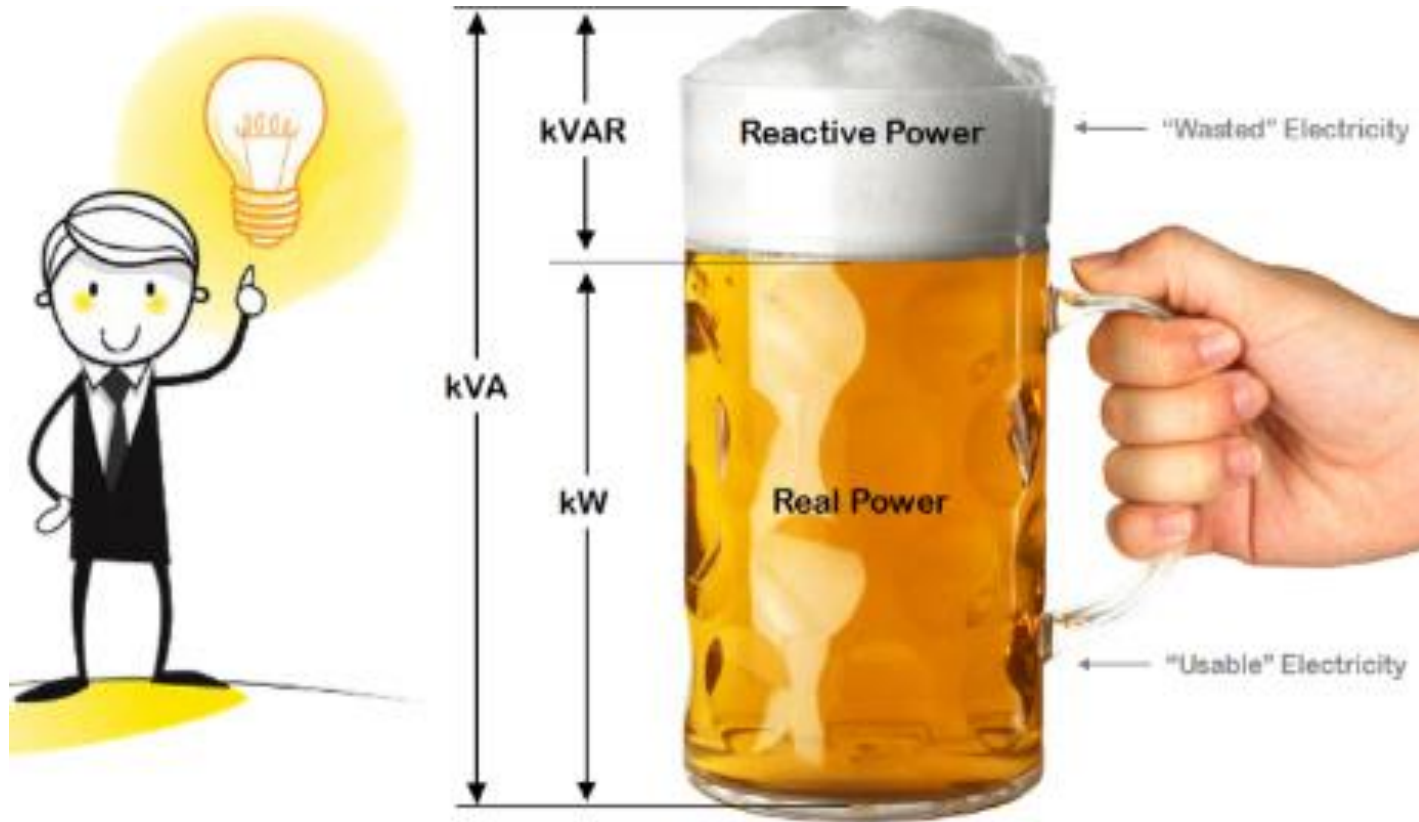


# ION Meter Applications

Mike Richard & Philip Genovese

October 27, 2016

# Overview of Energy Quantities



Voltage and Current

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# Additional channel to the ION Meter

# Additional channel to the ION Meter

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Why?

- Complaint from a client concerning being billed for no load losses even when the transformer has no energy present
- Estimate cost of 30 to 80 thousand dollars a year even when the transformer is not in use

# Additional channel to the ION Meter

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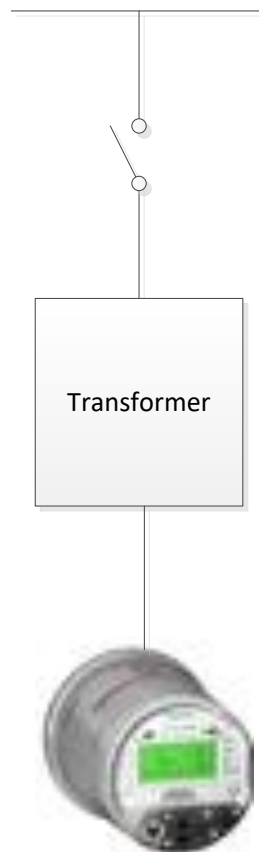
## Condition of use

- Disconnection from the grid is part of normal operation
- The meter(s) must have the capability/logic to identify when the transformer is disconnected from grid
- Meter(s) must be powered from a different power source

# Additional channel to the ION Meter

## Conditions of use

- Disconnect must be located ahead of the meter and no other transfers are present



# Additional channel to the ION Meter

How ?

- As per IESO requirements voltage(s) per phase is recorded in the load profile
- If all voltage channels are equal to zero, then a 1 will appear in the additional channel
- If any voltage channels are greater than zero, then a 0 will appear in the additional channel

# Additional channel to the ION Meter

Interval Time	Channel 1 Set 1 KWH (Usage)	Channel 2 Set 1 KVARH (Usage)	Channel 3 Set 2 KWH (Usage)	Channel 4 Set 2 KVARH (Usage)	Channel 5 Set 0 V2H (Usage)	Channel 6 Set 0 V2H (Usage)	Channel 7 Set 0 V2H (Usage)	Channel 8 Set 0 I2H (Usage)	Channel 9 Set 0 I2H (Usage)	Channel 10 Set 0 I2H (Usage)	Channel 11 Set 0 KWH (Usage)
2016-10-07 06:00	0.00	0.00	0.00	0.00	1075.13	1083.63	1088.68	0.00	0.00	0.00	0.00
2016-10-07 06:05	0.00	0.00	0.00	0.00	214.68	216.73	217.55	0.00	0.00	0.00	0.00
2016-10-07 06:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 06:55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 07:55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-07 08:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

MV90 Additional channel active



# Additional channel to the ION Meter

Interval Time	Channel 1 Set 1 KWH (Usage)	Channel 2 Set 1 KVARH (Usage)	Channel 3 Set 2 KWH (Usage)	Channel 4 Set 2 KVARH (Usage)	Channel 5 Set 0 V2H (Usage)	Channel 6 Set 0 V2H (Usage)	Channel 7 Set 0 V2H (Usage)	Channel 8 Set 0 I2H (Usage)	Channel 9 Set 0 I2H (Usage)	Channel 10 Set 0 I2H (Usage)	Channel 11 Set 0 KWH (Usage)
2016-10-11 05:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-11 05:15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
2016-10-11 05:20	0.00	0.00	0.00	0.21	189.04	190.40	191.24	0.00	0.00	0.00	0.00
2016-10-11 05:25	2.94	0.00	0.00	1366.02	1209.33	1219.94	1216.00	0.16	0.16	0.15	0.00
2016-10-11 05:30	3.13	0.00	0.00	1445.60	1218.61	1229.64	1224.97	0.17	0.17	0.16	0.00
2016-10-11 05:35	3.15	0.00	0.00	1447.31	1220.85	1231.40	1227.81	0.17	0.17	0.16	0.00
2016-10-11 05:40	3.17	0.00	0.00	1445.03	1218.16	1228.92	1225.63	0.17	0.17	0.16	0.00
2016-10-11 05:45	3.15	0.00	0.00	1426.20	1201.97	1213.99	1209.20	0.17	0.17	0.16	0.00
2016-10-11 05:50	3.15	0.00	0.00	1422.20	1198.79	1211.12	1205.57	0.17	0.17	0.15	0.00
2016-10-11 05:55	3.15	0.00	0.00	1417.59	1194.67	1207.11	1201.65	0.17	0.17	0.15	0.00
2016-10-11 06:00	3.15	0.00	0.00	1412.36	1189.19	1202.24	1197.10	0.17	0.17	0.15	0.00
2016-10-11 06:05	3.14	0.00	0.00	1401.73	1181.00	1193.94	1188.79	0.17	0.17	0.15	0.00
2016-10-11 06:10	3.15	0.00	0.00	1403.08	1182.91	1194.12	1189.89	0.17	0.17	0.15	0.00
2016-10-11 06:15	3.15	0.00	0.00	1391.11	1173.53	1184.66	1179.89	0.17	0.17	0.15	0.00
2016-10-11 06:20	3.20	0.00	0.00	1416.96	1194.44	1205.25	1201.38	0.17	0.17	0.15	0.00
2016-10-11 06:25	3.23	0.00	0.00	1425.67	1201.74	1212.75	1208.37	0.17	0.17	0.16	0.00
2016-10-11 06:30	3.25	0.00	0.00	1429.81	1205.57	1216.51	1211.43	0.17	0.17	0.16	0.00
2016-10-11 06:35	3.22	0.00	0.00	1415.18	1193.04	1203.91	1198.61	0.17	0.17	0.15	0.00
2016-10-11 06:40	3.20	0.00	0.00	1403.23	1183.60	1194.42	1188.84	0.17	0.17	0.15	0.00
2016-10-11 06:45	3.21	0.00	0.00	1404.60	1184.24	1195.45	1189.89	0.17	0.17	0.15	0.00
2016-10-11 06:50	3.20	0.00	0.00	1403.31	1183.31	1194.62	1189.07	0.17	0.17	0.15	0.00
2016-10-11 06:55	3.22	0.00	0.00	1408.86	1188.48	1199.16	1194.25	0.17	0.17	0.15	0.00
2016-10-11 07:00	3.24	0.00	0.00	1415.22	1192.96	1205.01	1199.80	0.17	0.17	0.15	0.00
2016-10-11 07:05	3.22	0.00	0.00	1402.54	1183.13	1195.75	1189.69	0.17	0.17	0.15	0.00
2016-10-11 07:10	3.26	0.00	0.00	1423.89	1201.42	1212.24	1207.50	0.17	0.17	0.15	0.00

MV90 Additional channel inactive

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# Feed in Tariff (FIT) SCADA Control

# FIT SCADA Control

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## Purpose

- Control room requires a disconnect for a Solar FIT  $>10\text{Kw}$  and  $< 500 \text{ Kw}$
- A quick way to drop the customers generation remotely if a situation arises

# FIT SCADA Control

- It is in no way a means of protection or part of an operating guarantee



# FIT SCADA Control

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How ?

- Using the DNP 3 protocol SCADA is provided contact points which will be able to control the Analog contact of the I/O expander which in turn activates the relay to shutting down the solar FIT via the solar inverters
- In addition a signal will be return through a digital input to verify the relay has been activated

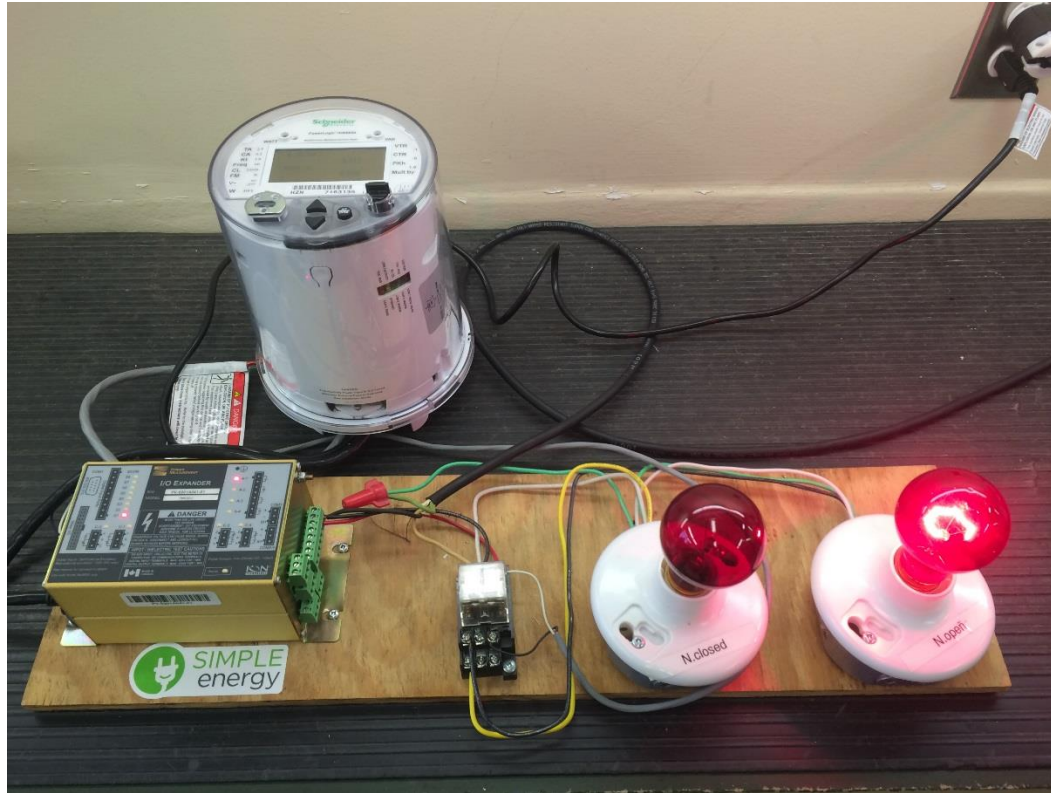
# FIT SCADA Control



Relay is de-energized in normal state



# FIT SCADA Control



Relay is energized , contact closed, inverter off and status is on

# FIT SCADA Control

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Why ?

- A Motorized disconnect switch is too costly for smaller FIT projects to justify the cost to the customer
- Only one meter is required to provide control and collection of billing data
- This equipment setup is flexible and will allow for market change rules



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Any Questions ?