“NERP” — A Science-based GHG Reduction Quantification Protocol

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## Summary

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<td>Consensus of consulted experts in Canada &amp; US</td>
<td>4R N management for cultivated crops in Alberta (and Canada)</td>
<td>Canada’s National Inventory Method and Reduction Modifiers for direct and indirect N₂O.</td>
<td>3-year historical average for each crop type per unit crop produced</td>
<td>Implement 4R N management with Accredited Professional Advisor</td>
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<td>Standards-setting process, integrating iterative learnings in Alberta Offset System</td>
<td>4R framework is universal, but quantification and BMPs tuned to regional crops and conditions.</td>
<td>Method addresses variation of soil, topography and climate in Canada. But, uses scale which allows verifiability.</td>
<td>Output-based intensity approach facilitates comparison of baseline and project.</td>
<td>Implement at selected performance level, increasing in degree of landscape-directed management</td>
<td>4R-based training program for professional advisors to streamline project implementation and verification.</td>
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Process and Scope

• Broad-based consensus of experts according to ISO 14064-2
  • Extensive documentation to provide background was provided to experts (from Canada and USA, n=25 to 50, depending on phase of development) — decisions in process can be documented.
  • Experts achieved 80% agreement on all elements of NERP.
  • Expert = MSc or greater in relevant science (soils, agronomy, etc.)

• All sources of nitrogen accounted in quantification and documentation
  • Required by IPCC, Canada’s Tier II method, and ISO 14064-2.
  • Includes fertilizer, manure / compost, crop residues.
Quantification — Nitrogen Rate

• Reductions related to N rate decrease
  • Based on data from many observations (n=72) across the climatic region
  • Linear equation (Tier II) accounts for regional differences, but estimated emissions are comparable to Tier I
  • Ecodistrict-level emission factors address local moisture regime, soil texture, topography, etc.
Quantification — Nitrogen Management

• Reductions related to N management change
• Reduction Modifiers (RM) represent consensus of expert judgment.
  • Conservative — assigned according to reduction potential for single BMP (must use suite of BMPs).
  • Reduction Modifier (and conservativeness) justified by case study data.
  • Emissions estimated by Tier II method, then multiplied by Reduction Modifier to estimate project emissions.
• Basic RM = 0.85; Intermediate and Advanced RM = 0.75

*Reduction Modifiers used only to quantify project emissions.*
Guidance — Implementation

• Prescribe suite of practices for each performance level, with increasing degree of landscape-directed management.
• An Accredited Professional Advisor (AAP) must sign-off on baseline calculations, management plan, and post-harvest assessment.
• APA will need to be qualified to sign-off on regulatory documents in agronomic practice, and will be required to pass 20+ hour on-line training course.
• To track development of training resources, visit [www.interactivestandards.com](http://www.interactivestandards.com).
Guidance — Documentation

• Prescribe the sources of data which constitute evidence that the NERP practices have been implemented effectively.

• The prescribed data and documentation are aligned with the data and documentation needed (1) to support comprehensive management of N, and (2) to provide confidence of sustainability of management.

• The prescribed documentation, including the several points of sign-off by the APA, provide the basis of a checklist for verification.
Benefits of NERP

• Drives practice change
  • Comprehensive, professional, 4R plan advances better N management.
  • Support for NERP enhances infrastructure to continue advances in N management.

• Provides leading edge for ecosystem services
  • Documentation prescribed by NERP requires assessment of total farm N balance.
  • Documentation provides proof of claim of management to support water quality trading.
Approved Professional Advisor (APA)

• APA will sign-off on the Baseline calculation.
  • Review of the documentation for Baseline practices
  • Evaluate conclusions supported by the documentation, and
  • Attest to the accuracy of calculations.

• APA will design and sign-off on 4R plan for participating farm.
  • 4-R plan will address all fields and all crops at the performance level selected by the grower.

• APA will provide written attestation that the 4R nitrogen plan was implemented as designed.
  • Involves post-harvest assessment of activities (including responses to weather-related disruptions), of yield data and of testing results.
  • Assessment will form the basis for the next year’s 4-R nitrogen plan.
Training of APA

Training will be designed for ease of adaptation to support 4R management of N (including GHG reduction practices) in global agriculture.