



SUSTAINABLE ENERGY & ENVIRONMENTAL PLAN

Global Resource Efficiency Services
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Sustainable Energy & Environment Plan

The objectives of creating the Sustainable Energy & Environmental Plan are:

1. To establish a strategy framework for sustainable energy and environmental activities.
2. To define the projected energy and resource needs over a 15 year time horizon.
3. To evaluate utility plant options to meet future needs including renewable energy options.
4. To develop a Sustainable Energy Environment Master Plan which describes the strategies and the roles for staff.
5. To develop possible funding strategies for plan implementation.
6. To assist in the selection of an energy measure implementation partner and to define the partnering relationship, if applicable.

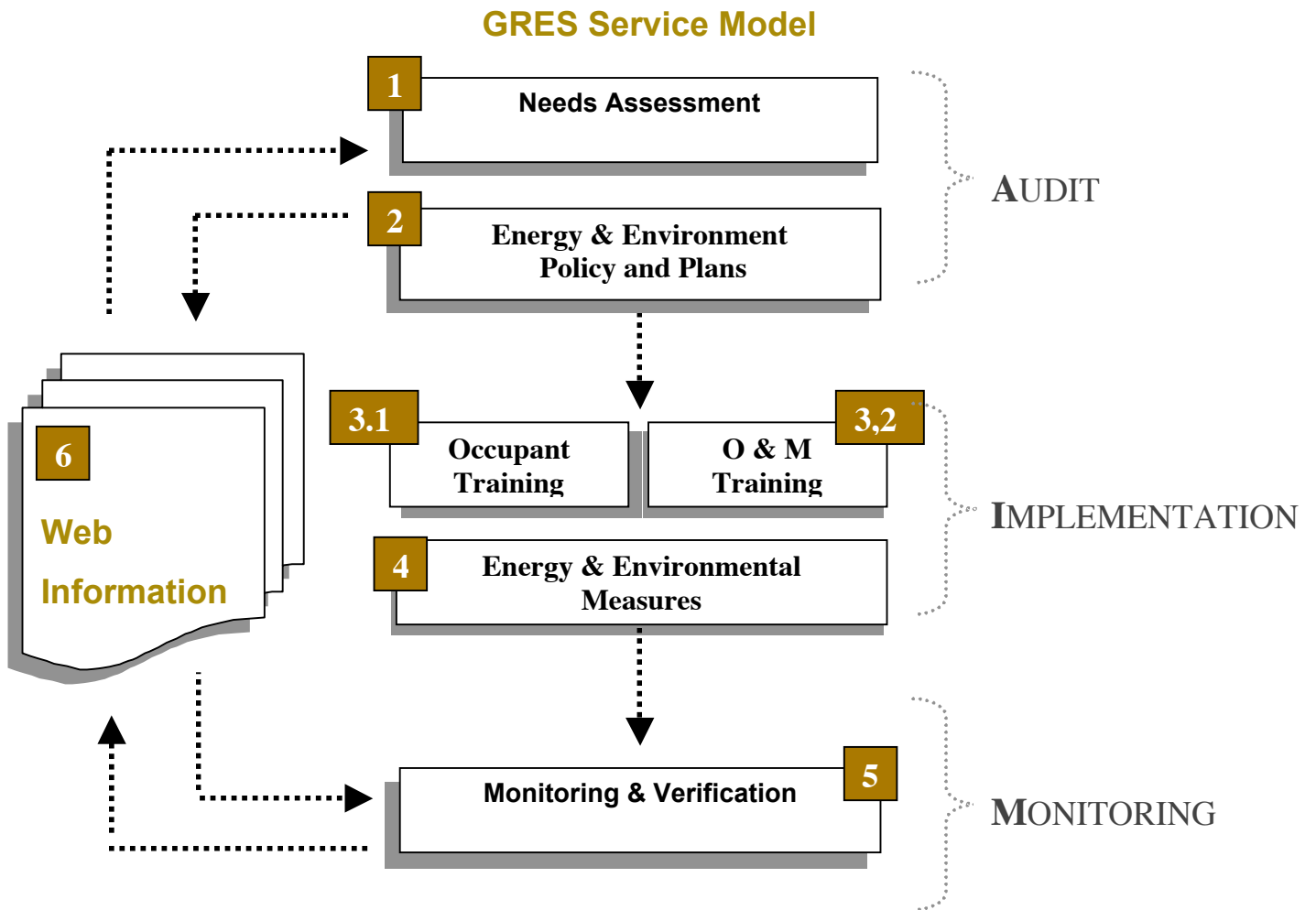
Approach

The scope of work describes the tasks required to accomplish the six objectives defined above. The approach is based on the creation of a baseline of existing energy/utility use in buildings. The second aspect of the work will be an estimate of the possible energy/utility savings based on our collective knowledge of building systems and their condition. After estimation of savings, we will be able to project future energy use.

The next step will be a review of energy price curves for existing energy sources (grid electricity and natural gas) and renewable energy options. The energy price curves will be projected over the 15-year time horizon. The utility plant options can now be evaluated in both economic and environmental terms. After some discussion, an optimum utility plant strategy can be selected.

Finally, an energy partner can be selected to integrate implementation measures and possibly assist with funding mechanisms. Issues such as specifications for energy audits, building documentation standards, training needs and M&V strategy must be defined before the partner starts any work.

The energy and environment plan must also follow a well defined management process ---- Audit ---- Implementation ---- Monitor. The process is defined for Institutional in the diagram below.



Sustainable Energy & Environment Plan Outline

1. Policy Approval at Board level. The Policy should be consistent with the Asset Plan and sustainability principles. Policy must also articulate the strategies for implementation of the policy. Roles, responsibilities and timelines need additional discussion and approval from the Board.

2. Energy Audits and Forecast will be needed as an input to the Utility Plant Master Plan. The existing energy use for current buildings will be defined by energy end use. Access to the institutions Asset Plan, which includes capital forecast and modernization estimates, will be required. A forecast of future energy use will be defined based on the Asset Plan and technology for energy saving measures. Forecast estimates of the savings will be made. The forecast will be used as input to the Utility Plant Master Plan. The Utility Plant Master Plan will review the cost curves for various energy sources including renewable energy sources and recommend the best options.

3. Occupant and O&M training for plant personnel will be selected based on the E&E Policy. The Web Information Center will be used to enable two way communications. GRES can develop the training and education programs based on a detailed Needs Assessment.

4. The implementation of energy and environmental measures will be completed using an energy partner selected based on a partnering approach. Another aspect of implementation will be the new buildings where we will use a sustainable design approach. Care must be taken to develop the roles and responsibilities for implementation tasks. The financing issues will be reviewed and various sources of financing considered beyond the energy and operating cost savings.

5. Monitoring and Verification will deal with the use of energy accounting to the baseline and calculation of savings with weather adjustments. Effort should be made to develop plans for real time monitoring with smart meters. The role of building automation in monitoring will be part of the plan. The use of building documentation and CAD will also be part of monitoring since we must develop standards of performance for building operation and maintenance. The training programs will review the CAD documentation standards and the standards of performance for efficient operation.

6. The Web Information Center will expedite the flow of communication on the policy and the plans. Eventually individual campus action plans will be developed and posted on the web page. The web page allows two way flow of information. The design will evolve to become more interactive as the program proceeds.

The GRES approach is defined as a level of effort based on the tasks defined. The level of effort can be modified after we have a chance to review the types of specifications and energy audits and other reports in Institutional files.

DRAFT ENERGY & ENVIRONMENT STRATEGIC PLAN OUTLINE

1 Objectives

- 1.1 Utility Supply Management
 - Time of use electricity metering
 - Demand response
 - Gas purchase agreement
 - Water Use
- 1.2 Energy & Environmental Management
 - Energy retrofit program for ___% savings
 - Smart metering
 - Student/Teacher participation
 - O&M documentation and training
- 1.3 Renewable Energy
 - Target of ___% by 2010

2 Asset Management Strategy

- 2.1 Alignment of Energy Efficiency measures with Capital forecast
 - Asset Management Framework
 - Loads-Systems-Plant sequencing
 - Leverage energy savings for renewal capital
- 2.2 Economic criteria for retrofits and life cycle costing
 - Life Cycle costing
 - Discount rate for LCC
 - Escalation rates for utility types
 - Renewal and savings funding

3 Utility Supply Management

- 3.1 Electricity
 - Smart metering
 - Sub metering
 - Building Automation metering interface
 - 3.2 Natural Gas
 - Group purchasing
 - Portfolio approach
 - 3.3 Water
 - In Building
 - Landscaping
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- 4 Energy & Environment Management
 - 4.1 Audits
 - Energy Accounting for Audits
 - Investment grade audits
 - O&M documentation
 - 4.2 Retrofits
 - Retrofit projects
 - Commissioning
 - 4.3 Training and Technology Transfer
 - Training needs
 - Workshop process
 - Training evaluation
 - 4.4 Communication to Stakeholders
 - Stakeholders
 - Web site
 - Web communication
 - 4.5 Monitoring and Savings Verification
 - Energy accounting software
 - Weather correction
 - Changes in use and baseline
 - 4.6 Building Automation and Real Time Metering
 - Smart metering
 - Sub metering
 - BAS for metering interface
 - 4.7 O&M documentation
 - CAD documentation
 - Ops manual
 - BAS documentation
 - 4.8 Education
 - All Occupants
 - Energy Star
 - 5 Renewable Technologies
 - 5.1 Renewable Strategy
 - Efficiency first
 - Incentives
 - Sponsorship
 - 5.2 Combined Heat Cooling & Power (CHCP) Economics
 - PV solar
 - Wind
 - Thermal solar
 - Ground source heat pumps
 - Cogen
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5.3 Combined Heat Cooling & Power (CHCP) Projects

- PV Solar
- Wind
- Thermal Solar
- Ground source heat pump
- Cogen

6 New Buildings & Additions

6.1 Building Design Process

- Design Build
- Integrated Design Process
- Green Material policy
- Life Cycle costing guideline

6.2 Commissioning

- Process
- Commissioning agent
- Acceptance testing and documentation

7 Stakeholder communication

7.1 Cross functional issues

- Planning and operations
- Purchasing and use
- Transportation

7.2 Teaching and Learning

- Systemic thinking
- Buildings as a system

7.3 Web Site

- Communication needs
- Site design
- Site reporting

8 Implementation

8.1 Retrofit Project Implementation

8.2 Renewable Implementation

8.3 Education & Communication Implementation
