



JUNE 24, 2021

Revenue Metering Standing Committee

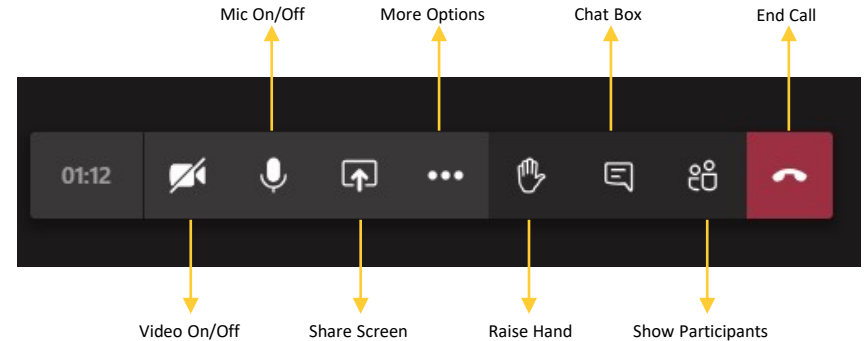
Various Presenters

Meeting Essentials

Please ensure you mute your microphone during the presentation.

If you have a question or comment you may:

- Unmute your microphone; or
- Use the chat feature



Administrative Items

- Review current meeting agenda
- Review and approval of last meeting minutes

Action Items

#	Date	Action	Status	Comments
1	June 2020	IESO to review and have a discussion with MSPs and get some insight regarding issuing a common commissioning template to all MSP's to potentially raise the performance of timely submission of commissioning reports (Measure 11).	In Progress	Jun 24/21: - on March 4, 2020, the market manual 3.2-Meter Point Registration and Maintenance, Appendix B, was revised to provide additional details regarding IESO's requirements for commissioning a metering installations and clearly identifies the acceptable supporting results comprising the commissioning verification report. This represents the criteria that is assessed for approval by IESO upon receipt of the commissioning verification report.

Administrative Items - Updates on action items

#	Date	Action	Status	Comments
2	June 2020	IESO to investigate the potential capability for Online IESO to allow MSPs to submit revised SLDs for in flight registrations.	In Progress	Jun 24/21: - minor progress due to other priorities and shortage of IESO staff
3	December 2020	IESO to review and have a discussion internally to see how to best support MSPs with training requirements. MSPs are encouraged to provide their input via email which could result in an joint working group.	In Progress	Jun 24/21: - IESO intends to develop a formal MSP Training Plan document to support the MSP's training needs in the future

MSP Training Plan

- Proposed Content:
 - Purpose, Audience, Objective, Scope and Assumptions
 - Training Need Assessment
 - Training Approach and Delivery
 - Roles and Responsibilities
 - Materials and Resources
- Currently in planning and surveying phase

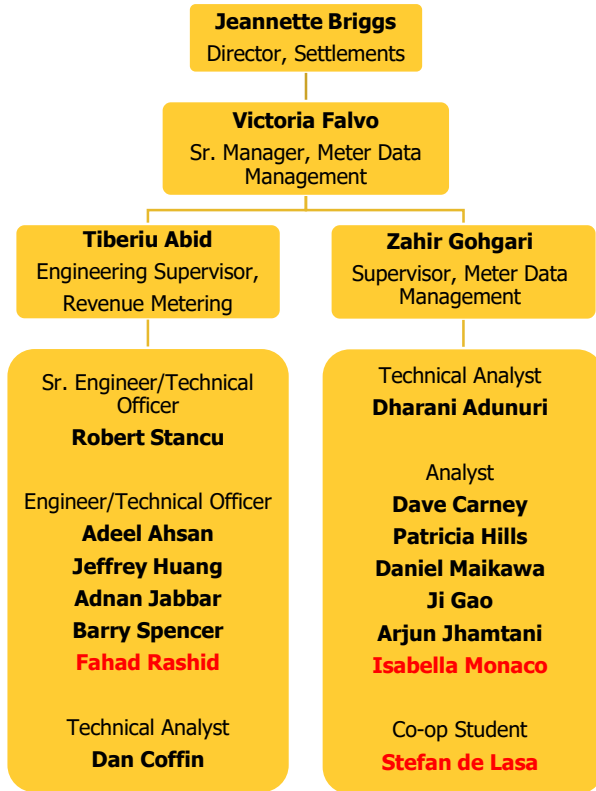
MSP Training Need Assessment

- Survey MSPs to assess:
 - Focus training areas and topics
 - Training delivery method, e.g., quick-takes, guides, training sessions
- Expected time of survey: Q4-2021



Metering Updates

IESO Staff Updates



Changes:

- Isabella Monaco & Stefan de Lasa -New members in the Meter Data Management team
- Fahad Rashid - On rotation with IESO Market Development team

Metering Installations by the numbers

Total of 2416 metering installations registered in IESO Administered Market (IAM)

Physical Metering Installations

- 2168 physical metering installations
- 1805 registered under the Declaration of Compliance (DOC)
- 363 registered under the Alternative Metering Installation Standard (AMIS)

Metering Installations by the numbers

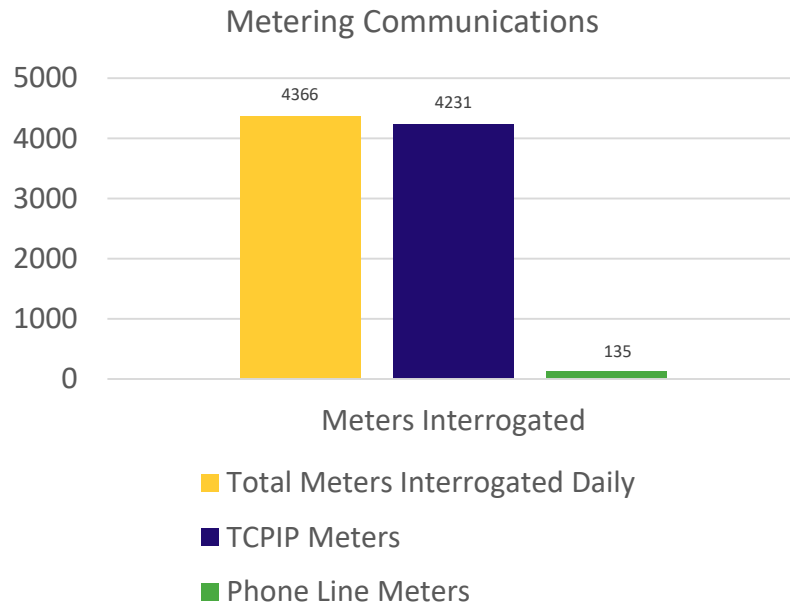
Virtual Metering Installations

- 248 virtual metering installations
- 62 represent unmetered station service
- 48 represent estimates for the purpose of allocating station services between MMP's
- 138 represent embedded generation for the purpose of transmission tariff (Form 1563)

Metering Communications

By The Numbers:

- 4366 Meters interrogated daily
- 4231 via TCPIP (97%)
- 135 via telephone lines (3%)



Poll 1

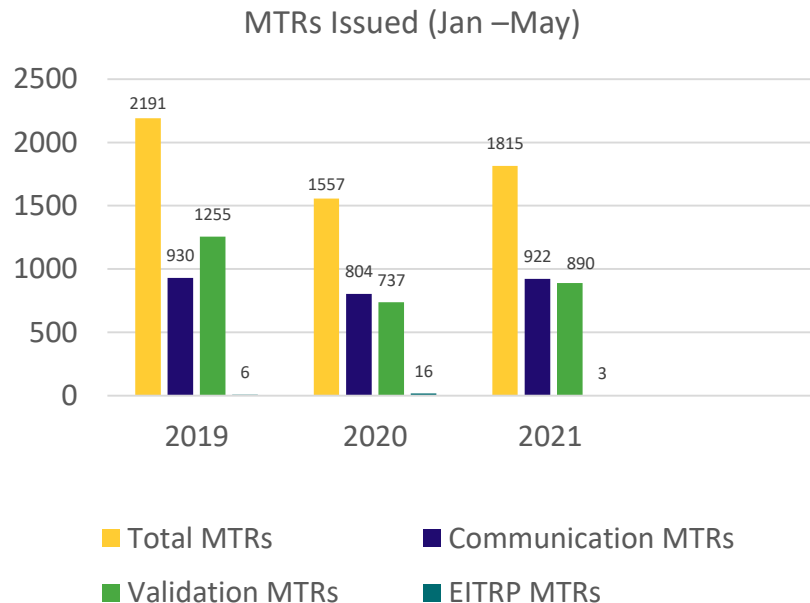
When will MSPs migrate remaining TCPIP meters to Phone Line? (Mandated by IESO)

- A) 0 - 6 months
- B) 6 – 12 months
- C) Over 1 year
- D) All our meters are already using TCPIP

Meter Trouble Reports (MTRs) Overview

From January 2021 – May 2021:

- 1815 MTR's issued to date
- 922 Communication and 890 Validation MTRs
- 3 EITRP MTRs



Overall MSP Performance Summary

- Positive MSP performance over the last 12 months (May 2020– April 2021)
- Approximately 94% of the Meter Installations do not experience communication MTRs on a monthly basis (Measure 3)
- Approximately 97% of Meter Installations do not experience validation MTRs on a monthly basis (Measure 4)

Overall MSP Performance Summary

- MTR responses has shown positive results relating to:
 - MTRs Resolved Within 2 Business Days of Issuance (Measure 5)
 - Number of Unresolved MTRs by Preliminary Settlement Statement (Measure 6)
 - Number of Unresolved MTRs by Final Settlement Statement (Measure 7)

Overall MSP Performance Summary

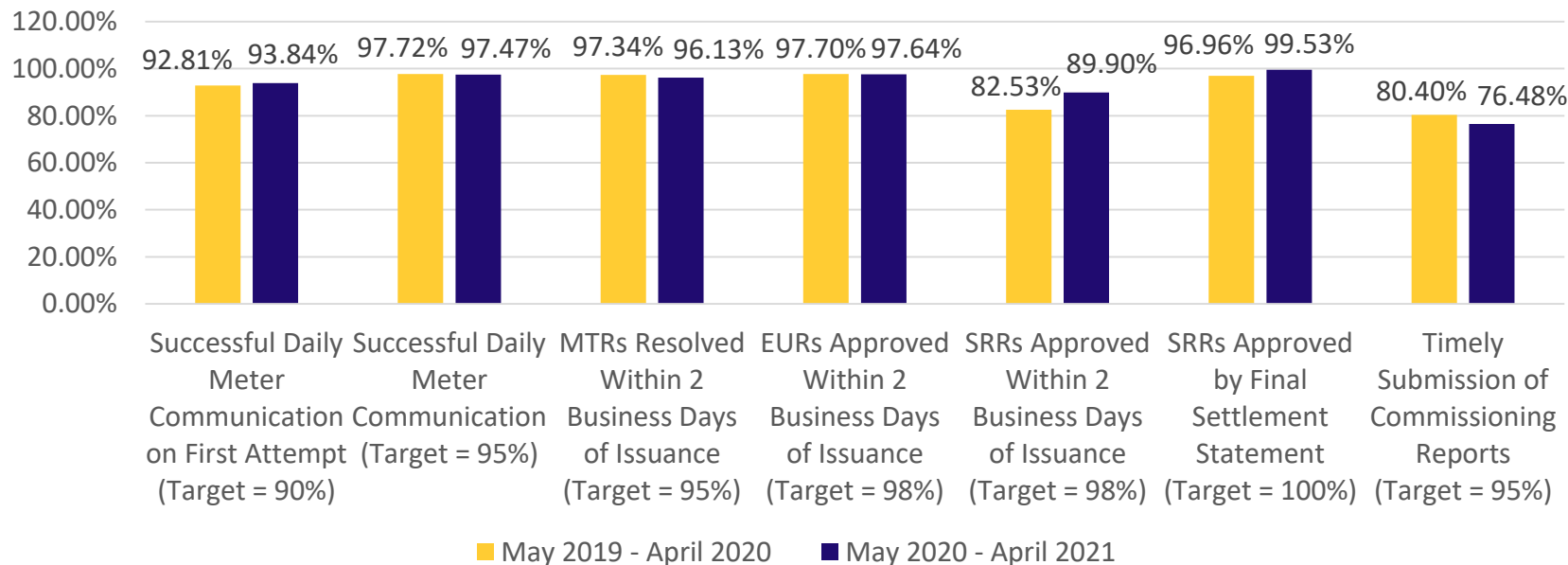
- Registration activity has shown positive results relating to:
 - EURs Approved Within 2 Business Days of Issuance (Measure 8)
 - SRRs Approved Within 2 Business Days of Issuance (Measure 9)
 - SRRs Approved By Final Settlement Statement (Measure 10)
- Registration activity has shown low performance relating to:
 - Timely Submission of Commissioning Reports (Measure 11)

Overall MSP Performance Summary

- Measure 12, “Metering Registry Errors” have been 0 over the last couple of years
- Measure 13, “Non-conformance incidents” resulting from R&P audits will continue to be reported (seeing positive impact from R&P audits conducted to date)

MSP Performance Breakdown

All MSPs 12 Month Performance
(May 2019 – April 2020 vs. May 2020 – April 2021)



MSP Performance Monthly Breakdown (May 2020 – April 2021)

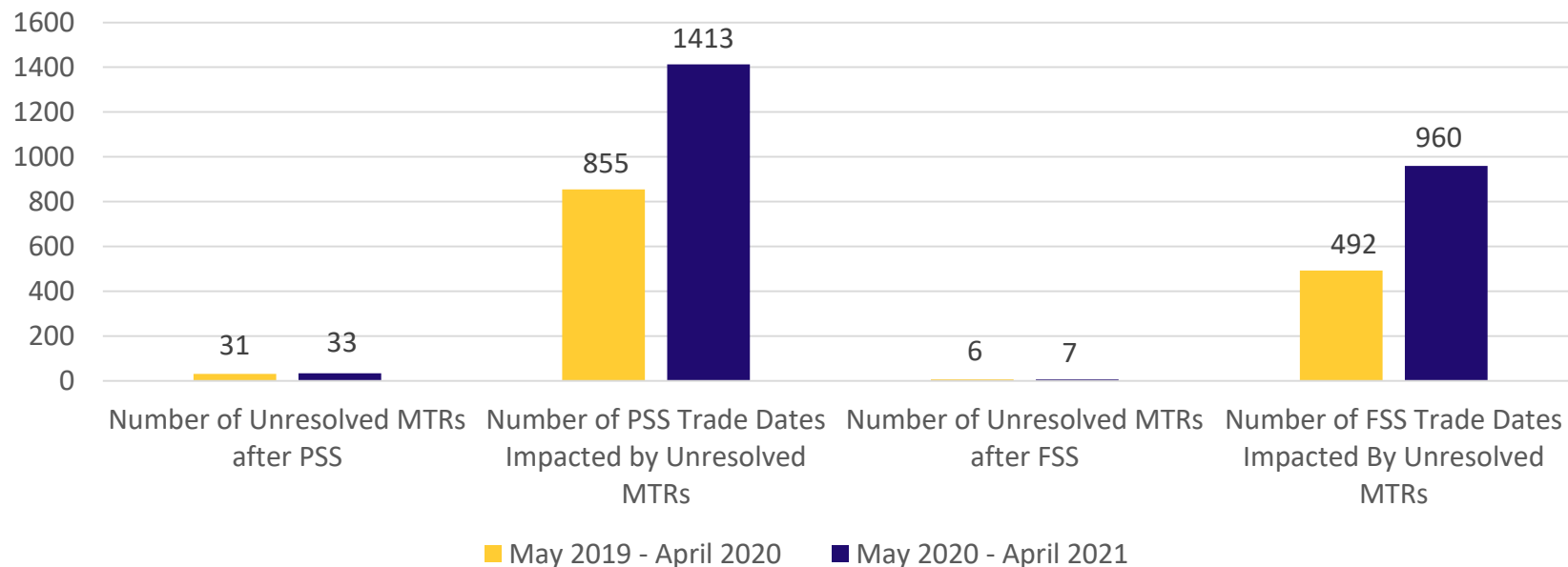
Measure	Target	May 2020	Jun 2020	Jul 2020	Aug 2020	Sept 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021
1 - Successful Daily Meter Communication on First Attempt	90%	94.9	94.9	94.8	94.3	93.9	93.1	92.8	93.6	93.8	92.7	94.0	93.2
2 - Successful Daily Meter Communication	95%	98.2	98.2	97.9	97.6	97.3	96.8	96.6	97.6	97.8	96.7	97.9	97.1
3 - Communication Meter Trouble Reports Issued													
- Number of Communication MTRs Issued	0	160	196	175	179	210	274	261	171	141	146	179	233
- % of Meter Installations without communication MTRs issued	100%	95.1	93.5	93.9	93.7	91.6	90.6	91.4	94.2	95.4	95.4	94.8	93.6

MSP Performance Monthly Breakdown (May 2020 – April 2021)

Measure	Target	May 2020	Jun 2020	Jul 2020	Aug 2020	Sept 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021
4 – Validation Meter Trouble Reports Issued													
- Number of Validation MTRs issued	0	88	126	92	69	98	106	128	73	50	75	116	80
- % of Meter Installations without Validation MTRs issued	100%	96.5	95.8	96.5	97.3	96.2	95.9	95.2	97.2	98.1	97.6	96.4	97.5
5 – Meter Trouble Reports Resolved Within 2 Business Days of Issuance	95%	93.6	97.5	95.5	97.3	95.7	98.1	96.5	97.1	96.8	95.3	94.7	94.5

PSS/FSS Performance Overview

All MSPs 12 Month Performance
(May 2019 – April 2020 vs. May 2020 – April 2021)



MSP Performance Monthly Breakdown (May 2020 – April 2021)

Measure	Target	May 2020	Jun 2020	Jul 2020	Aug 2020	Sept 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021
8 – Engineering Unit Reports Approved Within 2 Business Days of Issuance	98%	100	100	93.1	97.1	98.7	91.5	99.0	98.1	100	100	100	100
9 – Site Registration Reports Approved Within 2 Business of Issuance	98%	48.4	90.9	100	87.8	100	95	100	100	100	100	100	100
10 – Site Registration Reports Approved by Final Settlement Statement	100%	98.4	100	100	100	94.4	100	100	100	100	100	100	100

MSP Performance Monthly Breakdown (May 2020 – April 2021)

Measure	Target	May 2020	Jun 2020	Jul 2020	Aug 2020	Sept 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021
11 – Timely Submission of Commissioning Reports	95%	66.7	26.7	45.5	90.9	82.4	64.5	95.6	81.5	47.4	88.6	71.42	81.8
12 - # of Metering Registry Errors	0	0	0	0	0	0	0	0	0	0	0	0	0
13 - # of Non Conformance Incident	0	0	0	0	0	0	0	0	0	0	0	0	0

Poll 2

Do MSPs actively monitor their performance metrics on a monthly basis?

- A) Yes
- B) No
- C) Sometimes

MSP Performance Reminders

- MSPs are expected to actively monitor, review and improve their performance measures on a monthly basis.
- IESO expects MSPs to meet the targets as per the Market Rules and address any issues when performance is lower.
- IESO also monitors each MSPs performance and identifies lower performing MSP metrics.
- If an MSP is consistently underperforming on a particular metric on a monthly basis and subsequently has a low 12 month average, IESO reaches out to the MSP for more insights on the issue.
- MSPs should address performance issues as they occur and should not rely on the IESO to bring to the forefront performance issues at hand.

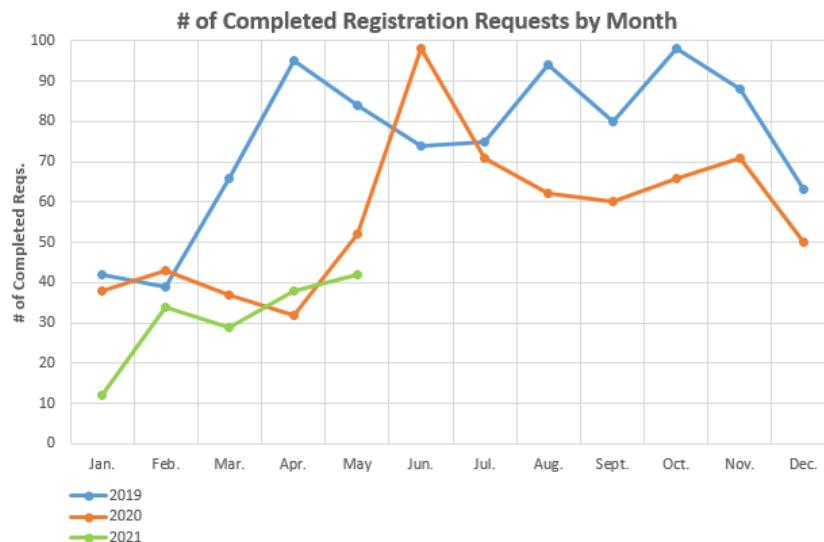
Poll 3

What are the main challenges MSPs face when aiming to meet the required performance targets?

- A) New Staff (Training Required)
- B) Shortage of Staff
- C) Unaware of IESO performance metrics & requirements
- D) Not sure

Meter Registration Hotline Activities & Enhancements

- 234 completed (Jan 2021 – May 2021)
- Register Metering Installation (14)
- Update Metering Installation (98)
- Like for Like Update (108)
- Deregister Metering Installation (14)



New TIM Update

- IESO updated the latest Translation Interface Module (TIM – Version 3.2.2.4) used in MV-90 for Alpha A3 meters
- For the IESO this new TIM allows improved support for diagnostics from the manufacturer and minor performance enhancements
- New TIM was tested and implemented into IESO systems
- There should be no changes in terms of meter configuration for MSPs

Conforming Meter List Update

- IESO tested and approved a new version of Schneider ION 8650 meter: ION 8650-V4.040.001
- This new firmware contains new features and changes to improve the security of the meter
- The Conforming Meter List (CML) has been updated to include this new meter
- MSPs can move forward with replacing meters with the new ION 8650-V4.040.001 meters

Conforming Meter List Update

- There are no changes to meter configurations as compared to other ION models approved by the IESO
- There is no change to the commissioning requirements for meter replacements



Meter Phase Rotation

Dan Coffin | Technical Analyst – Revenue Metering and Meter Data Management

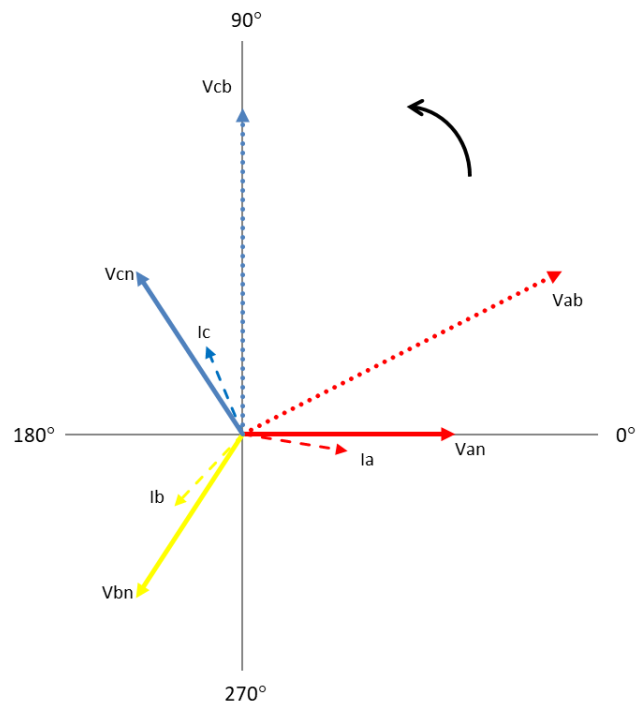
Meter Phase Rotation – Purpose of Discussion

- The purpose of this discussion is to share IESO's observations relating to IT connections and resulting impact to meter inputs
- A brief introduction as to how we discovered the issue
- Explain how IT inputs affect the quality of a meter installation
- Highlight associated codes and conditions governing meter installations
- Remediation plan going forward
- Opportunity to share any comments or concerns

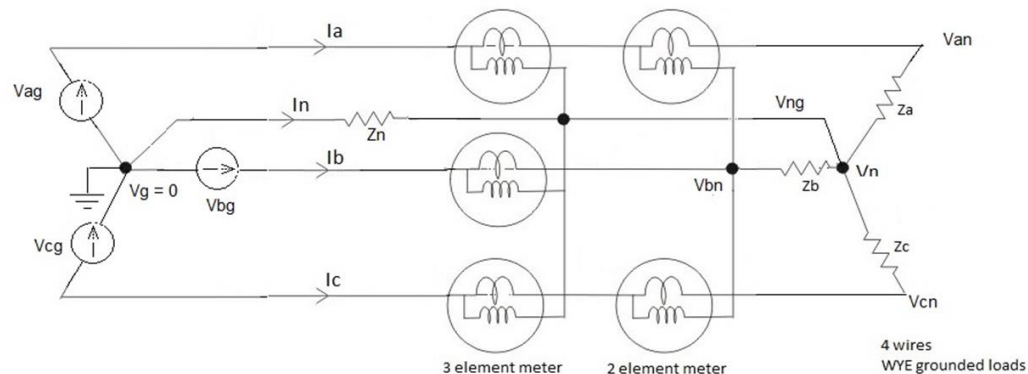
Meter Phase Rotation – Background

- Phase rotation defines the relative sequence of voltage peaks occurring with respect to time for a polyphase AC circuit
- Two varieties of phase rotation for 3-phase circuits: ABC or ACB
- Sources of differing phase rotation are not compatible and cannot be connected in parallel
- Phasor displays often featured in modern revenue meters and associated portable test equipment provide a convenient means to verify phase rotation of the meter installation

Meter Phase Rotation – ABC sequence

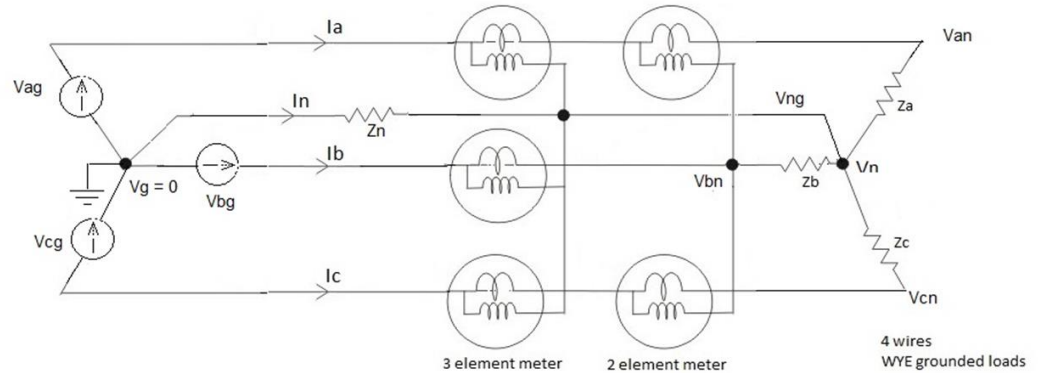


- Example phasor display for balanced system with lagging power factor and ABC sequence





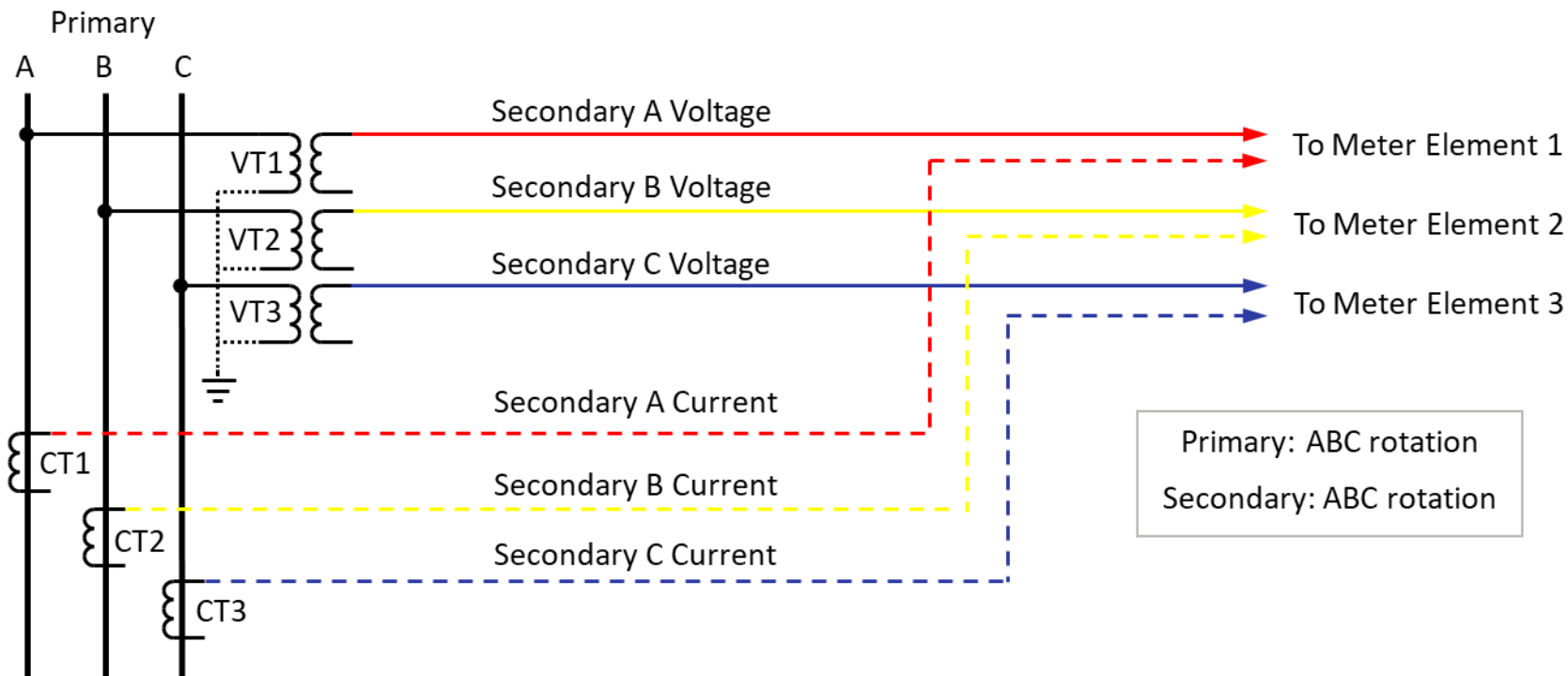
- Same example as previous, but now ACB sequence



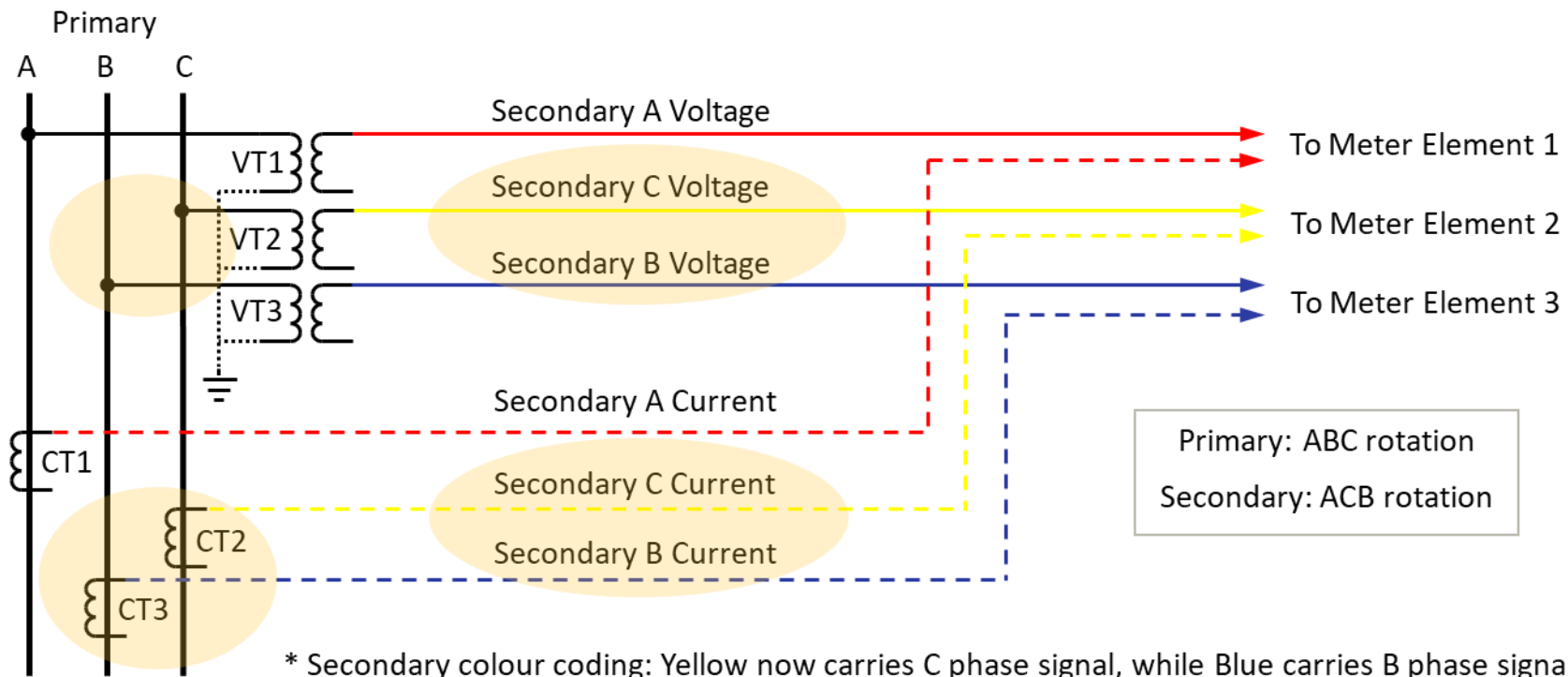
Meter Phase Rotation – Observations

- Branch circuits within the IESO-controlled grid are assumed to be ABC phase rotation (unless explicitly specified)
- Through a combination of field audits and review of commissioning results during registration, IESO has observed several instances of meters indicating ACB rotation instead of the expected ABC
- Further investigation into these occurrences has revealed a common error introduced during initial construction of affected metering installations and is related to wiring of instrument transformer secondary circuitry

Meter Phase Rotation – Example 1



Meter Phase Rotation – Example 2



Meter Phase Rotation – Results

- Relation between primary and secondary circuitry not maintained leading to increased potential for errors in analysis (e.x. EITRP)
- Meter data channels 5 thru 10 do not correspond to expected phases
- Settlements has not been found to be impacted (* provided that voltage/current inputs to a single meter element remain associated to a common phase and polarity is consistent with IESO hardware standard)
- Indicates gaps in procedures followed during construction and commissioning

Meter Phase Rotation – Applicable Policies

IESO Market Rules – Chapter 6

1.1.2 Nothing in this Chapter shall affect the obligation of any *market participant, metered market participant* or *metering service provider* to comply with all applicable *federal metering requirements* provided that, **where this Chapter or a policy or standard established by the IESO pursuant to this Chapter prescribes a higher standard** than that prescribed by *federal metering requirements*, the relevant *market participant, metered market participant* or *metering service provider* shall, for purposes of this Chapter, **comply with such higher standard.**

Meter Phase Rotation – Applicable Policies

IESO Wholesale Revenue Metering Standard - Hardware

5.10.1 Codes and Conditions Instrument transformer secondary cabling and cabling accessories **shall comply** with the following codes and conditions:

- a. the “Ontario Electrical Safety Code”;
- b. Measurement Canada S-E-08 **standard drawings** for colour coding and permanent tagging/labelling shall be used);

Meter Phase Rotation – Applicable Policies

IESO Market Manual 3.2 - Meter Point Registration and Maintenance, Appendix B: Requirements for Commissioning a Metering Installation

Record *instrument transformer* nameplate data (e.g. **phase association**, manufacturer, model, MC approval number, MC accuracy class, & available ratios). Using the *metering installation* wiring diagram, **a visual check of all equipment which forms part of the *metering installation*** shall be conducted.

Meter Phase Rotation – Applicable Policies

Measurement Canada S-E-08 — Specifications for the Installation and Use of Electricity

5.0 Standard Installations

5.1 Meter Connections

- Each meter (including instrument transformers) forming part of an electricity metering installation **shall be connected in accordance with the appropriate diagram established in the Measurement Canada Standard Drawings for Metering Installations. Refer to Appendix A.**

Meter Phase Rotation – Applicable Policies

Measurement Canada S-E-08 — Specifications for the Installation and Use of Electricity

5.0 Standard Installations

5.2 Colour Codes

- MC standard wire colour codes are established in Appendix B. Colour coding of wires shall be continuous from end to end.

Meter Phase Rotation – Applicable Policies

Measurement Canada S-E-08 — Specifications for the Installation and Use of Electricity

6.0 Non-standard Installations

6.1 Meter Connections

- Meter connection configurations other than those established in Appendix A may be used subject to the terms established in section 4.2.1 of Specification S-E-03 — Specification for the Installation and Use of Electricity Meters - Input Connections and Ratings

Meter Phase Rotation – Applicable Policies

Measurement Canada S-E-03 — Specification for the Installation and Use of Electricity Meters - Input Connections and Ratings

4.2.1

- Meters shall be connected to instrument transformers in accordance with the appropriate diagram established in the Measurement Canada Standard Drawings for Metering Installations. Other connection configurations may be used only if a formal drawing showing the actual connections is provided by the owner of the installation, and the drawing is determined to be acceptable to Measurement Canada Engineering and Laboratory Services.

Meter Phase Rotation – Applicable Policies

Measurement Canada S-E-08 — Specifications for the Installation and Use of Electricity

6.0 Non-standard Installations

6.2 Colour Codes

- Colour codes other than standard are acceptable subject to the following requirements:
 - a) the difference between current and voltage leads is clearly distinguishable;
 - b) the use of green and white is restricted only to purposes which conform to the Canadian Electrical Code; and,
 - c) the code is consistent in other installations owned by the electricity distributor/contractor.

Meter Phase Rotation – Remediation Plan

- Meter installations which IESO has found to record ACB phase rotation will be assigned a conformance monitoring task for the MSP to complete remediate within one year
- Remediation may be to perform wiring adjustments as necessary and submission of commissioning reporting package (verification and test)
- Or, obtain and submit formal exemption from Measurement Canada for the affected meter installation

Meter Phase Rotation – Comments / Concerns



Send to Metering.Installations@ieso.ca



Meter Power Supply: Automatic Transfer Switch (ATS)

Ji Gao | Analyst – Revenue Metering and Meter Data Management

Today's Purpose

- Introduction and overview of ATS
- Possible Market Manual updates to support ATS meter installations
- Round table discussion + Poll

What is an ATS?

- An Automatic Transfer Switch (ATS) can be used to provide redundant power supply to the Main/Alt Meters and communication equipment



What is an ATS?

- An ATS has two inputs signals (default and backup) and one output signal
- The default input is supplied from an *independent* power source and the backup input supplied from an *dependent* power source (see 6.4.1 of Hardware Standard Issue 14.0)
- Upon failure of the default input signal, the ATS switches to the backup input, providing uninterrupted power supply to the meters and communication equipment

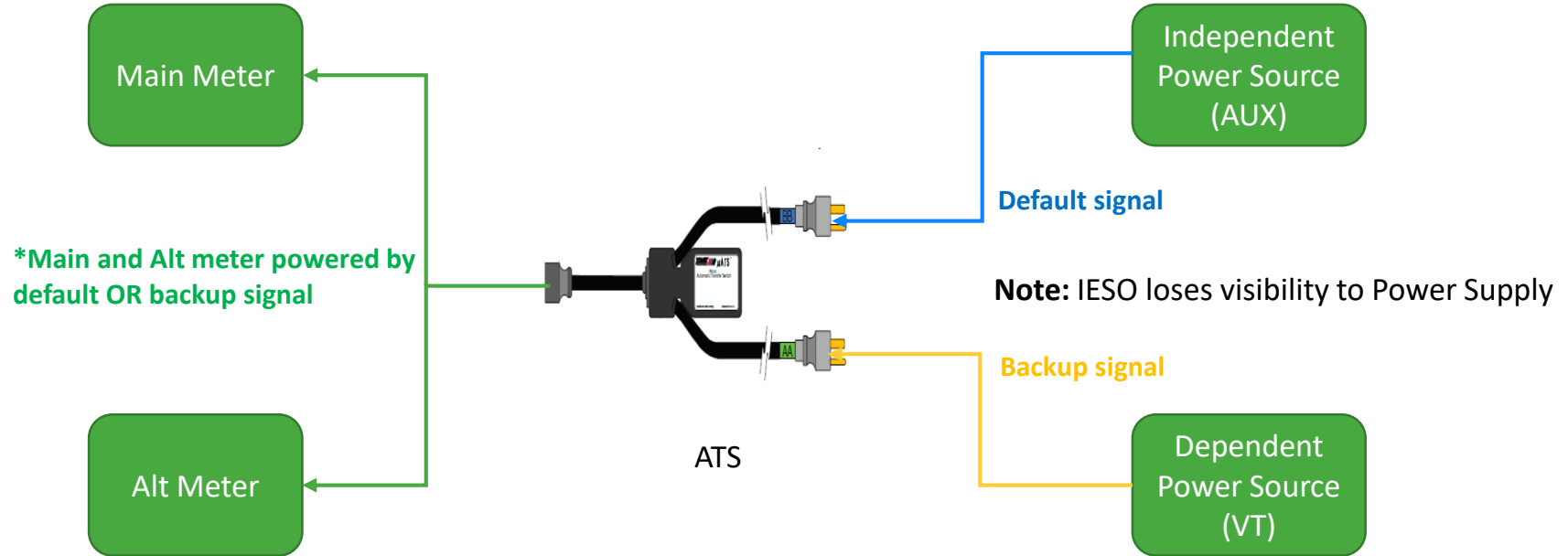
"Common" Meter Installation



Note: IESO has visibility to the Power Supply



ATS Meter Installation



ATS Truth Table (OR Gate)

Default Input	Backup Input	ATS Output
ON	ON	ON
ON	OFF	ON
OFF	ON	ON
OFF	OFF	OFF

- In Summary, "One or the other"

Benefits of ATS Implementation?

- Reduce number of POs and subsequently MTRs issued.

Increases the power supply redundancy for both Main and Alt meters even during a valid power outage (ex. Scheduled maintenance)

Probability that both power supplies fail is lower

- Potentially improves MSP performance, specifically Measure 4: # of Validation MTRs issued

Things to Consider...

- IESO loses visibility of power supply record at the source (AUX vs VT)
- Adjustment to process change
 - Power Outage MTR decision table
 - Meter Installation Registration – Measurements Error Correction coefficients must be revised and approved for “worst case scenario” where for the VT burden all additional power supply must be considered: MAIN, ALT meters, communication devices, and ATS

Questions Regarding ATS?



Possible Market Manual Updates – Hardware Standard

6.4 Auxiliary Power Supply for Main and Alternate Meters

6.4.1 Auxiliary Power Supply Sources

Under normal *meter* operating conditions, the auxiliary power supply to the main and alternate *meters* shall be powered from:

- a. Independent power sources which may include, but are not limited to:
 - *Station service* supply;
 - Distribution secondary service supply;
 - DC battery bank; or
 - Uninterruptible power supply powered from *station service* supply or distribution secondary service supply; or
- b. Dependent power sources which may include, but are not limited to:
 - VT phase power; or
 - Uninterruptible power supply powered from VT phase power.

6.4.2 Auxiliary Power Supply Configuration – Minimum Requirements

The *metering data validation* process must be able to differentiate between an actual measurement circuit outage versus a loss connection to the *meter* auxiliary power supply. The *IESO's* Meter Data Acquisition System (MDAS) must be able to communicate with the main *meter* under all operating conditions to ascertain any measurement circuit outage event.

Table 6.1: Power Source Connections – Minimum Requirements

Metering Service Mode	Main Meter	Alternate Meter
Normal operating conditions ¹	Dependent power source	Dependent power source different VT phase than main meter
VT Primary Switching – Metering Outage ²	Independent power source	Dependent power source
Power Systems Operations Switching – Extended Power System Outage ³	Independent power source	Independent power source

6.4.2.1 Normal Operating Conditions

Under normal operating conditions where the metering installation sustains a loss of an input VT phase, at minimum, the main *meter* auxiliary power supply must be connected to a dependent power source and the alternate *meter* auxiliary power supply must be connected to a dependent power supply from a different source of VT phase power.

Power supply connections configured for either of:

- Independent power source to main *meter* and dependent power source to alternate *meter*; or
- Independent power source to main *meter* and independent power source to alternate *meter*,

will both meet and exceed minimum power supply requirements.

6.4.2.2 VT Primary Switching – Metering Outage

Where VT primary switching results in a *meter* outage to the *metering installation*, at minimum, the main *meter* auxiliary power supply must be connected to an independent power source, and the alternate *meter* auxiliary power supply must be connected to a dependent power source.

Power supply connections configured for:

- Independent power source to main *meter* and independent power source to alternate *meter*,

will meet and exceed minimum power supply requirements.

Possible Market Manual Updates – Meter Registration

- Update Online IESO Meter Registration details to include “ATS” power supply (new drop down options)

Meter Master Files

Show Historical Record Selection

Main Meter Point ID

Main Meter Point Master File

Main Auxiliary Power Supply

Source A

Main MIRT Update Form

Alternate Meter Point ID

Alternate Meter Point Master File

Alternate Auxiliary Power Supply

External Phase A

Alternate MIRT Update Form

Possible Market Manual Updates – PO Decision Table

Table 1: MM 5.2 Appendix E: PO MTR Decision Table

Case	Main	ALT	IESO Action for MTR	MSP Action to MTR
1	PO	PO	No MTR are issued if either Main or Alt are powered by phase voltage and have same outage, otherwise MTR issued.	Confirm PO is valid for time specified or supply data file if invalid.
3	PO	LOAD	**Copy from ALT (Channels 1 to 4 and zero out ch 5-8 (10) and issue Case 3 PO MTR.	Accept edit unless data is incorrect (1) then provide data file.
4	PO	ZERO	If confirmed zeros then do not issue MTR on zero load, otherwise, issue Case 4 PO MTR.	Confirm PO is valid for time specified or supply data file if invalid.
13	ZERO	PO	No edit required and no MTR issued unless current presence, then apply Min/Max to Ch 1-4 and zero out channel 5- 8(10).	None. No MTR will be issued unless Current Presence MTR and then edit must be accepted or data file provided.

“Common” vs. ATS Supply Case 4 or Case 13 PO

- With ATS, both Main and Alt meter powered by the same source at any given time
- Therefore, it is problematic for one meter to be auxiliary supplied while the other is out (PO flag)
- In the rare event this happens, investigation required (MTR issued)

Possible Market Manual Updates

- IESO Meter Data Management currently in discussion to update PO MTR Decision Table
- 2 Possibly Solutions:
 - Keep existing table and include ATS scenarios
 - Create new table to address ATS scenarios exclusively

Questions Regarding Possible Market Manual Changes?



Poll 4

Following this presentation and subsequent discussions, what is the level of interest among MSPs to implement an ATS?

- A) Very Interested
- B) Interested
- C) Mutual
- D) Not Interested

Roundtable Discussion



Feedback Survey

- Thank you all for joining the virtual RMSC meeting
- Please share your feedback by completing the survey via the hyperlink below (also sent in the chat box).

Hyperlink:

<https://www.surveymonkey.com/r/T2SK772>

Thank You

ieso.ca

1.888.448.7777

customer.relations@ieso.ca

engagement@ieso.ca



[@IESO Tweets](https://twitter.com/IESO)



facebook.com/OntarioIESO



linkedin.com/company/IESO