U.S. Dairy Industry's Sustainability Commitment

Business Models for
Anaerobic Digester Adoption on U.S. Dairy Farms

Renewable Energy Education Field Day

Las Cruces, NM

October 26, 2011

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Innovation Center for U.S. Dairy

Dairy Industry Committed to…

25% by 2020

GHG reduction for fluid milk

$238 million

Estimated business value across industry

1,300 Digesters

On U.S. Dairy Farms by 2020

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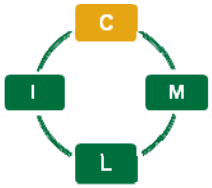
Sustainability Council



Producers

Alliance Dairies
Clauss Dairy Farms
Fair Oaks Farms
Fiscalini Farms
Foster Brothers Farm
Gar-Lin Dairy Farm
Graywood Farm
Haubenschild Farms Inc.
Maddox Dairy
Medeiros & Sons Dairy
Nobis Dairy Farms
Prairieland Dairy
Spruce Haven Farm
Stauffacher Highway Dairy
Werkhoven Dairy

Associations/ Government

DMI · NCFC · REAL · Western United Dairymen · hmpf · WDA Western Dairy Association · AFIA · USDA · CAES Center for Advanced Energy Studies · IDFA · California Milk Advisory Board · Global Dairy Platform (Knowledge · Insight · Guidance)

RUAN

LAIA · Hood · glanbia · KRAFT · Nestlé · LeprinoFoods · Stonyfield Organic · Byrne Dairy · Oakhurst Dairy · General Mills · Dean Foods · Shamrock Farms (Real Farm. Real Fresh.) · DANNON

Retailers

Kroger · RILA Retail Industry Leaders Association (Retail's Future…Educate, Innovate, Advocate) · Walmart (Save money. Live better.)

WWF · Manomet Center for Conservation Sciences · C-AGG Coalition on Agricultural Greenhouse Gases · FMI Food Marketing Institute · Sustainability Consortium

Co-ops

Land O'Lakes, Inc. · United Dairymen of Arizona · Prairie Farms · Darigold · Agri-Mark · Dairylea Cooperative Inc. · DFA Dairy Farmers of America · Tillamook Cheese (Tastes better because it's made better.) · Upstate Farms

DeLaval

American Farmland Trust

Crop Production	Milk Production	Transport	Processing	Packaging	Distribution	Retail	Consumer/Academic NGO

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USDA /Dairy Industry - Memorandum of Understanding

- ✓**USDA/Dairy Industry**
- ✓**25% GHG reduction by 2020**
- ✓**$238 million of business value**

USDA Secretary Vilsack
"*a digester per week*"
backed by
USDA grants, loan guarantees and assistance

USDA

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Digester Finance Summit

September 20, 2011

Judy Canales, USDA

Mitigating and monetizing manure is predicated on successful piloting of new business model

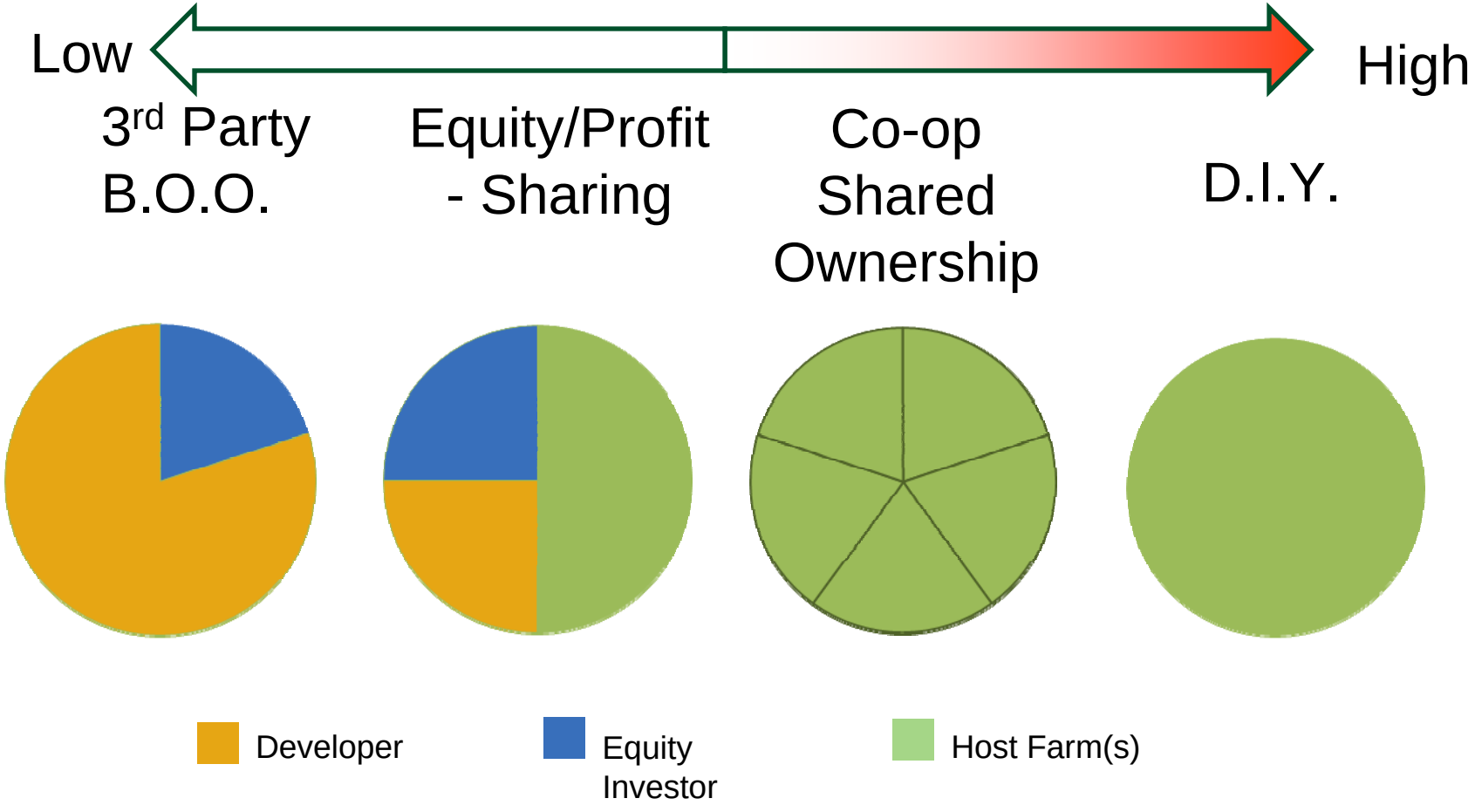
From

- ‘Going it Alone’
  - Manure only input
  - Unproven technology
  - Limited / complex external funding
  - Energy only off-take

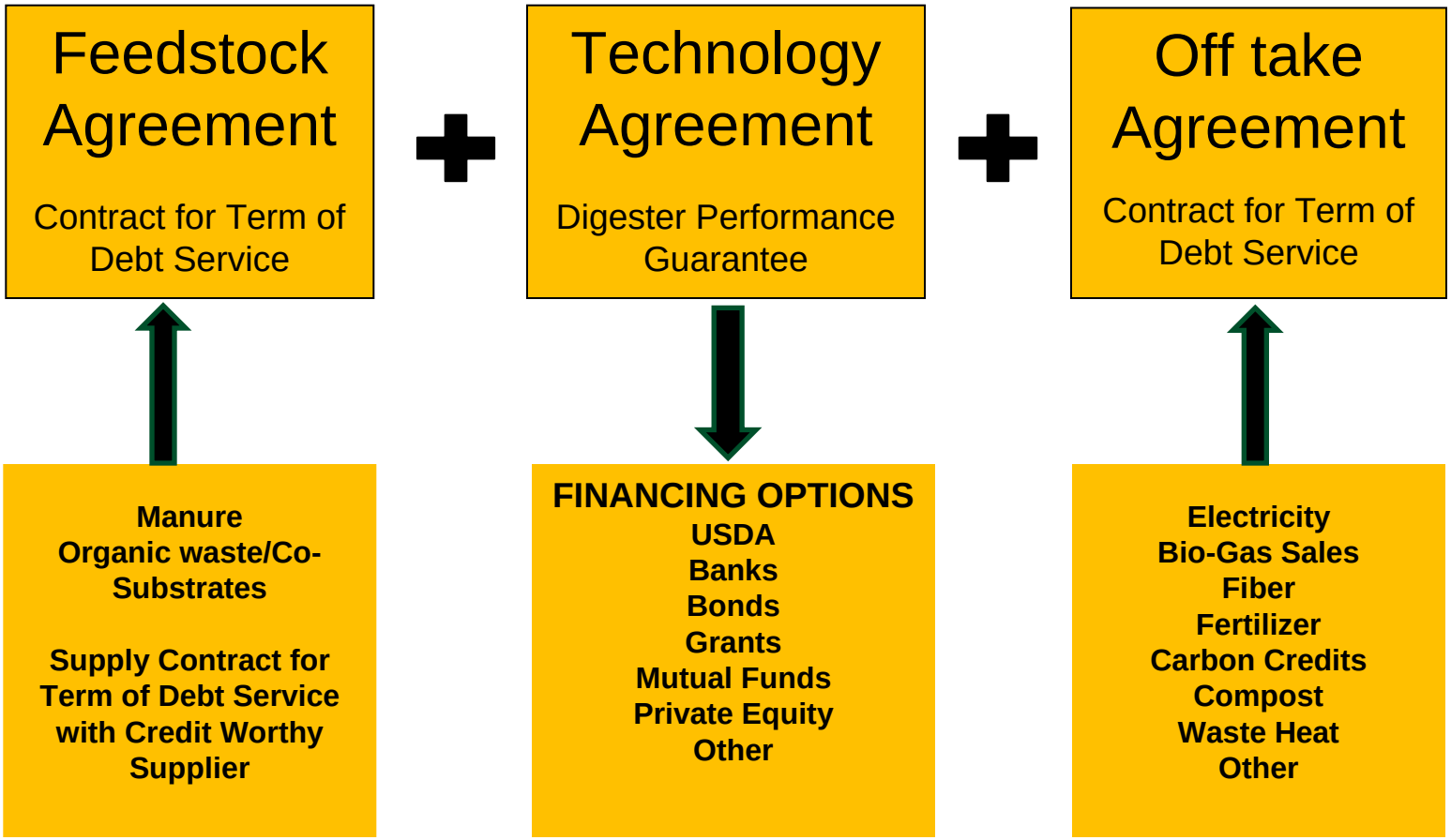
To

- ‘Quality Partnerships’
  - Manure plus substrates
  - Technology performance guarantee
  - Ample private sector funding
  - Energy plus high-value by-products
- USDA Program Support for Digester Development
- Develop Digester Business Case and Project Financing Options
- Digester Market Potential Study and National Site Analysis

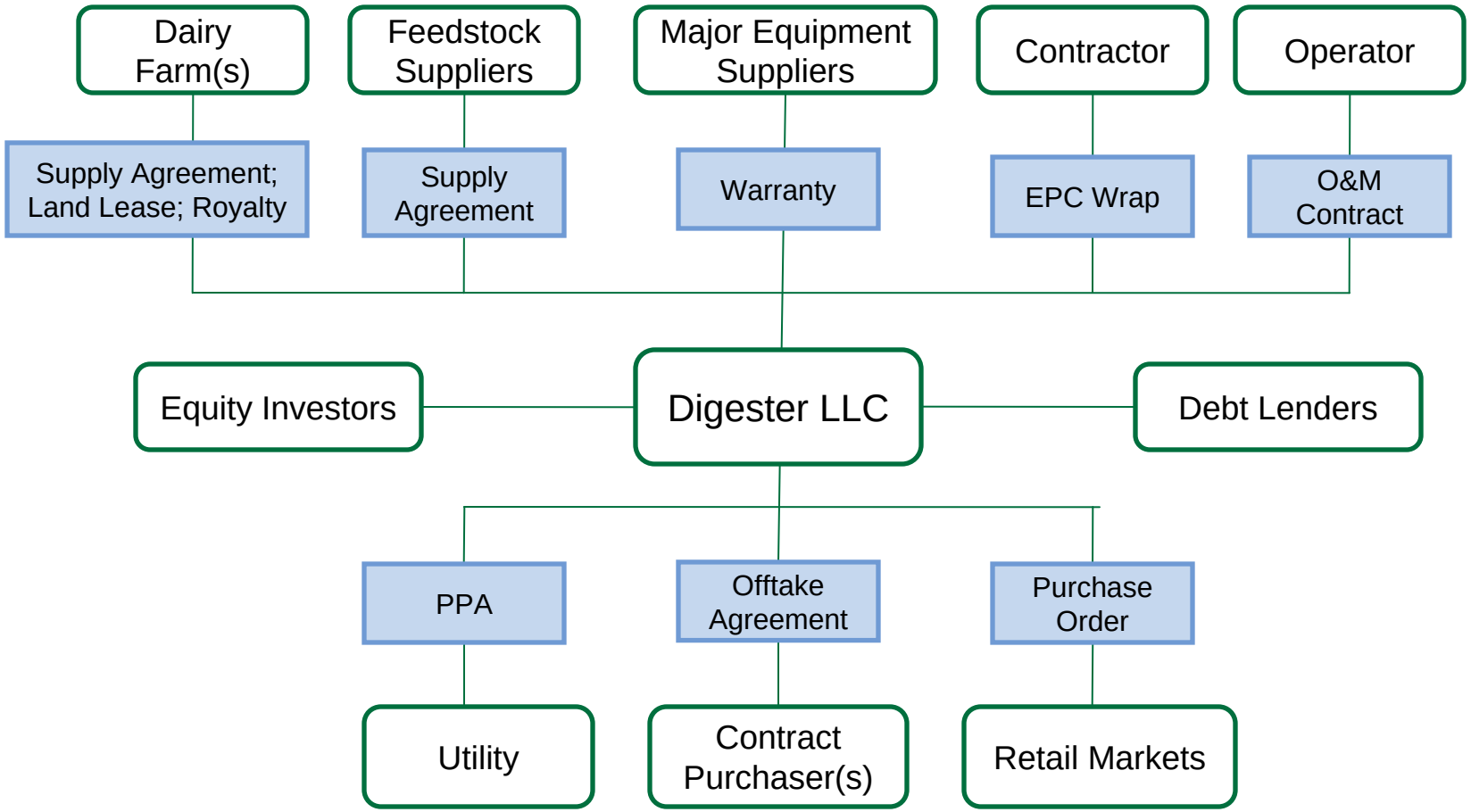
Risk to Farmer



“Project Finance” model for sustainable digester systems



The Developer-Led Model



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Adapted from Garrad Hassan, EWEA:
"Wind Energy – The Facts"

SAMPLE

A Business Model for Sustainable Dairy Digester Systems

Crop Fertilizer
$300,000 annual avoided cost

Bedding
$100,000 annual avoided cost

Clean Renewable Energy
5 million kWh to power nearly 700 homes
$400,000 annual revenue

Renewable Energy Credits (REC)
5 million RECs
$50,000 annual revenue

Carbon Offsets
11,000 tons GHG destroyed
$85,000 annual revenue

Reduce waste
Create clean renewable energy
Advance sustainable products

Anaerobic Digester
750 kilowatt system

Manure

3,000 Lactating Dairy Cows

Milk
Annual production of 60 million pounds/ 7 million gallons of milk

Organic Waste
104 tons of organic waste annually
(2 tons per week)

Rich Garden Soil Amendment
20,000 cubic yards of digester fiber
$160,000 annual revenue

Nutrient-Rich Dairy Products

For more information go to USDairy.com/Sustainability or contact InnovationCenter@USDairy.com

U.S. DAIRY SUSTAINABILITY COMMITMENT

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Values reflect Big Sky Dairy in Idaho

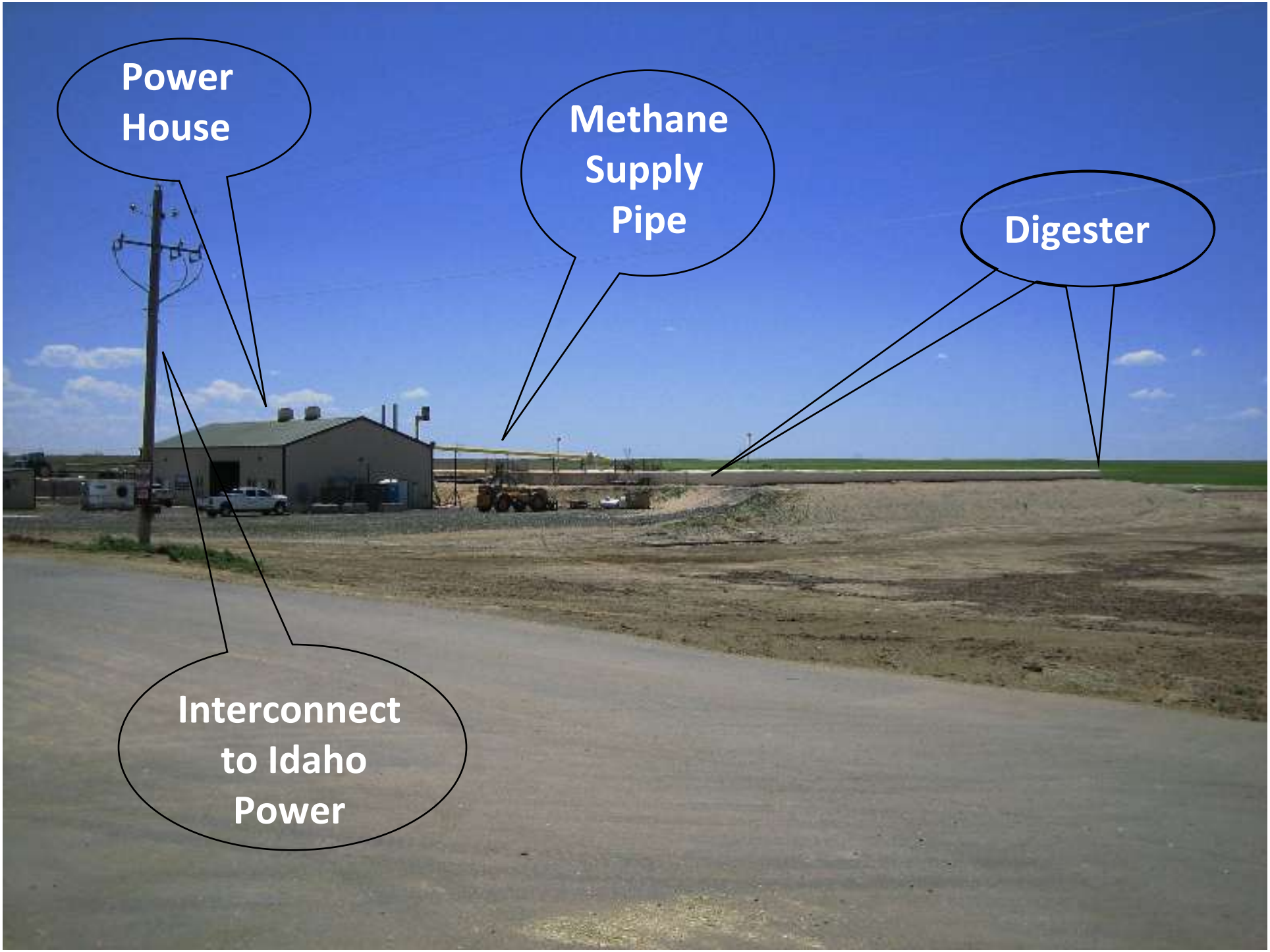
Gooding, ID
4,200 Cows
1.2 MW @ 95% CF
$6 Million project cost


Dairy feeding operation


Manure collection on cement floor to reduce dirt & contaminates

Manure washed from floor fed through gratings to slurry tank


Manure slurry supplied to the digester


Power House
Methane Supply Pipe
Digester
Interconnect to Idaho Power

Power from dual 710 kW gen-sets


Garden fiber output
from the digester


Digester effluent used as fertilizer or P-K-N separated and sold

Market Potential

Table 1. Potential for Biogas Recovery Systems at Swine and Dairy Operations

Animal Sector	Candidate Farms	Energy Generating Potential		
		MW	MWh/year	Thousands of MMBtu/year
Swine	5,596	804	6,341,527	68,710
Dairy	2,645	863	6,802,914	73,709
Total	8,241	1,667	13,144,441	142,419

6,802,914 MWh x $0.08/kWh = $544 Million

New analysis includes:

- MWh (Electricity) plus 25% substrates
- Fiber
- Nutrients (P K N)
- Carbon, RECs & RINs

Market Size 2020 = $1.9 Billion

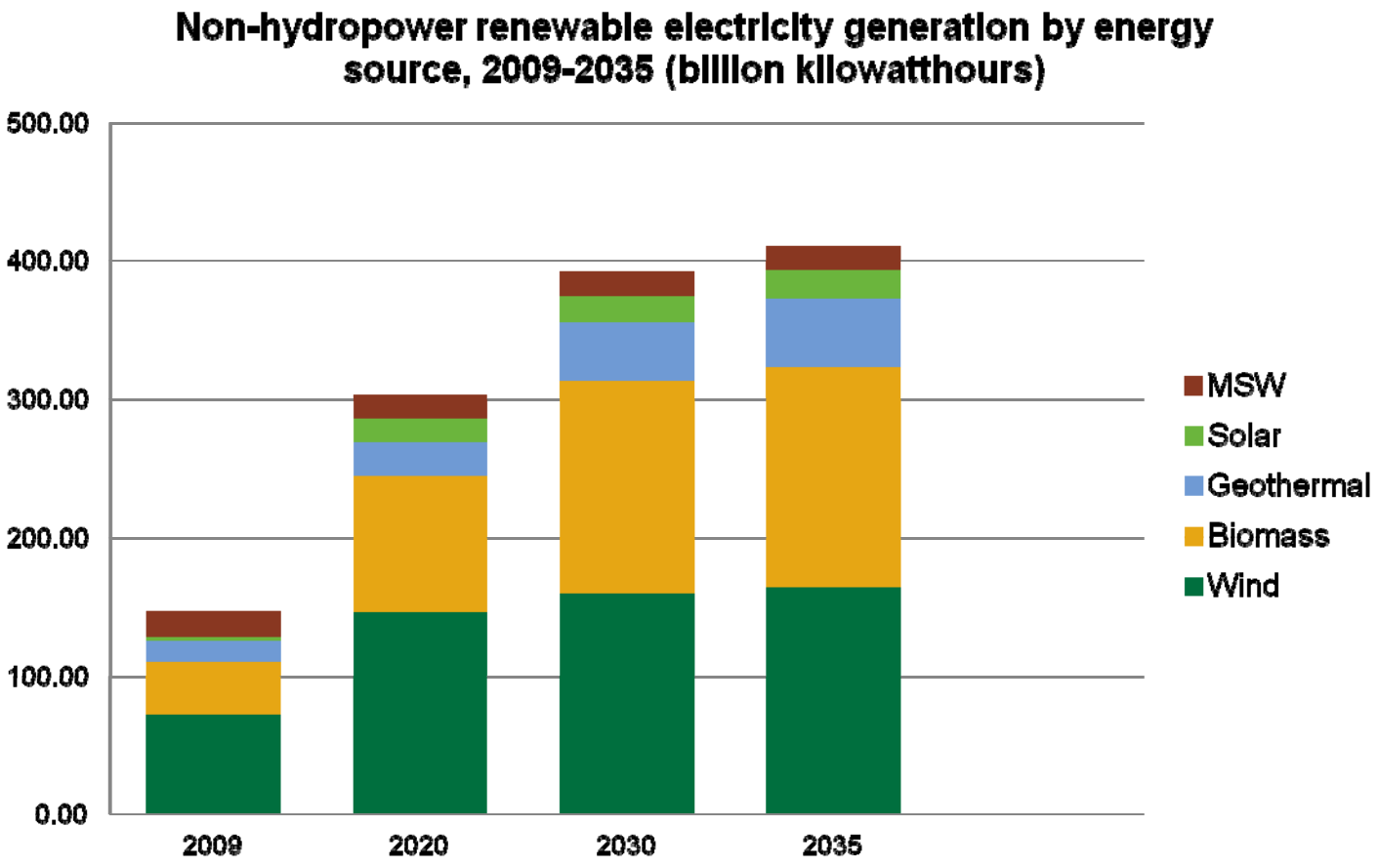
Co-Digestion Improves Economics

WASHINGTON STATE UNIVERSITY

Co-Digestion Economics

	Manure-Only	Co-Digestion
Gross Receipts	$/AU yr	$/AU yr
Tipping Fees	---	192.97
Electrical Sales	68.76	150.37
Carbon Credit	19.68	19.68
Avoided Bedding Cost	12.71	15.25
Tax Credit	27.50	60.15
Fiber Sales	31.78	38.11
Total Revenue	160.43	476.53
Role Substrate % of Revenue	---	66.3

Renewable Energy Market Potential (Billion kWh)



http://www.eia.gov/forecasts/aeo/source_renewable.cfm

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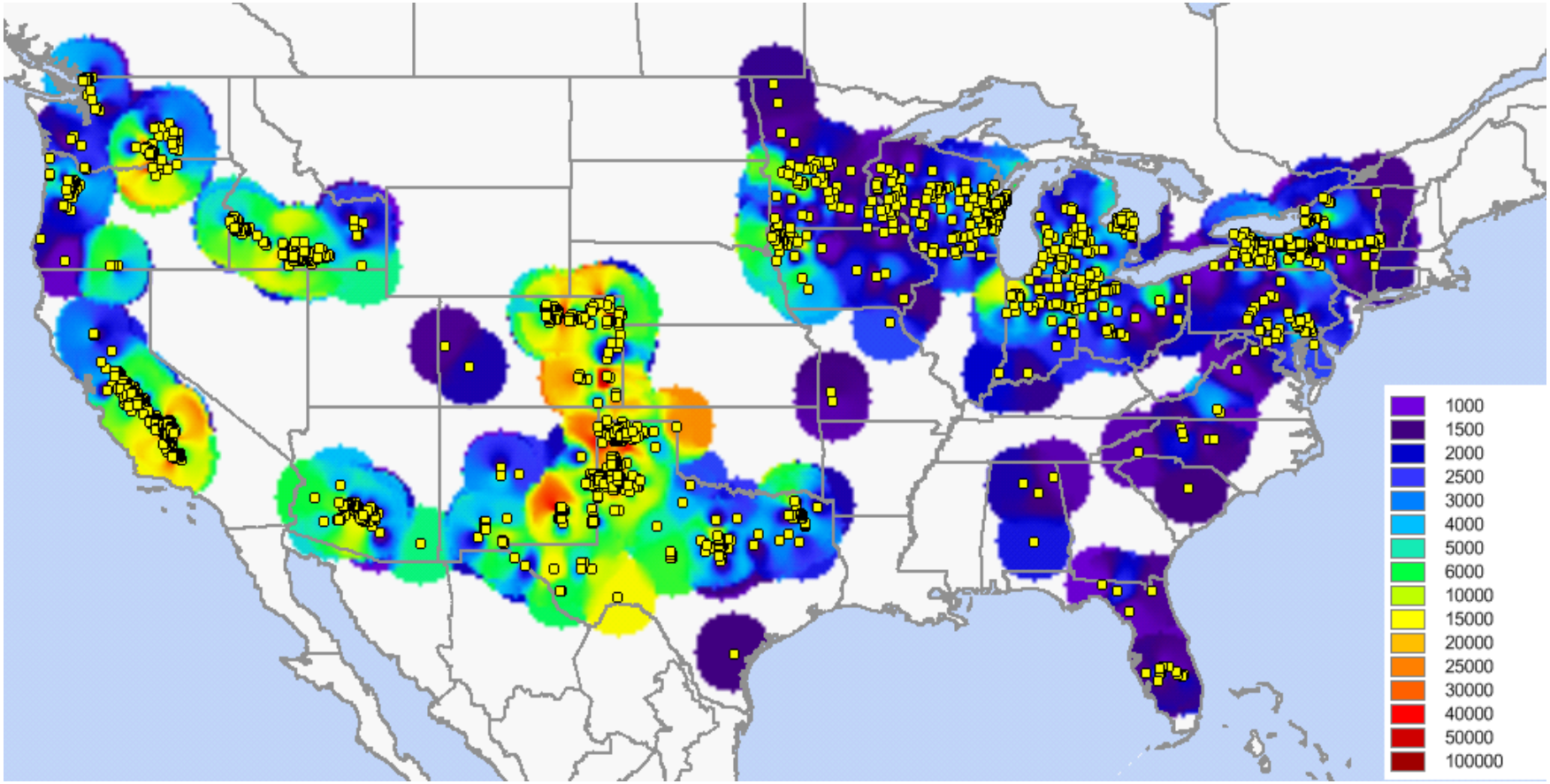
Dairy digester locations – construction potential



2,242 Dairies > 1000 Head

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Double A Dairy
Idaho
4.6 MW
15,000 cows


CAT
CAT
CAT