



Ontario Energy Board
Commission de l'énergie de l'Ontario

Farm Stray Voltage Consultation

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Presentation

to the

47th Annual Rural Energy Conference

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OUTLINE

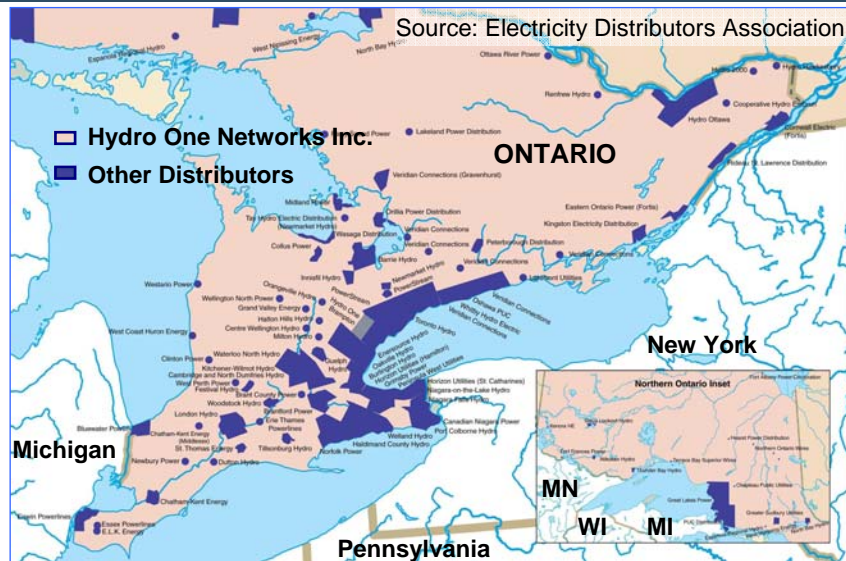
- Background: Regulation of Electricity Distributors in Ontario
- The Board's Farm Stray Voltage initiative
- Main elements of a regulatory framework
- Questions



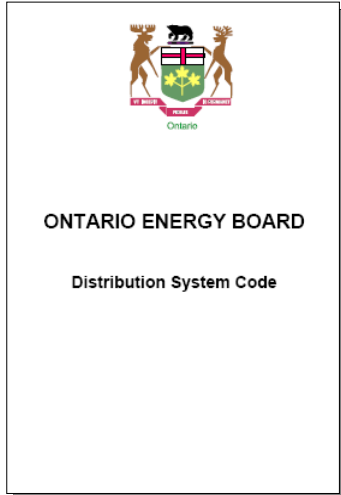
REGULATION OF ELECTRICITY DISTRIBUTORS IN ONTARIO

- **The Ontario Energy Board (the Board)**
 - protects the interests of Ontario consumers with respect to prices and the adequacy, reliability and *quality of electricity service* (the Board also regulates gas utilities)
 - promotes economic efficiency and cost effectiveness in the generation, transmission, distribution, sale and demand management of electricity and facilitates the maintenance of a financially viable electricity industry
- The Ontario **Electrical Safety Authority (ESA)** administers and enforces *safety* codes and standards regulating the use of electricity and electrical equipment in Ontario

Electricity distributors in Ontario



ONTARIO electricity distribution system standards



The Board's ***Distribution System Code*** (the "Code") provides rules for distribution system operations and the provision of electricity service to customers; e.g.

- distributors must establish Conditions of Service
- Conditions of Service must include the *quality of electricity service* standards according to which the distributor's system is designed and operated
- Conditions of Service must be filed with the Board

THE BOARD'S FARM STRAY VOLTAGE INITIATIVE

Directive from the Ontario Minister of Energy:

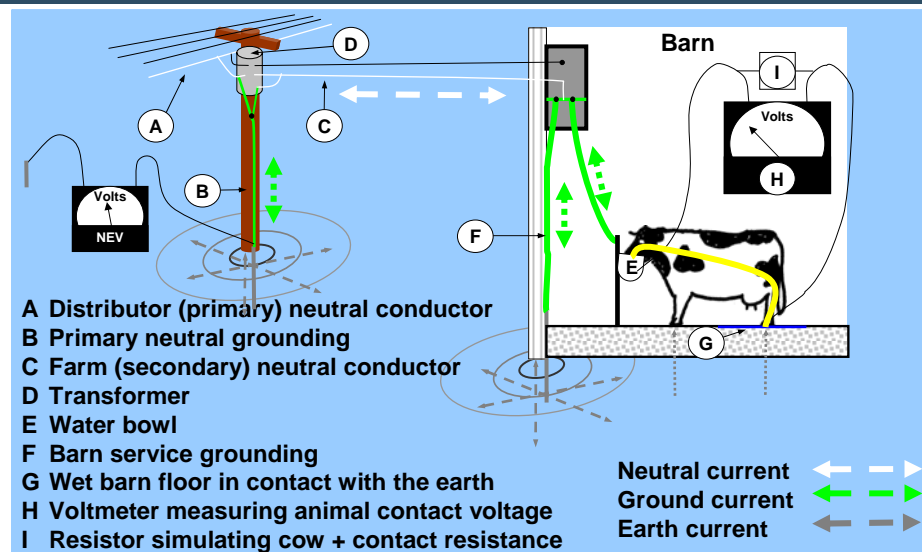
The Board shall implement such measures which, in its own discretion, having regard to the objective related to provided for under paragraph 1(1) 1 of the Act, are necessary to ensure electricity service to farm customers, in relation to "tingle" or "stray" voltage, is of a quality that does not unduly impact the operation of the farm.

What is 'farm stray voltage'?

Stray voltage is a difference in voltage measured between two surfaces that may be contacted simultaneously by an animal.

USDA - Agriculture Handbook 696; p. 9-4

What is 'farm stray voltage'?



THE BOARD'S FARM STRAY VOLTAGE INITIATIVE

- formed a Farm Stray Voltage Consultative Group
 - Electrical Safety Authority
 - Electricity Distributors Association
 - Ontario Federation of Agriculture
 - Ministry of Agriculture, Food & Rural Affairs
 - Hydro One Networks Inc.
 - Waterloo North Hydro
 - Ministry of Energy
- held Province-wide Farmer Consultation Meetings to hear the farm community's views
- retained Consultants
 - Reviewed literature on impact of FSV on animals
 - Reviewed approaches to regulation in Canada and U.S.
 - Reviewed cost and effectiveness of mitigation measures
- prepared a Board Staff Discussion Paper on Farm Stray Voltage
 - Look for it on our [Farm Stray Voltage web page](http://oeb.gov.on.ca) (oeb.gov.on.ca)

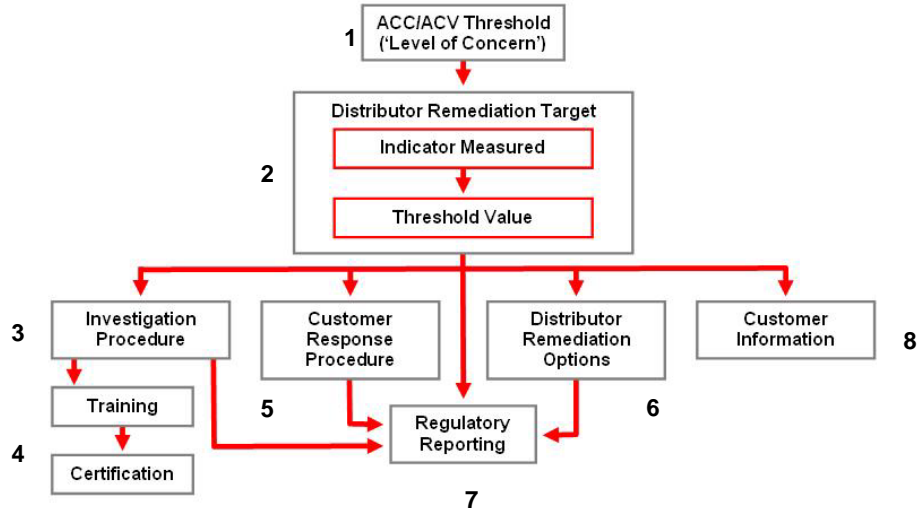


Milestones & next steps

- Consultation initiated
- Stakeholder Consultation Conference held
- Staff Discussion Paper issued/comments received
- Proposed regulatory approach issued for comment
- Distributor Investigation Procedure issued for comment
- Finalized 'Code' Amendments Issued



MAIN ELEMENTS OF A REGULATORY FRAMEWORK



1 Selecting an ACC/ACV threshold: considerations

“No single value for voltage can be considered acceptable or unacceptable because each contact situation may be different”

Doug Dorr; *Determining Voltage Levels of Concern for Human and Animal Response to AC Current*; IEEE T&D Presentation, April 2008

- The 'level of concern' depends on:
 - the objective (e.g. safety; aversion)
 - species to which it applies
 - contact scenarios - 'worst case' body and current path impedance values
 - other indicators of a 'conservative' approach
- For worker safety, contact voltages over 50 V AC are of concern
 - But to prevent cows avoiding contact locations where they eat, drink, etc. voltages must be much lower

1 Selecting an ACC/ACV threshold: proposed regulatory approach

- Where a customer provides their distributor with information that reasonably indicates that farm stray voltage may be adversely affecting the operation of the livestock farm customer's farm, the distributor is obliged to initiate an investigation
- If the investigation results reveal that either:
 - ACC on the farm exceeds 2.0 mA; or
 - ACV on the farm exceeds 1.0 V,

the distributor is obligated to conduct tests in accordance with the investigation procedure to determine whether and the extent to which the distribution system is contributing to farm stray voltage measured on the farm

2 A distributor remediation target: choosing an 'indicator'

- *Animal Contact Current/Voltage (ACC/ACV)* can arise from on-farm and off-farm sources or both, so an **indicator** is needed to signal when distributor action is required
 - An appropriate indicator should
 - have a material impact on the ACC/ACV Threshold ('level of concern');
 - be within the ability of the distributor to control; and
 - yield verifiable results
1. measured distribution system contributions to ACC/ACV?
 2. distribution system PNEV at the farm connection point?

2 A distributor remediation target: choosing a 'threshold value'

- What should the limit be for distribution system contributions to ACC/ACV?
 - distributors can only manage distribution system sources, so the distributor's threshold should be less than the overall ACC/ACV threshold ('level of concern')
- Ultimately, the choice of an appropriate threshold value must be based on what is both practicable and achieves the objective



2 A distributor remediation target: proposed regulatory approach

- Where the prescribed investigation procedure reveals that the distribution system is contributing more than 1.0 mA ACC or 0.5 V ACV to farm stray voltage on a farm, the distributor is obligated to take steps to ensure that the distribution system contribution does not exceed the threshold level



3 Investigation procedure requirements: considerations

- Where numerical thresholds are applicable, an investigation procedure (i.e. measurement, testing & analysis) is implied
- A procedure may be *recommended* if there are optional approaches, including different measuring instruments or techniques, that will yield the desired data quality and coverage
- A procedure may need to be *prescribed* if:
 - even small variations in method can make a big difference in the result;
 - the cost of procedures varies;
 - some procedures are more thorough and definitive than others;
 - or
 - results may need to be verified by re-testing.



4 Investigator training: considerations

- Specialized knowledge and experience can ensure
 - all customers receive the same quality of care
 - accurate and confirmable results
 - cost-effective investigations and remediation
 - effective remediation
- Formal training requirements; field experience; a combination?
- Prescribed or recommended?
- For all personnel involved in testing and remediation or just the personnel responsible?



4 Investigator training: proposed regulatory approach

- Distributor must make sure that persons responsible for investigating, analyzing and determining the appropriate means of addressing problems on the distributor's behalf are competent to do so
- Qualifications acquired through a successfully completed recognized training course could be one means of ensuring competence



5 Customer response procedure: considerations

- Distributors have 'default' customer response procedures
- Special procedures may be needed where:
 - Time is of the essence (prioritization is important)
 - Weather or seasonal conditions can affect investigation results
 - Distributor 'due diligence' or specific interactions with the customer must be documented
 - Other agencies are or can be involved



5 Customer response procedure: proposed regulatory approach

- Distributors with livestock farm customers must prepare, file with the Board if requested and make available on their web site or upon request, a farm stray voltage customer response procedure that describes or explains
 - how the distributor will respond to complaints or inquiries
 - how and to whom complaints or inquiries should be made
 - the types of information required by the distributor regarding the basis of the customer's concern that ACC/ACV from the distributor's system is affecting farm operations; and
 - the estimated amount of time the distributor requires following receipt of a complaint or inquiry to contact the customer to schedule a site visit



6 Distributor remediation options: considerations

- Distributor remediation choices can depend on:
 - measured performance relative to the target threshold value
 - the cause(s) or source(s) of the problem on the distributor's system
 - cost vs. effectiveness
 - potentially unique characteristics of each case
 - the condition and operation of a distribution circuit
 - safety-related codes and practices



7 Regulatory reporting: considerations

- Where numerical targets or other forms of regulation are in place, reporting helps regulators:
 - track distributor compliance and performance;
 - evaluate the effectiveness of the regulation itself; and
 - understand the evolving scope, severity and complexity of the problems that arise and any linkages that may exist with other elements of the distribution regulatory framework, like reliability and customer service standards
- Reporting efficiency and cost must be considered



7 Regulatory reporting: proposed regulatory approach

- Distributors must record, retain and provide to the Board, on request and in the form and manner required by the Board:
 - Information on FSV complaints; and
 - Information on FSV investigations, including:
 - Farm location; circuit(s) characteristics; and distance from the circuit substation and the end of the circuit;
 - test measurement values recorded in the process of conducting the investigation;
 - distribution system ACC or ACV source(s);
 - any remediation measures taken; and
 - the total cost of the investigation and of any remediation measures taken



8 Informing customers: considerations

- The better informed customers are, the better they can
 - determine who to call first (i.e. distributor or an electrician)
 - facilitate efficient and effective distributor investigations
 - better understand and facilitate distributor mitigation efforts
 - access and navigate distributor and/or regulatory dispute settlement processes

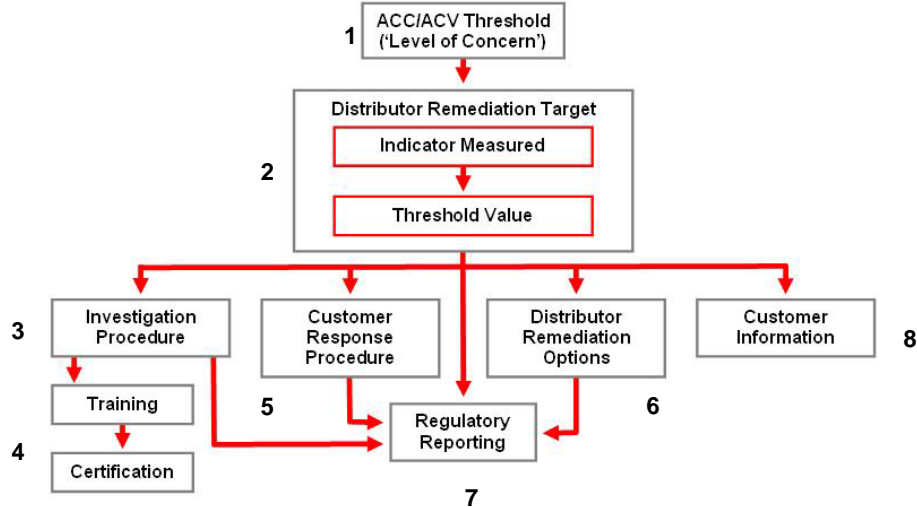


8 Informing customers: proposed regulatory approach

- At least yearly, distributors with livestock farm customers are to provide them with a “written notice” describing how they can obtain:
 - information on farm stray voltage, what causes it, and common ways of addressing distribution system contributions;
 - a copy of the distributor’s farm stray voltage customer response procedure; and
 - a copy of the distributor’s dispute resolution process
- The “written notice” can be in the form of a bill insert
- Posting the “written notice” or the information itself on the distributor’s website alone does not fulfill this requirement



QUESTIONS



Thank you

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