



Corporate Environmental Affairs



# IBM's EPA Climate Protection Award

Presentation by: Jay Dietrich, CEA Program Manager of Climate Stewardship

Presented by: Mark Carlson, Manager of Environmental, Space, and Maintenance of Rochester, MN



## Agenda

- **OVERVIEW: IBM & CLIMATE CHANGE**
  - **Voluntary Initiatives**
- **IBM'S 2006 EPA CLIMATE PROTECTION AWARD FOCUS AREAS**
  - **Operational Energy Efficiency**
  - **Renewable Energy**
  - **PFC Emissions**
  - **Transportation Initiatives**



## IBM & Climate Change

- **ACKNOWLEDGES CLIMATE CHANGE AS CRITICAL CHALLENGE**
  - **A History of Involvement in Voluntary Initiatives**
  - **Long-standing and Aggressive Energy Conservation Program**
  - **Renewable Energy Program**
  - **Commuter Programs**
  - **Formalized Product Stewardship Program**
  
- **PRODUCT INITIATIVES**
  - **Processor Technology: Many Power Reducing Innovations**
  - **Product Manufacturing**
  - **Data Center Management**
  
- **CONTINUE TO EXECUTE OPPORTUNITIES TO MAINTAIN COMPETITIVENESS AND EXTEND LEADERSHIP**
  - **Continued Advocacy and Engagement with Appropriate Groups**
  - **Continued Operational Energy Efficiency**
  - **Product Innovations**



## Sampling of IBM's Participation In Voluntary Partnerships

- 1992** Charter member of USEPA's ENERGY STAR computer program
- 1995** Began reporting under USDOE Voluntary Greenhouse Gas Emissions (1605b) Reporting.
- 1996** Signed Memorandum of Understanding with USEPA to voluntarily reduce PFC emissions.
- 2000** Charter member of the World Wildlife Fund/Center for Energy & Climate Solutions Climate Savers program.
- 2000** Joined Pew Center's Business Environmental Leadership Council.
- 2000** Charter member of World Resource Institute's (WRI) Green Power Market Development Group.
- 2002** Signed second Memorandum of Understanding with USEPA to voluntarily reduce PFC emissions.
- 2002** Charter member of USEPA's Climate Leaders program.
- 2003** Charter member of the Chicago Climate Exchange.



## IBM's Voluntary Climate Protection Goals

- 1996** Achieve annual energy conservation savings equivalent to 4% of IBM's actual annual electricity & fuel use.
- 1998** Reduce PFC emissions by 40% by year-end 2002 against a 1995 baseline, indexed to production: **Achieved in 2002.**
- 2000** WWF CLIMATE SAVERS: Achieve CO<sub>2</sub> emissions reductions equivalent to 4% of IBM's total CO<sub>2</sub> emissions each year over the period 1998 to 2004: **Achieved 5.7% Annual Avoidance of CO<sub>2</sub> Emissions for Commitment Period.**
- 2002** The 1996 energy conservation goal was updated to encourage the purchase of renewable energy and recognize the role of renewable energy in reducing indirect CO<sub>2</sub> emissions.
- 2002** EPA CLIMATE LEADERS: Achieve average annual CO<sub>2</sub> emissions reductions equivalent to 4% of the emissions associated with IBM's annual fuel and electricity use over the 6 year period from 2000 through 2005; and achieve an absolute 10% reduction in PFC emissions from IBM's semiconductor manufacturing processes by the end of 2005, against the 2000 base: **Achieved 6.2% CO<sub>2</sub> Avoidance and a 57% Absolute PFC Reduction.**

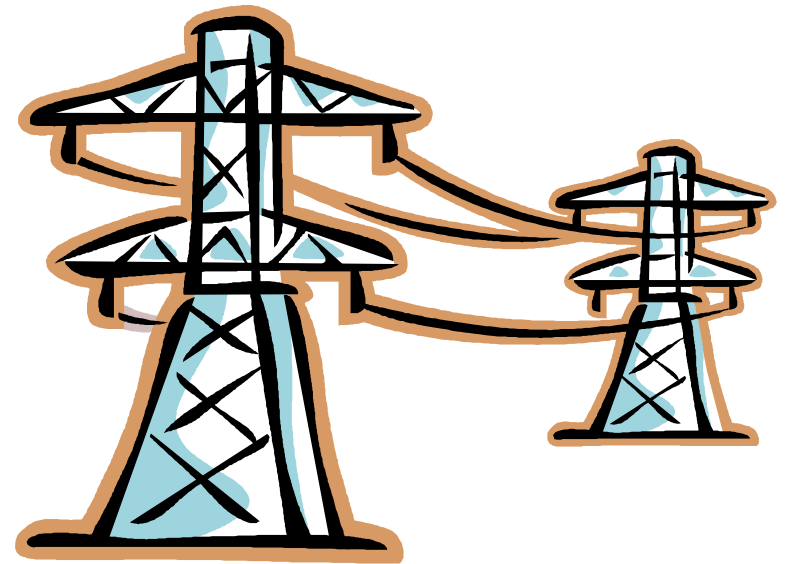
## IBM's History with the EPA Climate Protection Award

- **IBM won the EPA Climate Protection award in 1998**
  - **First year the award was offered**
  - **Focused on energy conservation and pollution prevention**
  
- **IBM also won the same award in 2006**
  - **First time a company has won twice**
  
- **IBM's 2006 Award Focused On:**
  - **Operational Energy Efficiency**
  - **Renewable Energy**
  - **PFC Emissions**
  - **Transportation Initiatives**



Corporate Environmental Affairs

# OPERATIONAL ENERGY EFFICIENCY





## Energy Conservation Strategy

- **UTILIZE NEW APPROACHES**
  - **Real Time Metering**
    - **Installed in 20 US Sites, Over 500 Meters**
    - **Identified 1.5% Electrical Reduction, \$750 K**
  - **Building Re-Commissioning**
    - **Building Energy Inspection: \$20 to \$50 K/MSF**
    - **Typically Identifies Significant Opportunities**
  - **Data Center Strategy**
    - **Integrate with Data Center Managers**
    - **Standard Approaches to Utilization**
    - **Facilities Standards for Office Buildings**
  
- **PROGRAMS IN PLACE TO CONTINUE TO WORK TOWARD ANNUAL 4% ENERGY CONSERVATION GOAL**

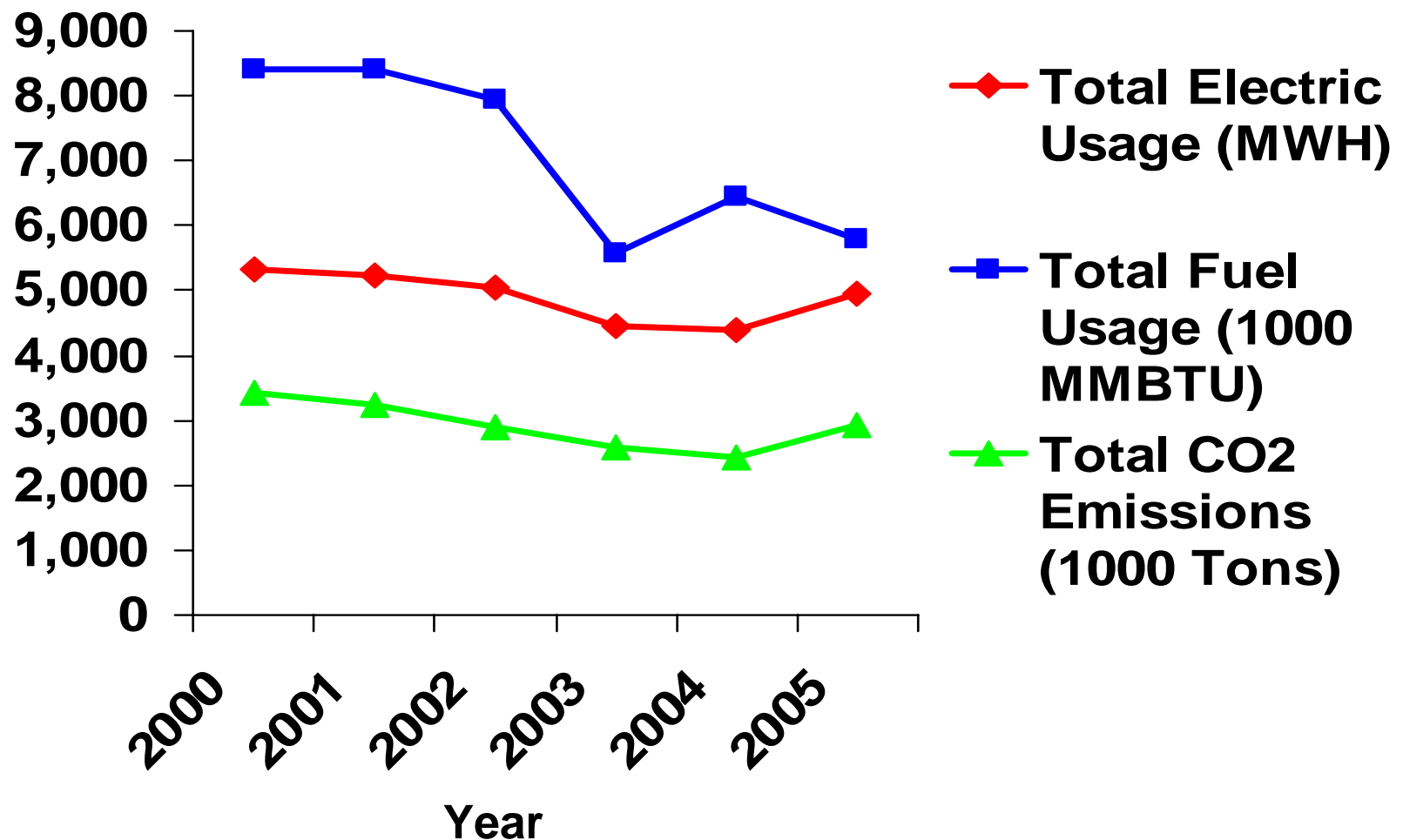


## Energy Program Results

- **CONTINUED ENERGY CONSERVATION EXCELLENCE**
  - **Achieved >5.0% Annual Reduction from 2000-2005**
  - **Annual Average of \$15.6 M Savings Per Year**
  
- **PROGRAM RECOGNITION**
  - **World Wildlife Fund Award**
  - **References in Business Articles and by Politicians**
  - **Climate Leaders**



## Worldwide Energy Usage and CO<sub>2</sub> Emissions





Corporate Environmental Affairs

# RENEWABLE ENERGY





## IBM's Renewable Energy Strategy

- **Direct Purchase and Use of Renewable Energy**
  - **Purchase within Service Areas**
  - **In Most Cases, Energy is Subsidized (U.K., Austin, Germany)**
  
- **“Greening” of the Electrical Supply with Renewable Energy Certificates (RECs)**
  - **Member of World Resource Institute’s (WRI) Green Power Market Development Group (GPMDG)**
    - **Analyze Development and Availability of Renewable Energy**
    - **Do Group Pricing for Renewable Energy Purchases**
  - **Recently Joined European Counterpart to the WRI GPMDG**
  
- **Work With Line Business Organizations to Facilitate Green Energy Purchases**



## IBM's 2006 Renewable Energy Purchases

- **2005 Purchases: 131,795 MWH (2.7% of Electrical Usage)**
  - **Germany: 11,800 MWH, 8%**
  - **UK: 105,000 MWH, >50%**
  - **Austin: 10,000 MWH, 8.5%**
  - **Beaverton: 2,200 MWH, 11%**
  - **Small Purchases: Raleigh, Tucson, Boulder, Rochester, Zurich, Amagi**
  
- **Projected 2006 Purchases (Approx. 6% of Projected Electrical Usage):**
  - **Germany, Austin, & UK Purchases Increased to over 200,000 MWH.**
  - **Purchase 96,000 MWH of Renewable Energy Certificates**
  - **Small Purchases Continued**
  
- **In the Top 10 of the 2005 USEPA Green Power Partners**



Corporate Environmental Affairs

# PFC EMISSIONS REDUCTION



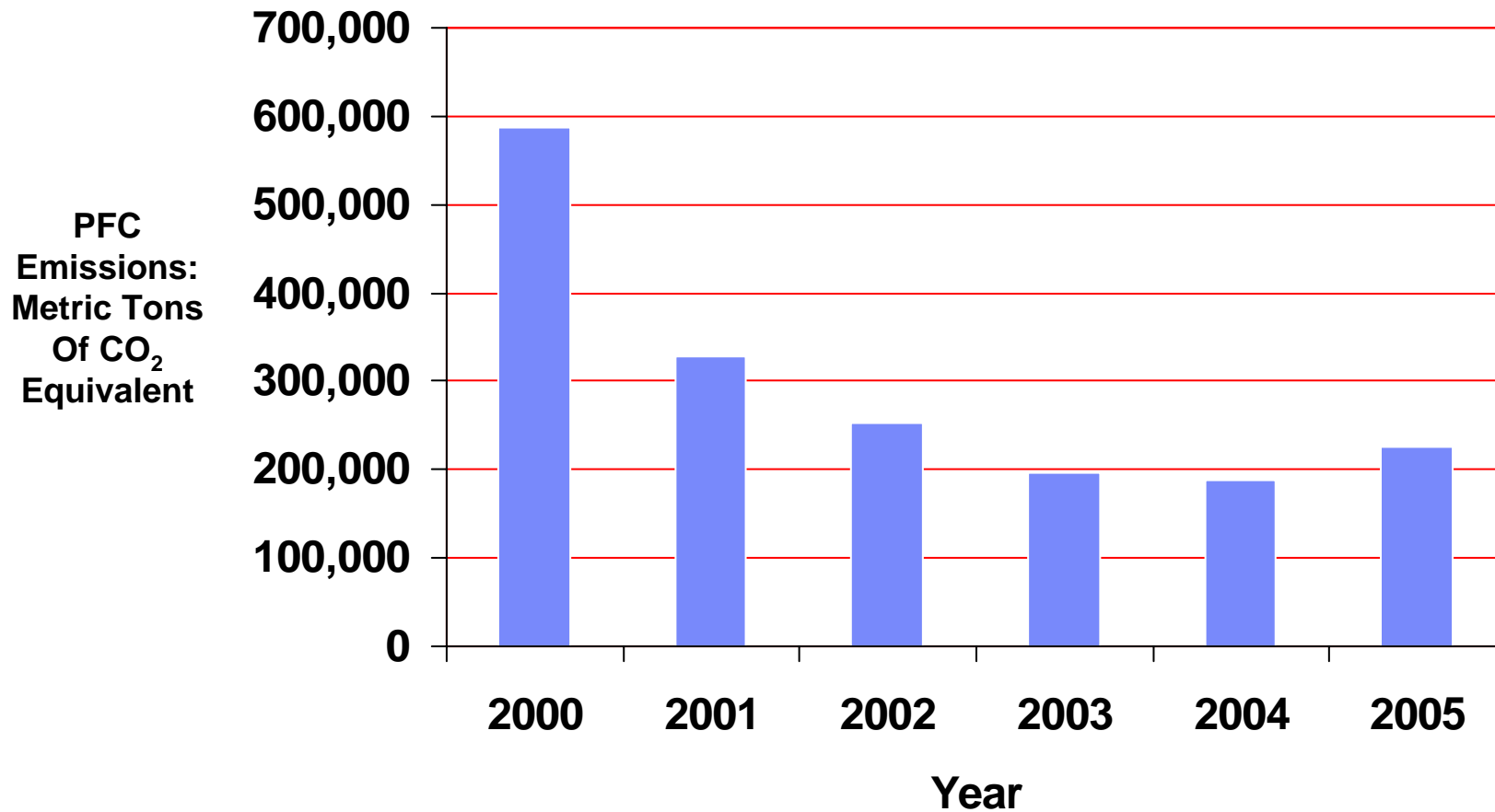


## PFC Reduction Efforts

- **PFCs (perfluorocarbons) are green house gases and result exclusively from human industrial processes and have high global warming potentials**
  
- **Existing 200 mm Processes**
  - **IBM Process Engineers Developed:**
    - **Low Flow C<sub>2</sub>F<sub>6</sub> (perfluoroethane) Process**
      - ✓ **Reduced PFC Usage & Emissions by 40-60%**
      - ✓ **Improved Equipment Reliability**
      - ✓ **Saved \$600 K in Costs**
    - **NF<sub>3</sub> (nitrogen trifluoride) Clean Process**
      - ✓ **Replaced C<sub>2</sub>F<sub>6</sub> w/NF<sub>3</sub> in Some Processes**
      - ✓ **Reduced PFC Emissions by 95-99%**
      - ✓ **NF<sub>3</sub> Fully Destroys in the Clean Process**
  - **Primary Driver of Emissions Reductions 2000-2005**
  
- **300 mm Processes**
  - **NF<sub>3</sub> Clean Processes Used Almost Exclusively**
  - **Other PFC Processes Have Emission Abatement Which is 99+% Efficient**
  - **Has Minimized the Emissions from the 300 mm Line to less than 10,000 Metric Tons of CO<sub>2</sub> Equivalent**



## PFC Emissions Reductions





Corporate Environmental Affairs

# TRANSPORTATION AND TRAVEL





## Commuting

- **IBM EXHIBITS LEADERSHIP IN COMMUTING THROUGH WORK AT HOME AND MOBILE EMPLOYEE PROGRAMS.**
  - **Over 100,000 IBM Employees Participate in Work at Home and Mobile Employee programs on a Global Basis.**
  - **Allows Reductions in Office Space & Operational Energy Use and Reduce Commute**
    - **5 MSF (464 KSM) Reduction in U.S. from 2000-05 (Part of Reduction Likely Due to Work at Home Increases)**
    - **50,000 tons of CO<sub>2</sub> Emissions from Commuting**
  
- **OTHER PROGRAMS IN PLACE AT VARIOUS SITES AROUND THE GLOBE**
  - **Shuttle Buses: on-site or to mass transit facilities**
  - **Transit Passes**
  - **Bicycling Support**
  - **Car Rental and Car Leasing: Encourage use of more fuel efficient cars**



## Commuting

- **BEST WORKPLACES FOR COMMUTERS PROGRAM (USEPA)**
  - **Recognizes Employers Who Encourage Commuting**
    - **Must Have 2 of 3 Commuter Support Options**
      - ✓ **Work at Home**
      - ✓ **Transit Subsidy of \$33/month**
      - ✓ **Guaranteed Ride Home & Ride Share Matching**
  - **Ranked 17<sup>th</sup> Out of Participating Fortune 500 Companies in 2005.**
- **RESO & BUSINESS UNITS WORKED TO IMPROVE RANKING IN 2006**
  - **Added 5 New Sites in 2006**
  - **Increased BWC Eligible Employees from 58,000 to over 67,000**



## Continued Focus On Climate Change Initiatives

- **CONTINUE GHG REDUCTION (CO<sub>2</sub>) EFFORTS IN OPERATIONS:**
  - **Continue Energy Efficiency Goal for Sites**
    - **Maintain Energy Efficiency Measurements for Operating Sites**
    - **Utilize New Technologies Where Appropriate**
    - **Evaluate Requirements for Datacenters.**
  - **Utilize Renewable Energy Where Economically Efficient**
  - **Continue Efforts to Manage PFC Emissions**
  
- **WORK ON COMMUTE AND TRANSIT INITIATIVES**