

# Applying the Numbers for Credible Outcomes

*Sheilah Nolan, MSc, PAg*

*Climate Change Specialist  
Agriculture and Rural Development  
Edmonton*

April 14, 2015

# Overview

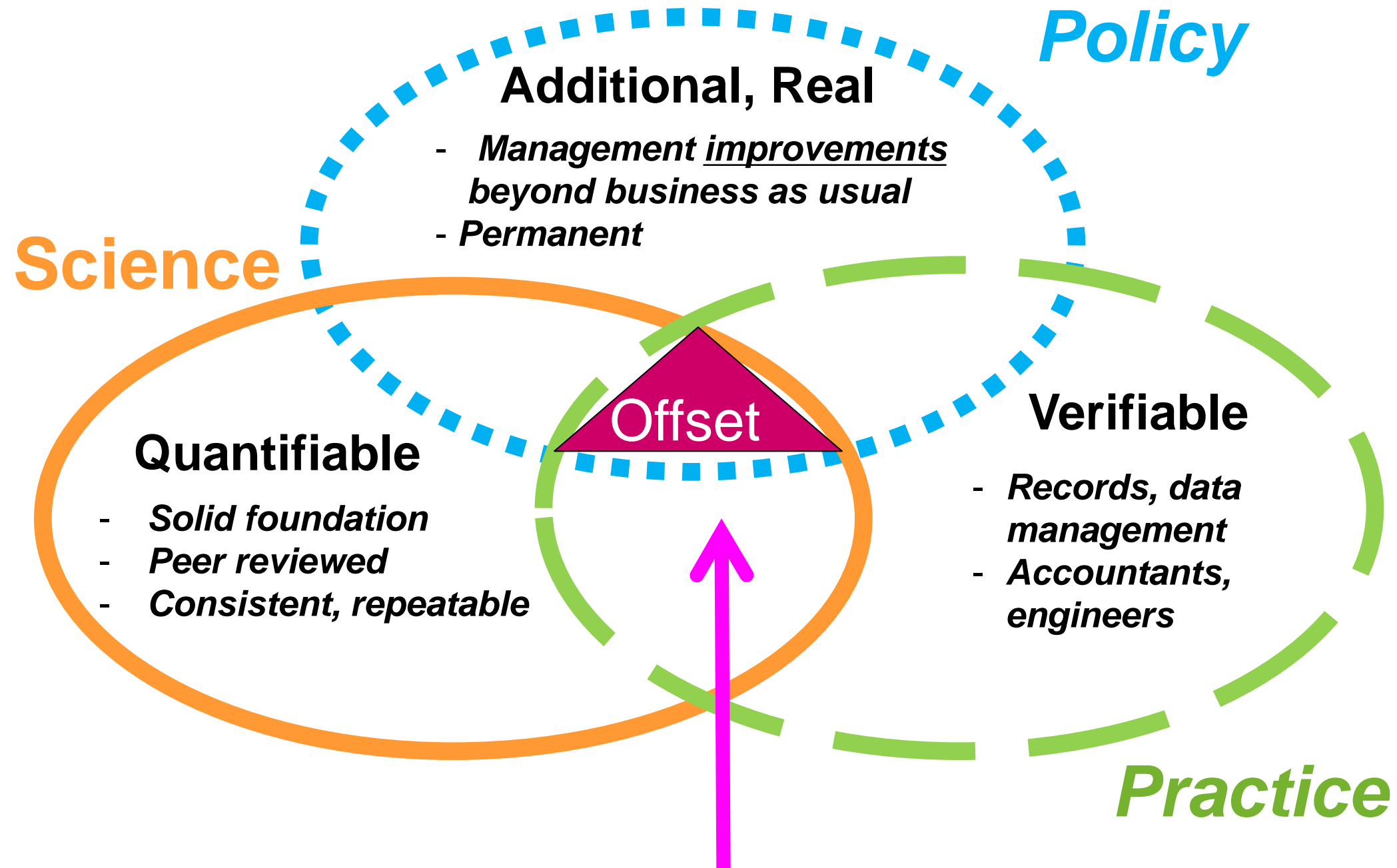
---



- 1) Site specific measures of carbon change are highly variable, expensive, and limited
- 2) Estimating impacts of management changes requires extrapolation beyond measured conditions
- 3) Calibrated models provide a means to systematically estimate change factors
- 4) Credibility influenced by: quality of measurements, expertise, peer review
- 5) Collaboration is key to assurance

# Alberta's Regulated Offset System

---



# Standardized Approach: Offset Quantification Protocols

- Follows ISO 14064 - 2 process
- Internationally compatible, standardized
- Based on most recent science, conservativeness, technical review
- Quantify emission factors and calculations to track practice change
- Describes monitoring and verification
- Reduces costs by prescribed process
- Assured by government approval of protocols, 3rd party verification, Alberta Emissions Offset Registry (CSA)
- Provides stability, certainty about GHG tonnes reduced

## Agricultural Carbon Offsets

INFORMATION FOR ALBERTA'S OFFSET MARKET

Tillage System Management

### EARNING CARBON OFFSETS THROUGH TILLAGE MANAGEMENT

Agricultural producers can use this protocol to broaden the benefits they receive from reduced tillage practices, by qualifying for carbon offsets under the Alberta Offset System.

Alberta has introduced three of its most significant pieces of legislation to North America that give agricultural producers new ways to benefit from helping to reduce greenhouse gas emissions. The result is the Alberta Offset System, which includes a number of protocols producers can follow in order to earn carbon offsets from documented improvements to practice changes. These may include:

- reduced tillage practices, such as a no-tillage system, or a reduced tillage system, or a no-tillage system, or a no-tillage system.
- reduced tillage practices, such as a no-tillage system, or a reduced tillage system, or a no-tillage system.

The focus of this protocol is for producers to reduce their amount of tillage. This can mean shifting portions of their land from a full-tillage system to a reduced tillage or no-tillage system, or from a reduced-tillage system to a no-tillage system. The more land in a lower tillage system, the greater the number of carbon offsets a producer can earn under the Alberta Offset System.

Offset agreement will be an additional income for producers in the short term. Documenting and verifying practice change by meeting protocol requirements can also open the door to greater opportunities in the future. Best practices and market potential for environmental goods and services in this area are expected to continue to improve and expand.

**KEY DETAILS**  
The key details of this protocol fall into several categories.

**Main requirements**

- Producers must document, verify and report carbon offsets based on creating 'before' and 'after' practice change that results in lowering of greenhouse gas emissions. In this tillage protocol, coefficients were adjusted to allow early adopters to participate in the offset market as early proof of the reduced tillage practice is required.

Tillage Change	Before	After
(1) No-till	(7100a / ha yr)	(7100a / ha yr)
NT	0.00	0.00
RT	0.00	0.00
(2) Dry Farm	0.00	0.00
DF	0.00	0.00
RT	-0.00	-0.00

A more complete table including economic factors is available in the full protocol.

Note: After January 1, 2012, updated coefficients will reduce credit potential due to increased in adoption levels of reduced tillage.

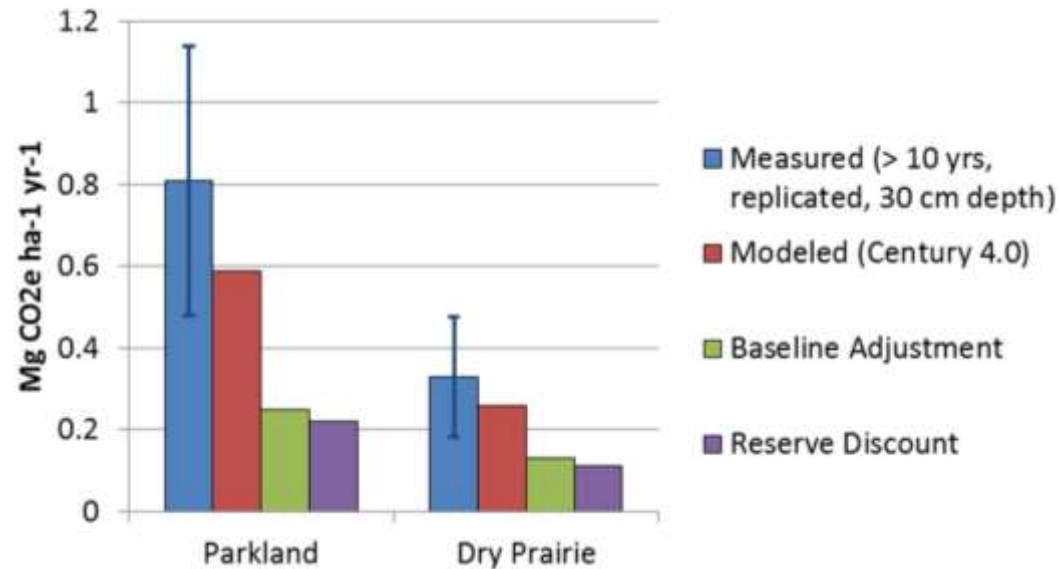
## QUANTIFICATION PROTOCOL FOR CONSERVATION CROPPING

Version 1.0 | March 2012

Specified Gas Emissions Regulation

# Example: Soil Carbon Change Factors

---



- 38 prairie studies measured carbon change due to Full Till vs No Till management, but only 13 of quality to calibrate Century
- Modelled results of variations in representative conditions at soil landscape polygon scale
- Regional management change factors estimated from aggregate
- Adjustments to account for baseline adoption and reversals

# Success Factors



## Sound Science Basis

- Research on sequestration rates
- High quality data to calibrate Century model
- Experts applied Century to model specific estimates, rolled up to regional change factors (McConkey and 23 others, 2007)
- Results accepted in literature (Vanden Bygaart et al. 2008, Can. J. Soil Science), National Inventory Report (Environment Canada, 2014)

## Practice

- Enabled use of records (not measures) to demonstrate improvement
- Role of professional agrologists to sign-off on farm evidence
- New business of aggregation to compile and verify records

# Challenges.....

---



## High uncertainty and variability, requires

- ✓ Commitment - many years to build knowledge base
- ✓ Funding - amounts, stability
- ✓ Expertise – dedicated careers
- ✓ Consistency - compare between studies, e.g. how address repeated samples? which measures - horizon vs depth ?
- ✓ Integrate new knowledge/ technology, e.g. GPS, indicators

## Management characterization, requires

- ✓ Records – lack at farm-scale, cost, verification, compliance
- ✓ Generalization to level where farm-scale records make sense
- ✓ Many farms to make project, agricultural GHGs are diffuse

## Knowledge gaps

- ✓ Rates of reversal, equilibrium.....