occurrence of prices below €50/MWh relative to the period reviewed for the setting of the 2010 PFLOOR, reflecting lower underlying fuel costs, a significant decline in demand and an increase in price taking generation. However, an Excessive Generation Event has yet to be declared by the MSP software and prices remain unlikely to go negative for reasons other than generator bidding behaviour. Notwithstanding this, the future setting of PFLOOR may need to take into account the prospect of excessive generation events occurring as increasing levels of variable price taking generation come on the system, in addition to the increase in generators bidding negatively. This issue is being examined in more detail as part of the RAs Dispatch and Scheduling workstream[7], on which a proposed decision is due shortly.

3.3 Proposal

The SEM Committee therefore proposes to leave PFLOOR unchanged at minus €100/MWh for 2011.

[7] Principles of Dispatch and the Design of the Market Schedule in the Code : Consultation Paper http://www.allislandproject.org/en/renewable_current_consultations.aspx?article=e0c599c8-6b2c-4931-b7cd-d2f818bed836

4. Uplift Parameters

As with the consultation on the 2010 Uplift Parameter values, the Regulatory Authorities are approaching this consideration of the Uplift Parameters from the perspective of seeking to determine whether there is evidence that change is required, rather than from the perspective of a repeat of the full review process that concluded with the Decision Paper of 15th March 2007[8].

4.1 Analysis

The Uplift values[9] calculated over the optimisation time horizon are optimised to meet two objective functions:

1. Minimising Uplift revenues (the cost objective); and,
2. Minimising Shadow Price distortion (the profile objective).

These functions are weighted within the optimisation by two Uplift parameters, α and β. In addition, a third Uplift parameter, δ, constrains the overall impact on revenue of the Uplift calculations.

The Code defines that α and β are complementary, such that $0 \leq \alpha \leq 1$, $0 \leq \beta \leq 1$ and $\alpha + \beta = 1$. The Regulatory Authorities concluded in the decision paper on the 2010 Uplift parameter values (SEM-09-095) that α = 0, β = 1, δ = 5 were the most appropriate Uplift parameters and that they provided the most appropriate balance of costs and price stability.

In considering the Uplift Parameter values for 2011, the RAs have undertaken further statistical analysis to examine the performance of Uplift and to determine whether the relationships between SMP, Shadow Prices and Uplift values have substantially changed from the previous analysis undertaken for the 2010 values.

[8] See http://www.allislandproject.org/GetAttachment.aspx?id=ed31f7f2-57d3-4a9c-b00d-9150e3fc93c5 for further details

[9] The uplift element of SMP is explicitly designed to cover the costs of start-up and no-load, and is defined such that all price maker generator units should, within each period of continuous operation, recover their scheduled costs of operation from SMP payments (i.e. without resort to make whole payments to individual generators). Uplift is calculated in an optimisation which minimises a weighted sum of total generator revenue and the sum of the square of the uplift price, reflecting the objectives set out in the Code

Previous Data Set – November 2007 to May 2009

The analysis in the 2010 consultation paper (SEM-09-066) was undertaken using a dataset covering the period 1 November 2007 to 15 May 2009. The statistics presented in that paper are shown below:

€/MWhr where appropriate	Shadow	Uplift	SMP
Mean	62.24	7.61	70.85
Median	57.43	0.77	61.36
Maximum	551.5	645.5	696.9
Minimum	0.00	0.00	3.29
Standard Deviation – All Trading Periods[10]	31.53	16.03	37.96
Coefficient of variation[11]	0.499	2.107	0.536

SMP correlated with…	Shadow	Uplift
Correlation	0.910	0.578

New Data Set — May 2009 to April 2010

The RAs have examined the data relating to the Ex-Post Initial SMPs (from the D+4 run) for one year from May 2009 to April 2010 and the following are the results:

€/MWhr where appropriate	Shadow	Uplift	SMP
Mean	34.5	8.1	42.6
Median	33.7	1.0	37.5
Maximum	1000	529.7	1000
Minimum	4.1	0.0	4.1
Standard Deviation - All Trading Periods	18.2	18.1	27.55
Coefficient of variation	0.53	2.24	0.65

SMP correlated with…	Shadow	Uplift
Correlation	0.759	0.756

[10] Standard deviation is a statistical term that provides a good indication of volatility. It measures how widely values (half hourly prices in this instance) are dispersed from the average. The larger the difference between prices in each half hour and the average price, the higher the standard deviation and the higher the volatility.

[11] The coefficient of variation, which is a normalised measure of volatility, is the ratio of the Standard Deviation to the Mean and can be used to compare Standard Deviations.

From this we can see that there are some changes to the observed data. In particular we note that:

- the mean and median of the Shadow Price and SMP have fallen, which can be explained by the lower fuel prices and reduced demand;
- the standard deviation of the Shadow Price and SMP have fallen substantially, implying less volatility – this is explained by lower Shadow Prices and SMPs more generally;
- the coefficient of variation for Shadow Price, Uplift and SMP have increased marginally – this is primarily due to the lower mean values;
- the correlation between SMP and Uplift has increased - this can be explained as Uplift is making up a larger portion of SMP than had been the case and the opposite is true for Shadow price where the correlation between SMP and Shadow Price has decreased. However, given that the Uplift parameters used are designed to produce this effect, a strong correlation still exists between SMP and Shadow Price.

In last year's consultation paper, consideration was given to the effect of the specific outlier events on the statistics. Two particular outliers, with SMPs of close to €700/MWh, were removed and the effects were examined. It was noted that there are only minor differences in the statistics and the paper concluded that a small number of outliers do not have a material effect on the summary statistics. Therefore the effect of outliers has not specifically been examined in this paper.

A respondent to last year's consultation paper suggested the following:

> *"The average of daily standard deviations is a more appropriate measure of volatility than the standard deviation of the series as a whole, as the daily price setting algorithm means that there is no reason for the Uplift from 5.30am to 6.00am on one Trading Day to be related to that from 6.00am to 6.30am on the following Trading Day*."

The RAs have calculated the average of the daily standard deviations (based on a Trading Day running from 6am to 6am) and the following are the results:

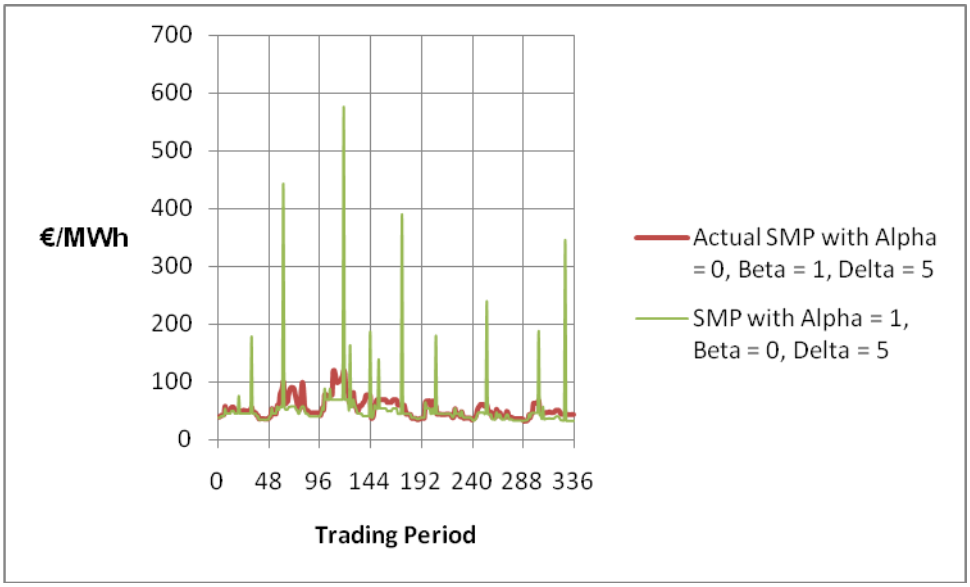
€/MWhr where appropriate	Shadow	Uplift	SMP
Average of the Daily Standard Deviation	10.46	13.30	21.91

These values are lower than the standard deviation calculated for all the Trading Periods over the year.

Another suggestion by a respondent to last year's consultation paper was as follows:

> *"It would be useful for comparison purposes if the RA's were to perform analysis on the Uplifts that would occur if alpha=1"*

The RAs have taken a number of days in May 2010 and compared the actual SMP using α = 0, β = 1, δ = 5 to the "uplift cost" SMPs calculated using α = 1, β = 0, δ = 5 and the results are shown below.



As expected the "uplift cost" SMP is more volatile than the actual SMP as the uplift beta which governs the importance of the Uplift Profile Objective is set to zero and the uplift alpha which governs the importance of the Uplift Cost Objective is set to one. In 95% of trading periods, the "uplift cost" SMP is less than or equal to the actual SMP, but in the remaining 5% of trading periods, the "uplift cost" SMP is greater than the actual SMP by an average of 221.5%. These spikes can be shown in the graph above. Should a larger period be examined, it is likely that some of these spikes in the "uplift cost" SMP case may hit PCAP.

€/MWhr where appropriate	Actual SMP	"Uplift Cost" SMP
Mean	54.9	52.9
Median	50.2	44.7
Maximum	120.6	576.5
Minimum	32.82	31.12
Standard Deviation - All Trading Periods	17.5	48.9

The table above shows the summary statistics from the analysis of the days examined (seven particular days in May 2010). For the actual SMP, the weighting for the parameters is towards beta (the profile objective), which is shown by the lower standard deviation. On the other hand, for the Uplift Cost SMP, the weighting for the parameters is towards alpha (the cost objective) shown by lower mean value.

These results should be treated with caution due to the limited dataset which was analysed (seven particular days in May).

4.2 Proposed Uplift Parameters for 2011

Using different parameters could lower the overall costs of Uplift to consumers, but would be expected to drive a lower correlation and increase the volatility of SMPs. Such an increase in volatility might be expected to increase suppliers' risks, in-turn driving an increase in costs to consumers (with a potential to negate any Uplift revenue benefits). In view of this and the above analysis, the RAs are minded to leave the current Uplift Parameter values unchanged for 2011.

Based upon the above considerations, the SEM Committee proposes that the values of the Uplift Parameters for the year 2011 should remain unchanged. Therefore:

- α should be set at zero;
- β should be set at 1; and
- δ should be set at 5.

5. Proposed Parameters for 2011

As detailed in this paper, the SEM Committee proposes to leave the value of the policy parameters for 2011 unchanged as follows:

- PCAP at €1,000/MWh;
- PFLOOR at minus €100/MWh;
- Uplift Parameter α to be set at zero;
- Uplift Parameter β to be set at 1; and,
- Uplift Parameter δ to be set at 5.

The SEM Committee welcomes the views of interested parties on these proposals. It is intended to publish all responses received. If any respondent wishes all or part of their submission to remain confidential, this should be clearly stated in their response. Comments on this paper should be sent to Dana Kelleher and Jean Pierre Miura, preferably electronically, to arrive by 5pm on Tuesday 3rd August 2010.

Dana Kelleher
Commission for Energy Regulation
The Exchange
Belgard Square North
Tallaght
Dublin 24

DKelleher@cer.ie

Jean Pierre Miura
Northern Ireland Authority for Utility Regulation
Queens House
10-18 Queen Street
Belfast
BT1 6ED

JeanPierre.Miura@URegNI.gov.uk