



**The Value of Lost Load, the Market Price Cap
and the Market Price floor**

A Response and Decision Paper

18 September 2007

AIP-SEM-07-484

Table of Contents

1	Introduction	1
2	Comments on the Consultation Paper and the Regulatory Authorities' Response	2
2.1	Value of Lost Load (VOLL)	2
2.1.1	Initial Proposals	2
2.1.2	Respondents' Comments.....	2
2.1.3	Response by the Regulatory Authorities	4
2.1.4	Final Proposal	5
2.2	The Market Price Cap (PCAP)	6
2.2.1	Initial Proposals	6
2.2.2	Respondents' Comments.....	6
2.2.3	Response by the Regulatory Authorities	8
2.2.4	Final Proposal	9
2.3	The Market Price Floor (PFLOOR).....	10
2.3.1	Initial Proposals	10
2.3.2	Respondents' Comments.....	10
2.3.3	Response by the Regulatory Authorities	12
2.3.4	Final Proposal	15
3	Conclusion	15

1 Introduction

On the 2nd July 2007, the Regulatory Authorities (RAs) published a Consultation Paper (AIP-SEM-07-381) which addressed the question of the values to be determined for certain administered prices in the Trading and Settlement Code (T&SC), namely the Value of Lost Load (VOLL), the Market Price Cap (PCAP) and the Market Price Floor (PFLOOR).

The Consultation Paper proposed:

- values for the period from 1 November 2007 to 30 September 2008 of €10,000/MWh for VOLL; €10,000/MWh for PCAP; and minus €500/MWh for PFLOOR;
- that the RAs would keep these values under review in the first year of operation of the Single Electricity Market (SEM) and that the RAs would change these values in the event that conditions warranted it; and
- that these values would be reviewed annually thereafter.

The RAs received comments from eleven interested parties on the Consultation Paper. The eleven respondents were:

- Airtricity
- Bord Gáis Energy Supply
- EirGrid and SONI jointly
- ESB Customer Supply (ESB CS)
- ESB International (ESBI)
- ESB Power Generation (ESB PG)
- Irish Wind Energy Association (IWEA)
- Northern Ireland Electricity (NIE)
- RES-GEN Ltd
- Synergen
- Viridian Power & Energy (VPE)

One respondent asked that material in an Appendix be treated as commercially confidential and not be published.

The following sections summarise these eleven submissions, dealing separately with VOLL, PCAP and PFLOOR in turn. A response by the RAs is provided in each case and each section concludes with the RAs' final decision. These final decisions are summarised in a concluding section.

2 Comments on the Consultation Paper and the Regulatory Authorities' Response

The comments of respondents to the Consultation Paper are summarised below, beginning with comments made on the RAs' proposal that VOLL be set at €10,000/MWh.

2.1 Value of Lost Load (VOLL)

2.1.1 Initial Proposals

In the Consultation Paper, the RAs recognised that:

- the definition of VOLL in the Trading and Settlement Code (the value an end-customer would willingly pay to avoid having his or her supply interrupted) should theoretically be measured using customer surveys; and
- that a value for VOLL derived from the fixed and variable costs of a peaking plant and the generation security standard was not strictly an estimate of the value of energy at the margin to customers, but an estimate of the cost required to reduce load shedding to eight hours a year.

While the RAs were aware both of the difficulty of defining the concept of value of lost load and of estimating its value, they were of the opinion that deriving the implicit value for VOLL from the costs of the BNE peaking plant and the generation security standard was an adequate methodology to use in the circumstances. The RAs therefore proposed to:

- set a value for VOLL of €10,000/MWh for the eleven months beginning 1st November 2007, based on the fixed and variable costs of the BNE peaker and the generation security standard of 8 hours used in the calculation of the capacity payment mechanism sums for 2007 and 2008; and to
- use the relevant constituent elements of the capacity payment sum calculations each year to derive the implicit value for VOLL for that year.

2.1.2 Respondents' Comments

Airtricity found it difficult to understand why the RAs had decided to recommend a value based on Best New Entrant (BNE) costs and current gas prices. Airtricity believed that using two regulatorily determined numbers to derive an implicit estimate of the value customers would attach to the marginal unit of electricity invested the calculation with an unwarranted level of authority. Airtricity recommended instead that the RAs should pick a value of VOLL that delivered an appropriately strong capacity price signal; and that the value should be incremented by the increase in the CPI in future years, rather by application of a methodology that had little to do with the algebraic objective of the parameter.

BGES agreed that the proposed derivation of the implicit value for VOLL from the costs of a BNE peaking plant and the generation adequacy standard was appropriate. BGES also had

no objection to the relevant constituent elements of the capacity payment sum calculations being used each year to derive the implicit value for VOLL for that year.

EirGrid & SONI noted that the proposed value of €10,000/MWh for VOLL was at the upper end of the expected range. They recommended, however, using the Expected Unserved Energy (EUE) in the calculations rather than the Loss of Load Expectation (LOLE) (referred to as D* in the Consultation Paper). LOLE was concerned only with the likely number of hours of shortage. EUE (expressed in MWh/year) went further and took account also of the extent of shortages.

ESB CS noted that the value of VOLL of €10,000/MWh was at the high end of the ranges in the international comparisons shown in the paper.

ESBI agreed with the RAs' assessment that VOLL should correspond to the amount that customers would willingly pay to have their supply interrupted. ESBI recognised that it was difficult to put a value on this without an active demand-side market and proposed that an appropriate customer survey should be carried out. While the T&SC did not allow for VOLL to be set dynamically to represent the range and the profile of results that was likely to result from a customer survey, it would still be a worthwhile exercise.

NIE considered that the general approach to determine the implicit value of VOLL from the generation security standard was sensible. However, NIE was concerned about the variability in VOLL that would result from the variability in the capital cost of peaking plant varies. It was clearly not rational that customers' valuation would change markedly over short time periods while at the same time requiring a stable level of generation security. It would be reasonable to ensure that the implicitly determined valuation of VOLL should also dampen volatility by using a longer term cost for peaking plant that would smooth out short term supply/demand driven cost volatility. Therefore it would be more appropriate to smooth the changes by, for example, using a five year rolling average cost for the peaking plant; or - if further simplicity was desirable - using current costs for a period of years with only a general inflation indexation until the next full cost review.

Synergen believed that the methodology for determining VOLL based on utilising the generation security standard was not robust. First, the security standard figure (of 8 hours a year) was based on an unconstrained all-island basis. The physical reality that would reflect this assumption would not arise until 2012. The use of this figure was not a reflection of customers' rationing prices in either jurisdiction now.

The second calculative element was the use of the BNE price. Under the approach taken, the VOLL calculation could not reflect customer's actual rationing price on an ongoing basis unless the BNE price was re-visited each year. This would make VOLL variable, an outcome that would be undesirable against any market stability success criteria. However, if the VOLL figure was set at €10,000MWh and then increased by an appropriate inflation index each year the arrangement would be stable, but the underlying accuracy of the figure would diminish if BNE costs rose/fell over time. Further, setting VOLL based on a one-off BNE calculation at a given point in time would lack robustness.

Synergen also proposed that there should be no within year review of VOLL within the first year of the SEM as this would prejudice parties' contract positions.

VPE were not convinced that the price that a customer was willing to pay to avoid disconnection was set by the cost of BNE open cycle gas turbines. However, VPE's primary concern about adopting the proposed methodology was that it implied an annual review and could be subject to significant variation between years. VPE recommended a fixed VOLL price with any change in this figure being limited to annual escalation by an agreed inflation index.

VPE noted that the current market in the South had a long established VOLL price of €7,550/MWh. While €7,550/MWh was arguably too high, it would provide regulatory certainty to continue with this figure.

Neither **ESB PG** nor the **IWEA** nor **RES-Gen** made any comment on the RAs' proposal to set VOLL at €10,000/MWh.

2.1.3 Response by the Regulatory Authorities

In response to these various comments, the RAs note that:

- the proposed methodology for calculating VOLL is robust, derived as it is from a straightforward cost analysis which is based on the premise that load would efficiently be unserved in hours when the cost of serving it (using a BNE peaker) would exceed VOLL. It therefore effectively sets a cap on the price the average customer would be prepared to pay to avoid being cut off;
- the proposed value for VOLL of €10,000/MWh would give an appropriate capacity price signal, because the value is derived from the same parameter values that are used to determine the value of capacity payments in the SEM;
- picking a particular number for VOLL at the outset of the SEM and updating it each year using an appropriate price index (as was done in the old England and Wales Pool) would have the merit of introducing a desirable degree of stability in its value through time;
- while using an index that closely tracks the capital costs of generation capacity, including civil construction and other costs in Ireland would be preferable, a general price index such as the Consumer Price Index in Ireland or the Retail Prices Index in the UK, which are widely quoted and used for the purpose of indexation, always available and robustly determined, would on this basis be an acceptable proxy, though it is acknowledged that using the CPI would introduce a risk of increasing inaccuracy to the extent that generation capital costs grow consistently faster or slower than the CPI over a number of years;
- the current value of €7,550/MWh in the Irish market referred to by VPE in its response was derived a number of years ago using the same methodology as was proposed by the RAs in the Consultation Paper (AIP-SEM-07-381). A value of €10,000/MWh for the SEM would therefore represent an updating of the value of €7,550/MWh figure for changes over the past few years in the costs of a BNE peaker;

- the use of 8 hours a year for the security standard is consistent with the approach used in the determination of the capacity requirement for the purposes of the CPM.

2.1.4 Final Proposal

Having considered the various responses on the question of what value to put on VOLL in the SEM, the RAs have decided that:

- VOLL should be set at €10,000/MWh for the calendar years 2007 and 2008, i.e., for the period beginning 1st November 2007 and ending 31st December 2008;
- its value should not be changed during the course of the period to 31st December 2008;
- its value in subsequent calendar years will be determined by taking its value in the preceding year and uprating it by applying the weighted average of the year-on-year increases in the Irish Harmonised Index of Consumer Prices (HCIP) (using a weight of two-thirds) and the UK HCIP (using a weight of one-third) in the July of the preceding year by comparison with that a year earlier. For example, if the values of the Irish and UK HCIPs in July 2007 and 2008 were as set out in the table below, the value of VOLL for the year beginning 1st January 2009 would be set equal to €10,000/MWh (its value in 2008) times the weighted average of the increases in the Irish HCIP and the UK HCIP in July 2008 by comparison with July 2007, i.e., €10,250/MWh.¹

	Weight	July 2007	July 2008	Percentage change
Irish HCIP (2005 = 100)	0.67	105.7	108.1	2.3%
UK HCIP (2005 = 100)	0.33	104.4	107.5	3.0%
Weighted Average				2.5%

- the absolute value of VOLL will be re-examined, and reset if necessary, every five years, using the methodology set out in the Consultation Paper.

¹ The sources for the data on HCIPs are the Central Statistical Office (CSO) in Ireland and the Office for National Statistics (ONS) in the UK.

2.2 The Market Price Cap (PCAP)

2.2.1 Initial Proposals

In the Consultation Paper, the RAs noted that they had developed an approach both to limit market power and to control the abuse of any residual market power in the SEM. That approach was founded on a number of building blocks which included:

- imposing a requirement on ESB PG to make available to eligible suppliers a suite of Directed Contracts (DC) at prices and on terms determined by the RAs which was intended to reduce the incentive for the seller of those contracts to submit price bids above competitive levels; and
- a licence condition in all generation licences obliging the licensee to bid their plant at short run marginal costs (SRMC).

The RAs were satisfied that these various measures would mitigate market power in the SEM, with the corollary that a cap on wholesale prices was not warranted as a defence against the abuse of market power. Moreover, the requirement on generators to bid at 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. The need for a price cap in the SEM to minimise volatility was thereby greatly reduced. The RAs therefore proposed to set a value for PCAP equal to that of VOLL (i.e., €10,000/MWh).

2.2.2 Respondents' Comments

Airtricity argued that, if the System Marginal Price (SMP) was capped at PCAP, it would be reasonable to assume that VOLL should be higher than PCAP to capture the premium value of capacity when fuel prices spiked and capacity was tight. In circumstances of extreme fuel price spikes and high availability, generators should not be forced to bid below cost, so any PCAP below VOLL was unfair on generators.

Based on the arguments set out in the Consultation Paper, Airtricity believed that a reasonable approach would be to remove any price cap, and shed load when SMP reached VOLL. This would ensure that customers would never be required to pay more than they wished for their power and generators were not forced to bid below cost.

BGES argued that the proposed value of PCAP was unacceptable. Given the market environment, it was not inconceivable that implementation of the proposed value of PCAP would have material financial consequences on the profitability of independent suppliers. This could impede the development of a competitive market. Customers who were subject to market cost pass through tariffs could also face serious financial difficulties. A PCAP value set at a maximum of 50% of the proposed €10,000/MWh should be adequate for the SEM, given the supply/demand dynamics that would exist in the short/medium future.

BGES welcomed the RAs intention to keep the values of VOLL, PCAP and PFLOOR under review for the first year of operation of the SEM. However, simply reviewing without being able to revise these values on a fairly immediate basis - particularly if they were causing

severe financial hardship for suppliers and customers - may well result in an unfeasible market for all market participants.

EirGrid & SONI expressed concern at the proposed setting of the market price cap (PCAP). They argued that in other markets which have a capacity element, notably in the United States, PCAP was set at a value much lower than VOLL, e.g., \$1,000/MWh in the ISO New England and PJM markets. They argued that capacity markets were generally put in place to provide a revenue stream for participants to service their fixed costs, thereby avoiding the need for large price spikes. They believed that the CPM combined with SRMC bidding principles rendered it difficult to justify an offer price greater than €1,000/MWh.

ESB CS argued that it was not difficult to conceive of a situation where SMP would go to VOLL over a number of hours in the day and for a number of such days in the year. All that was required was a combination of significant generation plant outages and medium-to-high demands for electricity. If this happened, a supplier with an average demand of 3,000MW over the relevant hours might be expected to pay energy costs in the order of €100 million in a single day. While contract hedging would reduce the exposure, the extent of the exposure would still be significant. Furthermore, such costs could apply over a number of consecutive days. Medium to large customers of both regulated PES and NIE subjected to pool price pass through tariffs would be exposed to the full extent of the VOLL/PCAP should the event occur. The RAs should consider surveying these customers first to see if they were willing to pay this amount to avoid their supply from being interrupted.

ESBI agreed that there was a need for a price cap in the market but did not believe that it needed to be coupled with VOLL, arguing that the SEM was a gross mandatory pool with capacity payments. Setting PCAP equal to VOLL created a risk that generators may be significantly overpaid in the SEM. The solution was not to decrease the capacity payments pot, since its very existence was to reduce the uncertainty of revenue for a generator, but to examine the price-cap used in setting the capacity pot. ESBI recommended a lower price cap than €10,000/MWh, consistent with the capacity calculation.

ESB PG were concerned that €10,000/MWh was excessively high. ESB PG had expected a price cap of around €500/MWh. If the RAs decided on a cap of €10,000/MWh, ESB PG recommended a clause in the T&SC that invoked administered pricing in the event that the SMP reached PCAP for more than three settlement periods.

NIE agreed with the proposal to set the value of PCAP equal to the value of VOLL.

Synergen had a number of concerns regarding the RAs proposals. First, the proposed level of PCAP could present significant commercial risks to most participants and customers, particularly when all load was actually served. PCAP should therefore be set at a level which struck a balance between a prudent economic signal and a manageable risk profile. Second, the workings of the CPM negated any justification for PCAP being set equal to VOLL that might exist in a less mechanistic/regulated regime. Third, Synergen had reservations about energy prices being set equal to PCAP when no customer load was shed in practice but the Market Scheduling and Pricing (MSP) software failed to reflect this when price was set ex post.

Synergen proposed that:

- PCAP should be set at a conservative level until adequate secondary market liquidity (including Directed Contract availability) existed to adequately manage risk and until there was sufficient certainty that scheduling software issues would not drive prices to PCAP at times when all load was actually being served;
- PCAP should be formally reviewed one year after market start to see whether the risks associated with a higher level could be appropriately managed;
- PCAP should be subject subsequently to annual reviews based on assessments of the maximum modelled SMP outcomes produced by the RAs as part of the DC and CPM modelling; and
- that there should be no within-year review of PCAP, VOLL and PFLOOR in the first year of the SEM as this would prejudice parties' contract positions.

VPE also understood that SMP could be set at PCAP if the deemed plant dispatch in the unconstrained MSP software runs was not sufficient to meet the calculated demand in the software, even though in reality no load had been shed. Similarly they understood that insufficient plant flexibility in their technical characteristics could trigger SMP being set at PCAP under certain circumstances. It would also be important to understand how the MO included suppressed demand (i.e. demand control) and interconnector residual capacity in the software.

VPE agreed with the RAs that the value of PCAP should be set equal to that of VOLL. If PCAP = VOLL then generators would not be required to generate at a loss if its SRMC was higher than PCAP; at VOLL it was reasonable for a generator not to be commercially available as customers should be unwilling to pay for electricity at that price.

The **IWEA** and **RES-GEN** made no comment on the RAs' proposal to set PCAP at €10,000/MWh.

2.2.3 Response by the Regulatory Authorities

In response to these various comments, the RAs note that:

- the T&SC requires that a value be set for PCAP and so removing the price cap is not an option. The choice is between setting it equal to VOLL (i.e., €10,000/MWh) or at some value less than VOLL;
- in the event that an Insufficient Capacity Event is called, the rules state that SMP is set equal to PCAP. If PCAP is equal to VOLL, then capacity payments and charges would go to zero in that trading period, given the VOLL/SMP scaling factors used in the T&SC. Rather than being deducted from the total amounts recovered from suppliers, the monies from the CPM in that period are pushed into other time periods to ensure that the fixed amount of CPM monies in a month are paid out to generators and recovered from suppliers over the month;
- to the extent that there are any Insufficient Capacity Events in a trading year, payments to generators in the SEM and recovered from suppliers (taking SMP and

capacity payments together) will be higher than they would have been in an energy-only market and higher than they need to be to encourage efficient entry and exit; and that this undermines the theoretical case for setting PCAP equal to VOLL;

- a number of respondents to the Consultation Paper argued that the proposed level of PCAP would create significant commercial risks for market participants and expressed concerns that SMP could be set at PCAP if the deemed plant dispatch in the unconstrained MSP software runs was not sufficient to meet the calculated demand in the software, even though no load had in reality been shed;
- in the light of the responses to the Consultation Paper, there is a good case for a more conservative approach to the setting of PCAP, at least until there is adequate liquidity in the contract market to enable participants to manage risk effectively and until there is sufficient certainty that the MSP software does not frequently drive prices to PCAP at times when all load is actually being served;
- a more practicable solution is to set PCAP to a number reasonably in excess of the highest expected SRMC of the most expensive plant, to allow for variations in SRMC during the year and to ensure that no generator would be required to generate at a loss if its SRMC was higher than PCAP;
- based on the modelling by the RAs of SMP done for the setting of Directed Contract prices, a PCAP of €1,000/MWh would be appropriate, always bearing in mind that Make Whole Payments to Price Maker Units will make up the difference between what generators receive from SMP during a billing period (i.e., a week) and their Schedule Production Cost within that billing period;
- PCAP should be reviewed at the end of 2008 to see whether the risks associated with a higher level than €1,000/MWh could be appropriately managed;
- leaving open the option of changing PCAP within the period to end-2008 would create unnecessary uncertainty and would prejudice contract positions.

2.2.4 Final Proposal

Having considered the various responses on the question of what value to put on PCAP in the SEM, the RAs have decided that:

- PCAP should be set at €1,000/MWh for the calendar years 2007 and 2008, i.e., for the period beginning 1st November 2007 and ending 31st December 2008;
- its value will not be changed during the course of the period to 31st December 2008;
- a review of its effectiveness will be carried out in the second half of 2008.

2.3 The Market Price Floor (PFLOOR)

2.3.1 Initial Proposals

In the Consultation Paper, the RAs noted that the T&SC requires the RAs to set a market price floor (PFLOOR). The MSP software can handle negative prices and generators are allowed by their licences to bid negative prices. The question therefore arises of whether the market price floor should be negative and, if so, how negative. A negative market price floor would allow generators to bid negative prices. Generators that may bid negative prices in accordance with the bidding principles include CHP plant, where the opportunity cost of not generating may be high (e.g., because of the need to use stand-alone oil-fired boilers to replace the heat ordinarily derived from electricity generation), and eligible renewable generators in Northern Ireland who would lose the value of their Renewables Obligation Certificates (ROCs) if they do not generate. A negative market price floor would also allow negative prices in the SEM in conditions where there was excessive price maker generation. Customers would benefit from negative prices at times of low demand and excessive generation. If price maker generators and customers were not exposed to appropriate pricing (including negative pricing) then the efficiency benefits arising from changing demand patterns would be lost.

Conversely, a negative market price floor would expose price taker generators to the risk of losses. The RAs would expect that most if not all price taker generators would be protected from low or negative prices through their contract positions, but the RAs were interested in knowing if this was not the case and the extent to which it was not.

The RAs wished to maintain a balance between minimising the exposure of participants to negative prices without excessively dulling an efficient price signal. The RAs proposed a value for PFLOOR of minus €500/MWh. This was smaller in absolute value than that proposed for PCAP and comparable (though less negative) to price floors seen in those markets that had price floors.

As in the case of PCAP, the RAs expected this floor rarely to be binding.

2.3.2 Respondents' Comments

Airtricity first acknowledged that generators may face opportunity losses if they failed to generate. The opportunity loss might include, for example, the loss of Renewable Obligation Certificates (ROCs). PFLOOR should therefore allow the bidding of negative prices, to ensure market dispatch correctly reflected generator costs.

On the other hand, Airtricity argued that a notional excess of generation would displace reserve and would therefore reduce overall system costs. It would be inequitable to penalise a group of generators by requiring them to pay for saving the system money. Furthermore, in conditions of excessive generation it would be likely that the system operator (SO) would have dispatched a Variable Price Taker Generator Unit down below its potential generation capability. This would result in Price Taker Units having to pay for energy they would not have generated.

Finally, Airtricity argued that, while generators may be contractually protected from negative pool prices, that was true for renewable generators only if their output was less than or equal to their counterparty's demand. And it was unlikely that an offtake contract would require the counterparty to pay for energy not generated, but for which the generator was liable as a result of following the SO's dispatch instruction. In this case the generator would remain fully exposed to negative pool prices.

Airtricity therefore recommended a PFLOOR of zero. This would be compatible with other aspects of the T&SC, such as the deemed decremental price of zero for Price Taker Units.

ESBI recognised that there was no obvious economic rationale for setting a price floor, though it was worth noting that the majority of generators exposed to a negative price would be those who were limited in their ability to respond. In principle generators should be surveyed to discover the amount that they would be willing to pay to remain on-load during an optimal number of over-generation events rather than becoming price responsive. However this approach was clearly not practical and the RAs' proposed value of minus €500/MWh appeared to strike a reasonable balance between generator exposure to negative prices and a suitably sharp pricing mechanism.

ESB PG argued for setting PFLOOR at zero. This was because a negative price floor would have an impact on renewable generation since SMP would be set to this floor price if all generators scheduled by the MSP software were Price Taker Units. This would reduce the commercial viability of these generators and might act as a barrier to renewable generation entry.

The **IWEA** acknowledged that most wind farms had taken long term power purchase agreements to date and as such were protected from market fluctuation. But if prices were allowed to go negative, someone would pay eventually. If the market allowed negative pricing, the IWEA felt that this could seriously affect the palatability of wind to both suppliers and Government.

A second concern was more of a logistical one. The wind operators would have to invest in significant market modelling IT systems to predict negative pricing and change their output or bidding behaviour to minimise its impact.

A third concern was related to the market signal. Variable Price Taker Units (mainly wind farms) were committed to taking whatever the market price was. Their only option was to switch off to avoid negative pricing, thereby losing priority of dispatch.

Finally the IWEA believed that setting a negative price was squarely in violation of the RES-E directive, both in the area of priority dispatch and the area of equal access. The IWEA believed that the PFLOOR value should be zero for wind generation.

NIE agreed that generators must be able to submit commercial offers that are less than zero, always providing that they reflected the SRMC principles to which all generators were required to comply. On the other hand, on the assumption that the SOs would target the disconnection of larger groupings of variable Price Taker Units in the event of there being too much variable price taker generation on the system, the generators who would be most

exposed to negative prices were more likely to be the smaller renewable generators who may also have less contract coverage and hence protection against negative prices.

RES-GEN's contractual position post-SEM was still a matter of negotiation with the relevant suppliers. However RES-GEN shared the RAs' expectation that the finally negotiated position should protect price taker generators from exposure to negative market prices under normal generation conditions.

However, this protection would not seem to be afforded under circumstances where a Variable Price Taker was constrained down in response to a dispatch instruction from the System Operator. Under these circumstances the contractual position with the supplier was irrelevant. With a negative PFLOOR, the generator that did not generate would be obliged to pay for compliance with a dispatch instruction issued for the benefit of the network as a whole. Perversely, however, Price Taker Generator Units that are not required to reduce output would continue to be protected from the negative price.

RES-GEN suggested that the simplest solution to this deficit in the short term might be to ensure that compensation for constrained down generation had a minimum value of zero.

Synergen agreed that the rationale for setting PFLOOR as a subjective judgement balancing risks and economic signals was reasonable. On this basis PFLOOR and PCAP should have the same criteria applied to setting their absolute value at a reasonable level which avoided unnecessary volatility; and PFLOOR should be a negative value with the same absolute value of the PCAP figure.

Synergen proposed that that there should be no within-year review of PFLOOR in the first year of the SEM as this would prejudice parties' contract positions.

VPE were concerned about the interaction of the proposed value of PFLOOR with an Excessive Generation Event. A price taker with an SRMC of zero would be required to generate at a significant loss. VPE did not, however, have a fundamental concern about generators bidding negative prices if they considered this to be their SRMC.

VPE suggested that the T&SC should be changed such that, in an Excessive Generation Event, the market price would be set at zero. Setting an excessive generation at a negative PFLOOR would cause price taker generators to generate at below cost.

BGES, Eirgrid & SONI and **ESBCS** made no comments on the proposal to set PFLOOR at minus €500/MWh.

2.3.3 Response by the Regulatory Authorities

In response to these various comments, the RAs note that:

- a majority of respondents were keen to allow generators, including renewable generators, to bid negative prices;
- the MSP software schedules plant to meet demand on an ex post unconstrained basis, with no account taken of reserve. Reserve is specifically excluded from the

T&SC as drafted and the question of inequitably penalising a group of generators for saving the system money does not arise;

- the deemed decremental price of zero for Price Taker Units in the T&SC is based on the notion that their avoidable cost is zero. The rationale for the zero decremental price is linked to the costs faced by the generator, and not the price paid for their energy. There is no relation between the deemed decremental price of zero and the value of PFLOOR;
- as the responses indicated, market participants that are primarily exposed to the risk of negative prices are Price Taker Units, including renewable units. And, as a number of respondents pointed out, Price Taker Units that are constrained off will not be protected by their contracts with suppliers against the risk of negative prices. The RAs fully acknowledge these points. They note, however, that Price Taker Units have options under the T&SC to avoid being exposed to the risk of negative pricing. These options depend on the size of the generator in question:
 - variable generators which have a maximum export capacity of more than 10MW and whose participation in the pool is therefore mandatory can choose to be either Price Makers or Price Takers. Variable generators can avoid being exposed to the risk of negative pricing by choosing to be Price Makers. This is because a Variable Price Maker's market schedule quantity would be determined by the MSP software and not by its outturn availability, as would be the case if it had registered as a Variable Price Taker. This would mean that a Variable Price Maker would not be required to pay for energy it had not generated if PFLOOR was negative. Choosing to be a Variable Price Maker rather than a Variable Price Taker would, however, mean that a renewable generator would no longer have priority dispatch status. The volume risk that this might introduce would be minimised by bidding zero prices on a default or standing basis. A standing basis bid price of zero would mean that the data submission requirements on a Variable Price Maker would be no more onerous in the RAs' view than those required of a Variable Price Taker. Both must submit daily forecast availability data to the system operator and market operator. They need not submit daily price/quantity data and can rely instead on default data;
 - generators with a maximum export capacity of less than 10MW also have choices under the T&SC:
 - they can choose to participate in the market and, if they are dispatchable, can register as Variable Price Makers and thereby avoid the risk of negative prices; or
 - they can choose not to participate in the market, in which case they can contract with a participant and have their output treated in the pool as negative demand. The RAs expect almost all renewable generators with maximum export capacities of less than 10MW to choose this option. This is confirmed by the latest information at the

RAs' disposal, which shows that only four below 10MW renewable generators have so far elected to participate. Three of these are hydro units, which have registered as Predictable Price Makers. The fourth is a wind generator, which has registered to participate as an Autonomous Unit;

- all market participants can also avoid their exposure to the pool price by negotiating contracts for differences with suppliers and the RAs understand that such contracts are available;
- as a number of respondents have pointed out, it is possible that - in an Excessive Generation Event - Variable Price Takers will have to pay for energy they have not generated if PFLOOR is set at a negative value Excessive Generation Events can occur for two reasons:
 - one might be when there was too much Price Taker generation capacity on the system relative to Schedule Demand and the SO was obliged to constrain some of it off for system reasons. In these circumstances both those Price Taker Units that stay on and those Price Taker Units that are constrained off would effectively be paid the PFLOOR price. It would be discriminatory were those Price Takers that are constrained off to be paid a different price to those that were not;
 - Excessive Generation Events can also be triggered in the MSP software by inter-temporal constraints. For example, an Excessive Generation Event might be triggered in a single trading period to avoid the costs of turning a generating unit off for one period and then back on again in the next. The MO is proposing that the over-generation and under-generation MSP penalties in the T&SC be set such that there is an equal chance in these circumstances of an Excessive Generation Event and an Insufficient Capacity Event being triggered. This means that Price Taker Units would benefit equally on average over time from prices set at PCAP (when an Insufficient Capacity Event is triggered) as they would be disadvantaged by prices set at PFLOOR. Given the different absolute levels of the two prices, Price Taker Units would tend on average to benefit from the way in which the MSP software resolves intertemporal constraints.
- while the RAs note the point made that a generator's contract position will protect it against fluctuations in the pool price only if its output is less than or equal to its counterparty's demand, the RAs do not think that the T&SC rules should be determined by the particular contractual arrangements of some generators on the system;
- as the RAs stated in the Consultation Paper, allowing all generators, including renewable generators, to bid negative prices is a valuable option and one which would be denied them and other generators if PFLOOR was set at zero;

- finally, allowing negative prices in the SEM would send efficient price signals and, given that there may be generators that are prepared to pay to stay on the system rather than be constrained off, the appropriate solution is to allow prices to reflect that willingness to pay.

2.3.4 Final Proposal

Having considered the various responses on the question of what value to put on PFLOOR in the SEM, the RAs have decided that:

- in response to the reaction of a number of respondents to the Consultation Paper to the RAs' proposal of a PFLOOR at minus €500/MWh, the RAs have decided that PFLOOR should be set at minus €100/MWh for the calendar years 2007 and 2008, i.e., for the period beginning 1st November 2007 and ending 31st December 2008. A PFLOOR of minus €100/MWh would allow eligible renewable Price Maker Generating Units in the North to bid the opportunity cost of their ROCs with a margin to spare, given that the 'buyout' price for 2007/08 (set by Ofgem) stands at £34.30/MWh;
- the value of PFLOOR will not be changed during the course of the period to 31st December 2008;
- a review of its effectiveness will be carried out in the second half of 2008.

3 Conclusions

The Regulatory Authorities are required by the Trading and Settlement Code to set values for VOLL, PCAP and PFLOOR in €/MWh.

The Regulatory Authorities have decided, after due consideration of the responses to the Consultation Paper published on 2nd July 2007, that for the period from 1st November 2007 to 31st December 2008:

- VOLL will be set to €10,000/MWh
- PCAP will be set to €1,000/MWh
- PFLOOR will be set to minus €100/MWh

These values will remain valid for the period to end-2008.

Furthermore the Regulatory Authorities have decided that

- in the case of VOLL,
 - its value in subsequent calendar years will be determined by taking its value in the preceding year and uprating it by applying the weighted average of the year-on-year increases in the Irish Harmonised Index of Consumer Prices (HCIP) (using a weight of two-thirds) and the UK HICP (using a weight of one-

third) in the July of the preceding year by comparison with that a year earlier;
and

- its absolute value will be re-examined and reset if necessary every five years, using the methodology set out in the Consultation Paper.
- in the case of PCAP and PFLOOR, these values will be reviewed annually and re-set if necessary.