

Municipal Solid Waste (MSW)  
A Source of Biomethane Transport Fuel  
for  
New Jersey

Alternative Transportation Fuel Workshop

May 1, 2013

Organized by the NJ Clean Energy Innovation Council

# Biomethane – Renewable Natural Gas

- **Biomethane** is methane derived from the recent biological decomposition of organic matter in the absence of oxygen, a process known as **anaerobic digestion**.
- **Anaerobic digestion** occurs:
  - **Naturally:**
    - Sediment deposits in lakes, estuaries and oceans.
    - Ruminant livestock : cattle, sheep, goats
    - Wetlands, rice paddies
    - Termites
  - **Man-made:**
    - *Sanitary Landfills*
    - Wastewater Treatment Plants
    - Anaerobic Digesters

# Why MSW as a Source of Biomethane for NJ?

1. NJ generates an abundance of MSW - 6 Million Tons/Year
2. 74% of MSW disposed is landfilled, 50% of which is exported.
3. Landfills are robust, very effective anaerobic digesters.
4. Source separation of organics is coming but is expensive and difficult to implement.

Anticipate two decades before significant diversion of organics from landfills occurs and even then landfills will continue to generate biogas.

# Municipal Solid Waste (MSW) Disposal In New Jersey

Destination	Year					
	2008	%	2010	%	2011	%
<b>In-State Landfills</b>	2,220,139	36	2,043,515	34	<b>2,011,870</b>	34
<b>In-State RRFS</b>	1,455,686	23	1,463,612	25	1,539,328	26
<b>Out-of State Landfills</b>	2,594,202	41	2,410,334	41	<b>2,373,105</b>	40
<b>Total</b>	6,270,027	100	5,917,461	100	5,924.303	100

1. MSW represents ID #10 Waste (residential, commercial and institutional) and ID #23 Waste (Vegetative)
2. Source: NJDEP, DSHW, Joseph Davis, Ross Hull

# NEW JERSEY EXPORTED MSW 2008

RECIPIENT STATE	TONS MOVED	% OF TOTAL TONS	MILES TRAVELED	DIESEL GALLONS CONSUMED
<b>PA</b>	1,894,573	73	21,942,074	5,485,513
<b>NY</b>	34,731,	1.2	28,416	7,104
<b>OH</b>	141,282	5.4	3,338,907	939,110
<b>VA</b>	37,404	1.4	6072	63,495
<b>KY</b>	433,382	17	*	1,172,925
<b>SC</b>	52,829	2	132,667	175,960
<b>TOTALS</b>	<b>2,594,202</b>	<b>100</b>	<b>25,448,136</b>	<b>7,844,107</b>

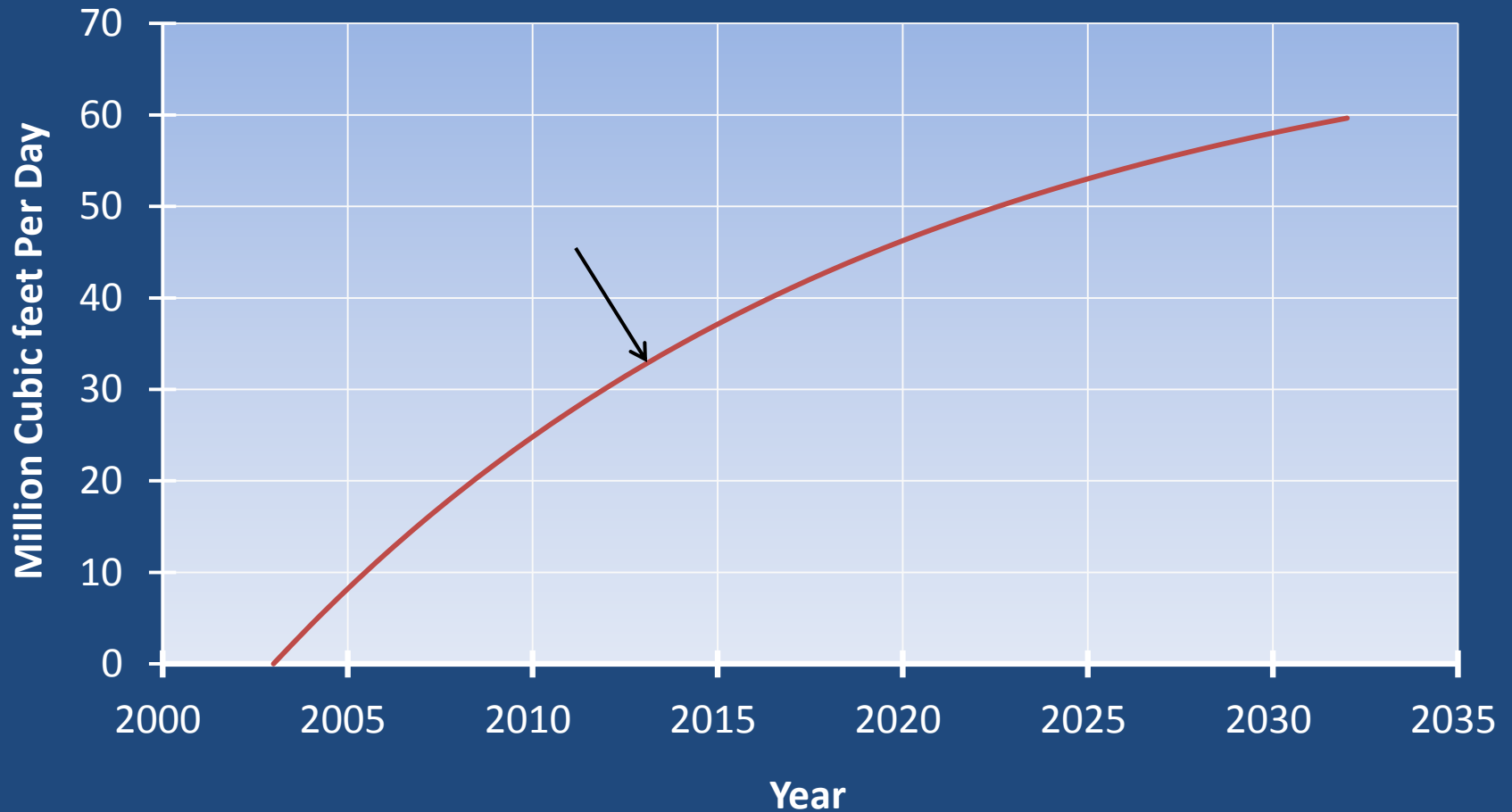
1. Hudson County rail hauled 409,149 tons MSW 1180 miles round trip to KY.  
(ton-miles /436 ton-miles/gal=gals)

2. Source: R.W. Simkins, Burlington County Department of Solid Waste Management; Ross Hull, NJDEP

# New Jersey

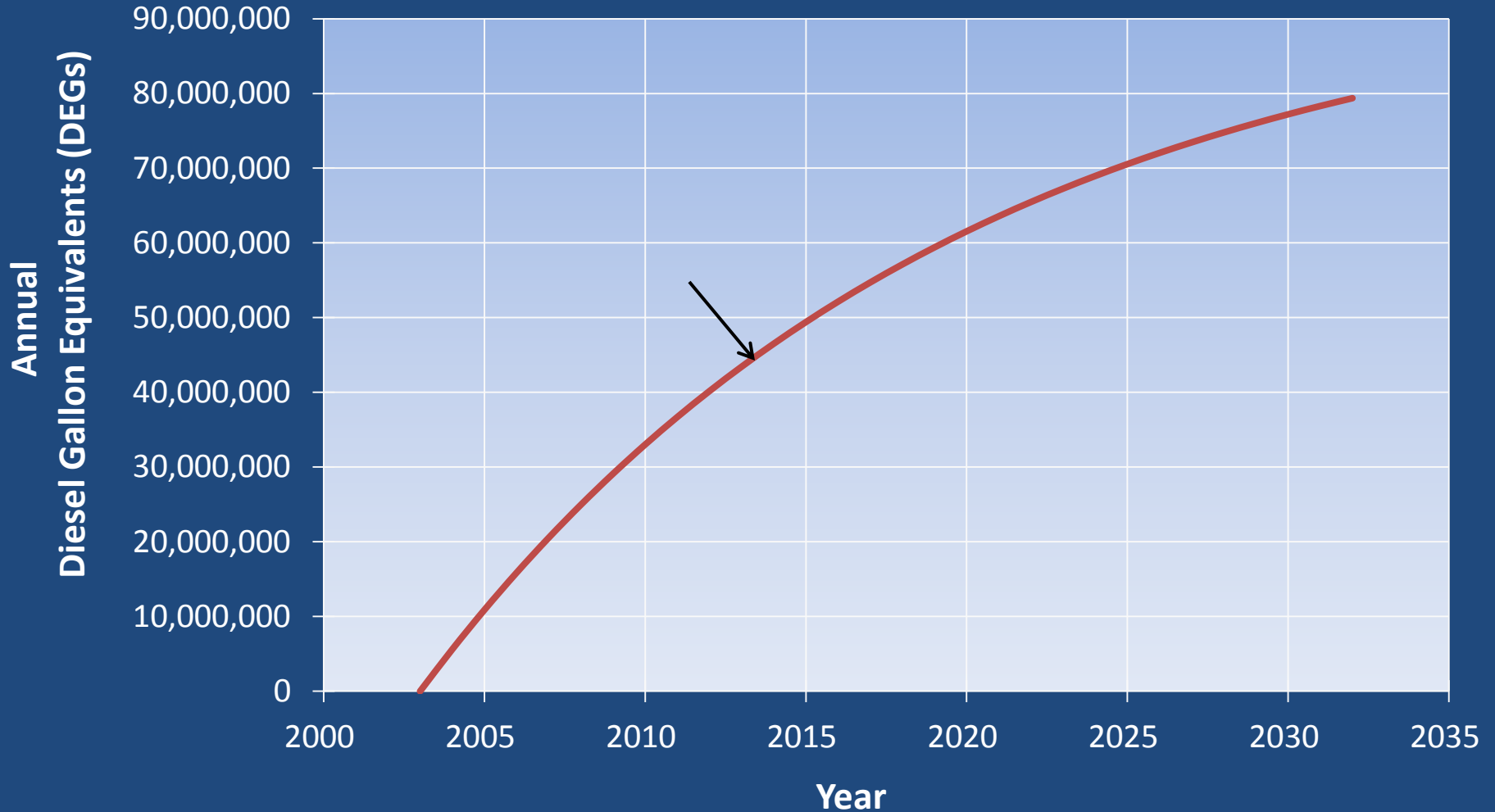
## Landfill Biogas Production

### In-State and Out-of-State Landfills



Source: G. McCarron, SCS Engineers.  
Assumed: Methane content of LFG 50%  
Assumed Decay Rate Constant of 0.06  
Assumed Ultimate Biogas Recovery Rate of 2980 cf/ton

# New Jersey Annual Biomethane Production (DGEs)



## 4.3 Million Tons Per Year of Installed AD Capacity

- Twelve (12) In-State Landfills - 2 Million Tons Per Year Capacity
- Multiple Out-of-State Landfills – 2.3 Million Tons Per Capacity
  - Most landfills currently produce electricity due to federal tax incentives.
  - “Green Electricity” from ICEs does not necessarily mean clean energy.
  - To get cleaner emissions from ICEs, biogas must be cleaned more.
  - Landfills are now considering the option of biomethane for excess biogas.
    - » No combustion emissions onsite.
    - » Sale of fuel on-site to captive fleets using the landfill.
    - » Sale of fuel off-site to fleets via NG pipeline or special trucks.



# Three Recommendations

1. Biomethane Marketing Homework:
  - a) Identify and cultivate demand within New Jersey and region for biomethane transport fuel to meet Corporate Social Responsibility (CSR) and Sustainability Program goals of our major corporations.
  - b) Corporations and their supply chains will require this fuel to be utilized, alone or with other alternative fuels, and pay the differential cost, because of significant added GHG reductions it offers. Well-to Wheel GHG reductions are 88-100% compared to diesel fuel.
2. Utilize a “Biomethane Production and Buy Back” provision in long term County transport and disposal contracts for waste transported out-of-state.
3. Establish pilot projects at NJ landfills for:
  - a) dedicated bio-cell clusters to manage source separated organic waste
  - b) siting a dedicated AD facility for biomethane production and utilize waste heat and electricity from existing on-site power plant.

Thank you.

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