



Organics Operating System: An Integrated Approach

January 2013

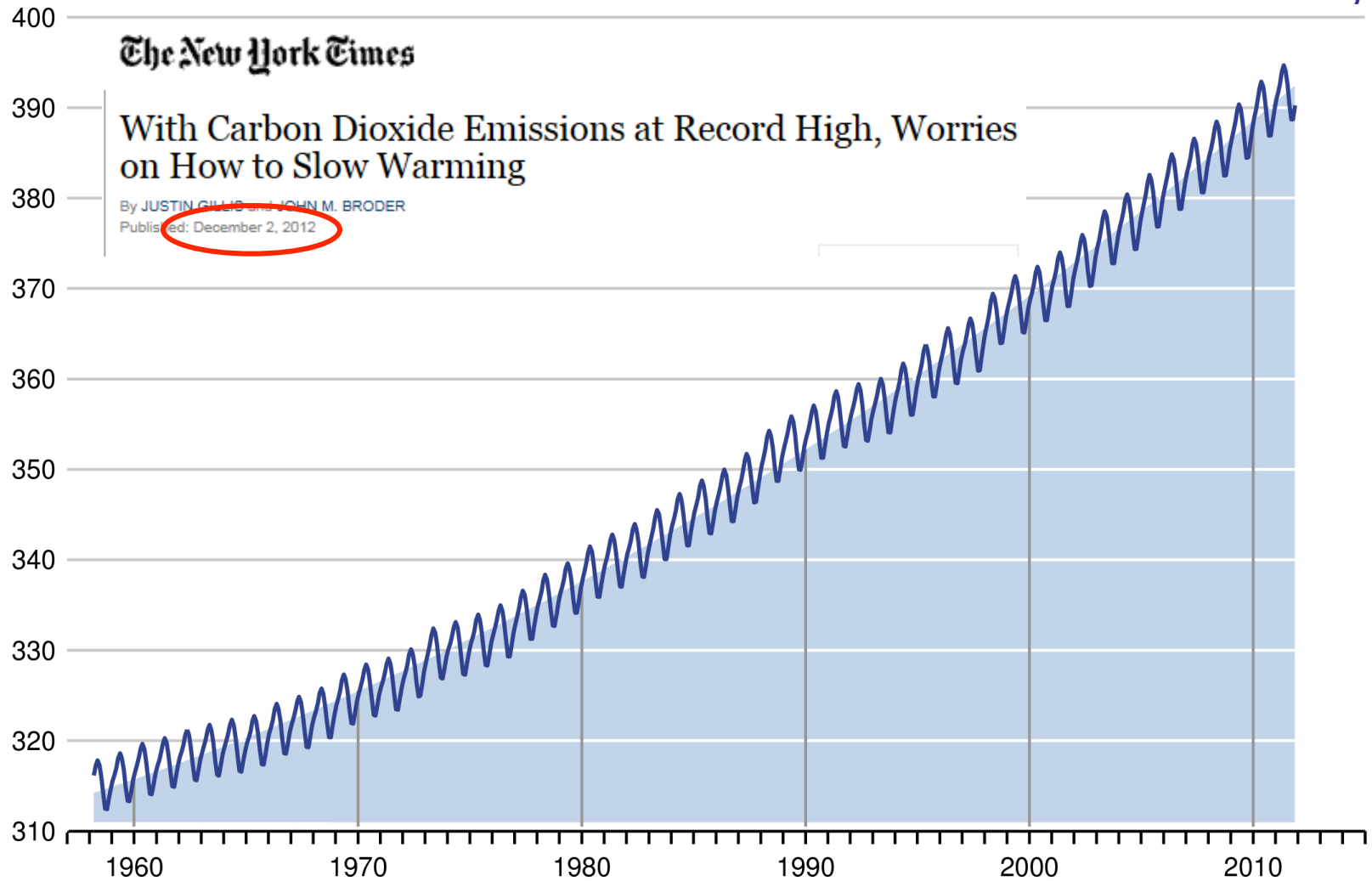
Paul Sellew
CEO
Harvest Power, Inc.

Three major challenges that many view as distinct...

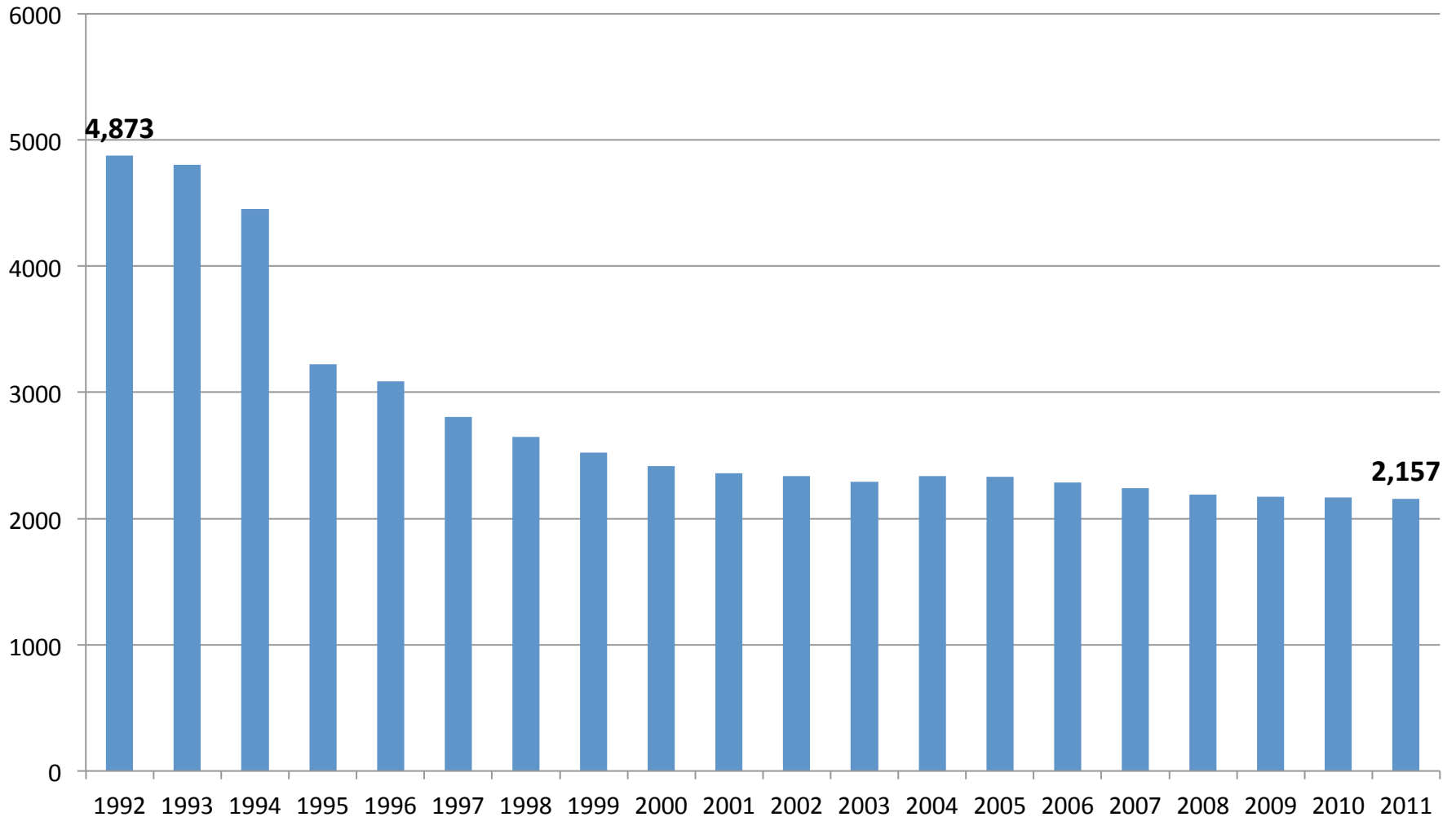
Monthly Carbon Dioxide Concentration

parts per million

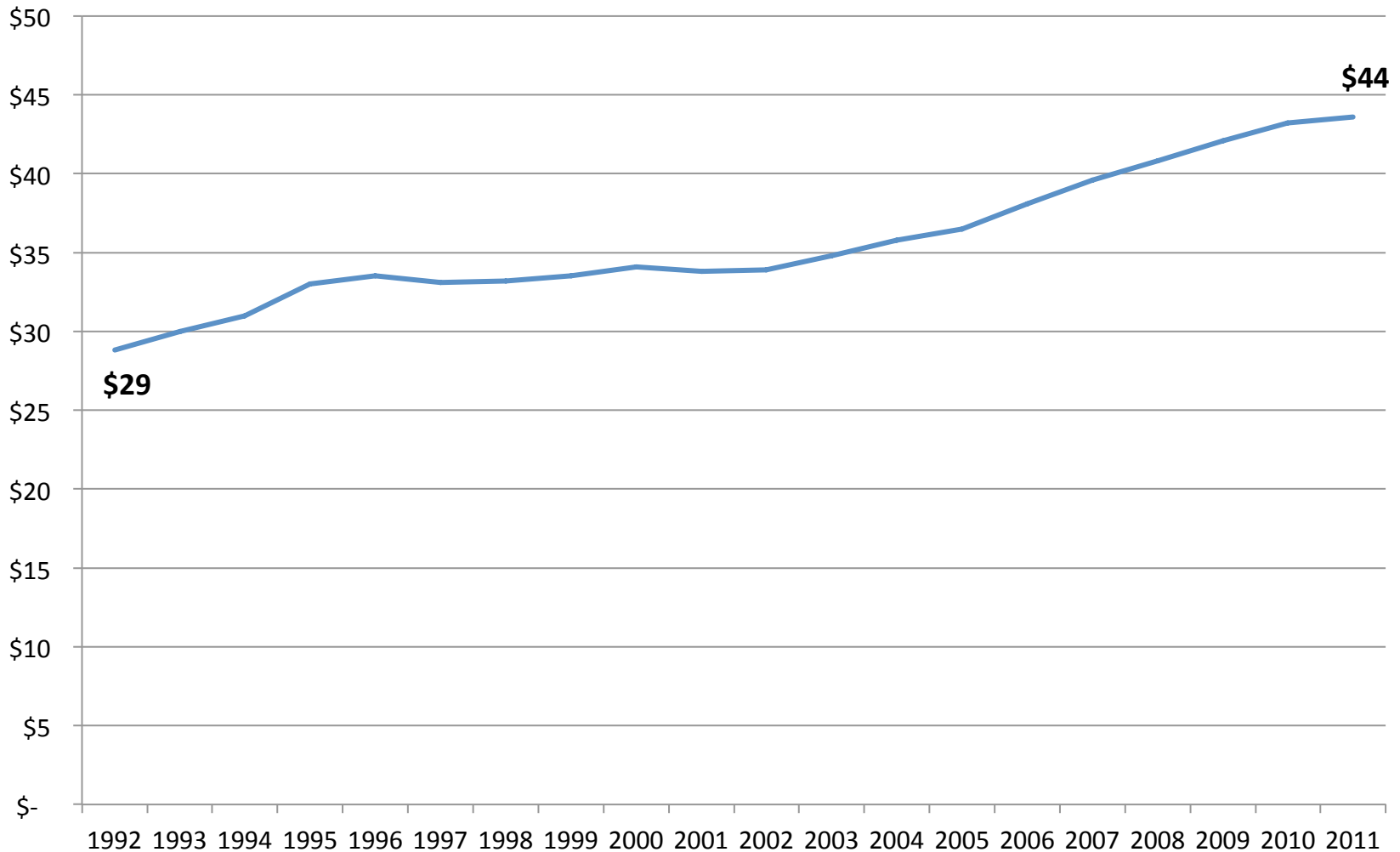
NOAA's Mauna Loa Observatory



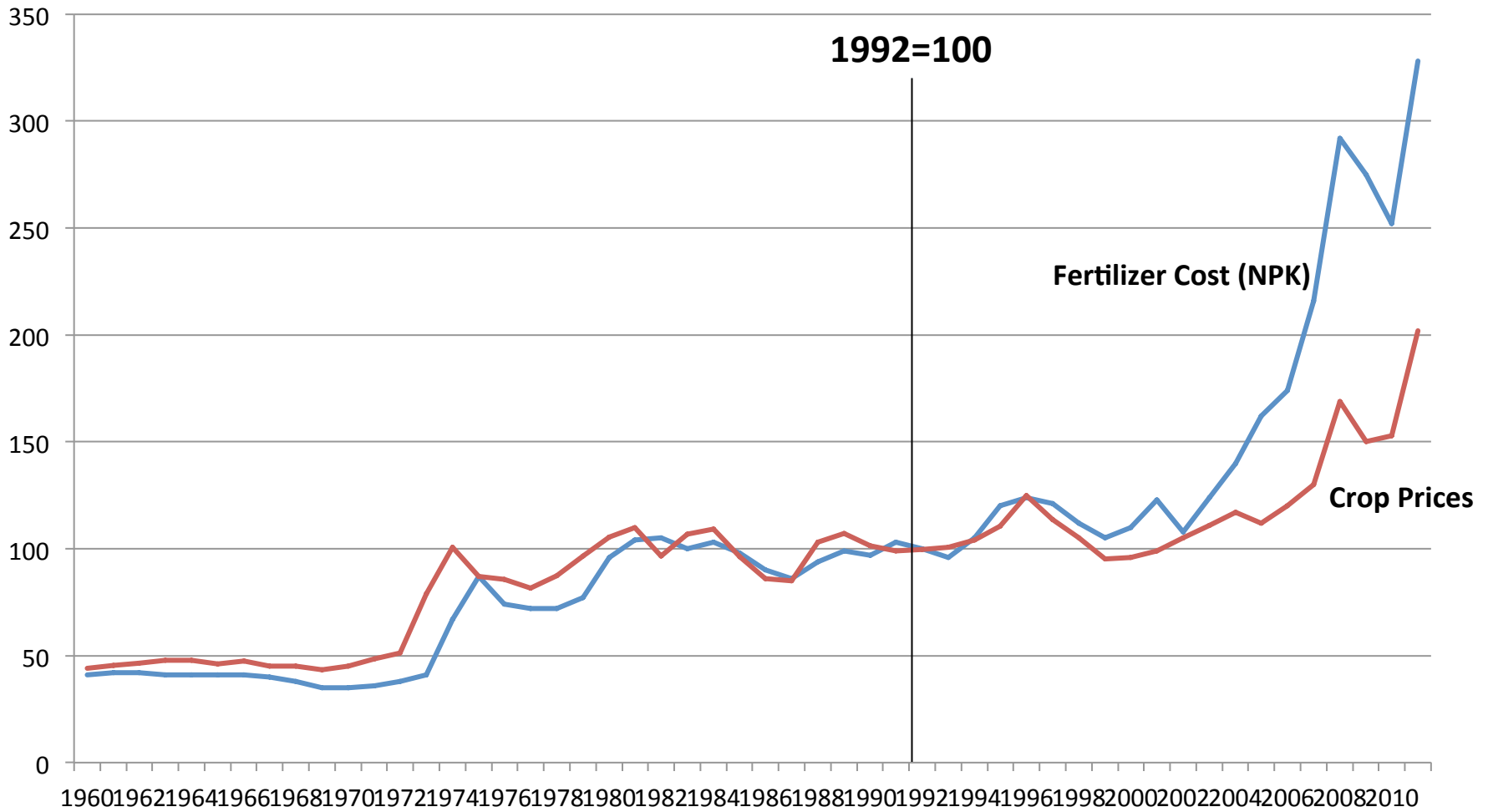
Number of Operating Landfills in the US



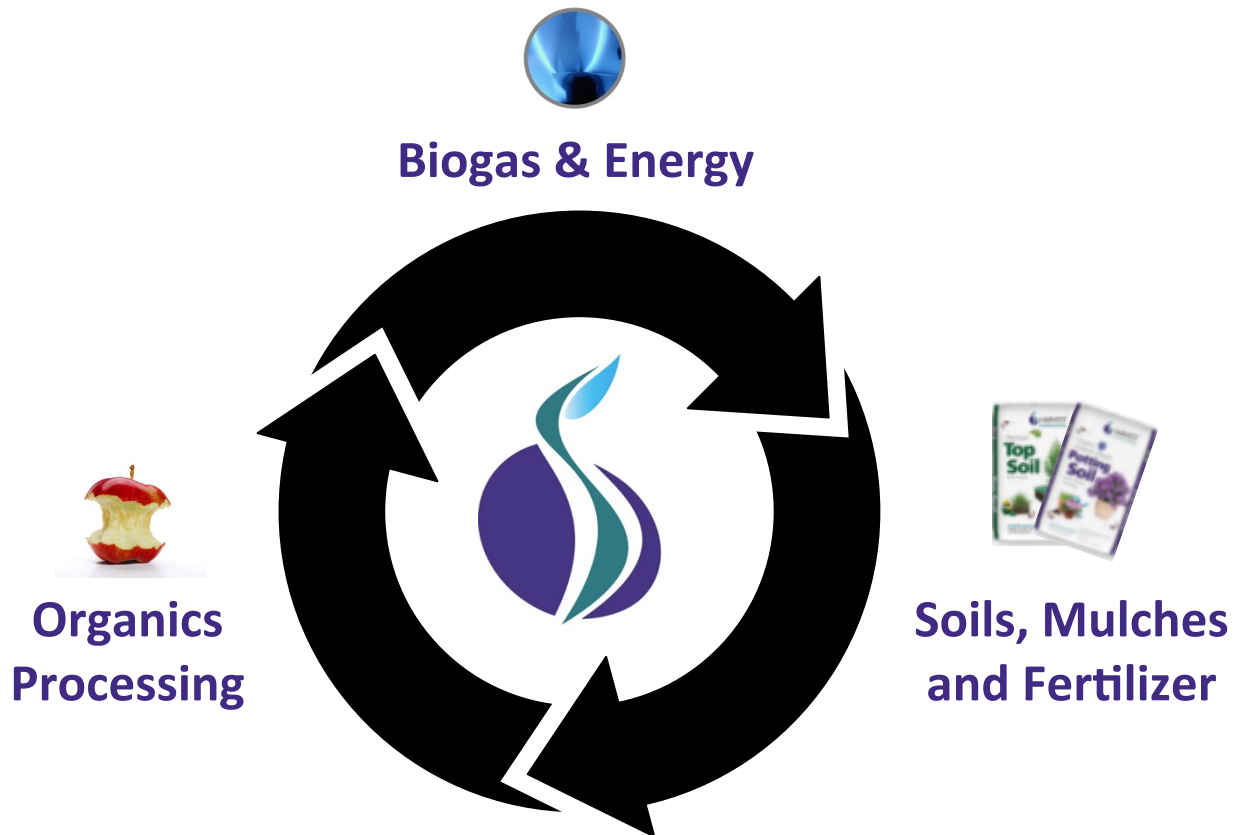
US Average Landfill Tip Fees for MSW (\$/ton)



Indexed Price Paid for Chemical Fertilizer vs. Price Received by Farmers for All Crops



Harvest's Integrated View – Sustainability!



Harvest generates revenue from all three segments of the “wheel”, which we expect will create the lowest costs in all three markets

Harvest is creating a more sustainable future by helping communities meet the challenges at the intersection of waste, agriculture and energy in the 21st Century

Company Profile

- Lead the industry, managing more than 2 million tons of organic materials, **largest composter of yardwaste & foodwaste in North America**
- Operate 30 processing facilities in North America with more than 450 employees, >\$100mm of revenue
- Commissioning two of North America's **largest commercial anaerobic digestion facilities** this fall. Third facility starting up in 2013



Current Market Drivers

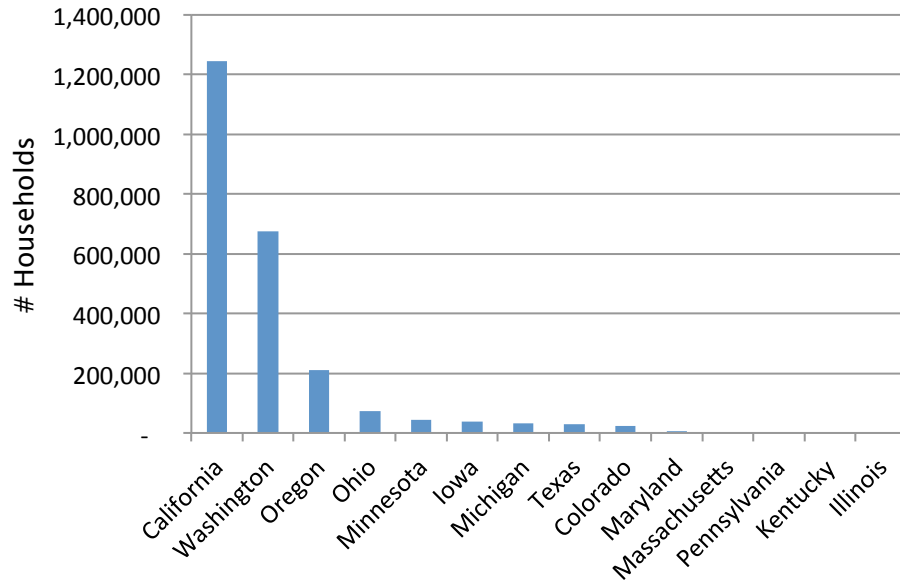
- Landfill capacity and cost
- Public policy
 - Yard waste diversion programs
 - Food waste diversion programs
 - Biosolids reuse
- Corporate sustainability programs
- Renewable energy incentives
- Public supports recycling and renewable energy
- Need for high quality compost
- Future driver – Climate Change
 - California AB32
 - Obama executive orders?



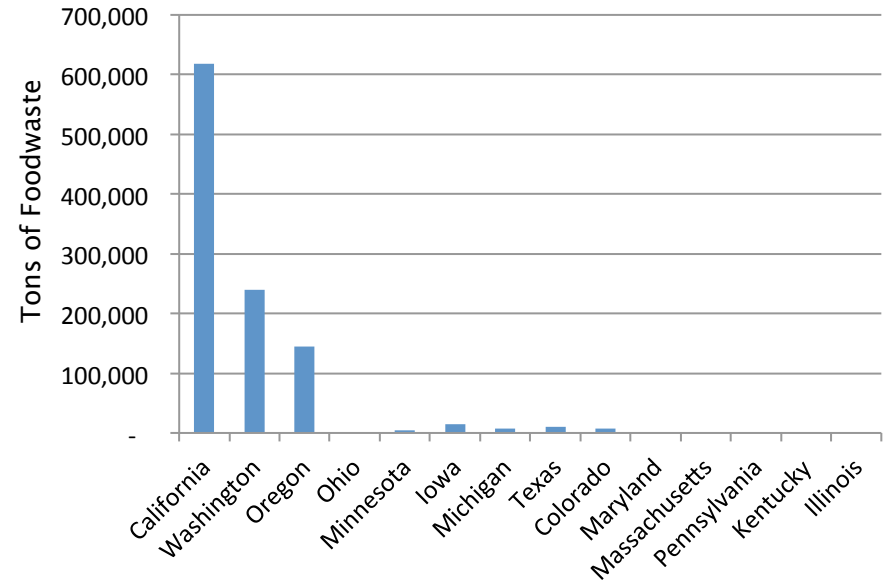
Residential Foodwaste Separation

California currently has **1.24 million households** with mandatory foodwaste separation, and **618,000 tons** of separated foodwaste in 2011 – more than the rest of the US states combined...

US households with SSO for foodwaste



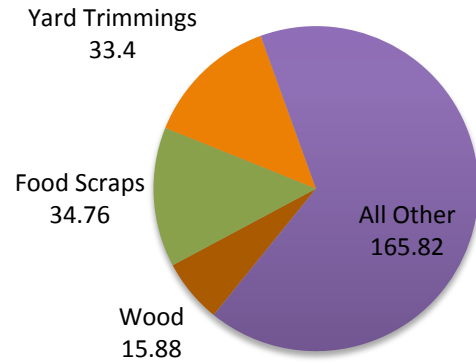
2011 Tons of residential foodwaste (by state)



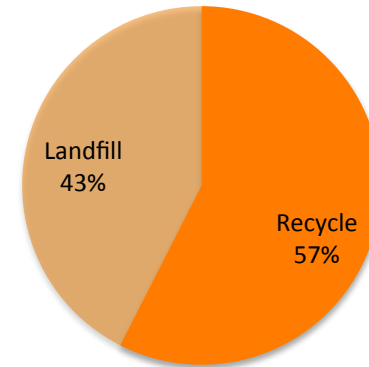
Source: Biocycle 2012

US MSW and Organics Market

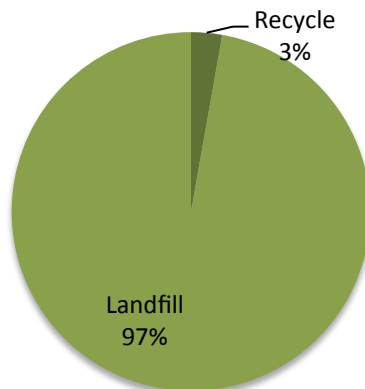
US Municipal Solid Waste Stream (in millions of tons)



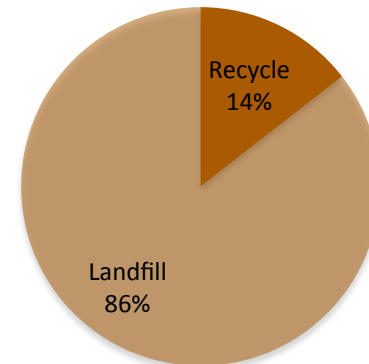
Yard Trimmings



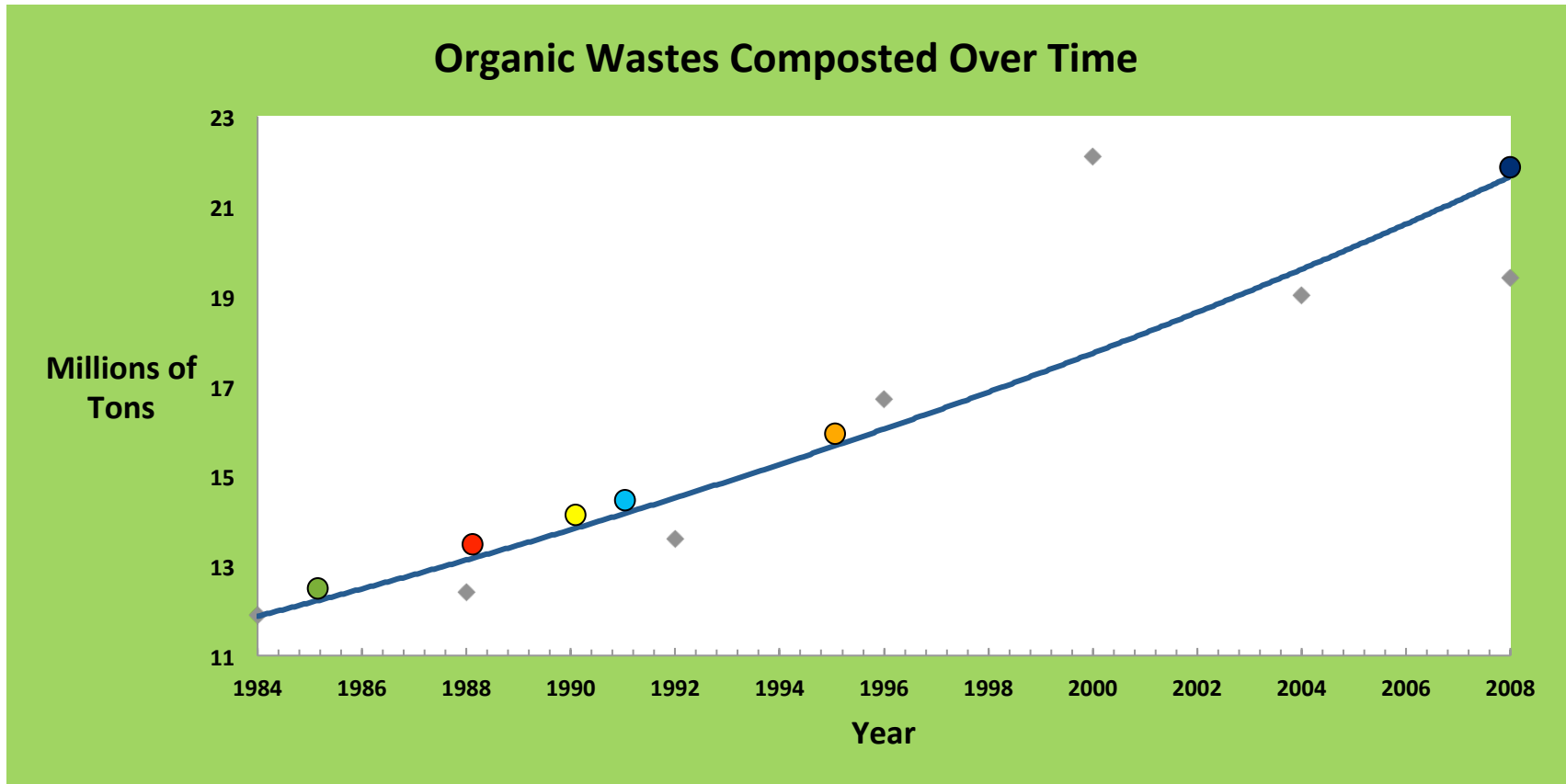
Food Scraps



Wood



Birth of the US Organics Industry – Policy Driven



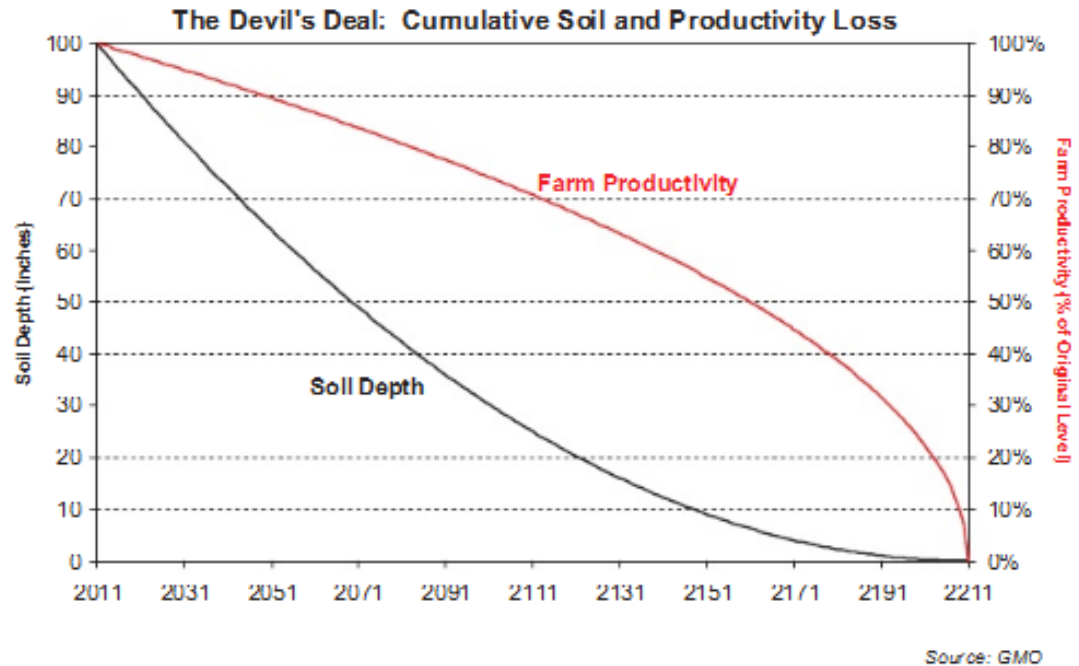
- 1988: Ocean dumping of biosolids partially prohibited
- 1990: State yard waste landfill bans begin to take effect, USCC formed
- 1991: Ocean dumping of biosolids completely prohibited

- Mid-1980s: MSW Composting arrives in the US
- Mid-1990s: MSW Compost facilities peak
- 2008: MSW compost facilities decline to 1980s levels

Roosevelt: “The nation that destroys its soil destroys itself”

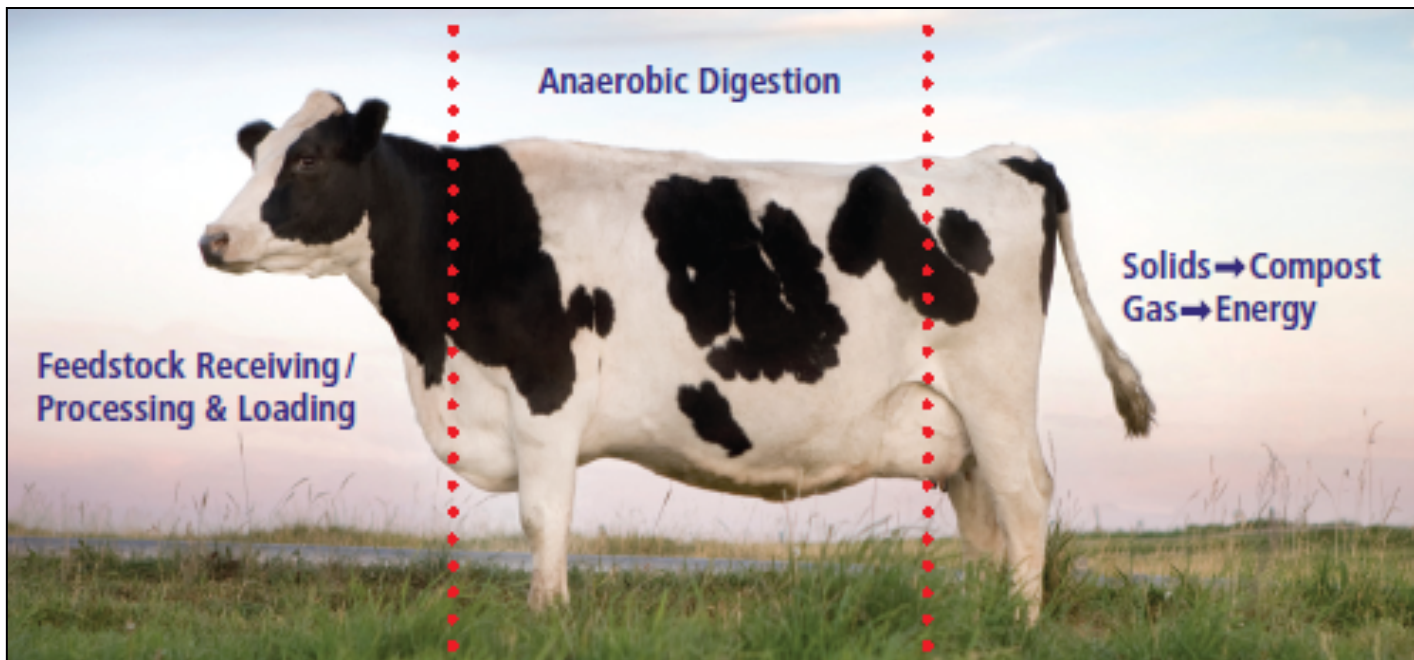
Cornell: 1/3 of world's arable land in last 40 years lost to erosion

Iowa State: Extreme storm events cause one to several years of erosion in a single event



Our Renewable Energy Technology

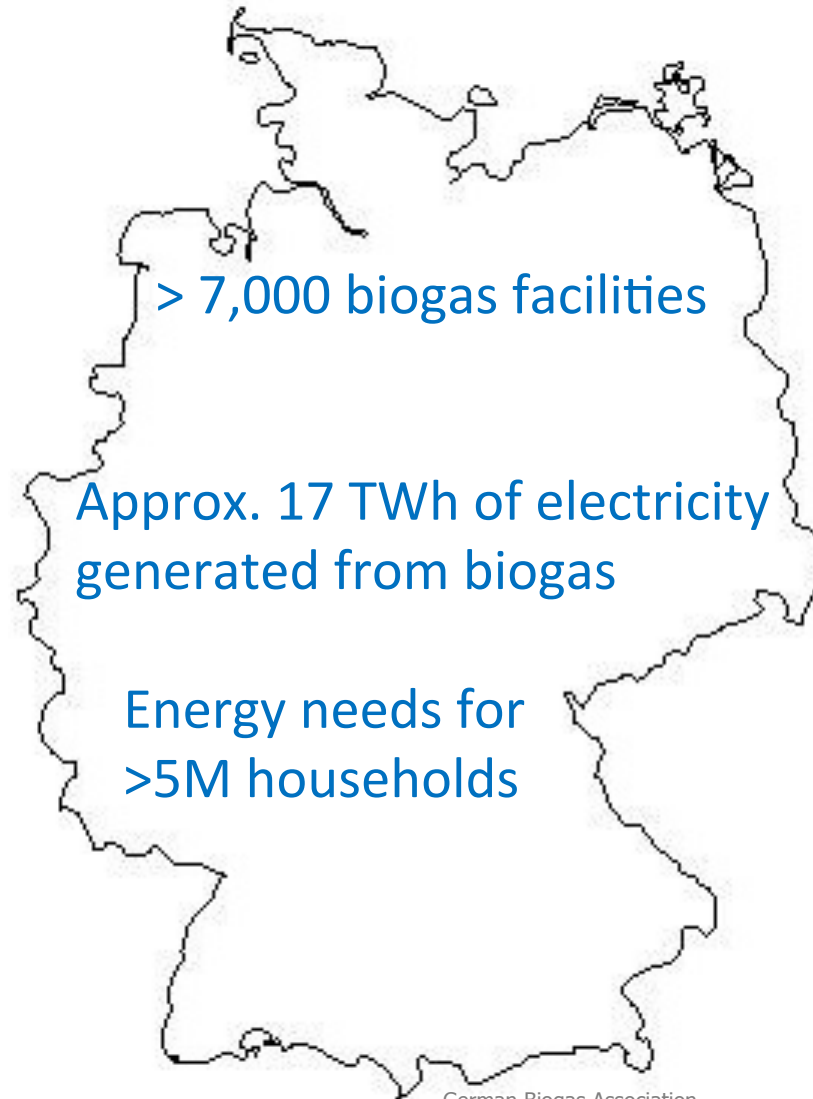
Anaerobic digestion mimics the processes that occur in a cow's stomach. We use similar micro-organisms in a large chamber, capture and utilize the biogas as it is produced. We optimize biogas production by creating an ideal environment for the microbes to do their work.



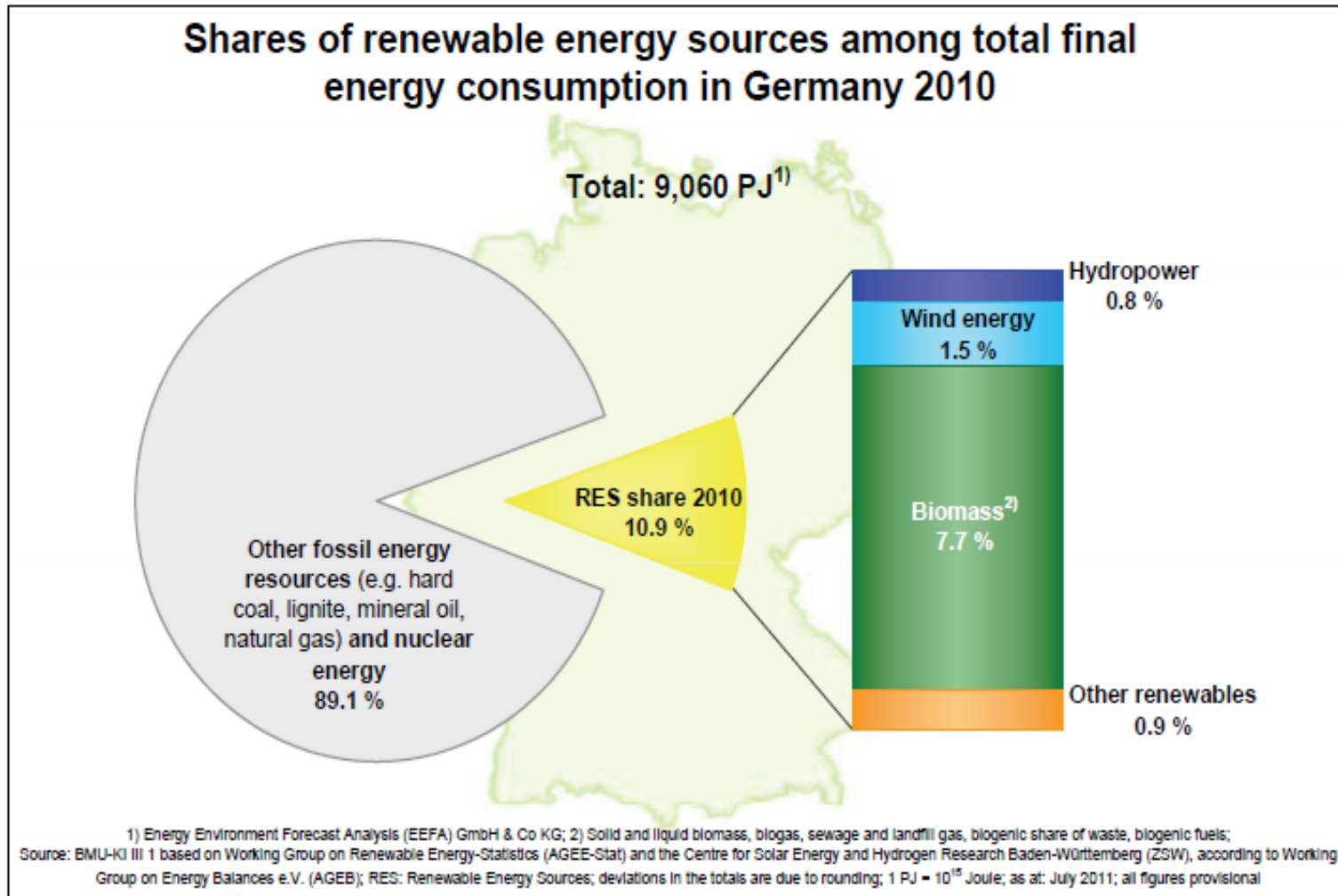
Case Study: Germany

Germany in 2011-12

- ✓ Policy, policy & policy
- ✓ Total ban on all organic wastes in landfills
- ✓ Societal support of source separation programs



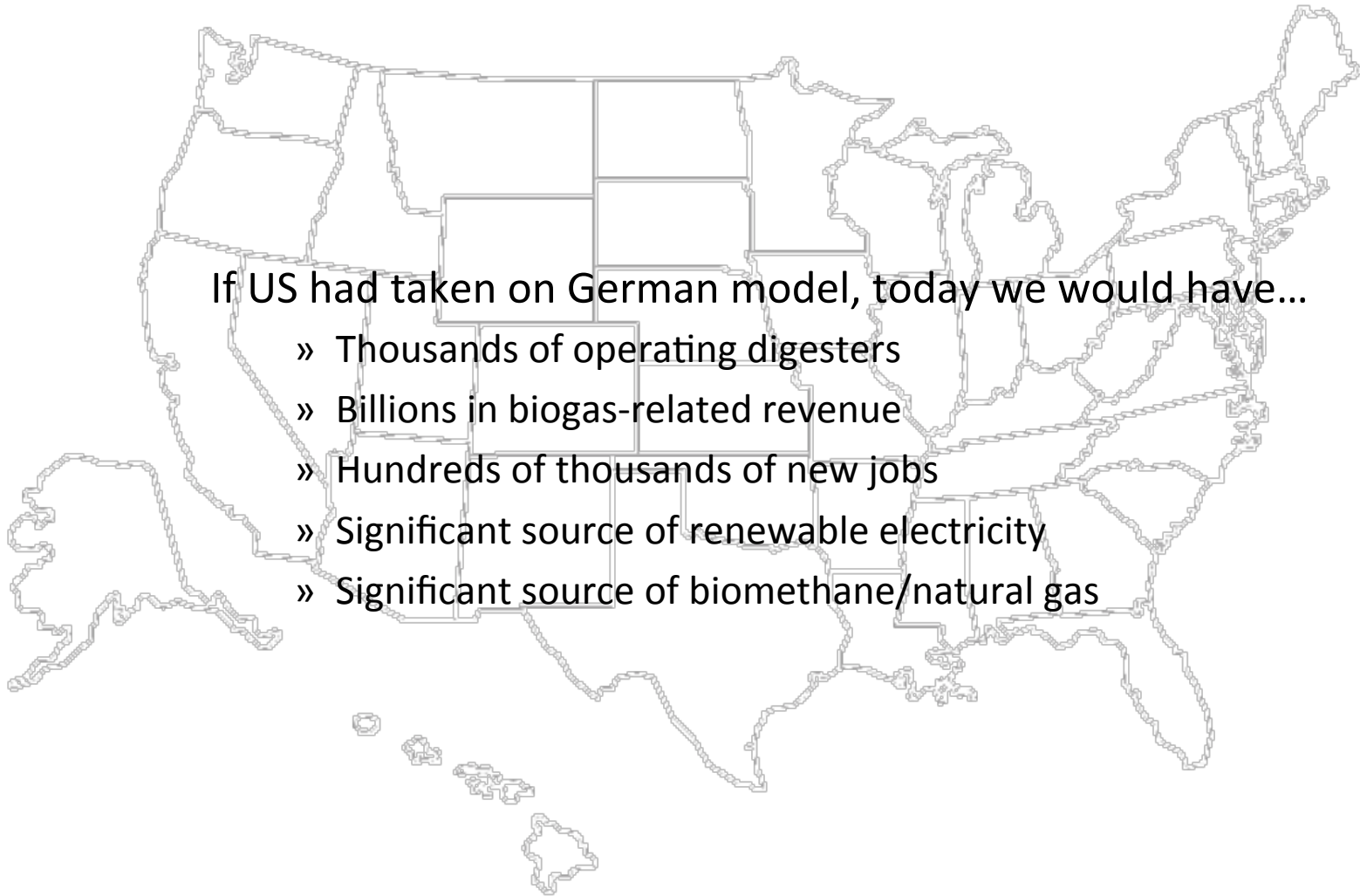
German Renewables - Organics Dominates



...But actually produces more energy from organic materials through biogas than wind and solar combined

Low Hanging Fruit

Development of biogas resources in the US lags far behind, but the potential is tremendous....



If US had taken on German model, today we would have...

- » Thousands of operating digesters
- » Billions in biogas-related revenue
- » Hundreds of thousands of new jobs
- » Significant source of renewable electricity
- » Significant source of biomethane/natural gas

Biogas Potential in the US

*The biogas production potential of biomass in the US is roughly equivalent to the **total residential demand for natural gas...** or 20% of all natural gas demand*

| | Millions of Dry Tons Available | Methane Yield (m3/dry ton) | Natural Gas Potential (Trillion Cubic Feet) |
|--|--------------------------------|----------------------------|---|
| Corn Silage (Grain & Stover) | 238 | 350 | 2.9 |
| Grass Silage (Perennial grasses, cane) | 118 | 300 | 1.2 |
| Agricultural Residue (Straw & Secondary Residue) | 51 | 210 | 0.4 |
| Manure | 16 | 160 | 0.1 |
| Food Scraps | 12 | 300 | 0.1 |
| Green Waste | 15 | 130 | 0.1 |
| Total Production Potential | | | 4.8 TCF |

Total US Residential Natural Gas Consumption (2011):

4.7 TCF

Total US Overall Natural Gas Consumption (2011):

24.2 TCF

Harvest Energy Garden – Richmond, BC

Harvest is ramping up our Vancouver Energy Garden that uses high solids anaerobic digestion technology to turn 40,000 tonnes per year of mixed food scraps and yard trimmings into electricity and compost. The site, which serves the Metro Vancouver region's 2.3 million residents, represents a model for managing organics in an urban environment.



Harvest Energy Garden - London, Ontario

Harvest is completing construction on an Ontario-based Energy Garden that uses low solids anaerobic digestion technology to turn 65,000 tonnes per year of mixed food scraps into electricity and fertilizer granules. This will be the **largest commercial anaerobic digester in North America**. *Opening in Q1 2013.*

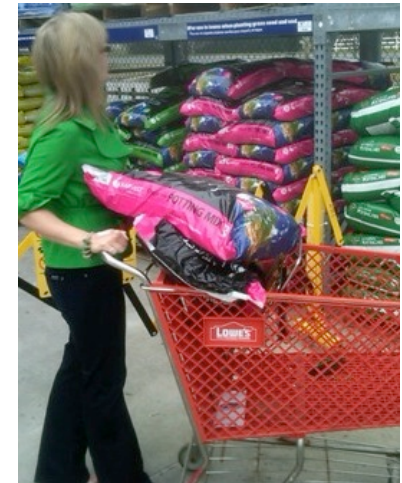
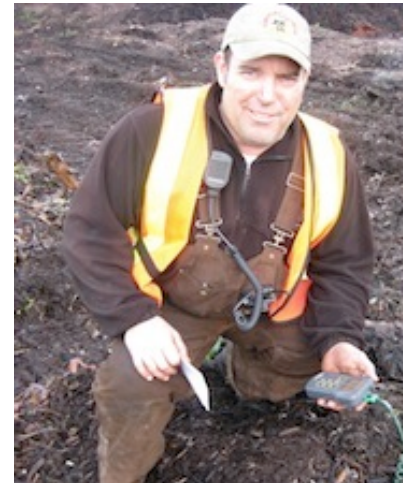


Harvest Energy Garden - Florida

Harvest's Florida Energy Garden will co-digest food wastes from local tourist and resort locations with biosolids from the adjacent, publicly-owned waste water treatment plant (WWTP) to produce baseload renewable energy, fertilizer and soil amendments. The facility will process 120,000 tons of organics and produce 6 MW of combined heat-and-power and 3,200 MT of granular fertilizer each year. **Opening Q4 2013.**



Working Together to Manage Organics Sustainably



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