

# Oregon University System – Sustainability Plan

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For the accompanying web presence, please visit: <http://capcon.ous.edu/sustainability>

## Contents:

Letters from the Chancellor and from the Sustainability Coordinator

Acknowledgements

1. Overview
2. Challenges, Role and Context of OUS and Its Seven Institutions
3. Principles of Sustainability for Higher Education
4. Current and Planned Actions

Appendices    Examples from several campuses  
                  Examples of sustainability frameworks

## **Letter from OUS Chancellor**

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We are at an exciting juncture in higher education in Oregon. There are continuing funding challenges and the pressure of rising enrollments, but the challenges also pose great opportunities. The collective role of our colleges and universities in sustainability is one such opportunity.

OUS has the chance to foster collaborations among the various campus sustainability initiatives to strengthen each program and the entire system in new and exhilarating ways. We have the chance to build bridges among the emerging and potentially far-reaching changes in technology, management and awareness that promise to reshape our economy and society while simultaneously protecting our treasured environment. Oregon's aims – job creation, quality of life, natural resource stewardship, strong communities – are what higher education seeks to fulfill. I look forward to supporting all of the campuses as they join this effort to build a better Oregon.

Richard Jarvis  
Chancellor, Oregon University System

## **Letter from the OUS Sustainability Coordinator**

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This is the beginning of an initial plan created on a tight timeframe to meet reporting requirements set out by the state. The plan will outline a year-long process of figuring out, as a system, how to define and take action on sustainability as a group.

Many things are happening already at the campus level, however, this effort is about figuring out how to coordinate in ways that we aren't already, and how to function as a team where it is appropriate and where it gives us leverage. The challenge is to figure out how to create a system-wide institutional culture on sustainability.

Many firms, non-profits and public agencies are striving to implement sustainability plans. A large number have already improved the efficiency and effectiveness of their organizations. Working collaboratively with these entities, our universities are uniquely situated to develop and implement models of sustainable management that provide examples of effective strategies that integrate the basic principles of environmental, economic, and social sustainability.

Bob Simonton  
Sustainability Coordinator and Director of Capital Construction, OUS

## **Acknowledgements**

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This plan was developed by consulting a wide range of people throughout the Oregon University System. The following people (in alphabetical order) gave their time for interviews, or to give comments on previous drafts: Shirley Clark, Michele Crim, Bob Doppelt, David Ebsen, Dave Ervin, Don Gerhart, George Hecht, Denise Lach, Rich Linton, Jim Lloyd, Karyn Kaplan, Steve Medley, Bruce Moats, Darlene Morgan, Hallie Neupert, Earl Potter, Alan Smith, Fred Tepfer,

Christine Thompson, Brandon Trelstad, Tim White and Dan Williams. Bill Blosser and Thomas Miller also provided helpful comments as a part of the initial review of the plan by the Oregon Sustainability Board. The content and suggested actions in this plan were ultimately approved by the Sustainability Coordinator, and do not necessarily represent the views of all of the people who were consulted, other OUS administrators, or the incoming Board of Higher Education.

# 1. Overview

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Oregon's state government, under the mandate and encouragement of the current governor and his predecessor, faces the official challenge of pursuing sustainability. Although that challenge does not come with clearly identifiable end-points, it is generally agreed that it consists of many changes in processes – learning, communication, adaptive management, new systems of incentives and rewards, etc. As one of the twenty state agencies currently asked to prepare a sustainability plan, the Oregon University System offers this report on its progress and strategies for improving and defining target outcomes and processes.

OUS considers this plan as the first effort and foundation of an on-going process of reporting on the system's sustainability performance. To that end, this document is a starting point for three efforts:

- On-going reporting, as required by the state;
- Collaboration with the campuses in creating a more detailed version of this plan; and
- A web presence to support the reporting and collaboration.

OUS considers it premature to develop more than this preliminary structure, and asks all campuses to consider how best to reach the initial goals herein. OUS will engage all universities in the process of setting the goals. Since sustainability means such different things to different people in different contexts, it is not desirable or feasible to impose a comprehensive and detailed plan in a top-down manner. OUS does, however, describe the channels for feedback and areas of emphasis, as laid out throughout this document.

The challenge of sustainability is far-reaching and forces us to think long-term and holistically. It involves the transformation of both individual perspectives and organizational processes. It involves new ways of understanding the world and society, our constraints and our opportunities. Perhaps most of all, the challenge is a collective one – especially for a system of institutions whose job it is to think, to train thinkers and to disseminate better thinking into the rest of society.

## **The Structure of the Plan, and About This Document**

This plan is on paper now, but it will evolve – both by getting new detail and by changing in response to input – over the coming year, before the state-mandated revision in twelve months' time. The table at the beginning of Section 4 lists the nine points that the Sustainability Board requests of each agency's plan, and OUS has elected to report using this structure.

This document has four main sections after this introduction:

Section 2 – Challenges, Role and Context of OUS and Its Seven Institutions – discusses the key elements of the system's current circumstances, including its financial health, its system of governance, the major outside trends in the pipeline, and the physical state of its infrastructure. These details make OUS unique among state agencies, and its sustainability efforts should be viewed with these facts in mind.

Section 3 – Developing Principles of Sustainability for Higher Education – starts the conversation (that OUS will attempt to foster and facilitate) on the *sustainability*

*principles* that Oregon's public higher education institutions can teach to students, use to guide research, use in outreach to commerce and industry in Oregon, and live by example in their operations.

Section 4 – Current and Planned Actions – provides the detail on the initial goals set out by OUS, current actions and planned actions (to start progress toward those goals and to engage the system in order to refine the goals), as requested by the Oregon Sustainability Board. This section also communicates how OUS perceives “sustainability efforts” on the campuses, which can be difficult to define. OUS views the “sustainability” label in a multi-disciplinary and cross-functional manner.

The Appendices provide (a) an in-depth example of sustainability activities on the campuses and (b) summaries of several well-known sustainability frameworks.

This table follows the format in the Guidance Document provided by the Sustainability Board.

<b>1. Goals</b>	<ul style="list-style-type: none"> <li>a) Collaborative development of sustainability principles for institutions of higher education, relevant to all campuses in the system</li> <li>b) Development of a Framework for Sustainability Governance and Assessment</li> <li>c) Development of New Financing Models for Challenges that Defy Current Systems</li> </ul>
<b>2. Current Actions</b>	<p>See examples below in Section 4 from across the seven campuses. Examples cover teaching, research, service/outreach and combinations of these areas. (Given the size and scope of the system, and the extent of existing activities, it was not possible to provide comprehensive assessment of activities for this document. See section 5 for related plans.)</p>
<b>3. Target Actions</b>	<ul style="list-style-type: none"> <li>a) Convene virtual and/or in-person gatherings for the development of a set of high-level sustainability principles for higher ed in Oregon</li> <li>b) Identify and document current governance structures on the campuses right now</li> <li>c) Create campus-level inventories of facilities-based and academic sustainability efforts</li> <li>d) Begin facilitating single- and multi-campus learning and sharing of best practices</li> <li>e) Address priority areas for learning and assessment</li> <li>f) Create an OUS Energy Cooperative</li> <li>g) Explore new models for on-going external financial relationships</li> <li>h) Develop standard design criteria for capital construction</li> </ul>
<b>4. Define Effect of Actions</b>	<ul style="list-style-type: none"> <li>a) Begin to give clarity to the challenge, begin the right conversations</li> <li>b) Improve practices, clarify/improve governance, help define roles</li> <li>c) Get some results in a few key areas that would not have been addressed otherwise</li> </ul>
<b>5. Performance Measurement</b>	<ul style="list-style-type: none"> <li>a) Inventories of programs, practices and approaches (academic)</li> <li>b) Indicators and benchmarking for facilities and operations performance</li> <li>c) Establishment of clearer governance</li> </ul>
<b>6. Responsibility</b>	<ul style="list-style-type: none"> <li>a) Elaboration of the role of Sustainability Coordinator in the Chancellor's Office (Bob Simonton, the Director of Capital Construction)</li> <li>b) Facilitation of effort among existing positions and efforts on campuses</li> <li>c) Identification of people inside the system who already have a sustainability governance roles on their respective campuses</li> <li>d) Creation of an OUS Sustainability web presence to support campuses</li> </ul>
<b>7. Communications Program</b>	<ul style="list-style-type: none"> <li>a) Presentations by the Sustainability Coordinator to key groups (Academic Council, Administrative Council, facilities directors, etc.)</li> <li>b) Workshops and meetings by OUS with specialized groups of facilities staff for sharing best practices on particular challenges</li> <li>c) Meetings on sustainability strategy with existing single-campus and multi-campus groups</li> </ul>
<b>8. Fitting into Agency Strategic Plan</b>	<p>(OUS is currently without either a board or a strategic plan. See the brief discussion of this at the end of the plan.)</p>
<b>9. Coordination with Other Agencies</b>	<p>Aggregate campus-specific needs and facilitate assistance from Office of Energy and others</p>

## 2. Challenges, Role and Context of OUS

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### **Sustainability, Higher Education and OUS\* : Defining the Agency's Challenge and Role**

Each Oregon state agency, like every individual or organization pursuing sustainability, must ask: what is unique about our task? The Oregon University System has key characteristics that define the challenge of sustainability for the system and therefore also the reporting process itself. We present these now because they set the tone and expectations for this report, and they lay out a role for OUS itself.

First, we can make two sets of observations on the state and roles of the seven campuses:

- ❑ **Fundamental role in sustainability for the state:** As a group of higher education institutions, the OUS campuses serve functions for the entire state that relate to sustainability in quite different but all fundamental ways:
  - Teaching
  - Research
  - Outreach, service and extension\*\*
  - The operation of facilities and infrastructure
- ❑ **Decentralized system:** The OUS campuses have a great deal of delegated autonomy, so the system is characterized by high decentralization:
  - A large share of financial decision making happens at the individual campuses

Second, we can make two observations on the particular role of OUS:

- ❑ **OUS has strong leverage in a few key areas:** Because of its specific roles vis-à-vis the campuses, OUS has much stronger opportunities in some areas than others for a leverage point for sustainability. These areas include:
  - The convening and facilitation of on-going coordination and planning for presidents, provosts, financial/administrative vice presidents, and others
  - Influence on high-level priority setting on operations and academic topics
  - Influence on facilities management, purchasing, capital construction and business practices generally
- ❑ **OUS' support role:** OUS has mainly administrative, coordinating and support functions, and is both an overseer and a coordinator of the system.

### **The special challenge of higher education, and OUS' particular role**

Education must be a cornerstone of our efforts to create a sustainable world. Sustainability requires new ways of thinking and understanding; therefore, it requires new ways of teaching and learning. Universities and colleges, like all institutions of education, must take on this challenge.

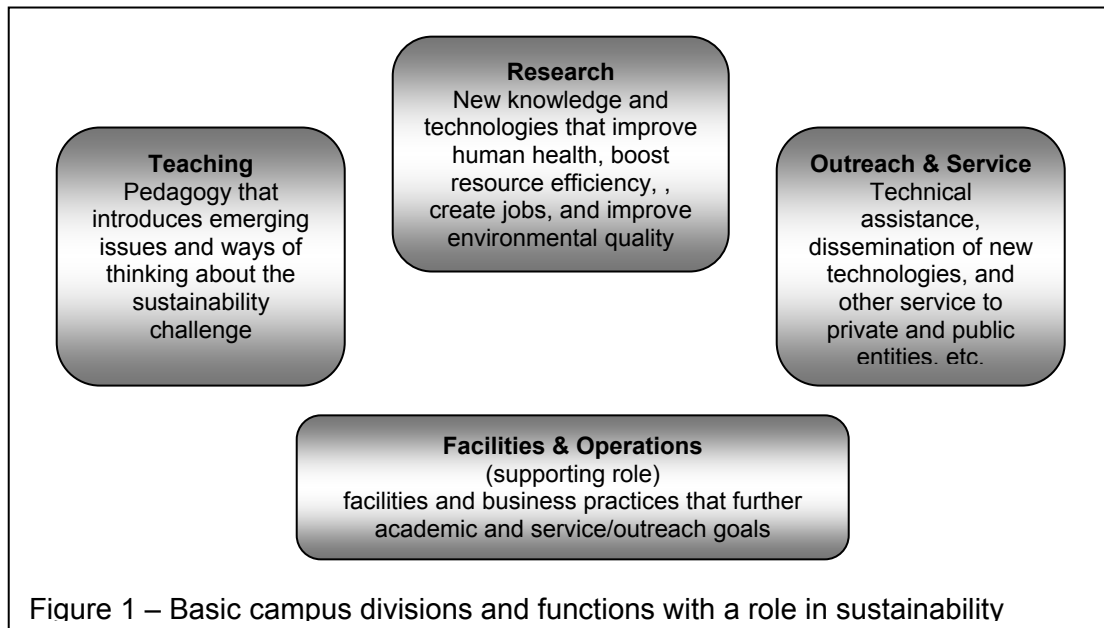
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\* Throughout the document we use "OUS" to refer to the executive body that is a direct agency of state government, and "the campuses" or "the OUS campuses" to refer to the system's seven constituent campuses.

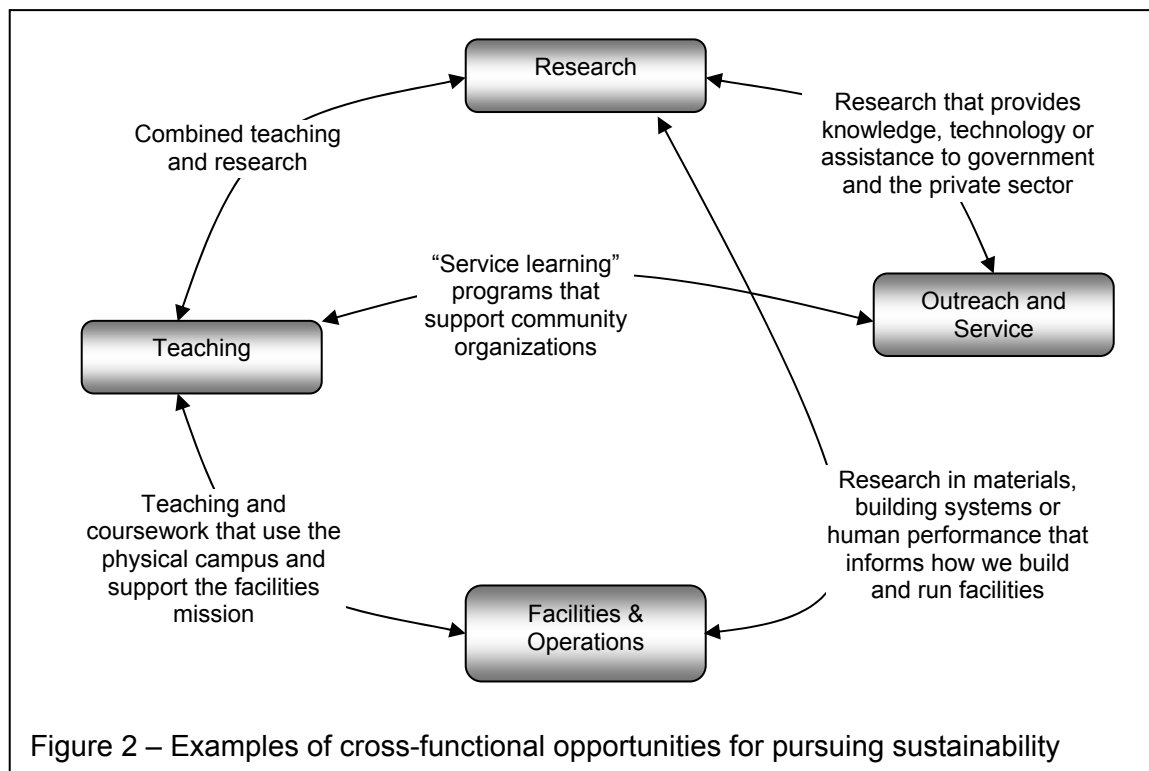
\*\* Outreach, service and extension naturally cover different specific functions on different campuses; these differences are not explored in detail in this document, but they will be important in subsequent elaborations of this plan.

Ultimately, the solutions and impetus for change must come from the campuses and OUS simultaneously and in partnership with communities, businesses and government agencies. The universities can lead the process because of their unique positions, but success will require intellectual and experiential knowledge of outside partners. OUS' primary role is to facilitate and assist work that the campuses wish to pursue.

Nonetheless, OUS will take this as an opportunity to better understand and identify its responsibilities in this area. OUS will seek to understand which sustainability challenges are best addressed at a system-wide level, and then take those on or directly facilitate work on them. In areas where the individual campuses are best suited to tackle problems and challenges, OUS will look to assist in clarifying challenges, disseminating common tools and facilitating communication among the campuses.



OUS' principal goal is to support the campuses in understanding how each of the individual missions and functions in Figure 1 should see sustainability, and how each can define and improve its sustainability performance. However, these functions overlap and therefore have the potential to reinforce each other. Figure 2 articulates how this is possible. (Later in this document, in **Section 4. Action and Assessment**, we provide some specific examples of this overlap.)



### Current and continuing crisis: trends, budgets and deferred maintenance

We must inform our ambition for sustainability with facts about our circumstances. There are some serious challenges that *everyone* in the system – inside OUS and on the campuses – must acknowledge in order to comprehend the nature of the challenge at hand and best set priorities for the near future. These deserve some elaboration, but we can state them simply:

- ❑ **Operating budgets are insufficient, shifting the burden** on every campus onto students (in the form of higher tuition and fees), staff and professors (low salaries) and the environment (wasteful practices that save money only in the very short run).
- ❑ **Deferred maintenance** has reached staggering proportions, as there are outdated and ineffective buildings on every campus.
- ❑ It is almost certain that **enrollments will rise** at every campus to accommodate the 5-10% rise in the college-aged population in Oregon over the next decade.

The combination of these factors means that the financial outlook will be difficult for the foreseeable future. More important, it means that the campuses, with OUS' help, will have to make the most of the budgets they have.

These challenges also present opportunities. Several of the planned actions (especially Target Actions 3a, 3b, 3d, 3e, 3f and 3h, and Performance Measurement actions 5a and 5c) involve multi-campus collaboration in areas where the campuses have previously operated separately. These efforts can simultaneously reduce operating costs and environmental and health impacts. However, OUS also acknowledges the need to minimize the burden on staff and faculty time.

### 3. Developing Principles of Sustainability for Higher Education

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#### **New Thinking: developing principles and shared understanding**

The Oregon Sustainability Board defines sustainability with these aims:

- ❑ Develop a vibrant economy and strong communities
- ❑ Ensure sustainable use of resources
- ❑ Enhance economic self-reliance and human well-being
- ❑ Maintain and restore natural systems
- ❑ Preserve Oregon's economic, social and environmental assets for future generations

Oregon wants to strive for these goals, and higher education will play a key role in getting there. OUS' challenge is to assist the process of learning and change at the seven institutions in order to accelerate teaching, research, service and operations that can be the means for achieving these goals.

Unfortunately, few campuses enjoy anything like campus-wide consensus on sustainability issues, and there is certainly no system-wide consensus on what sustainability means for higher education, or how it is or should be part of the various missions. However, we can count on two key points:

- *Change at the level of society as a whole requires change in ways of thinking, and*
- *Institutions of higher education must take responsibility for leading in this change.*

Since there is growing consensus about some of humanity's emerging challenges – and in particular about the challenges faced by Oregon and the region – we have the task of “defining” sustainability so it links the clearly identified missions to the emerging challenges. Some relevant aspects of sustainability enjoy a high level of consensus already and are therefore worth mentioning briefly:

- ❑ Eliminate reliance on, or dramatically reduce the use of, non-renewable resources such as fossil fuels and most extracted minerals
- ❑ Realign the use of key renewable resources (arable land in agriculture, forests used for) with the ability of ecosystems to regenerate or assimilate the resource use
- ❑ Protect biodiversity, mainly by addressing our indirect impacts on habitat (water use, air and water pollution) and direct destruction or alteration of habitat
- ❑ Slow and eventually eliminate human contributions to climate change
- ❑ Assist the world's population in meeting basic needs in ways that do not contribute to these problems we hope to solve

To this end, our task is to articulate additional, more specific, and explicitly mission-oriented shared understanding around which we can all rally. OUS will not attempt to provide all of the answers; instead, OUS aims to facilitate a process that will articulate principles that are relevant for academic disciplines, programs or campus units; explore how to disseminate them in the relevant academic and non-academic units on the seven campuses; and assist the process of refining and interpreting them for the widest appropriate range of contexts.

The goal is to support individual teachers, researchers and campus entities in organizing and informing their thinking, furthering their activities and sharing knowledge and experiences with other campuses. A short description of each gives a hint of how some of these can enhance higher education's role in building the knowledge and innovative capacity of the state's companies, workforce and institutions.

### **The quest for shared understanding and principles – goals and examples**

There has been an explosion of research and writing on implementing sustainability inside complex organizations such as government agencies, private businesses and universities. Observers increasingly point to a handful of common features of successful sustainability efforts. These are often described in terms– governance, leadership, communication, systems thinking, transparency, etc. – that suggest organization effectiveness generally.

What is different about the challenge of sustainability, from the vantage point of the current moment? In particular, what should higher education bring to this challenge? OUS sees the challenge in terms of our tools for thinking and communicating about emerging challenges. We will make progress in part by choosing tools, such as “principles” and “frameworks” of sustainability, based on a shared understanding of the challenges. As Oregon's educational infrastructure, OUS has a responsibility for bringing people together around this shared understanding of our challenges, and thus around mental models that make the most sense for our circumstances.

Fortunately, we are not starting from scratch: an appendix to this document briefly describes eight frameworks and sets of principles that provide guidance for educating on sustainability and on sustainable design and thinking. Without judging these frameworks' effectiveness, appropriateness or accuracy, it is worthwhile to bring them into the conversation so we can start to assess how they, as emerging mental models, can add to the ways we conceive of the missions of higher education and the ways in which individual researchers, instructors, extension agents, students and facilities staff pursue these various missions. The frameworks in the appendix are:

- A. The System Conditions of the Natural Step
- B. Natural Capitalism approach
- C. Zero Waste approach
- D. Ecological Footprint
- E. CERES Principles
- F. Bellagio Principles
- G. Sustainable Process Index

*Frameworks such as these never provide silver-bullet solutions* for aligning our thinking with emerging challenges. In some cases, they provide only popular or non-scientific background that can inform university discussions. In a few cases, there is some scientific rigor and peer review to raise our confidence. Yet, overall, these frameworks simply frame the challenge of sustainability.

These frameworks differ somewhat in content emphasis and considerably in operational intent. Some of them emphasize process, while others emphasize outcome. Some of them attempt to balance environmental and social equity concerns, while others focus largely on the

environment. Some appeal to a holistic scientific mindset, while others have more of an application-oriented and engineering-style approach.

Nonetheless, they have common themes that overlap with the sustainability goals articulated by the Sustainability Board's Guidance Document. Furthermore, they all share a narrow set of purposes: to help organizations both understand the challenge of sustainable development and take on that challenge. Several – especially the Natural Step – have been used by businesses and other organizations to give coherence to organization-wide efforts. Thus, they should be considered important guinea pigs in the experimentation with new mental models for the sustainability challenge.

## **4. Action and Assessment**

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The sub-sections below correspond to the reporting requirements of the Sustainability Board's Guidance Document:

<b>1. Goals</b>
<b>2. Current Actions</b>
<b>3. Target Actions</b>
<b>4. Define Effect of Actions</b>
<b>5. Performance Measurement</b>
<b>6. Responsibility</b>
<b>7. Communications Program</b>
<b>8. Fitting into Agency Strategic Plan</b>
<b>9. Coordination with Other Agencies</b>

## 1. Goals

OUS has a single goal that flows from the discussion of principles in Section 3 above: *to define – for a system of higher education institutions – what sustainability means, how it should be pursued and how it will reshape internal and external institutional relationships*. Given the breadth of this goal, OUS has articulated this goal as three distinct, more manageable goals:

Goal #1: Collaborative Development of Principles

Goal #2: A Framework for Sustainability Governance

Goal #3: Develop New Financing Models for Challenges that Defy Current Systems

OUS' three main goals will provide better understanding of how activities on the campuses can contribute to sustainability, and begin that process. The actions to achieve these goals are described in greater detail in subsequent sections (3. Target Actions, 5. Performance Measurement).

### Goal #1: Collaborative Development of Principles

The principles mentioned above are, as stated, only a starting point. OUS will seek input from individuals throughout the system, facilitate or convene formal discussions on the topic, and attempt to provide a set of principles that represent shared understanding of the core ideas of “sustainable thinking” for the purpose of pedagogy, research, service and outreach, and management of the physical campus.

#### Target Actions and Performance Measurement Items for Goal #1

3a) Convene gatherings for the development of a sustainability principles for higher ed  
3c) Create campus-level inventories of academic and facilities-based sustainability efforts

### Goal #2: Development of a Framework for Sustainability Governance and Assessment

Every campus needs to ensure that its governance systems begin to address these emerging concerns and challenges. By governance, we mean the way an organization “distributes power and authority through its information, decision-making and resource allocation mechanisms.”\* As elaborated in the actions below (especially 3), this effort will begin by describing what type of sustainability governance and decision making exist now (in teaching, research, service and outreach, capital construction, facilities maintenance, purchasing and awareness-raising among campus users). OUS will then facilitate a discussion among campuses in order to identify which strategies work best for which situations and purposes – sustainability committees, sustainability coordinators, collaborative forums, multi-campus meetings

#### Target Actions and Performance Measurement Items for Goal #2

3b) Identify and document current governance structures on the campuses right now  
3d) Begin facilitating single- and multi-campus assessment  
3e) Target priority areas for learning and assessment  
3h) Develop Standard Design Criteria for Capital Construction

\* Bob Doppelt, *Leading Change Toward Sustainability*, p. 17.

among counterparts, etc. – and suggest ways that the campuses can improve governance.

The performance measurement efforts (5a-c) also support the documentation and articulation of governance processes. Where campuses do not have any assessment process in place, OUS will assist campuses in developing their own tailored plans specific to individual institutions' needs. Where such processes exist, OUS will learn from them and encourage system-wide coherence to maximize cross-campus learning without forcing the use of inappropriate templates.

### **Goal #3: Develop New Financing Models for Challenges that Defy Current Systems**

Many of the instances of substandard sustainability performance stem from old and/or inappropriate systems of financial decision-making. Purchasing that requires low bid over low life-cycle cost; budgets and thinking that focus on buildings' first costs without regard for subsequent maintenance; and efficiency and conservation efforts that have no way to reap reward from their success – these are all examples of how incentives and systems are insufficient for our current challenges.

OUS will examine a few areas where new and more effective systems can be put in place. Ultimately, this may require initially unfamiliar changes in processes, but OUS has find wide agreement that current systems do not always sufficiently foster solutions to environmental and financial challenges.

#### Target Actions and Performance Measurement Items for Goal #3

- 3f) Create an OUS Energy Cooperative
- 3g) Explore New Models for On-Going External Financial Relationships
- 3h) Develop Standard Design Criteria for Capital Construction

## 2. Current Actions

There is currently no catalog of all of the sustainability-related projects, in all departments, divisions and campus units, at all of the seven institutions. Indeed, the creation of campus-level inventories and campus-level sustainability indicators are among the performance measurement actions listed below. Therefore, the current descriptions convey only a set of stories, rather than a systematic assessment of actions throughout the system.

OUS can still identify several kinds of actions that represent the ways that institutions make progress on issues of sustainability. First, there are actions linked directly to the facets of the mission, as well as operations:

- ❑ **Research** that develops new technologies or techniques, or that expands our understanding of natural systems or human systems, or of the interrelationships among human and natural systems
- ❑ **Teaching** that communicates the concepts of sustainability to people who then carry those ideas into the workforce and into society as a whole
- ❑ **Service and outreach** in its various forms – extension, technical support, service and peer learning – that provides direct assistance builds capacity, or convenes collaboration and/or communication.
- ❑ **Operations** that reduce a campus’ negative impacts, improve human health, provide habitat, educate facility users and visitors, etc.

### Examples of sustainability successes in core mission areas

SPECIAL NOTE: Since there is no comprehensive inventory of all campus sustainability actions, programs and projects, the examples below are intended only to provide a sample, not a representative cross section. Not all campuses are represented, nor are all areas of action fully described. *These explanatory examples simply illustrate the possibilities for action.*

Sustainability successes in teaching	<b>Environmental studies programs and programs that incorporate environmental studies</b> now exist on all of the campuses and contribute to general “sustainability literacy” and opportunities for further study.
Sustainability successes in service, outreach and extension	<b>PSU’s Professional Certificate in Implementing Sustainability</b> provides extended community education. Participants learn about the opportunities and challenges for moving their organizations beyond compliance toward the triple bottom line of integrating environmental, social, and economic systems. Topics include the development of sustainability metrics and techniques for developing and implementing a sustainability initiative in a variety of organizations. The program is aimed particularly at professionals in the field.
Sustainability successes in facilities management and new construction	<b>High-performance or “green” building</b> efforts at several campuses have resulted in buildings that provide greater use and comfort at significantly lower life-cycle cost through innovations in design, materials use and building systems. The Lillis Business Complex at the University of Oregon and the new dorms at Portland State University are examples of this trend. At OSU, the Kelley Science Building is already providing benefits during the construction phase, as over 90% of the construction waste has been recycled, saving the university money. (see appendix)

In addition to these “pure” forms (the three prongs of the mission, plus the business practices of campuses), there are combinations of these, such as:

- Operations and Teaching: using operational challenges or efficiencies as pedagogical opportunities.
- Teaching and Outreach: service learning programs and other methods, e.g., internships, for providing students with a structure for an academic experience that contributes to the community at the same time
- Research and Teaching: leveraging the work of professors and other researchers to provide academic experiences that expose students to cutting edge technologies and ideas

These general categories are, in effect, strategies for furthering sustainability through the core missions of the institution; the combinations demonstrate how interdisciplinary and cross-functional activities provide special opportunities. There are many barriers to making such efforts successful, so a few examples from across the system demonstrate key actions that individual campuses are taking:

**Examples of interdisciplinary and cross-functional efforts:**

Integration of operations, research and teaching	<b>Oregon Institute of Technology’s Geothermal Plant</b> produces clean and inexpensive geothermal energy for the campus while providing research and teaching opportunities related to the cutting-edge technology in place.
Operations that provide learning experiences for students	<b>Recycling efforts with key student involvement</b> are a fixture on several OUS campuses, large and small. Programs often rely on student employees for their recycling programs. In addition to providing employment opportunities for students, these programs demonstrate practices that students take with them when they leave. The University of Oregon’s nationally recognized recycling program, which now consistently recovers at least 40% of the campus’ waste stream, employs many students and has numerous alumni now working in recycling at other higher ed institutions.
Student academic experiences that provide service to the community	<b>Service learning opportunities</b> are present throughout the system. Portland State University’s Urban Studies Program has numerous channels for students to integrate community service with academic programs. The University of Oregon has many regular programs that link students with community service projects, including the Community Planning Workshop (CPW) and Resource Assistance for Rural Environments (RARE) (both in the Community Service Center) the Environmental Service Learning Program (in the Environmental Studies Program).

It is important to note that all of the academic projects happen outside of the direct auspices of the OUS Chancellor’s office; these are the decentralized efforts of the various campuses. OUS highlights these achievements to provide examples of how the various institutions are excelling in various areas.

### 3. Target Actions

- a) Convene virtual and/or in-person gatherings for the development of a set of high-level sustainability principles to guide higher ed academic and operations programs in Oregon
- b) Identify and document current governance structures on the campuses right now
- c) Create campus-level inventories of facilities-based and academic sustainability efforts (including a comprehensive list of courses that either focus on or integrate sustainability perspectives and/or principles) – see Performance Measurement below
- d) Begin facilitating single- and multi-campus assessments (centralized data-gathering benchmarking) and learning (convening of focused working groups)
- e) Target priority areas for learning and assessment (Offer support to all interested campuses in those target areas – optional participation by campuses)
- f) Create an OUS Energy Cooperative
- g) Explore New Models for On-Going External Financial Relationships
- h) Develop Standard Design Criteria for Capital Construction

Each of the items described in greater detail below has *tentative timeframes and milestones*. These will depend to some extent on funding, staff availability and interest/involvement of key campus stakeholders.

#### **3a) Convene gatherings to develop set of sustainability principles**

*Estimated Timeframe:* *begin mid-2004, continue through mid-2005*

*Performance Milestone(s):* *clear articulation, in document form, of shared sustainability principles to inform subsequent actions by mid-2005*

Given the diversity of circumstances, perspectives and missions throughout the system and on individual campuses, it will be important to develop a consensus set of general sustainability principles on which to base our thinking and our actions.

OUS will attempt to engage following groups initially, which already meet regularly:

- Provosts (the Academic Council)
- VPs of administration and finance (Administrative Council)
- Facilities directors
- Campus-level committees on environmental and/or sustainability issues
- Faculty Senate representatives
- Student government leaders

Such efforts can be an exhausting experience of deliberating over details, but this effort will not focus on the word-smithing of definitions. Rather, the goal is to identify ways of thinking that can apply in various contexts in order help individuals – students, staff, teachers, researchers, etc. – to think about their respective roles and the relationship of their roles to the missions of their institutions. Ultimately, “sustainability” is about shared values, such as health and community and fairness, but we need new ways of thinking in order to connect our individual roles more effectively to these values. Instead of seeking universal dictums to apply to everyone, the goal is to find principles and frameworks that get different groups aligned with top-level goals.

### **3b) Identify and document current governance structures on the campuses**

*Estimated Timeframe: begin mid-2004; on-going*

*Performance Milestone(s): clear articulation, in document form, of sustainability governance experiences for circulation by early- or mid-2005; concrete plans by mid-2005 for multi-campus gathering to discuss findings*

Fully engaging sustainability will involve both taking some new actions and integrating actions that have been previously kept separate. These first-time efforts will, in some cases, require new forms of decision making, new information channels or other new ways of doing things. That will occasionally require new forms of governance and adjustments in existing ones.

Campuses in Oregon and all over the country are experimenting with “sustainability coordinators” and “sustainability committees” in order to coordinate functions that seem to require integrated strategies. OUS will document the efforts underway in this area in order to help the campuses understand the advantages and disadvantages of particular governance paths.

OUS has no expectation that there will be a one-size-fits-all governance solution, especially given the diversity of scale and scope in the system. However, there will certainly be lessons to share across campuses. Despite their differences, campuses can find value in asking certain common questions, such as:

- Who or what connects faculty to the surrounding community to provide students with a range of service learning options?
- Which academic staff or campus entities connect faculty inside and across disciplines to boost the synergies of related research, teaching and outreach on sustainability issues?
- Who communicates with the campus community about the impacts of “daily life” on health, the environment and social issues? Who is in charge of creating the related behavior-change programs that improve performance in this area while saving money?
- Whose job is it to ensure that sustainability is a topic of high-level discussions involving the president and off-campus constituents and stakeholders?
- Who coordinates growth and development of campus facilities, making sure that they all take into consideration some aspect of sustainability?

### **3c) Campus-level inventories of academic-side sustainability efforts**

*Estimated Timeframe: begin mid-2004; on-going at interval to be decided with campus input*

*Performance Milestone(s): create simple format/template/guidelines, with campus inputs by fall 2004; completed documents of each campus' efforts by early 2005 (to be completed by the campuses with OUS assistance)*

Each of the campuses individually and the system as a whole will benefit from documentation of existing sustainability efforts. The examples above (in 2. Current Actions) only scratch the surface. More comprehensive cataloging will increase the campus community's understanding of the common goals shared by a wide range of efforts, as well as a better understanding of what is meant by “sustainability” as a term. This shared understanding of the interconnectedness of many activities will reinforce the sense of the campus missions.

Some campuses have already begun to assemble this sort of inventory or census. These campuses will be invited to take a role in shaping this multi-campus process, as well as in

sharing their individual processes and outcomes with others in order to accelerate the process for the system as a whole.

### **3d) Facilitation of single- and multi-campus learning and sharing of best practices**

*Estimated Timeframe: begin mid-2004, continuing activities throughout 2005*

*Performance Milestone(s): organization of initial gatherings and identification of appropriate audiences by late 2004,; conduct 2-3 workshops by mid-2005; identify subsequent needs/interests among campuses by mid-2005*

OUS will convene meetings focused on particular facilities or academic challenges/functions and, increasingly over time, the use of benchmarking data to inform these meetings.

OUS will, over the course of the coming year, offer specific support to all interested campuses in several key target areas. OUS will offer targeted assistance (both technical support and assistance in finding funds) to all interested campuses for:

- ❑ Development and implementation of campus-based courses in campus sustainability assessment and campus sustainability projects
- ❑ Development and implementation of extended education and outreach efforts in sustainability education and capacity building
- ❑ Planning, design and construction of high-performance buildings
- ❑ Support (financial or otherwise) of academic internships connecting students with off- and on-campus sustainability activities, particularly in building design and construction.
- ❑ Computer and electronics recycling
- ❑ Sustainability indicators and assessment for facilities

Several campuses have already developed efforts in one or more of these areas

### **3e) Target priority areas for learning and assessment**

*Estimated Timeframe: begin mid-2004 with learning activities for high-performance buildings and fall 2004 with assessment activities for waste management, electronics and GHG inventories*

*Performance Milestone(s): minimum threshold training for relevant campus staff on high-performance buildings by early 2005; initial electronics assessment, waste assessment and GHG inventories depending on campus interest and priorities; preliminary GHG inventories also as required/funded/assisted by governor's climate change initiative*

OUS will target a handful of key areas for learning and assessment. OUS encourages suggestions for such priority areas, and offers the following as a starting point:

- High-performance buildings
- Waste management
- Life-cycle management of computer hardware and other electronics
- Greenhouse gas (GHG) inventories and development of climate strategies
- Courses in campus sustainability assessment (that support OUS and campus efforts)

These present great opportunities for the campuses. The following chart notes a few reasons that these have been identified as priority areas:

Priority areas and rationale	Opportunity for cost-savings and risk reduction	Opportunity to address major health and/or environmental issue, and to teach campus users	Templates or related practices exist on one or more OUS campuses
Priority Area: High-performance buildings	Efficient and healthy buildings (e.g., LEED or LEED-EB certified) have lower life-cycle operating costs and deliver greater health and comfort to users	LEED and the practices it promotes are emerging as widely accepted best practices in the design, architecture and construction communities.	Several campuses have built or are building LEED buildings.
Priority Area: Life-cycle management of computer hardware and other electronics	Purchasing based on life-cycle costs promises considerable savings for campuses.	Disposal of so-called “e-waste” is emerging as an economy-wide problem.	Several campuses are changing the ways they purchase and dispose of computer hardware
Priority Area: GHG inventories and development of climate strategies	Emerging programs of selling “carbon offsets” could provide a source of funding for renovations that boost efficiency.	Emerging issue; growing consensus that large organizations are suitable units of analysis for GHG inventories	Existing tools have turned creating a GHG inventory into a straightforward task.
Priority Area: Courses in campus sustainability assessment	Highly focused data collection in some areas could facilitate better decision making.	Indicators, metrics and assessment are hot themes where students could get valuable campus-based experience.	Several campuses have courses that do partial sustainability assessments and there are many existing tools to draw on.

### 3f) Create an OUS Energy Cooperative

*Estimated Timeframe: planning is already underway, continuing activities will be on-going; concrete approval by Board of Higher Education by fall 2004*

*Performance Milestone(s): organization of initial gatherings and identification of appropriate*

OUS will create an Energy Cooperative of the seven campuses in order to realize economies of scale and scope in several areas related to energy purchasing and consumption. A comprehensive energy management strategy will coordinate generation, distribution and end use needs.

Currently, the system has no overall strategy toward its energy needs on the campuses, much less individual campus-wide strategies adapted to campus-specific needs. OUS has internal resources that it can use to develop and implement an energy strategy. Despite its multiple locations, the system will be able to coordinate demand-side and supply-side management, identify and compare system-wide opportunities, and set priorities in a way that reflects budget and financing constraints at a more aggregated level.

### 3g) Explore New Models for On-Going External Financial Relationships

*Estimated Timeframe: gather examples throughout 2004 and early 2005*

*Performance Milestone(s): completed document with existing examples and clear description of challenges by mid-2005*

The seven campuses have numerous relationships with outside vendors of all kinds that provide goods and services to the campus. These consumption streams represent, in aggregate, an important share of the campuses’ total environmental and economic impacts. OUS will gather

best practices from inside and outside the system on how to amend or restructure certain relationships in order to improve performance in various ways. There are already examples on several campuses of innovative contract arrangements that, by altering incentives, bring higher performance, often at lower cost to the campus.

Vendor relationships to consider include:

- Waste haulers and recyclers
- Food service
- Suppliers of computer hardware and other electronics
- Suppliers of paper and office supplies

### **3h) Develop Standard Design Criteria for Capital Construction**

*Estimated Timeframe: begin mid-2004, on-going*

*Performance Milestone(s): solicit input from relevant campus staff by late 2004; provide staff with draft criteria by early 2005, conduct review/feedback process; completed criteria document by mid-2005*

OUS currently lacks a single set of design criteria for capital construction projects. With design criteria that all projects on all of the campuses can follow, but that permit institutional flexibility where necessary, we will assure higher system-wide performance, especially in areas such as energy and water efficiency. This will also provide an opportunity for providing tools for implementing better life-cycle cost analysis for large construction projects.

Several of the campuses already have guidelines or project criteria that can inform a new set of system-wide design criteria. These campus-specific examples, and the campuses' individual experiences, are a resource to bring together for the benefit of the entire system.

## **4. Define Effects of Actions**

The effects of the Target Actions above and of the Performance Measurement actions below are woven into those sections, so it is not necessary to elaborate this section as requested in the Guidance Document. However, we can summarize the effects of the actions with these general aims:

- Begin to give clarity to the challenge, and begin new conversations
- Give clarity to the organizational and governance challenges
- Assess current performance, identify better practices, and help define the roles to go with the practices

## 5. Performance Measurement

*Note: The biennial reporting by OUS to the legislature, as required by Senate Bill 919, is an important system-wide form of performance measurement that already exists. The work suggested here (especially in 5b below) has not yet been reconciled with this existing framework, but OUS will address this over the next year in order to streamline reporting and avoid excess reporting burdens to the campuses and the system.*

*Also note the timeframes and milestones items under the actions in section 3.*

- a) Inventories of programs, practices and approaches (academic)
- b) Indicators and benchmarking for facilities and operations performance, relative to both inside and outside of higher ed and inside and outside of Oregon
- c) Effective governance – The ‘performance measurement’ milestone here will be the successful articulation of the governance structures in place at the separate institutions.

It is important to distinguish between academic and non-academic activities here. On the academic side, “performance measurement” is misleading; there is no consensus about what makes a “sustainable university” in terms of research, teaching and service, so it is impossible to establish a scale for measuring performance. On the facilities and operations side, this will involve sharing and documenting of best practices, and benchmarking as appropriate to support the sharing and documenting of best practices. Campus-specific indicators could provide data on the areas above and others, like utility consumption (energy, water use), Kyoto compliance, etc.

However, there is rapidly growing awareness of and consensus around the principal challenges we face as a society, so it is possible to identify an institution’s efforts that address social, health, environmental and economic development challenges. Therefore, the goal is instead to assemble “inventories of practices” to document the unique bundle of programs, practices and other strategies that each institution has developed as a way of pursuing sustainability in its context. Nonetheless, these inventories will be constructed for the purpose of sharing and reinforcing efforts throughout the system, and for identifying opportunities and obstacles.

### *5b) Indicators and benchmarking for facilities and operations performance*

OUS plans a narrow and streamlined facilities benchmarking approach, *focused on supporting existing efforts in areas of relatively high consensus*. OUS will attempt to avoid many of the problems in which indicators efforts typically get bogged down: comparisons across non-comparable institutions; burdensome reporting (in scale or scope); lack of focus on action areas; over-reliance on either narrowly quantitative or vaguely qualitative proxies of impacts and progress.

OUS will engage the campuses with a small set of targeted indicators to be determined in part in collaboration with directors of facilities and business officers. The indicators will focus on:

- Construction and development guidelines
- Computer hardware recycling, purchasing, inventories
- Custodial and landscape chemicals (purchasing and inventories)

- Energy, water and waste (*Note: These areas of benchmarking will focus on comparing individual institutions over time, rather than on inappropriate multi-campus benchmarking across highly diverse institutions.*)

OUS will develop measurement criteria (and draw on existing examples) in order to seek to understand the specific challenges for each institution, and to identify opportunities for coordination and sharing of best practices among institutions.

*5c) Sharing of best practices and principles/lessons of effective governance*

OUS will document the examples of areas in which the target actions in 3b, 3d and 3e make progress. There is no identified structure for this yet; we expect it will emerge as a schedule for meetings and a structure for benchmarking emerge out of the work with the campuses.

## 6. Responsibility

- a) Further elaboration of the role of Sustainability Coordinator in the Chancellor's Office (Bob Simonton, the Director of Capital Construction)
- b) Facilitation of effort among existing positions and efforts on the various campuses
- c) Identification of people inside the system who already have a sustainability governance roles on their respective campuses
- d) Creation of an OUS Sustainability web presence to support the campuses, facilitate multi-campus actions, and provide information from assessments and other resources

There is a Sustainability Coordinator in the Chancellor's Office (Bob Simonton, the Director of Capital Construction). The coordinator will further define the role, while facilitating work among existing positions and efforts on the seven campuses. OUS expects that a set of appropriate responsibilities for the Sustainability Coordinator position will emerge through the work with the campuses.

Also, the first year of the implementation of this plan will involve (as detailed in 3 and 5 above) the documentation of the sustainability governance structures on each of the campuses. Once the existing governance systems have been identified and assessed, OUS will begin to look for ways to make those systems more effective and ways to assign responsibilities and functions fairly and effectively.

Currently, there is a variety of coordinators, committees and miscellaneous positions on the campuses. OUS is not starting with the assumption that one size will fit all; indeed, the diversity in size and function from one campus to the next suggests that solutions will need to be highly tailored to the individual institutions. However, there will also undoubtedly be lessons to share from one campus to the next, and OUS will attempt to bring those together for general consumption.

### *Funding Uncertainty and Alternative Governance Options*

As this goes to press (in late February), it is unclear what resources OUS will have for pursuing and/or supporting sustainability efforts on individual campuses or among multiple campuses. It is not yet known whether OUS will have a designated sustainability coordinator, or if such a position exists, how much staff time will be devoted to it.

One long-term option to spread the governance burden is to create an OUS Sustainability Council with representatives from each campus. We mention this option here, but do not elaborate further on how it would play out. However, we are reasonably sure that there would be considerable interest (from most of the campuses) in participating in such a body and its activities.

## 7. Communications Program

OUS (lead by the Sustainability Coordinator) will conduct and organize a schedule of presentations, workshops and facilitations for specific campus audiences in order to find system-wide synergies for achieving the system's sustainability goals. Examples could include:

- a) Presentations by the Sustainability Coordinator to key groups (the Academic Council, the Administrative Council, the meetings of the facilities directors, campus environmental or sustainability committees, etc.). (This component will be crucial for developing sustainability principles and other tasks in 3 and 5 above.);
- b) Meetings of specialized facilities staff to share best practices on a particular challenge and generate solutions (peer learning groups); and
- c) On-campus presentations and other targeted outreach to particular groups (facilities staff, teaching faculty, faculty senates, student governments, etc.) that have a sustainability governance function and who can disseminate ideas and information.

In general, the communications efforts will flow in large part from the interactions with the campuses. OUS will listen carefully to feedback to learn which methods work best.

Another communications channel will be the dissemination of the inventories and assessments to top administrators (VPs of Administration/Finance and Provosts), as these snapshots are assembled.

For gatherings of upper administrators, it may be possible to bring selected representatives of leading U.S. university sustainability program to Oregon to present their ideas on sustainability for higher education. This could be particularly appropriate for the high-level meetings on sustainability principles for the system as a whole.

## 8. Fitting into Agency Strategic Plan

OUS is currently transitioning to a new board, which will develop a new strategic plan. However, the biennial reporting framework required by Senate Bill 919 already provides system-wide data that match the priorities and vision identified by the Board of Higher Education in 1997, with implementation of the performance indicators first begun by the Chancellor's Office in 1998.

Although a new Board will undoubtedly generate some new priorities or at least a new emphasis, the core goals adopted previously – *access, quality, employability, cost effectiveness* – are so similar across public university systems that, in transition, we should continue to consider them as the legislature's main criteria for judging the overall performance of the system.

## 9. Coordination with Other Agencies

OUS differs slightly from other agencies in its relationship with Department of Administrative Services (DAS). Since OUS has many of its own rules and guidelines,

OUS will continue to identify areas in which it can collaborate with other state agencies. OUS will continue to aggregate campus-specific needs and facilitate assistance from Office of Energy. Also, OUS is working with the Department of Geology and Mining Industries on seismic safety issues.

## Appendix: In-Depth Examples of Campus Sustainability

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SPECIAL NOTE: This is one example of campus sustainability, from one campus and focused in one area. There exist many other examples from other areas of action and from other campuses; for example, there are existing cases of high-performance or “green” buildings already in operation at PSU and UO. However, as noted previously, *complete inventories of campus sustainability activities do not exist*, so this case study (like others cited in the report) is intended only to illustrate a particular example.

### Sustainability Fact Sheet for Kelley Engineering Center Oregon State University, Corvallis, Oregon

The Kelley Engineering Center, centrally located on the Oregon State University campus in Corvallis, is the physical centerpiece for the College of Engineering’s drive to become one of the nation’s top-25 engineering programs.

The new building’s design is centered on communication, innovation and responsible environmental design. It will house wireless classrooms, flexible laboratories, office clusters, and common areas that encourage communication including “plug-and-learn” alcoves built into spaces often underutilized in traditional building designs and an E-café where faculty, staff, students, and industry partners can gather to share ideas.

When it opens in fall 2005, the Kelley Engineering Center will be home to the rapidly growing School of Electrical Engineering and Computer Science, providing labs, classrooms, and offices for over 360 professors and graduate students.

The four-story, 146,000-sq.ft., \$45 million building will feature extensive sustainable “green” design elements, used to educate students and others about sustainability and renewable energy issues, before, during, and long after construction.

OSU is seeking a US Green Building Council LEED (Leadership in Energy and Environmental Design) Gold (2.0) rating. The Kelley Engineering Center’s numerous “green” building elements include many features typical in LEED-rated buildings:

- **Natural ventilation** will provide interior spaces with fresh air. An extensive heat recovery system will recover more waste heat from ventilation than standard requirement, and will pay itself off in 3.8 years.
- **Daylighting** from a central atrium and windowed walls will supply classrooms, labs, and offices with natural light, cutting lighting energy costs up to 40 percent.
- **Total energy use will be reduced** by at least 55% over Oregon Energy Code, based on energy modeling to date.
- **Earth-friendly concrete** will reduce CO<sub>2</sub> emissions associated with cement production.
- **Bio-planters** around much of building perimeter will use runoff for irrigation and provide outdoor seating.
- **Bicycle parking, showers and close access to Corvallis busses** will encourage alternative transportation usage.
- **Local construction materials** will make up at least 20% of building materials, reducing transportation costs and environmental impacts.
- **Recycled building materials** will be used extensively throughout the project.

- **Low-toxicity finishes, fiberboard, and flooring** will minimize VOC off-gassing and improve indoor air quality for the life of the building.
- **The white roof** will be Energy Star compliant with high emissivity and high reflectivity, reducing heat absorption by the roof.

The Kelley Engineering Center will incorporate other innovative and unique features not typical in today's buildings. Such systems and components include:

- **A rooftop solar system** will be used for electrical generation and hot water production. Water heated by a solar collector will flow to sinks and showers in the building. Additionally, a grid tied 2400-watt photovoltaic system will offset some of the building's electrical use with clean, renewable resources.
- **A 16,500-gallon rainwater collection system** will irrigate native landscaping after running through bio-planters to remove unwanted contaminants and, more uniquely, provide water to flush toilets and urinals. The combination of water-efficient fixtures and rainwater collection system will allow a reduction in water usage by 65%.
- **Permeable surfaces** are used on surrounding grounds rather than paved hard surfaces, to mimic natural drainage and minimize need for runoff water control. Individual pavers will eliminate concrete surfaces.
- **Operable windows** and an underfloor air distribution system will allow for more individual control of occupied space to promote the productivity, comfort and well-being of building occupants. Windows and interior transoms are tied to climate controls so systems respond according to user inputs (open window = heat shutdown).
- **It is a goal to divert 90% of construction project waste** from landfills. As of October 2003, the project had diverted 99% of construction and demolition waste from landfills.
- **OSU encourages process responsibility:** the contractor, Skanska, has implemented an environmental management system that is ISO 14001-certified. Skanska implements this standard at all jobsites, not only LEED jobs.
- **It is planned that the building will be used as a learning tool** to allow students, faculty and visitors to experience successful 'green' processes, features and systems. Signage, tours, curriculum, real-time read-outs from monitoring equipment, and an interactive website will make the Kelley Engineering Center a unique point of interest for year to come.

This fact sheet was prepared by Brandon Trelstad, Sustainability Coordinator for Facilities Services at Oregon State University.

## Appendix: Summaries of Sustainability Frameworks

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The following summaries draw on *Pathways to Sustainability*, a report produced by the Washington State Department of Ecology and available on the web (<http://www.ecy.wa.gov/sustainability/resources.htm>).

### A. Natural Step System Conditions

The Natural Step (TNS) is a set of four system conditions for judging whether human activities are "sustainable" or not. From a beginning in Sweden, these simple guidelines have been adopted by several national governments (Sweden, Poland, Hungary, perhaps others), and a world-wide movement has sprung up promoting the four main principles of The Natural Step. ([www.naturalstep.org](http://www.naturalstep.org))

The system conditions are based on the four following scientific principles:

1. All mass and energy in the universe are conserved
  - First Law of Thermodynamics - conservation of energy
  - Conservation of Matter
2. Energy and matter tend to disperse spontaneously
  - Second Law of Thermodynamics
3. Material quality is in the concentration and structure of matter
  - We consume the concentration, purity and structure energy
4. Net increases in material quality on Earth are generated almost entirely by sun-driven photosynthetic processes

The Natural Step System Conditions are:

In order for a society to be sustainable, nature's functions and diversity are not systematically...

1. ...subject to increasing concentrations of substances extracted from the Earth's crust;
2. ...subject to increasing concentrations of substances produced by society;
3. ...impoverished by physical displacement, over-harvesting, or other forms of ecosystem manipulation; and
4. resources are used fairly and efficiently in order to meet basic human needs globally.

## B. Natural Capitalism Approach

Natural capitalism is a new business model that enables companies to fully realize their opportunities. Natural Capitalism was created by business author Paul Hawken with Hunter and Amory Lovins of Rocky Mountain Institute, which has created a training and consulting service to support its use.

Natural Capitalism is based on the understanding that an economy needs four types of capital to function properly:

- **human capital**, in the form of labor and intelligence, culture, and organization
- **financial capital**, consisting of cash, investments, and monetary instruments
- **manufactured capital**, including infrastructure, machines, tools, and factories
- **natural capital**, made up of resources, living systems, and ecosystem services

The industrial system uses the first three forms of capital to transform natural capital into the stuff of our daily lives: cars, highways, cities, bridges, houses, food, medicine, hospitals, and schools.

Natural Capitalism consists of four central strategies that are a means to enable countries, companies, and communities to operate by behaving as if all forms of capital were valued.

- **Radically increase the productivity of natural resources.** Through fundamental changes in both production design and technology, farsighted companies are developing ways to make natural resources—energy, minerals, water, forests—stretch 5, 10, even 100 times further than they do today. The resulting savings in operational costs, capital investment, and time can help natural capitalists implement the other three principles.
- **Shift to biologically inspired production models and materials.** Natural capitalism seeks not merely to reduce waste but to eliminate the very concept of waste. In closed-loop production systems, modeled on nature’s designs, every output either is returned harmlessly to the ecosystem as a nutrient, like compost, or becomes an input for another manufacturing process. Industrial processes that emulate the benign chemistry of nature reduce dependence on nonrenewable inputs, make possible often phenomenally more efficient production, and can result in elegantly simple products that rival anything man-made.
- **Move to a “service-and-flow” business model.** The business model of traditional manufacturing rests on the sale of goods. In the new model, value is instead delivered as a continuous flow of services—such as providing illumination rather than selling light bulbs. This aligns the interests of providers and customers in ways that reward them for resource productivity.
- **Reinvest in natural capital.** Capital begets more capital; a company that depletes its own capital is eroding the basis

### C. Zero Waste Approach

A *zero waste* approach uses the Visionary Goal of zero waste to represent the endpoint of “closing-the-loop” so that all materials are returned at the end of their life as industrial nutrients, thereby avoiding any degradation of nature. *Zero waste* also promotes working toward a goal of 100% efficiency of use of all resources -- energy, material and human -- thereby reducing costs, lightening demands on scarce resources and providing greater availability for all. The same visionary goal of *zero waste* applied to products reduces impacts during manufacture, transportation, use and at end of life. The key initiatives within a *zero waste* strategy are listed and graphically shown below. ([www.zerowaste.org](http://www.zerowaste.org))

1. **Zero Waste of Resources**
  - Energy
  - Materials
  - Human
2. **Zero Emissions**
  - Air
  - Soil
  - Water
  - Solid Waste
  - Hazardous Waste
3. **Zero Waste in Activities**
  - Administration
  - Production
4. **Zero Waste in Product Life**
  - Transportation
  - Use
  - End-of-Life
5. **Zero Use of Toxics**



## **D. Ecological Footprint**

The book *Our Ecological Footprint; Reducing Human Impact on the Earth*, by Mathis Wackernagel and William Rees introduced the ecological footprint as an accounting concept for ecological resources. Human consumption is translated into areas of productive land required to provide resources and assimilate waste products. The ecological footprint is a measure of how sustainable our life-styles are. In order to live, people consume what nature offers. The Ecological Footprint measures what we consume of nature. It shows how much productive land and water is needed to produce all the resources we consume and to process all the waste we make.

It is estimated that the average American uses 30 acres to support his or her current lifestyle. This corresponds to the size of 30 football fields put together. Nature provides an average of 5 acres of bioproductive space for every person in the world. With a global population of 10 billion for the year 2050, the available space will be reduced to 3 acres. This should also give room for the 25 million other species. Already, humanity's footprint may be over 30 percent larger than what the world has to offer as it consumes more than what nature can provide.

The Ecological Footprint model challenges us to face the earth's limits for providing resources and processing waste, and to reduce the impact of our personal and working lives towards a more sustainable level. Without such concepts of our planetary limits, sustainability can be inappropriately less imperative.

## **E. The CERES Principles**

The Coalition for Environmentally Responsible Economies (C.E.R.E.S.) is a coalition of investors, public pension trustees, foundations, labor unions, and environmental, religious and public interest groups, believes that globally sustainable economic activity must be environmentally responsible. CERES' (pronounced "series") mission is to encourage companies, in cooperation and collaboration with CERES, to endorse and practice the CERES Principles. Endorsing the CERES Principles represents a commitment for business to make continuous environmental improvement and to become publicly accountable for the environmental impact of all its activities.

(<http://www.ceres.org/about/principles.html>)

**PRINCIPLE #1: Protection of the Biosphere** -- *We will reduce and make continual progress toward eliminating the release of any substance that may cause environmental damage to the air, water, or the earth or its inhabitants. We will safeguard all habitats affected by our operations and will protect open spaces and wilderness, while preserving biodiversity.*

**PRINCIPLE #2: Sustainable Use of Natural Resources** -- *We will make sustainable use of renewable natural resources, such as water, soils and forests. We will conserve non-renewable natural resources through efficient use and careful planning.*

**PRINCIPLE #3: Reduction and Disposal of Wastes** -- *We will reduce and where possible eliminate waste through source reduction and recycling. All waste will be handled and disposed of through safe and responsible methods.*

**PRINCIPLE #4 Energy Conservation:** *We will conserve energy and improve the energy efficiency of our internal operations and of the goods and services we sell. We will make every effort to use environmentally safe and sustainable energy sources.*

**PRINCIPLE #5: Risk Reduction** -- *We will strive to minimize the environmental, health and safety risks to our employees and the communities in which we operate through safe technologies, facilities and operating procedures, and by being prepared for emergencies.*

**PRINCIPLE #6: Safe Products and Services** -- *We will reduce and where possible eliminate the use, manufacture or sale of products and services that cause environmental damage or health or safety hazards. We will inform our customers of the environmental impacts of our products or services and try to correct unsafe use.*

**PRINCIPLE #7: Environmental Restoration** -- *We will promptly and responsibly correct conditions we have caused that endanger health, safety or the environment. To the extent feasible, we will redress injuries we have caused to persons or damage we have caused to the environment and will restore the environment.*

**PRINCIPLE #8: Informing the Public** -- *We will inform in a timely manner everyone who may be affected by conditions caused by our company that might endanger health, safety or the environment. We will regularly seek advice and counsel through dialogue with persons in communities near our facilities. We will not take any action against employees for reporting dangerous incidents or conditions to management or to appropriate authorities.*

**PRINCIPLE #9: Management Commitment** -- *We will implement these Principles and sustain a process that ensures that the Board of Directors and Chief Executive Officer are fully informed about pertinent environmental issues and are fully responsible for environmental policy. In selecting our Board of Directors, we will consider demonstrated environmental commitment as a factor.*

**PRINCIPLE #10: Audits and Reports** -- *We will conduct an annual self-evaluation of our progress in implementing these Principles. We will support the timely creation of generally accepted environmental audit procedures. We will annually complete the CERES Report, which will be made available to the public.*

**Disclaimer**

These *Principles* establish an environmental ethic with criteria by which investors and others can assess the environmental performance of companies. Companies that endorse these *Principles* pledge to go voluntarily beyond the requirements of the law. The terms may and might in Principles one and eight are not meant to encompass every imaginable consequence, no matter how remote. Rather, these Principles obligate endorsers to behave as prudent persons who are not governed by conflicting interests and who possess a strong commitment to environmental excellence and to human health and safety. These Principles are not intended to create new legal liabilities, expand existing rights or obligations, waive legal defenses, or otherwise affect the legal position of any endorsing company, and are not intended to be used against an endorser in any legal proceeding for any purpose.

## **F. The Bellagio Principles**

In November 1996, an international group of measurement practitioners and researchers from five continents came together at the Rockefeller Foundation's Study and Conference Center in Bellagio, Italy to review progress to date and to synthesize insights from practical ongoing efforts. The following principles resulted and were unanimously endorsed.  
(<http://iisd1.iisd.ca/measure/1.htm>)

### **1. Guiding Vision and Goals**

Assessment of progress toward sustainable development should be guided by a clear vision of sustainable development and goals that define that vision

### **2. Holistic Perspective**

Assessment of progress toward sustainable development should:

- include review of the whole system as well as its parts
- consider the well-being of social, ecological, and economic sub-systems, their state as well as the direction and rate of change of that state, of their component parts, and the interaction between parts
- consider both positive and negative consequences of human activity, in a way that reflects the costs and benefits for human and ecological systems, in monetary and non-monetary terms

### **3. Essential Elements**

Assessment of progress toward sustainable development should:

- consider equity and disparity within the current population and between present and future generations, dealing with such concerns as resource use, over-consumption and poverty, human rights, and access to services, as appropriate
- consider the ecological conditions on which life depends
- consider economic development and other, non-market activities that contribute to human/social well-being

### **4. Adequate Scope**

Assessment of progress toward sustainable development should:

- adopt a time horizon long enough to capture both human and ecosystem time scales thus responding to needs of future generations as well as those current to short term decision-making
- define the space of study large enough to include not only local but also long distance impacts on people and ecosystems
- build on historic and current conditions to anticipate future conditions - where we want to go, where we could go

### **5. Practical Focus**

Assessment of progress toward sustainable development should be based on:

- an explicit set of categories or an organizing framework that links vision and goals to indicators and assessment criteria
- a limited number of key issues for analysis
- a limited number of indicators or indicator combinations to provide a clearer signal of progress
- standardizing measurement wherever possible to permit comparison
- comparing indicator values to targets, reference values, ranges, thresholds, or direction of trends, as appropriate

## **6. Openness**

Assessment of progress toward sustainable development should:

- make the methods and data that are used accessible to all
- make explicit all judgments, assumptions, and uncertainties in data and interpretations

## **7. Effective Communication**

Assessment of progress toward sustainable development should:

- be designed to address the needs of the audience and set of users
- draw from indicators and other tools that are stimulating and serve to engage decision-makers
- aim, from the outset, for simplicity in structure and use of clear and plain language

## **8. Broad Participation**

Assessment of progress toward sustainable development should:

- obtain broad representation of key grass-roots, professional, technical and social groups, including youth, women, and indigenous people - to ensure recognition of diverse and changing values
- ensure the participation of decision-makers to secure a firm link to adopted policies and resulting action

## **9. Ongoing Assessment**

Assessment of progress toward sustainable development should:

- develop a capacity for repeated measurement to determine trends
- be iterative, adaptive, and responsive to change and uncertainty because systems are complex and change frequently
- adjust goals, frameworks, and indicators as new insights are gained
- promote development of collective learning and feedback to decision-making

## **10. Institutional Capacity**

Continuity of assessing progress toward sustainable development should be assured by:

- clearly assigning responsibility and providing ongoing support in the decision-making process
- providing institutional capacity for data collection, maintenance, and documentation supporting development of local assessment capacity



## **G. The Sustainable Process Index**

The task group 'Ecologic Bioprocessing of the European Federation of Biotechnology' (Moser et al., 1993) has developed a definition for sustainability that requires the following four criteria ([a brief presentation on the SPI](#)):

### **(1) Anthropogenic material flows must not exceed the local assimilation capacity and should be smaller than natural fluctuations in geogenic flows**

This requirement maintains the quality of the material base for ecosystems (soil, aquifers, atmosphere, etc.). It is based on the assumption that geogenic flows are subject to fluctuations, which do not jeopardise evolution and that the local assimilation capacity is a measure of the rate with which ecosystems accept input streams without losing their evolutionary potential. This capacity changes with geography and to some extent with time, too.

Another assumption is that the rate of acceptance of input streams to the supporting ecosystems is clearly more restrictive than any rate of depletion of natural resources. We are facing a 'waste crunch' in contrast to a 'resource crunch', a fact that has been accepted quite widely during the last few years (Meadows et al., 1992).

### **(2) Anthropogenic material flows must not alter the quality and the quantity of global material cycles**

Most of the dominant global material cycles (like the carbon, nitrogen or water cycle) have natural buffer stocks. In some cases these stocks are exploitable deposits, in other cases there are unusable storage systems. Today the deposits are mined and exploited very fast, but the knowledge of the environmental impacts of exploitation is rather insufficient.

This requirement does not totally rule out the use of materials from these natural buffer stocks (like aquifers and fossile raw material deposits) but defines the input streams for industrial systems. It links the rate of exploitation to the rate of replenishment of these natural systems. In some cases even the quality might change, e.g., like for fossile raw materials. Here the main deposition of organic matter occurs by oceanic sedimentation. In this context the most important aspect is to keep the carbon concentration in the global cycles roughly constant. At least at the first glance, the form of carbon storage seems to be less important. The importance of the quality aspect can be illustrated by existing aquifers: If we contaminate these stocks the future utilisation is endangered.

### **(3) Renewable resources can only be extracted at a rate that does not exceed the local fertility**

This requirement again defines the input streams for industrial systems. In order to fulfil this requirement a locally adapted agriculture is called for which guarantees long-term preservation of the fertility of land. Thus erosions must be stopped as well as soil contamination and salination.

### **(4) The natural variety of species and landscapes must be sustained or improved**

This is a very far-reaching requirement. It calls for maintaining the important interaction between man and nature at a physical as well as a psychological level and for the use of nature's resources under the boundary conditions of aesthetics. Beauty is an intrinsic property of sustainability. Only if we maintain a sufficiently comfortable environment by accepting the rules of natural landscape we can ensure that man will evolve in this system. This can also be seen

from a very pragmatic point of view, since land as well as species are factors of the utmost importance in a society pursuing sustainable development. Degrading these factors irreversibly will impede our own chance to improve our quality of life and it will deprive future generations of an important basis for living.

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