

# Narragansett Bay Commission Sustainable Energy Planning Update

Presented at the  
Joint NEWEA/NYWEA  
2016 Spring Meeting  
by Barry Wenskowicz

# Presentation Overview

- \* Introduction
- \* Carbon Footprinting of NBC WWTFs
- \* Tracking & Reporting Energy Results
- \* Progress Towards Net Zero

# NBC Field's Point WWTF

## Major Operations

- ✓ 38 MGD Avg Daily Flow 2015
- ✓ 65 MGD Secondary/Advanced Treatment
- ✓ 200 MGD Primary
- ✓ Chlorination/De-chlorination
- ✓ Comb Sludge Gravity Thickeners
- ✓ 4 Remote Pumping Stations

## Electric Use

- ✓ 1.8 MW Average Demand
- ✓ 15,770,000 kWh/year total use
- ✓ 7,200,000 kWh/year from Wind



## Potential Opportunities:

- ✓ Small Hydro-Electric Project
- ✓ Small Solar Project
- ✓ Remote Net-Metered Projects

# NBC Bucklin Point WWTF

## Major Operations

- ✓ 18 MGD Average Daily Flow 2015
- ✓ 46 MGD Secondary/Advanced
- ✓ 116 MGD Primary
- ✓ UV Disinfection
- ✓ Anaerobic Digestion
- ✓ 3 Remote Pumping Stations

## Electric Use

- ✓ 1.4 MW Average Demand
- ✓ 12,460,000 kWh/year



## Potential Opportunities:

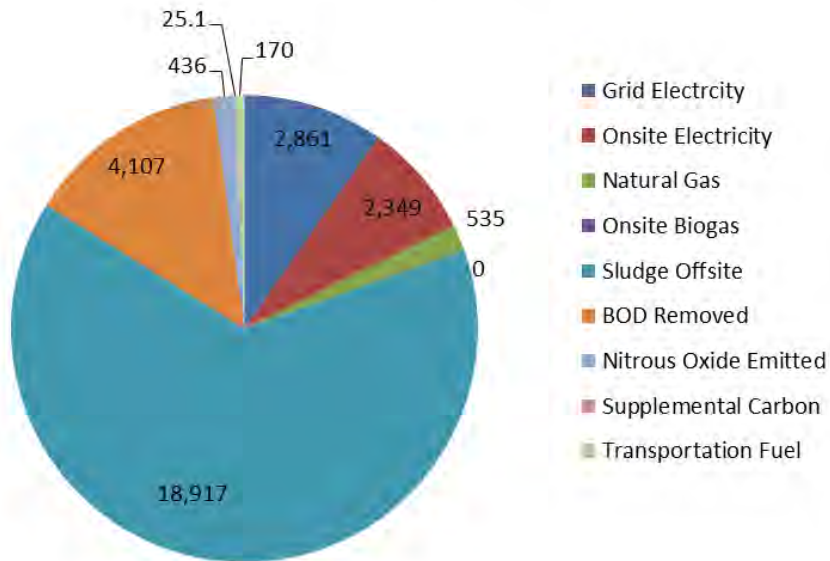
- ✓ Biogas Engine (air permit?)
- ✓ Solar Landfill (on hold)
- ✓ Remote Net-Metered Projects



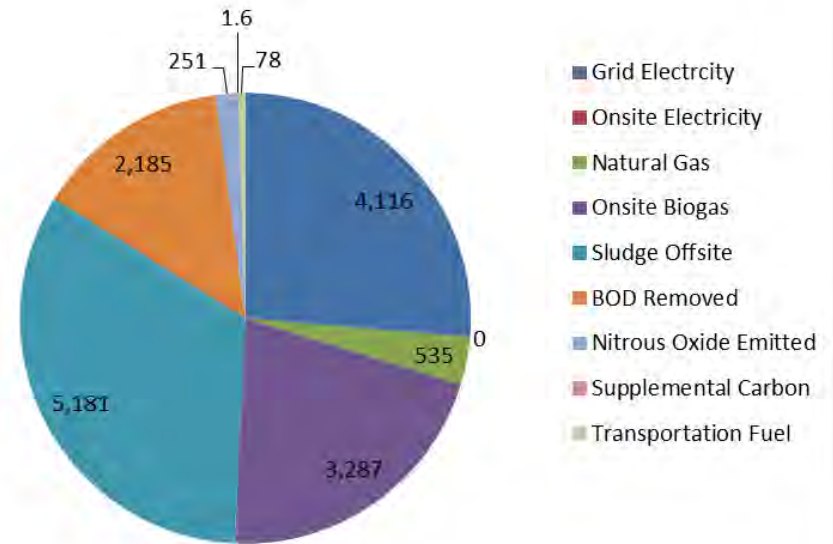
# NBC Facilities

## GHG Emission Estimates

**2015 GHG Emissions Associated with Fields Point (MTCO<sub>2</sub>/Yr)**



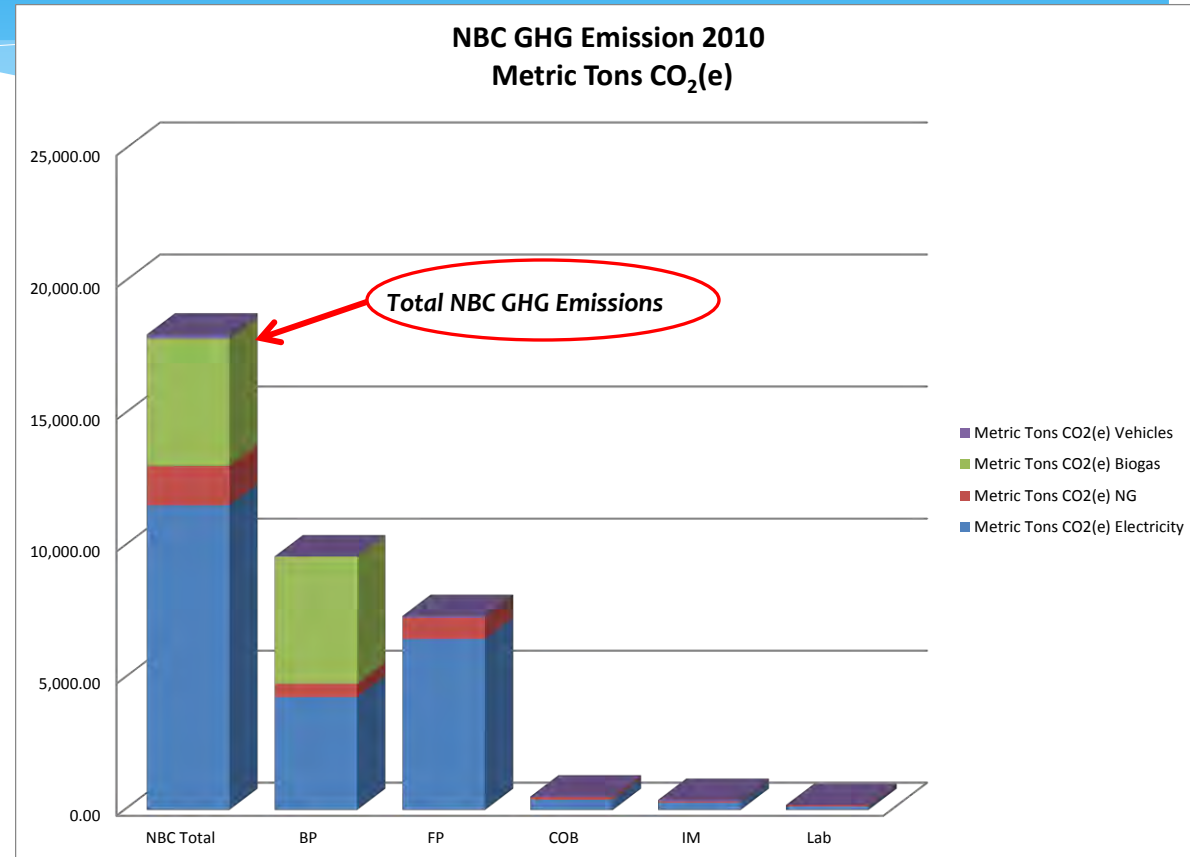
**2015 GHG Emissions Associated with Bucklin Point (MTCO<sub>2</sub>/Yr)**



# EPA Mandatory Reporting of GHGs 40 CFR 98 (2010)

## List Categories Regulated

- Listed Source (Table A-3 ) Category
  - ✓ Specifies Industry Types Regulated
  - ✓ WWTFs were listed in Proposed Regs, but deleted
- Listed Source (Table A-4 )
  - ✓ Emits 25,000 metric tons CO<sub>2</sub>e or more per year
- Not a Listed Source Category but:
  - ✓ 45% below 1990 levels by 2035
  - ✓ Has stationary fuel combustion units with 30 mmBTU/hr nameplate capacity or greater, and
  - ✓ Emits 25,000 metric tons CO<sub>2</sub> equivalents or more per year in combined emissions from all stationary fuel combustion sources
- ✓ **NBC is Well Below the 25,000 metric ton cut-off**
- ✓ **NBC is NOT Regulated YET!!!**
- ✓ **But we are being Proactive and Preparing for Future Regulation!!!**

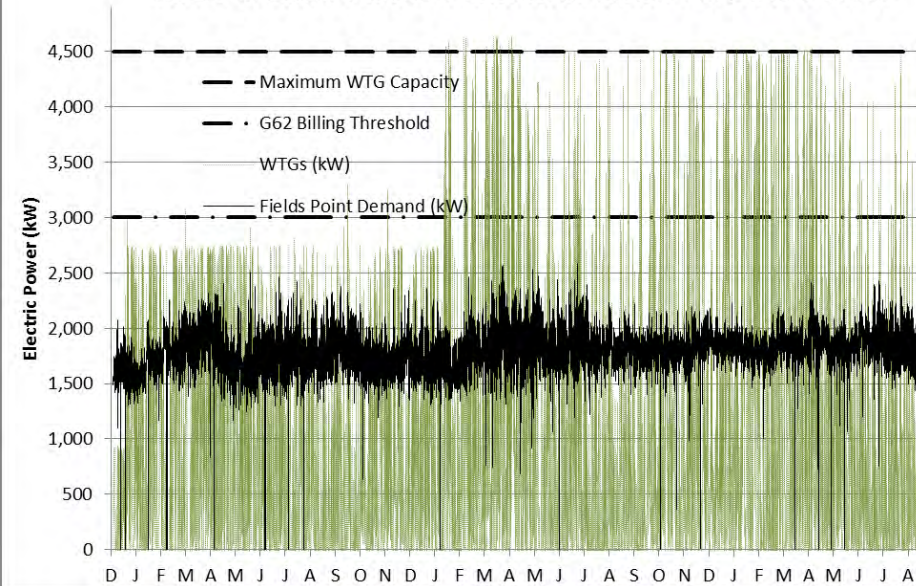


GHG Emissions in Blue are not Reportable under present regulations

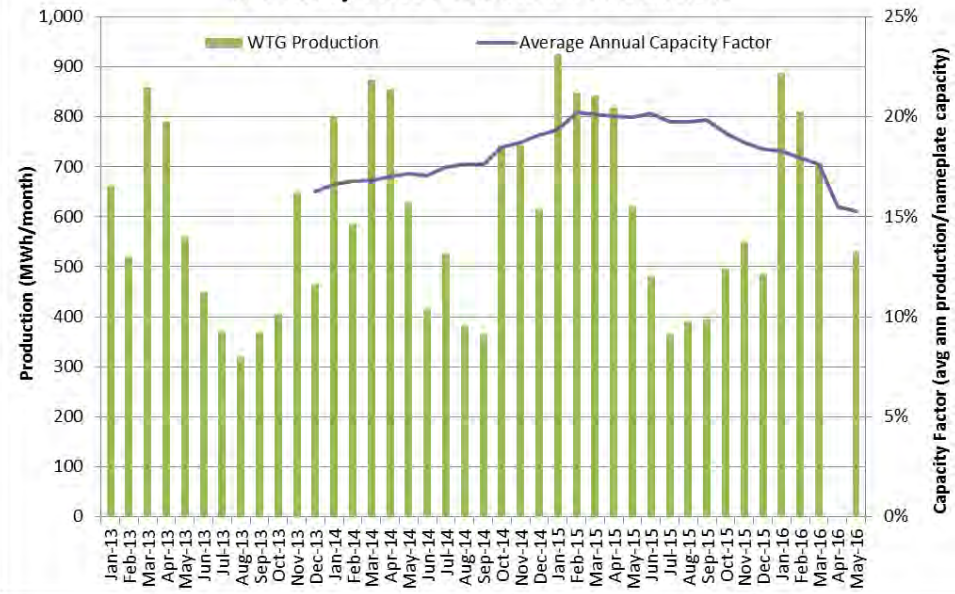
# Fields Point Wind Turbines

## Operating since December 2012

### 2014 & 2015 Fields Point and Wind Turbine Power

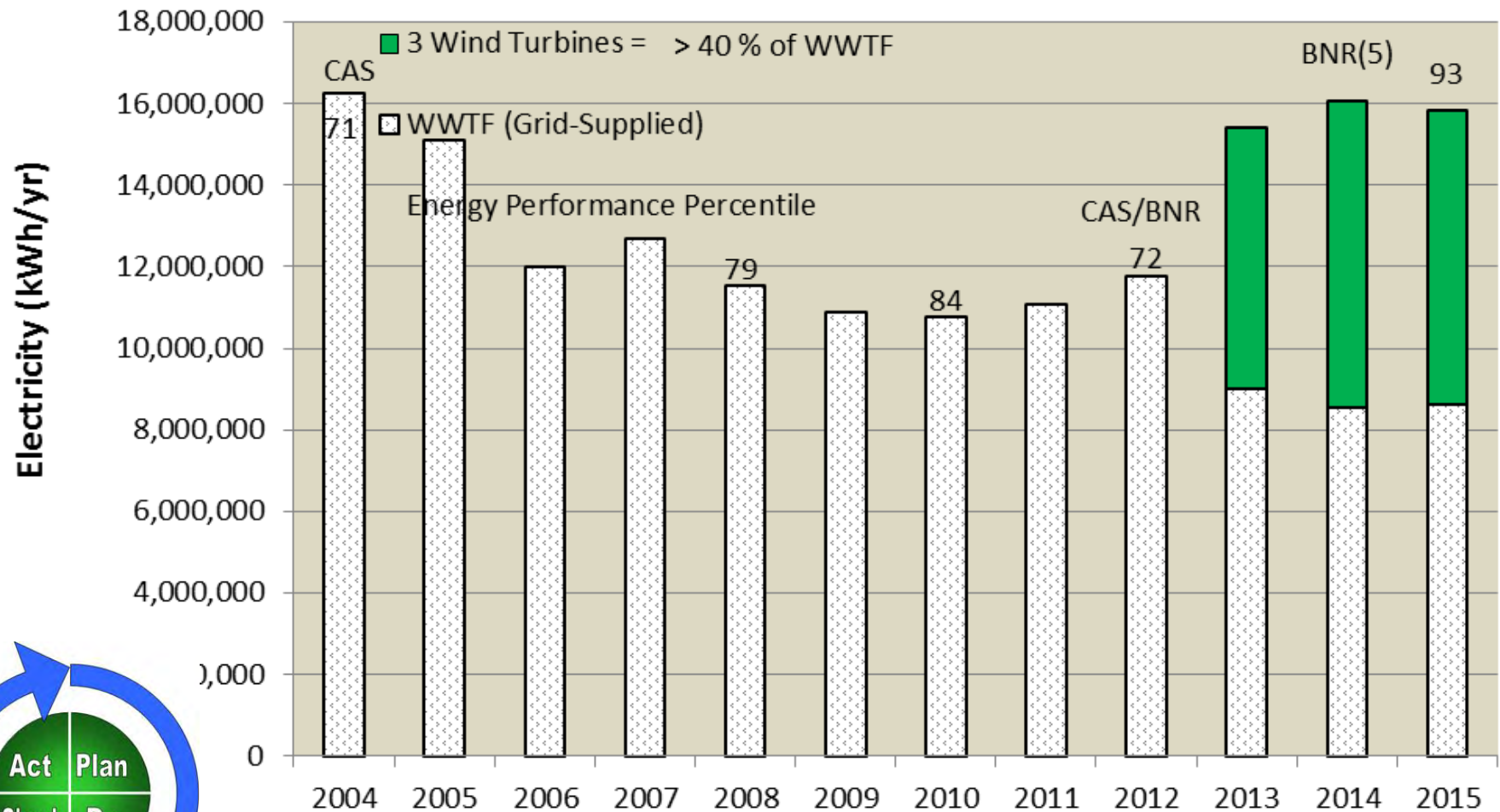


### Monthly Wind Turbine Production



# Annual Electric Use & Offset

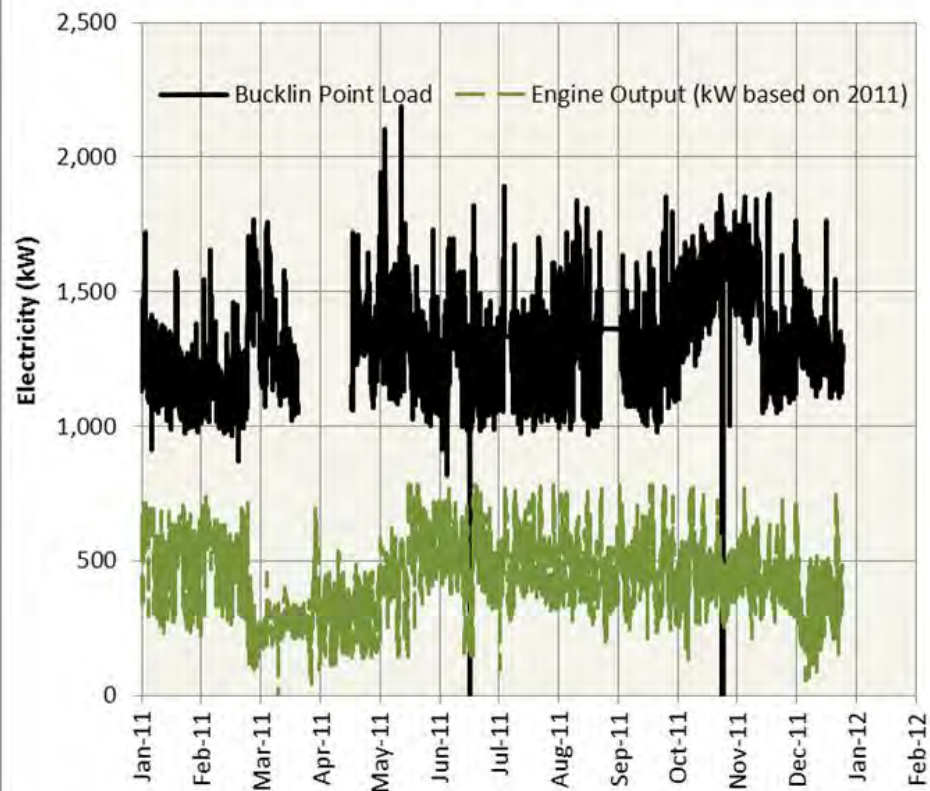
## Fields Point Annual Electricity



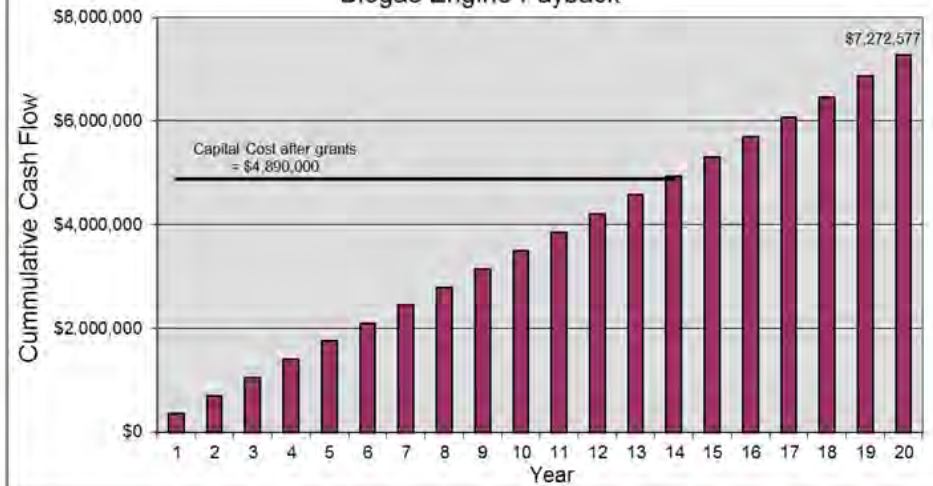


# Bucklin Point Digester Gas Engine Planned Project

## Potential Engine Output

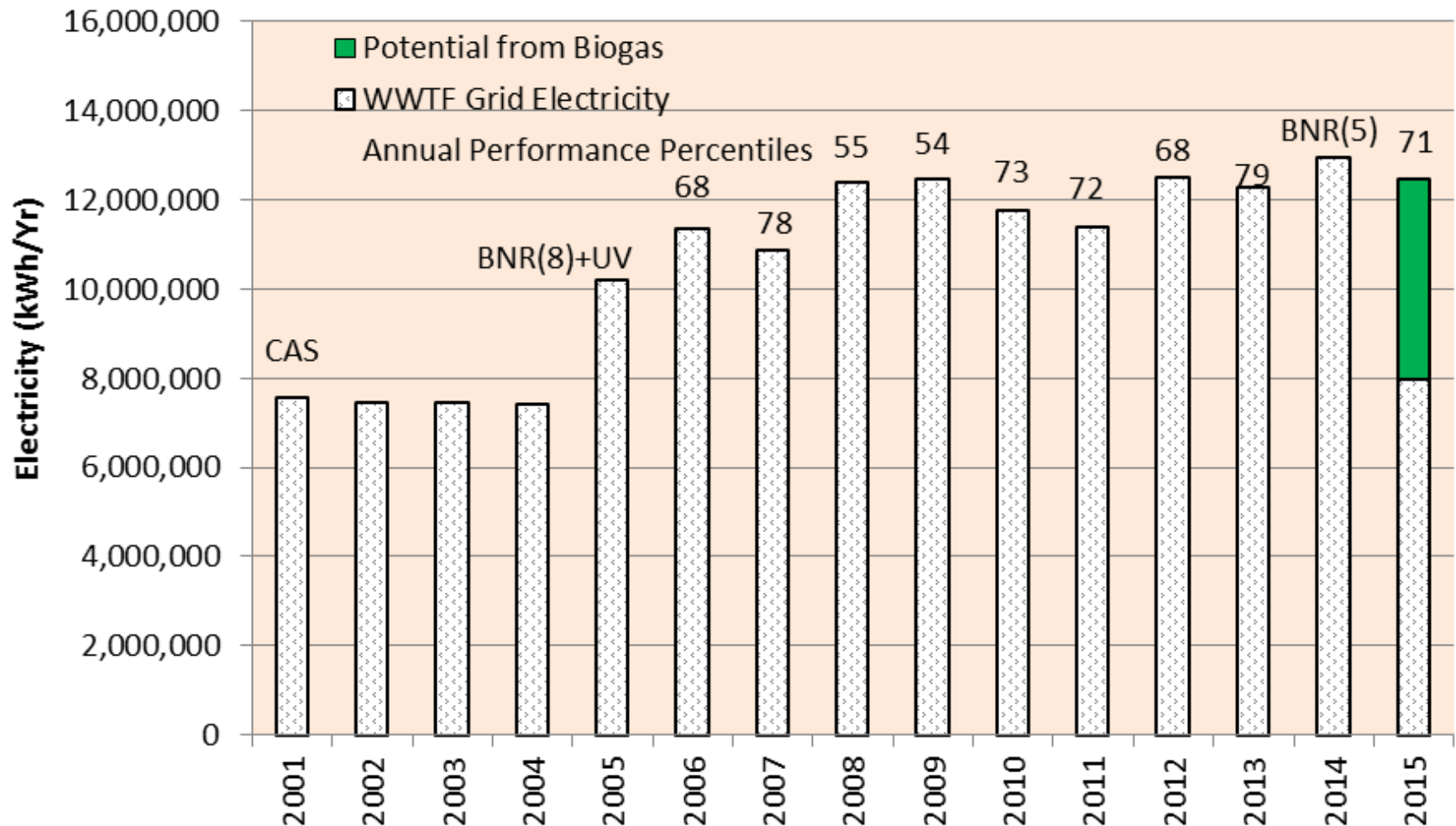


## Biogas Engine Payback



# Annual Electric Use & Offset

## Bucklin Point Annual Electricity



# Energy Efficiency Projects Completed & Planned

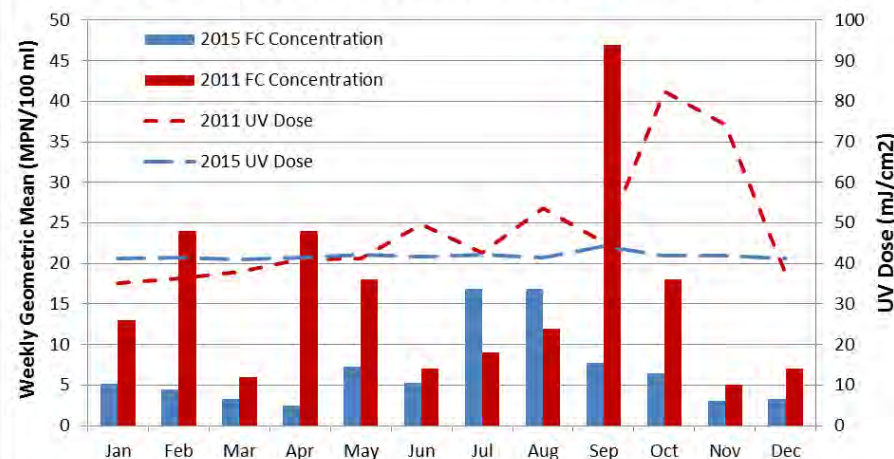
Year	Facility	Energy Improvements Completed	Energy Saved (kWh <sub>eq</sub> /year)	Facility	Energy Improvements Planned	Energy Saved (kWh <sub>eq</sub> /year)
1985	FP	Solar hot water heating system	na	FP	Install 500 hp VFDs on new centrifugal blowers	368,808
1985	FP	RASI VFDs	na			
1993	FP	Admin Building Lighting Upgrade	na	FP	RSPSII 18,000 CFM ERU/Heat Pipe	262,492
1996	FP	RASII VFDs	na			
2003	BP	VFD on Recycle Pumps	81,858	FP	PSPS 7,000 CFM ERU	153,433
2003	BP	Energy Efficient Blower	618,757			
2003	FP	Pitot Tube Air Station Sensors	24,788	FP	Lighting Upgrade	1,367,255
2004	FP	Upgrade Sludge Management	na	BP	Lighting Upgrade	654,852
2004	BP	Optimal DO and Blower Control	502,416			
2006	FP	Power Washing Diffuser Heads	25,266	Total Energy Saved (kWh/yr)		2,806,840
2006	FP	Fields Point Lighting Upgrade	63,347	% NBC Use		7.9%
2006	FP	VFDs on Blowers 1, 2, & 3	198,345			
2011	ESPS	VFDs on pumps #2,#3,#6,#7	66,971			
2012	FP	Plant Water VFDs	na			
2012	BP	40 VFDs	na			
2013	BP	Bucklin Point Lighting Upgrade	124,008			
2013	COB	Lighting upgrade at COB	63,419			
2013	BP	Efficient Blowers & Flexible Aeration	500,000			
2015	FP	FP Bisulfite Storage Building -ERU	227,308			
Total Energy Saved (kWh/yr)			2,496,483			
% NBC Use			7.0%			

# UV Disinfection Case Study

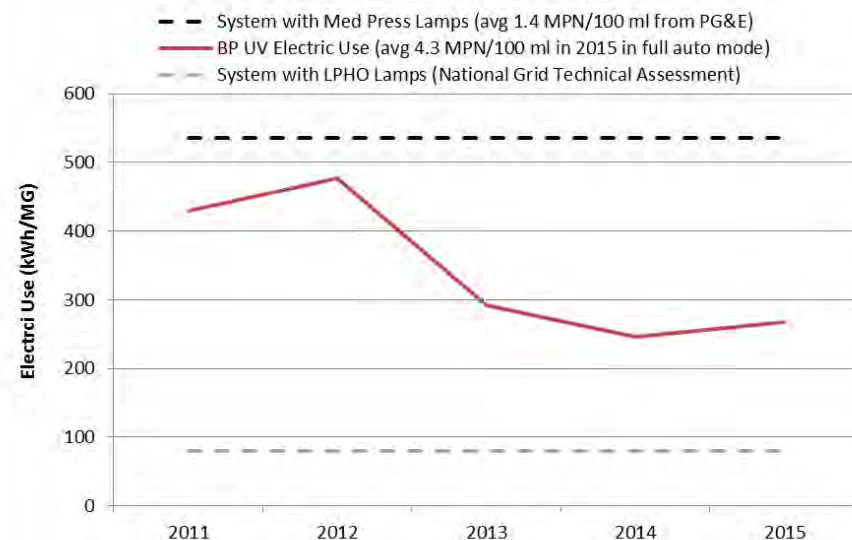
## NBC Bucklin Point Wastewater Treatment Facility UV Disinfection Retrofit Study & Improvements

- \* Average Flow– 20 million gallons/day
- \* Existing Condition
  - \* 10 Year Old Disinfection System, 20 year useful life
  - \* Uses Med Press lamps, paced w/ %T, Flow & TSS
  - \* Uses 40 mJ/cm<sup>2</sup> Dose (200 MPN/100 ml Monthly Limit)
  - \* Elevated Fecal Coliform (FC) at Low Summer Flow
- \* Problem
  - \* Algae & Floc Solids Shield FC from UV Radiation
  - \* High Dose with 2 Banks Didn't Fix Problem
- \* Solution
  - \* Clean UV Channel monthly if needed to remove solids
  - \* Ensure All 100 Lamps in Bank are replaced at same time
  - \* Upgraded Final Clarifiers as part of BNR Upgrade
  - \* NBC Now Operates System in full automatic mode
  - \* LPHO Retrofit is Breakeven Option for Future
- \* Impacts:
  - \* Compliance to Effluent FC Limits Maintained
  - \* Normalized Electric Use Reduced 48% in 3 years
  - \* Potential Future Savings with LPHO UV Lamps

**UV Dose & Effluent Fecal Coliform Concentration**



**Bucklin Point UV Disinfection**

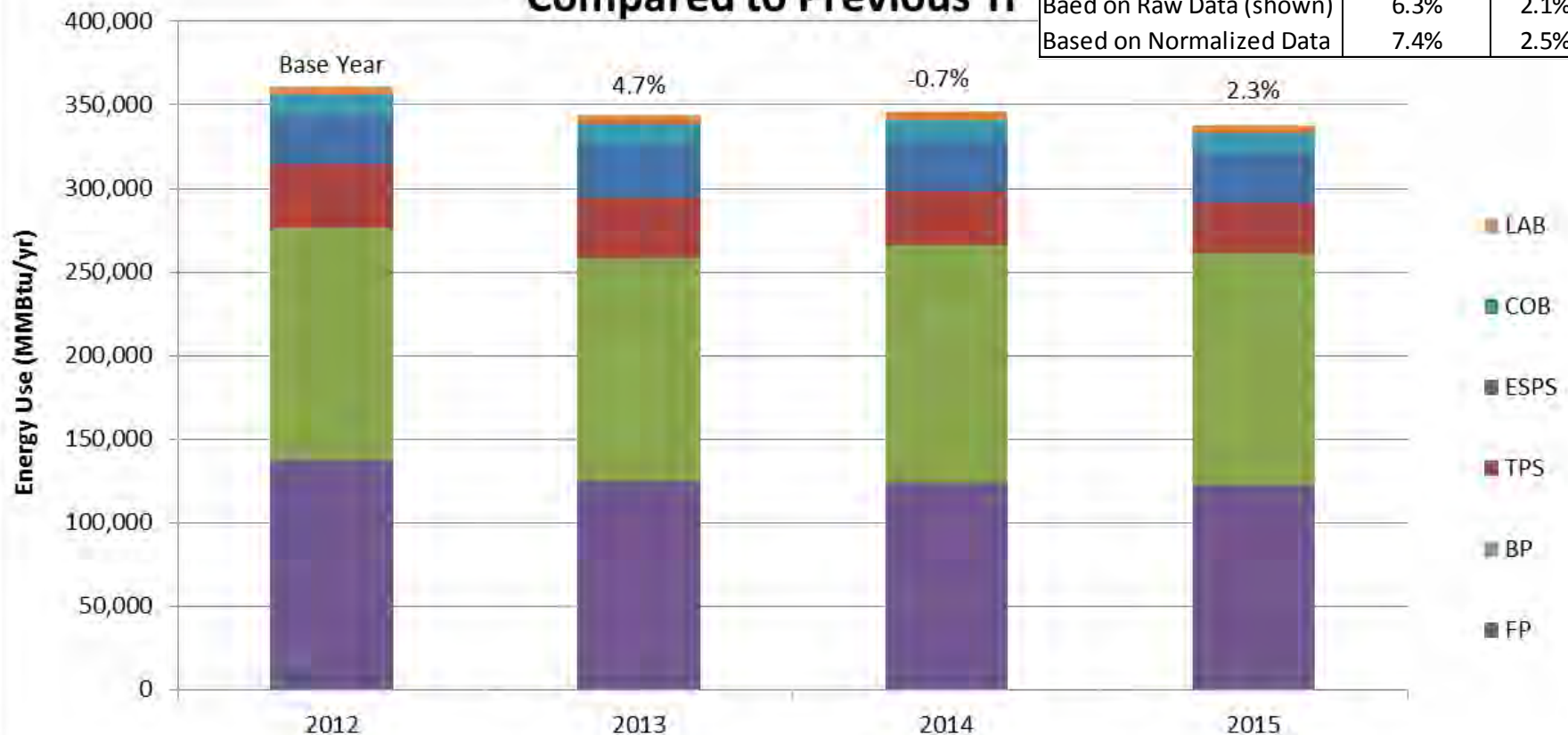




# Raw Energy Use

## USDOE Better Plants Program

### Energy Reductions Compared to Previous Yr



# Governor's Executive Order 15-17 Leading by Example in Clean Energy

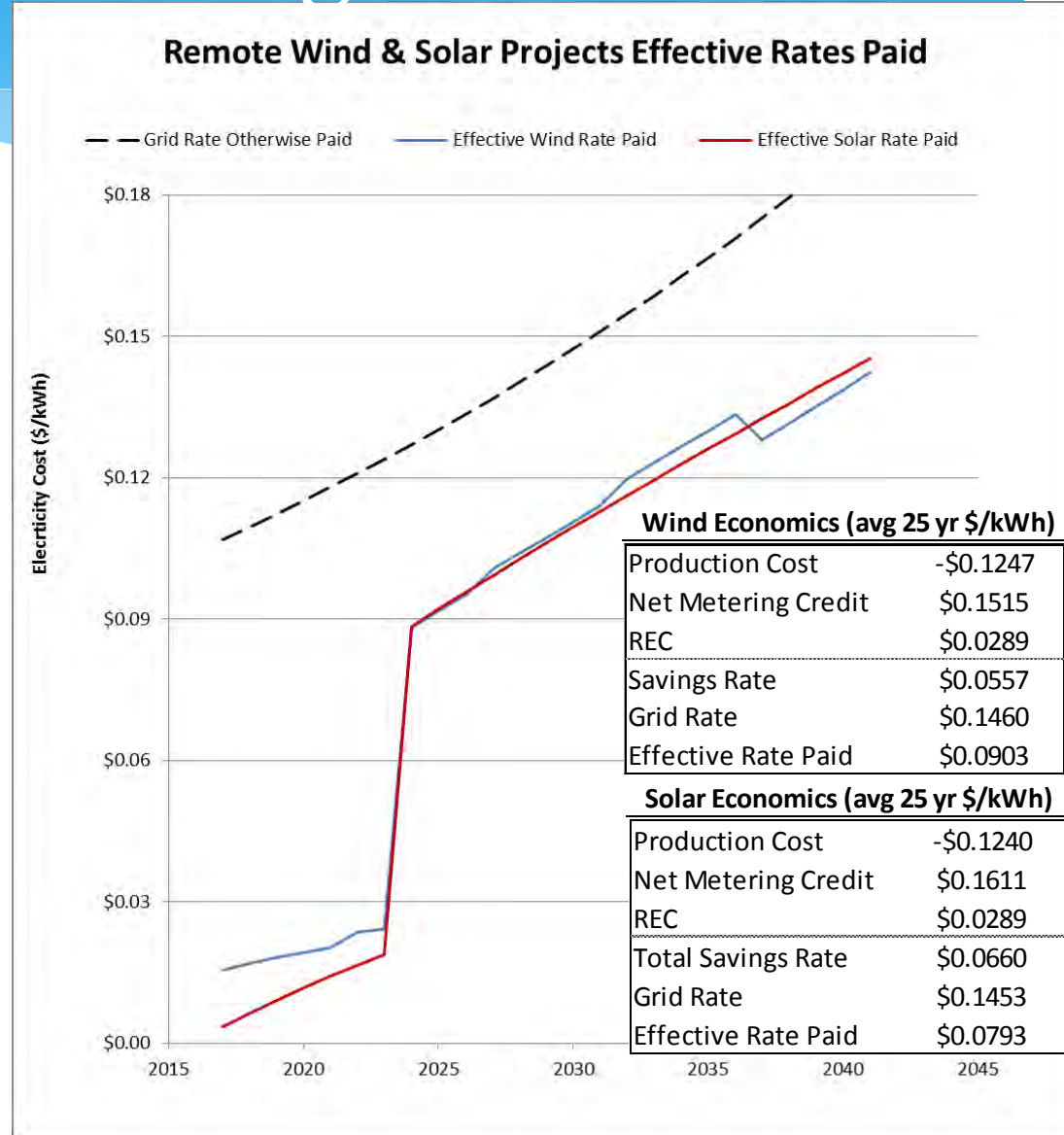
- \* State agencies will procure 100% of energy from **renewable resources** by 2025 and
- \* Reduce collective **energy consumption** by 10% by 2019 compared to 2014
- \* minimum of 25 percent of new light-duty state fleet purchases and leases will be **zero-emissions vehicles** by 2025
- \* achieve a high standard of **green building** operations and maintenance



# Remote Net Metered Projects

## Estimated Savings Rates

- \* RFPQ released in 2015 seeks remote renewable energy systems
- \* Awards based on lowest \$/kWh cost
- \* Purchasing (no interest) remote wind farm allows savings well below the market rate
- \* Solar PPA contract allows more savings and with little or no liability

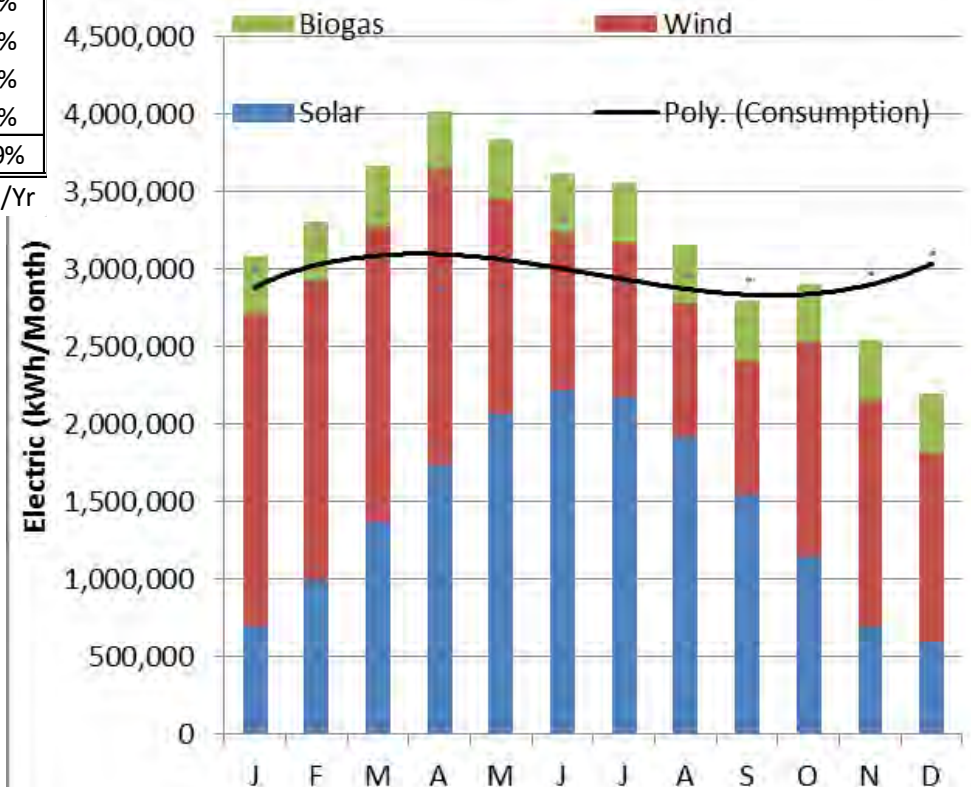


# Predicted Net Zero Renewable Power Mix

Sources of Renewable NBC Power

Potential or Existing Source	Nameplate (MW <sub>ac</sub> )	Capacity Factor (%)	Production (kWh/Yr)	% NBC Power Use
Bucklin Point Biogas Engine (onsite)	636	82%	4,565,413	13%
Field's Point Wind Turbines (onsite)	4.5	19%	7,524,978	21%
Coventry Wind Turbines (remote)	4.5	24%	9,421,649	26%
Solar Project (remote)	10	20%	17,160,567	48%
<b>Total Renewable Energy</b>			<b>34,107,193</b>	<b>109%</b>
Total NBC Electric Consumption (13 accounts)			35,564,169 kWh/Yr	

## Renewable Production & Use





# Questions?

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