Applying the Numbers for Credible Outcomes

Sheilah Nolan, MSc, PAg

Climate Change Specialist
Agriculture and Rural Development
Edmonton

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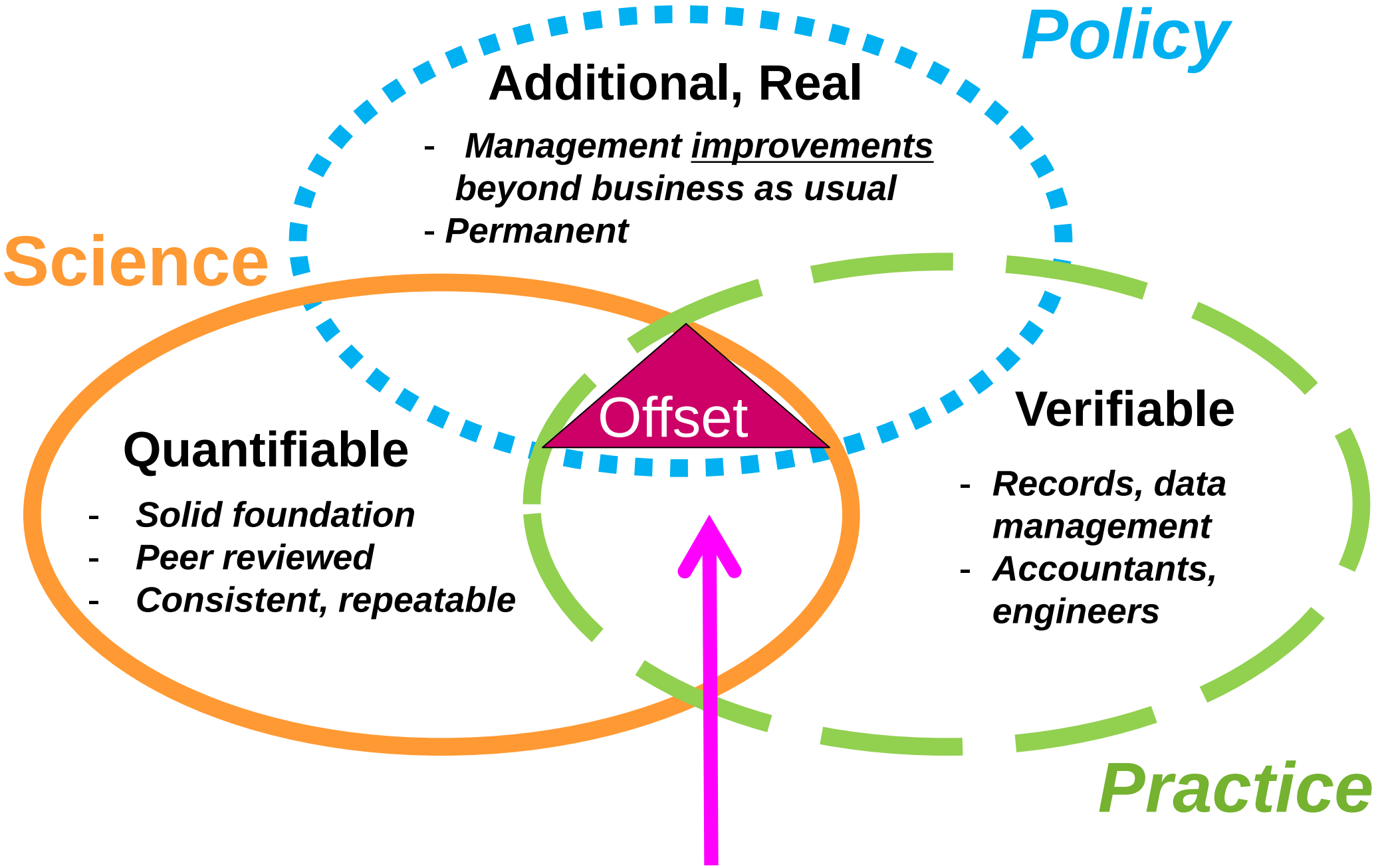
Overview

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

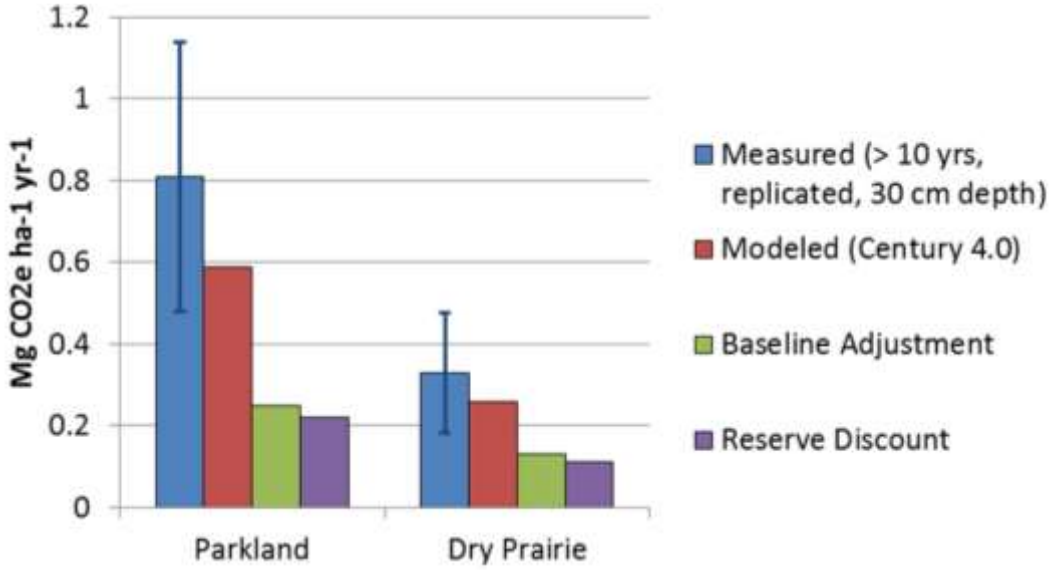
Alberta's Regulated Offset System



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

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….