



Physical Bilateral Contracts

Marketplace Training

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Physical Bilateral Contracts

AN IESO MARKETPLACE TRAINING PUBLICATION

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The Independent Electricity System Operator
Box 4474, Station A
Toronto, Ontario
M5W 4E5

Reception: (905) 855-6100
Fax: (905) 403-6921
Customer Relations: Tel: (905) 403-6900
Toll Free 1-888-448-7777

Website: www.ieso.ca

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1. Introduction

A physical bilateral contract is an agreement between a consumer to buy and a supplier to sell a specified quantity of energy at a specific price. In Ontario's market, you may purchase all or part of your energy from other market participants through physical bilateral contracts. This allows you to customize supply and pricing arrangements to meet your needs.

Objectives

When you have completed this workbook, you will be able to:

- Explain the purpose and application of physical bilateral contracts in the Ontario energy market
- Identify the impact of a physical bilateral contract on our¹ settlement process and on prudential requirements
- Given access to the Market Participant Interface (MPI), submit physical bilateral contract data in the correct format
- Given a physical bilateral contract data submission scenario, identify the data that must be submitted, who submits it, and the submission window
- Explain the impact of the transaction point and the 100% quantity flag
- For different physical bilateral contract scenarios, identify the price and quantity we use to determine the credit or debit for energy injected or withdrawn, and the price and quantity the parties use to settle between themselves

¹ In this workbook, 'we', 'our' and 'us' refer to the IESO.

2. Overview of Physical Bilateral Contracts (PBCs)

This chapter explains what information we need to know about your physical bilateral contract, how PBCs in the Ontario market differ from PBCs in some U.S. markets, and the impact of your contract on real-time operations, settlements, and prudential requirements.

Objectives

- Given a statement about a physical bilateral contract, determine if it applies to Ontario's IESO-administered energy markets
- Identify eligible participants in a physical bilateral contract that is submitted to us
- Identify the impact of a physical bilateral contract on real-time operations, the settlement process and prudential requirements

2.1 Why use a physical bilateral contract?

In general, there are two main reasons to enter into physical bilateral contracts:

- To manage price uncertainty
- To meet other corporate objectives

For example:

- Just Jeans, a clothing manufacturer, is planning to build a new factory. They want to know what their energy price will be for the longer term so that they can approach their bank for financing. They enter into a physical bilateral contract with Vintage Generation to supply 100% of their energy requirements. This guarantees their price over the term of the contract.
- GreenTree Recycling is a paper recycling plant that likes to buy 'green' energy from a source that is renewable and has lower environmental impact. They have come to an agreement with Chase the Wind to supply them with wind energy.

Both of these physical bilateral contracts require a price and quantity, but the other terms and conditions of the contracts are unlimited – the parties can negotiate them however they like.

2.2 Do we need to know if the parties have a physical bilateral contract?

The parties to a physical bilateral contract can choose whether or not they wish to submit their contract data to us.

- If they do **not** submit any data, billing and payment for contract quantities is between the parties to the agreement – we are not involved. We continue to bill consumers and pay suppliers based on their actual consumption and production, and on the real-time energy market price.

- If they submit the data to us, we adjust energy market settlement for the involved parties, allowing the participants to settle the energy according to their physical bilateral contract price. Note that there are specific data submission requirements if we are to use physical bilateral contract data in the settlement process – and contract price is not one of them.

This workbook deals only with those cases where the parties have elected to submit the physical bilateral contract data to us.

2.3 A physical bilateral contract comparison

The treatment of physical bilateral contracts in Ontario is different from some U.S. markets in a number of ways. Generally differences fall into three categories:

- Impact on real-time operations
- Timing and content of submitted data
- Effect on settlements

Impact on real-time operations

Used for settlements only – dispatch and scheduling based on bids, offers, and prices

In Ontario’s IESO-administered markets, physical bilateral contracts are not part of the scheduling and dispatch process – they are involved only in settlements. Many other markets integrate the bilateral contract information into market scheduling and dispatch decisions as well. We take energy from the suppliers and deliver it to the consumer **regardless** of whether the purchase is directly from the real-time energy market or via a physical bilateral contract.

The injection or withdrawal of energy by dispatchable participants and importers/exporters is based on their bid and offer prices in relation to the market price for energy (for details, see the *Introduction to Ontario’s Physical Markets* and *Interjurisdictional Energy Trading* workbooks, available on our [Marketplace Training](#) web pages). Physical bilateral contract data submitted by these participants has no effect on how we dispatch or schedule them – we do not direct a market participant’s operation based on information submitted as part of a physical bilateral contract. However, the participants themselves can impact their actual dispatch by altering their bid or offer strategy to comply with the terms of a physical bilateral contract.

Settlement

Actual supply and consumption do not affect settlement of the physical bilateral contract. We adjust the energy market settlements for each of the buying and selling market participants according to the physical bilateral contract data, regardless of their actual production and consumption. (See Chapter 4 for examples.)

Transmission

The Ontario market allows for unbiased transmission access for all market participants – transmission is not reserved. Moreover, since physical bilateral contracts affect only settlements, not dispatch or scheduling decisions, PBCs have no impact on transmission flows (except as outlined above where the participant chooses to alter operations to fulfill the terms of a physical bilateral contract).

Physical Bilateral Contracts in Ontario	Bilateral Contracts Elsewhere
Impact on real-time operation	
<p>Does not affect IESO scheduling and dispatch decisions:</p> <ul style="list-style-type: none"> • Dispatchable suppliers and consumers still need to submit dispatch data (i.e., offers and bids) • Importers and exporters still need to submit dispatch data (i.e., offers and bids) and make necessary arrangements with the neighbouring market • Non-dispatchable consumers simply consume as required 	<p>Integrated into scheduling and dispatch decisions.</p>
<p>Supply and consumption are not linked</p>	<p>Supply and consumption are linked.</p>
<p>Transmission arrangements are not needed:</p> <ul style="list-style-type: none"> • Transmission system provides equal access to all market participants • Transmission flows are not affected – PBCs have no effect on scheduling and dispatch 	<p>Transmission service typically needs to be arranged.</p>
<p>Priority or access for consumers or generators is not changed if there are transmission limitations or supply shortages.</p>	<p>The transmission service and linking of supply and consumption confer a certain priority for using the transmission path. This may lead to:</p> <ul style="list-style-type: none"> • Higher or lower priority if some transactions need to be cut for transmission limitations. • Greater certainty of supply to the buyer if there are generation shortages
Form and timing of PBC data submissions	
<p>Data may be submitted up to 6 business days after the dispatch.</p>	<p>Data must be submitted in advance of scheduling and dispatch.</p>
<p>A single transaction point is specified.</p>	<p>Injection and withdrawal points for the transaction are specified.</p>
<p>The quantity may be tied to the quantity generated or consumed, but not both. Exact quantity may be specified.</p>	<p>Exact quantities must be specified.</p>
Impact on settlements	
<p>Differences between the contract quantity and the physical quantities are treated as purchases or sales from the real-time energy market.</p>	<p>Deviations from contract quantities are (normally) accounted for as purchases or sales from the real-time energy market.</p>

2.4 Who can enter into a physical bilateral contract?

A physical bilateral contract is an optional legal arrangement available to energy buyers and sellers. In Ontario's IESO-administered market, any authorized market participant may use physical bilateral contracts

Marketers

You do not need to have physical facilities or to actually inject energy into or withdraw energy from the IESO-controlled grid. For example, a marketer (wholesale seller) can have a physical bilateral contract with another marketer.

Embedded suppliers and consumers

An embedded supplier or consumer wishing to enter into physical bilateral contracts can do so by becoming a wholesale market participant.

Multiple contracts

Market participants may enter into multiple physical bilateral contracts. For example:

- Chase the Wind routinely performs maintenance on their wind turbines and has included a clause in their physical bilateral contract with Powercorp Marketing that suspends the terms of their agreement under these conditions. Powercorp Marketing may enter into a physical bilateral contract with DSE Energy, another wholesale seller, to purchase the energy.
- Just Jeans has purchased more energy than they need under their physical bilateral contract with Chase the Wind. They enter into another physical bilateral contract with Great Grommets to resell them the excess portion of the energy.

2.5 What are the terms and conditions of PBCs?

To enter into a physical bilateral contract, the buyer and seller must agree on the terms of the contract. There is no standard format for the contract and a wide range of approaches can be taken.

The contract would include, among other terms:

- Financial and physical terms for the purchase of energy
- Definition of where the energy is deemed to be consumed (transaction point)
- Any other services required
- Liabilities, default, etc.
- Information exchange required between the parties

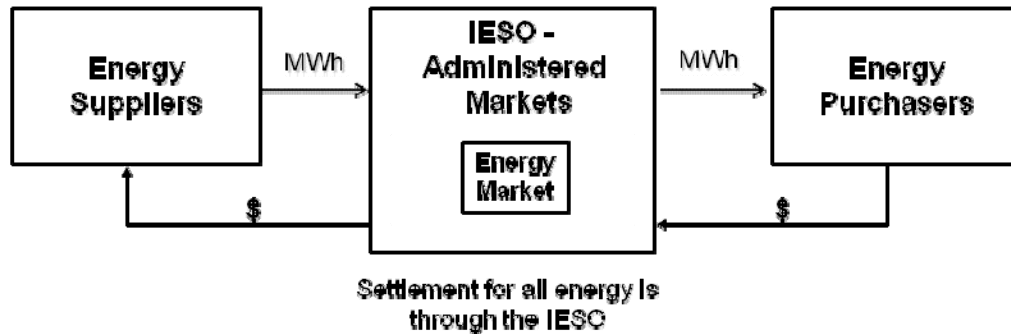
2.6 Impact on prudential requirements

When you determine your self-declared trading limit, you may take into account any of your physical bilateral contracts. Since the payment for the physical bilateral contract amount is made between the involved parties, payment obligations to us are reduced – this could reduce prudential obligations.

2.7 Impact on settlements

Settlement is the process of transferring payments from those who are required to make payment to those who are owed payment. The calculation we perform in the settlement process for the energy market differs depending on whether or not a physical bilateral contract exists.

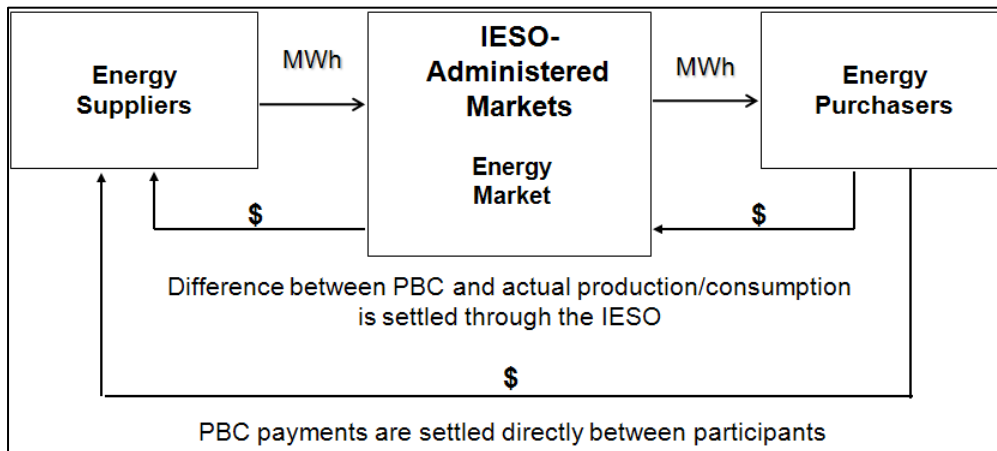
Settlement without a PBC



If there is no physical bilateral contract, all energy injected or withdrawn from the IESO-controlled grid is settled at the energy market price, which can be one of the intertie zone 5-minute prices, the Ontario 5-minute price, or the Hourly Ontario Energy Price (HOEP). (For details on how we determine these prices, see the *Introduction to Ontario's Physical Markets* and *Interjurisdictional Energy Trading* workbooks, available on our [Marketplace Training](#) web pages.)

We calculate payment amounts based on the real-time market price and energy quantities. There is no linkage between supplier and consumer in terms of actual production and consumption, or in our settlement process.

Settlement with a PBC



If there is a physical bilateral contract, we:

- Calculate payment amounts based on the real-time market price and energy quantities
- Subtract the value of the energy covered by the physical bilateral contract from the calculated payments owed to the seller and from those owed by the buyer

Payments under the terms of the physical bilateral contract are settled directly between the buyer and the seller.

There is still no linkage between supplier and consumer in terms of actual production and consumption, only in settlement. Note that participants without any intention to inject or withdraw energy from the physical power system can still have physical bilateral contracts between them. (See Chapter 4 *Settlement of Physical Bilateral Contracts*.)

Note: we will settle the physical bilateral contract data that has been submitted **whether or not** energy is supplied or consumed.

The value of the energy covered by the physical bilateral contract that we use to debit the seller and credit the buyer is not the contract price, but rather a price determined by the transaction point chosen by the parties to the physical bilateral contract. For detailed examples, see Chapter 4 *Settlement of Physical Bilateral Contracts*.

Participants may also assign components of their hourly uplift charges to other market participants via physical bilateral contracts.

2.8 Chapter review quiz: Overview of Physical Bilateral Contracts

1. Which of the following statements are true?
 - a) We use physical bilateral contracts for scheduling and dispatch of market participants
 - b) We are party to all the information in a physical bilateral contract
 - c) We take energy from suppliers and deliver it to the consumer regardless of whether the purchase is from the real-time energy market or through a contract
 - d) We do not need to know the price and payment terms of the physical bilateral contract
 - e) Physical bilateral contract data does not need to be submitted in advance of scheduling and dispatch
 - f) Physical bilateral contracts can affect the prudential requirements for a market participant

2. Which of the following authorized market participants can be parties to a physical bilateral contract submitted to us?
 - a) generators and retailers
 - b) wholesale suppliers and wholesale consumers
 - c) wholesale suppliers and retailers
 - d) all of the above

3. A physical bilateral contract can be used to: (more than one answer is correct)
 - a) reduce price risk
 - b) guarantee a supply of energy
 - c) resell excess energy
 - d) transfer hourly uplift components
 - e) settle energy quantities based on the retail market prices

4. A generator has a physical bilateral contract with a wholesale consumer. Which two of the following do we perform during the settlement process?
 - a) We calculate energy payment amounts based on the real-time market prices and energy quantities
 - b) We calculate energy payment amounts based on the PBC price
 - c) We subtract the value of the energy covered by the physical bilateral contract from the calculated payments owed to the supplier and from those owed by the consumer
 - d) We subtract the quantity of the physical bilateral contract from the actual energy amounts produced and consumed

Chapter review quiz answers: Overview of Physical Bilateral Contracts:

1. Which of the following statements are true?
 - a) We use PBCs for scheduling and dispatch of market participants
 - b) We are party to all the information in a physical bilateral contract
 - c) **We take energy from suppliers and deliver it to the consumer regardless of whether the purchase is from the real-time energy market or through a contract** ✓
 - d) **We do not need to know the price and payment terms of the PBC** ✓
 - e) **Physical bilateral contract data does not need to be submitted in advance of scheduling and dispatch** ✓
 - f) **Physical bilateral contracts can affect the prudential requirements for a market participant** ✓

2. Which of the following authorized market participants can be parties to a physical bilateral contract submitted to us?
 - a) generators and retailers
 - b) wholesale suppliers and wholesale consumers
 - c) wholesale suppliers and retailers
 - d) **all of the above** ✓

3. A physical bilateral contract can be used to: (more than one answer is correct)
 - a) **reduce price risk** ✓
 - b) guarantee a supply of energy
 - c) **resell excess energy** ✓
 - d) **transfer hourly uplift components** ✓
 - e) settle energy quantities based on the retail market prices

4. A generator has a physical bilateral contract with a wholesale consumer. Which two of the following do we perform during the settlement process?
 - a) **We calculate energy payment amounts based on the real-time market prices and energy quantities** ✓
 - b) We calculate energy payment amounts based on the physical bilateral contract price
 - c) **We subtract the value of the energy covered by the physical bilateral contract from the calculated payments owed to the supplier and from those owed by the consumer** ✓
 - d) We subtract the quantity of the physical bilateral contract from the actual energy amounts produced and consumed

3. Physical Bilateral Contract Data

This chapter explains how to submit physical bilateral contract data.

Objectives

- Given a physical bilateral contract data submission scenario, identify:
 - What data must be submitted
 - Who submits it
 - The permissible window for submission and revision
 - The impact of transaction point, 100% quantity flag, and defaults or suspension
- Identify components of hourly uplift that can be assigned using a physical bilateral contract

3.1 Submitting the data

Who submits the data?

The selling market participant is responsible for submitting the physical bilateral contract data to us, using the Market Participant Interface (MPI) web form or via template. We perform a validation check on the data and notify the market participant of acceptance via MPI. Only the seller can submit or modify physical bilateral contract data, but the buyer can view the submitted data via MPI.

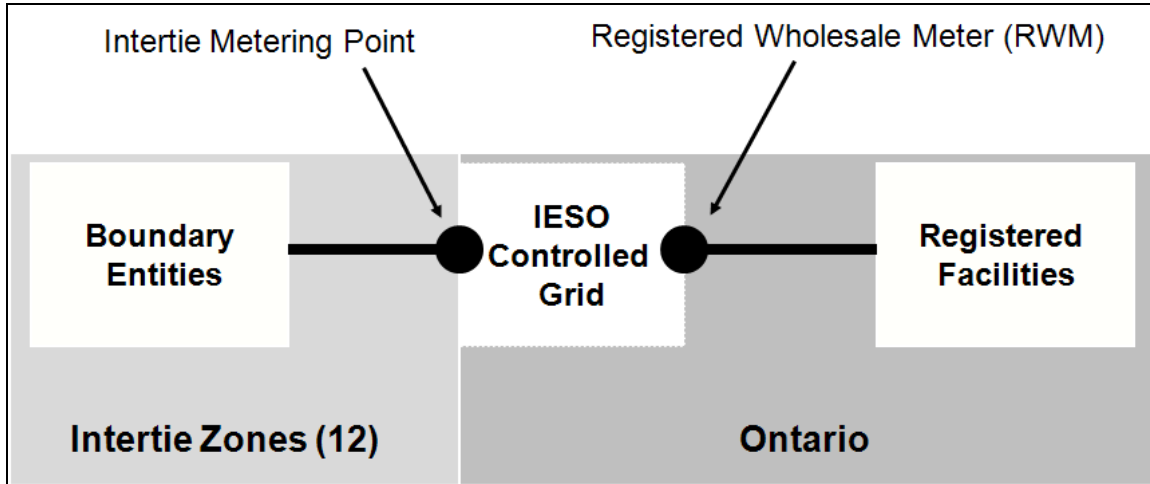
What content should be included?

Physical bilateral contract data must contain the following information:

- Identity of selling and buying market participants
- Applicable date and hours
- Location of transaction
- Quantity
- Assignment of hourly uplift components

Note that we do not require other terms and conditions of the contract, including price.

Transaction Location

**'Resource' and 'delivery point' – when do we use these terms?**

All injections and withdrawals of energy from the IESO-controlled grid occur at a physical point on the grid. Each point is used to create a resource or delivery point for the market participant that is associated with one or more registered wholesale meters for facilities located inside Ontario, or with an intertie metering point if at one of the intertie zones with other jurisdictions. We create this association for physical facilities within Ontario during the authorization process. The boundary entity/intertie metering point relationship is available to any participant that indicates, as part of the authorization process, that they wish to import and/or export.

The terms 'resource' and 'delivery point' refer to the same concept and are interchangeable. 'Resource' most often appears in documents and tools (such as the MPI) that deal with data submission, whereas delivery point is used in the metering and settlements areas.

The transaction location determines the price we use for the PBC quantities

The transaction between parties to a physical bilateral contract is deemed to occur at one of these resource/delivery point locations, as specified by the selling market participant when submitting the physical bilateral contract data. This location determines the price we use to credit or debit the market participants for their physical bilateral contract quantities.

A list of resources that participants without physical facilities can use is available on our [Technical Interfaces](#) web page. Submitting physical bilateral contract data using any of the listed resources ensures that settlement is based on an Ontario price.

Although two market participants could have multiple physical bilateral contracts between them, they can have only one contract in effect at a particular transaction point. Also, the contract can be based on only one type of quantity data (absolute quantity or 100% meter quantity) at a given transaction point for a given trading day. For example, two participants cannot have hours 1-12 settled as an absolute quantity and hours 13-24 settled as a 100% meter reading for the same delivery point on the same day.

Quantity

Settlement of physical bilateral contracts is based on hourly quantities. Therefore, data must be in megawatt hours (MWh).

The submitted quantity for a physical bilateral contract can be either an absolute value (MWh) or it can be flagged as 100% of the adjusted and summed metered quantity at the transaction point. The option of using the 100% quantity is only available where one of the two parties is the metered market participant for that meter. (See the *Revenue Metering* workbook, available on our [Marketplace Training](#) web pages for details on the adjusting and summing process.)

The 100% flag indicates that the total quantity will be used as the physical bilateral contract amount – in this case, actual physical events affect the physical bilateral contract quantities. This offers the convenience of ensuring all consumption is covered under the terms of the physical bilateral contract without having to revise quantities after the fact to match actual consumption. See Section 2.5 of *Charge Types and Equations* on our [Technical Interfaces](#) web page for further details on the 100% flag and reallocation of hourly uplift charges.

Hourly Uplifts

The IESO must remain in financial balance for payments to and from market participants. In addition to energy charges, we must recover costs for such things as:

- Energy losses in transferring electricity from suppliers to consumers
- Payments made to participants when, for reliability reasons, they are required to be dispatched differently from the (unconstrained) market schedule - referred to as congestion management settlement credits (CMSC)
- Provision of operating reserve and capacity reserve

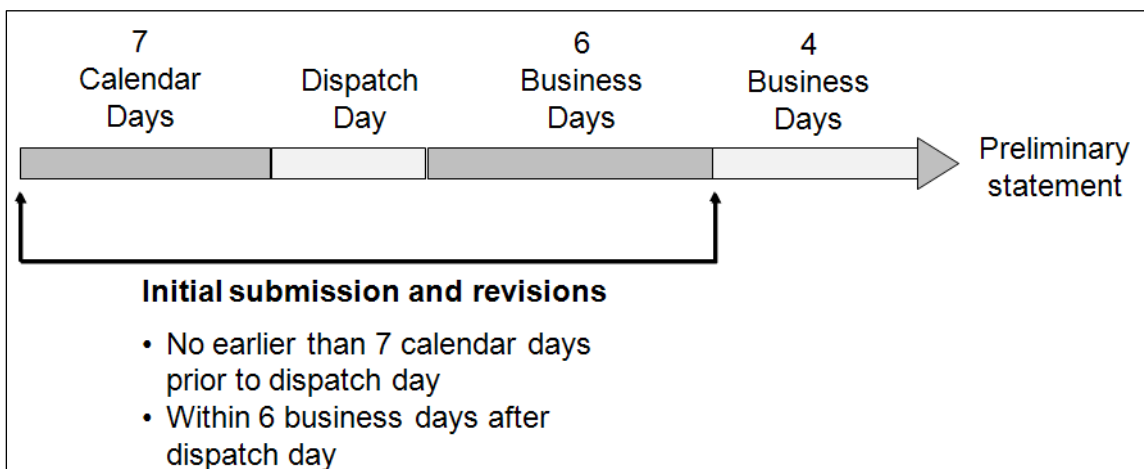
Typically the consumer pays these hourly uplift costs. However, using a physical bilateral contract, the seller may agree to cover these charges.

For example:

Star Manufacturing wants price certainty. They enter into a physical bilateral contract with Vintage Generation for 100% of their consumption. In addition, they agree that Vintage Generation will pick up the obligation for all hourly uplift charges. Vintage Generation submits the physical bilateral contract data to us, including identifying the hourly uplift charges to be transferred to them.

3.2 Submission timeline

Physical bilateral contract data must be submitted to us within the required window of up to seven calendar days before the dispatch day and six business days following the dispatch day. This leaves at least four business days for us to produce the preliminary statement for the dispatch day in question. (See the *Settlement Statements & Invoices* workbook, available on our [Marketplace Training](#) web pages.) Since physical bilateral contracts have no effect on scheduling and dispatch, after-the-fact submission is not a problem.



Note: A business day is any day other than a Saturday, Sunday or statutory holiday.

3.3 Revising and cancelling data

Revisions or cancellations of submitted data are allowed at any time within the submission window of seven calendar days before and six business days after the dispatch day.

For example:

Dynamo Generation has contracted with Acme Marketing to supply 20 MWh of energy. They submitted the physical bilateral contract data for the week on Monday, assuming that the plant would be functioning well. On Thursday the plant is forced out of service for two days.

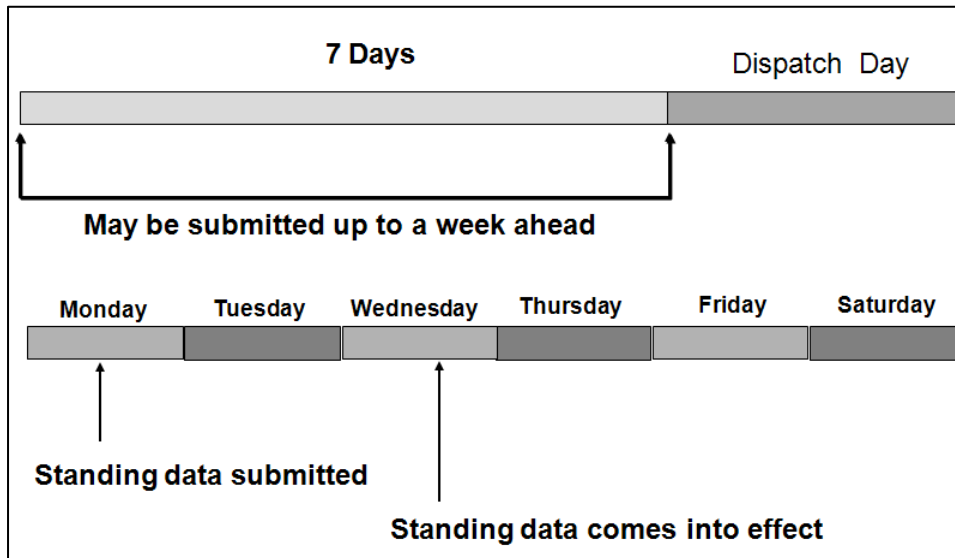
When negotiating the contract, Dynamo Generation did not want the bilateral sale to continue when the plant is unable to generate the 20 MW. Selling under these conditions would create some risk for them if market prices were to rise, as we would debit them for the quantity specified under the physical bilateral contract, and would not credit them for any production as their plant would be unavailable. The physical bilateral contract between Dynamo Generation and Acme Marketing includes terms to cover this situation, and indicates no delivery is required if Dynamo's unit is unavailable.

On Saturday when the generator starts to produce again, Dynamo Generation revises the physical bilateral contract quantity to zero for the two days the plant did not run, consistent with the terms of the contract.

Note: To ensure the correct data is used in the settlement process, to revise data for anything less than all hours of a given day, you should:

- Cancel physical bilateral contract data for the day in question
- Resubmit physical bilateral contract with the revised content

Standing Data



For contracts where data will not change from week to week, you can submit standing data. Standing data comes into effect on the second dispatch day after submission – this includes revisions or cancellations to existing standing data. It has the same form and content as ‘regular’ physical bilateral contract data, but it remains in effect until the specified expiry date or until it is superseded by another data submission for the same dispatch day.

Note: Because of the way the inputs to MPI are processed, standing data submitted with an expiry date is actually used in calculations for the day following the specified date, i.e., we use physical bilateral contract data submitted with an expiry date of May 15 to settle May 16.

Standing data may apply for all days of the week or for individual days. Since this data continues to be used week after week until it expires, the effort for a seller to submit data for a longer-term contract is minimal.

Defaults & Suspensions

If there is an event of default by a selling market participant, we revise outstanding physical bilateral contract quantities to zero. A number of conditions can lead to an event of default (see Market Rules Chapter 3, Section 6.3), including the situation where there has been an inadequate response to a margin call.

Similarly, if we were to issue a suspension order against a selling market participant, we would revise the physical bilateral contract quantities to zero for the period following the date of the suspension order.

Tool Simulations

For practice submitting PBC data, please see the PBC tool simulations, available on our [Marketplace Training](#) web pages.

3.4 Chapter review quiz: Physical Bilateral Contract Data

1. Which of the following market participants submits the physical bilateral contract data to the IESO?
 - a) Buyer
 - b) Seller
 - c) Either party to the contract
 - d) Generator

2. Physical bilateral contract data can be submitted to us no sooner than ____ calendar days before the dispatch day and up to ____ business days after.

3. Which of the following is valid physical bilateral contract data to submit to us?
 - a) Transaction point
 - b) Contract price
 - c) Applicable date
 - d) Quantity

4. Using the 100% flag for the physical bilateral contract quantity is only available when:
 - a) The seller is the metered market participant for the transaction point
 - b) The buyer is the metered market participant for the transaction point
 - c) Either party is the metered market participant for the transaction point
 - d) The consumer is the metered market participant for the transaction point

5. If a selling market participant is under suspension, physical bilateral contract quantities are:
 - a) Set to zero
 - b) Held at the last value
 - c) Unaffected
 - d) Set to 100% of the metered value

6. A seller submits standing data for a physical bilateral contract for every Saturday for a period of one year. To change the quantity for just next Saturday, May 10, the seller can submit revised data as early as _____ and as late as _____
- a) Saturday, May 3/ Monday, May 19
 - b) Monday, May 5/ Friday, May 9
 - c) Saturday, May 3/ Saturday, May 17
 - d) Sunday , May 4/ Sunday, May 16
7. Hourly uplifts recover costs associated with which of the following:
- a) Transmission rights
 - b) Provision of operating reserve
 - c) Energy losses
 - d) Congestion management settlement credits

Chapter review quiz answers: Physical Bilateral Contract Data: Content and Timelines

1. Which of the following market participants submits the physical bilateral contract data to us?
 - a) Buyer
 - b) **Seller** ✓
 - c) Either party to the contract
 - d) Generator

2. Physical bilateral contract data can be submitted to the IESO no sooner than 7 calendar days before the dispatch day and up to 6 business days after.

3. Which of the following is valid physical bilateral contract data to submit to us?
 - a) **Transaction point** ✓
 - b) Contract price
 - c) **Applicable date** ✓
 - d) **Quantity** ✓

4. Using the 100% flag for the physical bilateral contract quantity is only available when:
 - a) The seller is the metered market participant for the transaction point
 - b) The buyer is the metered market participant for the transaction point
 - c) **Either party is the metered market participant for the transaction point** ✓
 - d) The consumer is the metered market participant for the transaction point

5. If a selling market participant is under suspension, physical bilateral contract quantities are:
 - a) **Set to zero** ✓
 - b) Held at the last value
 - c) Unaffected
 - d) Set to 100% of the metered value

6. A seller submits standing data for a physical bilateral contract for every Saturday for a period of one year. To change the quantity for just next Saturday, May 10, the seller can submit revised data as early as _____ and as late as _____
- a) **Saturday, May 3/ Monday, May 19** ✓
 - b) Monday, May 5/ Friday, May 9
 - c) Saturday, May 3/ Saturday, May 17
 - d) Sunday , May 4/ Sunday, May 16
7. Hourly uplifts recover costs associated with which of the following:
- a) Transmission rights
 - b) **Provision of operating reserve** ✓
 - c) **Energy Losses** ✓
 - d) **Congestion management settlement credits** ✓

4. Settlement of Physical Bilateral Contracts

When we settle the market, we determine payment amounts and make payment transfers from those who owe the market to those who are owed by the market. This chapter discusses the impact of physical bilateral contracts on settlements.

Objectives

- Given a series of physical bilateral contract scenarios, determine the debit or credit amounts for buyers and sellers
- Given a participant type, identify the price we use to determine their credit or debit for energy injected into or withdrawn from the IESO-controlled grid
- Given a PBC transaction point, identify the value we use to credit or debit the seller and buyer for the PBC quantity

4.1 PBC settlement considerations

Settlement calculations

The settlement calculation for the energy market depends on:

- The quantity the supplier injects into the system
- The quantity the consumer withdraws from the system
- The location of the energy injection and withdrawal (i.e., at a delivery point that is associated either with a dispatchable or non-dispatchable facility, or at an intertie metering point associated with a boundary entity)
- Whether or not physical bilateral contract data has been submitted to us, and, if so:
 - The physical bilateral contract quantity
 - The transaction location (delivery point or intertie metering point)

Prices used in settlements

There are three types of energy prices used in settlements:

- **Ontario MCP** – market clearing price determined every 5 minutes, and uniform across the province
- **Intertie Zone MCP** - market clearing price determined every 5 minutes for each intertie zone
- **Hourly Ontario Energy Price (HOEP)** - arithmetic average of the Ontario MCPs for a given hour

See the *Introduction to Ontario's Physical Markets* and *Interjurisdictional Energy Trading* workbooks, available on our [Marketplace Training](#) web pages, for an explanation of how we determine these prices.

ENERGY SETTLEMENT WITHOUT A PHYSICAL BILATERAL CONTRACT

Suppliers	Applicable Price	Consumers
Dispatchable Generator	Ontario MCP	Dispatchable Load
Self-scheduling & Intermittent Generator	HOEP	Non-dispatchable Load
Boundary Entity Importers	Intertie Zone MCP	Boundary Entity Exporters

For actual energy injections into and withdrawals from the IESO-controlled grid, suppliers are credited and consumers are debited based on whether they are dispatchable, non-dispatchable or a boundary entity.

Suppliers credited: Actual Production X Applicable Price

Consumers debited: Actual Consumption X Applicable Price

ENERGY SETTLEMENT WITH A PHYSICAL BILATERAL CONTRACT

Settling the energy component of a statement for a participant with a physical bilateral contract in place is a two-step process:

- Determine the energy credit or debit of participants based on actual production or consumption (same calculation as performed when there is no physical bilateral contract)
- Determine the value of energy covered by the physical bilateral contract, and debit the seller, credit the buyer

The net of the two calculations determines what each participant is paid or must pay for the energy component of their statement. We also charge hourly uplift components to each participant as specified in the submitted physical bilateral contract data.

The value of the energy covered by the physical bilateral contract that we use to debit the seller and credit the buyer is not the physical bilateral contract price, but rather a price determined by the transaction point chosen by the parties to the contract.

Transaction Point (delivery point/resource associated with a..)	Seller Debited @	Buyer Credited @
Non-dispatchable facility <ul style="list-style-type: none"> • Load • Self-scheduling generator • Intermittent generator 	Ontario MCP	HOEP
Dispatchable facility <ul style="list-style-type: none"> • Generator • Load 	Ontario MCP	Ontario MCP
Intertie Metering Point <ul style="list-style-type: none"> • Imports or exports 	Intertie Zone MCP	Intertie Zone MCP

Note that the seller is always debited at a 5-minute price, even if the transaction is deemed to take place at a non-dispatchable delivery point/resource.

Payments under the terms of the physical bilateral contract take place between the parties themselves, and do not involve the IESO.

Settlement statements are created for each trading day and the energy credit or debit is identified for each delivery point for each interval that is settled. The participant receives one monthly invoice from us with their net energy credit or debit.

Transaction point

Considerations in choosing a transaction point

- If participants wish to use a 100% metered quantity, then one of the parties must be the metered market participant for the registered wholesale meter associated with that delivery point.
- To use an absolute quantity, the participants must choose whether they want us to use an Ontario price or an intertie zone price to value the contract. The HOEP calculation is a straight arithmetic average of MCPs for an hour. This means that a PBC settled at any delivery point in Ontario will be valued the same whether a dispatchable or non-dispatchable delivery point is used as the transaction location (the grey areas in the previous table).

To settle physical bilateral contracts based on a transaction point at a dispatchable resource, the quantity is divided by twelve to get a per interval MWh and is then multiplied by the MCP for each interval:

$$\text{PBC value} = \frac{\text{PBC Quantity} \times \text{MCP}_{\text{interval 1}}}{12} + \frac{\text{PBC Quantity} \times \text{MCP}_{\text{interval 2}}}{12} + \frac{\text{PBC Quantity} \times \text{MCP}_{\text{interval 3}}}{12} + \dots + \frac{\text{PBC Quantity} \times \text{MCP}_{\text{interval 12}}}{12}$$

To settle physical bilateral contracts based on a transaction point at a non-dispatchable resource, the hourly quantity is multiplied by HOEP, which is the arithmetic average of the twelve interval MCPs:

$$\text{PBC value} = \text{PBC Quantity} \times \text{HOEP}$$

$$\text{where HOEP} = \left(\frac{\text{MCP}_{\text{interval 1}} + \text{MCP}_{\text{interval 2}} + \text{MCP}_{\text{interval 3}} + \dots + \text{MCP}_{\text{interval 12}}}{12} \right)$$

Equation (1) and (2) yield the same result. Consider the following example where the value of a physical bilateral contract is calculated using both methods. The contract is for 120 MWh and MCP profile and HOEP are as shown.

Case 1: Transaction Point at dispatchable resource:

Interval	MCP	PBC Quantity (MWh)	PBC Value (\$)
1	23	120/12 = 10	230
2	24	120/12 = 10	240
3	24	120/12 = 10	240
4	24	120/12 = 10	240
5	26	120/12 = 10	260
6	26	120/12 = 10	260
7	25	120/12 = 10	250
8	26	120/12 = 10	260
9	32	120/12 = 10	320
10	32	120/12 = 10	320
11	27	120/12 = 10	270
12	26	120/12 = 10	260
Total = 120			3150

Case 2 : Transaction point at non-dispatchable resource

HOEP = \$26.25, PBC Quantity = 120 MWh

Value = 26.25 x 120

= \$3150

In either case, the value assigned the physical bilateral contract is \$3150. It does not matter whether a dispatchable or non-dispatchable resource is used as the transaction point for those wishing to settle a physical bilateral contract at an Ontario price.

Skill Check: PBC settlement considerations

1. Identify the price used for the following market participants' credit and debit for energy injected into or withdrawn from the IESO-controlled grid:
 - Hourly Ontario Energy Price (HOEP)
 - Uniform Ontario 5-minute price (Ontario MCP)
 - Applicable intertie zone 5minute price (Intertie Zone MCP)

Participant Type	Price used to credit/debit injections/withdrawals
Dispatchable Generator	
Boundary Entity	
Self-scheduling Generator	
Non-dispatchable Load	
Dispatchable Load	

2. Identify the value we use to debit the seller and credit the buyer for the physical bilateral contract quantity.

Transaction Point	Price used to debit seller	Price used to credit buyer
Dispatchable Facility		
Intertie Metering Point		
Non-dispatchable Facility		

Skill Check – Answers: PBC Settlement Considerations

1. Identify the price used for the following market participants' credit and debit for actual energy injected into or withdrawn from the IESO-controlled grid
 - Hourly Ontario Energy Price (HOEP)
 - Uniform Ontario 5-minute price (Ontario MCP)
 - Applicable intertie zone 5minute price (Intertie Zone MCP)

Participant Type	Price used to credit/debit injections/withdrawals
Dispatchable Generator	Ontario MCP
Boundary Entity	Intertie Zone MCP
Self-scheduling Generator	HOEP
Non-dispatchable Load	HOEP
Dispatchable Load	Ontario MCP

2. Identify the value we use to debit the seller and credit the buyer for the physical bilateral contract quantity

Transaction Point	Price used to debit seller	Price used to credit buyer
Dispatchable Facility	Ontario MCP	Ontario MCP
Intertie metering point	Intertie Zone MCP	Intertie Zone MCP
Non-dispatchable Facility	Ontario MCP	HOEP

4.2 Settlement scenarios

Objectives

- Given a physical bilateral contract scenario, identify the:
 - Credit or debit, quantity, and price we use to settle the energy and physical bilateral contract quantity
 - Payment price and quantity used by the parties to a physical bilateral contract to settle between themselves

Scenarios

The following scenarios are a representative cross-section of the impact of physical bilateral contracts on the settlement process under different conditions:

- Bilateral payments between the parties are shown (in gray) for completeness, but we have no knowledge of these details
- Hourly uplift charges are ignored here for clarity, but are part of the settlement process
- Settlement is shown for only one hour
- Where settlement is based on a 5-minute price, detailed per-interval credits and debits are shown

To simplify comparison in these scenarios, assume that production and consumption are constant for the hour. For dispatchable facilities, the variability of 5-minute prices and actual injection and withdrawal per interval have a pronounced effect on what the participant owes the market or is owed by the market. Below is an example for a dispatchable generator providing 120 MWh of energy in a given hour. Note the differences due to the interaction of per interval price and actual output.

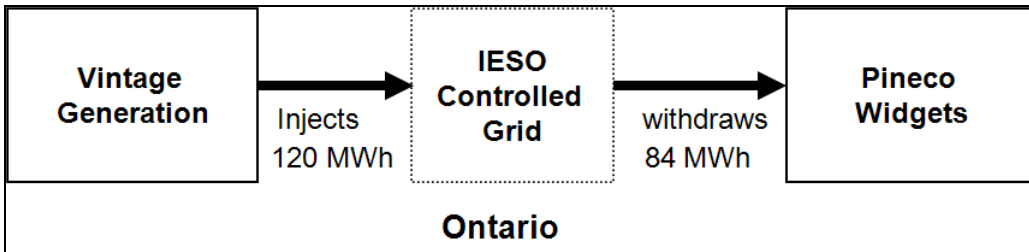
Interval	MCP	Case 1		Case 2	
		Production (MWh)	Credited for (\$)	Production (MWh)	Credited for (\$)
1	19	8	152	12	228
2	19	8	152	12	228
3	19	8	152	13	247
4	19	8	152	12	228
5	26	9	234	12	312
6	26	9	234	9	234
7	27	9	243	9	243
8	38	12	456	9	342
9	38	12	456	8	304
10	38	13	494	8	304
11	26	12	312	8	208
12	26	12	312	8	208
Hourly Totals		120	3349	120	3086

Non-dispatchable facilities are credited or debited based on their hourly production or consumption and HOEP. Therefore, actual per interval production or consumption is not a factor except as it impacts their hourly totals.

Use the following chart to determine the scenarios that pertain to most of your business requirements (there are lessons in each of the scenarios that may be useful, whatever your situation). Scenarios 1-6 involve the same market participants under varying conditions and are best completed in sequence.

	PBC Participants	Transaction Point	Key Features
1	<ul style="list-style-type: none"> • None 		<ul style="list-style-type: none"> ▪ No physical bilateral contract
2	<ul style="list-style-type: none"> • Dispatchable generator • Non-dispatchable consumer 	Load	<ul style="list-style-type: none"> ▪ Production and consumption greater than PBC quantity
3	<ul style="list-style-type: none"> • Dispatchable generator • Non-dispatchable consumer 	Generator	<ul style="list-style-type: none"> ▪ Illustrates that using any transaction point (dispatchable or non-dispatchable) within Ontario will yield the same PBC credits and debits in the settlement process
4	<ul style="list-style-type: none"> • Dispatchable generator • Non-dispatchable consumer 	Load	<ul style="list-style-type: none"> ▪ Generator is not dispatched
5	<ul style="list-style-type: none"> • Dispatchable generator • Non-dispatchable consumer 	Load	<ul style="list-style-type: none"> ▪ PBC quantity is for 100% of the buyer's consumption
6	<ul style="list-style-type: none"> • Dispatchable generator • Two non-dispatchable consumers 	Load	<ul style="list-style-type: none"> ▪ Two physical bilateral contracts: consumer enters into PBCs with generator and another consumer
7	<ul style="list-style-type: none"> • Two wholesale sellers 	Load	<ul style="list-style-type: none"> ▪ Physical bilateral contract between two participants without physical facilities
8	<ul style="list-style-type: none"> • Dispatchable generator • Boundary entity (exporting) 	Intertie Zone	<ul style="list-style-type: none"> ▪ Risks associated with transaction point
9	<ul style="list-style-type: none"> • Retailer • Boundary entity (importing) 	Load	<ul style="list-style-type: none"> ▪ Retailer's consumption less than PBC quantity ▪ Import greater than PBC quantity ▪ Risks associated with transaction point
10	<ul style="list-style-type: none"> • Retailer • Boundary entity (importing) 	Intertie Zone	<ul style="list-style-type: none"> ▪ Retailer's consumption less than PBC quantity ▪ Import greater than PBC quantity ▪ Risks associated with transaction point

Scenario 1



No physical bilateral contract

- The generator is dispatchable
- The consumer is non-dispatchable
- Hourly Ontario Energy Price = \$35
- Ontario MCP as in details below

Pineco Widgets is a large non-dispatchable Ontario manufacturing company with a load of 84 MWh. Vintage Generation is a dispatchable Ontario generator that can supply up to 120 MWh to the market. Neither is party to a physical bilateral contract. Assume that Vintage Generation successfully offers its full capacity in the market for the hour under consideration.

Pineco Widgets:

is...	by...	for...	of...	at...	of...	for a total of..
debited	the IESO	consumption	84 MWh	HOEP	\$35	\$2940

Vintage Generation:

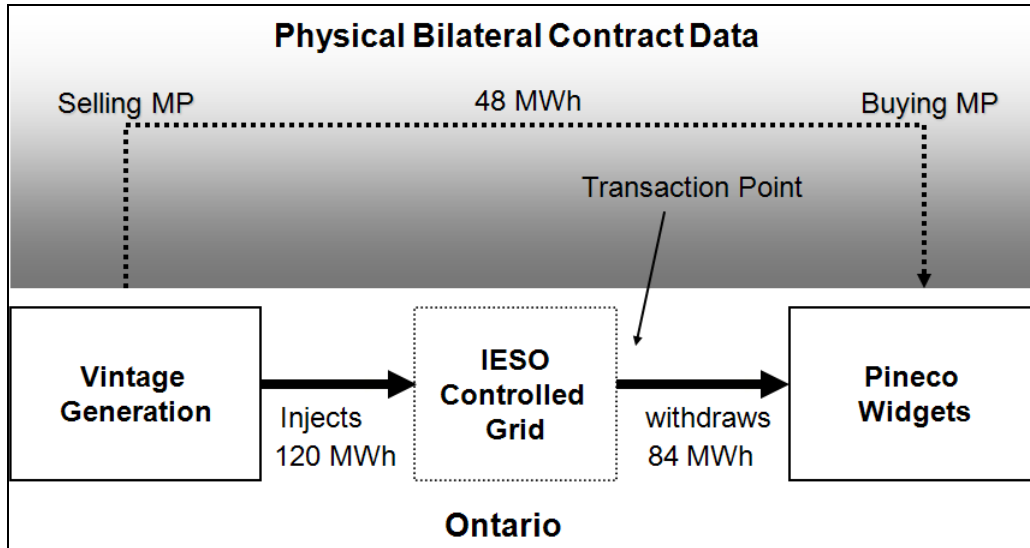
is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	120 MWh	Ontario MCP	see details	\$4200

Vintage Credit Details			
Interval	Production (MWh)	Ontario MCP (\$/MW)	Credit (\$)
1	10	32	320
2	10	32	320
3	10	35	350
4	10	35	350
5	10	35	350
6	10	35	350
7	10	35	350
8	10	35	350
9	10	35	350
10	10	37	370
11	10	37	370
12	10	37	370
Total	120		4200

Observations

- Since there was no physical bilateral contract data submitted to us, we settle the two parties based on their production and consumption only

Scenario 2



Physical bilateral contract is between:

- A dispatchable generator and non-dispatchable consumer
- Hourly Ontario Energy Price = \$35
- Ontario MCP as in details below
- Transaction point is at the load

Although in a given hour Pineco Widgets can consume up to 84 MWh, they have a minimum load of 48 MWh to operate their assembly line. To have price certainty for this minimum load, they enter into a physical bilateral contract with Vintage Generation to supply 48 MWh at \$36/MWh. The contract term is for every hour for one year with the transaction point being Pineco’s point of consumption. Production, consumption and prices are the same as in Scenario 1.

Pineco Widgets:

is...	by...	for...	of...	at...	of...	for a total of...
debited	the IESO	consumption	84 MWh	HOEP	\$35	\$2940
credited	the IESO	PBC quantity	48 MWh	HOEP	\$35	\$1680
billed	Vintage Generation	PBC quantity	48 MWh	PBC price	\$36	\$1728

Vintage Generation:

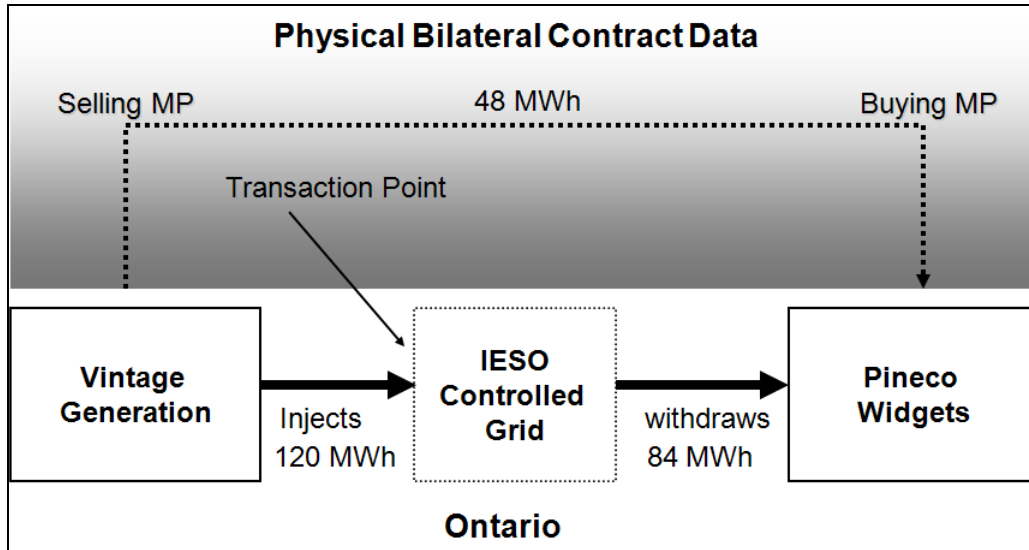
is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	120 MWh	Ontario MCP	see details	\$4200
debited	the IESO	PBC quantity	48 MWh	Ontario MCP	see details	\$1680
paid	Pineco Widgets	PBC quantity	48 MWh	PBC price	\$36	\$1728

Interval	Vintage Credit Details			Vintage Debit Details		
	Production (MWh)	Ontario MCP (\$/MW)	Credit (\$)	PBC Quantity (MWh)	Ontario MCP (\$/MW)	Debit (\$)
1	10	32	320	4	32	128
2	10	32	320	4	32	128
3	10	35	350	4	35	140
4	10	35	350	4	35	140
5	10	35	350	4	35	140
6	10	35	350	4	35	140
7	10	35	350	4	35	140
8	10	35	350	4	35	140
9	10	35	350	4	35	140
10	10	37	370	4	37	148
11	10	37	370	4	37	148
12	10	37	370	4	37	148
Total	120		4200	48		1680

Observations

- Pineco Widgets have protected themselves against a price increase on their continuous 48 MWh of consumption by using a physical bilateral contract
- As the seller, Vintage Generation's debit associated with the physical bilateral contract quantity is at 5-minute prices regardless of the chosen transaction point, which in this case is at a non-dispatchable facility
- The consumption covered by the contract is paid directly to Vintage Generation at the contract price by Pineco Widgets
- Only Pineco Widgets and Vintage Generation are party to the price terms of the physical bilateral contract

Scenario 3



Physical bilateral contract is between:

- A dispatchable generator and non-dispatchable consumer
- Hourly Ontario Energy Price = \$35
- Ontario MCP as in details below
- Transaction point is at the generator

All conditions are the same as for Scenario 2 except the transaction point is *Vintage's* point of production.

Pineco Widgets:

is...	by...	for...	of...	at...	of.	for a total of...
debited	the IESO	consumption	84 MWh	HOEP	\$35	\$2940
credited	the IESO	PBC quantity	48 MWh	Ontario MCP	see details	\$1680
billed	Vintage Generation	PBC quantity	48 MWh	PBC price	\$36	\$1728

Pineco Credit Details			
Interval	Production (MWh)	Ontario MCP (\$/MW)	Credit (\$)
1	4	32	128
2	4	32	128
3	4	35	140
4	4	35	140
5	4	35	140
6	4	35	140
7	4	35	140
8	4	35	140
9	4	35	140
10	4	37	148
11	4	37	148
12	4	37	148
Total	48		1680

Vintage Generation:

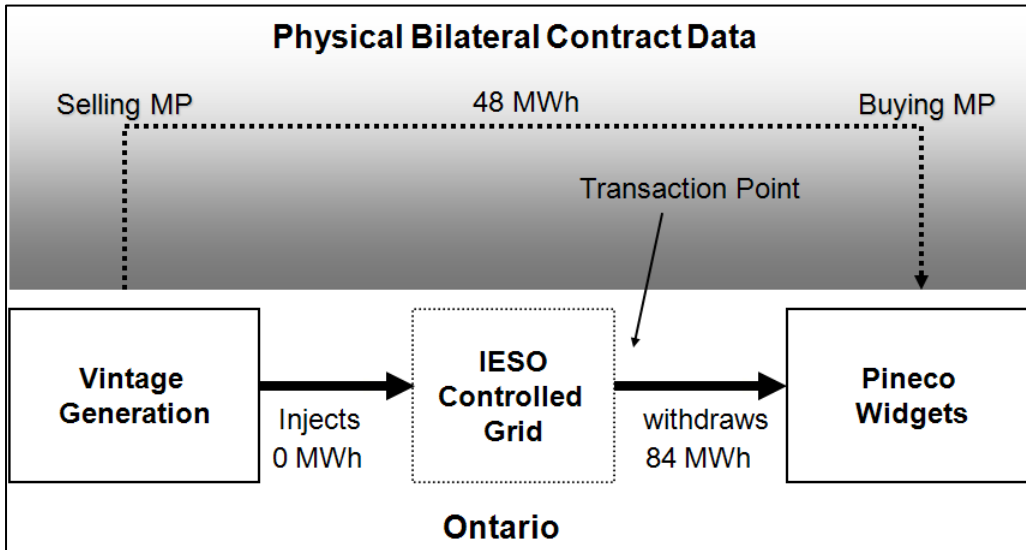
is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	120 MWh	Ontario MCP	see details	\$4200
debited	the IESO	PBC quantity	48 MWh	Ontario MCP	see details	\$1680
paid	Pineco Widgets	PBC quantity	48 MWh	PBC price	\$36	\$1728

Interval	Vintage Credit Details			Vintage Debit Details		
	Production (MWh)	Ontario MCP (\$/MW)	Credit (\$)	PBC Quantity (MWh)	Ontario MCP (\$/MW)	Debit (\$)
1	10	32	320	4	32	128
2	10	32	320	4	32	128
3	10	35	350	4	35	140
4	10	35	350	4	35	140
5	10	35	350	4	35	140
6	10	35	350	4	35	140
7	10	35	350	4	35	140
8	10	35	350	4	35	140
9	10	35	350	4	35	140
10	10	37	370	4	37	148
11	10	37	370	4	37	148
12	10	37	370	4	37	148
Total	120		4200	48		1680

Observations

- Pineco Widgets have protected themselves against a price increase on their continuous 48 MW of consumption by using a physical bilateral contract
- As explained in the introduction to this section, the HOEP calculation makes it irrelevant whether a dispatchable or non-dispatchable resource is used as the transaction point for a physical bilateral contract settled in Ontario - compare this scenario's results to scenario 2
- The consumption covered by the contract is paid directly to Vintage Generation at the contract price by Pineco Widgets
- Only Pineco Widgets and Vintage Generation are party to the price terms of the physical bilateral contract

Scenario 4



Physical bilateral contract is between:

- A dispatchable generator and non-dispatchable consumer
- Hourly Ontario Energy Price = \$21
- Ontario MCP as in details below
- Transaction point is at the load
- The generator is **not** dispatched

Market prices have fallen below Vintage Generation’s production cost as reflected in their energy offer into the market. As the result, Vintage Generation is not dispatched to produce any energy.

Pineco Widgets:

is...	by...	for...	of...	at...	of ...	for a total of...
debited	the IESO	consumption	84 MWh	HOEP	\$21	\$1764
credited	the IESO	PBC quantity	48 MWh	HOEP	\$21	\$1008
billed	Vintage Generation	PBC quantity	48 MWh	PBC price	\$36	\$1728

Vintage Generation:

is...	by...	for ...	of...	at...	of...	for a total of..
debited	the IESO	PBC quantity	48 MWh	Ontario MCP	see details	\$1008
paid	Pineco Widgets	PBC quantity	48 MWh	PBC price	\$36	\$1728

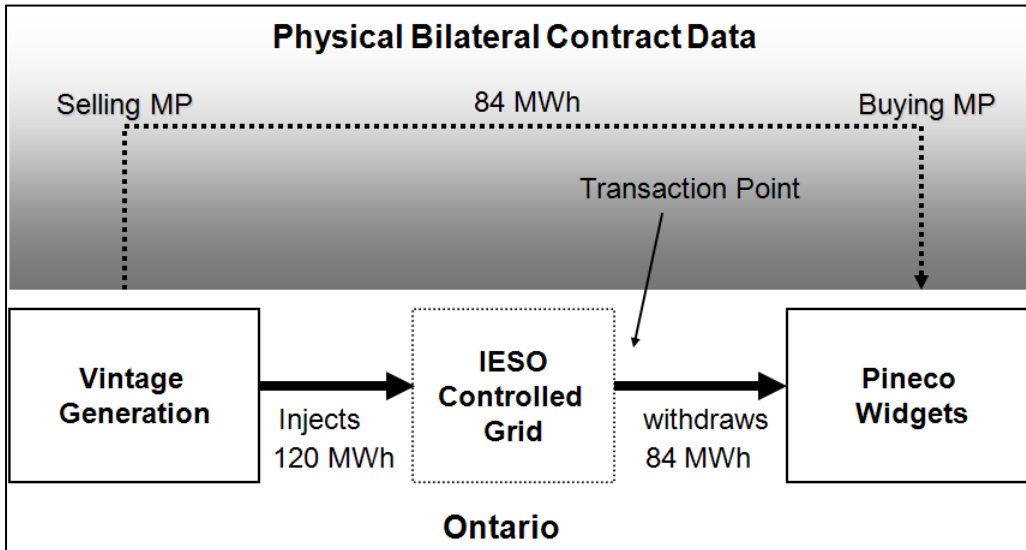
Vintage Debit Details			
Interval	PBC Quantity (MWh)	Ontario MCP (\$/MW)	Debit (\$)
1	4	15	60
2	4	17	68
3	4	18	72
4	4	19	76
5	4	19	76
6	4	19	76
7	4	19	76
8	4	22	88
9	4	23	92
10	4	27	108
11	4	27	108
12	4	27	108
Total	48		1008

Observations

- Pineco's net payment to the IESO is lower than in Scenario 2 because the price of its consumption (HOEP) not covered by the physical bilateral contract is lower
- Even though Vintage Generation's output is reduced to zero, Pineco's consumption is not affected – the market supplies the energy consumed by Pineco
- Vintage Generation owes the IESO as they have not produced any energy, however their cost in supplying the PBC is lower than in Scenario 2 (\$1008 vs. \$1680)
- At these prices, it is less expensive for Vintage Generation to satisfy the contract by purchasing from the real-time energy market rather than generating - they do not want to generate when they will be paid less at real-time energy market prices than their production cost

- Pineco's consumption and Vintage Generation's production are not tied to the physical bilateral contract
- Pineco Widgets and Vintage Generation make independent decisions about production and consumption based on their own circumstances and real-time energy market conditions

Scenario 5



Physical bilateral contract is between:

- A dispatchable generator and non-dispatchable consumer
- Hourly Ontario Energy Price = \$35
- Ontario MCP as detailed below
- Transaction point is at the load
- The contract is for 100% of the buyer's consumption

Pineco wants to fix the energy price for their entire consumption. They enter into a new physical bilateral contract with Vintage Generation. The contract is similar to the previous one, but this time the quantity is to cover 100% of the consumption measured at Pineco Widgets factory. The contract price is \$36 per MWh.

Pineco Widgets:

is...	by...	for...	of...	at...	of...	for a total of...
debited	the IESO	consumption	84 MWh	HOEP	\$35	\$2940
credited	the IESO	PBC quantity	84 MWh	HOEP	\$35	\$2940
billed	Vintage Generation	PBC quantity	84 MWh	PBC price	\$36	\$3024

Vintage Generation:

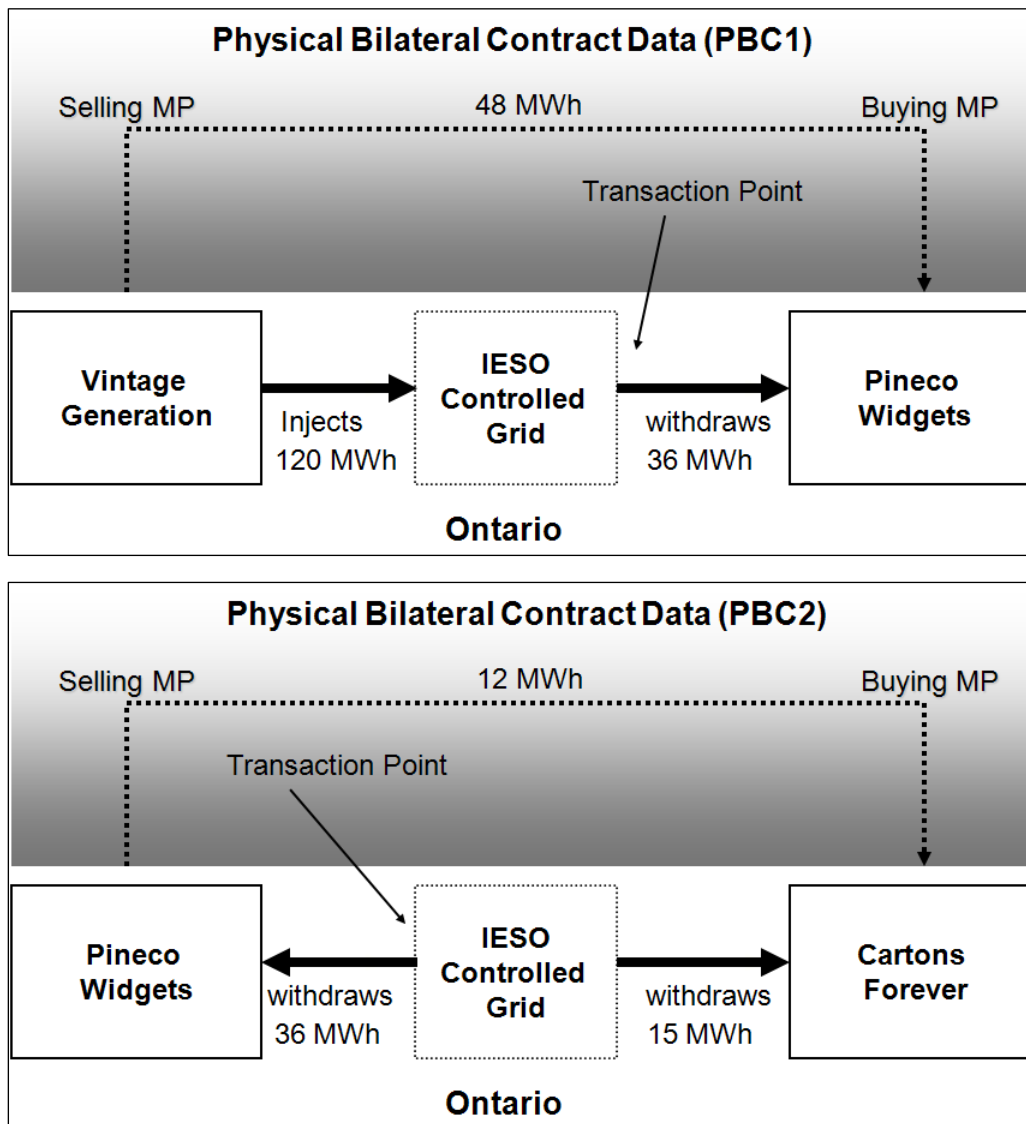
is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	120 MWh	Ontario MCP	see details	\$4200
debited	the IESO	PBC quantity	84 MWh	Ontario MCP	see details	\$2940
paid	Pineco Widgets	PBC quantity	84 MWh	PBC price	\$36	\$3024

Interval	Vintage Credit Details			Vintage Debit Details		
	Production (MWh)	Ontario MCP (\$/MW)	Credit (\$)	PBC Quantity (MWh)	Ontario MCP (\$/MW)	Debit (\$)
1	10	32	320	7	32	224
2	10	32	320	7	32	224
3	10	35	350	7	35	245
4	10	35	350	7	35	245
5	10	35	350	7	35	245
6	10	35	350	7	35	245
7	10	35	350	7	35	245
8	10	35	350	7	35	245
9	10	35	350	7	35	245
10	10	37	370	7	37	259
11	10	37	370	7	37	259
12	10	37	370	7	37	259
Total	120		4200	84		2940

Observations

- We determine the contract amount after the fact based on 100% of Pineco Widgets' metered consumption – we may adjust the actual value we use for a small loss component between the meter and the deemed transaction point on the IESO-controlled grid

Scenario 6



There are two physical bilateral contracts:

- PBC1 between a dispatchable generator and non-dispatchable consumer
- PBC2 between two non-dispatchable consumers
- Hourly Ontario Energy Price = \$35
- Ontario MCP as detailed below
- Transaction point for both bilateral contracts is at *Pineco Widgets*

After signing the contract in Scenario 2, Pineco Widgets decides to upgrade some of their equipment, which requires a shutdown of one of their assembly lines. As a result, their minimum consumption falls from 48 MWh to 36 MWh. Pineco Widgets explores renegotiating or selling back the 12 MWh to Vintage Generation or selling the energy to another party. They decide to strike another deal to sell it for \$35/MWh to Cartons Forever, the supplier of their shipping boxes.

Pineco Widgets:

is...	by...	for...	of...	at...	of...	for a total of...
debited	the IESO	consumption	36 MWh	HOEP	\$35	\$1260
credited	the IESO	PBC1 quantity	48 MWh	HOEP	\$35	\$1680
debited	the IESO	PBC2 quantity	12 MWh	Ontario MCP	see details	\$420
billed	Vintage Generation	PBC1 quantity	48 MWh	PBC1 price	\$36	\$1728
paid	Cartons Forever	PBC2 quantity	12 MWh	PBC2 price	\$35	\$420

Pineco Debit Details for PBC2			
Interval	PBC2 Quantity (MWh)	Ontario MCP (\$/MW)	Debit (\$)
1	1	32	32
2	1	32	32
3	1	35	35
4	1	35	35
5	1	35	35
6	1	35	35
7	1	35	35
8	1	35	35
9	1	35	35
10	1	37	37
11	1	37	37
12	1	37	37
Total	12		420

Vintage Generation:

is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	120 MWh	Ontario MCP	see details	\$4200
debited	the IESO	PBC1 quantity	48 MWh	Ontario MCP	see details	\$1680
paid	Pineco Widgets	PBC1 quantity	48 MWh	PBC1 price	\$36	\$1728

Interval	Vintage Credit Details			Vintage Debit Details		
	Production (MWh)	Ontario MCP (\$/MW)	Credit (\$)	PBC Quantity (MWh)	Ontario MCP (\$/MW)	Debit (\$)
1	10	32	320	4	32	128
2	10	32	320	4	32	128
3	10	35	350	4	35	140
4	10	35	350	4	35	140
5	10	35	350	4	35	140
6	10	35	350	4	35	140
7	10	35	350	4	35	140
8	10	35	350	4	35	140
9	10	35	350	4	35	140
10	10	37	370	4	37	148
11	10	37	370	4	37	148
12	10	37	370	4	37	148
Total	120		4200	48		1680

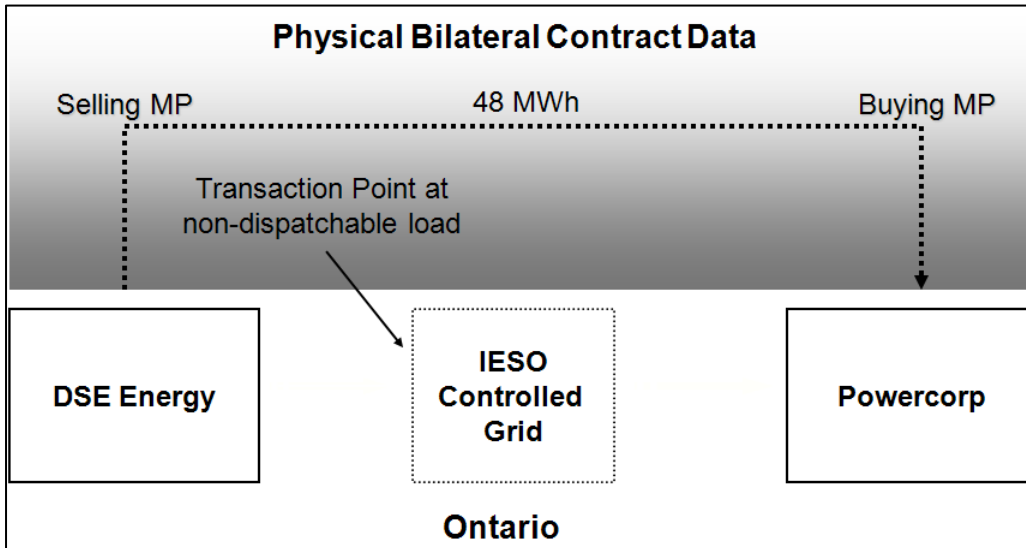
Cartons Forever:

is...	by...	for ...	of...	at...	of...	for a total of..
debited	the IESO	consumption	15 MWh	HOEP	\$35	\$525
credited	the IESO	PBC2 quantity	12 MWh	HOEP	\$35	\$420
billed	Pineco Widgets	PBC2 quantity	12 MWh	PBC2 price	\$35	\$420

Observations

- The new physical bilateral contract is between Pineco Widgets and Cartons Forever
- Pineco Widgets, as the seller in PBC2, submits physical bilateral contract data to us for the 12 MWh
- As seller, Pineco is debited at the Ontario MCP for the physical bilateral contract quantity
- The transaction between Pineco Widgets and Cartons Forever does not affect the settlements for Vintage Generation

Scenario 7



Physical bilateral contract is between:

- Two wholesale sellers
- Hourly Ontario Energy Price = \$35
- Ontario MCP is as in the details
- Transaction point is at a non-dispatchable load

DSE Energy enters a physical bilateral contract to resell 48 MWh of energy to another wholesale seller, Powercorp, for \$36/MWh. They want it settled based on an Ontario price – therefore, they use an Ontario resource as the transaction point. They could have used any delivery point in Ontario, but for this example chose a non-dispatchable one.

Powercorp:

is...	by...	for...	of...	at...	of...	for a total of...
credited	the IESO	PBC quantity	48 MWh	HOEP	\$35	\$1680
billed	DSE Energy	PBC quantity	48 MWh	PBC price	\$36	\$1728

DSE Energy:

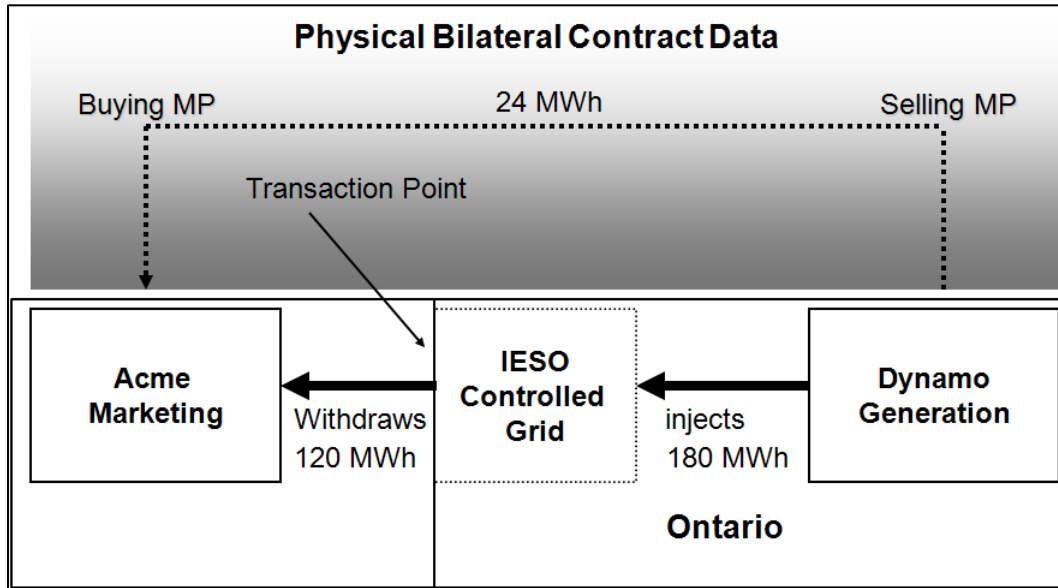
is...	by...	for ...	of...	at...	of...	for a total of..
debited	the IESO	PBC quantity	48 MWh	Ontario MCP	see details	\$1680
paid	Powercorp	PBC quantity	48 MWh	PBC price	\$36	\$1728

DSE Debit Details			
Interval	PBC Quantity (MWh)	Ontario MCP (\$/MW)	Debit (\$)
1	4	32	128
2	4	32	128
3	4	35	140
4	4	35	140
5	4	35	140
6	4	35	140
7	4	35	140
8	4	35	140
9	4	35	140
10	4	37	148
11	4	37	148
12	4	37	148
Total	48		1680

Observations

- No actual production or consumption is associated with this physical bilateral contract – it effectively allowed the participants to trade price hedges
- It wouldn't matter what transaction point was chosen (dispatchable or non-dispatchable) as the effect on settlement of the physical bilateral contract is the same for both
- A list of resources is posted on our [Technical Interfaces](#) web page so that participants without physical facilities can settle their physical bilateral contracts based on an Ontario price

Scenario 8



Physical bilateral contract is between:

- A dispatchable generator and boundary entity (wholesale seller) exporting
- New York intertie zone MCP as in details below
- Ontario MCP as in details below
- Transaction point is at the New York intertie zone

Dynamo Generation can produce 180 MWh of energy on a continuous basis and enters into a physical bilateral contract with Acme Marketing to sell them 24 MWh around the clock at a price of \$45/MWh. Acme Marketing intends to supply 120 MWh of energy from Ontario to another market and uses the physical bilateral contract with Dynamo to hedge some of their risk.

Note that in the real-time physical market, Acme Marketing can only export energy if they submit bids as a boundary entity, and are scheduled by the dispatch algorithm. Similarly, Dynamo must submit offers and be dispatched by the dispatch algorithm to actually inject energy into the IESO-controlled grid. Assume both parties are successfully scheduled in real-time and the intertie is congested in the export direction for the given hour. Also, recall that physical bilateral contracts are settled regardless of whether or not the contract parties actually inject or withdraw energy.

Acme Marketing:

is...	by...	for ...	of...	at...	of...	for a total of..
debited	the IESO	consumption	120 MWh	Intertie Zone MCP	see details	\$4800
credited	the IESO	PBC quantity	24 MWh	Intertie Zone MCP	see details	\$960
billed	Dynamo Generation	PBC quantity	24 MWh	PBC price	\$45	\$1080

Interval	Acme Credit Details			Acme Debit Details		
	PBC Quantity (MWh)	New York Intertie Zone MCP (\$/MW)	Credit (\$)	Consumption (MWh)	New York Intertie Zone MCP (\$/MW)	Debit (\$)
1	2	37	74	10	37	370
2	2	37	74	10	37	370
3	2	40	80	10	40	400
4	2	40	80	10	40	400
5	2	40	80	10	40	400
6	2	40	80	10	40	400
7	2	40	80	10	40	400
8	2	40	80	10	40	400
9	2	40	80	10	40	400
10	2	42	84	10	42	420
11	2	42	84	10	42	420
12	2	42	84	10	42	420
Total	24		960	120		4800

Dynamo Generation:

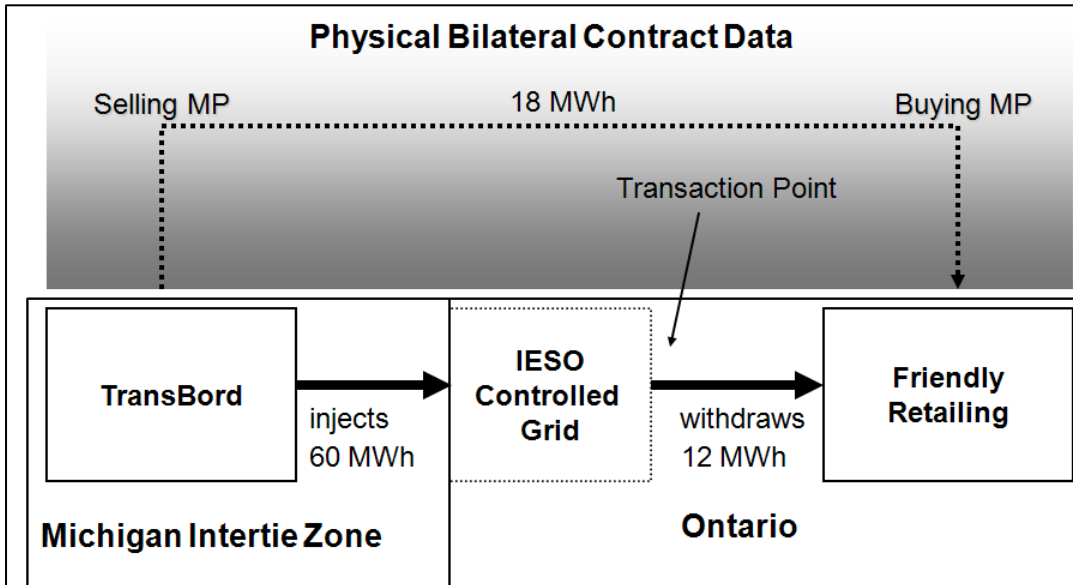
is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	180 MWh	Ontario MCP	see details	\$6300
debited	the IESO	PBC quantity	24 MWh	New York Intertie Zone MCP	see details	\$960
paid	Acme Marketing	PBC quantity	24 MWh	PBC price	\$45	\$1080

Interval	Dynamo Credit Details			Dynamo Debit Details		
	Production (MWh)	Ontario MCP (\$/MW)	Credit (\$)	PBC Quantity (MWh)	New York Intertie Zone MCP (\$/MW)	Debit (\$)
1	15	32	480	2	37	74
2	15	32	480	2	37	74
3	15	35	525	2	40	80
4	15	35	525	2	40	80
5	15	35	525	2	40	80
6	15	35	525	2	40	80
7	15	35	525	2	40	80
8	15	35	525	2	40	80
9	15	35	525	2	40	80
10	15	37	555	2	42	84
11	15	37	555	2	42	84
12	15	37	555	2	42	84
Total	180		6300	24		960

Observations

- Dynamo Generation has risk associated with the choice of transaction point. As seller, they are always debited at the 5-minute price (in this case, the intertie zone MCP), but they are credited for production at the Ontario MCP:
 - If the intertie zone MCP is higher than the Ontario MCP, Dynamo Generation gains from having the transaction point at the intertie zone (this scenario)
 - If the transaction point had been at the point of production, the intertie zone MCP no longer matters to Dynamo Generation as they are credited for actual production and debited for the physical bilateral contract quantity at the same price
- Acme Marketing has risk associated with the choice of transaction point – it is always debited at the intertie zone MCP for its consumption, but it is credited for the physical bilateral contract quantity at the transaction point:
 - When the transaction point is at the intertie zone, they are debited for actual consumption and credited for the physical bilateral contract quantity at the same price (this scenario)
 - If the transaction point had been at the point of production, Acme Marketing would be affected by any difference between the intertie zone MCP and the Ontario MCP
- Differences between the intertie zone MCP and the Ontario MCP can be hedged against by using transmission rights (see the *Transmission Rights* workbook, available on our [Marketplace Training](#) web pages)

Scenario 9



Physical bilateral contract is between:

- A retailer and a boundary entity (wholesale seller) importing
- Michigan intertie zone MCP as detailed below
- Ontario MCP as detailed below
- HOEP = \$35
- Transaction point is at the load

Friendly Retailing represents customers with a load of 18 MWh, all connected to Good Neighbour Distributing. Friendly Retailing enters into a physical bilateral contract with TransBord, a marketer importing energy into Ontario. The contract is for 18 MWh at \$40/MWh. They agree that the bilateral transaction takes place at Friendly Retailing's transaction point on the grid (equivalent to Good Neighbour's point of consumption).

TransBord imports 60 MWh at the Ontario/Michigan border. Friendly Retailing customers consume 12 MWh. Imports from Michigan have reached the limit for that intertie and the Michigan intertie zone MCP is \$2 less than the Ontario MCP.

Friendly Retailing:

is...	by...	for...	of...	at...	of...	for a total of...
debited	the IESO	consumption	12 MWh	HOEP	\$35	\$420
credited	the IESO	PBC quantity	18 MWh	HOEP	\$35	\$630
billed	TransBord	PBC quantity	18 MWh	PBC price	\$40	\$720

TransBord:

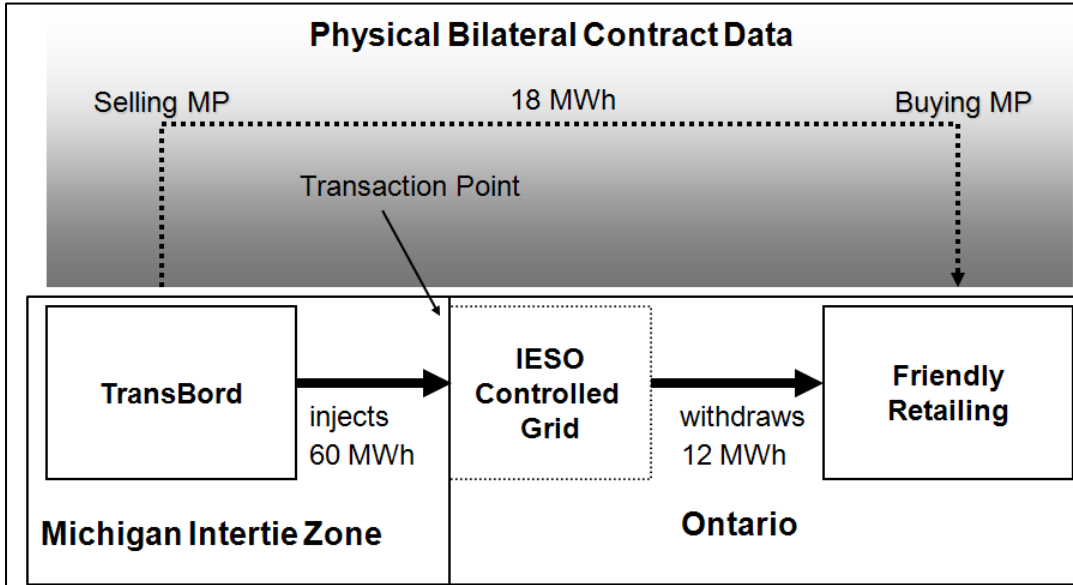
is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	60 MWh	Intertie Zone MCP	see details	\$1980
debited	the IESO	PBC quantity	18 MWh	Ontario MCP	see details	\$630
paid	Powercorp	PBC quantity	18 MWh	PBC price	\$40	\$720

Interval	TransBord Credit Details			TransBord Debit Details		
	Production (MWh)	Michigan Intertie Zone MCP (\$/MW)	Credit (\$)	PBC Quantity (MWh)	Ontario MCP (\$/MW)	Credit (\$)
1	5	30	150	1.5	32	48
2	5	30	150	1.5	32	48
3	5	33	165	1.5	35	52.5
4	5	33	165	1.5	35	52.5
5	5	33	165	1.5	35	52.5
6	5	33	165	1.5	35	52.5
7	5	33	165	1.5	35	52.5
8	5	33	165	1.5	35	52.5
9	5	33	165	1.5	35	52.5
10	5	35	175	1.5	37	55.5
11	5	35	175	1.5	37	55.5
12	5	35	175	1.5	37	55.5
Total	60		1980	18		630

Observations

- TransBord has a price risk because they receive credit for their supply at the intertie zone price but are debited for the physical bilateral contract quantity at the Ontario MCP (in this case the Ontario MCP is \$2 more than the Michigan Intertie Zone MCP)
- TransBord can offset this price risk by purchasing a Transmission Right which would compensate them for the difference between the Ontario MCP and Michigan Intertie Zone MCP (see the *Transmission Rights* workbook, available on our [Marketplace Training](#) web pages)
- Good Neighbour Distributing is not involved in the bilateral transaction or the settlements associated with it

Scenario 10



Physical bilateral contract is between:

- A retailer and a boundary entity (wholesale seller) importing
- Michigan Intertie zone MCP as detailed below
- Ontario MCP as detailed below
- HOEP = \$35
- Transaction point is at the Michigan intertie zone

TransBord wants to avoid the risk associated with differences between the zone price and the Ontario MCP. They renegotiate the contract with Friendly Retailing to change the transaction point to the Michigan intertie zone and drop the contract price to \$39 per MWh. All other terms of the contract remain the same.

Friendly Retailing:

is...	by...	for...	of...	at...	of...	for a total of..
debited	the IESO	consumption	12 MWh	HOEP	\$35	\$420
credited	the IESO	PBC quantity	18 MWh	Intertie Zone MCP	see details	\$594
billed	TransBord	PBC quantity	18 MWh	PBC price	\$39	\$702

Friendly Credit Details			
Interval	PBC Quantity (MWh)	Intertie Zone MCP (\$/MW)	Credit (\$)
1	1.5	30	45
2	1.5	30	45
3	1.5	33	49.5
4	1.5	33	49.5
5	1.5	33	49.5
6	1.5	33	49.5
7	1.5	33	49.5
8	1.5	33	49.5
9	1.5	33	49.5
10	1.5	35	52.5
11	1.5	35	52.5
12	1.5	35	52.5
Total	18		594

TransBord:

is...	by...	for ...	of...	at...	of...	for a total of..
credited	the IESO	production	60 MWh	Intertie Zone MCP	see details	\$1980
debited	the IESO	PBC quantity	18 MWh	Intertie Zone MCP	see details	\$594
paid	Friendly	PBC quantity	18 MWh	PBC price	\$39	\$702

Interval	Credit Details			Debit Details		
	Production (MWh)	Intertie Zone MCP (\$/MW)	Credit (\$)	PBC Quantity (MWh)	Intertie Zone MCP (\$/MW)	Debit (\$)
1	5	30	150	1.5	30	45
2	5	30	150	1.5	30	45
3	5	33	165	1.5	33	49.5
4	5	33	165	1.5	33	49.5
5	5	33	165	1.5	33	49.5
6	5	33	165	1.5	33	49.5
7	5	33	165	1.5	33	49.5
8	5	33	165	1.5	33	49.5
9	5	33	165	1.5	33	49.5
10	5	35	175	1.5	35	52.5
11	5	35	175	1.5	35	52.5
12	5	35	175	1.5	35	52.5
Total	60		1980	18		594

Observations

- The price risk is now shifted from TransBord to Friendly Retailing:
- Friendly Retailing is credited for the physical bilateral contract quantity at the Michigan Intertie MCP, but is debited for consumption at the Hourly Ontario Energy Price
- Friendly Retailing may be expecting a higher Hourly Ontario Energy Price averaged over the year, so they are not bothered by the higher contract price
- If Friendly Retailing is unhappy with the risk of a price differential between the Intertie Zone MCP and the Hourly Ontario Energy Price, they can offset most of this by purchasing a transmission right for the contract quantity - this would compensate them for the difference between the Intertie Zone MCP and the Ontario MCP (See the *Transmission Rights* workbook, available on our [Marketplace Training](#) web pages)
- There is no price risk to TransBord for the physical bilateral contract quantity because they are credited for their supply and debited for the physical bilateral contract quantity at the same price. However the remainder of the energy they are importing is being credited at the lower intertie zone price. They may want to offset this price risk by purchasing a Transmission Right to cover the un-contracted quantity (See the *Transmission Rights* workbook)

4.3 Skill check – settlement scenarios

Scenario A

Paige Generation is a coal-fired generator that can inject up to 80 MWh into the IESO-controlled grid. Ace Automotive is a non-dispatchable automotive parts manufacturer with a peak consumption of 60 MWh. They want to ensure 100% price certainty for 50 MWh of their consumption. They have entered into a physical bilateral contract with Paige Generation to supply the 50 MWh at \$35.

For the scenario above answer the following questions:

1. The transaction point chosen should be at _____ to achieve the price certainty that Ace wants:
 - a) Ace Automotive
 - b) Paige Generation
 - c) Either Ace Automotive or Paige Generation

2. Under the contract, Ace Automotive is directly billed by Paige Generation for:
 - a) 60 MWh at the physical bilateral contract price
 - b) 50 MWh at the Hourly Ontario Energy Price
 - c) 50 MWh at the physical bilateral contract price
 - d) 10 MWh at the physical bilateral contract price

3. We will debit Ace Automotive for their consumption of _____:
 - a) 60 MWh at Ontario MCP
 - b) 50 MWh at Ontario MCP
 - c) 60 MWh at HOEP
 - d) 50 MWh at HOEP

4. We will credit Ace Automotive for their PBC contract amount of _____:

Scenario B

Paige Generation is an Ontario generator that can inject up to 100 MWh into the IESO-controlled grid. Booker Marketing wants to export 50 MWh of energy via the Michigan Intertie Zone, but wants price certainty for 30 MWh. Booker Marketing enters into a physical bilateral contract to purchase 30 MWh from Paige Generation at \$45/MWh, with the transaction point at the Michigan intertie zone. For a given hour, assume the Ontario MCP (\$35/MW) and Michigan Intertie Zone MCP (\$40/MW) are constant for all intervals. Also, assume that Paige Generation successfully offers its 100 MWh into the market and is dispatched, and Booker Marketing successfully bids 50 MWh and its export is scheduled.

For the scenario above answer the following questions:

1. Paige Generation is credited by the IESO for their 100 MWh production at:
 - a) \$34
 - b) \$35
 - c) \$40
 - d) \$45

2. We credit Booker Marketing for the 30 MWh physical bilateral contract quantity at:
 - a) \$34
 - b) \$35
 - c) \$40
 - c) \$45.

3. The price risk associated with the physical bilateral contract is to:
 - a) Paige Generation
 - b) Booker Marketing
 - c) Neither

Skill check – answers: settlement scenarios

Scenario A

Paige Generation is a coal-fired generator that can inject up to 80 MWh into the IESO-controlled grid. Ace Automotive is a non-dispatchable automotive parts manufacturer with a peak consumption of 60 MWh. They want to ensure 100% price certainty for 50 MWh of their consumption. They have entered into a physical bilateral contract with Paige Generation to supply the 50 MWh at \$35.

For the scenario above answer the following questions:

1. The transaction point chosen should be at _____ to achieve the price certainty that Ace wants:

- a) Ace Automotive
- b) Paige Generation
- c) **Either Ace Automotive or Paige Generation** ✓

Comment: The credit for the physical bilateral contract quantity for Ace is the same whether a dispatchable or non-dispatchable delivery point is used as point of settlement.

2. Under the contract, Ace Automotive is directly billed by Paige Generation for:

- a) 60 MWh at the physical bilateral contract price
- b) 50 MWh at the Hourly Ontario Energy Price
- c) **50 MWh at the physical bilateral contract price** ✓
- d) 10 MWh at the physical bilateral contract price

3. We will debit Ace Automotive for their consumption of _____:

- a) 60 MWh at Ontario MCP
- b) 50 MWh at Ontario MCP
- c) **60 MWh at HOEP** ✓
- d) 50 MWh at HOEP

4. We will credit Ace Automotive for their PBC contract amount of **50 MWh**:

Scenario B

Paige Generation is an Ontario generator that can inject up to 100 MWh into the IESO-controlled grid. Booker Marketing wants to export 50 MWh of energy via the Michigan Intertie Zone, but wants price certainty for 30 MWh. Booker Marketing enters into a physical bilateral contract to purchase 30 MWh from Paige Generation at \$45/MWh, with the transaction point at the Michigan intertie zone. For a given hour, assume the Ontario MCP (\$35/MW) and Michigan Intertie Zone MCP (\$40/MW) are constant for all intervals. Also, assume that Paige Generation successfully offers its 100 MWh into the market and is dispatched, and Booker Marketing successfully bids 50 MWh and its export is scheduled.

For the scenario above answer the following questions:

1. We credit Paige Generation is credited for their 100 MWh production at:
 - a) \$34
 - b) **\$35** ✓
 - c) \$40
 - d) \$45

Comment: Actual energy settlement credits are based upon the applicable price at the delivery point associated with the facility (Paige Generation). In this case the facility is dispatchable and is therefore credited at the Ontario MCP for its actual production.

2. We credit Booker Marketing for the physical bilateral contract quantity at:
 - a) \$34
 - b) \$35
 - c) **\$40** ✓
 - d) \$45.

Comment: A settlement credit for the physical bilateral contract quantity is based on the transaction point identified during submission of the physical bilateral contract data. In this case the physical bilateral contract is settled at the Michigan intertie zone and therefore Booker Marketing is credited at the Michigan Intertie Zone MCP.

3. The price risk is to:
 - a) **Paige Generation** ✓
 - b) Booker Marketing
 - c) Neither

Comment: Price risk occurs when there is a difference between the price used to credit/debit a party to a physical bilateral contract and the price used to credit/debit them for their actual production/consumption. In this case, Paige generation is facing the risk since they are credited for production at Ontario MCP and debited for the physical bilateral contract quantity at the Michigan Intertie Zone MCP.

5. Additional Information

For additional information, please see:

- Market Rules, Chapter 8, Section 2
- Market Manual 5.3
- The *Introduction to Ontario's Physical Markets, Interjurisdictional Energy Trading, and Settlement Statements and Invoices* workbooks, available on our [Marketplace Training](#) web pages