

# SUSTAINABILITY and ALTERNATIVE ENERGY at MILWAUKEE COUNTY



Association of Metro Milwaukee Area  
Public Works Administrators & Engineers  
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Greg High, P.E. & Steve Keith, P.E.

# Presentation Overview

**Background – County Policy**

**Energy Trends**

**Alternative Energy Technologies**

**County Experience**

**Future Opportunities and Challenges**



# Milwaukee County's Green Print

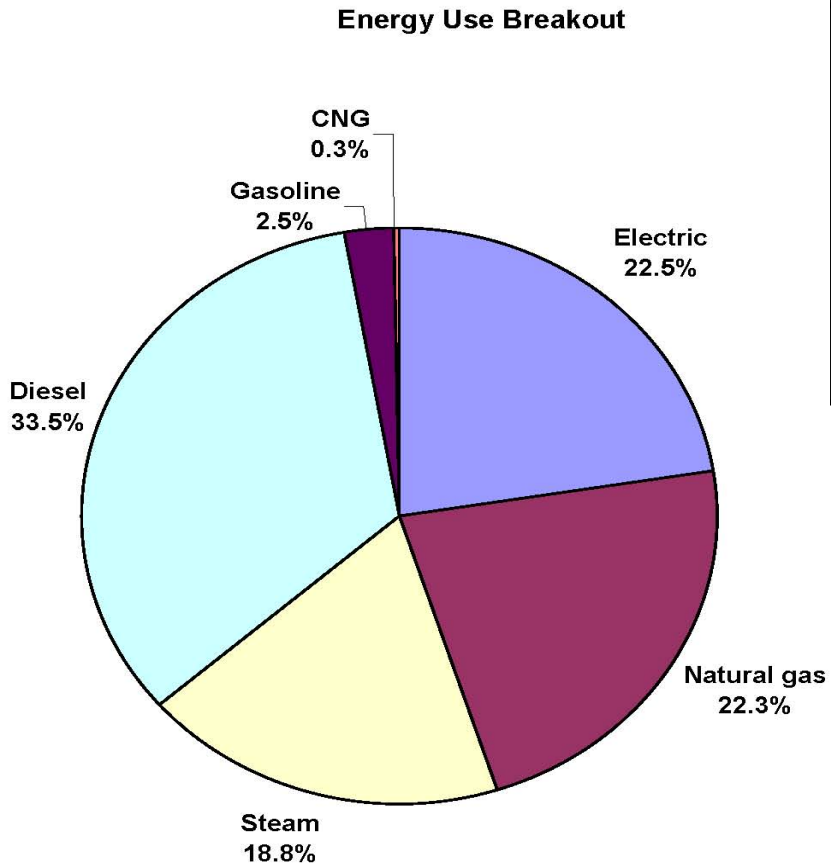
- Green Print
  - ▣ 2007 Resolution
  - ▣ 16 separate initiatives/goals, including alternative energy and alternative fuel vehicles
  - ▣ <http://county.milwaukee.gov/DPW/MilwaukeeCountysGreenPrint.htm>



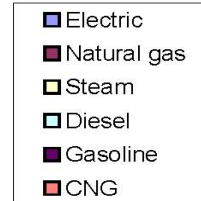
# Green Print Goals

- Energy Efficiency + Retrofits
- Sustainable Design
- Improve Storm Water / Water Conservation
- Enhance Recycling
- Land Conservation
- **Explore Alternative Energy Opportunities**
- **Purchase Cleaner Fleet Vehicles**
- Purchase Environmental Preferable Products
- Staff Education and Participation

# Energy Consumption

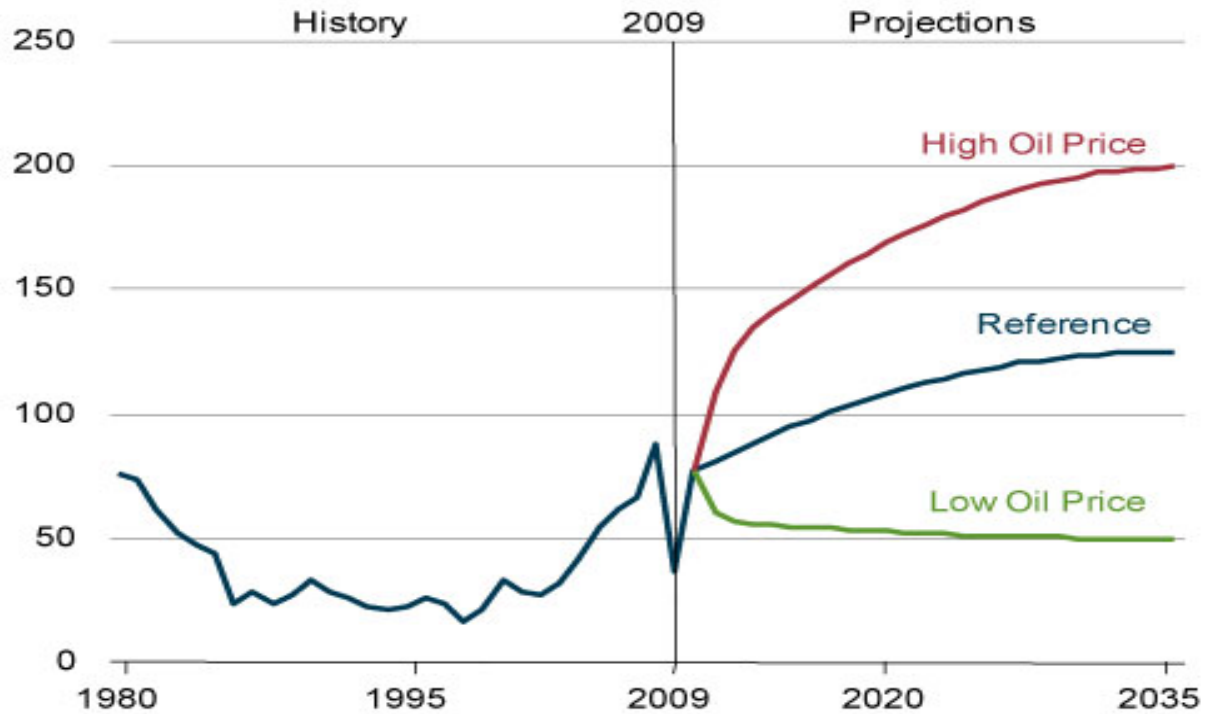


Electricity	\$11 million (27%)
Nat gas	\$3 million (9%)
Steam	\$5 million (13%)
Diesel	\$18 million (45%)
Gasoline	\$2 million (5%)
CNG	\$0.1 million (<1%)

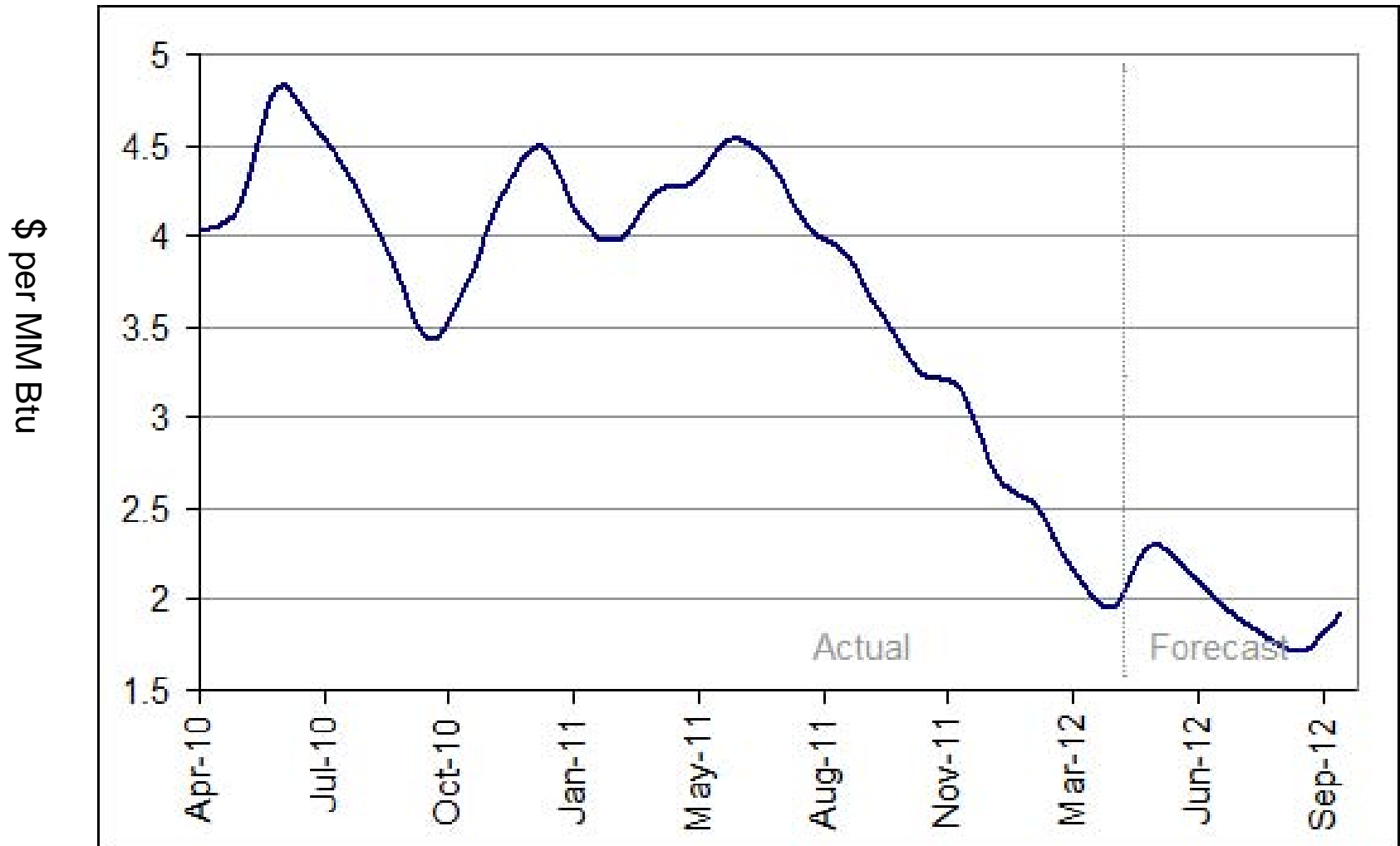


# Energy Trends – Oil

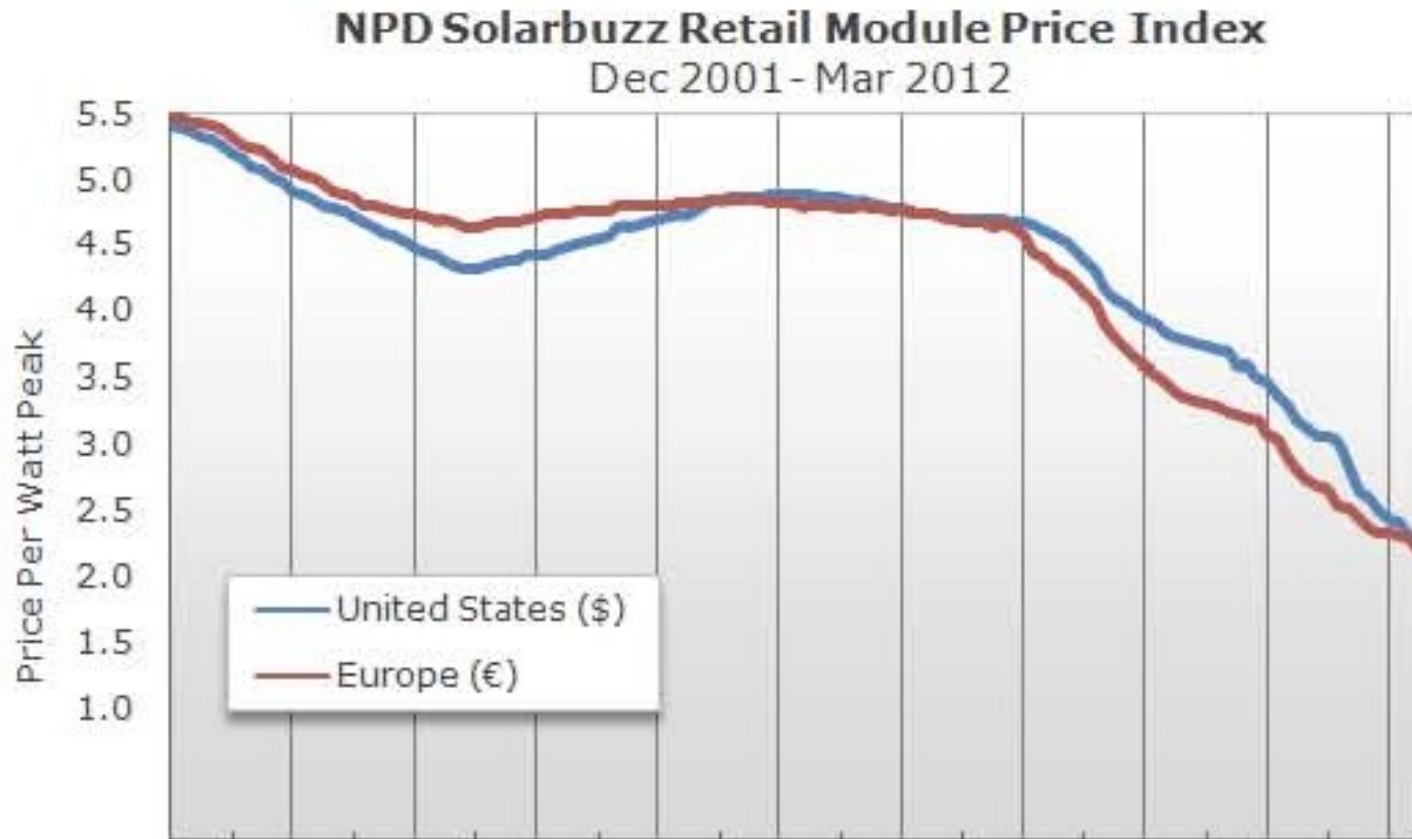
Figure 52. Average annual world oil prices in three cases, 1980-2035 (2009 dollars per barrel)



# Energy Trends – Natural Gas



# Trends – Price of Solar PV Panels





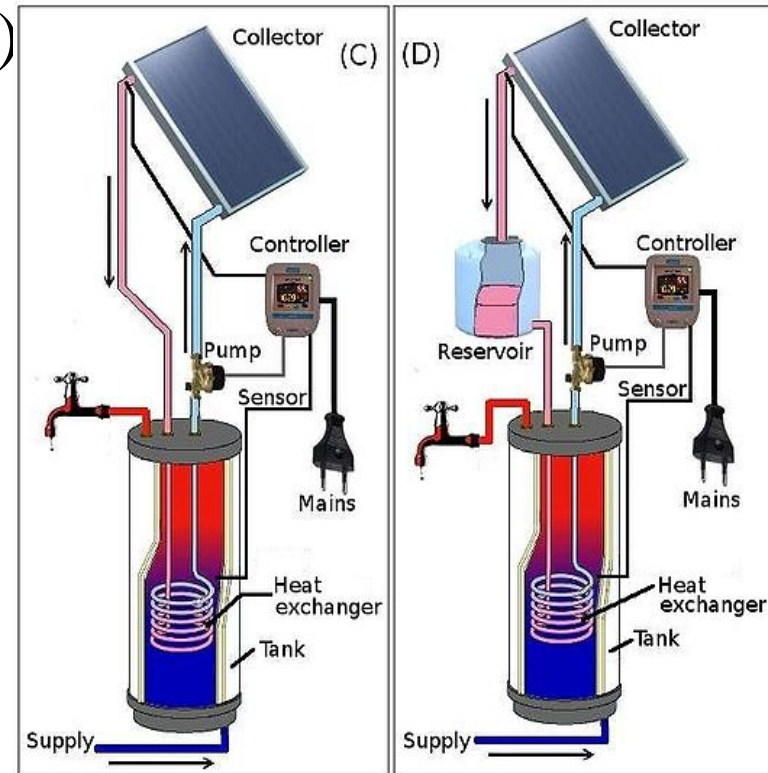
# Technologies - Solar Photovoltaic

- ❑ Crystalline panels
- ❑ Thin film
- ❑ Building-integrated



# Technologies - Solar Hot Water

- Main design types
  - ▣ Flat Plate (drain back)
  - ▣ Evacuated Tube (higher temps)
  - ▣ Pool collectors (low efficiency)
- More performance-spec



# Technologies - Wind Turbines

- Minimum height needed to be effective
- Significant economies of scale
- Cost per kW installed
  - <100kW: \$4,000/kW
  - >1 MW: \$1,750/kW



# Closer to 'Grid Parity' ?

- When cost of alternatives = cost of conventional
- Projected by ~2020. Vary by location + other
- Cost per kWh
  - ▣ Coal ~ 5-7 cents/kWh
  - ▣ Nat Gas ~ 5-7 cents/kWh
  - ▣ Solar PV ~ 10-20 cents/kWh (but dropping)
  - ▣ Wind ~7-9 cents/kWh
  - ▣ Nuclear ~ 7-9 cents/kWh

# Technologies – Alt. Fuel Vehicles

- Regenerative hybrids
- Compressed Natural Gas (CNG)
- Propane
- Plug-In Electric



ERIN MASTROIANNI / FOR THE JOURNAL SENTINEL  
The new Toyota Prius c, a smaller and less expensive version of the popular Prius hybrid, is on display at the 2012 Milwaukee Auto Show in February. Recent rebates have helped sales.

## Prius quietly moves to No. 3 in world

Once a niche vehicle, hybrid is boosting Toyota sales again

Bloomberg News

Toyota Motor Corp.'s Prius, a niche oddity when it went on sale 15 years ago, jumped to the world's third bestselling car line in the first quarter as U.S. demand and incentives in Japan

"It was good that introduction of Aqua and the start of government subsidies happened almost at the same time," said Koichi Sugimoto, senior analyst at BNP Paribas in Tokyo. He added that there's more to the success than the government incentives. "Toyota is introducing good vehicles and assuming it will maintain a certain volume even after the subsidies



# County Experience - Photovoltaic

- 5 systems installed, 2 in progress (all since 2008)
- Total of 28 kW installed capacity
- Roof-mounted and pole-mounted; grid-connected



# County Experience – Solar Hot Water

- 2 systems installed, 2 in progress
- All are “drain-back” flat plate design



# County Experience - AFVs

- 35 Ford Fusion Hybrids
  - Rated at 41 mpg
  - Tracking MPG on quarterly basis
  - Range: 23 – 132 mpg; with average climbing (42)
  - Estimated fuel savings: >10,000 gal/year



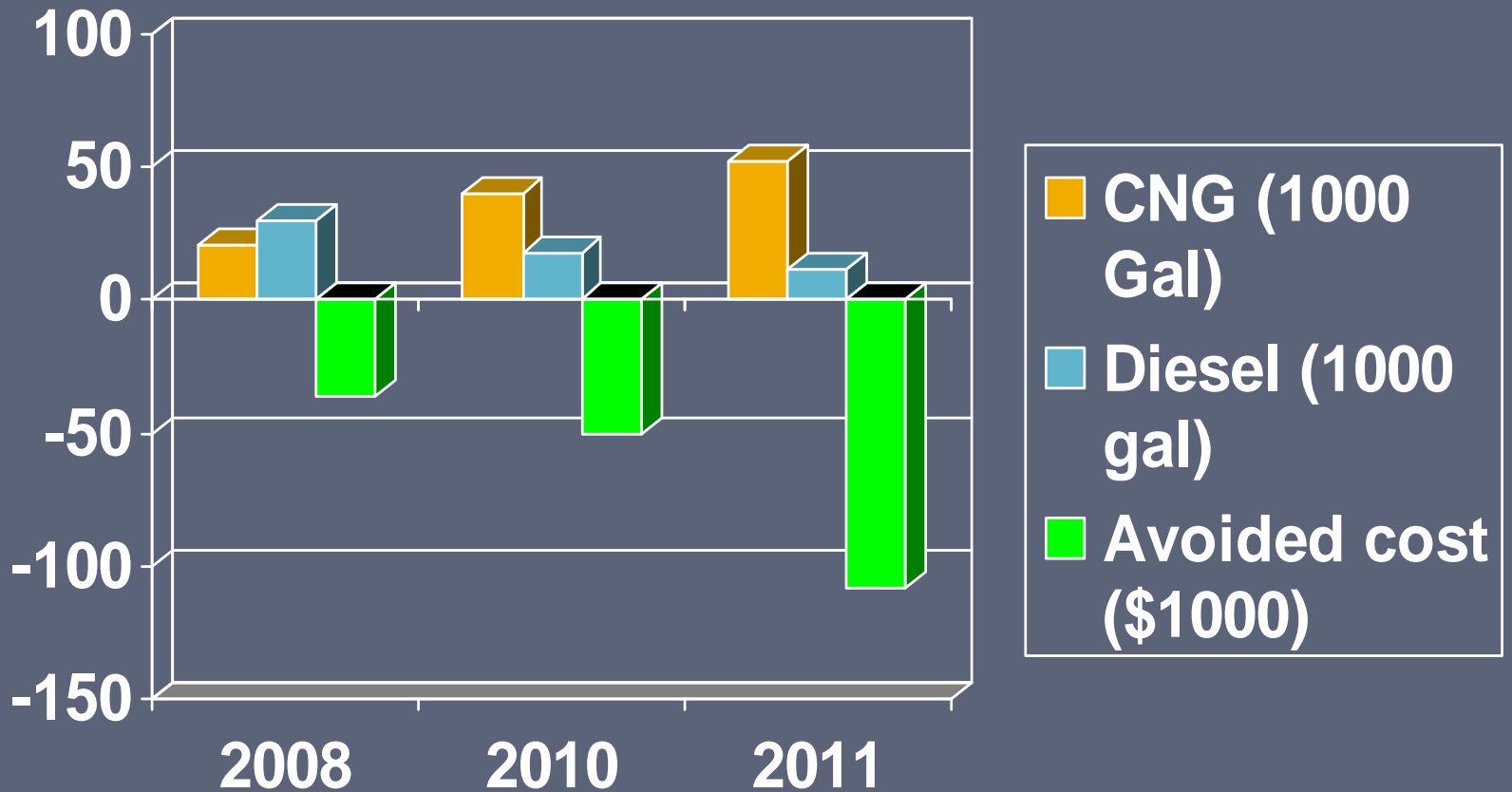


# County Experience - CNG Shuttles

- Fleet of 12
- Added 2 more in 2011
- \$1.80/gal vs. \$3.40/gal
- Reduced air emissions (vs older diesel)
- CNG refuse truck added



# CNG Shuttles at GMIA



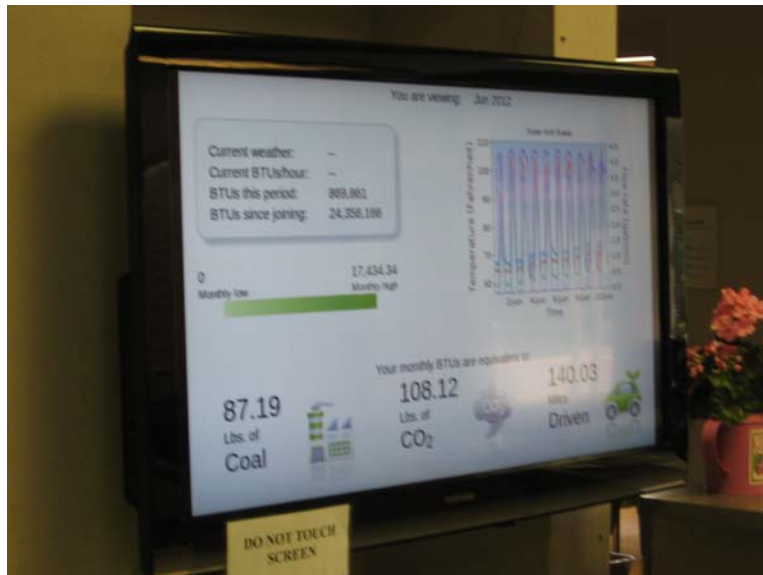
# County Experience -AFVs

- Hybrid Bucket Trucks (4)
  - Built by Dueco. Kenworth chassis, Odyne system
  - Projected fuel savings: 1750 gal per truck/year



# Opportunities & Challenges

- PEV codes & rules
- Power purchase agreements
- Staff education & training
- Instrumentation > feedback



# Takeaways

- Energy efficiency before energy generation
- Start small. Gain experience with design, O&M
- Begin review of PEV requirements
- CNG vehicles: worth a 2<sup>nd</sup> look?





***"When you're one step ahead of the crowd you're a genius. When you're two steps ahead, you're a crackpot."***

*--Rabbi Shlomo Riskin*

**Thank You**

Presented by:

Steve Keith, P.E.

Sustainability & Environmental Engineer

Milwaukee County

[Stevan.keith@milwcnty.com](mailto:Stevan.keith@milwcnty.com)

