

# “NERP” — Protocol ‘Plus’



The Fertilizer Institute

Nourish, Replenish, Grow

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# GHG Mitigation and Food Security

## Sustainable Intensification

### OBJECTIVE

achieve a sustainable intensification that removes greenhouse gases (mitigation), and enhances achievement of national food security and development goals.

<http://www.fao.org/climatechange/climatesmart/en/>

change, to **ensure that food production is not threatened** and to **enable economic development to proceed** in a sustainable manner.

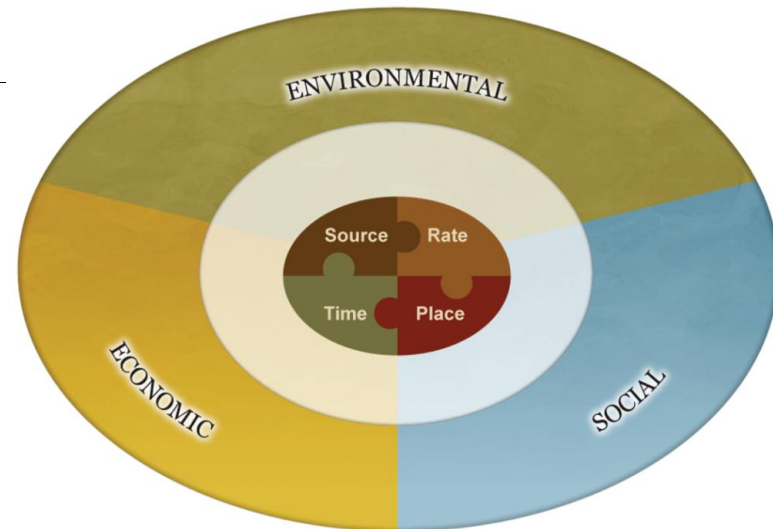
[http://unfccc.int/essential\\_background/convention/background/items/1353.php](http://unfccc.int/essential_background/convention/background/items/1353.php)





# 4R Nutrient Stewardship

<http://www.nutrientstewardship.com/index.php>



INTERNATIONAL  
PLANT NUTRITION  
INSTITUTE



CANADIAN FERTILIZER INSTITUTE  
INSTITUT CANADIEN DES ENGRAIS



# Summary



<b>Development Approach</b>	<b>Consensus of consulted experts in Canada &amp; US</b>	<b>Standards-setting process, integrating iterative learnings in Alberta Offset System</b>
<b>Scope</b>	<b>4R N management for cultivated crops in and Canada.</b>	<b>4R framework is universal, but quantification and BMPs tuned to regional crops and conditions.</b>
<b>Quantification method</b>	<b>Canada's National Inventory Method and Reduction Modifiers for direct and indirect N<sub>2</sub>O.</b>	<b>Factors based on extensive research results. Method addresses variation of soil, topography and climate in Canada. But, uses scale which allows verifiability.</b>
<b>Baseline</b>	<b>3-year historical average for each crop type per unit crop produced.</b>	<b>Output-based intensity approach facilitates comparison of baseline and project, and aligns with knowledge-based agriculture.</b>
<b>Project</b>	<b>Implement 4R N management with Accredited Professional Advisor.</b>	<b>Implement at selected performance level, increasing in degree of landscape-directed management</b>
<b>Guidance for N management</b>	<b>Prescriptive requirements for practices and documentation, which support environmental co-benefits.</b>	<b>4R-based training program for professional advisors to streamline project implementation and verification.</b>



# Protocol Characteristics — Industry ‘Must haves’

- Must provide framework for practice change.
  - Innovative nutrient management involves:
    - 4R-based practices to increase yields and enhance nutrient efficiency;
    - Management of N in balance with P, K, S, micronutrients.
  - Supporting infrastructure must provide training to farmers and advisors.
- Must provide framework for decision-making.
  - Farmers will only implement practices which make economic sense;
  - Required monitoring and record-keeping must be sufficiently comprehensive to allow cost-benefit analysis.
- Must provide framework for environmental assurance.
  - Quantification method and prescribed practices based on consensus of science (meta-analysis vetted by broad consultation with experts).
  - Required monitoring and record-keeping must be sufficiently comprehensive to support audit for environmental integrity.





# Connecting NERP to Agriculture

- Capital investment — \$ millions per farm.
- Operating costs — up to \$1000's per acre per year.
- Nutrient advisor costs — up to \$20 per acre per year.
- Offset revenues — up to \$5 per acre per year.
- Efficacy to frame infrastructure for practice change and to document environmental attributes of change — PRICELESS???

**Offset protocol assures environmental integrity of economic innovation!**

4R nutrient use,  
type of seeds, crop

**Infrastructure to implement offset protocol addresses barriers to economic innovation!**





# Value of Beneficial N Management

	CURRENT	OPTIMUM	DIFF	FUTURE
N applied (kg/ha)	146	100		144
Yield (kg/ha)	8440	8390		10980
Partial N Balance (PNB)	72%	105%		95%
Recovery Efficiency (RE)	30%	43%		55%
<b>Annual Benefits to Ontario:</b>				
Yield benefit from N use (\$M)	389	382		809
Cost of N fertilizer (\$M)	168	115		166
<b>Net Return To Grower (\$M)</b>	221	267	<b>46</b>	644

Assumption: 1 M ha, \$165 /t corn, \$1.15 /kg N

**From: Tom Bruulsema, International Plant Nutrition Institute**





# Guidance — Implementation & Documentation

- Prescribe suite of practices for each performance level, with increasing degree of landscape-directed management.
  - Implementation of protocol in harmony with emerging innovations in agronomic practice;
  - Protocol supports infrastructure to overcome barriers to practice change.
- An Accredited Professional Advisor (APA) must sign-off.
  - To become APA, professional must be qualified to sign-off on regulatory documents in agronomic practice
  - To become APA, professional must pass 20+ hour on-line course.
- The prescribed data and documentation are aligned to:
  - Support comprehensive management of N;
  - Assess economic benefits of practices; and
  - Provide assurance of sustainability ('eco-label', water quality, etc.).







# Accredited 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.
  - 4R 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 N use efficiency.
  - Assessment will form the basis for the next year's 4R nitrogen plan.



# Next Steps for NERP



- NERP used to drive change in knowledge-based agriculture.
  - Adapting NERP — Saskatchewan, Ontario (Australia, China, Europe?).
  - Farmer extension — Global Research Alliance Funding?
  - Provides basis for other nutrient initiatives in North America.
  - NERP as an element in sustainable brands, eco-labeling in North America.
- Canadian Fertilizer Institute supports implementation of the Alberta NERP (planning for roll-out in Spring 2011).
  - Train and certify Accredited Professional Advisors;
  - Fund research to refine GHG mitigation coefficients.
- The Fertilizer Institute has budget to adapt NERP to USA.
  - Select appropriate 4R practices for climate / cropping regions;
  - Adapt quantification method aligned with USDA methods / tools;
  - **Implement as part of 4R program — enhance nutrient efficiency to increase yield, to decrease GHGs, and to protect water.**

