Establishing a Carbon-Neutral Goal for Monsanto Company by 2021

Michael Lohuis, Ag Environmental Strategy Lead
ACES Conference, Jacksonville, FL (Dec. 6, 2016)
Monsanto’s Carbon Neutral Commitment: (Dec. 1, 2015)

• Monsanto commits to achieve a carbon-neutral footprint across its entire operations by 2021
  – Continue to reduce GHG emissions intensity in operations
  – Drive carbon neutral cropping in seed production operations
  – Support the adoption of carbon neutral cropping practices with through collaboration with its farmer customers in exchange for associated carbon reduction values
  – Develop transparent framework for carbon accounting, reporting and verification
Why make this commitment?

• Climate change is bad for environment & business*
• Adaptation is not enough
• Corporate responsibility
• Competitiveness and new opportunities

*Food security is #1 and Climate change is #4 on list of top global challenges by World Economic Forum
What is the Path to Carbon-Neutral Agriculture?

- **Reduce emissions intensity**
  - Precision Ag, N_inhibitors manufacturing improvements, fuel eff.

- **Build soil carbon**
  - reduced till, no-till, cover crops, carbon sinks

- **Purchase offsets**
  - Voluntary carbon markets

- **Avoid deforestation**
  - sustainable intensification + prevent land use change
Visualization of Life Cycle Assessment on a "Cradle-to-Farm Gate" Basis

System Boundary: Atmosphere + Soil
Visible Soil Erosion after one storm

No-Till
Double Crop in Wheat Residue

0.20 tons/ha

Tilled
Single Crop Soybeans

29 tons/ha

Courtesy of: Dr. Blake Brown, UT Milan REC

Summary

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>50 Year Yld Ave:</td>
<td>170</td>
<td>bu/acre</td>
</tr>
<tr>
<td>50 Year Yld STD:</td>
<td>38</td>
<td>bu/acre</td>
</tr>
<tr>
<td>Profit Average:</td>
<td>$47</td>
<td>$/acre</td>
</tr>
<tr>
<td>Profit STD:</td>
<td>$235</td>
<td>$/acre</td>
</tr>
<tr>
<td>Years Profitable Ave:</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Years Profitable STD:</td>
<td>14</td>
<td></td>
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<tr>
<td>Percentage of Field Profitable:</td>
<td>74%</td>
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Analysis by AgSolver Inc.
Subfield Financial Analysis: Release Acres

- Profits doubled by not farming 3-15%
- Profit STD cut in half
- Invest in best acres
- Limit inputs for rest
- Unprofitable acres become “Eco-Acres”?

**Summary**

- Discontinue ops on areas with avg. loss > $250/acre with risk adjusted insurance premiums and int. rates

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
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<tbody>
<tr>
<td>Profit Average:</td>
<td>$76/acre</td>
</tr>
<tr>
<td>Profit STD:</td>
<td>$124/acre</td>
</tr>
<tr>
<td>Percentage of Field Profitable:</td>
<td>72%</td>
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<tr>
<td>Percentage of Field Used Profitable:</td>
<td>81%</td>
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Reaching Scale

On-Farm Challenges
• Practice change costs/risks
• Data access & privacy

Industry Needs
• Harmonized GHG accounting
• Efficient GHG quantification
• Low-cost verification
• Business synergy
2016 USDA-NRCS Conservation Innovation Grant: Scalable On-Farm GHG Reductions & Water Quality Improvements: Development and implementation of an economical and verifiable insetting and accounting framework

**Awardee:** National Corn Growers Assoc / Soil Health Partnership

**Partners:** Monsanto, AgSolver, Applied GeoSolutions, DNDC-ART, Climate Smart Group and CropGrowers LLC

**CIG Project Deliverables:**
- Carbon accounting and insetting framework
- Documentation of water quality modeling metrics
- Low-cost, low-touch verification system
- Integration of precision business planning
- On-farm demonstration (Soil Health Partnership)

**Prerequisites:**
- Standardized GHG metrics, terminology and accounting methods
- Scientific support for model-based quantification of GHG reductions
The Carbon-Neutral Collaborative

**Challenge:** To achieve net GHG neutrality via reducing direct GHG emissions, storing soil carbon and avoiding indirect GHG emissions

**How?** This collaboration of experts is helping industry in the goal of achieving carbon-neutrality. Their expertise in GHG reduction, quantification and verification will help develop a path to GHG mitigation at an industry scale.

**Benefits:**
- climate change mitigation
- climate resilience
- improved soil health
- reduced soil erosion
- improved water quality
- ecosystem services
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