

Baseline Update – No Load Loss Enhancement for Disconnected Transformer

RMSC/MSP User Group Meeting

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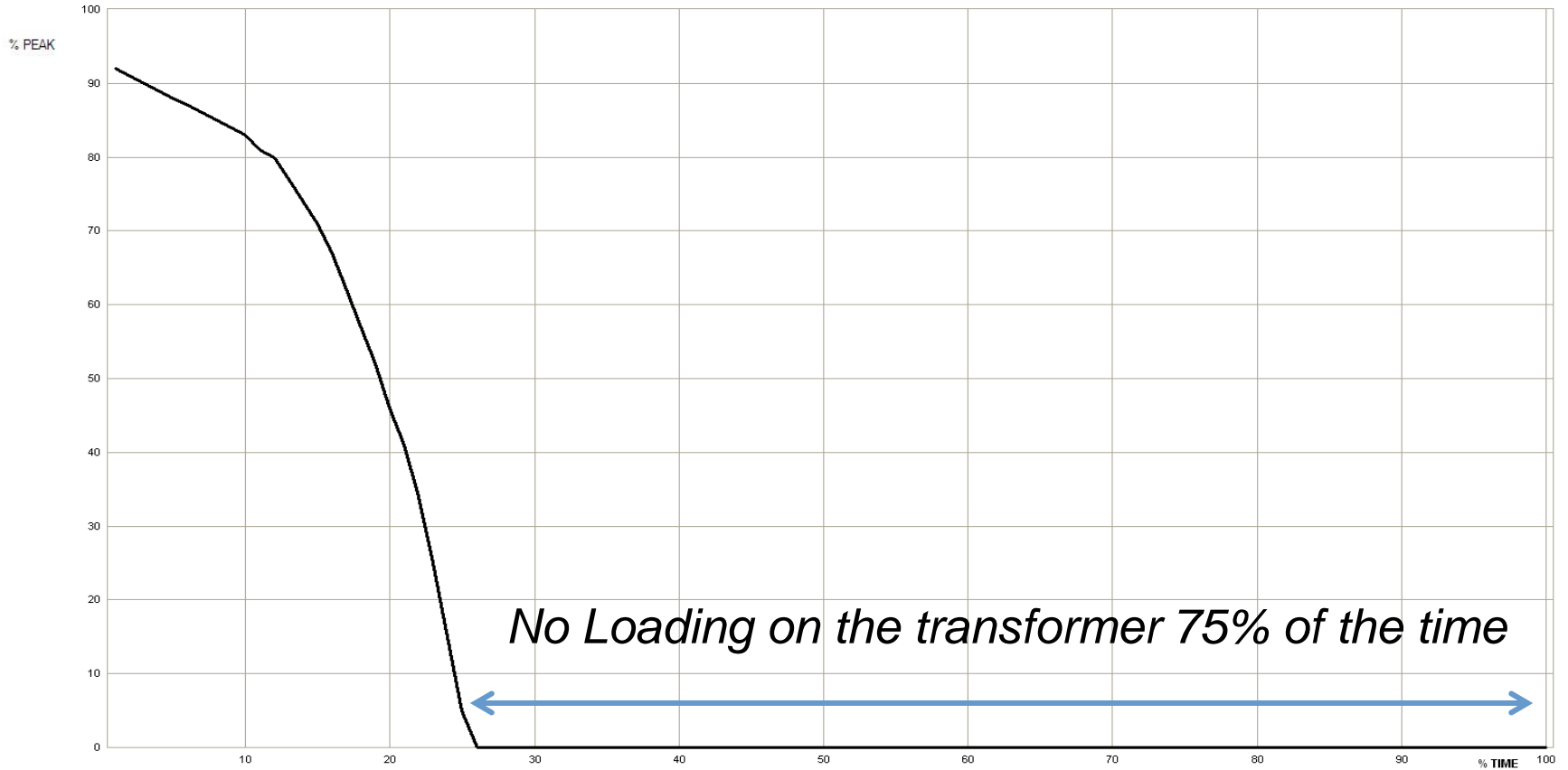
Metering Installation

June 12, 2018

Background

- IESO has Wholesale Market participants that, as part of their normal day to day operation, disconnect their facility from the IESO controlled grid.
- Depending on the metering arrangement, participants may incur No Load Losses when disconnected from the grid.
- These are typically production driven loads (e.g. arc furnace loads or combined cycle gas generators) which may have frequent switching conditions.
- It is estimated that a participant can incur between \$30K to \$80K in No Load Losses annually in this situation.

Example



5 Min Clock Intervals

LOAD DURATION PLOT

Chan: 1

Start: 08/10/01 00:01

Stop: 09/09/30 24:00

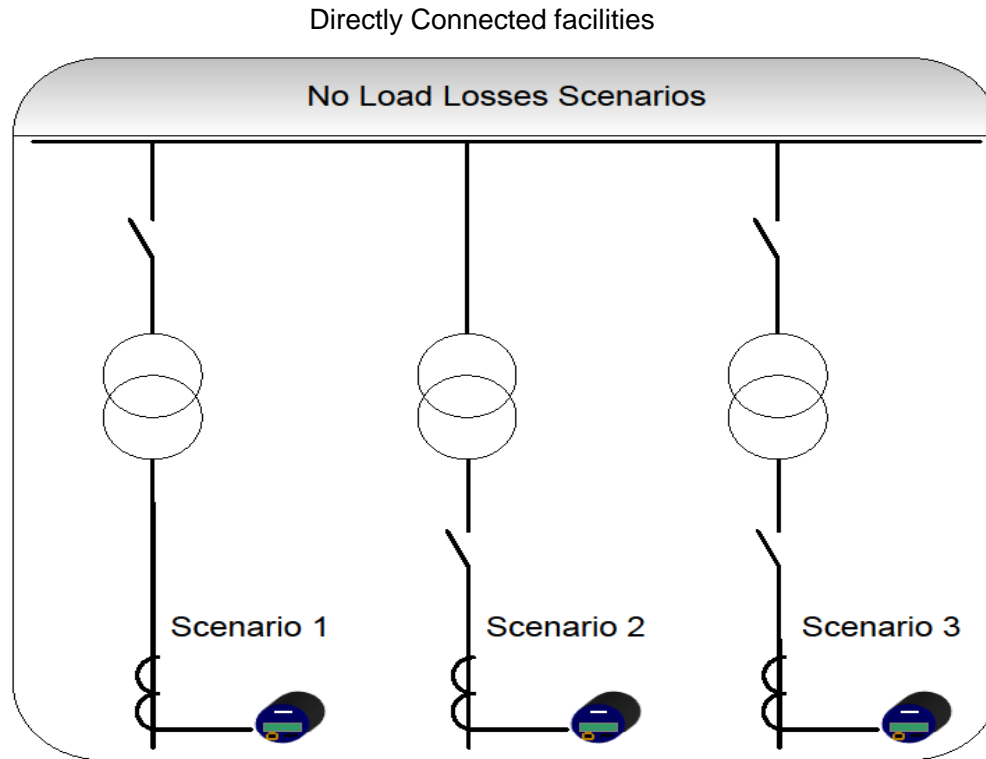
Max: 43360.2KW

Min: .0KW

Background

- Current metering standards do not consider dynamic changes of registration details (ex: transformer is de-energized), and as a result No-Load losses are applied for all cases.
- Based on estimates of No Load Losses over short periods of switching conditions, the costs in comparison to the normal load are negligible.
- For extended switched conditions (ex: transformer taken out-of-service for replacement), MSP can register a new totalization table to reflect the switch condition. For short or regular duration, there was no other option.

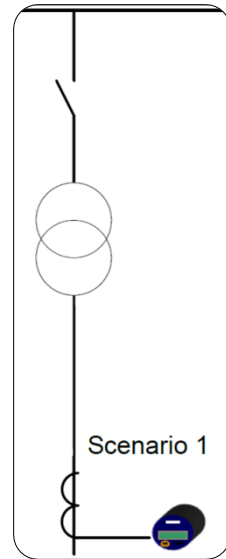
Scenarios



Metering data cannot differentiate between scenarios 1, 2 and 3.

Proposal

- Must meet certain conditions/requirements:
 - Power System configuration should comply with scenario 1: without a disconnect switch installed between the Power Transformer and Meter Installation; this means when the Power Transformer is disconnected the meter will measure zero volts.
 - An SLD is required to be registered with IESO confirming this configuration.
 - A Totalization Table update indicating No-Load Losses not to be applied when power equipment is disconnected from the IESO grid.
 - Requests will be assessed on a case-by-case basis



Totalization Table Example



TOTALIZATION TABLE FORM

Facility Name	Transformer Station TS
Effective Date	TBD
MSP ID	
Prepared By (MSP)	MSP A
IESO Build By	

Breaker Ratio	T ₁		T ₂		T ₃	
	MMP Feed	Total Feeders	MMP Feeders	Total Feeder	MMP Feeders	Total Feeder
MMP Name						
MMP1: MMP A	1					
		1				

metered _____

A. ENERGY MARKET

MMP #	DP ID	Summary 1	Summary 2	Meter Point ID	Channel No.	Operator (+ or -)	UoFM	Energy Flow Direction	Description of Measured Circuit	Ratio (3 dec.)	MEC	Assumed Voltage	Assumed P.F.	Service Type	CT Ratio	PT Ratio	Transformation		Radial Line		Transformation			Radial Line			TLF			
																	a(V ²)	b(I ²)	e(V ²)	f(I ²)	k ₁	k ₂	k ₃	k ₁	k ₂	k ₃				
1	1000000	100100E		1000010000	1	+	1	del	M1		0.0	120	0.95	WYE	80	140			0.025	-0.107	66.203									
					2	+	3	del																						
					3	+	1	rec																						
					4	+	3	rec																						

Note 1: K3 - No Load losses not be applied when Power Transformer equipment is disconnected from the IESO Grid.

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MDMS Setup - Logic used to offset NLL

- No Load Losses will be offset from the Energy Delivery point if the following condition is met:

	Σ energy = 0	Σ energy > 0
Σ volts = 0	NLL not applied	NLL applied
Σ volts > 0	NLL applied	NLL applied

- No Load Losses not applied if Σ of active energy and Σ of voltage channels are zero
 - No Load Losses applied if Σ of energy or Σ of voltage channels are different than zero
- Targeting September Baseline to update Market Manual 3.7 with details

Questions

Appendix

- No Load Loss Totalization methodology:
 - Add a two channel ratio meter RM_V having input:
 - Channel 1 - zero signal
 - Channel 2 – Σ of all voltage channels (5 to 7 or 5 to 6 of the physical meter)
 - Add a two channel ratio meter RM_E having input:
 - Channel 1 - zero signal
 - Channel 2 – Σ of all active energy channels (1 and 3 of the physical meter)
- Ratio Meter Logic:
 - If Σ input channel values = 0, Ratio = $\frac{1}{\# \text{ of Channels of the ratio point}}$
 - Else Ratio = $\frac{ABS(\text{channel value})}{ABS(\Sigma \text{ input channel values})}$

Appendix

- No Load Loss Totalization methodology (cont....):
 - The ratio meter RM_V output will be as follows:
 - If Σ of all voltage channels is zero Ch1 = 0.5 Ch2 = 0.5
 - If Σ of all voltage channels is different than zero Ch1 = 0 Ch2 = 1
 - The ratio meter RM_E output will be as follows:
 - If Σ of all energy channels is zero Ch1 = 0.5 Ch2 = 0.5
 - If Σ of all energy channels is different than zero Ch1 = 0 Ch2 = 1
 - A 20 meter having applied a proportion factor SF as follow:
 - If SSLA coefficients are method 1 – (a, b)

$$SF = 4 * Nr_{of\ elements} * a * V_{assumed}^2 / 20$$

- If SSLA coefficients are method 2 – (k1, k2, k3)

$$SF = 4 * K_3 / 20$$

Appendix

- No Load Loss Totalization methodology (cont....):
 - A one channel summary point where ratio meters RM_V ch1 and RM_E ch1 are multiplied with meter 20; the result will be:

	Σ energy = 0	Σ energy > 0
Σ volts = 0	1/4*4*No Load Loss	0
Σ volts > 0	0	0

- No Load Loss if Σ of active energy and Σ of voltage channels are zero
- Zero if Σ of energy or Σ of voltage channels are different than zero
- A second summary point with four channels where the meter point with losses will be added and the first summary point will be subtracted (losses being removed when is no energy and voltage on the meter)
- The ratio meter RM_V is required to permit the application of no load losses in case of estimated data (Volts channels are zeroed out)

Appendix

- No Load Loss Aggregation Model

No Load Loss application for equipment disconnected from IESO grid

