



**Market Power Mitigation in the SEM
Directed Contract Implementation Report**

AIP-SEM-07-92

2 April 2007

Table of Contents

1. Introduction.....	3
2. Organisation of this Report.....	4
3. Directed Contracts Policy and Implementation Overview Purpose	5
Enabling Documents and Industry Consultation Process	5
Timeline for Implementation	6
Publication of final form of Directed Contract	7
Publication of the Aggregate Directed Contract Quantities	8
Publication of the eligibility matrix for suppliers	9
Publication of the Directed Contract pricing formula and indicative prices	11
Execution of Directed Contract Master Agreements	13
Subscription Period.....	14
Supplemental Subscription Period.....	20
Monthly Review of Supplier Eligibility	22
4. Directed Contract Implementation Models.....	23
Market Concentration Model.....	25
How the Model Works.....	26
Baseload, Mid-Merit, and Peak Products	26
Step-By-Step Procedure to Determine Directed Contract Quantities.....	28
How the Concentration Model Measures the Contribution of Capacity Resources to Market Share	29
Exclusion of Units that Do Not Benefit from Execution of Market Power.....	30
Ownership Groups for the HHI Calculation	30
Calculation of Quarterly Volumes	31
Where Input Data Comes From	31
How to Use the Model	32
Eligibility Model.....	32
Econometric Pricing Model	34
PLEXOS Interface Model.....	36
5. Summary of Implementation Tasks	39
Publication of final form of Directed Contract	39
Publication of the Aggregate Directed Contract Quantities	39
Publication of the eligibility matrix for suppliers	39
Publication of the Directed Contract pricing formula and indicative prices	39
Execution of Directed Contract Master Agreements	40
Subscription Period.....	40
Supplemental Subscription Period.....	41
Monthly Review of Supplier Eligibility	41

1. Introduction

This Directed Contract Implementation Report is designed to serve as a guide for the implementation of the policies of the Regulatory Authorities with respect to Directed Contracts. It describes the rules for quantification, allocation, and pricing of Directed Contracts, and the timing of the process. The Report describes the tasks that must be performed by the Regulatory Authorities, as well as by the parties to the Directed Contracts, at each step in the process. It describes the models that will be used to define, allocate and price Directed Contracts and gives instructions regarding the use of these models. It is anticipated that this Implementation Report will be an evolving document, that will be updated as certain decisions which have been left to the implementation stage are finalised. Further, the report will be updated each year to accommodate any modifications, refinements or improvements to the Directed Contract process.

2. Organisation of this Report

Section 3 of the Report provides an overview of the Directed Contract policy, enabling documents and implementation timescale. It outlines the specific tasks that will be performed by the Regulatory Authorities and the parties to the Directed Contracts, and provides guidelines for how the Directed Contracts should be executed.

Section 4 addresses the specific models that will be used to quantify, allocate and price Directed Contracts. It describes the models and provides instructions on how to use them.

Section 5 provides a summary of the tasks associated with Directed Contract implementation.

3. Directed Contracts Policy and Implementation Overview Purpose

An integral part of the development of the SEM has been the development of a market power mitigation strategy to ensure that the benefits associated with the SEM are not undermined by the abuse of market power. To that end the Commission for Energy Regulation and the Northern Ireland Authority for Utilities Regulation (“the Regulatory Authorities” or “RAs”) have developed a strategy to mitigate market power in the SEM. A fundamental part of this strategy is the implementation of a suite of Directed Contracts (“DCs”), the purpose of which is to remove the incentives on the incumbents to attempt to profit from the use of market power.

These contracts will mitigate market power by reducing the incentive for the market participants to submit bids above competitive levels, or otherwise withhold capacity, in order to influence current spot prices or future contract prices. These contracts are a cornerstone of the market power mitigation plan and provide the opportunity and ability to place greater reliance on competitive forces.

Enabling Documents and Industry Consultation Process

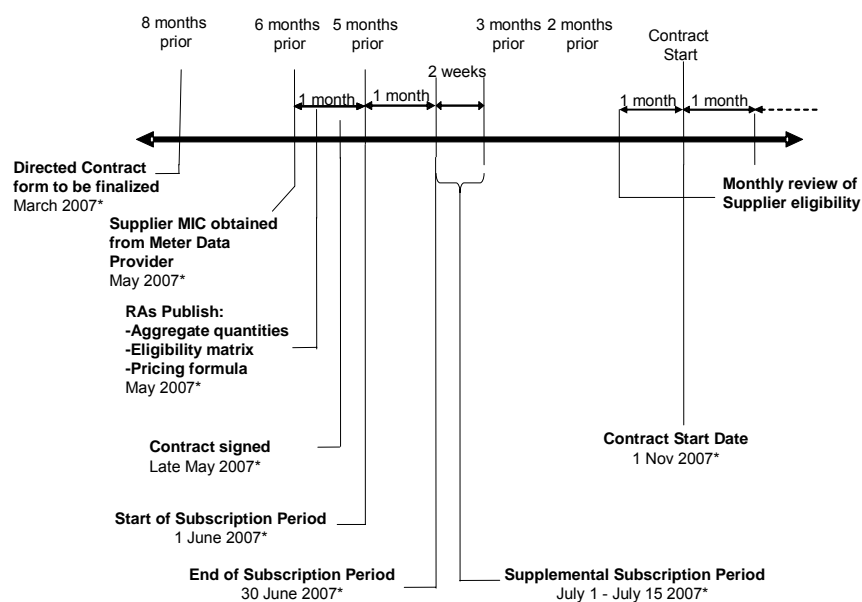
The Regulatory Authorities have engaged in an extensive consultation process with respect to the design, pricing and allocation of the Directed Contracts. The consultation process included an industry forum and bilateral meetings. Throughout the process, the Regulatory Authorities published a series of decision papers summarising the decisions with regard to Directed Contract policy. These enabling documents and key industry consultation milestones consist of:

- Directed Contracts: Price, Form and Allocation - Consultation Paper, 21 June 2006.
- Market Power Mitigation in the SEM: Directed Contracts proposed decision paper, 8 September 2006.
- Market Power Mitigation in the SEM: Directed Contracts Quantification Methodology Consultation Paper, 22 September 2006.
- Market Power Mitigation in the SEM Directed Contracts: Price, Form and Allocation: Supplemental Decision Paper.
- First draft of Directed Contract, distributed to Market Power Group on 13 November 2006.
- Market Power Group meeting on 20 November 2006, addressing Directed Contract first draft.

- Market Power Mitigation in the SEM - Directed Contracts Quantification Methodology Decision Paper, 8 December 2006.
- Publication of Responses on Directed Contracts Quantification, 8 December 2006.
- Second draft of Directed Contract, distributed to Market Power Group on 22 December 2006.
- Response paper on Directed Contract drafting issues, distributed to Market Power Group on 22 December 2006.
- Market Power Group meeting on 28 February 2007 to resolve outstanding issues related to the drafting of the Directed Contract.

Timeline for Implementation

The timeline for implementation of the Directed Contracts is depicted in the diagram below. Each step on the timeline is described in turn below.



*Dates for First-Year Directed Contracts

Publication of final form of Directed Contract

The Regulatory Authorities will finalise the form and pricing structure of the Directed Contracts at least eight months prior to the contract start date. For the first-year Directed Contracts, the contract start date is 1 November 2007,¹ which means that the final contract form will be published by March 2007. The final form of the first-year Directed Contract will be appended to the final version of this report.

Once the final form has been set, certain items will remain to be filled in upon execution. When the Directed Contracts are executed, the parties to the contracts will need to complete certain items. For the first-year Directed Contracts, these items are:

- Names of the buyer and seller (cover sheet)
- Date of execution (page 1)
- Jurisdiction of corporate organisation (page 1, recitals)
- Currency of transaction (throughout contract, choose euro for ROI seller and sterling for NI seller)
- Applicable regulatory authority of transaction (throughout contract, choose CER for ROI seller and NIAUR for NI seller)
- Bank name for interest calculation (section 7.4)
- Signatories (pages 24 and 25)
- Addresses and contact information (Schedule 2)

In addition, when eligible suppliers elect to subscribe to Directed Contract quantities during the Subscription Period, their elections will be recorded and confirmation letters (in the form of Schedule 6) will be made part of the Directed Contract.

Beginning no later than January of 2008, and annually thereafter, the Regulatory Authorities will facilitate a workshop for updates to the Directed Contract Form. Parties will be expected to provide written suggestions for updates and improvements to the Directed Contract and the Regulatory Authorities will convene a meeting to discuss and agree such changes. The Regulatory Authorities would make a decision following such a meeting as to updates to the

¹ The contract start date refers to the date upon which the difference payment obligations begin. The contract will be executed in advance of the contract start date.

Directed Contract Form. These meetings may be stopped if it is clear that the Directed Contract would not benefit from any further changes.

Actions required by RAs

- Facilitate annual workshop on Directed Contract improvement.
- Approve final Directed Contract form each year.

Publication of the Aggregate Directed Contract Quantities

The RAs will publish the final Directed Contract quantities, by quarter and product, and separately for ESB PG and NIE PPB, in the form of the table below, six months prior to the contract start date. For the first-year Directed Contracts, these data will be published during May 2007.

	ESB PG Directed Contract Quantities			<i>NIE PPB Directed Contract Quantities</i>		
Quarter	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	<i>Peak Quantity (MW)</i>
Nov-Dec 2007						
Q1 2008						
Q2 2008						
Q3 2008						

The Market Concentration Model will be used to determine the final Directed Contract quantities. The mechanics of the Market Concentration Model are described in detail in the modelling section below.

Actions required by RAs

- Set target HHI and run Market Concentration Model to determine Directed Contract quantities for ESB PG and NIE PPB.
- Publish Directed Contract Quantities

Publication of the eligibility matrix for suppliers

In addition, the RAs will issue eligibility quantities for each supplier, in the form of the table below. It is anticipated that an Excel spreadsheet model (“Eligibility Model”) will be released to suppliers no later than five and a half months prior to the contract start date (mid May for the first-year Directed Contracts). This spreadsheet will illustrate how the quantities of eligibility for each product and quarter will be determined given a supplier’s Maximum Import Capability (MIC) data. The mechanics of the Excel spreadsheet “Eligibility Model” are described in the modelling section below.

	<i>[Supplier Name]</i> <i>Directed Contract Eligibilities</i>		
Quarter	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)
Nov-Dec 2007			
Q1 2008			
Q2 2008			
Q3 2008			

Approximately five and a half months prior to the contract start date (mid-May for the first-year Directed Contracts), the RAs will receive from the Meter Data Provider the MIC data that will, along with historical “deemed” average load by customer types, determine the final Directed Contract eligibilities. The MIC data will be by supplier by customer type and will reflect a snapshot of maximum import capability as of a given date. The MIC data may be adjusted for any known pending customer supplier changes. In addition, the Meter Data Provider will provide half-hourly (or quarter-hourly) load data, aggregated by customer type (not by supplier) for 12 months. For non-half-hourly and non-quarterly-hourly metered customer classes, the Meter Data Provider will provide a load profile shape and total consumption for 12 months. The RAs will calculate “deemed” average load for each customer class from this load data—“deemed” average load is discussed further in the “Eligibility Model” section. The load shape data may be obtained by the RAs well in advance of the receipt of MIC data.

Actions required by RAs

- Arrange for timely provision of load shape data and supplier MIC data by the Meter Data Provider

Using MIC data and the historical load shape for each customer type, the RAs will create a matrix that specifies how the MW eligibility for each type of Directed Contract is derived for each supplier, given that supplier's MVA of MIC for each customer class.

Once the MIC data is received from the Meter Data Provider and adjusted as necessary, it will be input into the Eligibility Model that has a matrix of MW eligibility for each CFD type by customer class and the resulting final eligibilities by product and by quarter will be communicated by the RAs to the suppliers. The RAs will communicate to suppliers the final first-year Directed Contract eligibilities in the form of the table above at least one week prior to 1 June 2007 for the first-year Directed Contracts. (In subsequent years, this data will be communicated at least five months and one week prior to the contract start date.)

Note that if both ESB PG and NIE PPB offer Directed Contracts, the eligibility will be specified for both sellers. As explained in the description of the Eligibility Model below, a supplier's eligibility for Directed Contracts with a given seller will simply be that supplier's total eligibility for Directed Contracts multiplied by that seller's share of Directed Contract quantities for a given product and quarter.

	[Supplier Name] Eligibilities for Directed Contracts with ESB PG			<i>[Supplier Name]</i> <i>Eligibilities for Directed Contracts</i> <i>with NIE PPB</i>		
Quarter	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	<i>Peak Quantity (MW)</i>
Nov-Dec 2007						
Q1 2008						
Q2 2008						
Q3 2008						

Actions required by RAs

- Develop a spreadsheet (“Eligibility Model”) that converts MIC data (in MVA) for a customer type into eligibility data (in MW) for each type of Directed Contract (baseload, mid-merit and peak). This will rely on the historic customer type load shapes and can be done well in advance. The eligibility model is described in detail below.
- Issue spreadsheet to suppliers translating their MIC by customer group to DC eligibility.

Publication of the Directed Contract pricing formula and indicative prices

The RAs will also publish the final pricing formula for first-year Directed Contract transactions, along with indicative Directed Contract prices. In the first year, this will take place in early to mid May 2007; in subsequent years, it will take place no later than five and a half months prior to the contract start date.

The Supplemental Decision Paper dated 3 November 2006 contains an illustrative Directed Contract pricing formula, shown in the table below, which expresses the forward electricity price as a linear function of the forward fuel and carbon prices.² It is anticipated that a formula of this general form will be used to price the Directed Contracts. However, if as the Directed Contract Pricing formula is developed it becomes apparent that the proposed form is not satisfactory, then a different form may be chosen. For example variables for the relationship between fuel prices may be introduced.

Illustrative Directed Contract Pricing Formula – 3 November 2006

$$\text{ESTSEM}_{q,p} = \alpha_{q,p} + \beta_{q,p} * \text{COAL}_q + \gamma_{q,p} * \text{NG}_q + \delta_{q,p} * \text{LSFO}_q + \epsilon_{q,p} * \text{GO}_q + \zeta_{q,p} * C_q$$

$\text{ESTSEM}_{q,p}$ = Estimated Average Price for Directed Contract for the relevant quarter and product

$\alpha_{q,p}$ = formula constant, which may vary by quarter and product.

$\beta_{q,p}$, $\gamma_{q,p}$, $\delta_{q,p}$, $\epsilon_{q,p}$, and $\zeta_{q,p}$ = formula coefficients, which may vary by quarter and product

COAL_q = Forward Coal Price for the quarter -- in \$/tonne * Euro/\$ Exchange Rate

NG_q = Forward Natural Gas Price for the quarter -- in pence/therm * (Euro/GBP Exchange Rate) / 100

LSFO_q = Forward Low Sulphur Fuel Oil Price for the quarter -- in \$/bbl * Euro/\$ Exchange Rate

GO_q = Forward Gasoil Price for the quarter -- in \$/bbl * Euro/\$ Exchange Rate

C_q = Forward Carbon Price for the quarter -- in euro/tonne CO₂

² In the future, if a liquid forward market for electricity develops in Ireland and Northern Ireland, prices for forward electricity may be incorporated in the formula. For the pricing of the first-year Directed Contracts, such a forward market has not developed and is not reflected in the pricing formula.

Along with the formula, the RAs will publish indicative Directed Contract prices. These indicative Directed Contract prices will be obtained by inputting recent forward fuel and carbon prices into the final Directed Contract pricing formula. They will be published in the form of the table below, or in similar form.

	ESB PG Indicative Directed Contract Prices as of May __ 2007 [date of forward fuel price]			<i>NIE PPB Indicative Directed Contract Prices* as of May __ 2007 [date of forward fuel price]</i>		
Quarter	Baseload Price (€/MWh)	Mid-Merit Price (€/MWh)	Peak Price (€/MWh)	Baseload Price (£/MWh)	Mid-Merit Price (£/MWh)	<i>Peak Price (£/MWh)</i>
Nov-Dec 2007						
Q1 2008						
Q2 2008						
Q3 2008						
<p><i>*The Directed Contract pricing formula specified by the RAs will be used to determine a price for each product and quarter denominated in Euro per megawatt-hour. Any NIE PPB Directed Contracts that exist will be denominated in Pounds Sterling per megawatt-hour. To arrive at the price for NIE PPB Directed Contracts, the Euro per megawatt-hour price obtained from the RAs' formula will be converted to Pounds Sterling per megawatt-hour based on the exchange rate published by the European Central Bank. The exchange rate used will be for the same business day on which forward fuel prices were obtained.</i></p>						

The formula and formula coefficients used to set Directed Contract prices will be determined as a result of econometric analysis that will be performed during the spring of 2007 for the first-year Directed Contracts. In subsequent years, the formula and formula coefficients will be updated based upon econometric analyses that are performed six to eight months prior to the contract start date.

The mechanics of the econometric analysis ("Econometric Pricing Model") are described in the modelling section below.

Actions required by RAs:

- Run production model for a variety of fuel price scenarios to produce data base
- Run regression analysis using data base (“Econometric Pricing Model”) to determine Directed Contract pricing formulas;
- Publish Directed Contract pricing formulas
- Calculate and publish indicative pricing using forward fuel and carbon prices

Execution of Directed Contract Master Agreements

The Directed Contracts have been designed as Master Agreements. This allows all Directed Contract transactions to be governed under the same set of commercial terms and conditions. Each transaction executed during the Subscription Period (or Supplemental Subscription Period) will be recorded in the form of Schedule 6 and will become part of the Master Agreement. Schedule 6 specifies for a given transaction the quarterly prices at which the transaction is struck, the quantities applicable during each quarter, and the product definition (i.e., whether the transaction is baseload, mid-merit or peak).

The Master Agreements are to be executed in advance of the Subscription Period so as to put in place the commercial arrangements that will govern any transactions that are, at the election of the supplier, executed during the Subscription Period. The rights and responsibilities associated with transactions under the Master Agreement will not be triggered until transactions have been executed during the Subscription Period.

The first-year Master Agreements will be executed by eligible suppliers and the Directed Contract sellers prior to 1 June 2007. In subsequent years, the execution of Directed Contracts will occur at least five months prior to the contract start date.

Actions required by RAs

- Supervise execution of the Directed Contracts by sellers and buyers.

Subscription Period

Quantity Elections

For the first-year Directed Contracts, the Subscription Period will run from 1 June 2007 through 29 June 2007. In subsequent years, the Subscription Period will commence on the first business day of the fifth month preceding the contract start date.

On each day during the Subscription Period, suppliers can elect to purchase a percentage of their eligibility for each product, subject to a maximum of ten percent (or 10 MW, whichever is greater). Supplier elections should be specified in a form similar to the table below and should be communicated to the sellers (ESB PG and/or NIE PPB) between 8:30am and 10am on a given election day. On a given day, a supplier must submit the same election percentages to ESB PG and NIE PPB if both are selling directed contracts.

<i>[Supplier Directed [Date]</i>	<i>Contract</i>	<i>Name] Election</i>
Baseload Percent of Eligibility		__%
Mid-Merit Percent of Eligibility		__%
Peak Percent of Eligibility		__%

The eligibility percentage will be applied to that supplier's eligibility matrix to arrive at the MW quantities for each quarter and product to be included in Schedule 6 transaction confirmations. For example, assume the supplier has the following eligibilities.

	<i>[Supplier Directed Contract Eligibilities Name]</i>		
Quarter	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)
Nov-Dec 2007	200	100	100
Q1 2008	200	100	100
Q2 2008	100	50	0
Q3 2008	200	100	0

Assume also that the supplier makes the following election:

<i>[Supplier Directed [Date]</i>	<i>Contract</i>	<i>Name] Election</i>
Baseload Percent of Eligibility		10%
Mid-Merit Percent of Eligibility		10%
Peak Percent of Eligibility		10%
<i>Note that suppliers need not elect the same percentage for each product. Different percentages for different products may be elected. Nevertheless, for a given product, the same percentage must apply to eligibility in each quarter.</i>		

The corresponding quantities to be included in the Schedule 6 transaction confirmations would be as follows:

	<i>[Supplier Directed Contract Transaction Quantities for [date]</i>		
<i>Quarter</i>	<i>Baseload Quantity (MW)</i>	<i>Mid-Merit Quantity (MW)</i>	<i>Peak Quantity (MW)</i>
Nov-Dec 2007	20	10	10
Q1 2008	20	10	10
Q2 2008	10	5	0
Q3 2008	20	10	0

For the above example, a separate Schedule 6 transaction confirmation will be used for election in a given product. Since the supplier in this example elects to subscribe a percentage share of all three products (peak, mid-merit, and baseload), the supplier would need to execute three Schedule 6 transaction confirmations, one for each product.

If both ESB PG and NIE PPB offer Directed Contracts, the election percentages will be applied to the supplier's eligibilities for both sellers. For example, assume the supplier has the following eligibilities.

	[Supplier Name] Eligibilities for Directed Contracts with ESB PG			[Supplier Name] Eligibilities for Directed Contracts with NIE PPB		
Quarter	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)
Nov-Dec 2007	200	100	100	50	20	20
Q1 2008	200	100	100	50	20	20
Q2 2008	100	50	0	10	10	0
Q3 2008	200	100	0	50	20	0

Assume also that the supplier makes the following election:

[Supplier Name] Directed Contract [Date]	Election
Baseload Percent of Eligibility	10%
Mid-Merit Percent of Eligibility	10%
Peak Percent of Eligibility	10%

As noted, if a supplier elects to purchase a percentage of its Directed Contract eligibility, then it must elect to purchase the same percentage of its eligibility with ESB PG and NIE PPB. The corresponding quantities to be included in the Schedule 6 transaction confirmations would be as follows:

	[Supplier Name] Directed Contract Transaction Quantities with ESB PG for [date]			[Supplier Name] Directed Contract Transaction Quantities with NIE PPB for [date]		
Quarter	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)
Nov-Dec 2007	20	10	10	5	2	2
Q1 2008	20	10	10	5	2	2
Q2 2008	10	5	0	1	1	0
Q3 2008	20	10	0	5	2	0

In this case, the supplier elects to subscribe a percentage share of the peak product, the mid-merit product, and the baseload product with both sellers. Hence, the supplier will need to execute six Schedule 6 transaction confirmations, one for each product with each seller.

The RAs have set a cap on the quantities elected by a supplier on any given day during the Subscription Period. This cap is equal to the maximum of 10% or 10 MW. The Directed Contract sellers will apply the cap as follows:

1. For each product type and each quarter, the Directed Contract sellers will calculate what percent 10 MW is of the supplier's total eligibility – eligibility with ESB PG plus that with NIE PBB — in that quarter and for that product type. If eligibility is zero for a particular quarter and product type, then this percentage is not applicable for that quarter and product type. Each figure will be rounded to the nearest whole percentage point. An example is provided in the table below.

	[Supplier Name] Directed Contract Eligibilities			[Supplier Name] <i>10 MW is This Percent of Directed Contract Eligibilities (Rounded)</i>		
Quarter	Baseload Quantity (MW)	Mid-Merit Quantity (MW)	Peak Quantity (MW)	Baseload	Mid-Merit	Peak
Nov-Dec 2007	30	120	120	33%	8%	8%
Q1 2008	40	100	130	25%	10%	8%
Q2 2008	20	90		50%	11%	n/a
Q3 2008	20	50		50%	20%	n/a

2. Separately for each product type, the Directed Contract sellers will determine the lowest percentage of the quarterly percentages calculated in Step 1 above.
3. For each product type, the tentative maximum percentage the supplier can elect on any given day is the maximum of 10% and the percentage calculated in Step 2 above. Steps 2 and 3 are illustrated in the table below.

Product	Minimum Percentage from Step 2	<i>Applicable Maximum Percent Election (from Step 3)</i>
Baseload	25% (From Q1 2008)	<i>Max of 10% and 25% is: 25%</i>
Mid-Merit	8% (From Nov-Dec 2007)	<i>Max of 10% and 8% is: 10%</i>
Peak	8% (From Nov-Dec 2007 or Q1 2008)	<i>Max of 10% and 8% is: 10%</i>

Note that during the Subscription Period, suppliers cannot enter into transactions that exceed 100% of their eligibility in any product. Hence, the maximum daily election for a product is also constrained by previous elections for that product. For example, if a supplier has already

subscribed 96% of its baseload eligibility, any additional elections of baseload transactions may not exceed 4% of eligibility during the Subscription Period.

Finally, the RAs have specified that the elections will be subject to a minimum. The minimum quantity will be set equal to 1%. The RAs will also require that all elections be made as whole number percentages. Elections seeking to transact for a fractions of a percentage point of eligibility will not be accepted.

Subscription Guidelines

The Directed Contract sellers will submit Subscription Guidelines to the RAs for approval each year not later than two months before the start of the subscription window. This document, when approved, will be issued to DC buyers in addition to their notification of eligibility. The Subscription Guidelines will inform the DC buyer of the subscription process and detail its exact mechanics.

Actions required by RAs

- Ensure that Directed Contract sellers have procedures in place to implement the RAs policies for subscription.
- Review and approve the Subscription Guidelines

Strike Prices

The strike prices that apply to a given election are determined in accordance with the final Directed Contracts pricing formulas published by the RAs. These formulas convert forward fuel and carbon prices into forward electricity prices for each product and calendar quarter. When a supplier elects to purchase a share of its Directed Contract eligibility, the strike prices for that purchase are the estimated electricity prices for the relevant product and quarters on the day that election is made, as determined by the Directed Contracts pricing formulas. In other words, the forward fuel and carbon price indices that are used to determine strike prices for a given transaction are those that are quoted on the day that the transaction is entered into.

Any supplier seeking to make an election during the Subscription Period will need to notify the seller between 08:30 and 10:00 on the day upon it wishes to enter into Directed Contract transactions for a portion of its eligibility. The forward fuel prices used to price all transactions entered into on a given day will be the end-of-day forward fuel prices for that trading day. Hence, while the quantities transacted will be known by 10:00 AM, the corresponding prices will not be known until late in the day or early the following day.

The Directed Contract sellers will provide the RAs a nightly status report on transactions entered into on each day during the Subscription Period. The status report will include the names of the suppliers entering into Directed Contracts, their eligibility and the details of each transaction (e.g., product type, quarterly quantities, strike prices). Furthermore, at the end of each business day within the Subscription Period, the Directed Contract sellers will publish on a website the total cumulative MW quantity (by product and by quarter) subscribed for up to and including that date.

Note that if, between the time at which the pricing formula was published and a time at which it is applied during the Subscription Period, forward fuel or carbon markets move to a point outside the range of values for which there is sufficient confidence in the pricing formula (e.g. if the performance of the formula was never tested at those relative index levels, or if it is known that the formula does not produce reasonable prices at those index levels), then the Regulatory Authorities reserve the right to suspend subscription and rerun the Econometric Pricing Model at that time, using the prevailing forward fuel and carbon prices as inputs. In this case, the resulting formula would replace the original formula and would be used to establish strike prices. The formula may also be rerun if there is significant change to plant availability. The subscription window would reopen once the formula has been revised.

Actions required by RAs

- Monitor Directed Contract formula to assure formula is in range
- Direct a change in the Directed Contract pricing formula if monitoring reveals that formula is not in range or if there are significant changes to plant availability.

Notice of Unsubscribed Quantities

At the end of the initial Subscription Period, notice will be sent to suppliers who have taken 100% of their allocation of all Directed Contracts specifying the extent to which there are unsubscribed quantities for each type of product (baseload, mid-merit and peak) and each quarter.

Actions required by RAs

- Oversee subscriptions on each day during Subscription Period, per nightly status report
- Oversee daily website publication by Directed Contract sellers of remaining Directed Contract eligibility
- Ensure that Directed Contract sellers make notification of remaining eligibility at the end of the Subscription Period

Supplemental Subscription Period

The Supplemental Subscription Period will run during the first two weeks of the fourth month preceding the contract start date. For the first-year Directed Contracts, it will run for the first two weeks of July 2007.

The Supplemental Subscription Period is primarily designed to give suppliers who have fully subscribed their eligibility during the initial Subscription Period an opportunity to enter into additional Directed Contract transactions. In order to be eligible to enter into Directed Contract transactions during the Supplemental Subscription Period, suppliers must have subscribed 100% of their eligibility in all types of products (baseload, mid-merit and peak). A supplier who is fully subscribed for baseload (say), but not fully subscribed for peak will not be permitted to make additional elections during the Supplemental Subscription Period. Each supplier who may make elections in the Supplemental Subscription Period will have an eligibility equal to the entire quantity of remaining contracts. This ensures that if only one supplier wishes to subscribe to direct contracts in the Supplemental Subscription Period, then all remaining directed contracts may be subscribed to. When all the directed contracts assigned to ESB PG and NIE PPB are subscribed to, then no further subscriptions can be made – even if suppliers may notionally have eligibility remaining in the Supplemental Subscription Period.

New entrants who were licensed in the current year and are not affiliated with any existing market participant will also be permitted to participate in the Supplemental Subscription Period. Such suppliers will have a maximum entitlement based on their MIC as measured one week prior to the start of the Supplemental Subscription Period. Their eligibility will be calculated using the Eligibility Model and their elections will take the form of existing supplier elections. New entrants will need to execute the Directed Contracts prior to the first day of the Supplemental Subscription Period. New entrants will only be entitled to Directed Contracts if the contracts are not fully subscribed during the initial Subscription Period.

Actions required by RAs

Obtain MIC data for new entrants from the Meter Service Provider
Inform Directed Contract sellers and new entrants of the new entrant eligibilities

Quantity Elections

Suppliers making quantity elections during the Supplemental Subscription Period will be required to do so in the same manner in which the elections were made during the initial Subscription Period. Specifically, the elections must contain the data that is presented in the table below and must be communicated to the seller(s) between 08:30 and 10:00 on the transaction day.

<i>[Supplier Directed during Period [Date]</i>	<i>Contract Supplemental</i>	<i>Name] Election Subscription</i>
Baseload Percent of Eligibility		___%
Mid-Merit Percent of Eligibility		___%
Peak Percent of Eligibility		___%

Further, as was the case during the initial Subscription Period:

- Supplier elections will be subject to a minimum of 1%.
- Supplier elections will be subject to a maximum of 10% or 10 MW.
- Supplier elections must be specified as whole number percentages.

If the available Directed Contract quantities for a given product are oversubscribed as a result of multiple suppliers' electing the same transaction on the same day during the Subscription Period, those suppliers' elections will be scaled down on a pro rata basis until 100% of the available Directed Contract quantities are subscribed.

The Directed Contract sellers will provide the RAs a nightly status report on transactions entered into on each day during the Supplemental Subscription Period. In addition, at the end of each business day within the Supplemental Subscription Period, Directed Contract sellers will publish on a website the total cumulative MW quantity (by product and by quarter) of Directed Contract subscribed for up to and including that date.

Actions required by RAs

- Oversee subscriptions on each day during Supplemental Subscription Period, per nightly status report
- Oversee daily website publication by Directed Contract sellers of remaining Directed Contract eligibility
- Supervise rationing in event of oversubscription.

Monthly Review of Supplier Eligibility

The Regulatory Authorities will monitor supplier MICs on a monthly basis to assure that suppliers are not opportunistically putting load back on the PES on a seasonal basis to take advantage of seasonal differences in the cost of serving load, or taking advantage of a fixed PES tariff that does not change with market conditions and arranging to return customers to the PES and profiting from the Directed Contract.

If the Regulatory Authorities so elect, they may reduce the megawatt quantities that that supplier has under Directed Contracts to the extent there has been a material reduction in customer load served by the supplier. The intent of the Regulatory Authorities is that the quantity reduction is strictly an anti-gaming measure. It will therefore only be triggered if there is evidence of gaming, and not in other circumstances. To clarify, a reduction in contract volumes is subject to the following conditions:

- (1) A 20% MIC reduction
- (2) All the 20% MIC reduction must go to the PES(s)
- (3) ESBPG and/or PPB will be advised of the potential reduction and their opinion will be sought on whether to reduce volumes (based on their exposure under the contract)
- (4) Where a seller consents to a reduction the PES(s) will be offered the volume taken from the gaming supplier.

The first assessment of quantity reduction will be conducted before the contract start date to be effective with the contract start date, where the meter data day and the contract start date are more than a month apart.

Actions required by RAs

- Track MICs of suppliers with Directed Contracts
- If supplier experiences reduction of 20% in MIC
 - Evaluate whether gaming criteria have been met
 - Consult with Directed Contract sellers regarding quantity reduction
 - Offer contract reduction to PES, if RAs in consultation with sellers elect to reduce quantity

4. Directed Contract Implementation Models

As noted, several models have been developed as part of the market power work stream and are available to the implementation team. In addition, it is expected that the Market Modelling Group will produce a common forecast of SMP and market schedule, which will be used as input to these models. The models are as follows:

- (1) **Production Simulation Model (Plexos).** Directed Contracts will be priced based upon a forecast of SMPs. This will be performed with a production simulation model. The RAs intend to use Plexos in the first year and remain open to continuing with Plexos or using other models in the future. The RAs have initiated an effort to validate Plexos both with respect to the data that will be used and Plexos ability to properly simulate the SMPs under SEM market rules. A validated Plexos model is a key input to other models. In particular the Market

Concentration Model and Econometric Pricing Model will require input data developed from the validated production simulation model.

- (2) **Market Concentration Model.** This model determines the quantity of Directed Contracts that will be required to mitigate the market power of incumbents ESB PG and NIE PPB.
- (3) **An Eligibility Model.** This model takes Maximum Import Capacity (MIC) data and historical load and energy data from the Meter Data Providers and output from the directed contracts quantification model, and produces tables of directed contract eligibility by supplier. The model takes as an input half-hourly and/or quarter-hourly load data aggregated by customer type in order to determine MW eligibilities for each type of Directed Contract (baseload, mid-merit, peak) for each load group.
- (4) **Econometric Pricing Model.** This model creates the DC Pricing Formulae that specify the strike prices for Directed Contract transactions as a function of forward fuel and carbon prices. The DC Pricing Formulae are designed to determine for each quarter a unique price for baseload transactions, mid-merit transactions and peak transactions. The Econometric Pricing Model uses PLEXOS outputs, from a variety of bounding fuel price scenarios as an input and develops the Directed Contract pricing formulae.
- (5) **A PLEXOS interface model.** This simple model is used to interface between PLEXOS and the Market Concentration Model and the Econometric Pricing Model to ensure smooth transfer of data and accuracy of results.

Each model, with the exception of the Plexos production simulation model, is described in turn below.

Market Concentration Model

The Market Concentration Model (or simply “Concentration Model”) calculates the quantity of Directed Contracts that ESB PG and NIE PPB will be required to make available to suppliers in the SEM. The Directed Contract quantities are set such that market concentration in the SEM (as calculated by the model) is below a certain HHI (Herfindahl-Hirschman Index) threshold. HHI is a tool used by economists to measure concentration in an industry. The HHI index is equal to the sum of the squares of the market shares of firms in the industry. The maximum value for HHI in an industry in which a single firm has 100 percent of the market is 10,000. The HHI threshold to be used in setting the Directed Contract will be specified during implementation.

The market share calculations that underlie the HHI analysis in the Concentration Model are based on potentially competitive capacity. Put another way, in the model the "market" is defined as the total amount of capacity that is relevant to competition in any given hour. Potentially competitive capacity – that capacity that is relevant to competition – is calculated hourly³ for the various generation owners based on the cost of each generation owner’s units. In a given hour, a unit’s capacity is considered potentially competitive so long as its cost is less than or equal to SMP * (1.05). Further, wind and hydro units, as well as imports over Moyle, have custom criteria in the Concentration Model to determine their quantity of potentially competitive capacity. Units that have no incentive to raise the market price are treated as fully competitive supply in the HHI calculation.

In the Concentration Model, capacity under Directed Contract is treated as fully competitive supply since this capacity would not benefit directly from increases in market price. In effect, the capacity under Directed Contract is treated like a large number of very small competitors, and in this fashion Directed Contracts lower the HHI of the SEM. Directed Contracts are allocated in gradual steps to ESB PG and NIE PPB, with each marginal allocation given to the company with the largest residual market share – that is, the largest market share after allocated Directed Contract volumes have been subtracted. Directed Contracts are allocated until the HHI is reduced below its target level.

³ Load in the SEM is integrated on a half-hourly basis. For modelling simplicity Plexos uses hourly integrated loads.

As a first step, the Market Concentration Model determines Directed Contract quantities for ESB PG and NIE PPB by product type (baseload, mid-merit, and peak) for each month. Yet, Directed Contract quantities will vary quarterly. Quarterly Directed Contract quantities are determined in the Concentration Model to be the maximum monthly Directed Contract quantity occurring in that quarter.

The target HHI number is an input to the Concentration Model.

How the Model Works

The Market Concentration Model calculates Directed Contract quantities for ESB PG and NIE PPB, using an HHI approach.⁴ Market share is calculated based on each generation owner's potentially competitive capacity.

Much of the Market Concentration Model relies on PLEXOS inputs and outputs. Hence, validated PLEXOS model results will be obtained prior to running the Market Concentration Model. The details of the connection between PLEXOS and the Market Concentration Model can be found in the "PLEXOS Interface Model" section.

Baseload, Mid-Merit, and Peak Products

Directed Contract allocations to ESB PG and NIE PPB are determined separately for peak, mid-merit, and baseload products, and are initially determined separately for each month.

Note that there are two uses for the terms "peak", "mid-merit", and "baseload" with respect to the Directed Contracts themselves and with respect to the Market Concentration Model:

- The terms "peak", "mid-merit", and "baseload" are defined terms in the Directed Contracts. In this context, they describe the hours in which a given transaction will apply. For example, if the transaction is a peak transaction, it will only apply in those hours that are defined to be peak hours in the Directed Contract.

⁴ The HHI approach was decided on in the 8-Dec-2006 DC Quantities Decision Paper [AIP/SEM/208/06] (page 8).

- For purposes of calculating DC quantities, the Concentration Model designates each hour of the year as being one (and only one) of baseload, mid-merit, and peak. The hours that are exclusively baseload are designated as such in the Concentration Model. Hours that would be considered both baseload and mid-merit, but not peak, in the Directed Contract are considered for modelling purposes as exclusively mid-merit. Hours that would be considered baseload, mid-merit and peak in the Directed Contract are considered for modelling purposes as exclusively peak. The practical result of this is that each load period is treated independently – concentration in mid-merit and peak hours does not affect the calculation of baseload Directed Contract quantities.

The definitions of baseload, mid-merit, and peak, for purposes of calculating DC quantities, are as follows:

- **Peak.** In the winter months (October to March, inclusive) there are 3.5 Peak hours per day: the hours that fall between 1630 and 2000. In the summer months (April to September, inclusive) there are zero Peak hours per day. The peak DC product applies in these same peak time periods.
- **Mid-Merit.** In the winter months (October to March, inclusive) there are 12 mid-merit hours per day: the 9 hours that fall between 0730 and 1630 plus the 3 that fall between 2000 and 2300. In the summer months (April to September, inclusive) there are 15.5 mid-merit hours per day: the hours that fall between 0730 and 2300. In contrast, the mid-merit DC product applies in both peak and mid-merit hours, with mid-merit DC product set to 100% of the mid-merit DC MW on business days and 80% on non-business days.
- **Baseload.** There are 8.5 baseload hours every day: the 7.5 hours that fall between midnight and 0730 plus the one hour between 2300 and midnight. In contrast, the baseload DC product applies in all hours – peak, mid-merit, and baseload.

Step-By-Step Procedure to Determine Directed Contract Quantities

The initial monthly Directed Contract quantities are calculated for ESB PG and NIE PPB as follows:

- 1) The aggregate market share of each of each generation owner is calculated in each baseload⁵ hour. Aggregate market share for generation owners is based on their total potentially competitive capacity. The details of this calculation are discussed later in the “How the Model Works” section.
- 2) The HHI is calculated in each baseload hour for the generation ownership market shares calculated in the step above. An average baseload HHI is then calculated for the month as the simple average of all the baseload hour HHIs in the month. Any Directed Contract quantity a company has already been allocated is excluded from the numerator in the calculation to determine that company’s HHI contribution – that is, Directed Contracts are “atomized”.⁶
- 3) If the monthly average baseload HHI calculated in the previous step exceeds a threshold level, Y, ESB PG or NIE PPB – whichever has the highest baseload market share in that month – is allocated 1% of that company’s monthly average baseload market share, as calculated in Step 1, as a DC quantity. In determining the company with the largest baseload market share in that month, DC quantities already allocated to ESB PG and NIE PPB are first subtracted from their monthly average baseload market share.
- 4) Steps 2 & 3 are repeated, until such time as the monthly average HHI first falls to Y or less. The baseload DC quantities determined at this point are the final baseload DC quantities for that month. The baseload DC apply in all hours – baseload, mid-merit, and peak – though they are determined based on baseload-hour HHIs alone.

⁵ In this context, baseload, mid-merit, and peak hours are mutually exclusive.

⁶ In this context, “atomized” means that this capacity is in effect split up into many very small pieces to be owned by a very large number of companies. In practice, atomized capacity only appears in the denominator of the HHI calculation.

- 5) Steps 1 to 4 are repeated, this time for mid-merit hours. Note that mid-merit contracts are applied at reduced MW amounts on non-business days, compared to business days, currently an 80% reduction in the Model. For every 1% DC allocation on business days, allocation for non-business days is 0.8%. Baseload DC quantities calculated in Step 4, as well as any already determined mid-merit DC quantities, are allocated before making the mid-merit HHI calculation in Step 2. The mid-merit DCs apply in mid-merit and peak hours, though they are determined based on mid-merit-hour HHIs alone.
- 6) Steps 1 to 4 are again repeated, this time for peaking hours. Baseload and mid-merit DC quantities calculated in step 4 & 5, as well as any already determined peak DC quantities, are allocated before calculating the peak HHIs in Step 2.
- 7) The directed contract quantities (in MW) allocated to ESB PG and NIE PPB for each of the 3 product types and in each month are reported in a summary table.

How the Concentration Model Measures the Contribution of Capacity Resources to Market Share

As discussed above, a generation owner's market share is based on each generation owner's potentially competitive capacity. The calculation is as follows. For thermal units, a unit's capacity is considered "potentially competitive capacity" in a particular hour so long as that unit's cost/MWh is less than or equal to $(1.05) * SMP$.

- The SMP used will be SMP inclusive of the SEM uplift.
- Consider an SMP (with uplift) of €50.00/MWh. Then the threshold for units is €52.50/MWh.
- A unit's cost/MWh is its average cost. Average cost is calculated quarterly based on cost and generation outputs from PLEXOS. The costs considered are generation costs and start-up costs, inclusive of emissions costs.

The RAs have decided that “energy limited resources such as hydro, pumped hydro and wind will be recognised considering their energy limits and maximum production.”⁷ Here is how this rule is applied in practice in the Market Concentration Model:

- Hydro, including Pumped Storage. In a given hour, the amount of hydro capacity that is considered available is simply the amount of hydro that actually generated in the PLEXOS run associated with the Market Concentration Model run.
- Wind. Wind capacity is treated the same as traditional hydro – actual PLEXOS generation.

Additionally, the potentially competitive capacity due to Moyle is in every hour set equal to the maximum level of purchases into the SEM over Moyle.

Exclusion of Units that Do Not Benefit from Execution of Market Power

As decided in the 8-Dec-2006 DC Quantification Decision Paper [AIP/SEM/208/06], units that because of regulation do not benefit from the execution of Market Power are excluded from the HHI calculation (see pages 16-19). The units excluded from the HHI calculation are the three peat units: West Offaly, Lough Rea, and Edenderry. These units will be atomized – meaning they will be included in the denominator but not the numerator of the HHI calculation. Tynagh, Aughinish, and NIE PPB will be included in the HHI calculation.

Ownership Groups for the HHI Calculation

The following ownership groupings are considered in the Market Concentration Model:

- ESB PG – separate from affiliates, as decided in DC Quantification Paper (pg 16)
- NIE PPB – separate from affiliates, as decided in DC Quantification Paper (pg 16)

⁷ 8-Dec-2006 “Market Power Mitigation in the SEM: Directed Contract Quantification Methodology: Decision Paper” [AIP/SEM/208/06], page 20.

- ESBI units and Hibernian – as decided in DC Quantification Paper (pg 16). In practice this means that the Synergen Dublin Bay plant and Coolkeeragh CCGT units as well as Hibernian Wind units are treated as one generation grouping
- Huntstown and Huntstown II as one grouping
- Aughinish (an ownership group of one unit)
- Tynagh (an ownership group of one unit)
- Wind units not owned by Hibernian. It is assumed in the Concentration Model that the output from these units is divided equally between five different generation owners. While this is an approximation, it is reasonable for the purposes of calculating market concentration.⁸
- Moyle – Moyle is atomized, as decided in the DC Quantification Paper (pg 19)
- The three peat PSO units are also atomized, as stated above.

Calculation of Quarterly Volumes

The DC volumes that will ultimately be required are set quarterly. The Concentration Model calculates quarterly volumes by taking the maximum of the monthly volumes. The Market Concentration Model calculates the quarterly maximum volumes for each quarter and product type.

Where Input Data Comes From

All input data come from the PLEXOS input and output databases. For details see section “PLEXOS Interface Model”. In general terms,

⁸ Further note. The model takes in total wind generation as an input and divides that generation between Hibernian and non-Hibernian wind units in proportion to the total capacities of the Hibernian and non-Hibernian wind units.

- The price series that determines whether a unit is “potentially competitive capacity” is hourly SMP inclusive of uplift, from PLEXOS output data.
- The unit costs are average costs, inclusive of generation, start-up, and emissions cost, as calculated from PLEXOS output data.
- Unit capacities are from PLEXOS input data.
- Wind and hydro hourly generation patterns are from PLEXOS output data.

How to Use the Model

The model is an Excel spreadsheet model.

- Hourly prices, hydro generation, and wind generation need to be extracted from PLEXOS.
- Unit average costs need to be calculated from cost and generation data extracted from PLEXOS, and then copied into the Concentration Model.
- Any new units, unit retirements, unit ownership changes, or unit capacity changes must also be reflected in the Concentration Model, in line with PLEXOS inputs.

The Target HHI Level parameter must be set.

Eligibility Model

Each supplier with DC eligibility has an eligibility calculated separately for each quarter and each product-type – peak, mid-merit, and baseload. The calculations can be performed in a simple Excel model.

Eligibility Matrix

The first step is to fill in the Eligibility Matrix. This Matrix establishes, by customer class, DC eligibility per MW of MIC, calculated separately by quarter and DC product. For example, one MW of MIC serving the Industrial Customer Class might translate into

eligibility in Q1 2008 of 0.05 MW of baseload DC, 0.04 MW of mid-merit DC and 0.06 MW of peak DC. The Eligibility Matrix is calculated as follows.

- Step 1: Start with the total MW of DC, by quarter and product type, that the incumbent suppliers are required to make available. This quantity is calculated by the Market Concentration Model.
- Step 2: Across all suppliers, the total MW of DC eligibility due to a customer class is calculated separately for each quarter and product type. For example, the calculation for the Q1 peak DC eligibility due to the domestic customer class is calculated as follows. Start with the Q1 SEM Peak DC MW from Step 1; multiply by the Q1 “deemed” average peak-hour load for the domestic customer class; divide by the Q1 “deemed” average peak-hour load for all customer classes.⁹
- Step 3: Start with the total DC MW eligibility by quarter and product due to a particular customer class, as calculated in Step 2. Divide by the total MW MIC for that class.

The Eligibility Matrix is made from the ratios calculated in Step 3.

Note on calculation of “deemed” average load by load-period type—used in Step 2: For the calculation of “deemed” average load by load-period type, each hour is designated as one (and only one) of baseload, mid-merit, and peak. The designations should be the same ones used to calculate DC Quantities in the Market Concentration Model (see discussion in the section on that model).

DC Eligibility by Supplier

The Eligibility Matrix is used to calculate a supplier’s DC eligibility. DC eligibility for the supplier is calculated for each customer class to which a supplier supplies power. This quantity is a simple multiplication:

⁹ Deemed average load for a customer class is the average of a year of historical load data for that class, constructed as follows. For classes that are not metered in quarter-hourly or half-hourly increments, a year of load data is built by multiplying that class’s load profile shape for the year by its total consumption for the year. For customer classes that are metered quarter-hourly or half-hourly, their actual consumption by period is used.

[DC MW / MW of MIC, from the Eligibility Matrix, for that customer class, quarter, and DC Product] * [The customer class's MIC from the supplier]

The supplier's DC eligibility is the sum of its eligibilities due to the various customer classes it serves. The sum is performed separately by quarter and product type.

MVA vs. MW

MIC is measured in MVA. The RAs have expressed an intent to convert MVA to MW for the purposes of allocation. The preceding description assumes that MIC numbers were converted.

If Both ESB PG and NIE PPB Are Allocated DC

A supplier's total eligibility is calculated based on the sum of ESB PG and NIE PPB's DC quantities – summed by quarter and product type. A supplier's eligibility is split between ESB PG and NIE PPB based on their relative proportion of the total DC Quantities by quarter and product type.

Data Sources

- The Total DC Quantities for the entire SEM are the sum of the DC quantities for ESB PG and NIE PPB as determined in the Market Concentration Model
- A year of hourly load by customer class comes from the Meter Data Provider.
- MIC data for each customer class for each supplier comes from the Meter Data Provider.

Econometric Pricing Model

The pricing formulae that the RAs have chosen for Directed Contracts recognises that forward market prices for electricity are dependent on forward market prices for fuel and emissions (specifically, CO₂). This Directed Contract pricing formula expresses the forward market price for electricity in a given calendar quarter and for a given product (baseload, mid-merit or peak) as a function of the forward fuel and emissions prices.

This approach to pricing assures that the strike prices for Directed Contract transactions entered into during the one-month Subscription Period and two-week Supplemental Subscription Period will appropriately reflect the contemporaneous market prices of fuel and emissions markets.

The Econometric Pricing Model will be used to estimate the relationship between fuel and carbon prices and electricity prices and hence to derive the Directed Contract pricing formula. The Econometric Pricing Model will be used as a complementary tool to PLEXOS, which also analyses the relationship between fuels and carbon prices and electricity prices. The Directed Contract pricing formula published by the RAs will enable participants to understand how Directed Contract strike prices will change within the Subscription Period as a result of changes in underlying fuel and carbon prices. The Directed Contract pricing formulae will represent a view of price formation that is appropriate for establishing forward contract prices.

Derivation of the Directed Contract pricing formula from the Econometric Pricing Model

The derivation of the Directed Contract pricing formulae comes from a set of regressions. The dependent variable in this regression is mean SMP; the relevant independent variables are fuel and emission cost inputs. The regression will be run on pseudo data, i.e., a number of runs of the model at a variety of conditions will be run to give the regression the necessary variation to yield, after linear regression, proper conditional prices which reflect the mean SMP under different input price conditions. Mean SMPs are calculated by quarter and product type – with the means being weighted averages with weights to match the delivery requirements for each product type.

The results of the regression will allow the RAs to publish the parameters shown in the table below, which are anticipated to be the only parameters required to complete the specification of the Directed Contract pricing formula. To the extent that analysis of the relevant data implies that a different formula is appropriate, then the parameters specified may change slightly.

		α (formula constant)	β (coal price coefficient)	γ (natural gas price coefficient)	δ (LSFO price coefficient)	ϵ (gasoil price coefficient)	ζ (carbon price coefficient)
Nov- Dec 2007	Baseload						
	Mid-Merit						
	Peak						
Q1 2008	Baseload						
	Mid-Merit						
	Peak						
Q2 2008	Baseload						
	Mid-Merit						
	Peak						
Q3 2008	Baseload						
	Mid-Merit						
	Peak						

PLEXOS Interface Model

Both the Market Concentration Model and the Econometric Pricing Model require input data from PLEXOS runs in order to produce their results.

PLEXOS Interface with Market Concentration Model

The Market Concentration Model (or simply Concentration Model) requires the following inputs from PLEXOS:

- 1) Hourly SMP Prices
- 2) Hourly aggregate generation for Wind and Hydro
- 3) Average Costs/MWh for each unit
- 4) Unit capacities. If a unit is to come on-line or will retire mid-contract year, that should be noted as well.

The last item, unit capacities and any changes in on-line status, come from PLEXOS input data. All the other items come from PLEXOS output data. SMP prices and hydro & wind generation are simply copied and pasted into the Concentration Model. The calculation of average costs/MWh for each unit requires manipulation of PLEXOS outputs. Average costs include start-up and "generation costs", the latter of which

include no-load costs. All costs include emissions taxes. Average costs are calculated as a unit's total generation and start-up costs in a quarter divided by its total generation in that quarter. These quarterly averages are inputted into the Concentration Model.

The averaging process may take place in Excel or Access.

PLEXOS Interface with Econometric Pricing Model

The Econometric Pricing Model is a regression model, where the dependent variable is average SMP in the SEM. The SMP data comes from PLEXOS. There are twelve regressions to forecast average SMP prices by quarter for each Directed Contract (DC) product type. The interface works as follows.

- 1) Start with a series of indicative price combinations of: Natural Gas, Coal, Gasoil, LSFO, and Carbon. These indicative prices are hypothetical combinations of the index prices that will ultimately set the strike prices of the DC.
- 2) Each combination of index prices must be translated into PLEXOS input fuel and carbon prices for the units in the SEM.
- 3) PLEXOS is run for each combination of hypothetical prices. The hourly SMPs are the relevant outputs.
- 4) For each series of SMP outputs, calculate 12 relevant average SMP prices. The 12 prices are the weighted average SMPs for each quarter and DC product. The weights match how DC products are applied.
 - a. Baseload products have an equal weight in all hours.
 - b. Mid-Merit products have an equal weight in all mid-merit & peak hours on business days, but have a uniformly reduced weight in those same periods on non-business days. The non-business day weight is 80% of the business day weight. Mid-merit products have no weight in hours that are not mid-merit or peak hours.
 - c. Peak products have an equal weight in all peak hours, and zero weight in all other hours.

The twelve regressions are run with the following data. The independent variables are the hypothetical index-fuel-price combinations from Step 1). Note that, within a quarter, the same index values are used in each of the baseload, mid-merit, and peak regressions. The dependent variables are the associate average SMPs calculated in Step 4). The regressions may be expanded if it is found that reflecting fuel price relationships as independent variables significantly reduces that standard error and its variance.

5. Summary of Implementation Tasks

The list below recaps the major Directed Contract implementation tasks.

Publication of final form of Directed Contract

Facilitate annual workshop on Directed Contract improvement.
Approve final Directed Contract form each year.

Publication of the Aggregate Directed Contract Quantities

Set target HHI and run Market Concentration Model to determine Directed Contract quantities for ESB PG and NIE PPB.
Publish Directed Contract Quantities

Publication of the eligibility matrix for suppliers

Arrange for timely provision of load shape data and supplier MIC data by the Meter Data Provider

Develop a spreadsheet (“Eligibility Model”) that converts MIC data (in MVA) for a customer type into eligibility data (in MW) for each type of Directed Contract (baseload, mid-merit and peak). This will rely on the historic customer type load shapes and can be done well in advance.
Issue spreadsheet translating MIC by customer group to DC eligibility to each supplier

Publication of the Directed Contract pricing formula and indicative prices

Run regression analysis (“Econometric Pricing Model”) to determine Directed Contract pricing formulas;
Publish Directed Contract pricing formulas
Perform and publish indicative pricing using forward fuel and carbon prices

Execution of Directed Contract Master Agreements

Supervise execution of the Directed Contracts by sellers and buyers.

Subscription Period

Ensure that Directed Contract sellers have procedures in place to implement the RAs policies for subscription. Review and approve subscription guidelines.

Monitor Directed Contract formula to assure formula is in range

Direct a change in the Directed Contract pricing formula if monitoring reveals that formula is not in range

Oversee subscriptions on each day during Subscription Period, per nightly status report

Oversee daily website publication by Directed Contract sellers of remaining Directed Contract eligibility

Ensure that Directed Contract sellers make notification of remaining eligibility at the end of the Subscription Period

Supplemental Subscription Period

Obtain MIC data for new entrants from the Meter Service Provider

Inform Directed Contract sellers and new entrants of the new entrant eligibilities

Oversee subscriptions on each day during Supplemental Subscription Period, per nightly status report

Oversee daily website publication by Directed Contract sellers of remaining Directed Contract eligibility

Supervise rationing in event of oversubscription.

Monthly Review of Supplier Eligibility

Track MICs of suppliers with Directed Contracts

If supplier experiences reduction of 20% in MIC

Evaluate whether gaming criteria have been met

Consult with Directed Contract sellers regarding quantity reduction

Offer contract reduction to PES