

Single Schedule Market – Phase 1, Session 1

May 4, 2017

Minutes of Meeting

Date held: May 4, 2017	Time held: 9 am – 2 pm	Location held: Crowne Plaza Toronto Airport
Company Name	Invited/Attended	Attendance Status (A)ttended; Attended via WebEx; (R)egrets; (S)ubstitute
Acciona Energy	Labij, Christina	WebEx
Amp Solar Group Inc.	Luukkonen, Paul	WebEx
AMPCO	Anderson, Colin	A
APPrO	Butters, David	A
Brookfield Renewable	Wu, Julien	WebEx
Bruce Power	Whitehead, Paul	A
Bruce Power	Dalzell, Pat	A
Capital Power	Villiger, Kurtis	WebEx
Centre Lane Trading Ltd.	Nikkel, Jonathan	A
Charles River Associates	Bruno, Juliana	WebEx
Constant Power	Game, Jonathan	WebEx
Customized Energy Solutions	Tinkler, Mark	WebEx
Emera Energy	Ferguson, Dave	WebEx
Enbridge	Jayaraman, Jay	WebEx
Enbridge	Chin, Edith	WebEx
Energy Consultant	Eich, Christopher	WebEx
EnerNOC, Inc.	Griffiths, Sarah	WebEx
FTI Consulting	Harvey, Scott	A
FTI Consulting	Pope, Susan	A
Gerdau Long Steel North America	Forsyth, Dave	A
Goreway Power Station	Sutherland, Christopher	A
Goreway Power Station	Coulbeck, Rob	A
Hydro Quebec	Belanger, Frederic	A
Invenergy	Ma, Alexander	WebEx
ITC - a Fortis company	Motley, Doug	WebEx
Ivaco Rolling Mills	Abdelnour, Francois	A
Manitoba Hydro	Penner, Audrey	WebEx
Manitoba Hydro	Wells, David	WebEx
Ministry of Energy	MacPherson, Robin	R
Ministry of Energy	Lightbody, Ava	A

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MIT Power Canada Investment Inc.	Koizumi, Shigeru	WebEx
MIT Power Canada Investment Inc.	Iseki, Madoka	WebEx
Nalcor Energy	James, Ann	WebEx
Nalcor Energy	Oliver, Maria	R
NextEra Energy	Tuck, Jennifer	A
Northland Power Inc.	Samant, Sushil	A
Northland Power Inc.	Veldhuizen, Jon	A
Ontario Energy Association	Hrab, Roy	A
Ontario Power Generation	Wizniak, Lynn	A
Ontario Power Generation	Mo, Herman	A
Ontario Waterpower Association	Norris, Paul	A
Open Access Technology International, Inc.	Ejebe, Gabriel	WebEx
Open Access Technology International, Inc.	Rahimi, Farrokh	WebEx
Power Advisory LLC	Chee-Aloy, Jason	A
Power Advisory LLC	Cumming, Alison	A
Powerful Solutions	Inman, Peter	A
RBC Capital Markets	Burnham, Steve	WebEx
RBC Capital Markets	Doolittle, Robin	WebEx
Resolute Forest Products	Degelman, Cara	A
Rodan Energy Solutions	Holowatsky, Yuri	A
Rodan Energy Solutions	Goddard, Rick	A
Rodan Energy Solutions	Ingram, Rachel	R
Shell Energy	Kerr, Paul	WebEx
SMS Energy Engineering	Soufi, Safouh	WebEx
Suncor Energy Services Inc.	Scott, Christopher	A
Tembec	Dottori, Paul	WebEx
Tetra Tech - Power	Krishnan, Sanjay	R
TransAlta	Nguyen, Thanh	WebEx
TransCanada Energy	Kuntz, Margaret	A
Wasser Resources Inc.	Wasser, Leon	R
Workbench Corp.	Jayapalan, Jennifer	A
Workbench Corp.	Sears, Heather	A
	Cary, Rob	WebEx

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SmarterShift	Lortie, Phil	A
IESO	Bell, Brian	WebEx
IESO	Ellard, Barbara	A
IESO	Gojmerac, Mark	WebEx
IESO	King, Ryan	A
IESO	Matsugu, Darren	A
IESO	Movchovitch, Emanuel	A
IESO	Scratch, Jonathan	A
Scribe: Ingrid Sapona - Please report any corrections, additions or deletions to scribe at: ingrid.sapona@ieso.ca .		

All meeting material is available on the IESO web site at:

<http://www.ieso.ca/en/sector-participants/market-renewal/market-renewal-single-schedule-market>

Meeting Started at 9 a.m.

Introduction – Ryan King, Senior Stakeholder Advisor, Market Renewal IESO

Participants were welcomed to the initial meeting for the Single Schedule Market (SSM) stakeholder engagement process. Stakeholders were asked to provide feedback through the email address: engagement@ieso.ca, which the IESO will publish on its web page, along with its responses.

The Stakeholder Engagement Plan is still in the draft stage; the goals and principles will be finalized over the course of the next couple of meetings, pending stakeholder input.

Market Renewal Overview – Barbara Ellard, Director of Markets IESO (Slides 3-10)

The engagement framework and goal for today is to discuss the evolution of the process. The Market Renewal Plan (MRP) is an umbrella term for a collection of proposed changes to Ontario’s electricity market. Holistic improvements are needed now, rather than Band-Aid solutions. Instituting SSM is the type of foundational change needed for the system to operate effectively and efficiently in the rapidly changing electricity market.

The IESO encourages participants to read The Brattle Group’s report. The IESO isn’t just looking to adopt a US-style market and there’s no predetermined plan, but it makes sense to

learn from what has worked well elsewhere. The benefits case review showed estimated savings of \$3.4 billion over 10 years at a projected cost of \$200 - \$300 million.

There are three streams in market renewal: 1) energy, 2) capacity, and 3) operability, with a single schedule system being the foundational part of the energy stream. Past attempts at introducing a day-ahead market (DAM) failed because the existing two schedule system doesn't provide the needed pricing certainty. The IESO does a lot of scheduling and dispatching in real time and wants to back it up with DAM. As well, the Generator Cost Guarantee (GCG) program must be updated. Single Schedule Market (SSM) is the "enabling piece" that will allow these other changes to be made.

Market Renewal Engagement Framework (Slides 11-22)

The stakeholder-driven approach is meant to generate good discussions and be a collaborative exercise; it's not about the IESO presenting a design and hoping we don't get any pushback.

Rob Coulbeck: As Market Renewal Working Group (MRWG) co-chair I am looking forward to facilitating discussion with the SSM group and CEO Roundtable to get advice from across the sector and to ensure alignment at all levels.

IESO Comment: With a new CEO starting in June 2017, the CEO Roundtable should be an excellent source of information and insight on the Market Renewal Process (MRP).

To ensure the various forums don't go off in different directions, the groups have overlapping membership and MRWG are expected to attend stakeholder engagement meetings.

MRWG will be the forum for issue resolution. Where there's no substantial agreement, the IESO has the authority to make decisions but will record dissent and aim to explore all the options. Stakeholder engagement meetings will be the forum for design decisions.

Participant Question: Currently, while Technical Panel (TP) members "vote" on market rules, they are advisory only; IESO management can amend rules even when it doesn't win a majority vote. How will decisions be made, particularly in regard to High Level Design (HLD)?

IESO Response: The approach will be to understand the different design elements and present the options to determine whether stakeholders are okay with a certain decision. The approach (also used by the original Market Design Committee) will be to see if a substantial agreement can be reached and to record dissenting opinions. We have heard that stakeholders want more of the rules content in the stakeholder engagement forum before it goes to the TP which we will try to accommodate.

Participant Follow-up Question: Will there be room for participants in stakeholder engagement or MRWG to make specific representations and submissions on design concepts?

IESO Response: This is intended to be a collaborative process so there will be opportunities for stakeholders to comment on all design concepts as they're discussed in the engagement; no decisions have been made about the design.

Participant Comment: Talk of collaboration is good and hopefully it will continue. To date, the IESO hasn't provided the promised responses, or has been giving answers that aren't responsive to the questions. Hopefully the process will be collaborative and the IESO will check with stakeholders to ensure their questions have been answered. Also, is the session being recorded?

IESO Representative: The session isn't being recorded, but a summary report will be circulated for comment. Sometimes the feedback concerns issues that are quite a bit ahead of the current discussion, so the IESO may only be able to fully address that feedback during a later phase.

Participant Comment: There has been pushback in the United States regarding standard market design because of the impact of zero marginal cost resources and their impact on price formation. These issues are being looked at now in the US and he wants to make sure the IESO remains cognizant of these discussions in New York, PJM, and New England.

IESO Representative: The IESO is aware of these conversations; we were present at the Federal Energy Regulatory Commission (FERC) technical conference. Ontario's supply mix already has a significant amount of renewables and this will be important in shaping MRP. The IESO is following these developments and invites participants to share their experiences.

Participant Comment: The FERC conference information should be included in the MRWG and stakeholder engagement discussions. Be sure Scott Harvey and Susan Pope of Forensic Technologies International (FTI) are aware of this request.

Participant Question: To what extent will the IESO's principles and goals be driven by changes in the government's policy objectives?

IESO Representative: The MRP, just like any market mechanism must work within the government's policy framework and be enduring as policies change. The IESO, together with stakeholders, will set up specific objectives for each market renewal initiative to ensure the MRP is aligned with government policy and works within the current framework.

Single Schedule Market Work Plan and Stakeholder Process – Darren Matsugu, Manager, Market Design and Integration, IESO (Slides 23-35)

The IESO is attempting to have a consistent approach to stakeholder engagement throughout the MRP, particularly the approach to arriving at respective HLDs. There will be separate engagements for each of the five primary initiatives of the MRP:

- Single Schedule Market (SSM)
- Incremental Capacity Auction (ICA)
- Day-Ahead Market (DAM)
- Enhanced Real-Time Unit Commitment (ERUC)
- More Frequent Intertie Scheduling (MFIS)

We want to learn from other jurisdictions, but we're not aiming to simply import a solution from another market. When assessing different options, quantitative analysis will inform decisions by assessing the advantages/disadvantages between the available choices. When a design element is non-contentious, it will be given to MRWG as an information item noting that there is not likely the need for further discussion on the matter.

The date of the next meeting was erroneously given as Thursday, June 2; the correct date is **Friday, June 2, 2017**.

Participant Comment: The change from Thursday to Friday creates difficulty, as stakeholders were asked to book time for meetings every second Thursday for the foreseeable future.

IESO Representative: We make every attempt to adhere to the schedule; we apologize for these changes but they were unfortunately unavoidable. There may be times when dates might have to change but the IESO will try to give as much advance warning as possible.

IESO Representative: The HLD should include enough detail for stakeholders to understand how SSM will work. The design phase goal isn't to finalize all details but to understand the impact the design will have on stakeholders' organizations.

While the knowledge Scott Harvey and Susan Pope of FTI bring to their advisory role on SSM is valuable, the ultimate goal is to find the HLD that works best for Ontario.

Participant Comment: Given the IESO's MRP projected cost savings of \$2.3 billion over 10 years, the IESO could provide capacity to its stakeholder partners to help them provide the hoped-for input.

IESO Representative: We will take the idea back. We have tried to mitigate some the workload as much as possible; the process is staggered somewhat to allow the more substantive discussions of issues to not all take place at the same time. We encourage stakeholders to figure out which engagements are important for them to join (some aspects of a day-ahead market and essentially the entire enhanced real-time unit commitment (ERUC) engagement are more pertinent to gas generators, for instance). We are also always open to augmenting the engagement with direct outreach to individuals or groups. We want to make this engagement process accessible while also ensuring it proceeds in a timely manner.

Participant Response: While only two or three of the work streams are important to his organization, even participating fully in one is a lot of effort.

IESO Representative: We understand the time commitment, but only a handful of elements are likely to involve substantive discussions.

IESO Representative: We will do our best to circulate meeting materials and meeting summaries in a timely fashion. This way, if stakeholders have to miss a meeting, they'll have a good sense of key issues and will know whether certain design discussions are happening elsewhere. *Note: All fundamentals sessions will also be recorded and posted on the SE page.*

Electricity Contracts – Emanuel Movchovitch, Strategic Initiatives Market and Resource Development IESO (Slides 36-39)

The IESO agrees it's important to integrate contracts into the market renewal process from the beginning. The MRP will have consequences for contracts; some will be mechanical changes, while others will be more complicated and will require more thoughtful discussion. As a rule the IESO will not be attempting to extract any incremental value out of existing contracts at the expense of contract holders. Rather, this is a market initiative aimed at improving overall market efficiency.

Participant Question: Given the plans to move from the hourly Ontario energy price (HOEP) to locational marginal pricing (LMP) and, eventually, DAM and real-time pricing, will contracts be amended multiple times during this transition?

IESO Response: The hope is to cover the changes in one amendment.

IESO Response: It will depend on how MRP implementation proceeds. The IESO will try to figure out how to amend contracts with all future changes in mind.

Participant Follow-up Question: Is the idea to maintain the same risk profile, or might the IESO try to extract greater value from its contracts?

IESO Representative: Contracts are a hedge mechanism for market price and will remain so. There are many types of risks, whether they are commercial, environmental, or others. What risk is being referred to will have to be figured out.

Participant Question: An IESO webcast on how contracts will be affected by the MRP would be a good way to communicate high-level details about contracts and to give stakeholders ideas about a path forward. Can the IESO present such a webcast?

IESO Representative: A parallel contracts sub-stream might be formed to address general and specific matters. The IESO holds around 30,000 contracts, approximately 25,000 of which are

microFIT contracts that should not be affected by these changes. There are also a large number of renewable contracts that do reference HOEP and may have to change, and another 60 to 70 contracts that are market participants and will see the greatest impact. Our group is open to having group talks about contracts in general and one-on-one meetings to discuss specific, commercially sensitive topics and a new e-mail address has been set up for Market Renewal contract related questions: mr.contractmanagement@ieso.ca.

Participant Question: Will discussions about contracts be addressed in a separate stream?

IESO Representative: High-level questions related to all contracts can be addressed in these sessions, with more specific questions addressed in separate sessions, if necessary.

Participant Follow-up Question: Will discussions address issues for generators that are located in transmission-constrained areas?

IESO Representative: Specific issues will have to be addressed in one-on-one meetings with the current contract manager.

Participant Question: Will the IESO, for the sake of efficiency, consider meeting with groups of stakeholders who have similar contracts?

IESO Representative: That's an option we could explore to improve the efficiency of the MRP process.

Introduction to the Single Schedule Market – Jonathan Scratch, Design Supervisor, Single Schedule Market, IESO (Slides 4-54)

Jonathan provided a brief recap regarding why Ontario chose to adopt, and continues to use, the two schedule system. He also outlined the rationale for switching to SSM and the changes that will be required to realize its benefits.

Key Design Elements (Slides 61- 63)

In consultation with FTI, the IESO has come up with five key proposed design elements of SSM:

- Price formation – LMP
- Price formation – Other
- Market price mitigation
- Load pricing
- Settlement

Participant Question: Why are elements of the operability stream that affect decisions and trade-offs relevant to the energy stream not scheduled for discussion until later this year?

IESO Representative: Most of the operability stream issues are about managing the system and the uncertainty associated with variable intermittent generation, or net load. The dispatch algorithm and wholesale price are a function of the IESO's demand forecasts. Ontario and other jurisdictions struggle with the effects of a higher penetration of renewable energy because it creates an "increasing band of error" around demand forecasts. With an algorithm with system assets tightly optimized, we question what would happen if the forecast is wrong and the system isn't flexible enough to provide the resources needed. As of now, we know the two-schedule system isn't sending price signals that align with dispatch, and this is in the relatively certain context of uniform pricing. The idea is to improve this part of the market (that is, aligning prices with dispatch) and then, with a more solid foundation in place, consider additional enhancements such as a Day-Ahead market.

Participant Follow-on Comment: The IESO's response addresses the point raised. Many studies suggest the best way to deal with a changing resource mix is to find new approaches to pricing electricity. Though the power system still needs ancillary services, how much of these services are needed will depend on what changes are made to energy pricing. Conversely, changing system requirements and a different resource mix may dictate changes in ancillary services. How can the SSM stakeholder engagement group contend with these issues and develop the HLD without looking at operability issues?

IESO Representative: Once that alignment has been achieved, there are many good conversations to be had around finding a better way to set prices with SSM. However, if we don't first have a price that's connected to system operating conditions, we can't do any of those things.

Participant Follow-on Comment: Referring to Slide 50 (Comparison of Existing and Future Market), if the goal is to find a better energy price, then the box marked "System/Unit Constraints" feeding into the "Constrained Schedule" box becomes a crucial piece. Since a lot could go in that box, it matters where it goes – on the energy price formation side or on the ancillary formation side. How it goes there also matters since all of those things will affect the price and how it will be calculated.

Participant Comment: People love to hate Congestion Management Settlement Credits (CMSCs) and generator cost guarantees (GCGs), but they do achieve things, however inefficiently. Other jurisdictions that have implemented LMP have other design elements to ensure reliability. It seems the plan is to get rid of out-of-market payments, but that means the new energy price structures are being designed without knowing what replacement elements will be needed for the system to operate reliably.

IESO Representative: Eliminating all unit commitment programs is not being contemplated; the ERUC workstream is concerned with scheduling resources more efficiently. Even with locational pricing, there are still instances where the IESO will have to dispatch resources for reliability. We want to make sure we aren't bringing units online and forcing them to operate at

a loss. This will be discussed within the settlement category and make whole payments for congestion (Slide 62).

Introduction to FTI Consulting and an Overview of the SSM Design Elements – Susan Pope, FTI (Slides 55-60)

FTI examined what would be needed to transition to SSM efficiently; possible improvements to the market; and how SSM relates to other MRP streams. FTI will present eight modules over two meetings in June.

Module A: Energy Pricing

Question: How will SSM prices be determined at each location that are consistent with the physical dispatch of energy and provide efficient incentives for the supply of energy by all types of resources?

- Understanding the differences between uniform and locational prices, and why the prices the IESO uses today may not be “settlement ready.”

Question: How will SSM settlements be calculated for energy suppliers and for transactions at the IESO’s interties?

- Reviewing the structure for today’s intertie prices, how they can transition to SSM, and what other alternatives might exist.

Module B: Reserve Pricing

Question: How will reserve prices be determined at each location that are aligned with the physical scheduling of reserves and energy and provide efficient incentives for the supply of reserves by all types of resources?

- Reviewing co-optimization procedures in both schedules, how these two sets of prices are different, and how pricing reserves work in SSM in other jurisdictions.

Module C: Constraint Violation Penalties

Question: How will the market design set appropriate prices when reliability constraints are violated in the dispatch?

- Reviewing difficulties in carrying over IESO’s current penalty structure into SSM.

Module D: Multi-interval Optimization and Pricing

Question: How will the single-schedule prices in the current interval be related to system conditions in subsequent intervals?

- Building understanding of how multi-interval optimization software will affect SSM prices.

Question: How will the single-schedule prices for the current interval be related to dispatch instructions and actual resource performance?

- Exploring options for this, including using a second model run factoring in some pricing rules and policies, or using actual output of loads based on telemetered results of dispatch.

Module E: Pricing Operating Restrictions and Operator Actions

Question: Will single schedule prices reflect discrete operator actions and commitment decisions whose cost is not reflected in marginal dispatch prices? If so, how will this be done?

- Reviewing different alternatives, depending on the extent to which Ontario has fast-starting minimum load block units dispatched on margin that are potentially influential on marginal prices.

Module F: Load Pricing and Financial Transmission Rights

Questions: How will SSM settlements be calculated for non-dispatchable loads? Will the single-schedule energy pricing design provide efficient incentives for the participation of dispatchable loads and price-responsive loads? If so, how? Will the single-schedule energy pricing design provide efficient incentives for long-run decisions with regard to location, energy efficiency, and, potentially, exit by energy-intensive consumers that are not currently price-responsive? How might the transition from the status quo to the new design be managed? Will this design include financial transmission rights?

- Asking how the settlement system used for dispatchable loads will apply to non-dispatchable loads and how they can be made compatible.
- Learning how financial transmission rights can bridge these objectives to protect against large shifts in cost.

Module G: Market Power Mitigation

Question: How will the SSM design avoid undue increases in market prices for energy and for reserves or in uplift costs as a result of the exercise of local market power?

- Because CMSC cannot be used in SSM, looking at alternatives for how market power mitigation protocols can operate within market.

Module H: Make Whole Payment and Uplift

Question: How will the SSM rules ensure that resources have strong incentives to follow dispatch instructions through rules for the payment of uplift?

- Looking at ways to minimize the gaming of uplift payments used to align prices with dispatch signals.
- Where CMSC occurs today, making sure whole payments would occur in SSM.

Question: How will the SSM rules recover uplift and ancillary services costs and ensure that energy price signals are not distorted by the method for recovering these costs?

- Asking what other questions need to be addressed to put SSM into place.
- Discussing how differences between average and marginal cost of losses will be allocated, because this is a revenue source that is collected every single hour of the year.

Participant Comment: Issues raised in Modules C, D, and E bring to the fore the question of what makes sense for Ontario. Here there's no more dispatching around the margin. There are lots of out-of-market actions, so there are inefficiencies. Ontario has 10,000 megawatts (MW) a day of nuclear and hydro that "wants to run base load" and has to be scheduled efficiently. Plus, there are 7,000 MW of wind and 2,000 MW of solar creating havoc on the distribution side. It's troubling to hear the IESO directed FTI to move as quickly as possible from uniform pricing to locational pricing. This emphasis on speed might bypass important conversations.

FTI: Jurisdictions in the US with lots of wind are looking at the same issues as Ontario because of asset retirements. Many regions need to improve their single-schedule pricing to better deal with intermittency. Many of Ontario's issues stem from the lack of flexibility inherent in a two schedule system and CMSC. Saying it's important to deal with SSM first doesn't mean other improvements are being ignored.

Participant Follow-up Comment: There's a lot to fix in Ontario, and new ideas seem to be coming into play. Just recently, Andrew Ott of PJM told FERC commissioners that negative pricing must be rethought in terms of how prices are set, and that's a bigger issue for northern Ontario than it is for PJM. All these issues have to be considered in the move to SSM.

IESO Representative: The IESO wants to address those topics, and the operability stream is an important part of that, but the only way to get there is to first have a market price that reflects the underlying conditions of the system.

IESO Representative: Regarding concerns about the timing and scope of the stakeholder engagement process, the IESO will discuss with stakeholders the options that work best for the province given our unique circumstances. But also, we don't want to spend 10 years talking about it; we want to get it done in a reasonable period of time.

Participant Comment: Certain "forbidden zones" must be acknowledged in the design phase. Some options will be impractical because they are politically impossible to achieve. Politics frustrated an earlier attempt to establish locational pricing.

Participant Comment: Small generators will be totally confused and unable to understand what's happening. Ensuring participation and contribution from this level is important. We also need more clarity on how, or if, we will be impacted by constraint penalties.

IESO Representative: Discussion of constrained penalties is slated for the examination of technical issues in the June sessions.

IESO Representative: IESO thanked participants for attending. The minutes will be circulated as draft for review and stakeholders have a month to send comments to the IESO on anything discussed today.

Conclusion

Feedback is appreciated and should be sent engagement@ieso.ca

Next Meeting is Friday, June 2, 2017

Meeting Adjourned at 2 p.m.