



MILLIPORE

Energy Reduction at Millipore Compressed Air Case Study

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Millipore Background

MILLIPORE

From basic research
and discovery,

through product &
process development,

and into pharmaceutical
manufacturing & control,



. . . we help our Life Science customers win their fight against disease.

Millipore's Global Footprint



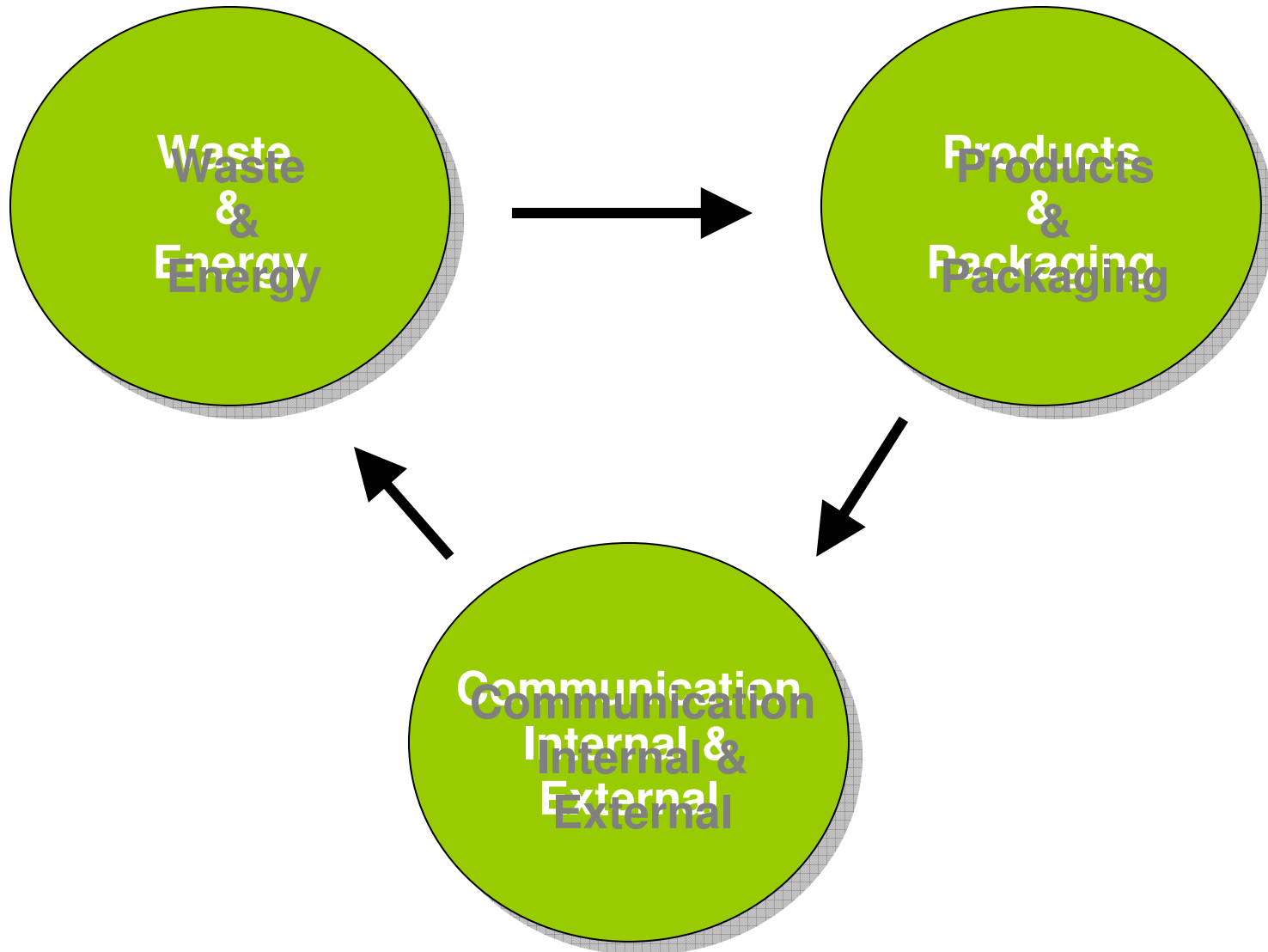
Sustainability Vision



Millipore's operations will become environmentally sustainable in the long-term by dramatically reducing the consumption of non-renewable resources, reducing waste and adopting behavioral changes that support sustainability company wide.

Martin Madaus, PhD, CEO

Key Focus Objectives for 2008



Accomplishments



Hybrid Vehicle Program

50% of leased vehicles are hybrids



Energy

3M+ KWh Saved



Packaging

Milliplex – 100% Recycled

Jaffrey – Using 25-60% Recycled



Water

Millions of Gallons Saved

But How Much Was That?



3,000,000 Kilowatt Hours



2,332 Tons CO_{2e} (~1.5% WW total)



427 Mid-sized Autos (25mpg)



309 Homes

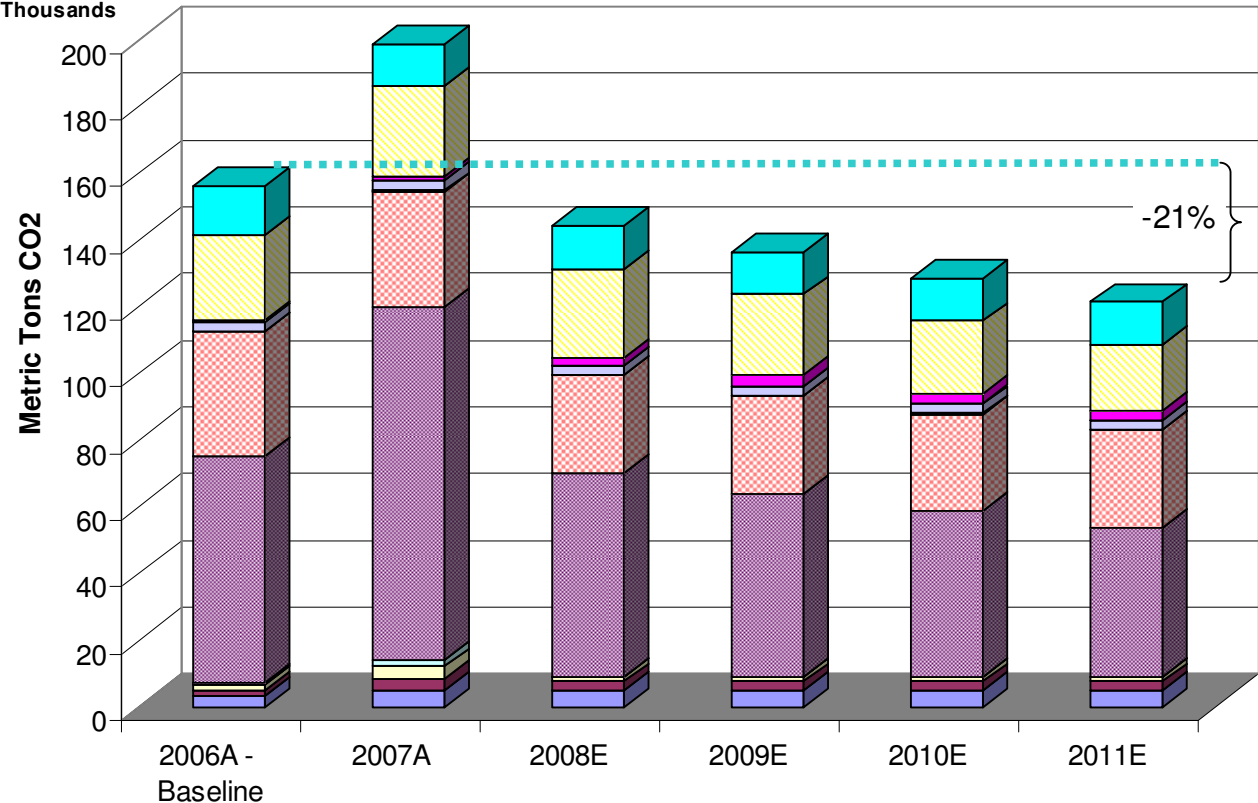


23,000 Light bulbs (left on all day...every day!)

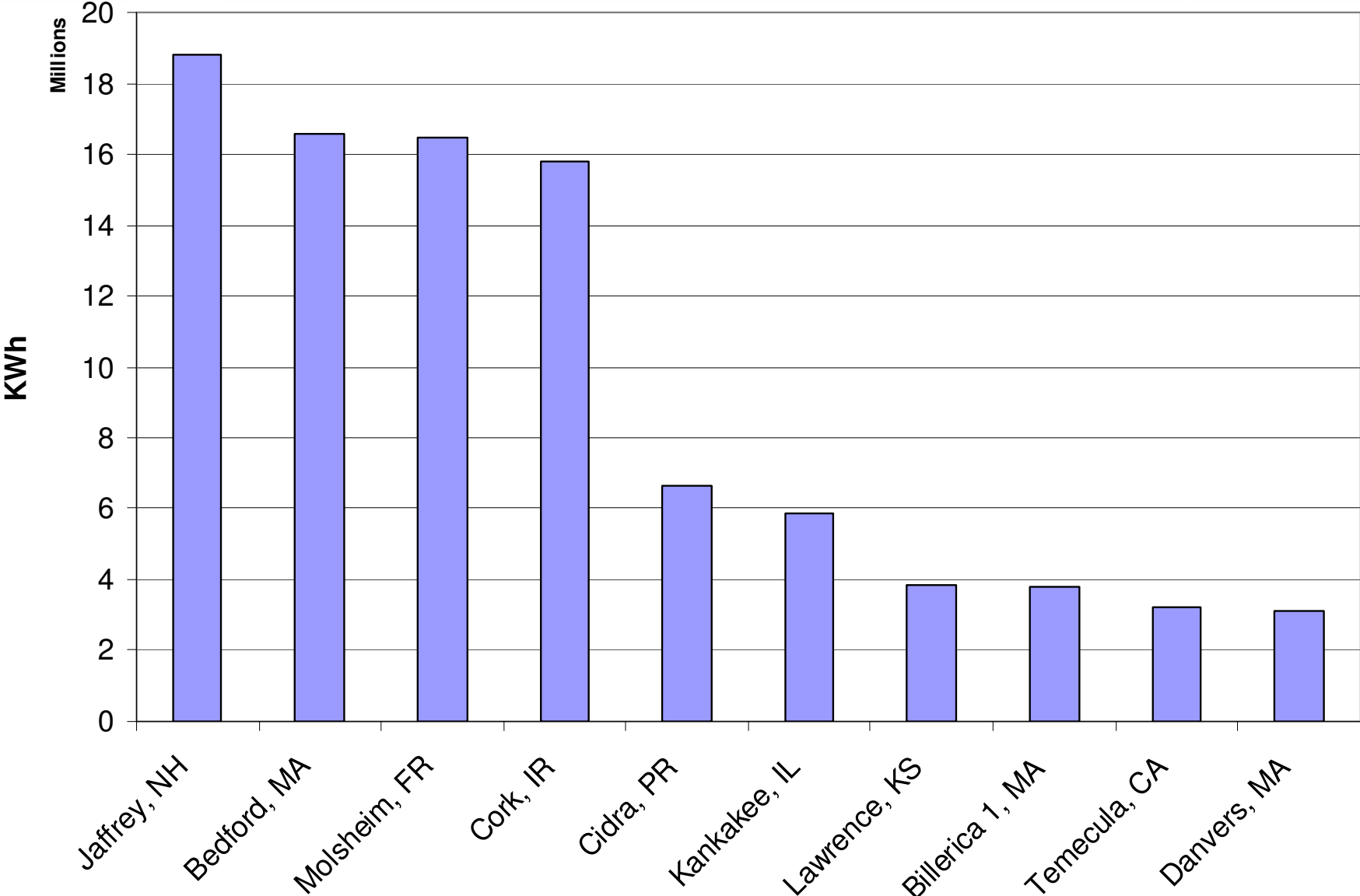


97,000 Backyard BBQ tanks

Greenhouse Gas 5-year Goals



2007 Worldwide Energy Use



Why focus on Compressed Air Systems?

MILLIPORE

Compressed Air- In a 24 Hr Manufacturing Operation is **THE** most expensive utility. “***A.K.A. The Fourth Utility***”

- Air Compressors are typically the **Largest** Horse Power Electric Motors
- The overall efficiency of a typical compressed air system can be as low as 10-15%.
- ***For every \$1 spent on energy for compressors, 85-90% is lost as heat & mechanical losses***

Think of your compressor as a **heater** rather than a compressor.



World Wide View

Jaffrey NH
4= 600 HP Reciprocating



Total ~ 2000 HP
Or
13,000,000 KWH/yr
Or ~ \$ 2 Mil/yr

Cork Ireland
8= 550 HP Rotary Screw



Bedford MA
3=350 HP Rotary Screw

1 HP = \$ 1000



Molsheim France
7= 400 HP Rotary Screw

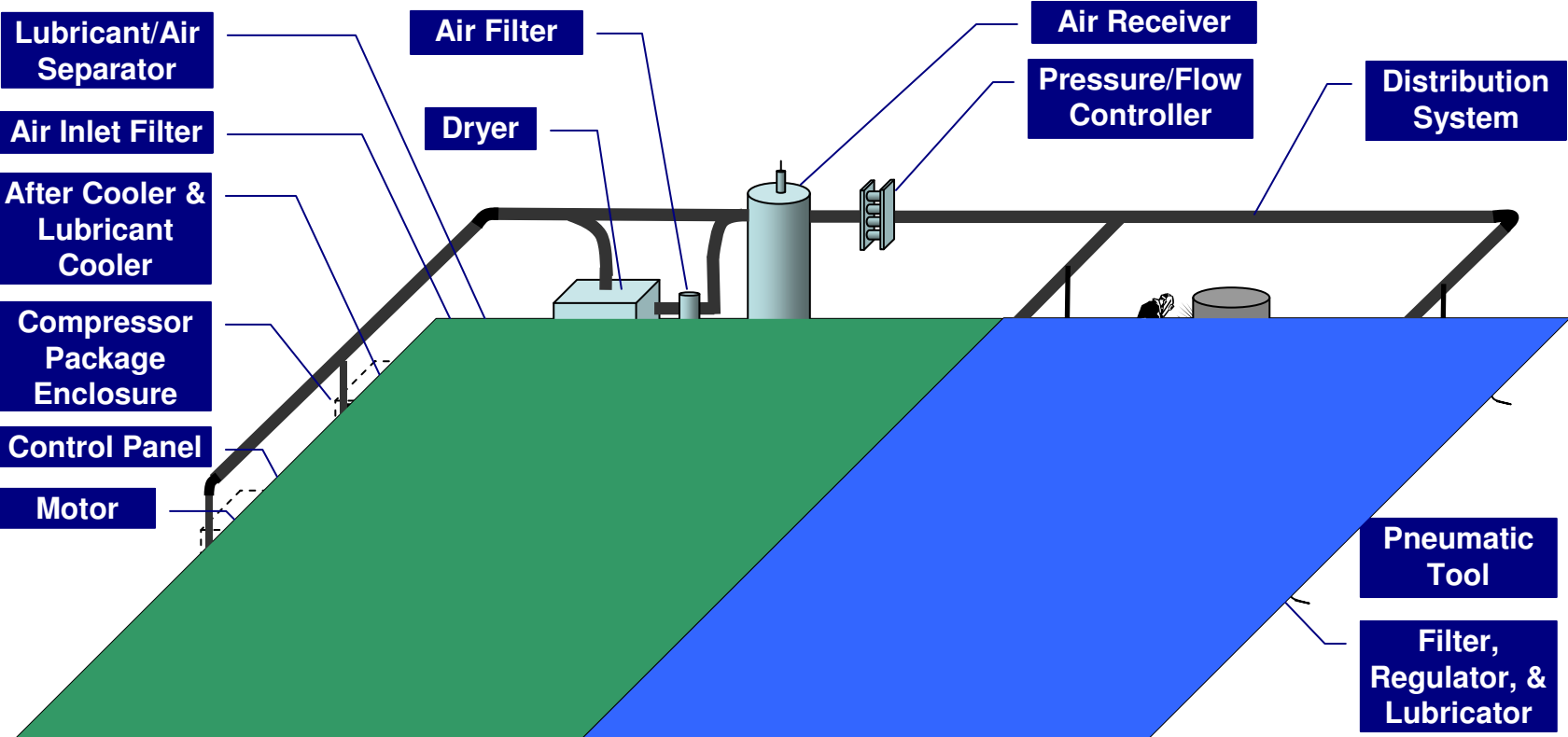
Two Sides to the System



All of the components necessary to generate and treat compressed air.

All of the components that consume compressed air

Areas of Focus



Tools Required



Flow Meters

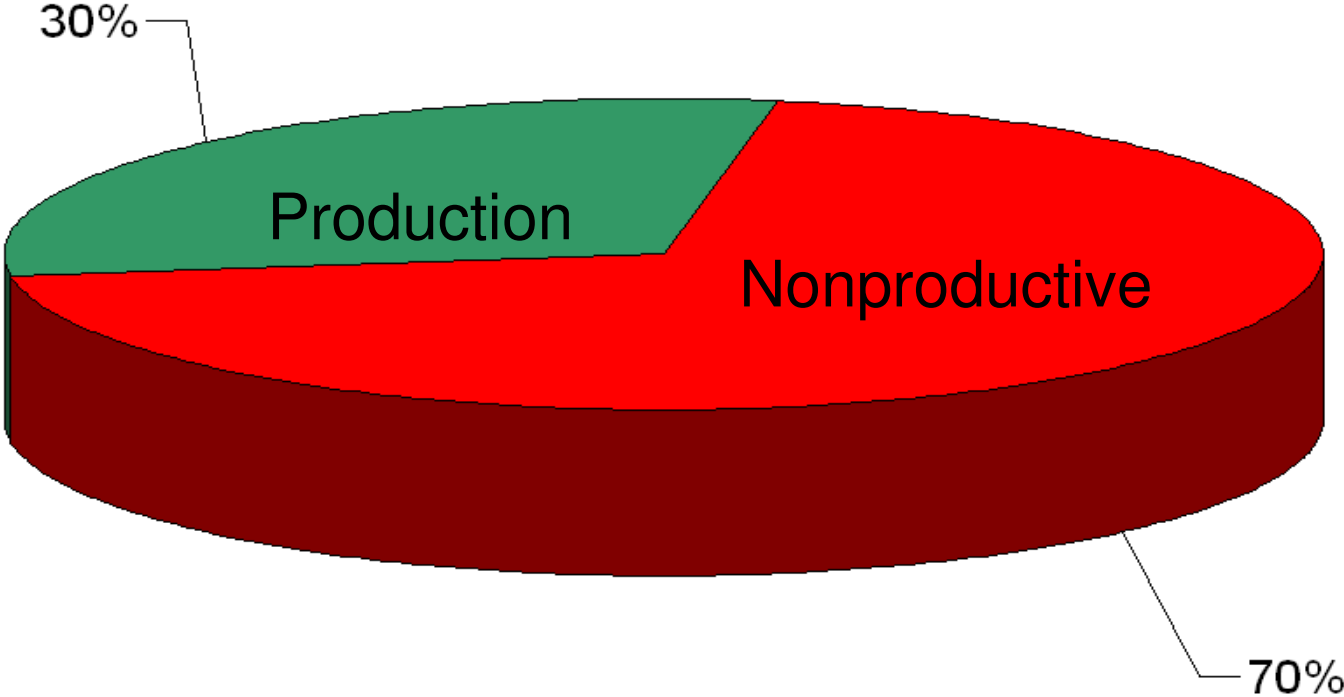


Power Meters

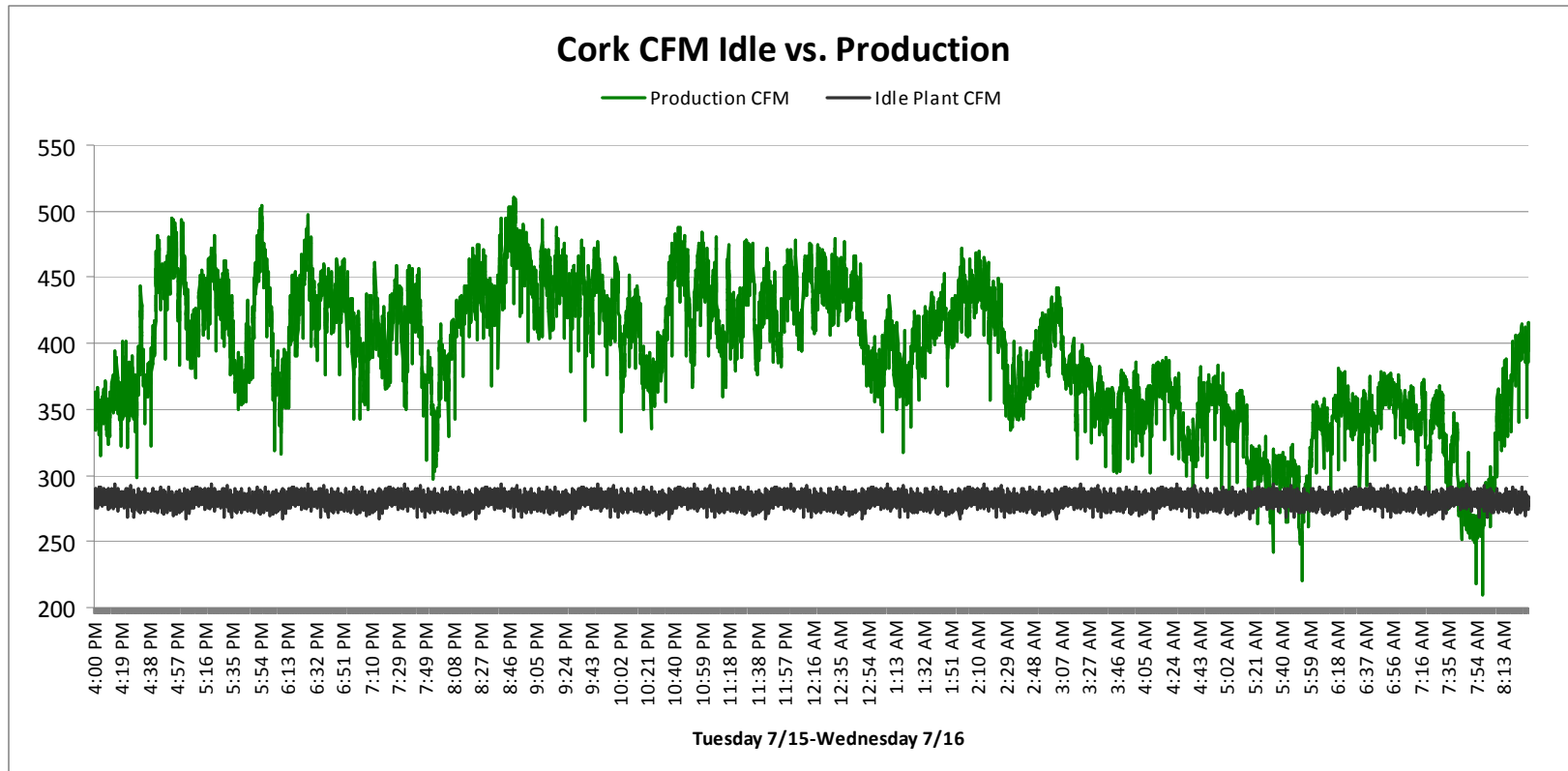
Leak Detectors

Bedford Compressed Air Demand

ESTIMATED ANNUAL ELECTRICAL USEAGE
1,287,227 kWh/Yr. OR \$204,700



Results of Teamwork to Reduce



Compressed Air System Engineering Study

Piping restrictions result in a significant pressure & Flow reduction. 2" pipe reduced to approx. 1/2".



Summary - Energy Efficiency Projects

<u>Energy Savings Projects</u>	<u>Date</u>	<u>KWh Savings</u>	<u>Pounds of CO2</u>	<u>Cost Savings</u>
Burlington Warehouse Lighting	May-07	973,525	1,246,112	\$ 122,566
Billerica 1/2 Lighting	May-08	46,000	58,880	\$ 6,509
Bedford CDA Compressors	Jul-08	278,381	356,328	\$ 44,767
Bedford CDA Demand Reduction	Nov 07-present	308,407	394,761	\$ 44,424
Jaffrey CDA Interconnect/ 1 Compressor	Jan-08	224,021	152,334	\$ 24,642
Jaffrey CDA Demand Reduction	Jan-08	137,970	93,820	\$ 15,177
Cork CDA VFD Installation	Dec-08	402,084	506,626	\$ 56,292
Cork Other Demand reductions	Jul-08	600,000	756,000	\$ 84,000
Subtotal		2,970,388	3,564,860	\$ 398,377

