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# Nutrient Recovery within an AD Platform: Partitioning of Nutrient Streams and Production of Value-Added Products

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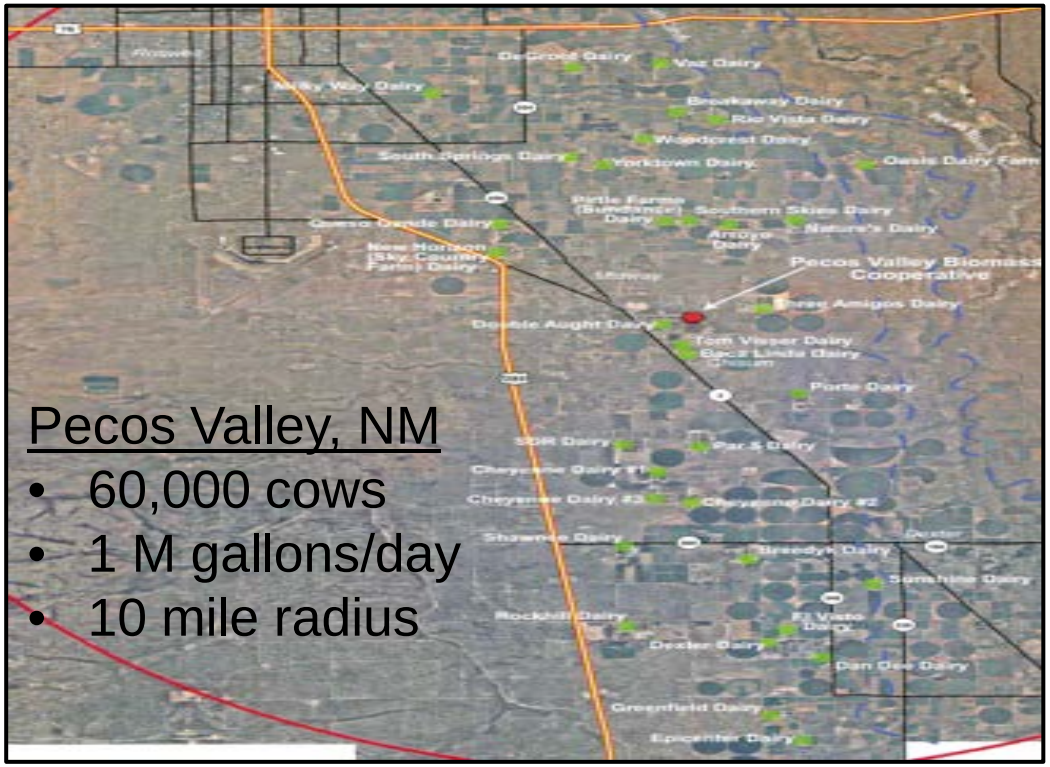
# Concentrated CAFO Regions

Due to expense of transporting liquid manure, soils nearby to *some* CAFOs have become over-burdened with phosphorus, nitrogen, and/or salts (USDA APHIS, 2005). *Some* regions now report levels in excess of national and state standards for ***PM 2.5 air quality, surface P, and groundwater nitrate***.




Pecos Valley, NM
- 60,000 cows
- 1 M gallons/day
- 10 mile radius

- Chesapeake Bay
- Mississippi River Valley
- Pecos Valley, NM
- Columbia Basin, WA
- Central Valley, CA
- Magic Valley, ID

# Take Home Message

As opposed to simply transforming a portion of organic nutrients to more bio-available inorganic form (present sales pitch), ***a paradigm shift is required—nutrients must be removed from the area.***

This can only be done by ***concentrating and partitioning a portion of the nutrients through active nutrient recovery processing***.

Thus, ***next-generation AD must be a combination of AD and nutrient recovery***; it is through this combination that serious nutrient threats are minimized and AD adoption is accelerated. ***Not AD for power, AD for environmental control, which also makes power.***

Must have a viable business plan: must be able to provide ***cost-effective technologies with viable markets and policy incentives.***

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***Co-Digestion (30% volume)***
***$210,000 + $173,000 + $150,000/year***
***(assume tipping fee, 2x biogas, 2x N, 1x P)***

30 tons N-Ammonia/year
(30% loss)

**$173,000/year @ $0.08/Kwh**

60 ft$^3$ $CH_4$/cow day

**1,000 Cow Scrape Dairy (30 gallons/cow day)**

*11 M gallons/year*
- *170 tons N/year*
- *30 tons P/year*
- *80 tons K/year*

**S/L**

115 tons N/year
25 tons P/year
75 tons K/year

3,400 tons fiber/year
@70% moisture

**$34,000/year @ $10/ton**

Install nutrient recovery technology
70% $NH_3$; 80% P; 20% K Recovery (~6:1:6)

Use Existing Lagoon Water (~2:1:2)

**Option 2**

**Agronomic application to 640 acres alfalfa**
**(25 and 180 pounds P and N/acre)**

**+**

**70 tons N-Fertilizer & 25 tons P-Fertilizer**
**($150,000 + $85,000/year)**
**(at $450/ton AS & $50/ton P-solid)**

**Option 1**

**Agronomic application to 1,250 acres corn**
**(160 pounds/acre at 2:1:2)**

**Export 56%, 83%, and 25% of N, P, K, respectively. Nutrient co-product sales at 1.6x the electricity. Halve the number of acres and fuel to apply lagoon water. More effectively use nutrients on field.**

# Contact

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