ieso
Power to Ontario.
On Demand.

Draft Efficiency Analysis Proposal: Peak vs Average Pre-dispatch Demand Forecast

Introduction

The Market Pricing Working Group (MPWG) is examining the use of peak demand forecast in the pre-dispatch sequences of the DSO. Stakeholders have expressed concern that using a peak demand forecast in pre-dispatch is resulting in an over-commitment of supply resources in pre-dispatch that has an inappropriate downward pressure on real-time prices. The IESO uses the peak demand forecast to ensure that sufficient resources are scheduled to meet the highest expected real-time demand of the upcoming hour.

From a market efficiency perspective, the commitment of supply resources on the basis of the forecast of peak demand could reduce market allocative efficiencies in real-time, such as:

- Use of higher priced committed imports instead of lower priced available domestic supply;
- The advanced start or delayed shut-down of fossil generating units causing unnecessary fuel costs and speed-no load costs;
- An increase in inefficient exports as a result of the systematically biased real-time price relative to pre-dispatch

The potential inefficiencies mentioned above would not be completely eliminated with a move to an average predispatch demand forecast. The root cause of the inefficiencies is scheduling and committing import and export transactions on a different time basis than domestic resources. Import and export transactions are scheduled one-hour ahead of real-time and are scheduled for an entire hour. Domestic resources are scheduled and dispatched on the basis of forecast actual demand for the next five minutes. When real-time demand is different than the hour-ahead forecast, there may be an inefficient set of import and export transactions scheduled. For example:

- When real time demand is greater than the predispatch hour-ahead forecast of demand it may be necessary to meet real-time demand using domestic resources that are more expensive compared to imports that were available in pre-dispatch but not scheduled.
- When the real time demand is below the predispatch hour-ahead forecast of demand there may be uneconomic imports scheduled: uneconomic in the sense that the higher priced imports are displacing less expensive available domestic generation.

This paper proposes a methodology for estimating the potential efficiency impacts of using an average pre-dispatch demand forecast relative to the current practice of using the peak forecast in pre-dispatch. The results of this analysis would then be part of the cost-benefit analysis of options. It should be noted that the cost-benefit analysis will look at implementation costs, and potential reliability impacts and wealth transfers.

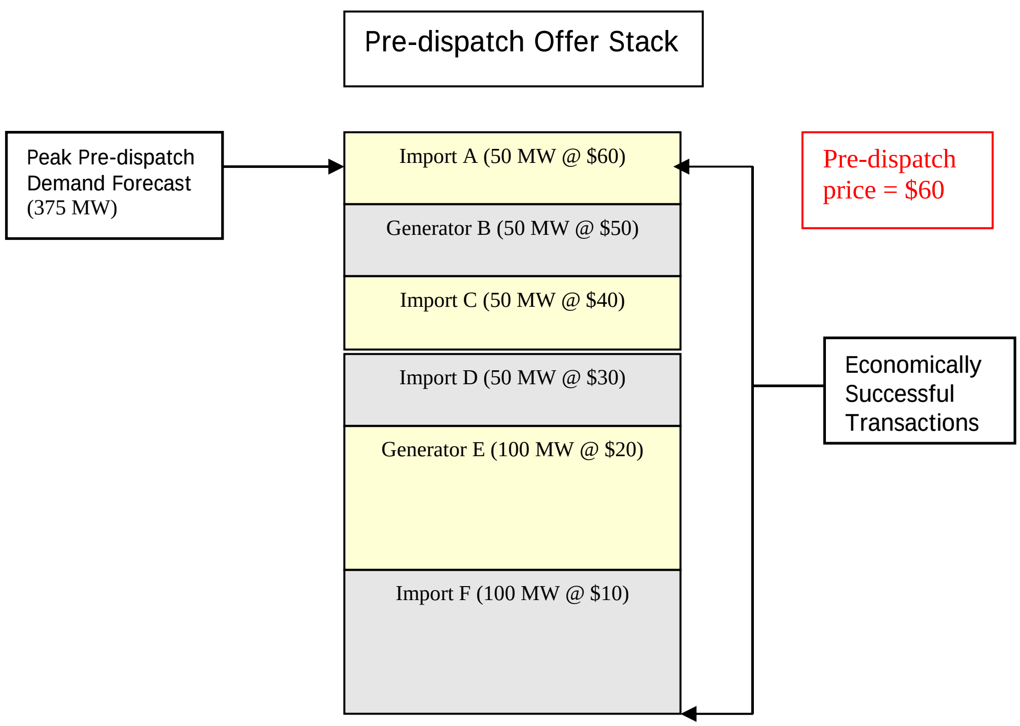
For more background information on the issue please refer to the issue paper:
http://www.ieso.ca/imoweb/pubs/consult/mep/MP_WG_2004jul09_ISS09-UseOfPkDmd.pdf

Current Market Design

In Ontario's current market design imports and exports are scheduled economically in pre-dispatch one hour before the delivery hour. As this economic assessment is being done prior to real time, a forecast of demand must be used. The forecast that is currently used is a forecast of the peak demand for the upcoming hour i.e. the pre-dispatch peak demand forecast. Using the peak demand forecast is done so that Ontario has enough resources committed to satisfy the highest expected demand for the delivery hour.

An example of scheduling domestic resources and imports using a peak demand forecast is shown below in Figure 1. In this example the pre-dispatch forecast of peak demand is 375 MW and 225 MW of import transactions are scheduled.

Figure 1: Scheduling resources in pre-dispatch using a peak demand forecast.

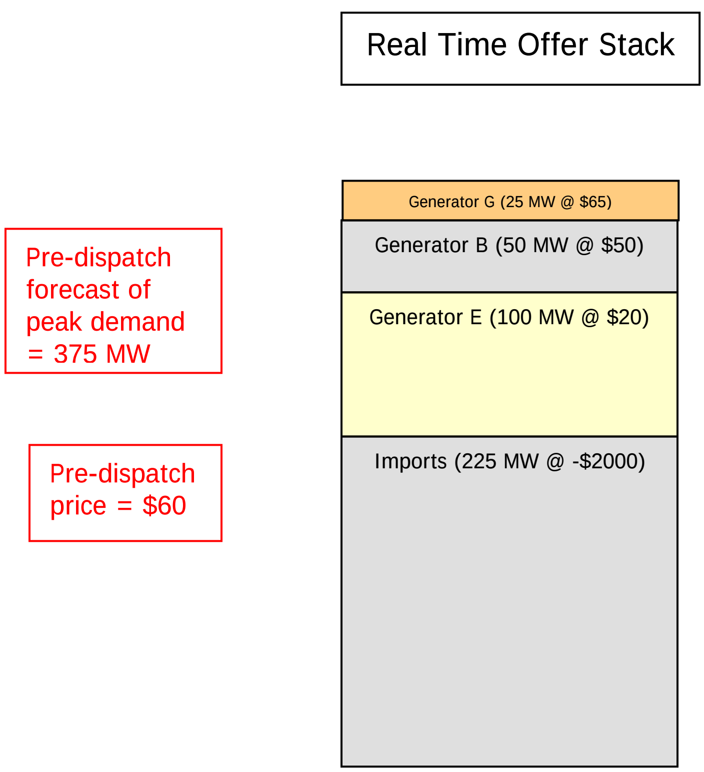


In this simple example we can calculate the total cost of meeting demand with the resources available in pre-dispatch. The total cost of meeting demand is the simple product of offer price * offer MW summed for the resources scheduled. The total cost of production to meet the peak forecast of demand in pre-dispatch is $10 500.

Resources	Scheduled MW	Offer Price ($/MWh)	Total Cost ($)
Import F	100	10	1000
Generator E	100	20	2000
Import D	50	30	1500
Import C	50	40	2000
Generator B	50	50	2500
Import A	25	60	1500
Total MW = 375		**Total cost = $10 500**	

Once imports are economically selected in pre-dispatch they are placed at the bottom of the real time supply stack and are assigned a -$2000 /MWh offer price. This is done as imports are not dispatchable in real-time. This practice shifts the supply stack up by the amount of the imports scheduled and may place downward pressure on the real time price. The resulting real-time supply stack is shown in Figure 2.

Figure 2: The real-time offer stack with a predispatch peak forecasted demand of 375 MW



The price depressing effect of imports can be shown with a simple example. Assume the real-time demand in the example is 350 MW. Using the supply stack in Figure 2 we can see that Generator B would be setting the price at $50. If the imports were not placed at the bottom of the real-time supply stack and the price was set utilizing the pre-dispatch offer stack as depicted in Figure 1, Import A would set the price at $60.

For the intervals of the hour where the real time demand is less than the pre-dispatch forecast of demand there are some imports whose offer price is greater than the market price, and whose offer price may be greater than the generation they are displacing in real time. We can use the results of the previous example to illustrate an example of an allocative inefficiency. Assume for this example that the real-time demand is 350 MW and the supply stack in Figure 2. As imports are scheduled for an hour at a time, in the first interval of the hour there are 225 MW of imports scheduled with offers of $10/MWh, $30/MWh, $40/MWh, and $60/MWh respectively. This selection of resources results in a total cost of satisfying 350 MW of demand of $9250. This calculation is shown in Figure 3.

Figure 3: Calculating the total cost of meeting 350 MW of demand in real-time using the resources scheduled in pre-dispatch

Resources	Scheduled MW	Offer Price ($/MWh)	Total Cost ($)
Import F	100	10	1000
Generator E	100	20	2000
Import D	50	30	1500
Import C	50	40	2000
Generator B	25	50	1250
Import A	25	60	1500
Total MW = 350		**Total cost = $9250**	

Continuing the previous example where the real-time demand is 350 MW, if the IESO were able to schedule the least cost set of resources the IESO would have scheduled 200 MW of imports with costs of $10/MWh, $30/MWh and $40/MWh and scheduled Generator B for 50 MW at $50/MWh. The total cost of satisfying demand with this set of resources is $9000. This calculation is shown in Figure 4. You can see from this example that the $60 /MWh import that was scheduled in pre-dispatch is displacing the cheaper domestic generator, Generator B with a $50/MWh offer. This is an example of an allocative inefficiency.

One can see the inefficiency by comparing the total costs of meeting demand. In the previous scenario with the imports that were scheduled in pre-dispatch the cost of meeting demand was $9250. For this scenario the total cost of meeting demand is $9000. An efficiency loss of $250.

Figure 4: Calculating the total cost of meeting 350 MW of demand in real-time if the IESO were able to select the optimum set of resources

Resources	Scheduled MW	Offer Price ($/MWh)	Total Cost ($)
Import F	100	10	1000
Generator E	100	20	2000
Import D	50	30	1500
Import C	50	40	2000
Generator B	50	50	2500
Import A	0	60	0
Total MW = 350		**Total cost = $9000**	

In general we can say that for levels of real-time demand that are lower than the pre-dispatch forecast of demand, there is the potential for more expensive imports to displace less expensive domestic generation.

A similar statement can be made when the real time demand is greater than the pre-dispatch forecast of demand. When the real-time demand is greater than the pre-dispatch forecast of demand we may be using more expensive domestic generation to satisfy demand when less expensive imports were available in pre-dispatch.

For example, assume the real time demand is 400 MW and the real time supply stack is the one depicted in Figure 2. As imports are scheduled in pre-dispatch for the entire hour there are a total of 225 MW of imports scheduled with offer prices of $10/MWh, $30/MWh, $40/MWh, and $60/MWh respectively. As the real-time demand is greater than the pre-dispatch forecast of demand we must utilize the final resource in this supply stack to meet demand, Generator G with an offer price of $65. The total cost of meeting demand in this scenario is $12 125. The calculation of the total cost can be seen in Figure 5.

Figure 5: Calculating the total cost of meeting 400 MW of demand in real-time with the resources scheduled in pre-dispatch

Resources	Scheduled MW	Offer Price ($/MWh)	Total Cost ($)
Import F	100	10	1000
Generator E	100	20	2000
Import D	50	30	1500
Import C	50	40	2000

Resources	Scheduled MW	Offer Price ($/MWh)	Total Cost ($)
Generator B	50	50	2500
Import A	25	60	1500
Generator G	25	65	1625
Total MW = 350		**Total cost = $12 125**	

Using this generator would be allocatively inefficient if there was a less expensive import available in pre-dispatch. Assume that there was an import offer available in pre-dispatch for 25 MW at $62.50 that was not scheduled in pre-dispatch. If this import were available in real time, it would lower the total cost of meeting demand in real time. If the $62.50 import was available in real time the total cost of meeting 400 MW of demand would be $12 063. The calculation of the total cost can be seen in Figure 6.

Figure 6: Calculating the total cost of meeting 400 MW of demand in real-time

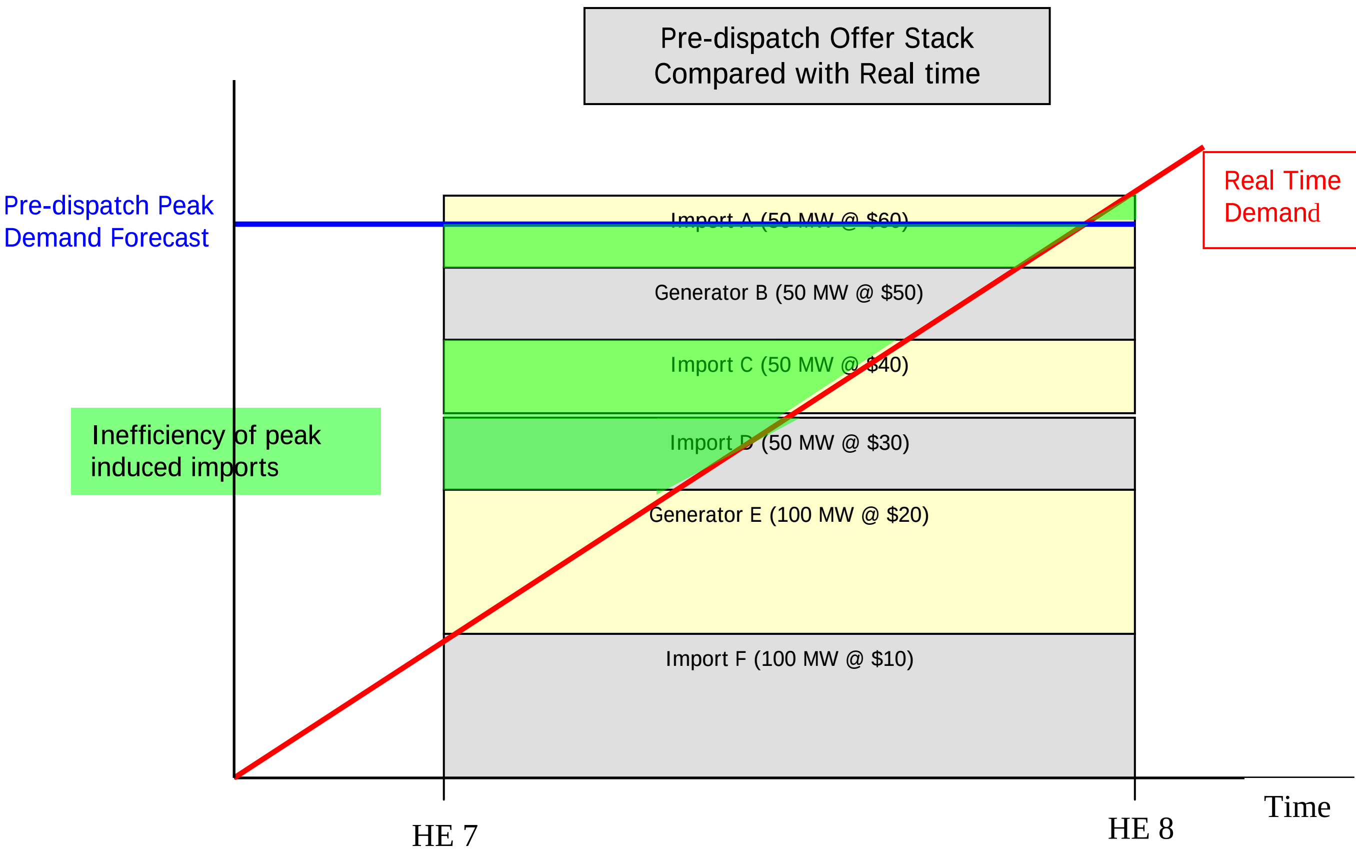
Resources	Scheduled MW	Offer Price ($/MWh)	Total Cost ($)
Import F	100	10	1000
Generator E	100	20	2000
Import D	50	30	1500
Import C	50	40	2000
Generator B	50	50	2500
Import A	25	60	1500
Import H	25	62.5	1562.5
Total MW = 350		Total cost = $12 063	

As one can see by comparing the total costs to satisfy 400 MW of demand, when real-time demand is greater than the pre-dispatch forecast of demand there is the potential for inefficiencies. In this example the total cost of demand with the resources scheduled with a peak pre-dispatch demand forecast is $12 125, which exhibits an inefficiency loss of $62 relative to the optimum solution.

The inefficient schedules described in the examples above are depicted in Figure 7 (below). Figure 7 uses the same pre-dispatch supply stack as the previous examples and superimposes the real time demand curve. This graph attempts to show that for certain portions of the hour we are satisfying demand utilizing relatively higher cost imports. The real time supply stack is not used to demonstrate this fact as the real time supply stack has the imports included at the bottom of the stack with a -$2000 price and does not represent their costs, the essential element when discussing efficiencies.

In Figure 7 the inefficient schedules are depicted by the green shaded areas. These areas represent the portion of the import that was not needed to satisfy the real time demand for the respective portions of the hour. If it were possible for the IESO to schedule intertie resources in the same time frame as domestic resources only the portion of the imports that are to the right of the real time demand line would have been scheduled by the DSO. The remainder of the imports were scheduled in pre-dispatch as a result of using a peak demand forecast. These can be referred to as the 'peak induced imports'[1].

Figure 7: Demonstrating the inefficiencies of scheduling resources using a peak demand forecast



[1] Imports are not the only resources affected by the use of a peak predispatch demand forecast. It is possible that a generator receives a predispatch schedule that they would not have received with an average predispatch demand forecast. When this happens there is the possibility of 'peak induced SGOL' payments. This action would have a similar effect as scheduling peak induced imports by adding inframarginal generation to the real time supply stack.

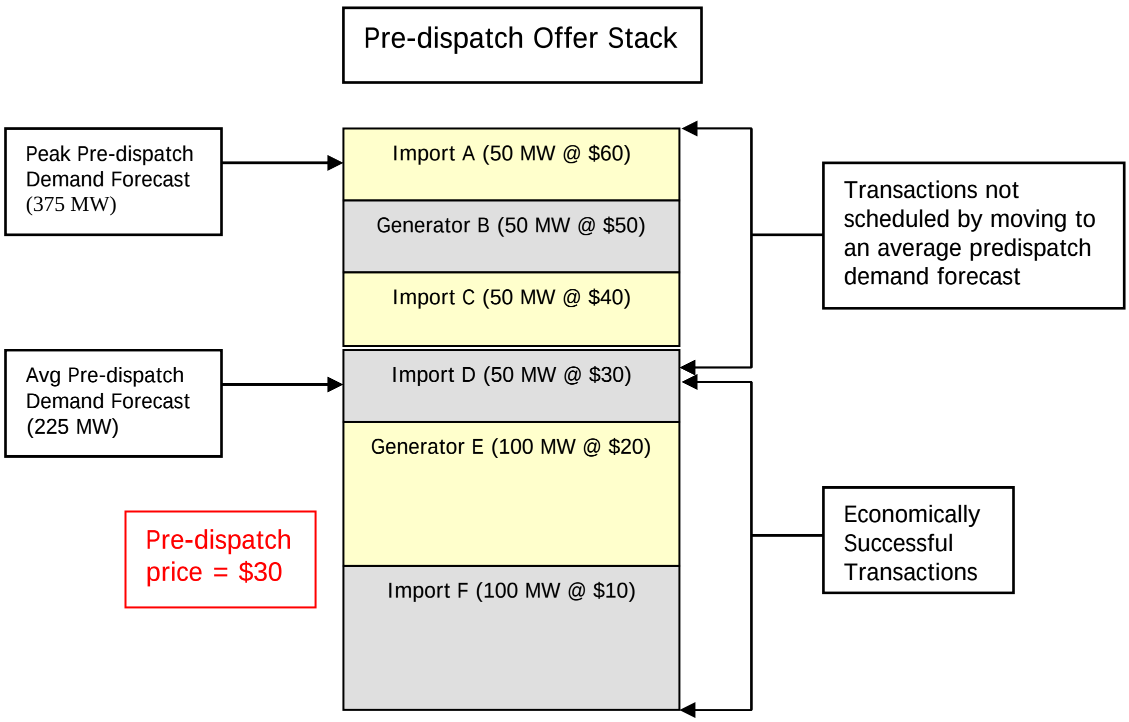
An additional possible consequence of scheduling imports using a peak demand forecast, and depressing the real time price, is that we are potentially increasing the level of exports that may be economic in real-time. If the real time energy price is $50 /MWh but imports are scheduled that have offers of $60 /MWh Ontario consumers are paying $60 for that import. At the same time an export that has bid $70 in predispatch, purchases the energy in real time for $50 and ships the energy to an external jurisdiction, earning economic rents in the transaction. By exporting energy that is above cost Ontario consumers are implicitly subsidizing consumption in other jurisdictions. The use of a peak demand forecast is exacerbating these problems through scheduling the highest level of imports that are economic in pre-dispatch for any given hour. Through scheduling the highest level of imports we are implicitly depressing the real-time price more than we would under any other pre-dispatch demand forecast.

Potential Impacts of the Proposed Change

Moving from a peak pre-dispatch demand forecast to an average pre-dispatch demand forecast we expect that fewer import transactions would be scheduled and fewer domestic resources would receive a pre-dispatch schedule. This would result in a lower pre-dispatch price.

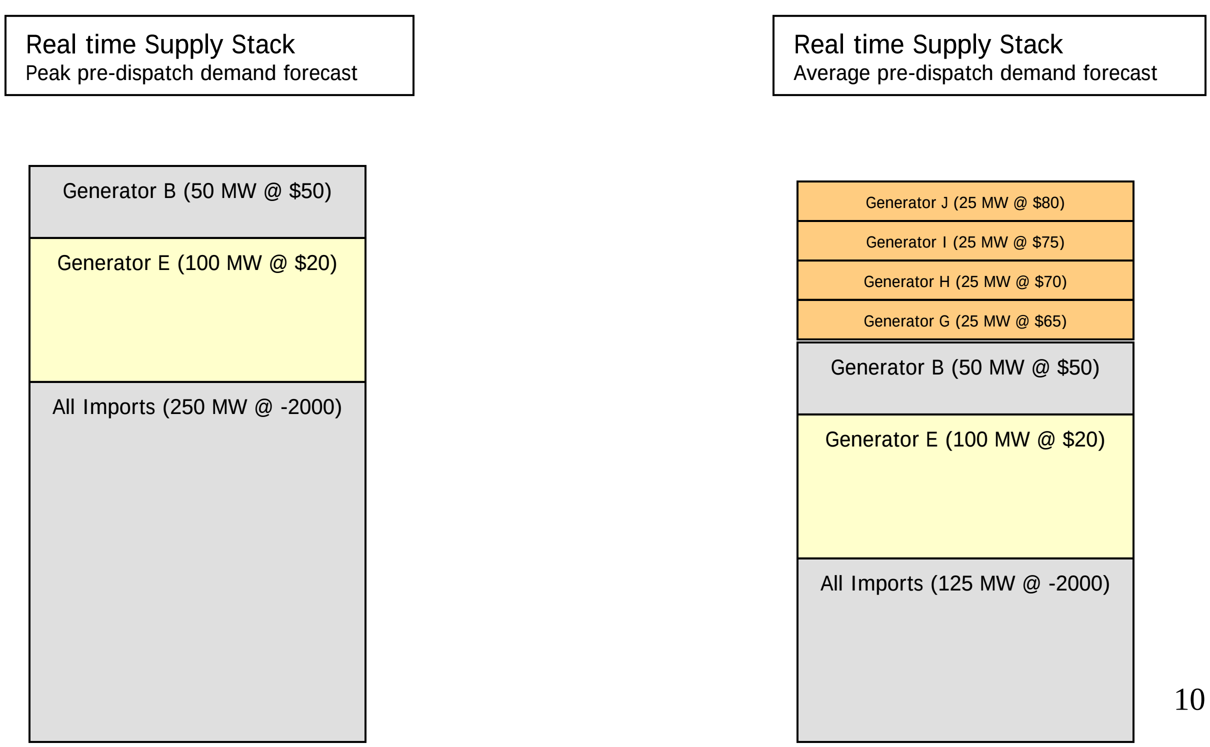
The impact of scheduling transactions using an average pre-dispatch demand forecast is depicted in Figure 8. In this example the pre-dispatch peak forecast is 375 MW and the average pre-dispatch demand forecast is 225 MW, a difference of 150 MW. Using an average pre-dispatch demand forecast in this example would result in 125 MW of import transactions being scheduled, compared to 225 MW being scheduled when using a peak demand forecast i.e. Imports A and C would not be scheduled. In addition to not scheduling Imports A and C, Generator B would not receive a pre-dispatch schedule.

Figure 8: Scheduling resources in pre-dispatch using an average demand forecast.



By scheduling fewer import transactions in pre-dispatch there are fewer import transaction being added to the real time supply stack. As imports are given a -$2000 offer in real time, decreasing the imports scheduled in predispatch reduces the price depressing effect on the real time price. This may lead to exporters modifying their offers in expectation of lower price depression possibly reducing any inefficient exports. In Figure 9 the real time supply stacks for a peak and average demand forecast are shown.

Figure 9: Comparing the real time supply stack with a peak pre-dispatch demand forecast and an average pre-dispatch demand forecast



This example illustrates a number of possible consequences of moving to an average pre-dispatch demand forecast:

- Less price depressing effect compared to a peak demand forecast

  In the example in Figure 9 the real time price for a demand level of 360 MW when using an average pre-dispatch demand forecast is $75 compared with the peak demand forecast scenario where the real time price is $50. The possibility of this occurrence may lead some exporters to decrease their offers or not offer at all. This may result in less total export volume and the potential for reducing inefficient exports.

- Possibility for increased real time price volatility

  By scheduling fewer imports and committing fewer resources in pre-dispatch there is a potential for greater real time price volatility. In general, the further up the supply stack we go the smaller the offer laminations become. This is illustrated in the real time supply stack in Figure 9. As can be seen in this diagram if the demand were to fluctuate up or down by 25 MW the clearing price would fluctuate from $75 to $80 with an average pre-dispatch demand forecast. With a peak pre-dispatch demand forecast and the same 25 MW fluctuation the real time price would not change, Generator B would continue to be the marginal resource.

- Increased reliance upon domestic resources and possible increased usage of Control Actions in real-time

  By scheduling fewer import transactions in pre-dispatch there is the potential for increased reliance upon domestic resources real-time. This is illustrated in Figure 9. In order to satisfy demand with fewer imports increased output from Ontario based generation may be necessary

The three consequences discussed above are expected to be mitigated to some extent by export response. As was presented at May's meeting of the MPWG, a 1% increase in real-time price will result in a 4.7% decrease in export volume. This would place downward pressure on the real time market demand and price. The end result would be equilibrium further down the supply stack i.e. lower real-time prices and reduced real-time price volatility. And with less export demand to satisfy the increased reliance upon domestic generators will be reduced, reducing any potential reliability concerns.

Moving to an average demand forecast in pre-dispatch will not eliminate all the inefficiencies of scheduling import transactions in pre-dispatch or solve the allocative and dynamic efficiency problems in Ontario's electricity market. The root cause of the inefficiencies when scheduling intertie transactions is the inability to select the economically optimal level of imports during each scheduling interval. By scheduling import transactions on a different time basis than domestic generators (hourly versus 5-minute intervals, respectively) there will always be "too few" imports in some intervals and "too many" imports in other intervals. The only time when the efficient level of imports would be scheduled is when the real time demand is equal to the pre-dispatch forecast of demand.

Methodology to Estimate the efficiency impact of moving to an average pre-dispatch demand forecast

As has recently been discussed at the MPWG, when discussing efficiencies it is important to recognize that efficiencies are related to production and consumption decisions and their resulting costs and benefit to participants. Consumer and exporter market participants reveal their marginal benefit of consumption through their bids to consume. Generator, and importer, participants reveal their marginal benefit of production through their offers to produce. The intersection of the marginal benefit to consume and marginal benefit to produce is the optimum solution and when this condition is true, efficiency is maximized.

When maximizing efficiency we are attempting to maximize the benefit for the entire market. To do this we use costs and benefits as stated through offers and bids. When costs of meeting demand are minimized the marginal benefit to participants has been maximized. To state this in different terms, we have maximized the gains from trade; the objective function of the DSO.

Once the DSO has determined an efficient solution we can derive the total cost of meeting demand for the period the DSO has performed its optimization, and by definition this will be the lowest cost solution to satisfy demand given the inputs to the DSO. If we perform 2 simulations of the same period with the same inputs, one would use a peak pre-dispatch demand forecast (the base case) and another simulation with an average pre-dispatch demand forecast we will have two values for the total cost of satisfying demand. We would then compare the total costs and can determine which the lower cost solution is. If the total production costs of meeting demand utilizing a peak demand forecast in pre-dispatch are greater than the total production costs of satisfying demand with an average demand forecast then it can be said that utilizing an average demand forecast results in a more efficient solution than using a peak demand forecast.

One aspect that must be incorporated into the analysis is the potential response from exporters as a result of the potential price increase in real time. The IESO believes that with the expectation of a price increase in real time exporters on the margin, or risk adverse exporters, will adjust their bids, or not bid at all, to avoid the potential price increase in real time. These actions will tend to decrease the reliance upon domestic generators in real time. If export demand falls in real time generators would incur less costs to satisfy the real time demand, increasing the efficiency of moving to an average demand forecast in pre-dispatch.

To incorporate this effect into the analysis we propose to utilize the Export Arbitrage response results previously presented to the MPWG. In that study we found that with a 1% increase in the real time price we can expect a 4.7% decrease in the volume of real time exports.

The simulation methodology is:

Base Case simulation (peak pre-dispatch demand forecast):

1. Perform a simulation of pre-dispatch using a peak demand forecast. This will result in pre-dispatch schedules for imports, exports and domestic resources.

2. Use the schedules from the pre-dispatch simulation to simulate the real-time outcome.

3. From the results of the real-time simulation calculate the total surplus (consumer surplus + producer surplus) of meeting demand in real time.

    Outcome: total surplus of meeting demand in real time with the resources scheduled using a peak demand forecast in pre-dispatch.

Simulation of possible change (average pre-dispatch demand forecast):

4. Perform a simulation of pre-dispatch using an average demand forecast. This will result in pre-dispatch schedules for imports, exports and domestic resources. From this we can calculate the change in net imports from the peak pre-dispatch simulation. The change in net imports is the difference between the net imports scheduled with a peak pre-dispatch demand forecast and the net imports with an average demand forecast.

    From previous simulation results the change in net imports is expected to be negative the vast majority of the time, i.e. a decrease in net imports.

5. Incorporate the changes in net imports into the real-time simulation inputs.

6. Build export response function into the real-time simulator.

    Utilizing the elasticity estimates previously discussed with the working group an export response function has been built into the real-time simulation tool. This function estimates the export response to changes in the real-time price. Effectively, this function converts the real-time demand curve from a perfectly inelastic curve (a vertical line) to a demand curve with a constant elasticity.

7. Simulate the real-time results with changes to the net imports from Step 5 and utilizing the export response function in Step 6.

8. From the results of the real-time simulation calculate the total surplus (consumer surplus + producer surplus) in real time.

    Outcome: total surplus in real time with an estimate of the resources scheduled using an average demand forecast in pre-dispatch.

Compare the total surplus in real-time:

9. Once the total surplus in real-time demand has been calculated for the peak pre-dispatch demand forecast and the average pre-dispatch demand forecast we can determine which demand forecast results in a more efficient outcome.

Note: The measure of efficiency used in the simulation methodology is the total consumer and producer surplus. Previously in this paper the total cost of meeting demand was used as a measure of efficiency. This was done to make the examples clear and concise. For the vast majority of the time the total cost of meeting demand = total surplus. When dispatchable consumers are being constrained down the total cost of meeting demand diverges from the total consumer and producer surplus and in these cases the total surplus is the correct estimate of efficiency.

Assumption and Limitations of the Proposed Methodology

In order to perfectly estimate the efficiency impact of the proposed change, simulations of the constrained run of the DSO would be necessary. However, the simulation tools that are available to the IESO are simulators of the pre-dispatch and real-time unconstrained run of the DSO. We are proposing to utilize the unconstrained simulators of the DSO as an estimate of the results of the constrained run of the DSO. In an attempt to more closely estimate the constrained run the ramp rate multiplier in the real-time unconstrained simulator will be changed to a 1X multiplier to mirror the 1X multiplier used in the real-time constrained run of the DSO.

Assumption of Analysis	Why this is a reasonable assumption	Possible impact on results of efficiency analysis if the assumption is violated
Consumption in Ontario remains the same in both simulation scenarios	At price levels examined, it is believed that short-term elasticity of the vast majority of Ontario consumption is very low.	Consumption changes will change the amount that domestic generators will be required to produce in real time and possibly affect pre-dispatch results through a different pre-dispatch demand forecast. The effects on the efficiency analysis of changes in demand are uncertain as it would be changing pre-dispatch scheduling results and real time production decisions.

Assumption of Analysis	**Why this is a reasonable assumption**	**Possible impact on results of efficiency analysis if the assumption is violated**
Generator offers are representative of their production costs	This is a necessary assumption as a result of our simulation tools. We are unable to modify generator offers for the purposes of a simulation.	If a generator is using a strategic offer, that is an offer that is different than their true production cost in order to attain a desired level of output, the efficiency results will be skewed. If the strategic offer is lower than the generators actual opportunity cost then the efficiency result will tend to be overstated as a generator's true opportunity cost is likely higher increasing the costs required to satisfy demand in real time. If the strategic offer used by the generator is higher than their actual opportunity cost then the efficiency result will tend to be understated as the estimate of costs to the domestic generators satisfying real time demand will be inflated.
Import offers can be used as a representative measure of their opportunity cost of providing energy to Ontario	Importers must offer competitively in order to be scheduled in predispatch. If an importer attempted to offer higher in an attempt to extract greater profit from the market they run the risk of not being scheduled and earning no revenue.	If importers offer below their actual opportunity cost to ensure they flow in real time, the efficiency result will tend to be understated as the avoided costs of not scheduling peak induced imports will be lower than it actually is. If importers offer above their actual opportunity cost, the efficiency result will tend to be overstated as the costs incurred by not scheduling the peak induced imports would be higher than if another metric were used. It is highly unlikely that importers would offer above their true opportunity cost as they would risk not being scheduled in pre-dispatch. Other possible estimates of importers opportunity cost are intertie shadow prices, or the next highest intertie LMP in the neighbouring jurisdictions.

Assumption of Analysis	Why this is a reasonable assumption	Possible impact on results of efficiency analysis if the assumption is violated
Import offers remain unchanged as a result of the change in pre-dispatch demand forecast used.	This is a necessary assumption as a result of our simulation tools. We are unable to modify import offers for the purposes of a simulation.	Importers must offer economically in pre-dispatch in order to be scheduled to run in real time. A change in pre-dispatch to an average demand forecast would lower the pre-dispatch price forcing importers to offer at lower prices in order for the same number of MW's to be scheduled. If importer offers tended to decrease in order to be scheduled for real time then the efficiency result will be understated. If importers lower their offers they are providing lower cost energy to the market, and thus reducing the total cost of meeting demand in real time and increasing the efficiency of using an average demand forecast in real time.

Assumption of Analysis	Why this is a reasonable assumption	Possible impact on results of efficiency analysis if the assumption is violated
Moving to an average demand forecast in pre-dispatch will not result in additional generators desynchronizing.	This is a necessary assumption as a result of our simulation tools.	This assumption is a limitation of our simulation tools. We are unable to incorporate the dynamic response of generators desynchronizing in the late evening hours and the imports required to replace the generation reduction. Using a peak demand forecast in pre-dispatch will tend to over commit domestic resources in pre-dispatch preparing to meet the expected real time peak. This has potential efficiency implications if the generator that is being kept online would have otherwise de-synchronized and could have been replaced with relatively inexpensive imports. Not including the possibility that moving to an average demand forecast in pre-dispatch may cause additional generators to desynchronize will tend to understate the efficiency result. If a generator that desynchronizes has relatively higher marginal cost than an import that could have replaced it, the total cost of supplying demand is higher than if the import was scheduled.
Hours the efficiency analysis will be conducted for	This proposal suggests conducting the efficiency estimate for all hours. Conducting the efficiency analysis for all hours will provide us with a rich data set to perform our analysis. If it is decided to consider changing to an average demand forecast for a sub-set of hours, we would remove the impact of all other hours from the efficiency analysis.	

<table>
<tr><th>Assumption of Analysis</th><th>Why this is a reasonable assumption</th><th>Possible impact on results of efficiency analysis if the assumption is violated</th></tr>
<tr><td>Usage of elasticity estimate</td><td>N/A</td><td>The elasticity estimate used will be appropriate for the period under study.
<table><tr><th></th><th>Export Elasticity (%)</th></tr><tr><td>Peak Hours</td><td>-5.65</td></tr><tr><td>Off-Peak Hours</td><td>-2.79</td></tr></table>
Recall that export elasticity says that for a 1% increase in price there will be an x% decrease in export volume.</td></tr>
<tr><td>Export response function in real-time adjusts exports on an interval by interval basis</td><td>This is a necessary assumption in the simulation.
Exports respond to changes in the real-time price and are not greatly effected by changes in the pre-dispatch price. To adequately estimate the response from exporters it must be estimated in real-time.</td><td>Allowing exports to be adjusted in real-time in the simulation will tend to overestimate the actual export response.</td></tr>
</table>

Next Steps

- Incorporate stakeholder feedback into the methodology
- Conduct the efficiency analysis and present results
- Assess and attempt to quantify reliability impacts
- Possible Cost-Benefit analysis
- IESO recommendation