

Environmental Management Systems (EMS)

SHS 101: Haz. Materials Regulation I
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Objectives

After this discussion, you should be able to:

- Define an EMS
- List elements in an EMS
- List the benefits of an EMS

What is an Environmental Management System?

- “The part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing achieving and reviewing the environmental policy.” ISO14001

What is an Environmental Management System?

An environmental management system brings together the people, policies, plans, review mechanisms, and procedures used to manage environmental issues at a facility or in an organization.

Things About EMS You May Not Know

- You already have one
- May not meet requirements of ISO 14001
- After this class, you may be able to identify ways to improve your EMS



An EMS is *Environmental*

- Facilitates environmental compliance
- Addresses environmental impacts
- Broadens environmental responsibilities to all whose work can have a significant impact on the environment
- Environmental office has technical expertise to contribute

An EMS is *Management*

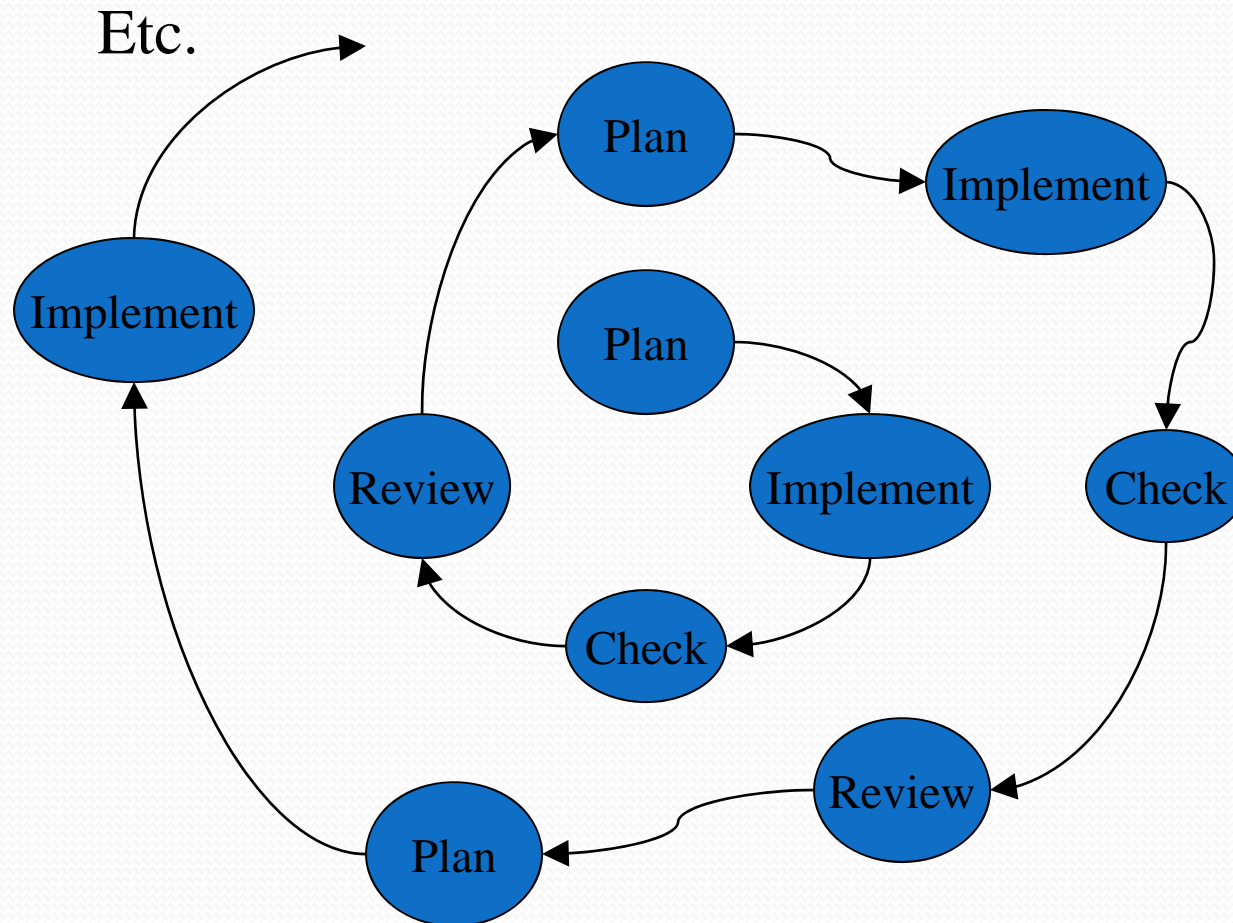
- Must have commitment of top managers
- EMS owned by facility manager
- Must be consistent with other management systems



An EMS is a *System*

- Requires awareness of formal structure
- Addresses policies, procedures, programs
- Doesn't specifically address compliance components (drums, labels, etc.)

Continual Improvement Cycle





EMS Frameworks

- ISO 14001 Standard
- Code of Environmental Management Principles
- Compliance-Focused EMS
- Eco-Management and Audit Scheme

ISO 14001 Components

- Environmental Policy
- Planning
- Implementation and Operation
- Checking and Corrective Action
- Management Review



Environmental Policy

- Issue a policy statement signed by facility manager
- At a minimum, commit to
 - Continual improvement
 - Pollution prevention
 - Environmental compliance
- Identifies EMS framework
- Publicly available

Planning

- Identify aspects and impacts from facility activities, products, and services
- Review legal requirements
- Set objectives and targets
- Establish formal EMS program

Implementation and Operation

- Define roles and responsibilities
- Provide EMS training
- Establish internal and external communication mechanisms
- Establish document control system
- Establish operational controls
- Integrate with or establish emergency preparedness procedures

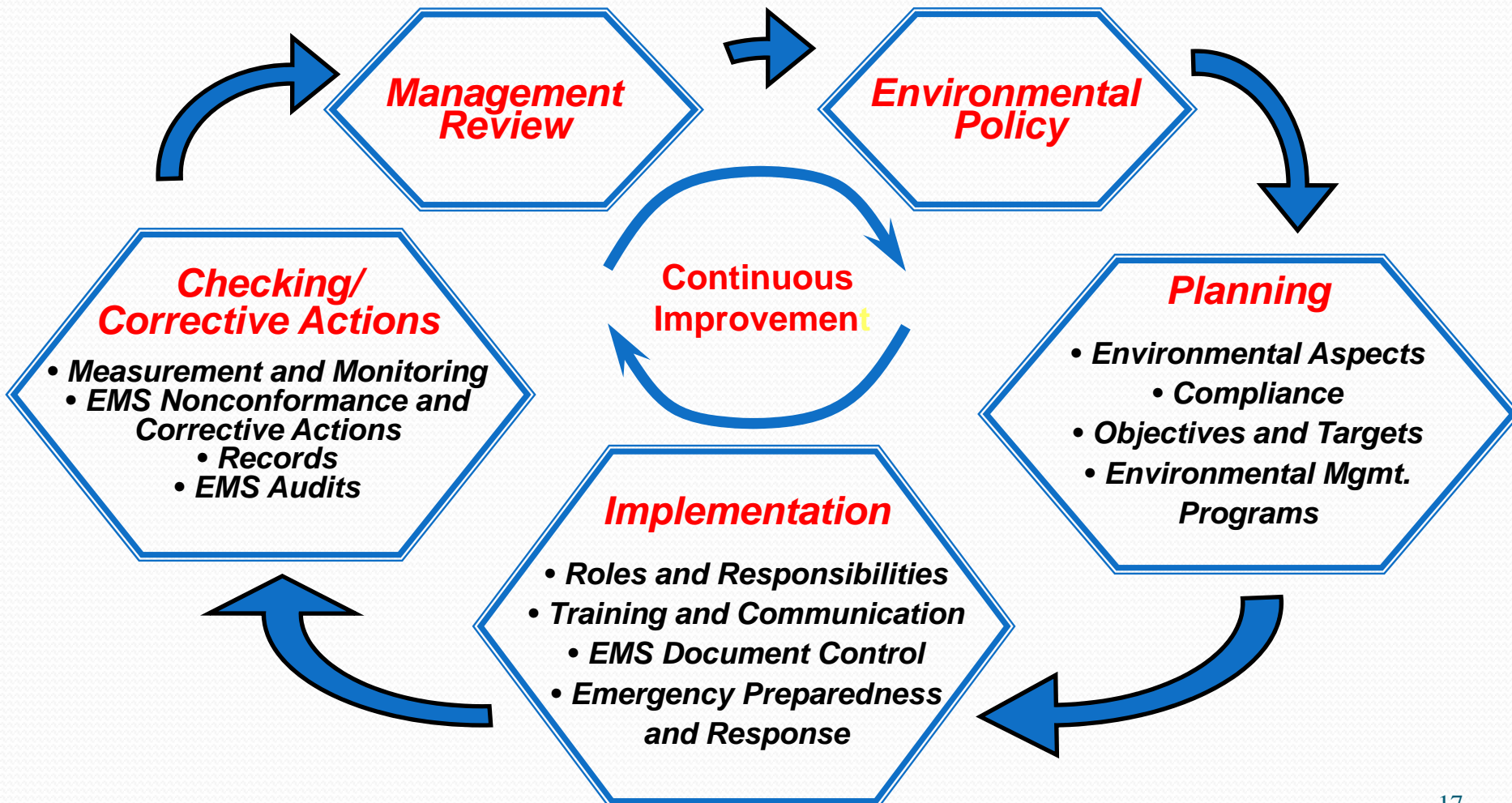
Checking and Corrective Action

- Conduct periodic monitoring of environmental performance
- Identify root causes of findings and conduct corrective and preventive actions
- Maintain environmental records
- Conduct periodic EMS audit

Management Review

- Conduct periodic senior management review of EMS
- Revise policies as needed

ISO 14001 Elements



Other ISO 14001 Terms

Registration - An external audit of an EMS for conformance with ISO 14001 by an entity certified in the US by Registrar Accreditation Board (RAB)

Registrar - Entity that conducts external audit of EMS for registration

Conformance - Adherence to ISO 14001 standard measured externally or internally

Self-Declaration - An assertion by an organization that it is in conformance with the ISO 14001 standard based on an internal audit of its EMS



Benefits of an EMS

- Helps maintain compliance
- Reduce operating costs
- Integrate environmental programs into mission
- Increase employee involvement
- Reduce environmental impacts

What else do we need to do?

- Structure
- Continual improvement
- Top level management commitment
- Management review or ownership
- Formal awareness of “system”
-????

Summary

- An EMS is the combination of people, policies, procedures, review, and plans to help address environmental issues
- Important EMS elements include continual improvement, management commitment, formalization, and awareness of system approach

Northwest Environmental Conference - 2010

Environmental Management and EMS Systems

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- Aspects / Impacts and Continuous Improvement
- Environmental Regulatory Requirements
- Operational Control
- Continuous Improvement Projects/Examples
- Performance Monitoring

- Aspects/Impacts and Continuous Improvements
 - **Aspects = Business Activity = Inputs**
 - Set appropriate boundary conditions
 - Around Site & Within Site
 - Organize to align with functional leaders
 - Facilities, Engineering, Admin, Manufacturing, Purchasing, Shipping/Receiving, etc
 - **Impacts = Environmental Impact = Outputs**
- Utilize Spreadsheet approach to Track and Update
- Methodology - Incorporate a ranking and rating method to identify 'significant aspects'.
 - Identify Business Activities
 - Evaluate Environmental Impacts (scale, scope, extent, duration)
 - Evaluate Business Impacts (Technical Feasibility, Financial Feasibility, Stakeholder benefits)
 - Rate Legal / Regulatory Impact
 - Weight importance by of the above areas

Example – Aspect / Impact

- Business Activity
 - Wastewater Treatment (3 stage gravity fed neutralization)
 - Inputs – process rinse waters, neutralization chemicals, energy (mixers/controls)
 - Outputs – treated rinse water, energy consumption, raw material consumption (neutralization chemistry)

Environmental Regulatory Requirements

- Requirement: Identify Environmentally Regulatory Requirements (and other requirements) related to environmental aspects
- Recommendation: Connect Primary Functions that can influence performance to the 'regulatory requirement' (or influence the aspect).

Legal Register: Summary of Environmental Regulatory Requirements									
Regulatory Requirement	Regulation	Applicable	Facilities	Equipment Engineering	Process Engineering	Manufacturing	HR	IT	EHS
Greenhouse Gas Rule	OAR-340-215	Yes	Yes	Yes	Yes	Yes		No	Yes

- Verify 'operational controls' are in place (engineering systems, procedures, training, verification) .
- Example Industrial Wastewater Discharge Permit Requirements
 - pH controls on outfall
 - Temperature
 - Flow (daily max, daily average)
 - Sampling and Reporting Protocols and Procedures

ISO 14001:2004 , Section 4.4.6 Operational Control

- The organization shall identify and plan those operations that are associated with the identified significant environmental aspects consistent with its environmental policy, objectives and targets, in order to ensure that they are carried out under specified conditions by
 - A) establishing, implementing and maintaining a documented procedure(s) to control situations where their absence could lead to deviation from the environmental policy, objectives and targets, and
 - B) stipulating the operating criteria in the procedure(s), and
 - C) establishing, implementing and maintaining procedures related to the identified significant environmental aspects of goods and services used by the organization and communicating applicable procedures and requirements to their suppliers, including contractors

- WWT Engineering and Operational Controls
 - 3 Stage Neutralization (MgOH, H₂SO₄)
 - Monitored in each stage and initial outfall
 - Final outfall monitored (compliance point)
 - Secondary Containment
 - Below Grade Vault with sump (leak detection)
 - Facility monitoring System
 - Early Warning alarms for pH and system functionality (pumps, mixers, other)
 - Neutralization Tank Levels
 - Daily Rounds and Preventative Maintenance Procedures
 - pH Calibration/Verification
 - Tank and Vault inspections
 - Pump and Motor Maintenance – procedures
 - Neutralization Chemical off-load procedure

●MgOH – Optimization

- Improve Controls and reduce 'waste' of neutralization material
 - Implement 1st Stage "Self Neutralization"
 - Previously firmware with hard set points 1st stage (High and Low pH)
 - Convert to PLC based system
 - With PLC based system implemented - pH controls trigger at lower pH (following a 'study and controlled experiment process')
 - 2nd Stage is 'compliance stage'
 - 3rd Stage - trimming and redundancy to 2nd stage
 - Results – 20-30% raw material reduction and \$ savings.

Air Handling Continuous Improvement

- Environmental Requirements

- Maintain Stable Temperature and Humidity Control

- Improvement Projects

- Dead Band Controls
 - Implement acceptable 'band' for control (temperature/humidity)
- Reduce Reheat Temperature
 - Implement delta temp controls

- Cooling Towers – typically used to remove reject heat from chillers
- Continuous Improvement Project – Free Cooling
- Utilize ambient cooling to cool closed loop process waters
 - Isolate cooling tower from chiller (with the right ambient conditions)
 - Integrate heat exchangers and piping controls

- Develop Activity Based Monitoring
 - Align Metrics with Primary business function
 - ex – Office / Admin – metrics / person or per square footage
 - Energy Use / Output
 - Water Use /
 - Metric Resources
 - Company Web sites with Environmental Reports / Sustainability Reports in same industry
 - Standards
 - GRII – Global Reporting Initiative <http://www.globalreporting.org/Home>
 - Industry Standard Practices or Standards
- Report Monthly/ Quarterly
- Track Continuous Improvement Projects aimed at addressing significant aspects
- Celebrate Successes

• Key Success Factors

- Program Alignment with Management Structure
- Utilize Technology
 - Track and maintain program documentations (spreadsheets, other methods)
 - Utilize technology to ensure Operational Control
 - Quantify Savings and Environmental Benefit (energy/raw material & \$\$\$)
 - Enable and challenge innovation for continuous improvement
 - Either in Operational Control systems or through improvement projects
- Quarterly Reporting & Annual Management Review
 - Engage Others, Recognize Improvements
 - Communicate Results (Web site, postings)
 - Solicit Ideas/Encourage innovative solutions.

Environmental Management Systems in Multifamily

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Environmental Management Systems in Multifamily

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Existing Buildings: Operations &
Maintenance

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Sustainable Operations & Maintenance

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Green Property Management

Apartments & Condominiums



Benchmarking

Energy: Efficiency &
Production

Water: Conservation &
Stormwater Management

Waste – Is there such a
thing?



Benchmark using EPA's Portfolio Manager for Multifamily

The screenshot displays the EPA Energy Star website. At the top, there is a banner for 'THE NATIONAL BUILDING COMPETITION' with the text 'And the Winner is...' and 'Find Out Who Won EPA's First-Ever National Building Competition, and How All 14 Buildings Fared!'. Below the banner is a navigation bar with 'ENERGY STAR' on the left and buttons for 'Products', 'Home Improvement', 'New Homes', 'Buildings & Plants', and 'Partner Resources'. A search bar is also present. The main content area is titled 'ENERGY STAR for Real Estate/Multifamily Housing' and includes a photograph of a modern skyscraper. The text explains that energy is a significant expense for commercial buildings and that partnering with ENERGY STAR can lead to energy savings and environmental leadership. A 'What You Can Do' section lists several actions: 'Become an ENERGY STAR Partner', 'Benchmark your properties in Portfolio Manager', 'Join the ENERGY STAR Challenge', and 'Bring Your Green to Work with ENERGY STAR'. A 'Quick Finder' sidebar on the right provides links to various tools and resources.

ENERGY STAR

U. S. ENVIRONMENTAL PROTECTION AGENCY

And the Winner is...
Find Out Who Won EPA's First-Ever National Building Competition, and How All 14 Buildings Fared!

GO

About ENERGY STAR - News Room - FAQs - **KIDS!**

Search Go

ENERGY STAR Products Home Improvement New Homes Buildings & Plants Partner Resources

Buildings & Plants

Home > Buildings & Plants > Real Estate/Multifamily Housing

ENERGY STAR for Real Estate/Multifamily Housing

Energy represents the single largest operating expense for commercial buildings, with about 30% of building energy used inefficiently or unnecessarily. Through partnering with ENERGY STAR, organizations with commercial real estate, corporate real estate, and multifamily housing units have experienced significant energy consumption reductions while increasing asset value. EPA supports the efforts of real estate owners and managers with a proven energy management strategy and no-cost tools to save energy and money and demonstrate environmental leadership.

What You Can Do

Owners and managers of real estate portfolios that partner with EPA and take the ENERGY STAR Challenge, demonstrate a commitment to smart energy management as well as environmental stewardship.

- [Become an ENERGY STAR Partner](#)
- [Benchmark your properties in Portfolio Manager](#)
- [Join the ENERGY STAR Challenge](#)
- [Bring Your Green to Work with ENERGY STAR](#)

Learn more about ENERGY STAR for:

Getting Started for...

- Government
- Healthcare
- Higher Education
- Hospitality/ Entertainment
- Industrial
- K-12
- Real Estate/ Multifamily**
- Retail

Quick Finder

- [Portfolio Manager Login](#)
- [Target Finder](#)
- [ENERGY STAR Challenge](#)
- [ENERGY STAR Leaders](#)
- [Earn the ENERGY STAR](#)
- [Purchasing & Procurement](#)
- [Service Providers Directory](#)
- [Find Labeled Buildings and Plants](#)
- [Communications Materials](#)



- ID under-performing assets
- Set Goals & Track Progress
- Prepare for increasing legislation tied to Energy Star performance



Energy

Efficiency

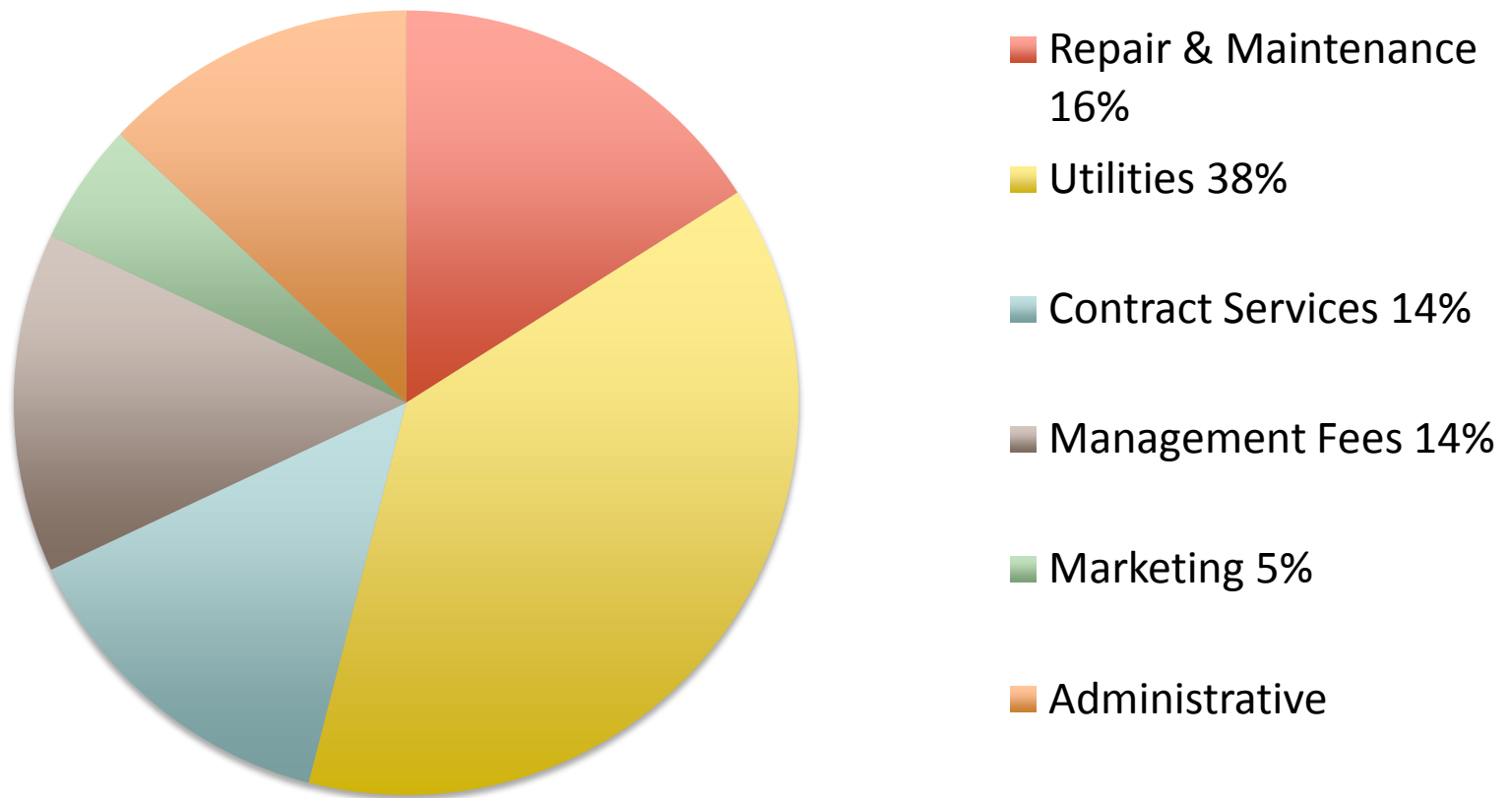


Production



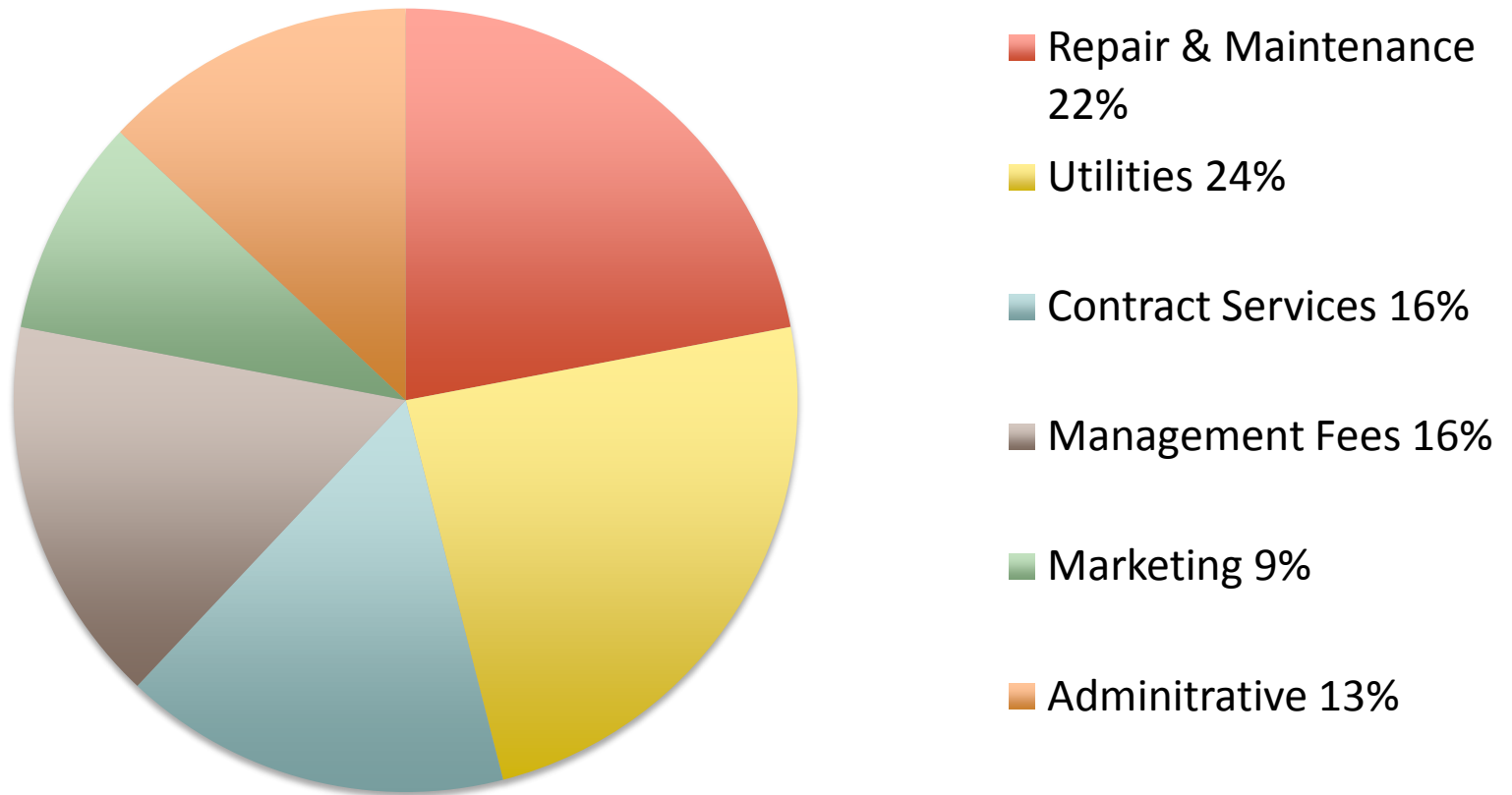
Utility Costs as a Percentage of Controllable Operating Expenses

Master Metered



Utility Costs as a Percentage of Controllable Operating Expenses

Directly Metered



Focus on Efficiency

1. Caulk & Seal
2. Properly sized heating & hot water boilers
3. Better thermostatic controls
4. Reduce DHW set point to 120°
5. Lighting Retrofit
6. Manage DHW consumption
7. Ventilation systems
50% leak rate
8. Energy Star appliances
9. Better windows
10. Rebates & Incentives

Energy Efficiency Advantages



Water

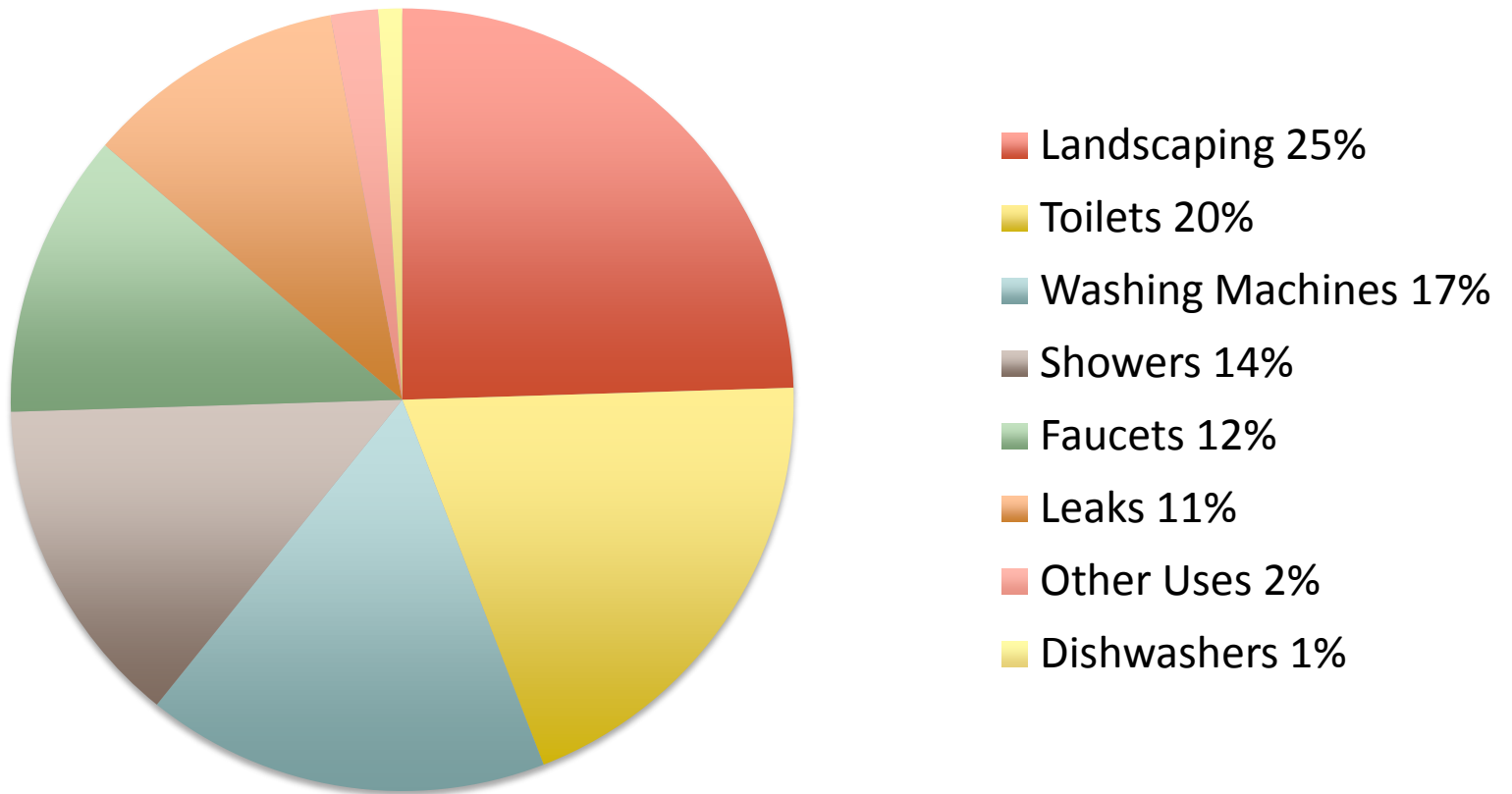
Conservation

Management



Average Water Use in Garden Style Complexes

Garden Style



WaterSense is Common Sense

Fixture	WaterSense Flow Rate - Maximum	Info
Faucet aerators	1.5 gpm	0.5 gpm may be acceptable
Toilets	1.28 gpf	Consider dual flush, retrofit kits, Niagra Stealth 0.8 gpf
Showerheads	2.2 gpm	1.5 – 1.75 Niagra makes an excellent product
Urinals	0.5 gpf	1 pint gpf has received good reviews

Sub-Metering vs. RUBS or Ratio Utility Billing Systems

Sub-metering = Accountability



RUBS = Accounting



WASTE!





Where does it go?

Superior environmental management will:

- **Increase net operating income**
- **Increase asset value**
- **Hedge against energy/water price volatility**
- **Meet the demand of green renters**
- **Stave off obsolescence**



RESOURCES & INSPIRATION

http://www.energystar.gov/index.cfm?c=multifam_housing.bus_multifam_housing

<http://www.naahq.org/green/Pages/welcome.aspx>

<http://www.greenlandlady.com/site>

<http://www.circleofblue.org>

<http://www.buildinggreen.com/>

<http://www.greenbiz.com/video/2010/02/08/spotlight-being-honest-ourselves-putting-numbers-behind-green-business>