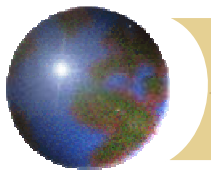


# *Municipal Energy Management*

Mayor's Asia-Pacific Environmental Summit  
Melbourne, Australia - May 9<sup>th</sup>, 2006

Presented by  
Doug Newman  
Global Energy Center at GTI  
Chicago, Illinois, USA

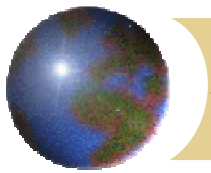
David Tooze  
Office of Sustainable Development - Energy Division  
City of Portland Oregon, USA



# *Municipal Energy Management*

- Significance
  - Economic
  - Environmental
  - Public Health
- Municipal Energy Management Plan & Actions
- Practical Implementation
  - Portland's Experience
    - Benefits To Date
  - Success Factors
  - Resources

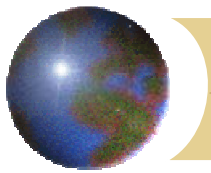




# *Municipal Energy Management*

## ❖ Economic Significance

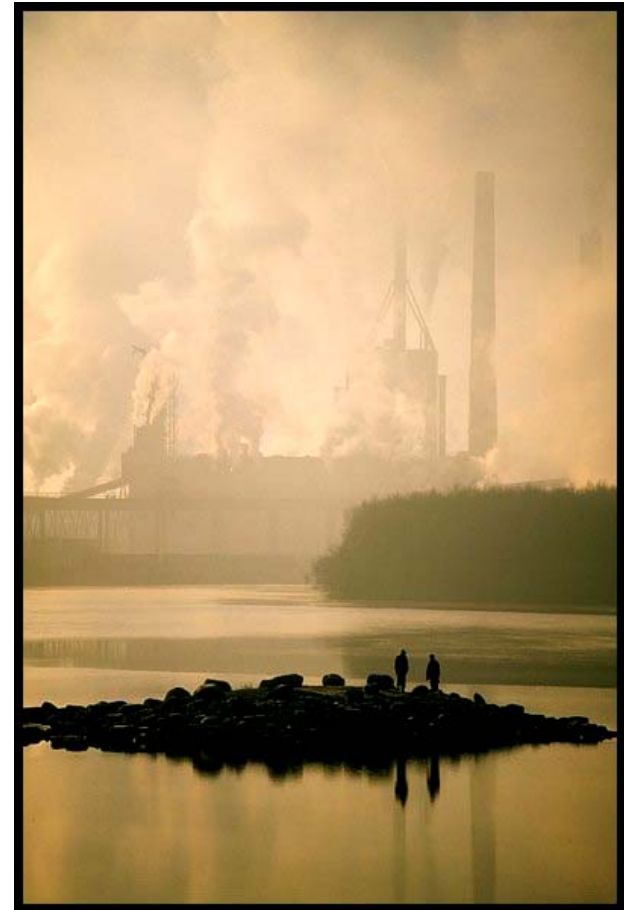
- ❖ Municipal energy bills can claim 2-5% of an annual budget in the U.S.
- ❖ Rising energy costs will increase these percentages significantly
- ❖ Practice of comprehensive municipal energy efficiency & conservation can save 10-40% or more on annual energy bills
- ❖ Municipal energy management program costs are minimal
- ❖ Net energy savings can be applied to other municipal needs
  - Philadelphia Example
    - Annual energy budget = \$57 million
    - Cost of operating the municipal energy office = \$100,000
    - Net annual energy efficiency/conservation savings = \$5.7 million

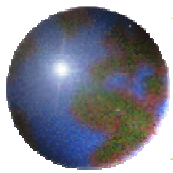


# *Municipal Energy Management*

## ❁ Environmental Significance

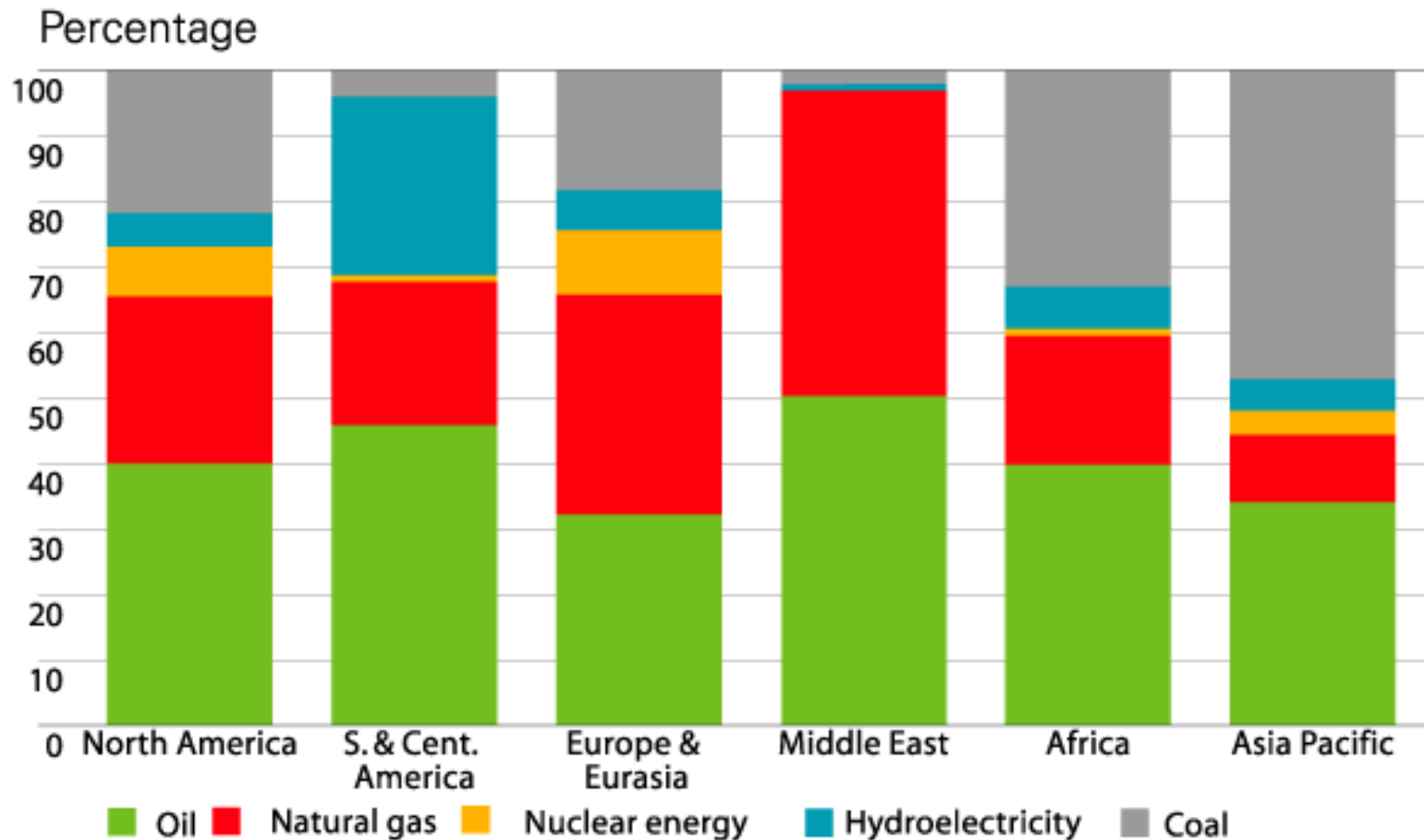
- ❁ Air Quality
  - Air toxics, GHG emissions, particulates, corrosion
- ❁ Water Quality
  - Acidification & thermal pollution
- ❁ Solid Waste Management
  - Ash, sludge
- ❁ Habitat & Species Survival
  - Habitat destruction & species endangerment



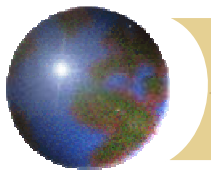


# Municipal Energy Management

## Energy Mix by Region: Fossil Fuels Dominate



Oil remains the largest single source of energy in most parts of the world. The exceptions are the Former Soviet Union, where gas dominates, and Asia Pacific, where coal is the dominant fuel.



# *Municipal Energy Management*

## Environmental Significance

### Annual Consumption - 500 MW Coal Plant:

- 1,430,000 tons of coal, 146,000 tons of limestone & 2.2 billion gallons of water per year

### Annual Production:

- 3.5 billion kilowatt-hours = service for 140k people
- 3.7 million tons of carbon dioxide
- 193,000 tons of sludge
- 125,000 tons of ash
- 10,200 tons of nitrogen oxide
- 10,000 tons of sulfur dioxide
- 720 tons of carbon monoxide
- 500 tons of small particles
- 220 tons of hydrocarbons
- 225 pounds of arsenic, 114 pounds of lead, 4 pounds of cadmium



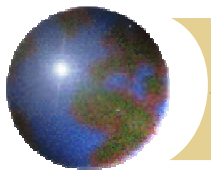
Exceptionally Clear Air Quality  
In Mexico City



Typical Air Quality



Poor Air Quality



# *Municipal Energy Management*

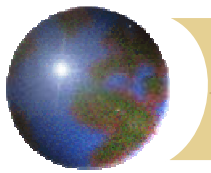
## Public Health Significance

- ❑ NO<sub>x</sub> – Respiratory disease
- ❑ SO<sub>2</sub> – Respiratory disease
- ❑ CO<sub>2</sub> – Heat stroke
- ❑ PM – Respiratory disease, cardiopulmonary & lung cancer
- ❑ Mercury – development growth problems in children



- ❑ Approximately 20-30 per cent of all respiratory diseases in Asia appear to be caused by urban air pollution – UN, WHO
- ❑ Public Health impacts are expected to increase with urbanization & industrialization





# *Municipal Energy Management*

## ☼ Goal

- ☼ Enhance the economic, environmental & public health of our communities & lessen their impact on global resources

## ☼ Objective

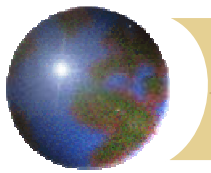
- ☼ Integrate energy-efficient end-use technologies & management strategies in all municipal facilities & services

## ☼ Tactics

- ☼ Municipal Energy Planning & Action!







# *Municipal Energy Management*

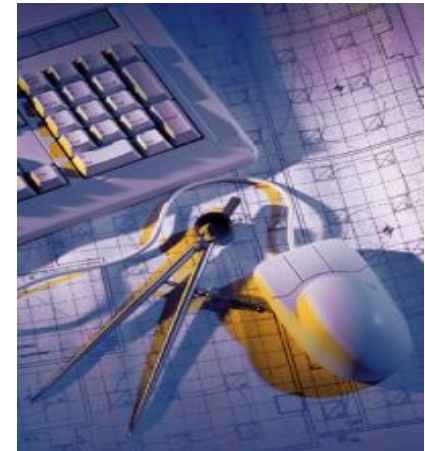
## ● Municipal Energy Management Plan

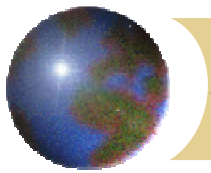
### ■ Considers all energy sources

- Electricity
- Gaseous fuels
- Petroleum
- Thermal
- Renewable resources

### ■ Considers all end-uses

- Structural lighting, appliances & equipment
- Street lighting, signalization, bridge & tunnel operations
- Heating, ventilation and air conditioning
- Potable water pumping & filtration
- Sanitary wastewater processing
- Fleet services (police, fire, medical, refuse collection)
- Mass transit



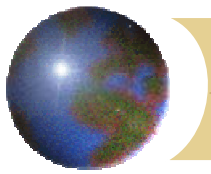


# *Municipal Energy Management*

## ✿ Elements of an MEM Plan

- ✿ Building efficiency
- ✿ Infrastructure efficiency
- ✿ Fleet efficiency
- ✿ Equipment efficiency
- ✿ Green procurement
- ✿ Green energy purchases
- ✿ Recycling & re-use



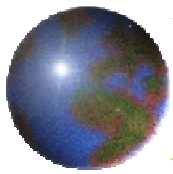


# *Municipal Energy Management*

## ☉ Portland, Oregon -

- ☒ 530,000 Population
- ☒ Metro Center for 1 million
- ☒ Port City - 2 Rivers + Pacific
- ☒ Governance:
  - Mayor + 4 Commissioners
  - Commissioner = Direct Mgr
- ☒ Citizens = Stakeholders
- ☒ Livability - Sustainability
- ☒ Economic Development
- ☒ Education
- ☒ \$15 million – 2005 energy bill





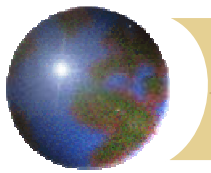
# *Municipal Energy Management*

## Portland's City Energy Challenge

- ❑ Savings: \$17 million
- ❑ \$2.1 mm in 2006
- ❑ Capital Invested \$9 mil
- ❑ CO<sub>2</sub> = 110,000 Tonnes
  - 2000 vehicles/yr







# Municipal Energy Management

## Steps to Success

- ❏ Calculate Energy Use
- ❏ Develop Policy
  - SET VISION
  - SET GOALS
    - 10% - \$1 mm by 2000
  - EMPOWER
    - Paybacks < 10 Year
- ❏ Implement
  - DELEGATE Responsibility
  - TECHNICAL RESOURCES
  - IMPLEMENT Projects
  - CREDIT SUCCESS



## Local Action Plan on GLOBAL WARMING

April 2001



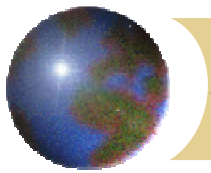
City of Portland &  
Multnomah County

Erik Sten, City Commissioner  
Susan Anderson, Director  
Office of Sustainable Development

1120 SW 5<sup>th</sup> Ave., Room 706  
Portland, OR 97204  
503.823.7222  
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Maria Rojo de Steffey, Director  
Department of Sustainable  
Community Development

501 SE Hawthorne Blvd., Suite 320  
Portland, OR 97214  
503.988.5000  
[www.co.multnomah.or.us/dscd](http://www.co.multnomah.or.us/dscd)

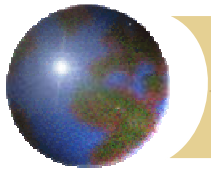


# *Municipal Energy Management*

## ☀ How Did Portland Succeed?

- ☒ Energy Manager = staff
    - 1% of Bureau Energy Bills
    - \$70,000 per year
  - ☒ Promote + Technical Assistance
  - ☒ Point to Policy: “Have to do it”
  - ☒ Help Them Find a Way
- Use OPM: “Other Peoples Money”
- Utility Audits - free
  - Cash Rebates – 20%
  - Tax Credits - State + Federal
  - Carve out of RRM Budgets
- ☒ Credit Decision Makers w/ Success





# *Municipal Energy Management*

## *Policies, Programs & Incentives*

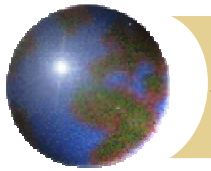
### A) Audit & Opportunity Assessment

- 1) Conduct an audit of current municipal energy consumption, related costs & carbon emissions across all end-uses & develop an opportunity list for energy conservation, efficiency & renewable energy best practices & technology applications

### B) Adopt Municipal Energy Management Best Practices

- 1) Change out all incandescent city lighting with compact fluorescent lighting. Convert all traffic lights & "exit" signs inside buildings to LED
- 2) Apply the Leadership in Energy & Environmental Design - New Construction (LEED-NC) or similar rating standard to all new municipal construction
- 3) Adopt a goal that an escalating percentage of vehicle purchases for municipal fleets each year will be hybrid, flex-fuel or dedicated alternatively fueled vehicles. Install adequate refueling infrastructure for non-petroleum fuels, direct municipal employees to utilize alternative fuels & monitor refueling to assure compliance



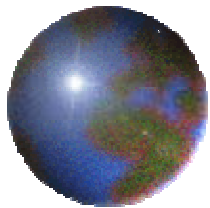


# *Municipal Energy Management*

## *Policies, Programs & Incentives*

### B) Adopt Municipal Energy Management Best Practices (continued)

- 4) Conduct energy conservation training for municipal operations & maintenance staff & offer incentives for superior performance
- 5) Install occupancy sensors & ambient light sensors in municipal buildings. Utilize occupancy sensors in high-traffic areas such as meeting rooms, break-rooms & bathrooms. Install light sensors in rooms with exposure to daylight
- 6) When replacing motor & pumps, use only properly sized, high-efficiency pumps, motors & drive systems
- 7) Purchase only Energy Star or equivalent appliances & office equipment



# *Municipal Energy Management*

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