

Energy Efficiency Programs & Processes

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Energy Use is Most Significant Source of Company Emissions

Deere's GHG Emissions

31% Direct

Largest Direct Processes

- Foundry
- Heat Treat
- Painting
- Powerhouses
- Testing Operations

69% Indirect

Purchased Electricity & Steam



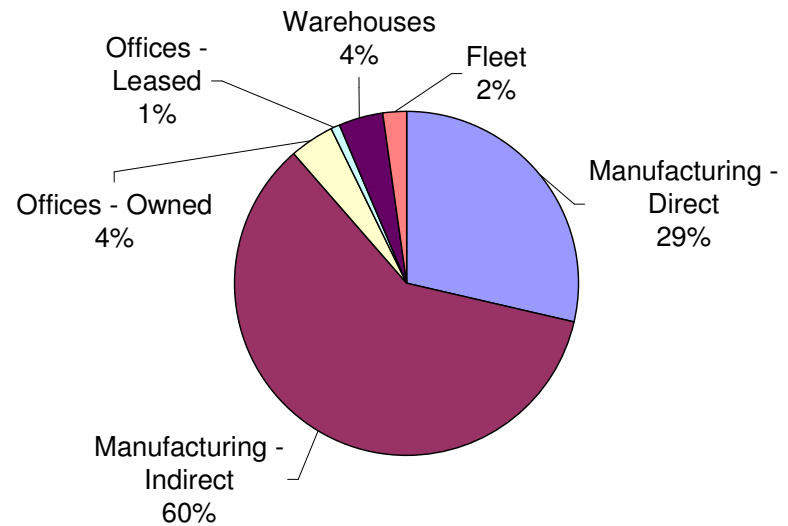
Opportunity Drilldown

Manufacturing "Top 15"

- 30% of our mfg units account for 81% of our CO2 tons
- Represent 69% of our energy cost
- Energy costs doubled FY2003-FY2007
- FY2006-FY2007 increased 42%

**Unit Energy
Reduction Goals:**
2005: 9 units
2006: 20 units
2007: 28 units

2006 CO2 Tonnage Breakdown



Manufacturing: 89%



Building Energy Usage

- Opportunities for buildings energy use
 - Improved efficiency - lighting/heating/cooling/plug loads
 - Building standards - ASHRAE/LEED
 - On-site power generation - solar PV/fuel cells
- Project Opportunities
 - Modernization/Upgrade projects
 - Integration with other project or initiative
 - Stand-alone energy projects



Industrial Process Opportunities

- Opportunities for industrial processes
 - Fuel switching or blending - boilers / process heaters
 - Improved efficiency - utility systems / process equipment
 - Renewable energy - biomass / solar / wind
 - On-site power generation - combined heat and power
- Project Opportunities
 - Modernization / Upgrade projects
 - Integration with other project or initiative
 - Stand-alone energy projects



Encourage Units to Designate Energy Champion (EC)

- Energy Champion
 - Possibly Regional (as done in Waterloo)
 - If not Regional, then individual required at each unit
 - These people are the primary energy contact at each unit.
 - The Energy Champion will be charged with developing a strategy to reduce their facility's *GHG* emissions.
 - The Energy Champion will administer and monitor the *GHG* reduction program at their facility.

- Progress
 - Energy Champions have been identified at all top 15 units.
 - Many other units have also identified an Energy Champion.
 - Energy Champions are an even mix of Facility Engineers and Environmental Professionals



Train / Inform Energy Champions

- Energy Efficiency Teleconferences
 - Monthly web-based (LiveMeetings), one hour long
 - Topics are typical facility systems and possible energy conservation opportunities. (Lighting, compressed air, VFDs, HVAC, EMS, etc.)
 - Share best practices in energy efficiency amongst units in support of company's energy/greenhouse gas reduction goal
 - Seven sessions completed (attendance has ranged from 19 to 41 on-line)
 - Topics scheduled thru August 2008

- Plant-wide Training / Awareness
 - Some plants (Dubuque & Davenport) are considering a plant-wide training session to make all employees aware of initiative. Tentative dates set in late-April / early-May.



Energy Steering Committee

- Participants
 - Mainly comprised of large plant's Energy Champions
 - Meet regularly (roughly every three weeks) - Web meeting
 - 8 individuals - global
- Function
 - Establish best practices and procedures for energy management program to reduce GHG
 - Develop tools to assist other units
 - Develop common practice through tools and procedures
- Progress
 - List of potential goals for committee have been identified
 - Seven meeting have been held
 - Tools / Common Practices Developed To-Date
 - Energy/GHG tracking vs. Goal spreadsheet
 - Financial project calculator
 - Communication policy / methods
 - Energy Audit suppliers and scope of work



Energy Technical Committee

- Participants
 - Deere & Company Facility Engineering
 - Meet regularly (roughly every three to four weeks)
 - 4 individuals
- Function
 - Establish best practices document for facility-related systems, regarding energy issues.
 - Develop technical criteria to provide guidance to other units when retrofitting systems or designing new systems



Energy Technical Committee

- Progress
 - List of facility systems have been identified and split among members
 - Best practice document completed for:
 - Compressed air
 - Boiler systems
 - Lighting systems
 - Systems remaining to be completed:
 - Chilled Water Systems
 - DX Cooling Systems
 - Ventilation & Air-side HVAC Systems
 - Building Automation Systems
 - Pumping Systems
 - Indoor Air Temperatures
 - Dust Collection Systems
 - Insulation Systems
 - Paint Systems
 - Building Envelope
 - Electrical Distribution Systems
 - VFD's and Motors
 - SCADA Systems



COMPRESSED AIR

100 POUNDS PRESSURE

1/8" Hole 8 hrs per day equals 10 cents per day equals \$3.50 per month (26 days) equals \$42.00 per year.

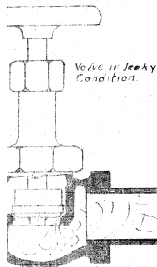
3/16" Hole 8 hrs per day equals 61 cents per day equals \$17.88 per month (26 days) equals \$214.56 per year.

1/2" Hole 8 hrs per day equals 4 cents per day equals \$1.04 per month (26 days) equals \$12.48 per year.

| DIAMETER OF OPENING | Cu Ft air wasted per month 30 da 24 hrs at 100 lbs pressure | Cost of waste per month at 5 cents per 1000 Cu Ft |
|---------------------|---|---|
| 1/2" | 17,798,400 | \$ 889.92 |
| 3/8" | 3,979,200 | 498.24 |
| 1/4" | 449,600 | 27.28 |
| 3/16" | 1,114,560 | 55.72 |
| 1/8" | 278,640 | 13.73 |
| 1/16" | 69,552 | 3.48 |

1/2" Hole 8 hrs per day equals 4 cents per day equals \$1.04 per month (26 days) equals \$12.48 per year.

STEAM



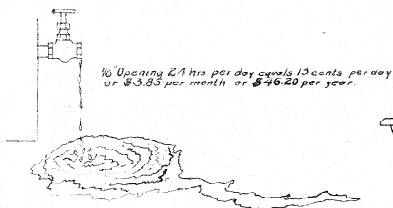
1/4" Hole 24 hrs per day equals 17 cents per day - \$4.10 per month or \$49.20 per year.

Valve opening open to hole 1/4" size 24 hrs per day equals \$2.70 per day - \$81.20 per month or \$974.40 per year.

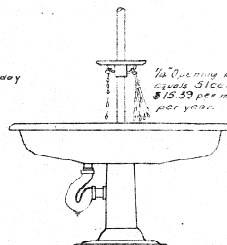
| DIAMETER OF OPENING | Pounds wasted per month 30 da 24 hrs at 100 lbs pressure | Cost of waste per month at 40 Cents per 1000 pounds |
|---------------------|--|---|
| 1/2" | 805,000 | \$ 322.00 |
| 3/8" | 460,000 | 184.00 |
| 1/4" | 203,000 | 81.20 |
| 1/8" | 50,500 | 20.20 |
| 1/16" | 12,750 | 5.10 |
| 1/32" | 3,175 | 1.27 |

| DIAMETER OF OPENING | Cost of waste per month at 40 cents per 1000 lbs per month |
|---------------------|--|
| 1/2" | \$ 322.00 |
| 3/8" | 184.00 |
| 1/4" | 81.20 |
| 1/8" | 20.20 |
| 1/16" | 5.10 |
| 1/32" | 1.27 |

WATER



1/8" Opening 24 hrs per day equals 13 cents per day or \$3.83 per month or \$46.20 per year.

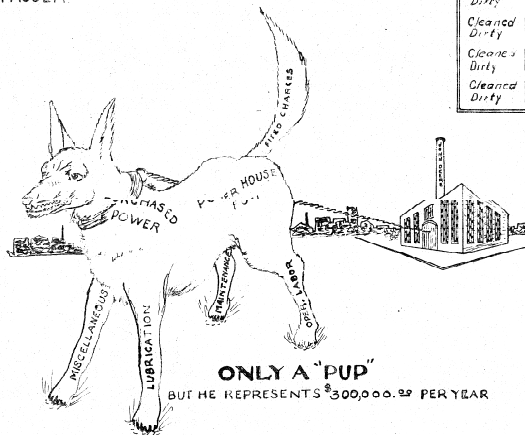


1/2" Opening 24 hrs per day equals 51 cents per day or \$15.30 per month or \$184.80 per year.

| DIAMETER OF OPENING | Cu Ft water per month 30 days 24 hrs at 40 lbs pressure | Cost of waste at 40 Cents per 1000 gallons |
|---------------------|---|--|
| 1/2" | 1,250,000 | \$ 62.50 |
| 3/8" | 692,400 | 34.62 |
| 1/4" | 307,700 | 15.39 |
| 1/8" | 26,900 | 3.85 |
| 1/16" | 19,200 | 0.96 |
| 1/32" | 4,800 | 0.24 |

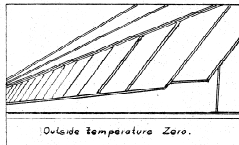


THE BUCK PASSER



ONLY A "PUP" BUT HE REPRESENTS \$300,000.00 PER YEAR

THE OPEN WINDOW



Outside temperature zero.

| Condition of window | Cu Ft air lost per month | Cost per month |
|---------------------------|--------------------------|----------------|
| 1-10 X 12 Glass broken | 432,000 | \$ 173.20 |
| 1-2 X 4 Glass broken | 31,560,000 | 16.30 |
| 80 X 4 sash open 6 inches | 172,800,000 | 82.80 |

WATCH THE WINDOWS
They are for ventilation and light. Open them only when necessary. Keep them clean at all times.

THE OPEN DOOR

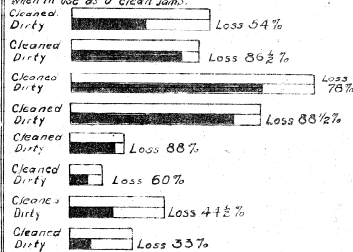


Outside temperature zero.

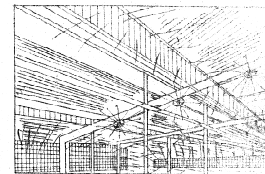
| Condition of door | Cu Ft air lost per month | Cost per month |
|--------------------|--------------------------|----------------|
| Door open 2 inches | 277,200 | \$ 3.44 |
| Door open 1 foot | 43,047,200 | 20.64 |
| Door half open | 215,236,000 | 103.20 |
| Door open | 430,472,000 | 206.20 |

WASTE DUE TO DIRTY LAMPS

The following chart shows the results of a study made in a foundry and indicates the relative light values in foot candles for dirty and clean light bulbs and reflectors. A dirty lamp consumes just as much electric energy when in use as a clean lamp.

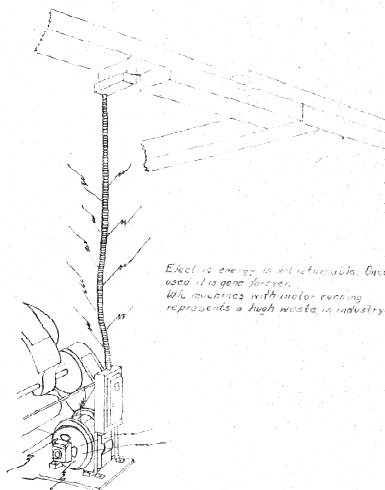


LIGHTS



| Number of 100 watt lamps burning 10 hrs per day | Number of KW hrs wasted per month | Cost of waste per month at 5 cents per KW hr |
|---|-----------------------------------|--|
| 10 | 480 | \$ 9.60 |
| 20 | 960 | 19.20 |
| 30 | 1440 | 28.80 |

MOTORS



Electric energy is inefficient. One used it is gone forever. 10% machines with motor running represents a huge waste in industry.

| Motor | Number of KW hrs wasted per month at 10 hrs per day | Cost of waste per month at 5 cents per KW hr |
|-------|---|--|
| 5 HP | 375 | \$ 7.50 |
| 10 HP | 750 | 15.00 |
| 15 HP | 1125 | 22.50 |