THE HEALTHY SOILS INITIATIVE
Technical and Scientific Considerations

March 9, 2016

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Science Advisor to the Secretary
Manager of Environmental Programs
Office of Environmental Farming and Innovation
Claire Chenu: ‘Take a closer look at the earth beneath your feet’ Claire Chenu speaks with authority and conviction when it comes to soils.

Solving real-world problems in the agricultural, environmental, and human sciences to produce a better world, healthier lives, and an improved standard of living for everyone.

International Ranking
Agriculture and Forestry
Soil Health

- Improved Water Quality
- Reduced Sediment Erosion and Dust
- Improved Plant Health and Yields
- Water Retention
- Reduced Salinity
- Reduced Fumigant and Synthetic Inputs
- Build Soil Organic Matter
- Sequester and Reduce GHGs
- Improved Water Quality
- Reduced Salinity
BUILDING SOIL ORGANIC MATTER

Establishing Demand (CDFA)
- Incentive Program
- Demonstration Projects

Establishing Supply (CalRecycle, CalEPA)
- Building composting facilities
- Composting of Food Waste and Manure

Funding Research
- 4th Assessment for Climate Change

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Economic Potential and Climate Benefits for Carbon Sequestration on Rangelands &amp; Croplands</td>
<td>$400,000</td>
</tr>
<tr>
<td>B. Use of Composted Food Waste and Livestock Manure to Enhance Agricultural Resilience While Reducing Greenhouse Gas Emissions</td>
<td>$200,000</td>
</tr>
<tr>
<td>C. Mapping Forest Carbon for Sequestration and Adaptation</td>
<td>$500,000</td>
</tr>
</tbody>
</table>
INCENTIVE PROGRAMS

Program will be designed to provide financial incentives for farmers and ranchers to adopt management practices.

Framework will be discussed at next EFA SAP meeting in May (date to be determined).

Opportunity for Public Comment.

Since $ are from California Climate Investments Program (Cap and Trade revenues), must have GHG reductions.

In process of discussions with ARB on the methodology.
# INCENTIVE PROGRAMS

## NRCs Practice Standards for Greenhouse Gas Emission Reduction and Carbon Sequestration

<table>
<thead>
<tr>
<th>Practice Code</th>
<th>Practice Standard and Appropriated Information Sheet</th>
<th>Benefit Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>257</td>
<td>Conservation Cover Management (CVR)</td>
<td>Establishes perennial vegetation on land rates from agronomic practises increases carbon and improves from as carbon sinks.</td>
</tr>
<tr>
<td>259</td>
<td>Production and Chapel Management (PM)</td>
<td>Limiting soil disturbance improves carbon sequestration and increases carbon sequestration from soils.</td>
</tr>
<tr>
<td>261</td>
<td>Agricultural Practices (AP)</td>
<td>Single capture reduce CH4 emissions to the atmosphere and provides a stable greenhouse effect for electricity generation or as a renewable fuel.</td>
</tr>
<tr>
<td>267</td>
<td>Ranching and Grazing (RG)</td>
<td>Capture and store CH4 emissions as for energy production.</td>
</tr>
<tr>
<td>270</td>
<td>Combustion System Improvement (C)</td>
<td>Change efficiency improvements reduce air emission and direct reduce CH4 emissions.</td>
</tr>
<tr>
<td>275</td>
<td>Wildfire and Drought Establishment (WDE)</td>
<td>Establishing trees and shrubs that are managed as an ecosystem helps to store carbon through in that vegetation can serve as a renewable fuel and feedstock.</td>
</tr>
<tr>
<td>276</td>
<td>UrbanLandscaping Establishment (ULE)</td>
<td>Establishing urban landscapes accelerates carbon sinks and enhances soil carbon.</td>
</tr>
<tr>
<td>281</td>
<td>Forest and Urban Conservation (FUC)</td>
<td>Single capture and store CH4 emissions as for energy production.</td>
</tr>
<tr>
<td>282</td>
<td>Foreign and Domestic Planting Establishment (FDE)</td>
<td>Establishing trees, shrubs, and plants that are managed as an ecosystem helps to store carbon through in that vegetation can serve as a renewable fuel and feedstock.</td>
</tr>
</tbody>
</table>

## COMET-PLANNER

Carbon and greenhouse gas evaluation for NRCS conservation practice planning

Evaluate potential carbon sequestration and greenhouse gas reductions from adopting NRCS conservation practices

NRCS Conservation Practices included in COMET-Planner are only those that have been identified as having greenhouse gas mitigation and/or carbon sequestration benefit or harms. This list of conservation practices is based on the qualitative greenhouse benefit system of practices prepared by NRCS.

<table>
<thead>
<tr>
<th>Project Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>State:</td>
</tr>
<tr>
<td>County:</td>
</tr>
</tbody>
</table>

NRCS Conservation Practices - Select Your Practices(s)

- Cropland Management (3 Items)
  - Cropland to Herbaceous Cover (10 Items)
  - Cropland to Woody Cover (7 Items)
  - Grazing Lands (3 Items)

- Restoration of Disturbed Lands (6 Items)

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Adam Chambers, USDA NRCS
INCENTIVE PROGRAM

Comet-Planner

Evaluate potential carbon sequestration and greenhouse gas reductions from adopting NRCS conservation practices

NRCS Conservation Practices included in COMET-Planner are only those that have been identified as having greenhouse gas mitigation and/or carbon sequestration benefits on farms and ranches. This list of conservation practices is based on the qualitative greenhouse benefits ranking of practices prepared by NRCS.

NRCS Conservation Practices - Select Your Practice(s)

- Cropland Management (9 Items)
- Cropland to Herbaceous Cover (10 Items)
- Conservation Cover - Retiring Marginal Soils (CPS 327)
- Forage and Biomass Plantings - Full Conversion (CPS 512)
- Forage and Biomass Plantings - Partial Conversion (CPS 512)
- Herbaceous Wind Barriers (CPS 603)

http://www.comet-planner.com/
INCENTIVE PROGRAM

Comet-Planner

County: Fresno

Windbreak/Shelterbelt Establishment (CPS 380)
Windbreak/Shelterbelt Renovation (CPS 650)
Riparian Forest Buffer (CPS 391)
Hedgerow Planting (CPS 422)
Alley Cropping (CPS 311)

Approximate Carbon Sequestration and Greenhouse Gas Emission Reductions¹
(tones CO₂ equivalent per year)

<table>
<thead>
<tr>
<th>NRCS Conservation Practices (Click Practice Name for Documentation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windbreak/Shelterbelt Renovation (CPS 650)</td>
</tr>
<tr>
<td>10 ac</td>
</tr>
</tbody>
</table>

Enter Acreage

<table>
<thead>
<tr>
<th>Carbon Dioxide (CO₂)</th>
<th>Nitrous Oxide (N₂O)</th>
<th>Methane (CH₄)</th>
<th>Total CO₂-Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

http://www.comet-planner.com
INCENTIVE PROGRAM

Comet-Planner

How are your carbon sequestration and greenhouse gas emission reduction estimates calculated?

Emission reduction coefficients were derived from recent meta-analyses and reviews. Coefficients were generalized at the national-scale and differentiated by dry and humid climate zones. More information on quantification methods can be found in the [COMET-Planner Report](http://www.comet-planner.com/).

Each emission reduction is calculated using the following equation:

\[
\text{Emission reduction} = \text{Area (acres)} \times \text{Emission Reduction Coefficient (ERC)}
\]

**Emission Reduction Coefficients (ERC)**
(tonnes CO₂ equivalent per acre per year)

<table>
<thead>
<tr>
<th>Greenhouse Gases</th>
<th>Carbon Dioxide (CO₂)</th>
<th>Nitrous Oxide (N₂O)</th>
<th>Methane (CH₄)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRCS Conservation Practices</td>
<td>Windbreak/Shelterbelt Renovation (CPS 650)</td>
<td>0.21</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Recommended use of COMET-Planner**

This evaluation tool is designed to provide generalized estimates of the greenhouse gas impacts of conservation practices and is intended for initial planning purposes. Site-specific conditions (not evaluated in this tool) are required for more detailed assessments of greenhouse gas dynamics on your farm. Please visit [COMET-Farm](http://www.comet-planner.com/) if you would like to conduct a more detailed analysis.

Please contact Amy Swan (Amy.Swan@colostate.edu) for more information.
COMPOST USE

Not in Comet-Planner (yet) – No NRCS MPS yet

- Set up scientific subcommittee of the CDFA EFA SAP to determine agronomic application rates for compost so it can be included in any future CDFA incentive program
- Interagency discussion on the available nitrogen
- Results presented at last EFA SAP meeting and included white paper report for public comment
- Established public comment period from January 18th to February 12th (4 weeks)
- Received 20+ comment letters – CDFA will review and provide edited report and suggestions from EFA SAP consideration at next meeting (total 185 pages)
Scientific subcommittee thought best way to determine agronomic rates for compost is by:

- Land type
- Agricultural system
- Type of compost (C:N ratio)

CDFA conducted literature review (Kelly Gravuer, UC Davis)
Evaluated carbon sequestration potential (GHG reductions)
Evaluated available and unavailable nitrogen in compost
Sensitive ecosystems and native plant species (rangelands)
AUGUST 28, 2015 EFA SAP SUBCOMMITTEE

APPLICATION RATES

Annual crops (incorporated)
- Conventional
  - C:N ≤ 11 (Higher Nitrogen)
  - C:N > 11 (Lower Nitrogen)
- Organic
  - C:N ≤ 11 (Higher Nitrogen)
  - C:N > 11 (Lower Nitrogen)

Orchards & vineyards (not incorporated)
- Conventional
  - C:N ≤ 11 (Higher Nitrogen)
  - C:N > 11 (Lower Nitrogen)
- Organic
  - C:N ≤ 11 (Higher Nitrogen)
  - C:N > 11 (Lower Nitrogen)

Rangeland (not incorporated)
- C:N ≤ 11 (Higher Nitrogen)
- C:N > 11 (Lower Nitrogen)
<table>
<thead>
<tr>
<th>Crop Type</th>
<th>Compost Type</th>
<th>Moist Compost Application Rate (tons/acre)</th>
<th>Equivalent Dry Compost Application Rate (tons/acre)</th>
<th>% of total recommended N fertilizer represented by rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>Higher N (C:N ≤ 11)</td>
<td>3 – 5</td>
<td>2.2 – 3.6</td>
<td>7.3 – 12.1%</td>
</tr>
<tr>
<td>Annual</td>
<td>Lower N (C:N &gt; 11)</td>
<td>8</td>
<td>5.3</td>
<td>8.1%</td>
</tr>
<tr>
<td>Tree</td>
<td>Higher N (C:N ≤ 11)</td>
<td>2 – 4</td>
<td>1.5 – 2.9</td>
<td>6.8 – 13.6%</td>
</tr>
<tr>
<td>Tree</td>
<td>Lower N (C:N &gt; 11)</td>
<td>6 – 8</td>
<td>4.0 – 5.3</td>
<td>8.6 – 11.4%</td>
</tr>
</tbody>
</table>

- 15% considered a “change” by NRCS
- For program, use “equivalent dry compost application rates” - convert to actual application rates on a batch-specific basis
PROPOSED COMPOST RATES
(TO SUPPORT A CDFA INCENTIVE PROGRAM ONLY)

Annual crops (incorporated)
- Conventional
  - C:N ≤ 11 (Higher Nitrogen) 3 - 5
  - C:N > 11 (Lower Nitrogen) 8
- Organic
  - C:N ≤ 11 (Higher Nitrogen) 3 - 5
  - C:N > 11 (Lower Nitrogen) 8

Orchards/vineyards (not incorporated)
- Conventional
  - C:N ≤ 11 (Higher Nitrogen) 2 - 4
  - C:N > 11 (Lower Nitrogen) 6 - 8
- Organic
  - C:N ≤ 11 (Higher Nitrogen) 2 - 4
  - C:N > 11 (Lower Nitrogen) 6 - 8

Rangeland (not incorporated)
- Conventional
  - C:N ≤ 11 (Higher Nitrogen) 5 - 10
  - C:N > 11 (Lower Nitrogen) 15 - 30
NEXT STEPS

• Review comment letters and edit white paper document
• Present white paper to EFA SAP for consideration at May meeting
• Work with ARB to develop Quantitative Methodologies for incentive program
• Develop framework for incentive and demonstration projects and present to EFA SAP at May meeting
• Hope we get funding in July!
• Facilitate your questions and find solutions to concerns
Thanks for your attention

**Important Contacts:**
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