

Panel Discussion

MA Agreen Energy

**Animal Waste + Organic Waste =
Energy for Small Farms**

A New Model

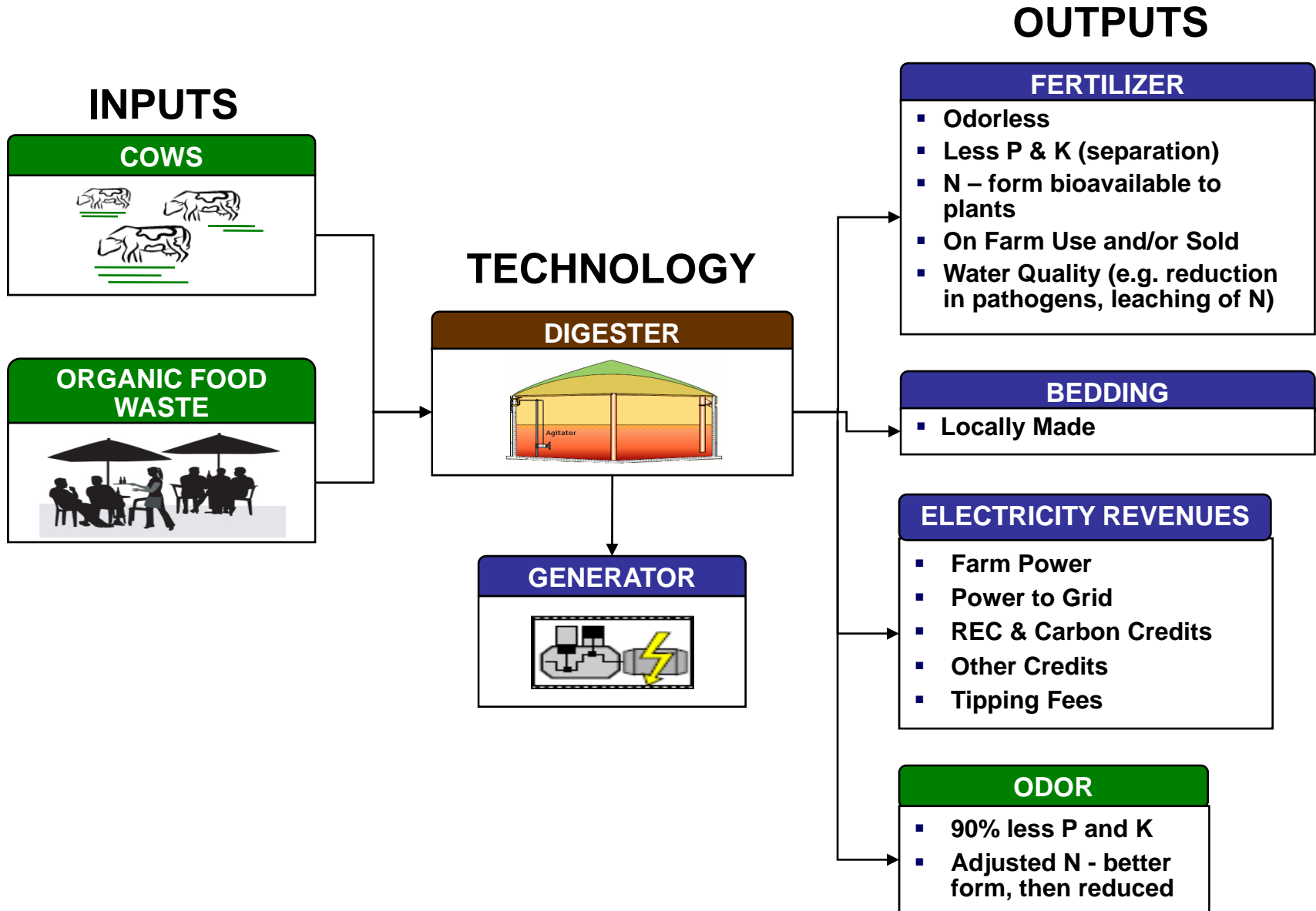
December 2008

Mansfield, MA

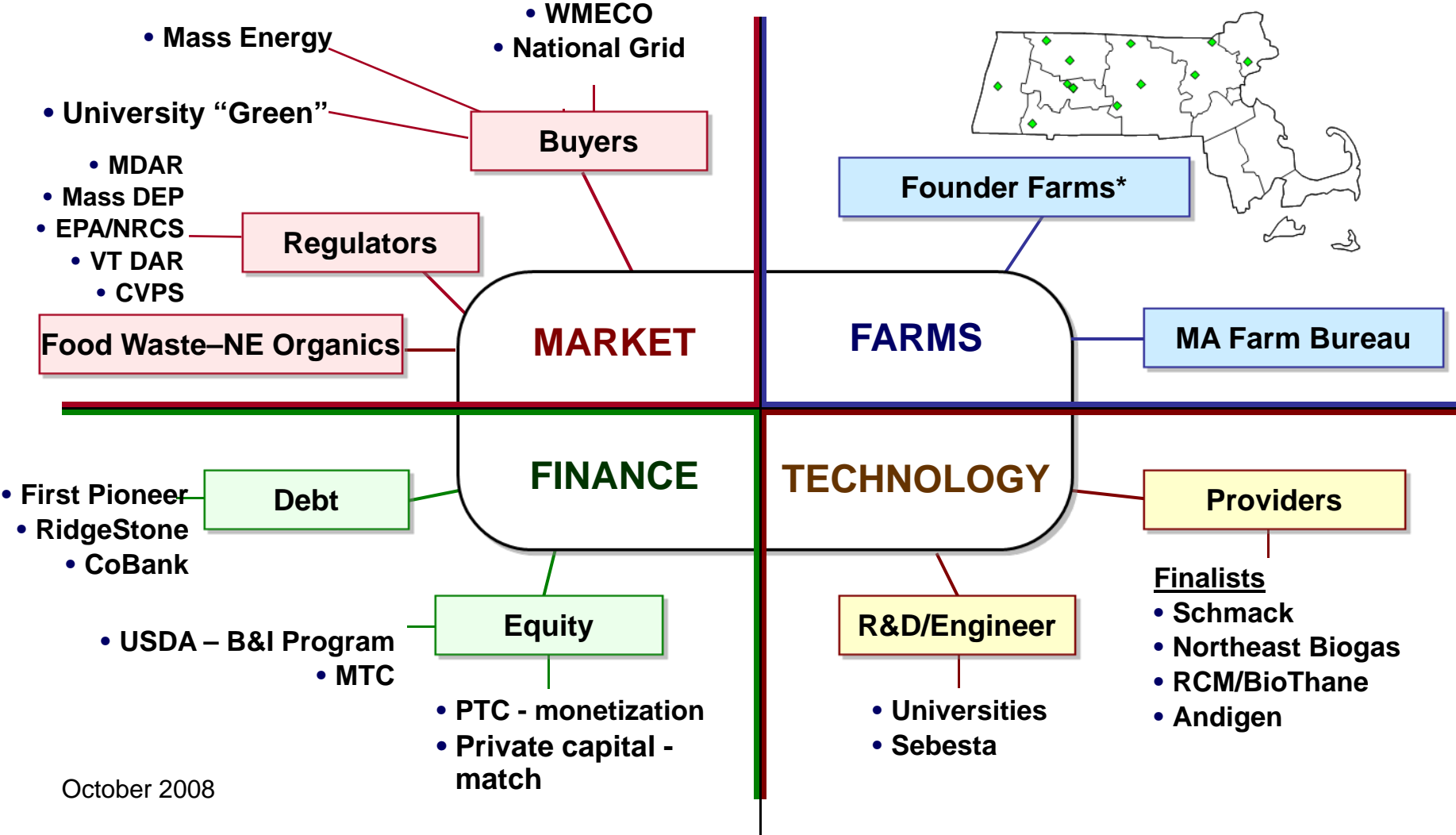
*Small farm digester on German dairy farm



Agreen Energy Project



MA has 17 collaborators for green energy



October 2008

SJH serves as a project manager and partner

What are the Benefits for Farms in the Coop?

1. Waste becomes a **cash crop**;
2. Urban organic waste **expands farm revenue**;
3. Farm **energy costs reduced 30%+** for ten years;
4. Creates **positive environmental conditions** for air and water;
5. Farmers will have another ‘crop’ to sell – **bedding and soil amendments**;
6. Potential for **Herd size increases** (contingent on permits) ;
7. Management of the AD, and sale of the energy and co-products are run remotely by professionals – **minimal workload for farmer**; and
8. **Equity** created by joining like-minded farms creates **“scale”** needed for finance/contracting utilities and long-term interest in business.

Potential for GHG Emission REDUCTION - Massachusetts

- Many dairies currently use lagoon storage
- Most food waste is landfilled



AD Benefits of MA Dairy Manure + Food Waste Are**:

- Removing emissions of **111,266** vehicles
- Planting **158,554** acres of forest
- Preventing the use of **1,349,398** barrels of oil
- Preventing the use of **63,421,693** gallons of gasoline
- Homes served – 28K to 105K
- Revenue (all farms in State) - \$35M to \$100M



*Figures do not include gas from food waste

**Assumes 100% of the farms are participating

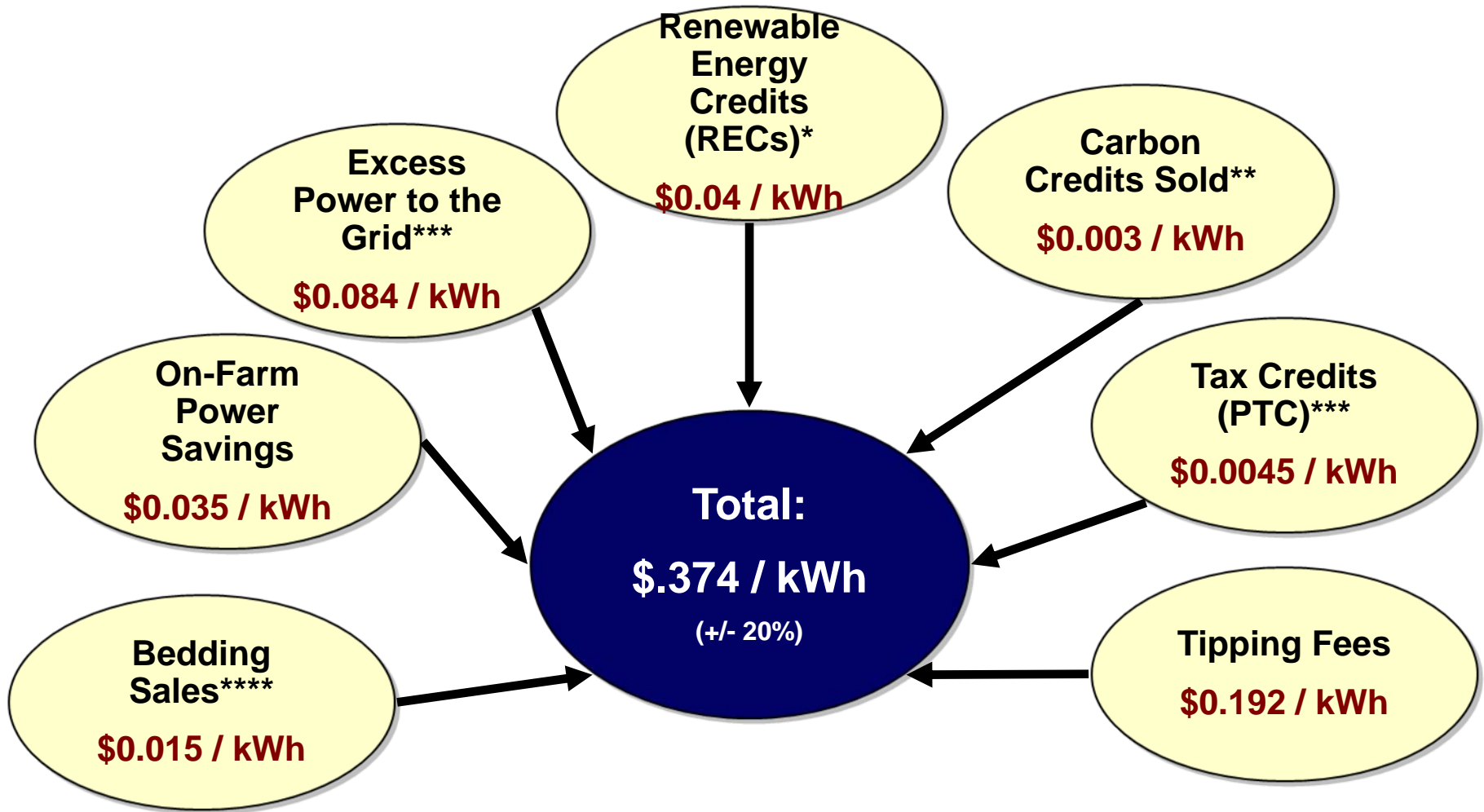
Environmental Quality Benefits – Beyond GHG

- **80-90% reduction in odor.**
- **P & K separation – depends on nutrient management plan**
- **95% decrease in effluent pathogen loads and flies.**
 - Decreases risks of bacterial contaminants reaching water supplies.
 - Better animal health conditions if wastewater is recovered to flush barns.
- **Solids recovery (bedding) captures some phosphorus and leaves an organic, nutrient-rich slurry with nitrogen in a form readily available to meet nutrient needs of crops.**
 - Slurry still must be either spread on fields or sold to greenhouses/other farms; however, it is now in a concentrated, low volume form that is easier for the farmer to manage to meet his/her nutrient management goals. Slurry
- **Decrease in nitrogen air emissions because of covered storage.**
 - Minimizes amount of ammonia deposited in nearby water bodies which can otherwise threaten water quality through acidification.

¹Quantified environmental quality benefits are dependent upon feed composition, bedding type used on-farm and type of digester technology used.

Sources: Wilkie, A. 2005. *Anaerobic digestion: biology and benefits. Dairy Manure Management: Treatment, Handling and Community Relations. NRAES-176. p. 63-72.* & Burke, D. 2001. *Dairy Waste Anaerobic Digestion Handbook. Environmental Energy Company. 54 pgs.*

Revenue Stream – MA Seven (7) Sources



* If sold without carbon credit value included

** If sold separately from RECs

*** Dependent on MA Net Metering Regulations TBD

**** Not including soil amendment sales

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Coop and LLC Structure

MA AGE LLC

Equity 50% / Debt 50%

FOUNDER COOP

- 10 farms – 100 to 250 cow units
- Estimate 0.75 MW generation capacity, 6,200 MWh a year enough to power 850 MA homes
- 2 Lead farms MTC grant \$0.6MM
- B & I Co-op equity
- Contract waste to coop – DEP loan
- Equity in Coop from outside

CO-OP ROLES / DUTIES

- 10 year animal waste supply to LLC from farm members
- Equity investment in LLC
- Virtual organization

LLC ROLES / DUTIES

- Design / build systems
- Turnkey installations
 - Flat-bed solutions
 - Professionally run remotely
 - 3 year performance guarantee
- Finance – B&I
- Outside investors
- Managing partner
- Contracts
 - Waste and Organic
 - Power – farm / sale
 - Land lease
 - REC's / carbon credits
 - Service / remote control
 - Co-products marketing
 - Research
- Crop insurance

Thank You

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