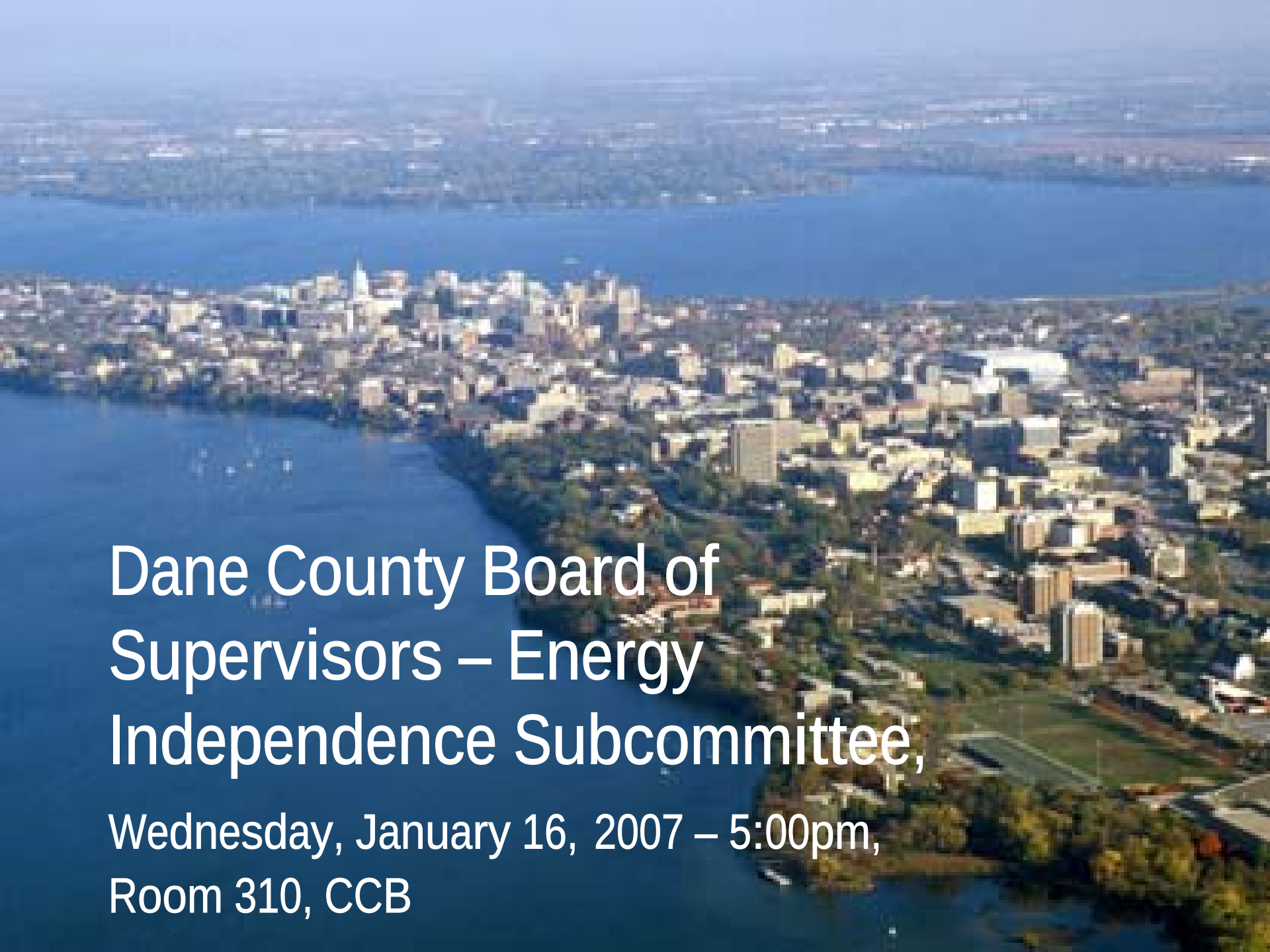


Dane County Board of Supervisors – Energy Independence Subcommittee,

Wednesday, January 16, 2007 – 5:00pm,
Room 310, CCB

Madison's Impacts on the Environment

- 750 miles of streets
- 6,000 acres of parks
- 3.7 million sq ft of government office & buildings
- 54 million kWh of electricity
- 1.3 million therms of natural gas
- 60,000 tons of garbage and recycling
- 2.3 million gallons of fuel for buses & fleet

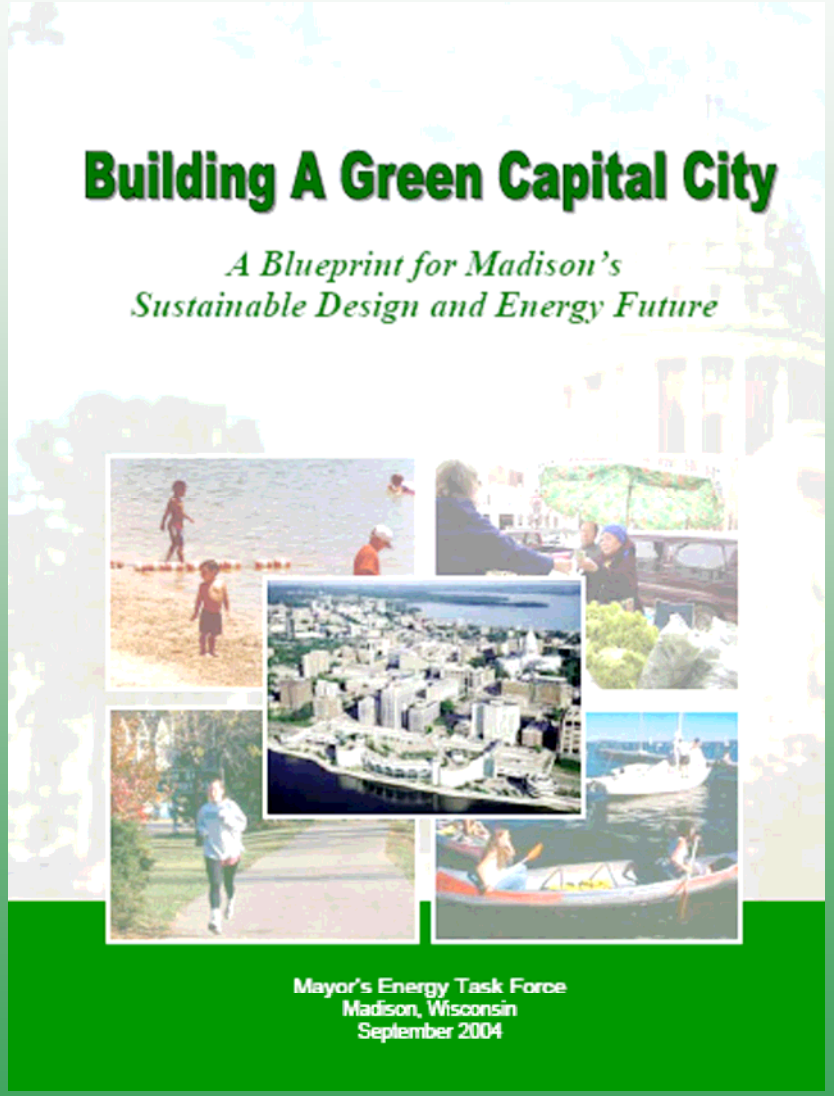
City government -- as both consumer and steward of our environment and its resources -- must incorporate the principles of sustainability to ensure the needs of tomorrow can be met.

Green Capital City Report

- October 2003:

  Mayor's Energy Task Force was convened
- September 2005:

  Building a Green Capital City Report presented to Common Council



Sustainable Energy and Design Commission

- Focuses on:
  - ✓ sustainability in City govt. and community
  - ✓ energy conservation and renewable energy
  - ✓ green building and greening city operations
- Encourages approaches such as:
  - ✓ building staff capacities
  - ✓ education, pilot programs, and studies
  - ✓ measurement and data analysis
  - ✓ procurement and code modifications
  - ✓ public-private and nonprofit collaborations
  - ✓ creative financial approaches

the NATURAL STEP

POWERING
YOU CAN MAKE MADISON THE CLEAN, GREEN ENERGY CAPITAL

Office of Facilities and Sustainability

- A position was created to manage the integration of sustainability in all City functions.
- Architects, Maintenance, and Custodial Staff were moved to the Engineering Division. This improves communication regarding building design and operations.

What is Sustainability?

"Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their needs."

United Nations 1987 Brundtland Report - *Our Common Future*

A Sustainable City:

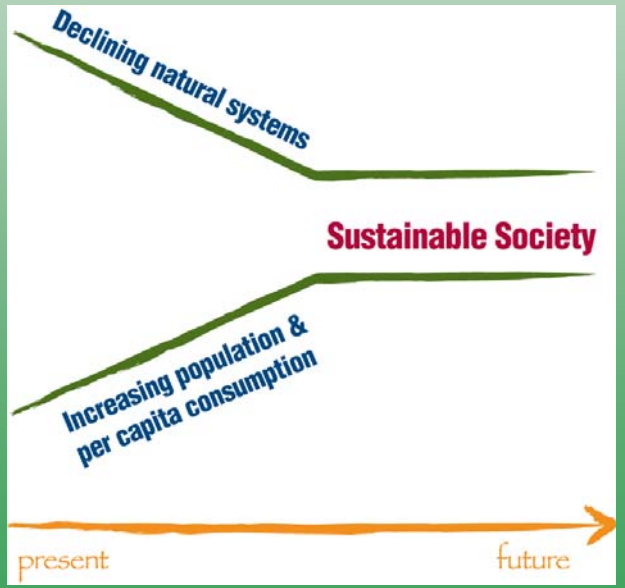
- Balances environment, economy, and social good
- Recognizes a healthy environment underpins economic and social well-being

Kyoto Commitment

- Urging federal and state governments to enact policies and programs to meet or beat the target of reducing global warming pollution levels to 7 percent below 1990 levels by 2012

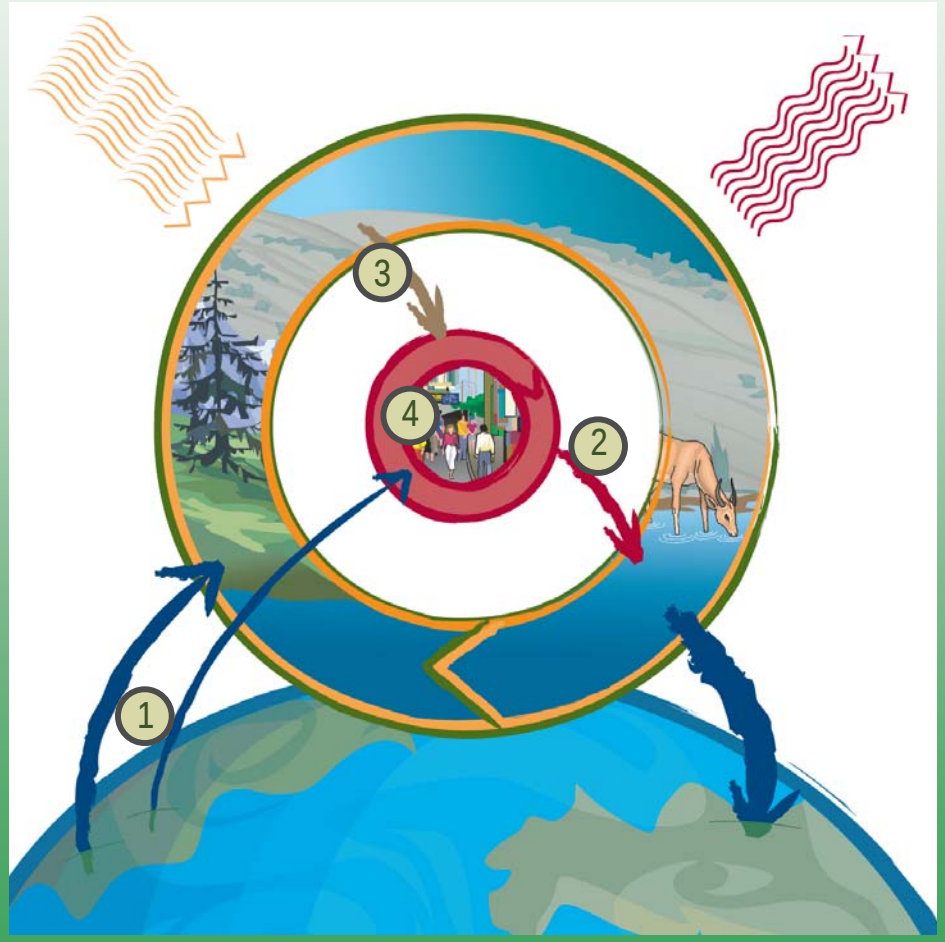
The Natural Step: Adopted in December 2005

- Provides a framework to think about the environmental, economic, and social impacts of City programs, projects, and facilities
- Lays out the conditions and requirements that will help the City make greater progress toward sustainability
- Encourages us to plan strategically for the most sustainable outcomes



The Natural Step: System Conditions

In a sustainable society, nature is not subject to systematically increasing:



1. Concentrations of substances <u>extracted</u> from the earth's crust
2. Concentrations of substances <u>produced</u> by society
3. <u>Degradation</u> by physical means

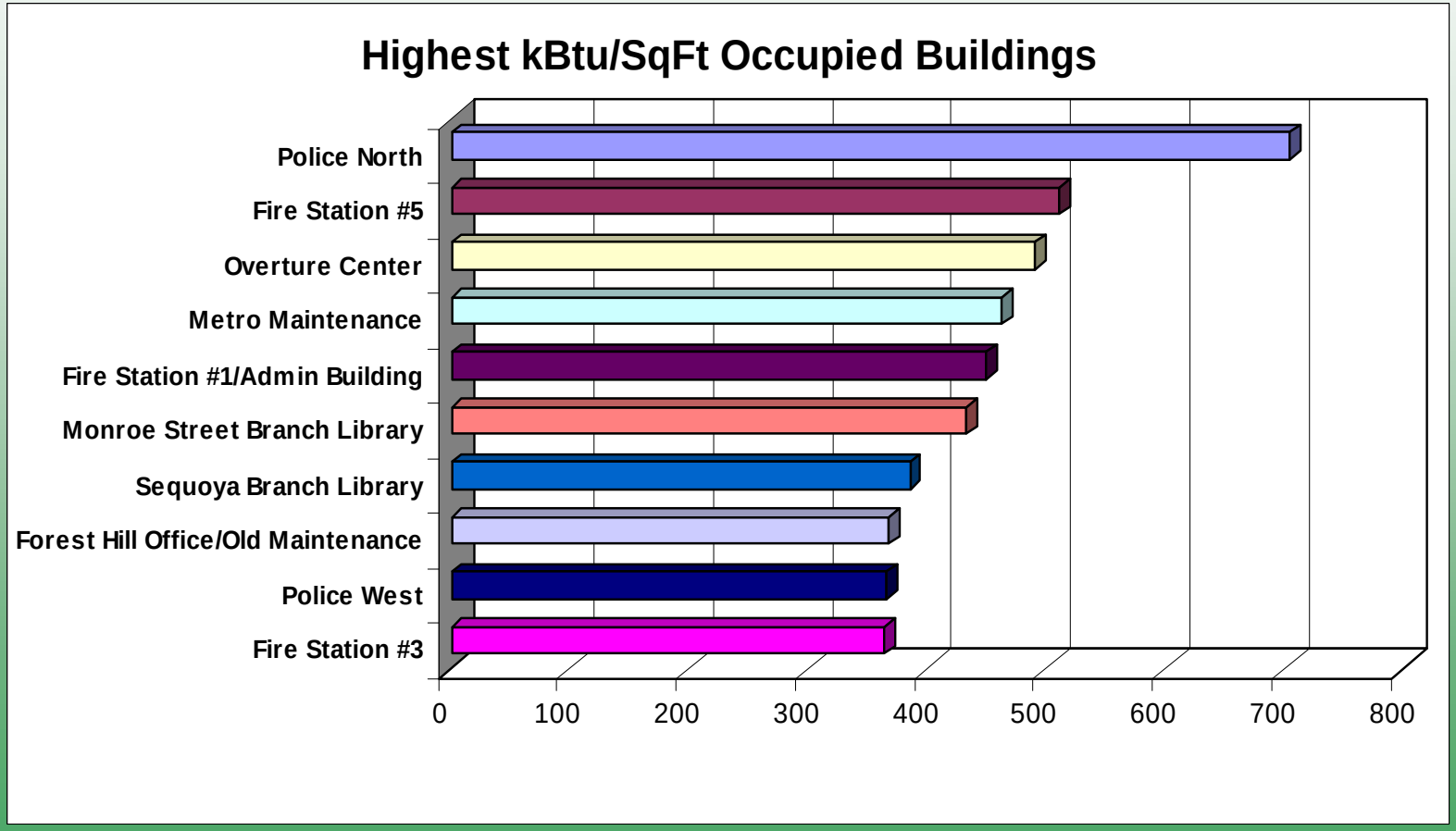
and, in that society…

4. <u>People</u> are not subject to conditions that systematically undermine their capacity to meet their needs.

The Natural Step:
Current Top 10 List of TNS Projects

1. Inventory of City buildings and their use of electricity and natural gas. Formulation of uniform lighting specifications and energy and ventilation standards for all City facilities.
2. Solar power and/or wind power at City facilities.
3. Green cleaning supplies and services.
4. Rewrite the City's zoning code with an eye on sustainability.
5. Bio-diesel pilot project for City Engineering vehicles.
6. Reduce fuel consumption and emissions of the City fleet and Metro buses.
7. Garage door at Metro to reduce heating costs and improve indoor air quality.
8. Replacement of bus wash and vacuum systems at Metro.
9. Commuting incentive programs for City employees to reduce SOV.
10. Develop energy saving approaches and policies for public housing in the City.

Natural Step Project:
Top Ten Energy Consumers



Top 10 Energy Consumers – Additional Notes

- The Utility Manager Software serves as a tool to track energy use in City of Madison buildings
- UM has the capability of producing rank analysis reports based on the data entered
- MG&E has provided the city with billing data from 2004 to present. Based on these data points we are able to identify the top ten energy consumers
- An energy audit was performed for five of the sites to try to determine points of improvement for these buildings
- City of Madison in 2008 has joined ICLEI and will be using ICLEI's software to track CO2 reductions or City operations and community-wide measures.

Steps Taken to solve the Energy Problems

- Fire Stations are going through redesign of the water heating systems that includes installation of solar water heaters
- Lighting retrofitting for the fire stations includes upgrade to energy efficient fixtures and installation of occupancy sensors

Steps Taken to solve the Energy Problems

- HV/AC upgrade at Police North
  - Replacing two boilers for, sealed combustion, condensing hot water boilers,
  - Installing an Energy Recovery ventilator,
  - Installing 16 VAV terminals,
  - Connecting the system to the City's Honeywell automatic system.

City of Madison's Building Standards – Another Natural Step Project

- Energy Modeling
- Commissioning
- Maximum use of passive solar
- Provide Bike Storage
- Flat green roof / sloped metal roof
- Low maintenance landscaping
- Pervious surfaces
- PV awnings as shading device on south side
- Locally produced and/or recycled and recyclable material
- Insulation - R60 roof, R30 wall, windows below U 0.2
- Full control of all energy-consuming devices
- Heat Recovery of waste air and water
- No use of unacceptable Material (i.e. Freon 22)
- Gray and rain water use

The Natural Step: Green Cleaning Initiative

- Cleaning products account for about 8% of non-vehicular VOCs
- 11.6% of work-related asthma comes from cleaning products
- City workers and visitors deserve a healthy indoor environment
- Using The Natural Step, the City of Madison launched its Green Cleaning Initiative
- Added to the City's APM's

The Natural Step: Other Initiatives

- Paper and Printer Policy
  - ✓ Adopted as a APM
  - ✓ Duplex as default mode, move to MFD, recycled paper, toner cartridges.
- Zero Waste Initiative
  - ✓ Resolution under discussion and SWAC
- Office Furniture, Paints, Carpeting, Lighting, etc
  - ✓ Systematically developing APM's

Recycling and Refuse:

Automated Systems

- Automated recycling:
  - ✓ 3 trucks off the road
- Automated refuse system:
  - ✓ 5 trucks off the road
- After one year:
  - ✓ 12 trucks off the road due to sharing back up trucks
- Fewer trucks
  - ✓ Equals less maintenance and fewer needed resources

LED Traffic Signals

- About 7000 LED units installed
- Saving per year:
  - ✓ Energy Cost savings: $240,000
  - ✓ 20,250 tons of CO_2 = 442 cars worth of CO_2 output
  - ✓ 2 million kilowatt hours
  - ✓ Peak energy demand reduced by 280 kilowatts
- Each LED reduces energy usage by 80-90% compared to the incandescent lamp it replaces
- Annual energy costs reduced to $126,000 annually

Wind and Solar Power

- 2006: 3% renewable energy
- 2010: 20% renewable energy goal
- 2008: Met a 13% goal

City signed up to MGE's program to purchase wind power. And also build PV systems and sell power back to MGE

Green Commissioning:

Commissioning and Retro-commissioning

- Goodman Maintenance Facility – LEED Certified
- Monona Terrace – LEED-Silver Certified as the 3rd LEED convention center in the country
- Sequoya Library – Planned LEED
- Fire Station #12 – Planned LEED

Metro Transit Facility

- Metro Transit: 2006 budget for natural gas to heat its building: $320,000
  - ✓Installing a special garage door to separate the storage area from the maintenance area will cut heating costs and improve indoor air quality and working conditions for maintenance staff
- Estimated cost of new garage door = $75,000
- Garage door will cut natural gas use by Metro about 25% and will pay for itself in ONE year

Fire Station Solar Water Heaters

- The new system saves 10.49 MwH of heat = 3.28 tons of CO_2 emissions per year
- System cost: $12,600
- Expected to pay for itself in 10 years
- More units will be installed in other fire stations

Mpower Madison Campaign

www.mpoweringmadison.com

- Cooperative public and private effort:
  - ✓To reduce city-wide carbon dioxide emissions by 100,000 tons by 2011
- Madison's City government:
  - ✓To reduce its CO_2 "footprint" by 25% by 2011 and eliminate 15,000 tons of carbon dioxide

MadiSUN

- City of Madison (with FOE and UW Extension as Partners) received a $200,000 grant from the USDOE.
- Goal is to double the number of PV and hot water solar system in the City.

Natural Bio-Retention

- Warner Park

  Native Prairie Rain Garden Project
- Adams Street Terrace Rain Garden

Greening the City Fleet

- City owns and maintains 1,000 vehicles
- 2.3 million gallons for fuel for buses and fleet vehicles
  - ✓ 1 million gallons for fleet vehicles
  - ✓ 1.3 million gallons for buses
- The City uses the same amount of fuel as it did in 1979
- 5% bio-diesel going to 10% in 2008.

Greening the City Fleet

- Establishing a baseline for our fleet emissions
- Developing café-like standards
- Other creative ways to increase efficiency
  - ✓New fuel dispensing system recently installed and GPS units on most city vehicles.
  - ✓Received a Wisconsin Department of Natural Resources grant to install catalytic oxidation mufflers that reduce particulate emissions on 9 off-road test vehicles

Greening the City Fleet :

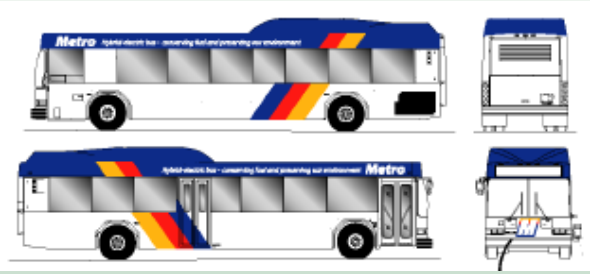
Waste Oil - Rodder truck

- Reduces:
  - ✓ particulate matter by 47%
  - ✓ carbon monoxide by 48%
  - ✓ total unburned hydrocarbons by 87%
  - ✓ sulfates by 100%
- Conversion costs about $4500
- Unit will pay for itself in less than 7 years

Greening the City Fleet: Hybrid Buses

Hybrid Buses: *"conserving fuel and preserving our environment"*

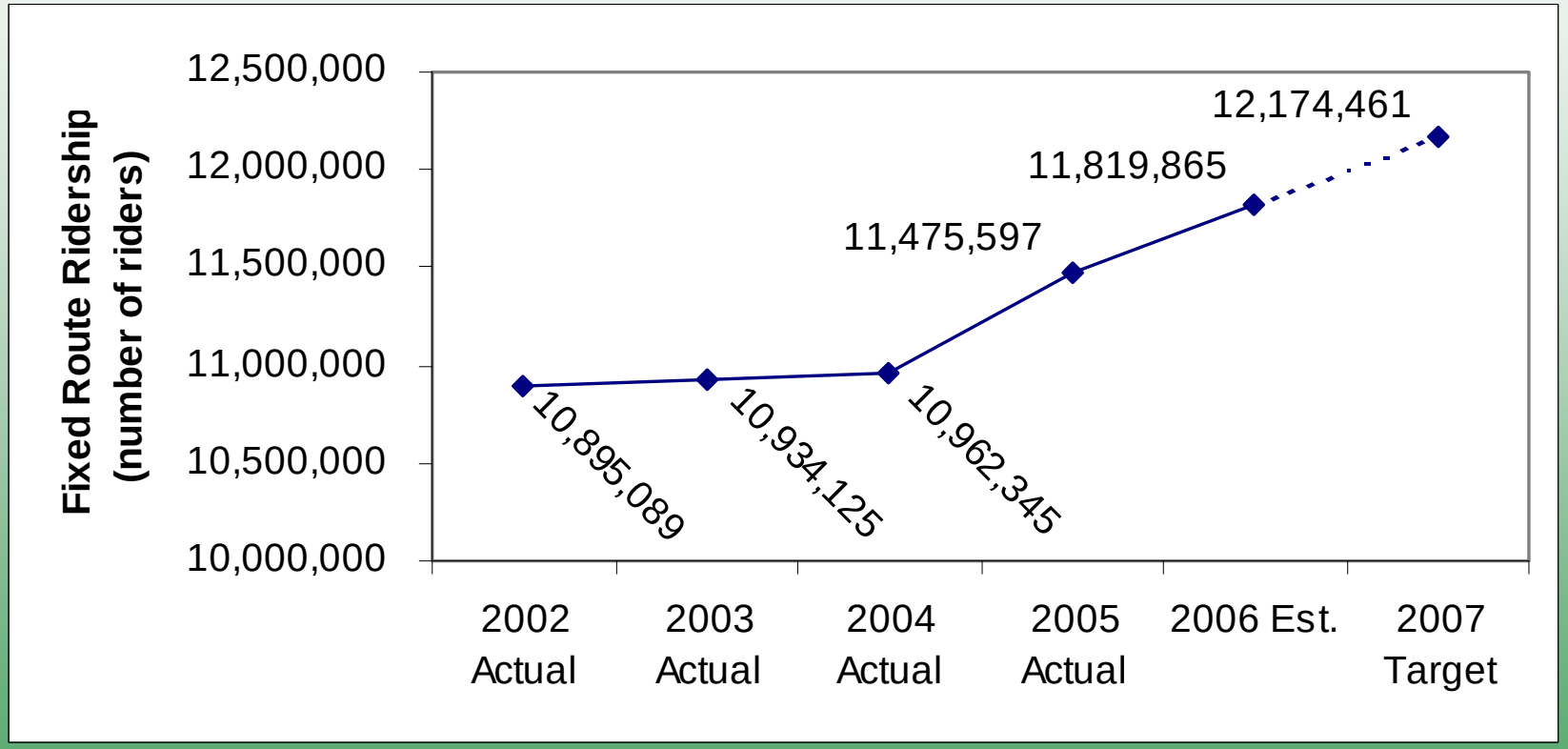
- ✓5 hybrid buses added to the fleet
- ✓Will be utilized on both university routes and all-city routes



Metro Transit

- Metro Transit Bus
- Expanding Services to other communites
- Expanding unlimited ride pass program
- Improved technology

Metro Transit Ridership:

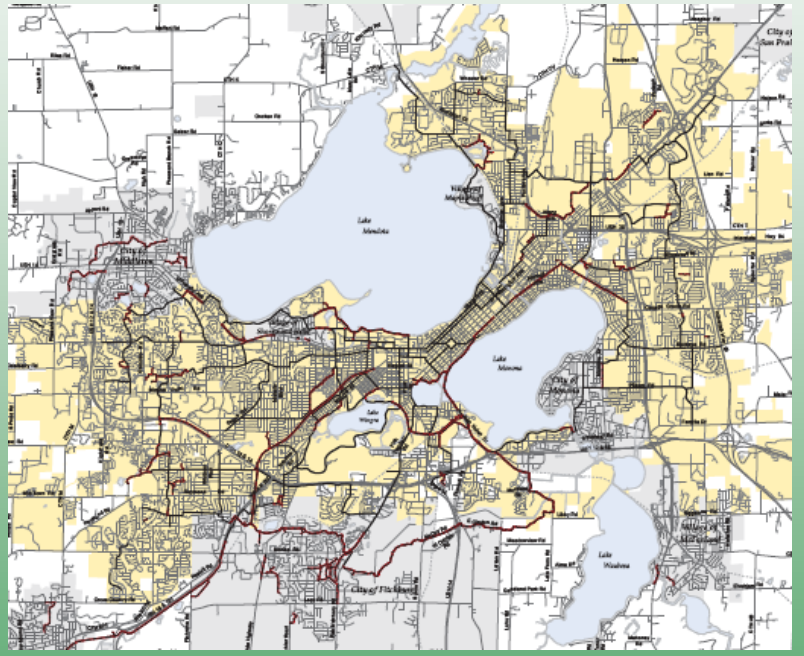


Platinum Bike Committee

- League of American Bicyclists:
  Bicycle Friendly Communities program
  - ✓ Madison is currently a GOLD Bicycle City
  - ✓ The City's Common Council passed a resolution to create a Platinum Bicycle Committee to help prepare a plan to help Madison achieve Platinum Bike status
  - ✓ Davis, California is the only Platinum level city
  - ✓ Bicycle Industry donated to the effort

Platinum Bike Committee

- As of 2000
  - ✓50 miles of on-street designated bicycle lanes
  - ✓55 miles of off-street designated bicycle and pedestrian paths
  - ✓130 miles of signed bike routes on City Streets



Conclusions: